



ARMY MEDICAL LIBRARY  
WASHINGTON

Founded 1836



Section .....

Number 337 .....















Surgeon General's Office  
May 30. 1859.

My dear mother  
I have just received  
your letter of the 10th



Handwritten text, likely a signature or title, in cursive script.



642891  
Mar  
26  
H G

A

# DICTIONARY

OF

# PRACTICAL MEDICINE:

COMPRISING

GENERAL PATHOLOGY,  
THE NATURE AND TREATMENT OF DISEASES,  
MORBID STRUCTURES,

AND THE DISORDERS ESPECIALLY INCIDENTAL TO CLIMATES, TO THE SEX, AND TO THE  
DIFFERENT EPOCHS OF LIFE.

WITH NUMEROUS

PRESCRIPTIONS FOR THE MEDICINES RECOMMENDED; A CLASSIFICATION OF DISEASES AC-  
CORDING TO PATHOLOGICAL PRINCIPLES; A COPIOUS BIBLIOGRAPHY,  
WITH REFERENCES;

AND AN

**Appendix of Approved Formulae:**

THE WHOLE FORMING A LIBRARY OF PATHOLOGY AND PRACTICAL MEDICINE AND A DIGEST  
OF MEDICAL LITERATURE.

BY JAMES COPLAND, M.D., F.R.S.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS; HONORARY MEMBER OF THE ROYAL ACADEMY OF SCIENCES OF  
SWEDEN; OF THE AMERICAN PHILOSOPHICAL SOCIETY; AND OF THE ROYAL ACADEMY OF MEDICINE OF BEL-  
GIUM; LATELY PRESIDENT OF THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY OF LONDON; FOR-  
MERLY CONSULTING PHYSICIAN TO QUEEN CHARLOTTE'S LYING-IN HOSPITAL AND SENIOR  
PHYSICIAN TO THE SOUTH LONDON DISPENSARY; CONSULTING, AND LATELY SENIOR,  
PHYSICIAN TO THE ROYAL INFIRMARY FOR DISEASES OF CHILDREN, ETC.

EDITED, WITH ADDITIONS,

BY CHARLES A. LEE, A.M., M.D.,

PROFESSOR OF MATERIA MEDICA AND GENERAL PATHOLOGY IN GENEVA COLLEGE, ETC., ETC.

"Gladly wolde he lerne and gladly teche."—CHAUCER.

IN THREE VOLUMES.  
VOL. III.



NEW YORK:  
HARPER & BROTHERS, PUBLISHERS,  
FRANKLIN SQUARE.

1859.

Annef  
WB  
C 784d  
1859  
V. 3

"Read, and fear not thine own understanding; this book will create a clear one in thee; and when thou hast considered thy purchase, thou wilt call the price of it a charity to thyself."

SHIRLEY.

"One caveat, good reader, and then God speed thee!—Do not open it at adventures, and, by reading the broken pieces of two or three lines, judge it; but read it through, and then I beg no pardon if thou dislikest it. Farewell."

THOMAS ADAMS.

"Where there is much desire to learn, there will of necessity be much arguing, much writing, many opinions; for opinions in good men are but knowledge in the making."

MILTON.

"Uti ratio sine experimentis mendax, ita experientia sine ratione fallax."

BRUNNER.

"Antequam de remediis statuatur, primum constare oportet, quis morbus et quæ morbi causa; ali-  
oquin inutilis opera inutile omne consilium."

BAGLIVI.

"It is the great excellence of a writer to put into his book as much as his book will hold."

S. JOHNSON.

"What dire necessities on every hand  
Our art, our strength, our fortitude require!  
Of foes intestine what a numerous band  
Against this little throb of life conspire!  
Yet science can elude their fatal ire  
A while, and turn aside Death's leveled dart,  
Soothe the sharp pang, allay the fever's fire,  
And brace the nerves once more, and cheer the heart,  
And yet a few soft nights and balmy days impart."

BEATTIE.

"Go, little book, from this my solitude;  
I cast thee on the waters: go thy ways;  
And if, as I believe, thy vein be good,  
The world will find thee after many days."

SOUTHEY.

---

Entered, according to Act of Congress, in the year one thousand eight hundred and forty-six, by

HARPER & BROTHERS,

in the Clerk's Office of the District Court of the Southern District of New York.

# DICTIONARY

OF

## PRACTICAL MEDICINE.

**PALATE.**—*SYN.* *Palatum*, *P. molle et durum*.  
*Palais*, Fr. *Der Gaumen*, Germ. *Palato*, Ital. *The fauces*.

1. The mucous membrane covering the isthmus faucium, the soft palate or uvula, may be simply relaxed, or inflamed, or ulcerated. The hard palate—the bones of the palate may be also diseased—may be inflamed or ulcerated and carious, but chiefly as a symptom of serious constitutional disease, especially of syphilis, more rarely of scurvy.

**I. RELAXATION OF THE PALATE AND UVULA.**  
*Relaxed throat—Relaxed sore throat—Catarrhal relaxation of the throat—Relaxation of the fauces.*

**CLASSIF.**—I. CLASS, I. ORDER (*Author*).

**DEFIN.**—*Uneasiness or soreness in the fauces, often with slight cough, without fever.*

2. This affection occurs *primarily*; but it also attends catarrhal and other inflammations of the mucous membrane covering those parts and the tonsils and pharynx. It is also symptomatic of catarrhal affections, of chronic bronchitis, of the several states of indigestion, and of numerous other diseases. The anterior fauces, or *velum palati*, appears more or less relaxed, very humid or watery, with little or no increase, or only with slight increase of vascularity, and the uvula is *elongated*, and hangs down upon the base of the tongue, often reaching to the epiglottis, and is sometimes also *edematous*. More or less uneasiness in the throat, somewhat increased on deglutition, and occasionally a dry, tickling cough, particularly when the relaxed uvula irritates the epiglottis, are complained of. Indeed, the elongation of the uvula is generally the cause of the chief uneasiness attending relaxation of the palate or fauces, which often becomes a chronic disorder, especially in leucophlegmatic habits, and in persons who live irregularly and intemperately.

3. This affection, when it appears *primarily*, is generally *caused* by the same influences as produce inflammatory attacks of the palate or fauces (§ 6), and catarrhal affections. It rarely continues limited to these parts, but extends to the adjoining surfaces, to the pharynx, epiglottis, and larynx, causing a tickling cough, with slight mucous expectoration. It is frequent in spring and autumn, especially during humid states of the air, and usually, with relaxation or irritation of the Schneiderian membrane, constitutes a principal part of the common catarrhal affection. (See Art. CATARRH, § 7.)

4. The *treatment* necessarily depends upon the causes of the affection, and upon the nature of the disorders of which it is symptomatic. If a part of, or connected with, the common

catarrh, the treatment advised for that disorder (§ 16, *et seq.*) should be employed, and a warm embrocation may be applied to the neck or throat. If it be a symptom of indigestion, tonics and astringent gargles, after biliary and intestinal secretions are evacuated, are generally useful. In persons subject to dyspepsia, in those of a relaxed habit of body, and in the irregular liver, relaxation of the soft palate and uvula often becomes chronic, whatever means of cure be prescribed, especially if the liver be at the same time torpid, or otherwise disordered. In those persons the elongation is often attended by œdema of the uvula, and is productive of the most unpleasant part of the symptoms. Amputation of the part has, therefore, been often recommended, and too often allowed. Several persons who have had the uvula removed, have consulted me on account of disorders which had either continued or appeared after this part had been extirpated. The function of the uvula is evidently to convey the mucus and saliva over, and thereby to lubricate the base of the tongue and epiglottis; and when it is no longer, or is imperfectly discharged, not only those parts, but also the pharynx and glottis, become the seat of a chronic irritation more serious than that caused by an elongation, which a judiciously-directed treatment to the original source of disorder would remove.

5. If the elongation continue after such treatment, the hydrochloric or nitric acids, or both conjoined, may be given in the decoction of bark, or in sirup with a tonic tincture, and astringent gargles may be employed. If these fail, the uvula may be touched by a solution of the nitrate of silver, or by a powder containing the sulphate of alumina or sulphate of zinc.

**II. INFLAMMATION OF THE PALATE.**—*SYN.* *Palatitis*, *Isthmitis*, Hildenbrand. *Isthmitis simplex*; *Angina simplex*; *Cynanche simplex*; *Angina gutturalis*; *Angina mitis*; *Angor Faucium*; *Inflammatio Palati*; *Inflammatio Faucium*, Auct. var. *Angine simple*, *Palatite*, Fr. *Die Rachenbräune*, *Halsentzündung*, *Entzündung der Fauces*, Germ. *Sore throat*, *Quinsy*, *Inflammatory Sore-throat*. *Inflammation of the Fauces*.

**CLASSIF.**—III. CLASS, I. ORDER (*Author*).

**DEFIN.**—*Redness of the soft palate, generally with elongation of the uvula, pain on swallowing, and slight fever.*

6. i. The **CAUSES** of Palatitis are chiefly those productive of CATARRH (§ 4, *et seq.*). The disorder is most prevalent in spring and autumn, in which seasons especially it is sometimes epidemic. It is an endemic in the vicinity of rivers, lakes, canals, and stagnant pools and



marshes. It may affect all ages and both sexes, but it is more frequently observed in young persons and in sanguine temperaments than in others. Cold and humidity, vicissitudes of temperature, weather, and season, cold applied to the extremities, or currents of air passing over the face and neck, and exposure of the neck or throat, especially after having been overheated, or to the night-dews and fogs, are the most common causes, particularly of the catarrhal form of the complaint. The ingestion of too hot or too cold, or of acrid substances, and the abuse of spirituous liquors, may also occasion inflammation of the fauces, in either its simple or its associated states.

7. Disordered states of the stomach and bowels, or accumulations of vitiated secretions in the biliary organs, or of excrementitious matters in the circulation, remarkably *predispose* to this affection. Palatitis, in either of its forms, is sometimes caused by, or is *symptomatic* of, disorder in these quarters, and it often attends, or ushers in, the eruptive fevers. Palatitis, in a *chronic, specific*, and generally *complicated form*, accompanies constitutional *syphilis*, and in its *acute and diffused states* it is frequently caused by the use of *mercurials*, especially if exposure to cold in any form concur to develop their effects.

8. ii. SYMPTOMS.—Inflammation is seldom confined to the soft palate, constituting the *simplest form of palatitis* or angina; but frequently extends more or less to the surfaces of adjoining parts, to those of the tonsils and pharynx, and occasionally to those of the posterior nares, of the upper part of the œsophagus, and even of the glottis, although in a slighter degree. This is more especially the case in respect of catarrhal palatitis and in some epidemic visitations of the complaint.

9. a. The symptoms vary not only with the extent of surface that is affected, but with the constitution and habit of body of the patient, with the *character* of the affection, with the limitation of it to the mucous membrane, or with its extension to the sub-mucous cellular tissue. On inspection, the soft palate—the velum and pillars of the fauces, are seen red and somewhat swollen. Slight heat, pain, and uneasiness, with dryness at first, are complained of, and are increased on swallowing. The uvula is much elongated, and hangs down upon the base of the tongue. There is generally a tickling or hawking cough from this cause, or from the extension of the inflammatory irritation to the lips of the glottis. There are often more or less mucous expectoration, and hoarseness of voice or speech. The tongue is loaded, and red at its point and edges. The pulse is accelerated, the bowels confined, and the appetite impaired. Chills and flushes continue to be felt, alternately, for two or three days. After the first or second day, a more abundant secretion of mucus takes place from the fauces and their vicinity, and in a few days more the complaint ceases.

10. b. Such is the usual course of the *simple* and more *mild palatitis*, particularly in its catarrhal form. But the inflammation often is more severe, and is attended by a lower or more *asthenic* fever, or it continues a longer period than that just stated. It may extend to or more immediately affect the Eustachian

tubes, the pharynx, &c., and thus be complicated with pain in one or both ears, and deafness, or with pharyngitis, and even, although rarely, with œsophagitis, especially when the stomach and liver are much disordered. In some cases the inflammatory irritation, of a catarrhal or more phlegmonous character, subsides in the fauces, while it continues in the pharynx, occasioning painful or difficult deglutition, or even the forcible regurgitation of substances attempted to be swallowed, through the nostrils. The inflammatory or catarrhal irritation, however, more frequently extends to the glottis, and thence, in delicate persons, sometimes to the bronchi, occasioning cough, and catarrhal or slight, or even acute bronchitis; but in these cases the pharynx is generally mediately affected.

11. c. In other *complicated instances*, in addition to redness of the surface of the tonsils and fauces, the *tonsils* are enlarged, chiefly owing to effusion of lymph and serum under the mucous membrane in the connecting cellular tissue; and, in many cases, more or less tumefaction of the fauces is produced by the same cause. (See art. TONSILS.) When the disease is thus more deeply seated, more pain, uneasiness, and difficulty of swallowing are experienced, and the patient opens his mouth with an increase of pain. A copious secretion of mucus, mixed with a ropy saliva, takes place, and as this becomes less abundant and thicker, it sometimes also appears slightly puriform, especially in children. In these acute states, the symptomatic inflammatory fever is usually more fully developed; and, if they are *complicated* with inflammation of the tonsils, as they very frequently are, this fever assumes a highly inflammatory character, particularly in children and young persons.

12. d. In cold, humid, and low situations, seldom in sporadic or in few instances, more frequently in an epidemic form, the inflammation is, apparently, more confined to the mucous membrane of the palate and adjoining parts than in others, or in the common sporadic or phlegmonous cases; and a grayish albuminous fluid is effused upon the inflamed surface, which immediately concretes into a false membrane. In this complication, the constitutional disturbance is extremely great, the powers of life often quickly sink, and the inflammation spreads rapidly over, if it does not simultaneously attack the mucous surface of the whole throat, of the soft palate, tonsils, pharynx, and even the Eustachian tubes, often extending, also, to the larynx and trachea, thereby inducing one of the forms of *croup*. (See art. CROUP, § 16.) In some cases, the inflammation spreads down the œsophagus also, particularly in children. (See art. THROAT.)

13. e. In the *thrush* and in other aphthous affections, the soft palate is implicated in common with the other parts of the throat and mouth, but this association of palatitis is fully considered in the article THRUSH. Palatitis, moreover, may supervene upon *erysipelas* of the face, and assume a very acute and diffuse character, the inflammation extending to the pharynx and larynx, and placing the patient in the most imminent danger.

14. f. The *chronic states* of palatitis differ from the simple and more common form chiefly in the slighter grade and longer continuance

of the complaint. The surface appears irregularly red, or is reddened in patches, points, or striae. Sometimes the vessels are more enlarged and conspicuous than usual, and the patches or points are of a more livid or dark hue. In some, dryness of the mouth and throat is complained of, and in others the mucous secretion is irregularly increased. This form of the complaint is generally prolonged by chronic disorder of the digestive organs, and by cachectic states of the system, or by constitutional disorder. Of the *specific forms* of inflammation of the palate, as the *acute form* caused by mercury, and the *chronic form* consequent upon the *syphilitic* infection, it is unnecessary to treat at this place. (See art. THROAT.)

15. *g.* The duration of the *acute states* of palatitis is seldom long, and generally terminates in a few days by resolution. These states seldom pass into *suppuration* unless they are very acute or phlegmonous, or are caused by some acrid or powerfully stimulating substance brought in contact with the palate and fauces. They rarely terminate in *gangrene* unless in malignant *scarlatina*, and much more rarely in the membranous angina alluded to above (§ 12) as occurring epidemically, especially in certain localities. (See art. THROAT.) I have observed this termination take place in two or three instances of erysipelas of the head and face, extending down the nostrils to the fauces. These cases occurred in persons addicted to spirituous liquors, whose liver and other digestive organs were much disordered.

16. *Ulceration* occurs chiefly in the more *chronic states* of the disorder, which are usually of long and very indefinite duration, owing to their dependance upon the constitutional maladies alluded to above (§ 14), on which maladies *specific inflammation* and *caries of the bone of the palate* may also supervene. Ulceration may occur also in the *asthenic* or more complicated and malignant states of acute inflammations of the throat, but not so frequently as it was formerly supposed to occur. (See art. THROAT.)

17. *iii.* The *Prognosis* of palatitis is commonly favourable, unless it assumes a very *asthenic* and complicated character, or extends to adjoining surfaces, owing to impaired vital energy, to disorder of the digestive and assimilating organs, or to contaminated states of the circulating fluids, in which circumstances it is apt to induce dangerous laryngitis. When it is associated with, or is symptomatic of, the diseases named above (§ 14, 15), the prognosis will altogether depend upon the nature of the primary malady, the state of the constitutional derangement, and the appearance of the local affection.

18. *iv.* TREATMENT.—*a.* There are few cases of palatitis which are not more or less benefited by an *emetic*, especially if its operation be duly promoted by diluents or the tepid or warm infusion of chamomile flowers, or if the affection be simple and mild, or caused by gastric or bilious disorder. The emetic should generally be followed by an active purgative and the warm pediluvium, a diaphoretic medicine being given at bedtime, and continued as the presence of fever may suggest. These remedies, in the slighter cases, will generally remove the complaint; but, in the more acute, they may be insufficient, and general or local depletions may

be also required, particularly when the patient is strong or plethoric, and the complaint complicated with tonsillitis. Antimonial diaphoretics, the solution of the acetate of ammonia, and the spirits of nitric ether will generally be of service in these cases; and when *blood-letting*, general or local, has been resorted to, *sina-pisms*, or *embrocations*, will be applied to the neck or throat with marked benefit. In the more acute or phlegmonous cases, particularly in robust and plethoric persons, the blood-letting will advantageously precede the emetic; and it should be also followed by a brisk cathartic, or a powder containing calomel and antimony, given at bedtime, and a purgative draught in the morning.

19. *b.* In this early or acute stage of the complaint, astringent or stimulating gargles are seldom beneficial; but the vapour of warm water impregnated with camphor, or the vapour of chamomile flowers and poppy-heads, or of an infusion of hops, &c., passed through the mouth, will often be of service. Afterward, warm gargles, with small quantities of nitrate of potash, of the hydrochlorate of ammonia and camphor, will be of use.

20. *c.* After the acute symptoms have been removed, and relaxation of the parts, or a *chronic state of irritation or congestion* remains, gargles, containing the muriatic or sulphuric acid, or the sulphate of alumina, and one or more of the tinctures of myrrh, bark, capsicum, &c., will then prove beneficial. When the uvula is elongated, gargles, with the nitrate of silver, or a stronger solution of this salt, applied to the part by means of a small brush, or the applications already noticed (§ 5), are then most efficacious. If an oedematous state of the palate continue after the acute stage has subsided, or if it have existed from the commencement, the terebinthinate embrocation (F. 311) I have so frequently recommended may be applied on warm flannel around the throat, or a blister may be applied on the back and sides of the neck.

21. *d.* If the inflammation proceed to *suppuration*, giving rise to a small abscess in the cellular tissue of the velum, &c., an early outlet should be given to the matter, and afterward similar means to those already advised ought to be employed, or varied with the circumstances of the case, particularly the external applications mentioned above (§ 20).

22. *e.* If the disease assumes the *asthenic*, or diffused, or *complicated form* alluded to (§ 13), or if membranous *exudations* form upon the inflamed surface, permanent stimulants and tonics in the former case, and discutient and solvent applications in the latter, as fully shown in the article THROAT, are imperatively required, as the only means of preventing fatal sinking of the powers of life in the one, and extension of the disease to the larynx and trachea in the other. (See arts. CATARRH, CROUP, SCARLET FEVER, THROAT, THRUSH, and TONSILS, for important pathological connexions of diseases of the palate.)

BIBLIOG. AND REFER.—*J. A. Foglia*, De Fancium Ulceribus, 4to. Neap., 1563.—*J. A. de Fonseca*, De Angina et Garotillo Puerorum, 4to. Comp., 1618.—*Th. Bartholinus*, Exercit. de Angina Puerorum, &c., 12mo. Paris, 1646.—*S. P. Hilscher*, De insigni Raucidinis Remedio (Vapore Aquæ calidæ), in Halleri Dissert. ad Med. pert., vol. 1. Jenæ, 1747.—*J. Wall*, Method of Treating the Sore



Throat, 8vo. Worcester, 1751; and in Med. Tracts, Oxford, 1780.—*J. Chandler*, Of the Disease called a Cold; also of the Putrid Sore Throat, &c., 8vo. Lond., 1761.—*F. Penrose*, Dissert. on the Inflammatory, Gangrenous, and Putrid Sore Throat, 8vo. Lond., 1766.—*S. Bard*, Researches on the Nature, Causes, &c., of Sore Throat, 8vo. New-York, 1771.—*W. Saunders*, Observations on Sore Throat and Fever, 8vo. Lond., 1778.—*R. Saunders*, Observ. on the Sore Throat in the North of Scotland in 1777, 8vo. Lond., 1778.—*T. Reeve*, An Essay on the Erysipelatous Sore Throat, 8vo. Lond., 1789.—*Renaudin*, Dict. de Sc. Med., t. ii.—*V. N. ab Hildenbrand*, Institut. Practico-Medicæ, &c., t. iii., p. 136.—*Kocher*, Dict. de Med. et Chirurg. Pratiques, t. ii.—*Sasche*, Encyclop. Wörterb., b. ii.—*Symonds*, in Libr. of Medicine, vol. iv., p. 46.—(See, also, BIBLIOG. AND REFER. to arts. CATARRH, CROUP, SCARLET FEVER, THROAT, and TONSILS.

**PALPITATION.**—See article HEART—*Functional Disorders of*.

**PANCREAS.**—*SYN.* Πανκρεας (from παν, all, and κρεας, flesh). *Pancreas*, Fr. *Gckrösdrüse*, *Pankreas*, Germ. *Pancreas*, Ital.

1. *The diseases of the Pancreas* have attracted but little attention, partly from the belief in their rare occurrence, and partly from the difficulty of recognising them during life. The *functions* of this viscus have been rather inferred than demonstrated. The similarity of the *secretion* produced by the pancreas to saliva has been shown by *MAGENDIE*, *TIEDEMANN*, *GMELIN*, *LASSAIGNE*, *LEURET*, and others. But the pancreatic fluid contains no mucus, while saliva does. The former seems to contain a little free acid, the latter is nearly neutral. No analysis, however, of the pancreatic fluid from the human subject has been furnished of sufficient accuracy to be confided in; and all we know respecting it is, that it resembles the saliva, but differs somewhat from it in chemical composition. The precise amount of function performed by the pancreas not having been ascertained, it has been supposed that the fluid secreted by it dilutes the chyme, and assists in the change of chyme into chyle. This office, at least, may be conceded to it; but it is not improbable that it also aids in the complete conversion of chyle into blood, or in the formation of hæmatizine, as great emaciation and anæmia have been present in cases where chronic disease and obstruction of this viscus have been found after death. Drs. *TIEDEMANN* and *GMELIN* think that it assists in animalizing vegetable food not containing azote, as it contains a large quantity of highly azotized principles.

2. Formerly several diseases were considered to have their seat in the pancreas. *FERNELIUS* believed that this viscus was concerned in the production of diarrhæa, dysentery, cachexia, atrophy, languor, slow fevers, &c., and *RIOLANUS* added to these hypochondriasis and some other chronic disorders. *MORGAGNI* and *PORTAL* have adduced several instances of its change of structure; but some recent writers have made but little mention of its diseases. Although these diseases are seldom observed, and but rarely detected during life, owing to the want of precise knowledge of the functions of the organ, and to the situation and relations of it in respect of other organs, yet there are several reasons for inferring that they are more frequent than has been generally supposed. I shall, therefore, notice, 1st. Those *functional disorders* which may be imputed to the pancreas, although with much doubt and reservation; 2d. *Inflammations* of it, and the *consequences* they usually produce; and, 3d. Those *lesions* of

structure not necessarily consequent upon inflammation.

I. **FUNCTIONAL DISORDERS WHICH MAY BE IMPUTED CHIEFLY OR PARTLY TO THE PANCREAS.**

**CLASSIF.**—I. CLASS, I. ORDER (*Author*).

**DEFIN.**—*Alterations of the quantity or quality of the pancreatic fluid so as to disorder the functions of digestion or defæcation.*

3. Although I have inferred that a material change in the quantity or quality of the pancreatic secretion will be productive of disorder of the stomach or bowels, still the exact characters of such disorders, and the differences subsisting between them and other disorders of these viscera, cannot be fully shown, or illustrated by satisfactory proofs.—*A. Deficiency of the pancreatic secretion*—*Torpor Pancreatis*—cannot be ascertained, although it very probably often occurs independently of organic lesion, and owing to impaired vital action of this gland. The extent of disorder, or the symptoms produced by this condition, hardly admit of remark; but it is not improbable that indigestion, costiveness, flatulence, and many of the symptoms I have assigned to functional disorder of the duodenum (see art. DUODENUM, § 2, *et seq.*), may partly depend upon this state of function of the pancreas. Indeed, when the vascular and nervous connexions of this organ, the duodenum, the liver, and of the stomach are considered, it will be admitted that impaired energy of one or more of them will readily extend itself to the others. Emaciation, anæmia, or imperfect sanguification and assimilation, in any of their grades, may not improbably partly depend upon this state of function. In the experiments by *BRUNNER* of extirpating the pancreas, the alvine evacuations became scanty and indurated; and, although but little reliance can be placed upon the results of so violent an operation as this, still they correspond with rational inferences.

4. *B. Increased secretion of the pancreatic fluid, with or without change of its qualities or properties*, may take place independently of structural lesion of, although hardly without vascular determination to, this organ. Analogy supports this inference, although demonstration of the fact cannot be adduced; and it may, upon the same evidence, be admitted that some agents will have the effect of increasing this fluid, although the proofs of such an effect may be disputed. In some cases of diarrhæa the stools present appearances so closely resembling those of the salivary and pancreatic fluids, that it is not unreasonable to infer that they consist, at least in part, of an increased flow of the latter fluid. But when diarrhæa follows the suppression or disappearance of salivation, the stools presenting these appearances, the inference as to its nature and origin—as to its being actually a form of *pancreatorrhæa*—is still more conclusive. In those cases, also, where watery and ropy evacuations have followed the exhibition of cholagogue purgatives, with the view of removing dropsical effusion, it is not unreasonable to suppose that a portion of these evacuations has consisted of an increased flow of pancreatic fluid.

5. Since I commenced lecturing in 1825, I have argued that the discharge from the stomach in *Pyrosis* (see that article) chiefly consisted of an augmented, and probably also of a



somewhat altered pancreatic secretion; that this secretion, owing to its properties or its quantity, or to both, had been regurgitated into the stomach, and that its accumulation there had occasioned pain and irritation, followed by its rejection. This I have viewed pyrosis as being more correctly a form of *pancreatorrhœa*, and have considered that alteration of the quality of the fluid has caused its ejection upward, instead of its passage through the bowels. More recently, MM. MONDIÈRE and GUERSENT have espoused nearly the same view of the origin of pyrosis, ascribing it to the irritating quality of the pancreatic fluid. It should not be overlooked, also, that WEDÉKIND and PORTAL ascribed chronic diarrhœa and dysentery, with watery, colourless, or ropy discharges, chiefly to a morbidly increased secretion from the pancreas. But DUPUYTREN went still farther when he believed that the enormously abundant discharges in epidemic cholera proceeded from this viscus.

II. INFLAMMATION OF THE PANCREAS.—SYNON. *Pancreatitis, Inflammatio pancreatis*.—*Pancræatite*, Fr. *Gekrösdrüsenentzündung*, Germ.

CLASSIF.—III. CLASS, I. ORDER (*Author*).

DEFIN.—*Deep-scated pain, somewhat below the pit of the stomach, or between this part and the umbilicus, extending to the back and under the left shoulder-blade; occasional vomiting of an albuminous and ropy fluid, great thirst, and symptomatic fever.*

6. The pancreas may, like other organs, be inflamed either in an *acute, sub-acute, or chronic form*. It is doubtful whether or not the second and third of these states, owing to the comparative mildness of the disease, and the frequent association of it with inflammation of adjoining parts, can be certainly detected during life—most probably only in a small proportion of instances; and it is not improbable that enlargement and induration of the organ are consequences of one or other of these states of inflammation, more particularly of the chronic. It has been doubted by MM. BÉCOUR and MONDIÈRE whether *acute, sub-acute, or chronic pancreatitis* is of most frequent occurrence, but the point hardly admits of solution, nor is it of much practical importance.

7. i. SYMPTOMS.—*a*. The phenomena attending the *acute state* of pancreatitis are chiefly dull, gravative, or even acute and deep-scated pain a little below the pit of the stomach, extending to the back and below the left shoulder-blade, increased by bending the body forward, and but little affected by pressure; a sense of constriction or of anxiety at the præcordia, and an unusual dryness of the fauces and thirst, with more or less symptomatic fever. There are other symptoms which are less constantly observed than the above, and there are some which occur more frequently in the course of the *sub-acute and chronic states* of the complaint than in that of the *acute*. Occasionally, a painful feeling of heat is complained of at the epigastrium, and sometimes a sense of tension in this region. There is every reason to infer that the pancreas is greatly tumefied when it is inflamed in either of the forms just mentioned, and hence jaundice, owing to the pressure of the tumefied gland upon the common bile-duct, may be expected sometimes to occur. In some cases, also, more or less tumour has been

detected between the scrobiculus cordis and umbilicus, the tumour being hard, painful, deeply seated, and distinct from the liver and stomach. Occasionally there is a discharge of a ropy fluid from the stomach without retching, or even without nausea or anorexia; and in other cases both nausea and vomiting occur, a ropy mucous fluid, of a whitish-gray colour, occasionally tinged with bile, being thrown up. Sometimes a more copious flow of saliva than usual takes place. The state of the bowels varies. When a ropy fluid is discharged upward, the bowels are generally confined; but occasionally a mucous diarrhœa, or loose, ropy stools are observed.

8. *b*. The more *chronic states* of pancreatitis are recognised with difficulty. Many of the symptoms above detailed are present in a slighter or less manifest form; but several of them, particularly the pain, sense of tension, and heat, are either felt only after a meal, or are aggravated by it. In addition to these, flatulence, acrid eructations, or pyrosis, various dyspeptic symptoms, and pain or uneasiness in the back, are complained of. According to HEINECKEN, EYTING, MONDIÈRE, FALLAT, and others, some degree of tumour, or fulness, may be detected in the epigastrium, and a ropy mucus, resembling saliva, is generally vomited every morning; or, when this is not observed, regular attacks of pyrosis occur, or evacuations from the bowels of matters partly resembling those which have been brought up by the œsophagus. In a few instances salivation has alternated with the above symptoms.

9. One question suggests itself, viz.: whether the augmented pancreatic secretion attends the *acute, sub-acute, or chronic states* of the disease? An increased discharge of this fluid appears often in connexion with inflammation of the gland; but whether it is antecedent to, coetaneous with, or consequent upon the inflammation, has not been determined. It is not unlikely that the most acute states of the disease, when the substance of the gland is the seat of the inflammation, are not attended by an augmented, but rather by a diminished secretion of the pancreatic fluid.

10. *c*. The *complications* of pancreatitis generally obscure, or altogether conceal, the disease of this viscus. Indeed, even when pancreatitis is the primary complaint, the inflammation may soon extend to the duodenum, or to the stomach, or to the liver, or to the root of the mesentery, or even to any two of these viscera; but probably the pancreas is more frequently affected consecutively of inflammation of one or other of these organs than primarily. The *symptoms* attending these complications have not been satisfactorily observed; but they may be inferred to consist of an association of many of the above symptoms (§ 7) with the phenomena characterizing inflammation of either of those viscera complicated with pancreatitis.

11. *d*. The *Terminations and Consequences* of pancreatitis are, 1st. Resolution; 2d. The effusion of coagulable lymph upon the surface of the organ; 3d. Suppuration; 4th. Gangrene; and, 5th. Chronic enlargement and induration.

12. (*a*) HARLES supposed that a copious sweat or diarrhœa is critical in pancreatitis, especially if the latter present a ropy or mu-

eous character; but facts are wanting to prove these points. It is, however, not unlikely that the complaint is resolved in the milder cases by a copious secretion, causing more or less diarrhoea, or even vomiting or pyrosis, without the symptoms having been so prominent as to lead to the detection of the antecedent pancreatitis.

13. (*b*) The *effusion of coagulable lymph* upon the external surface of the pancreas gives rise either to a false membrane, or to adhesion of it, owing to the extension of inflammation to the external surface of an adjoining viscus, as the duodenum, pylorus, stomach, liver, spleen, mesocolon. These adhesions vary in thickness and form with their situation, age, organization, &c.

14. (*c*) *Suppuration* has been noticed by LIEUTAUD, HARLES, BAILLIE, PORTAL, MOULON, BÉCOURT, and others; but it has been most accurately described by M. GENDRIN, who states that it generally commences with infiltration of the interlobular tissue of the part of the organ affected. The glandular granules are soft, of a reddish-gray colour, and diminished in size, although the organ is enlarged. The capsule is much inflamed, and sometimes thickened by the formation of a false membrane. At an advanced period of suppuration the matter is collected in one cavity, generally of moderate size. The pus is occasionally intermixed with the pancreatic fluid, which exhibits a clear, yellowish appearance. In some cases the abscess is so large as to destroy the whole substance of the organ. In these cases M. GENDRIN describes the matter as inodorous and creamy; but PORTAL states that it is sometimes very offensive.

15. Pancreatic abscess may be *discharged* either into the stomach or into the duodenum. It may pass even into the duplicature of the mesocolon, where it may be retained, or whence it may pass into the peritoneal cavity. It may even pass along the duct into the intestines, and be evacuated by stool. A case communicated by Dr. HAYGARTH to Dr. PERCIVAL seems to have been of this kind.

16. *Secondary abscesses*, or collections of matter after phlebitis, or consequent upon the absorption of matter in situations more or less remote, have been found in the pancreas in post-mortem examinations, but not so frequently in this viscus as in some others, as the liver, lungs, &c. They have been found chiefly after puerperal or uterine phlebitis, and after phlebitis consequent upon extirpation of the testicle. The occurrence of abscess in the pancreas, after extirpation of the testis, was first remarked by A. PETIT and PORTAL; but its actual dependance upon inflammation of the veins after the operation was not known until more recently.

17. The *symptoms* indicating suppuration of the pancreas have not been precisely observed; but they probably differ in few respects from those attending suppuration in other internal parts, which is usually insidious and obscure. If an abscess of considerable size should form, so as to occasion a tumour, the situation of it may assist in indicating its nature; but if it should cause jaundice by pressing on the common duct, it might be mistaken for tumour in the liver, or for an over-distended gall-bladder,

from occlusion of the common bile-duct, which latter generally attends enlargement or tumour of the pancreas of any kind.

18. (*c*) *Gangrene* has been very rarely observed in this organ. Two cases of it have been recorded by M. BÉCOURT, and one by M. PORTAL. In one of these the patient had been subject to occasional colicky pains, which were deeply seated above the umbilicus, and were sometimes preceded, at other times followed by nausea or by diarrhoea. He became emaciated, the pains were more acute, and the pulse rapid. The heat of the skin assumed an acrid or morbid character; the abdomen became tender; the urine scanty and red; and death followed a few days afterward. The pancreas was found of a livid red hue, very much softened, exuding from its whole surface a blackish, fetid fluid, and gangrened almost throughout its extent. The stomach and duodenum were inflamed.

19. (*d*) *Enlargement and Induration* of the pancreas are probably also consequences of chronic inflammatory action or irritation, or of prolonged excitement, followed by a change of the nutrition of the organ; but more particular notice will be taken of these lesions in the sequel (§ 25).

20. *ii. The CAUSES of Pancreatitis* are not fully ascertained. Many foreign writers consider the abuse of mercury to be the most frequent cause of it; and, next to mercury, HILDENBRAND views the use of tobacco, particularly the smoking and chewing of this noxious herb, as most influential. The immoderate use of spirituous liquors; a frequent recourse to purgatives; falls, blows, and other external injuries; and the extension of inflammation from adjoining organs, are probably also causes of this disease. Pancreatitis may even occur sympathetically of inflammation of the salivary glands. M. ANDRAL found the pancreas greatly injected in a patient who died of fever with enlargement of the parotids. M. MONDIÈRE refers to a case in which these glands were remarkably enlarged. The enlargement disappeared rapidly, but was followed by symptoms of disease of the pancreas; and this disease, in its turn, was superseded by inflammation of the testicle. The enlargement of the parotid again appeared, the affection of the testicle subsided, and the application of a blister upon the parotid fixed the inflammation in this latter part, suppuration being the result. I have met with several cases in which inflammation, in a sub-acute or chronic form, seemed to exist in the pancreas, but chiefly in pale and debilitated persons, who had complained of prolonged disorder of the digestive organs. Only one opportunity, however, was afforded me of verifying the diagnosis by an examination after death; and in that case the pancreas was very much enlarged, and somewhat indurated. The following case, recorded by Dr. SCHMACKEFFER, will illustrate the history of acute pancreatitis:

21. A female, twenty-nine years of age, contracted syphilis, for which she was treated by means of corrosive sublimate. Violent pyta-  
lism took place, four pounds of saliva being excreted in the twenty-four hours. As this secretion diminished, diarrhoea appeared and increased. Soon afterward the patient complained of anxiety and heat, with a fixed, obtuse,



and deep-seated pain at the epigastrium ; of loss of appetite, nausea, tension of the abdomen ; of great thirst and dryness of the throat, and rapid pulse. These symptoms were aggravated when the stomach was full. During five days some amelioration was remarked, but bilious vomiting supervened, and the pain and diarrhœa increased. The frequency of the calls to stool became remarkably great, a watery, yellowish fluid resembling saliva being voided. The deep-seated pain above the umbilicus prevented the patient from lying on her back and left side, and was increased by a full inspiration. Some days of relief followed, after which a violent increase of fever appeared, with a return of the diarrhœa, an acute pain at the epigastrium, and cough and orthopnea. Blood-letting was prescribed. The following morning the parotids were hot and painful ; the mouth was burning, the pulse small, and the stools were suppressed. Mercury, camphor, and opium were ordered, and leeches, blisters, &c., to the parotids. Towards evening the breathing became stertorous, the anxiety extreme, the pulse thready and intermittent, the extremities cold, and the face Hippocratic. She expired in the night. The pancreas was found red, swollen, and somewhat more consistent than natural. It weighed eight ounces, and blood ran freely from it upon dividing it. The duct was dilated. The parotids were also inflamed.

22. iii. *The TREATMENT* of pancreatitis differs but little from that of other inflammations of an acute and sthenic character. General or local blood-letting, or both, according to the state of the pulse and vascular system generally, and to the condition of the patient ; warm baths, fomentations, and diluents ; cooling diaphoretics and sedatives, are the most appropriate means. If diarrhœa be present, it merely should be moderated, by absorbents and opiates, or small doses of DOVER'S powder, and the circulation determined to the surface of the body by promoting a copious perspiration. A large blister, sinapisms, or warm turpentine embrocations, placed over the epigastrium, will generally alleviate the deep-seated pains, as well as the vomiting, when these symptoms are present. If the disease appears to have passed into a *chronic state*, these external derivatives may be rendered more permanent by repetition, or by procuring a discharge from the blistered or inflamed surface ; and, if indications of suppuration of the gland occur, the constitutional powers should be supported, and absorption promoted by prescribing the iodide of potassium and liquor potassæ with sarsaparilla and tonic vegetable infusions or decoctions, a discharge from the external surface being also procured. The pale and anæmic state of some patients in whom I have had reason to suspect the existence of inflammation of the pancreas, seems to contra-indicate the propriety of general, and even of local blood-letting, and to suggest very different, if not opposite means of cure ; and in a very few instances I have prescribed the sulphate of iron with camphor and opium ; sulphate of quinine with camphor and hyoscyamus, or conium, or extract of hops ; the trisnitrate of bismuth with ipecacuanha and either of these narcotics, and similar medicines, with marked benefit ; but

more or less doubt existed as to the exact seat and nature of the malady.

### III. STRUCTURAL LESIONS OF THE PANCREAS NOT NECESSARILY DEPENDANT ON INFLAMMATION.

CLASSIF.—IV. CLASS, I. ORDER (*Author*).

23. The *organic lesions* of the pancreas, as those of other organs, have been chiefly referred to diseased nutrition when they appear to differ from the more obvious consequences of inflammation. Still, this diseased nutrition, varying as it does in character, form, and results, must itself depend upon some pre-existing morbid state or states, originating either in the organic nerves of the part, or in the capillary vessels, or in the secreting apparatus of the part, or in these collectively—in the vitality, in short, of the organ. Modern pathologists, in grappling with this and several other subjects which have long been matters of discussion, have had recourse to new names and terms, believing that they afford explanations, even if they do not actually constitute discoveries. But the reader will soon be enabled to estimate the true value of terms or epithets when he reflects upon their meaning, and their applicability to visible phenomena and changes ; to deviations from the healthy condition, which are never stationary or exactly identical with one another, but varied in form, character, appearances, associations, morbid relations, and results, to an extent that precludes the possibility of description ; and he will readily detect what portion of sense and precise information may be concealed beneath the rubbish of phraseology, and the affected use of novel terms. Still, terms and names of some kind are conventionalities that must be resorted to, in order to convey accurate ideas of certain morbid conditions and their probable results ; but these should not be multiplied beyond the necessity of the occasion, nor be used when generally-received and well-understood words are altogether applicable.

24. i. *Atrophy* or *wasting* of the pancreas sometimes occurs, according to SIEBOLD and LOBSTEIN, at an advanced age. It is occasionally, also, the result of disease, either of itself or of adjoining organs. Dr. LOBSTEIN records an instance of the pancreas being atrophied and somewhat indurated, independently of lesion of any other organ. Most frequently, however, the wasting is connected with organic disease of the liver, duodenum, stomach, or of the mesenteric glands ; or consequent upon tumours developed in its vicinity, as scirrous enlargement of the pylorus, aneurisms of the aorta, &c. Doctor HULL found the pancreas wasted, owing to the pressure caused by a scirrous tumour in the mesentery. M. GUERIN observed this lesion produced by a similar cause ; MORAGNI by a tumour in the liver ; M. BERJAUD by aneurism in the aorta ; and M. MONDIÈRE by scirrous pylorus. In this last case, it is supposed that the atrophy of the pancreas is the result rather of interrupted or diminished function, owing to the small quantity of chyme passed into the duodenum, than of any pressure produced by the thickened pylorus. M. DARCY has adduced a case of *rabies* in which the pancreas was remarkably small. In a case recorded by Dr. WOLF, of a person who had complained of nausea, vomitings of bilious and mucous fluids, of a burning sensa-

tion along the œsophagus, of alternations of constipation and diarrhœa, and ultimately of excessive emaciation, the pancreas was found very small, indurated, of a grayish colour; its arteries being ossified, and its duct obstructed.

25. ii. *Hypertrophy or enlargement* is the most frequent lesion observed in the pancreas, but it is rarely seen without some change in the structure of the organ. Chronic inflammatory action, and the consequent deposition of albuminous lymph in the areolar or cellular tissue, especially the interlobular tissue, this lymph having become more dense by the absorption of its more fluid parts, and ultimately partially organized, are probably the changes constituting a large proportion of the cases of enlargement of this organ; and these, in a more advanced and indurated state, have not unlikely been mistaken for, and described as scirruses of the organ by several writers who have recorded instances of scirrous tumour in this situation. It is even not improbable that obstruction of the pancreatic duct may be followed by a form of enlargement which has not been accurately described. An out-patient of the South London Dispensary, under my care, in June, 1821, had complained of fever, pain below the epigastrium, of nausea, vomitings, thirst, emaciation, &c. She was pale, debilitated, and ultimately deeply jaundiced. A manifest tumour was detected in the lower part of the epigastrium. The body was examined after death by myself and Mr. BRYANT, my colleague. The gall-bladder was distended by thick black bile, the common and pancreatic ducts were entirely obliterated by a remarkably enlarged and indurated pancreas. Upon examining the structure of this organ more minutely, it seemed as if the glandular structure was more dense than natural; the connecting cellular tissue was infiltrated with albuminous lymph, which had become condensed by the absorption of its more fluid parts, and the ramifications of the ducts were dilated and filled with the albuminous and more consistent constituents of the pancreatic secretion, the more watery portion having apparently been absorbed.

26. It is not unlikely that these more simple changes, giving rise to enlargement of the organ, whether consequent upon chronic inflammation or upon obstruction to the discharge of the pancreatic fluid, may be followed by other important changes, several of those about to be noticed actually originating in these. The infiltration of an albuminous fluid or lymph into the connecting cellular tissue; the subsequent organization, partially or fully, of this, and the growth of it afterward as the organization of it becomes more perfect; the changes produced by it from pressure or otherwise, upon the natural structure and secreting apparatus; and the alterations of organic nervous influence, of vascular action and nutrition, of which the organ is subsequently the seat, may reasonably be viewed as not altogether an insufficient explanation of several of the changes and transformations observed in this and other glandular structures. Several interesting cases and notices of enlargement of the pancreas have been recorded by SEWALL, CRAMPTON, GREGORY, ABERCROMBIE, BÉCOURT, BEDINGFIELD, and others referred to in the *Bibliography*.

27. iii. *Softening* of the pancreas, as well as enlargement, may result from acute inflammation; but it has been observed chiefly in scorbutic and scrofulous persons. M. PORTAL found this organ remarkably softened, without being either reddened or enlarged, in two children who died in measles. This change has been also remarked in fatal cases of confluent small-pox, and of malignant scarlet fever. I have observed it in malignant remittent fever and in scurvy, but only in common with softening of several other organs, as the spleen, &c. I am not aware of any instance having been recorded of *hemorrhage* into the substance of the pancreas, independently of *wounds* or *rupture* of the organ.

28. iv. *Induration* of the pancreas may exist independently of scirrosity, and it is extremely doubtful whether or not simple induration is the commencement of scirruses, as supposed by some writers. Some degree of induration sometimes exists with hypertrophy; but, in simple induration of the glandular granules of the organ, increased bulk is rarely observed, the connecting cellular tissue being neither thickened nor indurated, as in cases minutely described by MM. MONDIÈRE and BÉCOURT, in which the granules only were remarkably indurated, the connecting cellular tissue being sound. The subject of one of these cases died of chronic duodenitis. In incipient scirruses a portion only of the organ is affected, and the cellular tissue is either primarily attacked or early implicated. Although simple induration of the pancreas is thus independent of, yet it is sometimes associated with hypertrophy, as in a case already noticed, and in another which was more recently observed, in neither of which, nor in the two cases described by Dr. SEWALL, did the disease present a scirrous character.

29. v. *Cartilaginous induration or transformation* of the pancreas was met with by MORGAGNI, ANDRY, and LILIENHAIN, who have described the organ as somewhat enlarged, its surface irregular, and its substance of a cartilaginous consistence. This change was found in persons who long experienced nausea, vomitings, thirst, pain at the epigastrium, costiveness, &c., and was probably the remote consequence of chronic inflammation.

30. vi. *Concretions* similar to those found in the salivary glands and ducts have been met with in the pancreas in rare cases. These are either small and numerous, or few and large. In some instances they are found apparently in the substance of the organ, but probably formed in the ramifications of the ducts; but more frequently they are lodged in the excretory duct. GRAEFFE found seven of the size of pease in the right portion of the gland. GALEALI found about twenty contained in a cavity the size of a hen's egg, in the head of the viscus. PORTAL met with a dozen, some of which were as large as a nut. The gland was greatly enlarged, and the duct much dilated. The concretions were rounded, whitish, and when reduced to a powder were dissolved by boiling water. They had an insipid taste. MERKLIN found a concretion as large as an almond; and MECKEL states that he has seen the organ changed to an almost taphaceous mass. Those commonly found in the excretory duct are often large, about the size of a nut, and composed



of the carbonate or phosphate of lime. They are generally whitish, and their surfaces irregular. By obstructing the duct, they occasion swelling and enlargement of the gland. The salivary secretion continuing for a time after the obstruction, the ramifications of the obstructed duct are distended by this fluid, which becomes inspissated by absorption of the watery parts of it, and thus a form of enlargement already noticed (§ 25) is produced.

31. vii. *Tubercular formations* have been seen in the pancreas by several modern pathologists, and have been fully described by NASSE, BOUILLAUD, REYNAUD, MITIVIE, HARLES, and BÉCOURT. They appear to have been attended by hectic fever, emaciation, occasional salivation and diarrhoea, and by pain at the epigastrium, or a little below it, and to have existed chiefly in the first and second stages of development.

32. viii. *Transformation of the pancreas into a fatty substance* has been observed by MM. DUPUYTREN, LOBSTEIN, and BÉCOURT. This lesion is different from, and should not be confounded with, an accumulation of fat in the cellular tissue uniting the lobes and lobules. The change may affect either a part or the whole of the organ, as in the cases observed by the writers just cited. The symptoms remarked in those cases were, a sense of oppression at the epigastrium, pain between the umbilicus and pit of the stomach, constant cardialgia, salivation, and jaundice.

33. ix. *Cysts* have been found in this organ by MORGAGNI, and M. BÉCOURT has described a preparation in the museum of the medical school at Strasburg of a cyst of a very large size in the body of the viscus.

34. x. *Scirrhus and carcinoma* of the pancreas have been observed by most of the writers referred to in the *Bibliography*; but many of the cases adduced as scirrhus have been more correctly instances of enlargement, with induration. True scirrhus generally affects, or commences in, a part only of the organ; but it may extend to the whole. This malady appears to attack the pancreas primarily in a large proportion of cases, as it alone has been found affected; although in others it has also been found in other parts. In a few cases the pancreas only is diseased; but in the great majority, lesions of some kind—non malignant or malignant—slight or extensive—are also observed in other, most frequently in adjoining organs, particularly the duodenum, the stomach, the pylorus, the liver, the spleen, the mesentery, the adjoining or connected ducts, blood-vessels, &c., or any two or more of these or other viscera. Scirrhus of the pancreas may exist without any increase of size. Most frequently, however, the bulk of the organ is more or less, or even very remarkably enlarged. The scirrhus pancreas sometimes adheres to one or more adjoining organs or parts; most frequently, when the scirrhus has gone on to *ulceration*, a result not frequently remarked, probably owing to the circumstance of scirrhus and the lesions associated with it in other organs usually terminating fatally before ulceration commences. Cases, however, of open cancer of the pancreas have been recorded by HASENOEHL, BERTHEAU, MATTHEIS, MAILLE, VAN DOEVEREN, LERMINIER, PORTAL, and VIDAL. Scirrhus enlargement of the pancreas is generally attended

by very obstinate vomiting, particularly when the pylorus or duodenum is much pressed upon or constricted by it, and by acute pain in the back. Instances not only of constriction of these and of the common bile-duct, causing deep jaundice, but also of compression of the aorta by this lesion of the pancreas, have been recorded by RAHN, PORTAL, SALMADE, and BRIÈRE DE BOISMONT. The compression and constriction of the aorta may even occasion aneurismal dilatation above the seat of constriction, as seen by PORTAL and SALMADE.

[The following case of scirrhus of the pancreas, recently reported by Dr. BATTERSBY, is too instructive to be omitted.

"The subject of the case was a woman between fifty-five and sixty years of age, who had been remarkable for her *embonpoint*, and had always enjoyed good health until two years previously, when she became subject to severe pains in the back, which affected also the shoulders and arms, and were supposed to be rheumatic. After the lapse of a year, there was discovered in the epigastric region a deep-seated pulsating tumour, about the size and shape of an orange, having a regular diastolic enlargement synchronous with the pulse, and a well-marked bruit de soufflet. Her disease was, in consequence, considered to be aneurism of the aorta. She also suffered from fluid eructations, and an obscure, deep-seated pain. Dr. BATTERSBY found her extremely emaciated. There was a marked fulness in the epigastric region, in which was to be felt a deep-seated, solid, and fixed induration, having a flattened surface and defined outline inferiorly. It was without pulsation, but a bruit de soufflet was audible on the application of the stethoscope over it in the course of the aorta. She suffered much from constipation, from symptoms of contraction of the colon, and from temporary dysphagia. There were occasional eructations of a clear watery fluid, and her mouth seemed always full of saliva. The tongue was pale and clean. Before death the limbs became highly anasarous, and there was some fluid in the abdomen. On examination after death, the colon and cardiac orifice of the stomach were found narrowed. The pancreas was universally hard and enlarged, and had lost every trace of its natural structure. Near the centre of this gland, and at its lower edge, existed a thin, translucent, horny cyst, which was slightly prominent, about the size of a walnut, and lay directly over the aorta. Its base was surrounded by a hard, cartilaginous, scirrous formation, which in part projected into it. The rest of the gland was composed of a less solid, but unyielding, heavy substance, apparently made of dense, closely-interwoven membranous bands. The lining membrane of the aorta was diseased, and in some points was eroded. The error committed of mistaking the tumour of the pancreas for aneurism of the aorta was due, no doubt, to the early development of the cyst, which, probably in the progress of the disease, had its fluid contents lessened by the encroachment of the scirrhus, while the close union of the latter to the spine having removed the impulse of the aorta, towards the conclusion no other symptom remained but the bruit de soufflet, which was not of itself likely to mislead. Ptyalism, as remarked by Dr. BATTERSBY

in this case, has not been observed, in connexion with diseases of the pancreas, by any writer in our language, so far as he is aware, although it has been frequently noticed by our continental brethren. Dr. B. thinks that this symptom may serve as a guide towards the diagnosis of pancreatic diseases, of which the other symptoms are in general very obscure and ambiguous, and in this he is confirmed by the facts of a case communicated recently to him by Mr. ROBERT MACDONNELL, in which the cleanness and great moisture of the tongue and mouth attracted the attention of three German physicians in attendance on Dr. GRAVES's Clinique, who, from this circumstance principally, were led to pronounce the patient to labour under scirrhus of the pancreas; and although the post-mortem examination showed that the disease was not confined to the pancreas, yet that gland was sufficiently engaged to confirm the accuracy of their opinion, founded on the extreme moisture and the pale and macerated appearance of the tongue."—*Dublin Med. Press*, April 17, 1844.]

35. xi. *Fungo-Hamatoïd disease* has been found in the pancreas in three cases by Dr. ABERCROMBIE, and in single instances by Dr. BRIGHT and others. I found this lesion in the pancreas of a boy about fourteen years of age. Several other organs were also the seat of this malady.

36. xii. *Melanosis* has been found in a few cases; but this disease has not been accurately observed and described as it affects the pancreas.

37. xiii. *The symptoms of organic lesions of the pancreas* are often very obscure; and, although it may be inferred, from the grouping of morbid phenomena, that the pancreas is the seat of disease, the exact nature of that disease, or the extent of lesion of other organs associated with it, can rarely be recognised during life. The symptoms which are most frequently observed, although not constantly, are cardialgia, nausea, vomiting, and other disorders of the stomach; pain at the lower part of the epigastrium; tumour in the same situation; salivation; diarrhoea, or constipation; emaciation; and jaundice.

[*Apoplexy of the Pancreas* has been observed by Dr. ROBERTS: the particulars of the case are recorded in the fourth number of the "*Bulletin de la Société Anatomique*. The subject was a female who was affected with a hæmorrhagic diathesis, and who died on the twelfth day of her illness, having laboured for some time under violent oppression of the chest, attended with copious expectoration of blood. Deposites of blood were found not only in the pancreas, but in nearly every organ in the body, even to the kidney, ovary, mammary gland, and omentum.

*Internal hæmorrhage* into the pancreas is recorded by STORCK in his *Annus Medicus*. The pancreas weighed thirteen pounds, and was converted into a membranous sac full of blood, partly grumous, and partly organized. The appearances were doubtless owing to the rupture of a small blood-vessel in the interior of the diseased gland. The subject, a female aged twenty-four years, had been subject to frequent fainting fits, with great anxiety and palpitation in the region of the heart, and was finally carried off, after a period of three months and a

half, by an attack of bilious vomiting and diarrhoea. A large, heavy, and irregular tumour had been latterly observed in the epigastric region.]

39. (a) *Cardialgia*, and other symptoms of severe indigestion, had been early remarked in all the cases of organic lesion of the pancreas which I have had an opportunity of observing. The appetite at this early period was not usually impaired; it was even increased in some cases. Thirst was often complained of at an early stage, but not so much as in the acute state of disease. To these symptoms generally succeeded *nausea* or *vomiting*, either occasionally or at intervals. At first only cructations of a ropy fluid occurred; but subsequently vomitings, two or three hours after a meal, supervened. As the disease proceeded to a fatal issue, the vomiting was more frequent and obstinate.

39. (b) *Pain*, deep-seated in the lower part of the epigastrium, with a sense of heat, was also an early symptom, and was most complained of when the stomach was empty. It was aggravated at intervals, especially by flatulence, which frequently attended it, and was relieved for a time by eructations, which sometimes were attended by a discharge of a ropy fluid, sometimes insipid, at others acid. The pain usually extended to the spine, and to either hypochondrium. It seems to have been most severe in the cancerous cases, as in that described by M. ANDRAL, in which it was very acute, and seated chiefly in the back, whence it irradiated to the chest and abdomen. In some instances, as observed by Dr. SEWALL and others, it was increased by the vertical position, the patient generally bending forward to obtain relief. In order to ascertain the exact seat of pain, and to distinguish between disease of the pancreas and that of the pylorus, the epigastrium should be examined or pressed upon at the same time that the left hand presses firmly against the back. When the pylorus is affected the pain is felt more superficially, chiefly to the right of the epigastrium, is more aggravated by pressure than in disease of the pancreas, and is more relieved by vomiting; but disease of both parts is often associated.

40. (c) *Tumefaction* between the pit of the stomach and the umbilicus was found deep-seated, in the more emaciated subjects, when there was considerable enlargement of the organ. The tumour was generally, at first, very difficult to detect. When this is the case the examination should be made in the manner just now directed. In some instances, in addition to a tumour, there was a feeling of weight in the back, with a sense of pulsation, which was perceived externally, or felt by the hand placed on the epigastrium.

41. (d) *Salivation* occurs in both acute and chronic diseases of the pancreas, and in both the early and late stages of the latter. J. P. FRANK saw a case in the last stage of emaciation from scirrhus of this organ, in which six pints of saliva were discharged daily. Similar, but not so remarkable instances, have been recorded by others. Salivation is one of the most frequent symptoms; it was sometimes followed and relieved by vomitings; and it was also often superseded by diarrhoea in the cases which I have seen.



42. (c) *Constipation* and *diarrhœa* are generally present at certain stages of organic lesion of this organ. They often alternate; but constipation is commonly observed at an early period, and is obstinate. Diarrhœa presents unusual characters, the stools being frothy andropy. Dr. Bright has directed attention to a very remarkable state of the evacuations when scirrur or other disease of the pancreas is associated with ulceration, or other lesions of the duodenum. In several cases of this complication, the stools contained much semifluid, fatty, or oily matter, which was of a fetid odour, and somewhat resembled adipocere.

43. (f) *Emaciation* and *anæmia*, the former especially, always attend the advanced stages of chronic alterations of the pancreas. Doctor PEMBERTON considered that emaciation is more extreme in these than in any other malady. The anæmia is also remarkable, and is obviously owing to the impaired chylification resulting from the disease of this organ.

44. (g) *Jaundice* is a frequent symptom, particularly where the head or the whole of the organ is enlarged. The pressure on the ducts is often, also, attended by great distention above the seat of pressure and accumulation of bile in them and in the gall-bladder. In these cases, the tumour caused by the distended gall-bladder may be distinguished from that caused by the diseased pancreas, by the more superficial position of the former.

45. xiv. *The treatment of chronic maladies of the pancreas* is very generally inefficacious. HOFFMANN placed more reliance on diet than on medicine for these diseases. PEMBERTON entertained a similar opinion, and recommended a vegetable and milk diet for them. Still, there is reason to believe that in an early stage, and when not malignant, they may be influenced by medical treatment; more especially by local blood-letting, by diaphoretics, by cooling or saline purgatives when the bowels are costive, and by absorbents and antacids, with ipecacuanha and opiates, or with DOVER'S powder, when the bowels are relaxed. Blood-letting can be ventured on only at an early period of the malady, and even then it should be local. The anæmia attending an advanced period of these lesions forbid a recourse to it subsequently. Besides determining to the surface of the body by diaphoretics, by warm or vapour baths, and by ipecacuanha, with opium or other narcotics, blisters may be applied over the epigastrium, or in the vicinity, and a discharge procured from them for a considerable time, or an issue may be formed. If there be any evidence of deep-seated tumour, the iodide of potassium may be prescribed with liquor potassæ and conium, or with other medicines, according to the peculiarities of the case; an external drain or purulent discharge being procured in any way that may be least unpleasant.

46. When the disease is attended by vomitings, opiates, creasote, the hydrocyanic acid, and small doses of calcined magnesia, with a few drops of laudanum in mint water, may be severally prescribed. Dr. CARTER recommends a drachm of the tincture of senna with five minims of laudanum, in an aromatic fluid; or small doses of calumba, soda, rhubarb, and capsicum, conjoined in the form of powder. Mercurials ought not to be employed, and drastic

purgatives are generally injurious. When the bowels are confined, enemata are preferable to purgatives, unless those of a mild kind, taken by the mouth.

47. If the disease be inferred to be of a scirrur nature, the remedies just enumerated, with conium, the iodide of potassium in small doses, and liquor potassæ, or the liquor hydriodatis hydrargyri et arsenici, with tinct. opii, may be tried; and unpleasant symptoms should be alleviated as they appear. In the more chronic cases, the deobstruent and alkaline mineral waters may be taken, and subsequently those which contain iron, along with deobstruent salts. The diet should be light, nutritious, and after short intervals, but in small quantities. When an external drain or discharge is continued for a long time, the diet should be more nutritious than in other circumstances; and wine in moderate quantity may be allowed, according to the state of the case. Change of air, sea air, and gentle exercise in a dry atmosphere, are generally beneficial, especially when aided by the use of deobstruent and chalybeate mineral waters.

BIBLIOG. AND REFER.—*De Graaf*, Tract. Anat. Medicus de Succo Pancreatici Natura et Usu, Svo. Leid., 1664.—*F. Hoffmann*, Dissert. de Pancreatis Morbis, 4to. Halæ, 1713; et Opera, Suppl. ii.—*J. C. Brunner*, Experimenta Nova circa Pancreas, Svo. Lugd. Bat., 172.—*Morgagni*, De Sed et Caus. Morb., Epist. xxx., arts. 7, 10, 110.—*Lieutaud*, Hist. Anat. Med., t. i., p. 245.—*J. Rahn*, Diagnosis Scirrurum Pancreatis Observationibus Anat. Patholog. illustrata, Göt., 1796; et in *Brera's* Syll. Select. Opusc., t. xi., p. 99.—*Portail*, Cours d'Anat. Médicale, t. v., p. 355.—*G. C. M. Hoffmann*, De Pancreate ejusque Morbis, Svo. Nuremb., 1807.—*Pemberton*, Practical Treatise on the various Dis. of the Abdominal Viscera, 2d ed., Svo., p. 63. Lond., 1807.—*J. P. Frank*, De Curandis Hom. Morbis Epitome, t. v., p. 87.—*C. F. Harles*, Ueber die Krankheiten des Pankreas, 4to. Nuremb., 1812.—*J. Bedingfield*, a Compendium of Medical Practice, &c., &c., Svo., p. 197. Lond., 1816.—*T. Sewall*, in New England Journ. of Med., &c. Jan., 1813; and in London Med. and Phys. Journ., vol. xxi., p. 194.—*Dupuytren*, in Biblioth. Med., t. xiii., p. 20.—*Hasenarhl*, Hist. Med. Morb. Epid., p. 60.—*Matheis*, Ratio Instituti Clinici Romani, Svo. Roma., 1816.—*M. Gelcen*, Journ. Complém., &c., t. xi., p. 12.—*E. Percival*, Inflamm. and Enlargement of the Pancreas, in Trans. of Fellows and Licentiates of College of Phys. of Ireland, vol. ii., p. 128.—*J. Crampton*, in ibid., vol. ii., p. 134.—*Schmackeffer*, Observations de quibusdam Pancreatis Morbis, 4to. Halle, 1817.—*V. N. ab Hildenbrand*, Institutiones Practico-Medicæ, &c., t. iii., p. 366.—*Darey*, Mém. de Méd. et Chirurg. Militaires, t. x., p. 87.—*Berjoud*, in ibid., t. xviii., p. 262.—*Lilienhain*, in Revue Médicale, t. iii., p. 130, 1826.—*Crucetthier*, Essai sur l'Anat. Pathol., Svo., t. i., p. 193; et Anat. Pathol., fol., livr. 15, 19.—*Sandwith*, in Edin. Med. and Surg. Journ., vol. xvi., 380.—*Martland*, in ibid., vol. xxiv., p. 493.—*J. Abercrombie*, in Edin. Med. and Surg. Journ., t. xxi., p. 243; and on Dis. of the Abdominal Viscera, Svo. Edin., 1828.—*Rennes*, in Arch. Génér. de Méd., t. vii., p. 82.—*Brière de Boismont*, in ibid., t. xvi., p. 132.—*Bouillaud*, in ibid., t. ii., p. 193.—*Reynaud*, in ibid., t. xxv., p. 165.—*Lobstein*, Anat. Pathol., t. i., p. 193.—*Tacheron*, Recherches Anat. Patholog., t. i., p. 335, 345.—*Gendrin*, Hist. Anat. des Inflamm., t. i., p. 262.—*Heyting*, in Philadelphia Med. Journ., vol. viii., p. 198.—*Duponchel*, Lond. Med. Repos., vol. xxii., p. 162.—*J. G. Bécourt*, Recherches sur le Pancreas, ses Fonctions, et ses Altérations Organiques, 4to., fig. Strasb., 1830.—*Carter*, Cyclop. of Pract. Med., vol. iii., p. 237.—*Jolly*, Dict. de Méd. et Chirurg. Prat., t. xii.—*W. Lawrence*, in Trans. of Medical and Chirurg. Society of Lond., vol. xvi., p. 367.—*R. Bright*, in ibid., vol. xviii., p. 1.—*J. J. Bigsby*, in Edin. Med. and Surg. Journ., vol. xiv., p. 65.—*Wolf*, in Gazette Médicale, t. v., p. 42, 1837.—*W. Thomson*, in Library of Medicine, vol. iv., p. 200.—*J. T. Mondière*, Recherches pour servir à l'Histoire Pathol. du Pancreas, in Archives Génér. de Méd., 2d ser., t. xi., p. 36, 265; t. xii., p. 133.

[AM. BIBLIOG. AND REFER.—*W. B. Ranney*, Case of Pancreatic Sarcoma, in Boston Med. and Surg. Journ., vol. xiii., p. 42.—*Charles Knowlton*, in Boston Med. and Surg. Journ., vol. xxix., p. 379; a very interesting, but obscure case of scirrur of the pancreas. The pancreas was covered externally with closely-adherent cellular and adipose matter,

and internally it had wholly lost its reddish, watery appearance, being gristly, dense, and heavy. It was firmly adherent to the duodenum, and diseased throughout. The patient, a man of 69, was extremely pallid, and subject to bilious diarrhoea.—*J. Bell and W. Stoker, Lectures on the Theory and Practice of Physic*, 2 vols., 8vo., 3d ed. Phil., vol. i., p. 551–554.—*Battersby*, in *Am. Journ. Med. Sci.*, vol. viii., N. S., p. 206.—*Ibid.*, vol. iv., N. S., p. 176.—*R. Dunglison*, in *Cycloped. Prac. Med.*, vol. iii., p. 457; et *Practice of Medicine*, 2d ed., vol. i., p. 541. Phil., 1844.—*Archives General.*, 1336.—*S. D. Gross, Elements of Patholog. Anat.*, &c., 2d ed. Phil., 1845, p. 689.]

**PARALYSIS.**—*SYN.* Παράλυσις (*resolutio, dissolutio*), πάρεσις; *Resolutio nervorum*, Celsus. *Paralysis*, Pliny; et *Auct. Recent.* *Carus paralysis*, Good. *Paralyse*, Fr. *Lähmung*, Germ. *Paralasia*, Ital. *Palsy*

**CLASSIF.**—IV. CLASS, III. ORDER (*Author in Preface*). See, also, **APoplexy**.

1. **NOOLOGICAL DEFIN.**—*A diminution or loss of motion, or of sensibility, or of both motion and sensibility, in one or more parts of the body.*

2. **PATHOLOGICAL DEFIN.**—*Disease generally organic, either of the cerebro-spinal axis and ramifications, or of adjoining parts implicating these, so as to impair or altogether to abolish motion or sensation, or both, in a part, or more extensively throughout the frame.*

3. **PARALYSIS** presents itself in several forms and states, according as the sensibility or the power of motion, or both, may be affected; and according to the degree and the extent of the affection. It varies thus in grade, character, and extent, from the numbness or weakness of a single joint or finger, to a complete apoplexy, in which the sensation and motion of the whole body are abolished. These circumstances have led to the use of various terms, as respects the form and extent of the disease, that may briefly be noticed. As regards the form or character of the malady, when either motion or sensation is entirely lost, the paralysis is complete as respects that function; if either be impaired only, or not altogether lost, the disease is incomplete. If only one function is affected, the paralysis is imperfect; if both sensation and motion are lost, the disease is perfect, as suggested by Dr. BENNETT. Thus palsy may be not only complete or incomplete, perfect or imperfect; or both complete and perfect, or incomplete and imperfect; but it may even be complete as respects either function, and yet imperfect, inasmuch as only one is lost; or it may be incomplete, and yet perfect as regards the affection of both functions.

4. **Palsy** has been divided, as respects its extent, into partial and general; the former has been farther divided into hemiplegia, when one side or lateral half of the body is affected; paraplegia, when the inferior half is attacked; and local, when a smaller portion of the frame is affected. It has, moreover, been called idiopathic and symptomatic; but those who have thus divided it have not pointed out in what its idiopathic nature consists. Palsy is generally, if not universally, a symptomatic malady, inasmuch as it depends upon lesion of the central nervous masses, or of the principal nervous trunks or chords, or of parts implicating them; as it is rarely owing to an affection of the parts themselves which betray the disorder, unless in a few instances of palsy from cold or from some agents directly influencing these parts.

5. **Paralysis** has been termed continued or intermittent, fixed or movable, according as it pre-

sents these characters. It has likewise been called plethoric, scrofulous, bilious, febrile, &c., according to its presumed cause, or to these states of concomitant disorder. Its origin in certain metallic and vegetable poisons has also been used, and with true practical advantage, to distinguish those instances which are thus produced. To these forms and characters of the malady attention will be directed in the sequel, as well as to the complications presented by them in practice. In describing the several states and forms of paralysis, loss of sensation will be first considered, and afterward the several forms of loss of motion.

#### I. VARIETIES AND STATES OF PALSY.

6. i. **PARALYSIS OF SENSATION.**—*Loss of Sensibility.*—A particular sense, or the feeling of a limited, or even of the greater part of the body, may be impaired or altogether lost—the palsy of sensation may be incomplete or complete in the part affected; the affection being either limited or so extended as to be almost general. Under the head of local, limited, or partial loss of sensation, may be comprised incomplete and complete palsy of the several senses, although some of these affections of sense are treated of in separate articles.

7. **A. Loss of Smell—Anosmia**—is commonly a symptom of some disease, as a catarrh, &c. It is rarely observed as a simple affection, unless it be caused by the abuse of stimulants or of irritants, as of snuff, &c. Dr. TOWN and Dr. GOOD mention instances of this having been a congenital affection. It often attends coryza, ozæna, nasal polypi, diseases of the spongy bones, &c., and it is sometimes caused by external injuries; by prolonged irritation or ulceration of the Schneiderian membrane; and by diseases of, or tumours pressing upon, the olfactory nerves. M. SERRES states that disease of the roots of these nerves, and more particularly of the external root, is not an infrequent cause of defect or loss of this sense.

8. **B. Loss of Taste—Ageusia**—sometimes, also, attends other diseases. It occasionally accompanies palsy of the tongue, or of the muscles of the face. It is frequently observed in continued and exanthematous fevers; and is in them, as well as in some other acute diseases, partially caused by the fur and viscid mucus covering the tongue and adjoining parts, that prevents the sapid body from coming into close contact with the nerves of taste. It may be produced also by the use of tobacco, especially by chewing it, or by other acrid substances. It has even arisen from want of exercise of the nerves of taste, as in a case detailed by Dr. ROBBINS (*Lond. Med. Gazette*, vol. x., p. 175), in which, owing to an unsound tooth, substances were usually taken and masticated in one side of the mouth, without being brought in contact with the side on which the diseased tooth was situated. After the tooth was removed, it was found that taste in that side of the mouth was impaired. A slight degree of ageusia often is associated with loss of smell in severe catarrhs and coryza; and it is then owing chiefly to the state of the nerves of smell and taste. Marked impairment, however, of the former sense often, also, slightly impairs the latter. Defect or loss of sight and loss of hearing are fully discussed in the articles AMAUROSIS and HEARING.



9. *C. Defect or Loss of Feeling.*—Absence of the Sense of Touch.—*Anæsthesia.*—*Insensibility of a part, or of the general Surface of the Body.*—Incomplete or complete loss of the sensibility of a part sometimes occurs *alone* or independently of any other form of palsy, but it more frequently *precedes* or *attends* loss of motion, generally of the same part; in rare cases, of another or opposite part. It very rarely *follows* paralysis of motion. It more commonly *precedes* loss of motion of the lower than of the upper extremities; but paralysis of motion is often unattended by loss of sensibility.

10. *a.* The *access* of anæsthesia is often sudden, and without any premonition. Sometimes it is characterized by a perversion, rather than by an absence of feeling; the sensation of fine sand, or of some intermediate substance between the skin and the object touching it, being for some time present, before feeling is lost. In other cases, formications, slight tinglings, and incorrect reports furnished by the sense of touch, precede for a short time more or less complete numbness.

11. The loss of sensibility may be very *partial* in any part of the surface. It may exist in one or more fingers only; and in this partial state may have been *congenital*, or have occurred soon after birth. Partial anæsthesia is observed most frequently in one limb, or in one half of the body, or in one side of the face. In this latter situation, when any substance is put between the lips, the sensation of its being broken is occasioned. Anæsthesia of the surface has been observed by M. ANDRAL in a number of round spots, the surrounding skin being quite sensitive. When loss of sensibility of any of the extremities is considerable, muscular motion of the same extremity is generally more or less impaired. In many cases, however, the defect of the muscular power of the part is caused by the want of report between sensation and voluntary action; for in holding an object in a hand which is deprived of sensibility, it is readily dropped if the eyes are not fixed on it: the sensation of its presence not being conveyed by the nerves of feeling in the part, the act of volition is either imperfectly excited, or is not excited at all. In some such cases, also, it is probable that volition is not transmitted in sufficient force to the muscles to produce prolonged or energetic action. In the familiar instance of numbness from pressure on one of the lower extremities, it will be found that the limb will not support the weight of the body unless volition be strongly exerted.

12. *b.* It is rare to find the sensibility of a part *completely* lost, so that it is insensible to the severest kinds of injury, as to fractures, burns, &c. Cases, however, of this kind have been adduced by YELLOWLEY, GOOD, EARLE, BROUGHTON, and others. It is also rarely observed to be *universal*; although it sometimes commences partially, and extends gradually and generally, until nearly all the surface of the body is implicated. The more extended forms of *partial* anæsthesia generally appear in one half of the body, *hemiplegic anæsthesia*, and is limited with precision by the median line, or in the lower or upper extremities. In these forms it is most frequently followed by, or associated with, loss of motion of the same part. Cases, however, sometimes occur of complete anæ-

sthesia of one side existing without palsy of motion, or with very slight local palsy. In some cases of this kind recorded by Mr. BROUGHTON, there was slight impediment only of speech. In the cases of hemiplegic anæsthesia which I have seen, the temperature of the surface was below that of the sound side, while in hemiplegia, with loss of motion only, the temperature was somewhat higher than that of the opposite side.

13. *c.* The *duration* of anæsthesia is very indeterminate, and depends much upon the remote causes, upon the pathological conditions producing the affection, and upon the treatment. The affection may continue but a short time, as in cases of concussion, or of temporary pressure on a nerve. It may be very protracted, and terminate only with life. The sensibility may be restored unexpectedly, and sometimes even suddenly. When the anæsthesia is associated with loss of motion, it is generally protracted, although it is often removed, while the palsy of motion continues, or is but little relieved.

14. *d.* The *pathological changes* producing anæsthesia are not always obvious; they have even been incorrectly assigned; and it is doubtful whether certain of the localities, which are at the present day supposed to be especially and solely concerned in the propagation of sensation, are really thus exclusively employed. The alteration producing anæsthesia may exist in the brain, in the spinal chord, or in the nerves themselves; but, although the posterior roots of the spinal nerves appear to be more especially concerned in the function of sensation, it has not been fully shown that the posterior columns of the spinal chord are the appropriated channels for the transmission of sensation. Numerous cases are recorded in which the posterior columns have been disorganized, or even the whole chord pressed upon, softened, or otherwise disorganized, and yet the sensibility has either been unimpaired, or even increased. Some of these cases have been referred to by M. OLLIVIER, and others have been lately published in recent transactions of societies and periodical works. To these a more particular reference will be made in the sequel. I may here, however, briefly remark, that anæsthesia has followed causes affecting chiefly the surface of the body, as the prolonged influence or excessive degree of cold. It has likewise been produced by torpid or interrupted circulation of blood in the part. It is sometimes a symptom in hysteria and hypochondriasis, in all which cases it is usually partial or limited as to extent; and it has occurred in the puerperal states. It has also appeared in connexion with certain epidemics affecting the system generally, and the cutaneous surface and extremities more particularly, as that which prevailed during the summer and autumn of 1823 in Paris: a circumstance calculated to support the view of the pathology of anæsthesia which I shall have to state hereafter.

15. *ii.* PARALYSIS OF MOTION.—*A.* The *more local and partial states of Palsy.*—Under this head are comprised those varieties of the disease which affect a part only of the body. They are divided, as already noticed, into, 1st. Local paralysis; 2d. Hemiplegia; and, 3d. Paraplegia.

16. *A. Local paralysis* implies loss of motion, or of sensibility, or of both, in some part only of the body, and to a small extent. Although sometimes a permanent state of the disease, it is more frequently the commencement of a more extended invalidity.

17. *a. Paralysis of motion of particular muscles and parts* is not infrequent, occasioning affections to which certain names have been applied according to their seats. *Strabismus* is often caused by palsy of one or more muscles of the eyeball, although not by this in all cases. *Ptosis*, or falling of the upper eyelid, often arises from an atonic or paralytic state of the *levator palpebræ superioris*, owing to some alteration implicating the nerve which supplies it; although it may arise also from a spasmodic action of the *orbicularis palpebrarum*. A slight examination, or the degree of resistance opposed to raising the eyelid, will immediately show the nature of the affection. *Ptosis* from local palsy is often associated with squinting, showing that the third pair of nerves is palsied. It is always a serious affection, particularly when thus associated; and is often indicative of cerebral disease, being frequently a precursor of hemiplegia, or even of apoplexy. It is a common and most unfavourable symptom of the advanced stages of diseases of the brain in children. It is, however, sometimes caused by a tumour pressing upon the nerves in some part of their course.

18. *b. Lagophthalmia*, or gaping of the eyelid, the eye being generally open or imperfectly closed, sometimes proceeds from paralysis of the *orbicularis palpebrarum*, owing to disease of, or implicating the *portio dura*. When this is the case, the affection is associated with a state of partial palsy about to be noticed.

19. *c. Palsy of the muscles of the face* is not infrequent, and is generally caused by pressure, injury or disease of the *portio dura*, and fifth pair of nerves. If loss of motion is complete, the *portio dura* and motor branches of the fifth pair are affected; if sensibility also be abolished, then the sensitive part of this nerve is implicated. Where the *portio dura* only is paralyzed, there is little evidence of palsy until the muscles supplied by this nerve are called into action. As long as the patient neither speaks nor smiles, the countenance presents nothing remarkable, and the sensibility of the face is unimpaired; but when laughing, coughing, sneezing, crying, or any of the actions of excited respiration are produced, the deformity of the countenance is apparent. The mouth is drawn to the sound side, the derangement of the features being remarkable in proportion to the intensity of the respiratory act. The affected cheek remains motionless, while the other is thrown into unusual action, is flaccid, or swells out at the moment of expiration, or when the patient attempts to pronounce a word with emphasis, and appears broader and more prominent than the sound one, which is more contracted or wrinkled. The muscles moving the jaws, and used in mastication, which are supplied by the motor portion of the fifth, still perform their functions. Owing to the palsy of the lips on the affected side, the labial consonants are imperfectly articulated, and saliva, or even aliments, sometimes escape from the palsied side of the mouth. The patient is un-

able to spit out his saliva, or to blow fully, or to sniff up with the nostril of the affected side. *Lagophthalmia* generally accompanies this state of the disease, the eye appearing more prominent, and being exposed to constant irritation, generally becomes inflamed. In protracted cases the muscles are wasted, and hence the face acquires a peculiar expression.

20. Palsy of the *portio dura* may be occasioned by severe or protracted cold, or currents of air, giving rise to what was usually termed a blight; but it is probably more frequently caused by an inflamed or enlarged state of the parotid gland, or a tumour in the vicinity of the stylo-mastoid foramen, or inflammation or abscess of the internal ear, or by disease of the petrous portion of the temporal bone, or by a tumour or abscess compressing the nerve at its entrance into the internal auditory foramen; by disease of the brain at the origin of the nerve, or by ulceration implicating the nerve in some part of its course; or, lastly, by a wound or injury of the nerve.

21. When the *motor portion of the fifth pair of nerves* only is palsied, there is generally slight loss of sensibility of the parts supplied by this nerve; but the motions of the jaw on the affected side are impaired. Mastication is impeded, and is not performed on that side, owing to the palsy of the muscles which convey the morsel to the operation of the teeth, and to the lost action of the masseter and temporal muscles. There are still, however, command over the countenance, little or no distortion of the features, and no loss of expression. The jaw is in some cases a little depressed, but this disappears when the patient smiles or laughs, a circumstance distinguishing this variety of palsy from that caused by disease implicating the *portio dura*. This state of disease may exist alone, but it is commonly associated with loss of sensibility (§ 10, *et seq.*), and is usually farther complicated with hemiplegia. The disease of the motor portion of the fifth pair may be seated in the course of the nerve, or in or near the origin of it in the brain.

22. As Dr. BENNETT has very justly remarked, it is rare that the lesions are confined to the fifth or to the seventh pair of nerves. In general, the symptoms of disease of the one and the other are conjoined, although they seldom indicate an equal affection of both nerves. Commonly the disease appears first in the one, and then in the other, and, when the muscles on which the nerves first affected ramify are completely paralyzed, the muscles supplied by the second are partially affected. In some of these cases, also, the paralysis is accompanied with neuralgia of a very acute description. Palsy of either of these nerves is very rarely met with in both sides in the same case. Dr. ABERCROMBIE met with an instance of palsy of the fifth pair on one side of the face, and of the *portio dura* on the other, occasioned by a tubercle in the brain.

23. *d. Palsy of particular muscles, or of a single limb*, is not uncommon. Temporary palsy is not infrequently produced in these by casual pressure of the nerves supplying them. It may arise, also, from overstraining the nerves, or the muscles themselves, by over-exertion, as by lifting very heavy weights. Dr. HEALY has



described instances of palsy of the hand and forearm, owing to pressure caused by the head resting on the arm when asleep, which could be removed only by electricity; and Dr. DARWELL has ascribed the palsy consequent upon over-exertion to the injury done to, or overstraining of, the nerves supplying the affected muscle.

24. Palsy of a single limb is not infrequent in children. It is often congenital, and the upper are more liable to it than the lower limbs. It is sometimes owing to congenital disease or deficiency of the brain; but, when it takes place subsequently to birth, it has been imputed to a loaded state of the bowels, or to disorder of the stomach; but disease of the brain or spinal chord is probably more immediately than those connected with its occurrence. Some of these cases grow up, and present the limb of a child joined to the body of an adult. I have met with several instances of this occurrence, one in a physician, another in a medical student, both being characterized by remarkable irritability of temper. An upper extremity, which contrasted remarkably in size with the sound limb, was affected in both these cases.

25. Palsy of a part, or of the whole of one limb, is very generally the commencement of a more extended malady; and instances are sometimes met with where only a few of the muscles of an extremity are affected, these being, according to Sir C. BELL, muscles naturally combined in action, although supplied with different nerves and different blood-vessels. Sometimes all the extensor muscles lose their power, while the flexors preserve it. In rare instances, also, as in the case of a lady lately under my care, the motions necessary for writing, or for any fine work, were completely lost, while the arm could be moved as strongly as ever. It has been supposed that the nerve in these cases is incapable of performing its functions, owing to pressure or disease; and this is probably the case in some instances, as in those recorded by Drs. ABERCROMBIE and STORER, and more especially when partial paralysis follows acute or chronic *neuritis*. It is even possible that, in other cases, the palsy is caused by imperfect or interrupted circulation through the blood-vessels of the limb, owing to disease of them, as supposed by GRAVES, STOKES, and others. But in some instances there are no indications of disease of the nerve itself, and the circulation is perfect in the affected extremity. In the case of the lady just alluded to, who is about sixty years of age, and of a full habit of body, there was no sign of disease in either the nerves or the blood-vessels of the limb itself. I prescribed for her blood-letting, which was performed under my own eye, twenty-four ounces being quickly taken away without any faintness being caused. After the depletion and purging, the partial state of palsy gradually disappeared.

26. *c. Paralysis of the tongue and muscles of articulation*, although occurring frequently in connexion with hemiplegia and apoplexy, is very rarely met with alone. I have, however, been consulted in several cases, in which it was either the chief part of the disease, or was associated with difficult or impossible deglutition. In a case from the country, which I recently attended, complete loss of the power of

articulation was associated with partial palsy of the extremities, the patient being deficient chiefly in the power of contracting the muscles of the hands and forearms. Both lower extremities were also weak. He returned without benefit from treatment, and died soon after. I have not learned the particulars connected with his death. In this case loss of articulation was the first and chief symptom, yet the tongue could be protruded without being drawn to either side.

27. Some years ago, Mr. WINSTONE consulted me in the case of a professional gentleman, aged about fifty, who had, for many months, lost all power of uttering the most simple articulate sound, and who swallowed substances with the utmost difficulty, or not at all, unless they were conveyed over the base of the tongue. The tongue could not be protruded, and, indeed, was incapable of motion. The mouth, also, could be opened only imperfectly, but the sense of taste was not affected. He had neither headache nor any other ailment, and no other part was paralyzed. He attended regularly to his profession during the usual hours of business, but was obliged to write down all he wished to say. The disease was ascribed to pressure or structural change at the origin, or in the course of the lingual and glosso-pharyngeal nerves; and the prognosis of suddenly fatal apoplexy or general paralysis was hazarded, which occurred some months after my attendance ceased. Various means were prescribed without any effect on the disease.

28. Most frequently, however, paralysis of the muscles engaged in articulation, or in deglutition, or in both functions, follows upon severe or renewed attacks of apoplexy, or of hemiplegia complicated with apoplexy. I have seen it occur after inflammation of the brain, and after cerebral convulsions in children, as in the case of a fine boy, respecting whom I was consulted by my friend Mr. WORTHINGTON of Lowestoft. The disease may continue for many months unmitigated by treatment; it is generally ultimately fatal, death taking place after or during a convulsive attack.

29. *f. Aphonia*, in the true sense of the word, can occur only when the *larynx* is affected, either its muscles being paralyzed, or its structure changed by serous or other effusion between its ligaments, tendons, or cartilages. Loss of the power of articulation depends upon paralysis of the tongue, cheeks, and lips; and this loss may be so complete as to prevent all *articulate* sounds from being produced; still the power of uttering sound remains, but in its simplest form only. When articulation is entirely gone, the motions of the muscles of the pharynx and base of the tongue are also lost. Simple aphonia is often caused by temporary inaction or torpor of the nerves of the larynx, in hysterical or nervous persons. Loss of the power of articulation is a much more serious and permanent malady than aphonia, and is either attendant upon, or followed by, the most general or fatal states of palsy, unless in hysterical cases; and in these the motions of the tongue are also sometimes temporarily lost. In catalepsy, voice and articulation are quite lost, with all voluntary motion, but they return as soon as it is restored. In incomplete palsy of the tongue, protrusion of it may generally be

effected; but it is generally drawn to one side, particularly if hemiplegia also exist. In other cases it is usually protruded in a straight direction. The tongue, even in cases of hemiplegia, is not always drawn towards the sound side. Sometimes it is drawn to the paralyzed side. LALLEMAND imputes its direction to this side to the action of the genio-glossus muscle of the unaffected side drawing the base of the tongue forward, and turning the apex to the opposite side. CRUVEILHIER attributes the direction of this organ, when protruded, to feebleness of resistance on one side than on the other.

30. *g. Paralysis of any of the muscles of organic life* rarely takes place to any extent, and is, indeed, incompatible with the continuance of life, unless in those viscera which are particularly influenced by volition, as the urinary bladder, the sphincters, &c. A temporary state of relaxation, or loss of the contractile power, of portions of the alimentary canal not infrequently occurs in the course of various diseases, and constitutes a part of the pathological conditions obtaining in inflammations of this canal, in colic and ilcus, in lead colic, in hysteria, &c.; but it rarely continues for any considerable period, at least in a complete form, and in the same portion of the tube, without being followed by a fatal result.

31. *h. Palsy of the urinary bladder*, owing to over-distention, is a frequent occurrence; it is likewise connected with paraplegia, and in both circumstances of the complaint retention of the urine is the prominent phenomenon. Hysterical paralysis of the bladder is often met with. Dr. TODD says that there is much truth in Sir B. BRODIE's remark that, in these cases of hysterical paralysis, "it is not that the muscles are incapable of obeying the act of volition, but that the function of volition is suspended." Of course the muscles possess their capability of motion; no one could have suspected the contrary; that the function of volition is suspended in these cases is, however, a more doubtful proposition. The truth is, that a careful inquiry into the phenomena of hysterical paralysis, in some cases which have come before me, has shown that, owing to a weakened or exhausted state of the spinal chord and motor nerves, volition is not transmitted in sufficient force to produce muscular action; and that volition is not suspended, although it may be weakened; but that it must be made with more than usual energy to act upon, or even to be transmitted to the muscles.

32. *i. Palsy, more or less complete, of the rectum*, is not infrequent in aged persons, and in hysterical females. In these cases fecal accumulations often form in the rectum and colon, owing to their inaction or want of power to overcome the resistance of the sphincter.

33. *k. Palsy of the sphincters* of the rectum and bladder attends most maladies in which either the brain or the spinal chord is oppressed, or has lost its power. The inability to retain the feces, or the incontinence of urine which results, becomes one of the most troublesome and unfavourable phenomena of the disease. As, however, this form of local paralysis very rarely occurs unconnected with a more extensive malady, it will be more fully noticed hereafter.

34. *B. Hemiplegia* (from ἡμιον, the half, and

πλήσσω, *I strike*)—*semisideratio*—is used to denote paralysis of one side, extending to both the upper and the lower extremities. When the upper limb of one side and the lower of the opposite side are affected, the palsy is usually called *transverse* or *crossed palsy*; but this form is comparatively rare. Hemiplegia is the most common form of the malady; and it occurs more frequently on the left than on the right side, the proportion being as three to two, according to the observations of Sir G. BLANE. Generally the paralysis extends to the side of the face, the angle of the mouth being drawn to the sound side, and a little upward; the tongue, also, is often more or less affected, and on the same side, as shown either by its imperfect protrusion, or by its being drawn to one side—usually to the same side as the mouth. The pharyngeal muscles are sometimes also affected. Hemiplegia is limited exactly to one half of the body, the median line being the boundary, owing to the distribution of the spinal nerves.

35. The attack of hemiplegia occurs variously. 1st. It may appear gradually; local palsy, affecting first the fingers or toes, leg or hand, taking place, and extending slowly and gradually until the lateral half of the body is implicated. In some cases of this form of the disease, convulsive movements of a limb, or even of both limbs, are remarked, and continue until the loss of motion is complete.

36. 2d. After various chronic cerebral symptoms, and affection of one or more of the senses, the speech becomes affected, the tongue more or less palsied, or protruded with difficulty, and the face distorted; upon these complete hemiplegia supervenes in a short period. This form is not infrequent in aged persons. In this and the preceding variety, several organic lesions, as tumours, tubercles of the brain, or its membranes, are often present.

37. 3d. After cerebral symptoms of a more acute and painful character; after severe headache, febrile commotion, sometimes delirium or intellectual disorder, spasm or twitchings of the muscles, pain in the limbs, occasionally spastic rigidity of some of the flexor muscles, or even convulsions, complete hemiplegia takes place. In this variety inflammatory softening of a portion of the brain is often present, and pain is complained of in the paralyzed limbs.

38. 4th. After injury of the head, at a more or less remote period, or after chronic cerebral symptoms, and various affections of some one or more of the senses, convulsions or epileptic seizures occur, which, after a more or less frequent recurrence, are followed by palsy of a limb, most frequently the arm, extending to the whole side; or at once by complete hemiplegia. In three cases of this variety I found one or more abscesses in the brain. In these several states of hemiplegia the sensibility is generally unimpaired, or but partially affected.

39. 5th. Hemiplegia may occur suddenly, without any previous indication. In some of these cases I have ascertained the existence of inflammatory attacks of the brain at a remote period, recovery having taken place long previously to the hemiplegic seizure. This variety is often followed by *apoplexy*, but at no precise period.



40. 6th. Hemiplegia frequently immediately follows an *apoplectic seizure*, or attends it, or appears in its course. In this variety more especially, and very often in that immediately preceding, hæmorrhage within the cranium has occurred. Generally the hemiplegia is observed only when the stupor subsides; but in many instances it may be detected at first by a careful examination of the state of the extremities and features. According to my experience, the sensibility is most frequently implicated in the fifth and sixth of these varieties of the seizure.

41. Although some reference has just now been made to the cerebral lesions upon which those varieties of hemiplegia individually appear most frequently to depend, still no precise or constant connexion between the one and the other has been ascertained, and most probably it does not exist. Nevertheless, the relation is too frequent and too obvious to be entirely overlooked. Of hemiplegia it may be remarked, in general terms, that it may proceed from any one or more of the numerous organic lesions which are described in the articles on the morbid anatomy of the BRAIN and its MEMBRANES, and of the CRANIUM. (*See these articles.*)

42. One fact may be relied on, viz., that the lesion exists, with very few exceptions, and these not very precisely determined, in the side of the brain opposite to the seat of palsy. Dr. R. B. TODD remarks that, according to the views of FOVILLE and others, we should expect to find the optic thalami and corpora striata, or some of the fibrous radiations which pass through these bodies, the seat of disease in hemiplegia; and, in fact, in the generality of cases, those bodies, or some portion of the cerebral hemisphere, present alteration of structure, variable in extent as well as in degree. It must be admitted, however, that cases occur in which one only of these bodies is the seat of disease, or in which no appreciable lesion can be detected in the hemisphere. Such occurrences, however, as Dr. TODD justly observes, can hardly be deemed to militate against the theory of FOVILLE, inasmuch as our ignorance of the mechanism of cerebral action, whether healthy or morbid, is alone sufficient to make them appear anomalous to us.

43. Hemiplegia is very rarely produced by disease of the upper part of the spinal marrow. In several cases of lesion of this part, in which I have been consulted, the paralysis has been at first local or partial, generally affecting one arm, but it has soon become more general. In some instances, however, one side has been affected more than the other, or one or two limbs more than the rest. Instances, however, have been observed of loss of motion on one side, and anæsthesia of the other; but these are remarkably rare. One has been adduced by PORTAL, and another by Mr. DUNDAS. This latter case was consequent upon concussion of the spine produced by a fall. The temperature of the side and limbs, deprived of sensation, but possessing muscular power, was  $1\frac{1}{2}^{\circ}$  Reaumur, below the side which retained sensation without motion, the heat on this side being rather beyond natural, and the sense of feeling morbidly increased.

44. Hemiplegia may be *congenital*, or may occur soon after birth. M. CAZAUVEILLI has

shown that congenital hemiplegia usually depends upon an arrest or defect of development or growth in a portion of the brain. The limbs of the affected side, particularly the arm, were stunted in growth, and flexed and contracted. The opposite hemisphere of the brain was generally smaller, the convolutions imperfectly developed, the capacity of the ventricle less, and the corpus striatum and optic thalamus of smaller size. Cases of this kind may attain an advanced age. Most of the instances I have had an opportunity of observing were idiotic, as well as incompletely paralyzed on the deformed side. Cases of hemiplegia have occurred in which the opposite side has become similarly affected, either soon after the first attack, or during convalescence from it. In these the sensibility has sometimes either been only partially, or not at all affected.

45. The paralyzed side may be the subject of *pain*, the result of morbid action in the brain, or of *spasm*; hence designated spasmodic hemiplegia by SAUVAGES and others. In these, inflammatory irritation in the brain or its membranes, in the vicinity of the primary seat of lesion, often exists. Deep-seated pain or spasm may occur in a limb, the superficial sensibility of which is either impaired or altogether lost; and either or both phenomena may affect the opposite or sound limb, although less frequently than the paralyzed side. I have never seen an instance of hemiplegia with spasm of the paralyzed side, to which the term of *hysterical*, imposed by some nosologists, was strictly applicable. Hysteria very rarely occasions true or complete hemiplegia, but I have met with several cases of paraplegia caused by hysteria.

46. *Intermittent hemiplegia* has been noticed by SAUVAGES, MORGAGNI, CULLEN, ELLIOTSON, and TODD; but examples of it have been rarely and imperfectly observed. It would seem that the congestion of, or vascular determination to, the brain, during the febrile paroxysm, occasioned a condition of one of the hemispheres, or of a portion of it, so as to interrupt the action of volition; but that the change was only temporary, and depended upon the state of circulation attending the febrile paroxysm; that it consisted neither of softening nor of hæmorrhage.

47. Much variety in the symptoms are observed in the course of hemiplegia, depending upon circumstances that will be alluded to hereafter, and upon a partial or more complete return of sensibility when this has been also lost, and upon a slight recovery of some of the motions of the limbs, particularly of the lower limb; but generally when the patient is able to walk a little, or with the aid of a stick, the lower extremity is usually thrown forward by the inclination of the trunk to the sound side. The foot is pointed outward when the limb is raised, and falls from its own gravity. The affected arm is applied to the trunk, and the forearm is slightly flexed on the arm, the wrist and fingers being also slightly bent inward, and occasionally somewhat œdematous.

48. *C. Paraplegia* (from *παρά, vitiose*, and *πλῆσσω, percutio*) has in modern times been applied to that form of palsy in which the lower half of the body is deprived of motion or sensation, or of both. HIPPOCRATES denominated all paralytic affections paraplegia which

were consequent upon apoplexy; and ARETÆUS employed the word to designate any form of palsy. BOERHAAVE and VAN SWIETEN defined paraplegia to be a palsy of all parts below the neck, or viewed it as a *general palsy* (§65, *et seq.*); and in this sense it has been used by OLLIVIER and several modern pathologists. I shall, however, apply the term *paraplegia* to that form of palsy which affects the lower half of the body on both sides. When palsy extends to the upper and lower extremities of both sides, it may be denominated, although it is not strictly, *general palsy*.

49. The symptoms most characteristic of *paraplegia* are, *loss of the power of motion in the lower limbs, with inaction of the urinary bladder and rectum, with loss of power over the sphincters, and often with impairment or entire loss of sensation.*

50. The *accession* of the symptoms of paraplegia, as well as the character, range, and grouping of the symptoms themselves, varies with the pathological changes or physical causes of the malady, as it proceeds from injury, from inflammation and its consequences in the spinal chord or its membranes, or from organic lesions of these parts, or of the bones and cartilages of the spine. When the disease is consequent upon injury, the symptoms are generally sudden in their accession and fully developed, although this is not always the case, especially if the accident be slight, and serious only as regards its consequences. When it proceeds from disease of the chord or of its envelopes, some disorder of sensation or of motion, or even of both, is first experienced, which becomes more or less rapidly increased to numbness, or diminished power of motion, of the lower extremities. The patient trips when walking, is unable to stand for any time, and complains of a sense of weight in the limbs, and of pains extending to the legs and feet. He cannot walk without the aid of one or two sticks, or of another person. The urinary bladder, rectum, and sphincters soon afterward become more or less affected, and various other phenomena supervene, according to the seat and extent of the organic change occasioning the affection. In some cases *sensibility* in the lower extremities is but slightly, or even not at all impaired, particularly when the lesion is seated high in the spine; and when this is the case, even the patient's power over the excretions and the sphincters may not be materially impaired. It is comparatively rare that sensibility is impaired or altogether lost in the lower limbs without the power of motion being also diminished or abolished.

51. *a. The symptoms, progress, and consequences or terminations* of paraplegia vary with the lesion producing it; and it is difficult, if not impossible, to connect the symptoms, in their full extent and course, with the particular lesion upon which they depend. The exact seat of lesion, in respect not only to the portion of the chord which it affects, but also to the roots of the nerves connected with the part implicated; the nature of the lesion, particularly as regards the degree of pressure, or of irritation, it produces; and the suddenness or slow progress of the change, all influence very remarkably the phenomena and course of the malady.

52. There are few diseases which have been

more lucidly illustrated than paraplegia consequent upon injury has been in the admirable paper upon the subject published by Sir B. C. BRODIE; and as injury often causes inflammation and its usual consequences of the spinal chord and its membranes, the subject has both a medical and surgical bearing. Many, however, of the changes consequent upon injury—even hæmorrhage upon or into, and softening of, the spinal chord—and various organic lesions of these parts or in their vicinity, may occur independently of external injury, and cause paraplegia. It will be proper to enumerate these.

53. *1a. Concussion* of the spinal chord affecting the intimate structure of some part of the chord, although not evidently to the unassisted eye; *2b. Manifest laceration or division* of its substance; *3c. The pressure or irritation* caused by *extravasated blood*; *4d. The pressure or irritation* produced by *displaced bone*; *5e. Sanguineous congestion*, particularly of the spinal veins or sinuses; *6f. The usual consequences of inflammation* of the chord or of its membranes, especially effusion of coagulable lymph, induration of the substance of the chord, &c.; *7g. Softening* of the chord, whether it be consequent upon inflammation, or upon impaired nutrition or lost vitality; *8h. Inflammation and its consequences of the vertebrae*, or of the intervertebral substance, as *caries, exostosis, ankylosis, &c., of the vertebrae*; *9i. Scrofulous disease and tubercles* in these parts; *10k. Tubercles or tumours in the chord or its membranes*; *11l. Hydatids* in either of these situations; *12m. And fungoid or malignant tumours* implicating the chord or the roots of the spinal nerves, are severally pathological causes of paraplegia; but the symptoms of individual cases, as well as the issue, depend upon the part of the chord affected; upon the extent of the particular lesion; upon the slowness or rapidity of its development; and upon the manner in which the chord or roots of the spinal nerves is implicated, whether by pressure, loss of substance, softening, irritation, interrupted circulation, &c., or by two or more of these conjoined.

54. It would be inconsistent with a proper consideration of this subject were I to overlook the physical condition of the spinal chord, especially in relation to the fluid surrounding it, to the membranes enveloping it, and the bony case protecting it. The physiological view here suggested materially aids the pathological consideration of the subject. This interesting physical condition also obviously concerns the roots of the spinal nerves, and serves to explain several circumstances connected with them, as well as with the spinal chord itself. These parts, being thus surrounded by a limpid fluid, and being protected by membranous coverings, and by a bony case and muscles, are thereby rendered much less liable to disease and injury than if they were otherwise circumstanced, as first insisted upon by COTugno, more recently by MAGENDIE, and most satisfactorily by Dr. TODD. Before pursuing farther this part of the pathological bearing of the subject, I will notice more fully the chief phenomena of paraplegia.

55. *b. Paralysis of motion* is the chief characteristic symptom of paraplegia, and it affects more or less all the muscles supplied with nerves from the seat of, and below, the injury or disease in the chord. If the disease be slight,



only one limb, or a set of muscles, may be affected, as above adverted to, especially if the roots of a nerve or nerves on one side only be implicated; or one limb may be more severely affected than the other; or a slight affection may soon become severe, or the converse. Complete paraplegia may thus be gradual and slow, or it may be sudden. It rarely happens that the palsy extends to parts supplied with nerves proceeding from a portion of the chord above the seat of injury. Instances, however, of this occurrence are recorded by Mr. STAFFORD and Sir B. BRODIE. In these cases, it may be presumed that the consequences of the injury, as softening of the chord, effusion of blood or of lymph, had extended upward from the part primarily injured.

56. Although voluntary motion is completely abolished in the lower limbs, involuntary motions and spasms of their muscles are not infrequent. When the lesion is seated high in the chord, spasmodic contractions, either of more or less permanency, or of a momentary or short continuance, may affect the abdominal muscles, as well as the muscles of the lower limbs, and these may be attended by much or by little pain, either in some portion of the spine or in the limbs. Occasionally the involuntary motions are of a tremulous kind, and often the flexor muscles are those more permanently contracted. The pains, involuntary motions, and spasms are manifestly caused by inflammation or irritation of the chord or of its membranes, or of the roots of the nerves at the seat of lesion, especially by extravasated blood; by pressure or irritation of tumours, displaced bone, effused pus; by caries of the vertebrae, by malignant or other formations.

57. *c. The affection of the urinary organs consequent upon paraplegia from injury or disease of the spinal chord varies in different cases.* It may be considered with reference to the functions of the kidneys and the states of the bladder. Paraplegia from severe external injury is very frequently followed by diminished secretion of urine, or even by complete cessation of the function; but this is often only temporary, and the urine is secreted in variable quantity and altered quality. In some cases, it is at first acid, very offensive, of a yellowish colour, and deposits a yellow, amorphous sediment. More commonly, however, especially after two or three days, the urine is ammoniacal and turbid when voided, and deposits on cooling a quantity of adhesive mucus. At a later period a white substance, phosphate of lime, may be detected in the mucus, which is often tinged with blood; and subsequently blood and bloody coagula are blended in the urine and mucus. These changes generally take place between the third and ninth days from the paralytic attack, when it is sudden and complete, especially if caused by injury, and when the bladder becomes distended from loss of its contractile power. At the same time that this distention exists, a dribbling of urine often takes place, if the fluid is not drawn off. In other cases, especially in those caused by disease seated in, or implicating, the chord, the voluntary power over the sphincter of the bladder only is paralyzed, there being incontinence, but no retention of urine. In the most severe cases, the urinary affection continues and hastens a fatal

issue; but in others, the power of evacuating the bladder, or of retaining the urine, is restored; and the urine assumes a more acid and healthier character. This amelioration of the urinary disturbance is one of the chief indications of restoration of the functions of the chord; but the state of the urine often varies from time to time, before it becomes permanently healthy, or before the muscles of the extremities obey the will.

58. In these cases, where the urinary bladder is paralyzed, and the urine retained, a state of septic or asthenic inflammation is rapidly produced in the mucous membrane of the bladder, ureters, and pelves of the kidneys, occasioning the chief changes observed in the urine, particularly the ammoniacal state, the presence of mucus and coagula of blood, &c. Sir B. BRODIE has put the question, whether the injury of the chord operates directly on the mucous membrane, or whether its first effect is to alter the quality of the urine, the mucous membrane becoming affected afterward, owing to the unhealthy and irritating secretion? Instead, however, of imputing the effect on the urinary organs to one of these causes only, I believe that it may be justly imputed to both of them: that the unhealthy and irritating secretion rapidly induces inflammation of the surfaces with which it remains for a time in contact, owing to the marked disposition of these surfaces to become inflamed when deprived of that portion of nervous influence which they derive from the spinal chord; and that they partake in this disposition to be inflamed and ulcerated with other parts below the seat of spinal lesion. In some instances, particularly when the lesion is seated high in the chord, or when the paraplegia is incomplete, or the power of motion principally affected, the urinary disturbance is not considerable, and the powers of expulsion and retention but little impaired.

59. *d. The bowels* are generally not only torpid in paraplegia, but the evacuations are very dark and morbid. This latter state is the more remarkable, the higher in the chord is the seat of lesion. In a case lately under my care, the evacuations, which were procured with difficulty, were nearly black, or of a deep greenish black, and of a treacle or tar-like appearance and consistence. This colour is probably owing to impaired decarbonization of the blood by respiration, the liver and digestive mucous surface performing a vicariously increased function in respect of sanguineous depuration, or of removing the superabundant carbon from the blood. This explanation of the phenomenon was published by me as early as 1815, and subsequent observations induce me to reassert it now.

60. One of the earliest phenomena associated with paraplegia is palsy or *inaction of the rectum and colon*, the latter viscus especially being unable to propel its contents. At the same time, the sphincter ani is not relaxed, but subsequently, or as soon as the fecal matters accumulate in the lower bowels, they pass involuntarily, owing to reaction of these bowels on their contents, and the loss of voluntary power over the sphincter. Incontinence of the faeces generally accompanies retention or incontinence of the urine; while, on the other hand, it is not remarked in the same states of the

disease that are unattended by the urinary disturbance (§ 57). Still, although the patient has power over the fecal evacuations, particularly when the upper portion of the chord is affected, or when paraplegia is consequent upon disease slowly developed and implicating the chord, the stools are not the less black and offensive. They are often also very abundant, and the intestines are usually distended by gases, and are tympanitic.

61. *c.* The *sensibility* in paraplegia varies remarkably. When the palsy is caused by concussion or other severe injury of the chord, both sensation and motion are abolished. In slighter cases, and in diseases or spontaneous lesions implicating the chord, and occurring gradually and slowly, the sensibility may be unaffected, while motion is altogether lost. In other cases, sensation may be only blunted, or it may be impaired in one part, and perfect in another, or entirely lost. Very frequently sensibility of the surface only is impaired or abolished, while deep-seated parts retain their sensibility; and often pains, more or less acute, or feelings of heat, burning, or constriction, are felt in the back, abdomen, or loins; or even in limbs or parts which are altogether insensible to touch, and even to external punctures or injuries. Sensation is sometimes gradually, occasionally suddenly, lost; but, as in hemiplegia, so in paraplegia, it is restored before the power of motion.

62. *f.* *Priapism* attends paraplegia from concussion or injury of the upper portions of the chord; but it sometimes occurs in those cases which are caused by disease. Sir B. BRODIE has not met with this symptom where the seat of lesion was below the sixth dorsal vertebra. It is observed even where the sensibility is altogether abolished. It seems to be occasioned, in some cases, by the irritation consequent upon the introduction of the catheter.

63. *g.* The *temperature* of the paralyzed parts is generally above the healthy standard. This is most manifest in complete paraplegia from external injury; but I have observed it also increased in cases produced by disease, although not so generally and remarkably, and where the sensibility of the surface was unimpaired. This increase of temperature appears to be chiefly owing to the dry and unperspiring state of the surface of the paralyzed parts, in connexion with the state of the circulation and blood.

64. *h.* The occurrence of *gangrenous sores*, upon the least injury or pressure of any of the paralyzed parts, is generally observed, and is often remarkable. It seems to be attributable to an impaired vital cohesion of the tissues, caused by a loss of that portion of nervous energy bestowed on them by the spinal chord. It is most manifest in cases of severe injury of the chord, and when sensibility is altogether lost. When the lesion is seated high in the chord, and is more or less chronic, a scurfy, dry, or furfuraceous state of the surface is often observed.

65. *D. GENERAL PARALYSIS.*—When palsy extends to both sides of the whole body—when all the limbs and trunk of the body are deprived of motion—the disease has usually been viewed as *general palsy*. In this very extended form of the malady voluntary motion may alone be

lost, sensibility still remaining. But the general sensibility is sometimes also more or less impaired, as in cases of paraplegia, much more rarely altogether abolished. Indeed, general palsy may be viewed as a more extended state of paraplegia, as it has been by some of the older as well as of more modern writers. In some rare instances the senses, or one or more of them, have been impaired, or even lost, as well as the power of motion and sensation. Instances of this kind have been published by M. DEFERMON and Mr. DAVIES GILBERT. In the more common states of general palsy the affection extends no higher than the upper extremities, and depends upon some lesion implicating the spinal chord or its membranes below the origin of the pneumogastric nerves. In the rare instances, where the senses are also implicated, the lesion is generally seated within the cranium, or in one or more of the parts composing the base of the brain. In the case described by Mr. D. GILBERT, it was found, upon dissection, that “the dura mater lining the basis cranii was deficient, and its place occupied by a thin and transparent membrane, loosely and singularly arranged; the tentorium cerebelli was likewise deficient, so that the posterior lobe of the brain rested immediately upon the upper surface of the cerebellum. All the nerves were regular.”

66. *a.* *Concussion of the brain* and the more severe states of *apoplexy* are attended by general palsy, concussion of the brain especially implicating also the senses. These, however, occur differently, and are attended by phenomena which remove them from the category of paralytic diseases. The relation between them, however, is intimate. Motion, sensation, and consciousness are all lost in these maladies, respiration and circulation alone continuing. As soon as the respiratory nerves are affected by direct or counter-pressure in apoplexy, or by the change produced in the intimate structure of the brain, or medulla oblongata in concussion, life is soon terminated. When, on the other hand, the mischief is less extensive, and the patient regains consciousness, a more or less general state of palsy may remain, at least for a time, and either recovery take place, or hemiplegia, or more partial palsy, only remain. The *apoplectic* or *cerebral form* of general palsy may be viewed as an indication merely of the nature and extent of the cerebral lesion. A person may be seized with hemiplegia consequent upon softening of a portion of one of the hemispheres, or upon hemorrhage in the brain, or upon any other organic lesion. A greater amount of the same lesion, or others concurring with it, may so completely subvert the powers of motion, and even of sensation, as to give rise to a general palsy, circulation and respiration alone remaining. These occurrences are not rare. Thus, inflammation, limited to a portion of the brain, may first occur, and be manifested by symptoms which the close observer will detect. At an indefinite period subsequent to this attack, the patient may be suddenly seized with hemiplegia, and may continue in this state for weeks, months, or even years, when a profound apoplectic seizure occurs, occasioning general palsy, extending ultimately to the muscles of respiration, and causing death by asphyxia. But in rare in-



stances, instead of an apoplectic seizure, the other side may become palsied, as respects the power either of motion or sensation, or of both, and either before or after the side first affected has recovered any, or much of its powers. In this case there is general palsy, incomplete, probably, as regards one or other function in either side, with certain of the senses and many of the faculties of the brain but little affected, until apoplectic coma or paralysis of the muscles of respiration terminates life. An instance of this kind recently occurred in the practice of my friend Dr. BABINGTON, and upon dissection lesions were found in both hemispheres of the brain.

67. *b.* The forms of general palsy to which I am most desirous of directing attention are altogether *spinal*. They may occur *suddenly*, as in cerebral general palsy, or *gradually*, and even slowly. Severe injuries, as dislocation of the cervical vertebræ, laceration of the chord, violent concussion of the spine, hæmorrhage upon the cervical portion of the chord, &c., usually occasion general palsy instantly; but disease seated in the spinal chord or its membranes, or implicating these consecutively, produces the paralytic phenomena much more slowly. Even severe injuries may not be followed by palsy for a considerable period; still it may be stated that the accession of general palsy from injury, as well as the phenomena characterizing it, will vary with the immediate or more remote effects of the injury upon the chord or its membranes, it being either instantaneous or remote, according to the extent and nature of the lesion produced. A muscular man, aged about sixty years, the father of a late medical friend, when turning in bed, his head being forcibly pressed on the pillow, so as to partially raise the trunk, felt something snap in his neck. He was afterward unable to bend or to rotate the head without causing much pain in the neck. I inferred that rupture or laceration of some of the small muscles or ligaments had occurred, and advised quietude and various means which palliate the more painful symptoms. Still the least movement of the head caused distress. Notwithstanding this, he travelled outside a coach, during the summer, to Cornwall, and returned to town, and not till sixteen months after the accident he complained of numbness and want of power in the left arm. In a day or two the palsy extended to both the upper extremities, but was incomplete in the right; it soon became more general, and in a short time difficulty of breathing, rapidly terminating in asphyxia, supervened. The body was examined by Professor R. QUAIN and myself, and the second cervical vertebræ was found fractured completely across on both sides, the fracture on one side passing close to the base of the odontoid process. Chronic inflammation had extended from the fracture to the theca and membranes of the medulla oblongata; lymph was thrown out upon the arachnoid surfaces; the membranes, particularly the dura mater, were much thickened, and ultimately the chord at this part was pressed upon.

68. Next to injury or concussion of the spinal chord, *caries* of one or more of the cervical vertebræ may be considered as a cause of general palsy; but the palsy rarely occurs until

the disease of the vertebræ has induced chronic inflammation of the membranes of the chord, with thickening and effusion of lymph, or such a degree of angular curvature as to affect the physical condition of the chord itself. I was lately consulted in the case of a child, twelve years of age, who presented unequivocal indications of caries of one or two of the cervical vertebræ consequent upon malignant scarlatina. To these supervened incomplete palsy of motion in one arm and hand, which gradually increased and extended to the other arm and lower extremities, until general and complete palsy of motion existed; sensibility was unimpaired. The bowels were obstinately constipated, and the evacuations black and tar-like. The sphincters were not paralyzed. Respiration was performed by the diaphragm, and all parts below the face were deprived of motion. The head could neither be rotated nor bent without great pain. The body and limbs were much emaciated. The skin was cool and dry, and covered with a furfuraceous scurf, particularly the scalp. The pulse was very frequent, weak, and soft; the tongue furred and loaded. After persisting for many months in a treatment hereafter to be described, this young lady recovered the use of her limbs, the neck, however, remaining stiff, shortened, and turned a little to one side. In this case, the change produced in the membranes enveloping the chord, or in the theca, was most probably limited to the diseased vertebræ and their immediate vicinity. It is not unlikely owing to this limitation of the disease, and to the gradual accession and increase of it, that the sphincters continued unaffected.

69. *c.* General palsy may be only an *extension of paraplegia*, or, in other words, the disease may commence and continue for a time as paraplegia, either complete or incomplete, and gradually extend higher and higher until the trunk and upper extremities are deprived of motion, sensibility being generally either not at all or but little impaired. In some of these cases, the palsy of the lower extremities, as well as that consecutively affecting the upper parts of the body, continues incomplete for a long time, the motions consequent upon volition being imperfect, weak, and vacillating, and executed slowly, tremulously, and with difficulty. In these the patient often complains of spasmodic or severe pains in the limbs, with a sense of constriction; of spasm and flatulent distention, with occasional attacks of painful constriction in the abdomen; of want of power over the sphincters, and involuntary discharges. This last symptom often varies much in different cases and different times in the same case, according to the treatment, &c.

70. In other cases, the paralytic symptoms either appear nearly contemporaneously in several parts or limbs, soon becoming general or more complete, or extend much more rapidly from the lower to the upper extremities, than in the immediately preceding class of cases. Still the same symptoms are generally present, only varying in some subordinate phenomena, sometimes continuing nearly stationary for months or even for years, and ultimately terminating in a similar manner. I occasionally attended, during nine or ten years, a gentleman somewhat above the middle age, who was

affected with this particular form of general palsy. It was long incomplete, sensibility being but little impaired, even when the power of motion was altogether lost. Power over the sphincters was only partially retained for some years, but was very considerably increased by opiates, conjoined with stimulants and aromatics; at last it was altogether lost. The intellectual powers were unimpaired. Ultimately cerebral symptoms, followed by coma and death, supervened. Permission to examine the body was allowed by his accomplished and highly intelligent relatives. The membranes at the base of the brain were more vascular than usual, and a considerable quantity of serum was effused. All the spinal arachnoid presented appearances of previous chronic inflammation. It was thickened, covered in parts with false membrane, or adherent to the opposite surfaces by means of cellular bands. The whole dura mater, or sheath of the chord, was more or less thickened throughout, and the arachnoid of the chord, where it was not adherent, was opaque and thickened. The venous sinuses, placed between the bodies of the vertebræ and the sheath of the chord, were remarkably dilated and congested, so as manifestly to encroach upon the spinal canal and diminish its calibre, especially at the lowest part of the chord. The chord itself was firmer than usual, particularly in this situation, was somewhat atrophied, and its gray substance was wasted and less apparent. Its vascularity also was diminished, although the spinal veins and sinuses external to the sheath were remarkably dilated, and congested with coagulated blood.

71. While I was treating the above case, a respectable tradesman, aged about fifty, came under my care, and was seen by me occasionally until his death, which took place three or four years afterward. The symptoms, protracted course, and termination of the disease, were altogether the same as those just described. On examination after death, the lesions found in the spinal chord were also similar to those observed in the preceding case. The chief difference was the less remarkable congestion of the spinal veins or sinuses, although this was considerable. The consequences of the chronic inflammation of the membranes, and the state of the chord itself, were nearly the same as those already described. There was, however, a more abundant effusion of serum between the membranes of the chord than in the former case; and much fluid was found in the ventricles of the brain. The upper portion of the medulla oblongata, and the membranes at the base of the brain, presented appearances of recent acute inflammatory action, especially increased vascularity and congestion, with a turbid serous effusion: these corresponded with the cerebral symptoms preceding death.

72. I have occasionally seen, during the last few years, with Mr. PETTIGREW, a gentleman between thirty and forty years of age, whose complaints are nearly the same as those characterizing the above cases, and are most probably owing to similar changes existing in the spinal chord and its membranes. In this case the loss of power over the sphincters is more remarkable than in the preceding cases, or, rather, appeared earlier in the course of the disease.

73. The above cases of general palsy from *chronic inflammation of the membranes of the chord and its consequences* came before me when the paralytic symptoms were more or less fully developed. I had an opportunity, many years ago, of observing the disease from its commencement. In 1820, a boy, aged thirteen, was brought to my house with chorea. He had rheumatism of the arms and wrists, associated with rheumatic pericarditis. After a few days the rheumatic affection subsided, and the chorea returned, with pain in the course of the spine. Leeches, &c., were applied along the spine; but the disease passed into a state of general palsy, which was complete in respect only of motion, from the head downward. All power over the sphincters was lost; sensibility of the surface was at first acute, and, although it became somewhat impaired as the general palsy was developed, still it was not materially diminished. After death, coagulated lymph and turbid serum were found effused between the opposite surfaces of the arachnoid of the chord in a very remarkable quantity, and so as to press upon the chord itself. (See *Lond. Med. Repos.*, vol. xv.)

74. *d.* It has been stated above (§ 52, 53) that *softening of the spinal chord*, whether it be the consequence of concussion of the spine, of inflammatory action, or of some other morbid condition of the vessels, or constituent tissues of the chord, is not an infrequent cause of paraplegia when seated in any portion of the chord below the fourth or fifth cervical vertebra. When the disease is seated at or above this part, the palsy is nearly general. In a very remarkable case recorded by Dr. WEBSTER, the spinal chord was soft and pulpy in this situation, particularly the posterior columns; the membranes were adherent to the chord; close to the softened part the medulla was of a dusky red tinge, but above and below this part it was healthy. The subject of this case "was for many months totally unable to move, even in the slightest degree, any muscle situated lower than the neck, but still retained the capability of feeling quite perfect throughout the surface of the body; while the other senses and intellectual faculties were unimpaired to the last moment of his existence. Indeed, the patient's cuticular sensibility even appeared, in the latter stages of the case, to be more acute than natural." The evacuations took place involuntarily, and violent spasmodic twitchings frequently affected the lower extremities.

75. *e.* Although general palsy as well as paraplegia is most generally caused by some manifest lesion seated in, or implicating the spinal chord or its membranes, when the functions of the brain are unimpaired, still it is not to be inferred that the lesion is always of a nature which may be detected. Cases sometimes occur that present no appreciable lesion, at least to the unaided eye, upon dissection; and others recover after a treatment not obviously calculated to remove any serious lesion of the chord or its membranes. Sir B. BRODIE refers to a case (*Lancet*, No. 1060, p. 380) which commenced as paraplegia and terminated in general paralysis. The spinal chord and solar plexus were examined with the greatest care after death; but they presented no change from the natural state. Sir B. BRODIE justly



remarks, that it is not, however, to be supposed that this is a mere functional disease because we see no lesion after death. The minute organization of the brain and spinal marrow is not visible to the naked eye, and even with the microscope we can trace it only a little way. Some defect in the minute organization, some change of structure not perceptible to our senses, may exist in the part and interrupt its functions.

76. Some years ago I attended, with my friend Dr. Roscoe, a gentleman who had resided many years in an intertropical country. On his voyage across the Atlantic to this country, in the winter season, he was seized with general palsy of the powers of voluntary motion immediately after prolonged exposure to cold and wet. The functions of the brain were unaffected; and neither pain nor uneasiness was felt in the neck or in any part of the spinal column under any circumstances of position, flexure, rotation, or pressure. No evidence of inflammatory action or of congestion in the spine could be detected. Cutaneous transpiration was suppressed, and the bowels were costive and torpid; but he retained the sensibility of the surface, and command over the sphincters. He was treated, at first, upon the supposition of either serous effusion or vascular congestion having taken place in the spinal canal, but without receiving any benefit. He ultimately, however, quite recovered by having a frequent recourse to warm baths containing stimulating substances.

77. That form or state of general palsy in which structural lesion may be inferred to be most decidedly absent, and which consists entirely of functional disorder, is the *cataleptic seizure*. In this affection, as shown elsewhere (see art. *CATALEPSY*), voluntary motion is altogether suspended; but in two very remarkable cases, which I had an opportunity of observing attentively, consciousness and sensibility remained, with the senses of seeing and hearing. Yet no part—neither the muscles of the tongue or jaw, nor the eyelids—could be moved during the attacks, which often continued for many hours; nor did the least muscular contraction take place on tickling the soles of the feet, or on pinching any part, although the sensibility was affected by these acts. Recovery from these seizures was generally sudden and complete, little disturbance beyond slight hysterical disorder on some occasions being observed.

78. *f. The symptoms of general palsy vary much with the lesion occasioning it.*—*a. The accession of the attack also varies.* In the *cerebral form* of the malady, particularly when it depends upon *apoplectic or epileptic seizures*, and when it assumes the cataleptic form, the accession is sudden or rapid. In the *spinal form* the symptoms appear gradually, and generally slowly, when it is the result of disease, but often suddenly and completely when it proceeds from severe injury. In the cerebral state, the *sensibility*, and even consciousness, are abolished or nearly lost; but in the *spinal states* (§ 67, *et seq.*) of the malady, sensibility, the functions of sense, and the intellectual powers are either unimpaired or but little affected. In a few cases only is the sensibility of the general surface remarkably diminished, and in still fewer is it altogether lost.

79. *β. The loss of voluntary motion* is most sudden and complete in the cerebral states of the disease, and in cases of injury of the cervical portion of the chord, or of concussion of the spine. When the palsy proceeds from disease of the spinal medulla or of its membranes, the loss of motion is rarely complete at first, and often does not become complete until after several years, and until the organic lesions have advanced so far as evidently to interrupt the functions of the chord. Still, there are exceptions to this, as the case noticed by Sir B. BRODIE. During the protracted progress of the malady the patient often experiences spasmodic actions, or more permanent contractions of the muscles, particularly of the flexors; frequently a sense of painful constriction around the abdomen and the thighs; and sometimes, especially when the upper part of the cervical medulla is implicated, even convulsions or complete epileptic attacks. These are evidently the consequence of inflammatory action or irritation in or near the portion of the chord or its membranes which is the seat of lesion.

80. A compositor, who was engaged in printing a work which I was editing many years ago, came to me with caries of one or two of the upper dorsal vertebræ. Matter had evidently formed, and was making its way externally. He became paraplegic, and subsequently generally paralytic; but at a very early period of the paraplegic state fully-developed epileptic seizures occurred. These became more frequent, and ultimately terminated in coma and death. On examination, a sanious pus was found collected around the second and third dorsal vertebræ, extending between the muscles, and between the theca vertebralis and bodies of the vertebræ. The membranes at, and to a considerable extent above, this part were inflamed, the arachnoid surfaces being partially covered with lymph or adherent. Injection of the vessels and effused serum were traced thence along the membranes to the brain. The chord itself was not, however, materially changed.

81. *γ. Pain*, even of a most severe character, is often remarked, particularly in the inflammatory states of the spinal disease, and when the roots of the nerves, or when the nerves, as they pass through the spinal foramina, are implicated in the lesion. The pains are usually deep-seated in one or more limbs, and are often not the less acute where the cutaneous sensibility is much impaired. In some instances of spinal general palsy the sensibility of the surface, particularly at first, is painfully increased, and sometimes even perverted. Pain is often felt in the part of the spine affected, either primarily or consecutively. In some instances, particularly when the disease commences in the lower portion of the spine and extends upward, it may be confounded with lumbago; or it may be viewed as originating in lumbago, the pain in the loins being caused either by inflammatory action or softening, or by congestion of the spinal veins and sinuses. When the disease is consequent upon masturbation or venereal excesses, it is often preceded and attended by pain in the loins, extending upward with the local lesion and the paralytic symptoms.

82. *δ. The bowels* are remarkably torpid, and

the evacuations in the more complete states of the disease, dark, and like tar or treacle (§ 59). The *urinary organs* are affected in the more complete and advanced forms, in the manner already noticed (§ 57, 58); but, in the less complete states, and when the spinal chord itself is not materially changed, the patient still retains more or less power over the evacuations and actions of the sphincters. In the more severe and sudden cases, particularly those consequent upon injury of any kind, and attended by marked disturbance of the urinary functions, priapism is a frequent symptom.

83. *e.* The *external surface* is always dry, often scurfy, sometimes discoloured in the extremities, or presenting livid spots resembling vibices. It is generally emaciated, and colder than natural, even when the patient complains of a sensation of heat. The disposition of the surface to ulcerate or slough on pressure, so remarkable in paraplegia, is less so in general palsy, unless at the last stage or more severe and complete state of this latter form of the disease.

84. *ζ.* The *cerebral functions*—sensation and intellectual power—are unaffected in general palsy as well as in paraplegia, and continue unimpaired until the malady terminates either in fatal congestion of the lungs, or asphyxia, or in congestion of the brain with serous effusion.

85. II. OF PARALYSIS IN NEW-BORN INFANTS AND YOUNG CHILDREN.—Paralysis is sometimes met with in new-born infants. It may be the effect of injury to the nerve either in the part paralyzed or in its course after its transmission through the cranial or spinal aperture. Dr. E. KENNEDY remarks that we have examples of this fact in injury to the portio dura, as in face presentations; or where the head has been long pressed in the pelvis against the projecting ischiatic spines; and he adds, that several cases of this kind had occurred to him in which the disease was quite local, the paralysis being removed on the subsidence of the swelling produced by the protracted pressure.—*a.* I have already mentioned (§ 44) that the paralysis may be the result, not merely of spontaneous lesion of some part of the nervous centres during fetal life, but also of arrested development or insufficient growth during the early periods of this epoch. In this latter case the palsy is often associated with idiocy. The cerebral or spinal lesion may, however, occur, shortly before, as well as during the period of parturition. In the following case, recorded by Dr. E. KENNEDY, the lesion must have existed some time before birth; and probably, from the speedy recovery, consisted merely of congestion of one side of the brain.

86. Immediately after birth a large, soft tumour was observed on the right side of the head, principally on the vertex, with two or three small excoriations on the left side. The left eye was closed; the mouth drawn to the left side; and when the child cried, the *ala nasi* and angle of the mouth were drawn up; the right eye was open, and the right side of the face unaffected during crying. The left side of the body was completely paralyzed. The extremities of this side were of less bulk than those of the right, and were rough to the touch; the muscles were flabby. Both pupils were insensible to light. The child was unable to

suck; but deglutition did not seem to be affected. On the third day it had several slight convulsions, confined to the upper half of the body. A leech was applied to the vertex, followed by the warm bath: stimulating liniments were rubbed over the spine, and the child recovered. In this interesting case the portio dura of the right side, and the levator palpebræ of the left side, supplied by the third nerve, were paralyzed, in connexion with hemiplegia of the left side.

87. It is often difficult to ascertain the extent of paralysis in new-born infants and very young children, as the paralyzed limbs are generally either so much convulsed, or so spasmodically contracted, as to be removed from under the influence of volition. When the spasms cease, the paralyzed state of the limb sometimes becomes more evident in the more unfavourable cases. The lesions which most frequently occasion paralysis in this class of subjects are, congestions of the brain and spinal column, serous effusion either between the membranes or in the ventricles, and extravasation of blood. This last is much less frequent in children and infants than in adults, and very rarely occurs in the cerebral structure. When hæmorrhage takes place within the cranium or spinal canal of infants, it is generally found to proceed from the surface of the membranes, and seldom causes permanent paralysis, but usually apoplectic attacks, or eclampsia, trismus, or convulsions, terminating generally in death. In these cases the effused blood produces either coma, spasm, or convulsions, according to the quantity effused; and ultimately, if the child live a short time, inflammatory action in the parts into which it is extravasated, owing to the irritation it occasions.

88. *b.* Paralysis, sometimes partial, at other times more or less general, accompanies the advanced progress of the disease usually called acute hydrocephalus, and of true or chronic dropsy of the brain. In the former of these maladies (*see Dropsy, acute, of the Brain*), I have shown that the palsy is the consequence of the softening of the more central parts of the brain, rather than of the effusion into the ventricles which either attends or supervenes on the softening. The tubercles sometimes found in the brain, or its membranes, of children, either associated with, or independent of, softening and serous effusion, are rarely a cause of paralysis, unless at an advanced stage of these lesions, or as a termination of convulsions or spasms, with which, however, some degree of paralysis is occasionally associated.

89. *c.* But palsy is sometimes met with under different circumstances, especially during suckling and teething; and, although not so frequently as immediately after birth, still sufficiently often to have procured for it, as occurring at this period, more attention than has been paid to it. From the first dentition to the period of puberty, paralysis is generally the consequence of scrofulous caries or disease of the vertebræ, or of softening of a portion of the brain, or of tubercles within the cranium or spine. In cases of softening or tubercles in the brain or its membranes, convulsions, more or less of an epileptic character, almost always precede the paralysis, which commences generally in one arm, and sometimes passes into



hemiplegia. When these lesions are seated within the spinal canal of young children, convulsions of a more limited character, often spasms or contraction of a limb, are more frequently remarked either before the development of palsy, or in connexion with it; although, even in these cases, the convulsions may assume an epileptic character, particularly when the upper part of the chord is implicated.

90. *d. Infantile paralysis* may, therefore, be divided as follows: 1st. The congenital, and then it is commonly a consequence of arrested development or congestion of a portion of the cerebro-spinal centres; 2d. That caused by the accidents attending parturition, as shown above (§ 85); 3d. That consequent upon lesions or spontaneous disease, of a demonstrable nature, implicating the brain or some portion of the cerebro-spinal axis; and, 4th. That which presents no obvious lesion in the brain and spinal chord beyond slight congestion, and from which recovery often takes place without sufficient evidence of organic lesion having been afforded. This last class of infantile palsies generally occurs in infants at the breast or during the first dentition. It is often sudden in its accession, and is preceded by no very apparent state of disease, beyond the usual irritation often attending dentition, or disorder of the alimentary canal or biliary functions. The arm is commonly the part affected; but the leg of the same side is sometimes either also paralyzed, or contracted and drawn up, or both palsied and contracted. Sensibility has not been, as far as I have observed, impaired in the affected limb, but, on the contrary, sometimes morbidly increased. A large proportion of the cases which I have seen of this description has recovered after the means that will be noticed in the sequel have been employed.

91. My very learned friend, Dr. M'CORMAC, of Belfast, has noticed cases of paraplegia in infants, which he considered to proceed from concussion of the spinal chord: a cause by no means unlikely to produce the disease in both infants and children, and to be followed by either hæmorrhage, inflammation, softening, serous effusion, or other change of the parts lodged in the spinal canal. He believes, also, that injury to the sciatic nerve may produce paralysis of the limb in infants; but this is manifestly a rare occurrence.

III. SHAKING PALSY.—*SYN. Seelotyrbe festinans, Sauvages. Paralysis Agitans, Parkinson. Synclonus ballismus, Good. Tremor, J. Frank. Tromos (Τρόμος), Swediaur. Tremblement, Fr. Zittern, Germ. Trembling Palsy.*

92. This disease is characterized by a tremulous agitation, a continued shaking, and by great weakness of one or more parts or members of the body. Although it was described by HARSCHER, DIEMERBROECK, SCHELHAMMER, HAMBERGER, and others, and more recently by PARKINSON and J. FRANK, it has not received the attention which the frequency of its occurrence and the obscurity of its nature should have obtained for it. Even its symptoms, its relations to other nervous affections, its course and terminations, have been imperfectly observed and described; and no accounts have been furnished of the appearances observed in fatal cases.

93. Shaking palsy may affect either a single part or limb, or many parts, or even the great-

er part of the body. It may continue *limited* to its original seat for many years, and even never extend beyond it; or it may not only increase gradually in the part first affected, but *extend* to two, or to all the limbs of the body. Generally the power of motion only is affected, and usually is only partially impaired; and it continues long in this state; so that the complaint may be viewed as *imperfect palsy of the power of motion, with shaking of the part.*

94. The affection usually commences imperceptibly, and proceeds slowly. It often begins in the head, or in one or both arms, and it frequently is confined to these parts for a long period, or even for years. It is generally attended by a feeling of weakness of the part. In two instances I have seen the complaint limited to the lower jaw, which was moved by a rotatory or lateral action in one case, and by a vertical action in the other. When the head is affected, it is commonly moved upward and downward; but it is in some instances in a constant state of rotation. In these situations, as well as when it affects the hands and arms, the motion often does not exceed that of tremour, or a gentle but quick shaking; but in others the agitation is more remarkable and violent; and even the slighter cases may be more severe when the patient is influenced by any excitement or marked emotion of mind.

95. The affection commences usually with a slight sense of weakness and proneness to trembling, especially on any emotion or after physical exertion, and commonly in the hands or arms, but sometimes in the head, or in the tongue or lower jaw. These symptoms gradually and slowly increase; and usually after one, two, or three years, but in some cases not until after a longer period, they extend to the lower extremities; and the patient finds great difficulty in walking; bends his body forward, and is obliged to assume a hasty or rapid pace, from the fear of falling forward. The tremulous agitation has now extended to his legs, and the limbs have become less and less capable of obeying volition. Suspension of the agitation is seldom experienced, unless in some cases when the limbs are held or supported; and when it ceases from this circumstance in one limb or side, it continues in the other. Thus it sometimes ceases in the arm or side on which the patient lies or reclines, but as soon as he changes to the opposite side it begins in the former. Occasionally, attempts to restrain the agitation only increase it; and it is often exasperated at the sight of strangers. When the patient walks, he is often thrown on the fore part of the feet, and impelled to adopt a quick or running pace, from fear of falling at every step on his face. At an early stage, or in less severe cases, the affection ceases for a short time, or is ameliorated after a refreshing sleep; and it is often then controlled by the will or by earnest attention to the part, but it soon afterward recommences.

96. At a far-advanced stage, the tremulous motions of the limbs occur during sleep, and, particularly when the patient dreams, waken him, often in agitation. The power to convey food to the mouth ultimately becomes so impeded as to oblige him to be fed by others. Mastication and deglutition are impeded, or difficult, and the saliva dribbles from the mouth

The trunk is permanently bowed, from the general want of power in the muscles. The bowels are costive; are acted upon with difficulty; and sometimes require mechanical means to remove them from the rectum. Ultimately, the agitation becomes more vehement and constant; and when exhaustion passes into sleep, it sometimes becomes so violent as to shake the room. The head falls down, so that the relaxed or shaking jaw meets the sternum. The power of articulation fails or is lost, and the urine and feces are passed involuntarily. Slight, low delirium, passing into coma, usually terminates life.

97. I have met with this affection both as the chief and primary malady, and in connexion with disease in some distant organ, of which it appeared either as a consecutive change, or as a concomitant disorder. I have seen it more frequently in males than females, and chiefly in persons about fifty years of age and upward. I observed it to a very remarkable extent in a man aged about sixty, who had valvular disease of the heart, upon which pulmonary congestion and dropsy supervened; but I could not obtain permission to examine the body. I observed it also in a lady in a similar form of complication, but I ceased to attend her long before her death. I was recently consulted by a gentleman from Lancashire, affected by this complaint in the arms, and in every other respect he professed himself to have been in good health. I have seen it both in plethoric and in thin and spare habits, but more frequently in the fair and sanguine than in any other temperament. I have never had an opportunity of observing the changes that existed after a fatal termination of the complaint, and I do not recollect of any case being recorded where such an opportunity had been enjoyed. It is frequent in very aged persons in its slighter forms.

98. In rare instances *hysteria* assumes a form very nearly allied to, or closely resembling, this affection. In 1842 I attended, with Dr. N. GRANT, a girl aged about sixteen, on account of various anomalous nervous affections consequent upon obstructed catamenia. After passing through various phases, in which the tongue, larynx, and diaphragm seemed spasmodically affected, violent tremulous agitation of the head and arms supervened. The head was rotated from side to side without intermission for several days. She received benefit from treatment, and ultimately recovered.

99. In the absence of *post-mortem* examinations, opinions as to the origin and seat of this complaint must be viewed as suppositions merely; but it is not unreasonable to infer that the medulla oblongata and upper part of the spinal chord are the chief seat of the affection. J. FRANK adduces the case of a widow, aged forty, who had experienced an interruption of the catamenia, had complained of pain in the spine, and had recourse to a vapour bath; after coming out of the bath she was exposed to cold, and suddenly was attacked by this affection. Her head was in a constant state of rotation, and the arms, hands, legs, and feet were in continual motion. Blood was taken from the spine by cupping, and she recovered sooner than was expected. It is not improbably connected with congestion of the venous plexuses, or sinuses, placed between the sheath of the

chord and bodies of the vertebræ, particularly in persons of a plethoric habit, and when it is consequent upon suppressed evacuations. In other cases it appears to depend more upon the states of the chord and nerves, or to be more strictly nervous.

100. IV. PARALYSIS FROM POISONS.—*Paralysis venenata*, CULLEN.—*Paralysis e venenis*.—Palsy, varying as to seat and character, is not infrequently observed consequent upon the operation of several poisonous substances of either a mineral or vegetable nature, especially the former. The poisons most liable to cause palsy are lead, mercury, arsenic, ergot of rye, monkshood, thorn-apple; and in rare instances palsy occurs as a contingent remote effect of most of the acro-narcotic poisons.

101. A. *Palsy from Lead*.—*Lead palsy* generally occurs after one or more attacks of colic (see COLIC FROM LEAD); but it occasionally appears without any severe disorder of the digestive organs. When the palsy is connected with colic it usually becomes manifest as the colic subsides; but both affections may be associated or cotemporaneous. When the palsy occurs independently of colic, costiveness and indigestion, with or without slight pains in the abdomen, are generally present, both before and concomitantly with it. The palsy usually presents peculiar characters. It is seated chiefly in the upper extremities, and affects the extensor more than the flexor muscles. It is attended by great emaciation of the affected muscles, and the loss of power is most remarkable in the muscles which move the thumb and fingers. The palsy is seldom complete, even in these, except in the extensors. The hands and fingers are constantly bent, unless when they hang down by the sides. The patient, in the most severe cases, is unable to raise them, and, when one arm is more affected than another, he raises the one by the aid of the other. Severe pains are also felt in the lower limbs and arms. Attacks of colic, severe fits of indigestion, and obstinate constipation are apt to occur, especially after irregularities of diet or exposure, and generally carry off the patient. The palsy of the arms is sometimes associated with deafness, owing to palsy of the auditory nerves.

102. In fatal cases the paralyzed muscles have been found pale, bloodless, and flaccid; and in cases of long standing they have become still more pale and fibrous. The nerves have also appeared atrophied and firmer than natural. It is not improbable that the lead, in a state of oxide, has in some measure combined with these tissues. In this case, however, it ought to be detected by chemical analysis; but, while some chemists avow that they have detected it, others assert that they were unable to do so. Dr. CHRISTISON's able researches into this subject do not countenance the opinion that a combination takes place between the lead and tissues affected in these cases. That the metal affects the states of these tissues cannot be doubted; but whether by its actual presence, or by its indirect operation on the nerves and nutrition of the muscles, independently of its presence, has not been demonstrated. Most probably its operation is direct in the state either of an oxide or of a salt, in either of which states it may pass into the cir-



ulation, and act immediately upon the nerves and muscles.

103. *B. Mercury*, when carried into the system in the form of an oxide, or of a salt, sometimes causes palsy, but generally in the form described as shaking palsy (§ 92), or *incomplete palsy of motion with tremour*—the *tremblement métallique* of French writers. It usually occurs in miners, in gilders, and in other workmen exposed to the operation of mercurial substances. It usually commences with unsteadiness of the arms, and afterward with tremours, which extend more or less with the continuance of the malady, and often becomes associated with convulsions. For a fuller account of this affection I may refer to the article *ARTS AND EMPLOYMENTS* (§ 24).

104. *C. Arsenic* sometimes occasions limited or partial palsy, when it has failed of causing fatal effects in a short time, or in the advanced stage of the more prolonged cases of poisoning by it. In some cases an incomplete form of paralysis, resembling palsy from lead, and affecting one or more of the extremities, is caused by this poison. Occasionally the palsy is preceded by cramps, tenderness, and weakness of the extremities, the palsy being sometimes attended by contractions of the joints. The affection is not confined to the power of motion, but generally also extends to that of sensation. Dr. FALCONER observed a case in which the palsy was limited to the hands, and another in which it gradually extended to the shoulders.

105. *D. Paralysis from narcotic or acro-narcotic poisons* is sometimes observed contingently upon their more remote effects. I was consulted many years ago respecting a case of hemiplegia caused by eating the root of monkshood by mistake. The more immediate effects had been numbness and palsy of the tongue, followed by apoplexy, and a state of the cutaneous and mucous surfaces closely resembling that existing in fully-developed purpura hæmorrhagica. The apoplexy had been either associated with hemiplegia from the commencement, or the latter rapidly followed it. The patient, aged about twenty, ultimately recovered, and I lately saw him without any remains of the paralytic affection, which, however, had continued during two or three years. Paralysis from this class of poisons generally affects the powers of sensation more or less remarkably.

106. *E. Ergot*, or *spurred rye*, sometimes occasions palsy, especially of sensation; but the effects of this substance are fully treated of in the article *ERGOTISM*.

107. *V. GENERAL HISTORY OF PALSY.*—i. OF THE VARIOUS DISORDERS PRECEDING AND ATTENDING PALSY.—From the description of the several varieties of palsy, it will be seen that the power of motion is much more frequently impaired than that of sensation; that either may be singly, or both jointly affected in various grades, but that, when motion is totally lost, sensation is frequently more or less impaired; that sensibility is very rarely entirely lost in a paralyzed part, and still more rarely over the surface of the body; and that palsy is both preceded and accompanied by considerable derangement of the general health as well as of the nervous system, to which especial attention should be directed.

108. *A.* It is impossible to notice all the *premonitory symptoms of palsy*, as the varieties and relations of the malady are so numerous as to render them both diversified and inconstant, and as they depend very much upon the nature of the pre-existing disorder and of the remote causes. *Hemiplegic palsy* is often preceded by the same premonitory symptoms as have been mentioned in connexion with the accession of *APOPLEXY* (§ 4), especially by various affections or disorders of one or more of the senses, particularly of hearing, sight, and touch; by neuralgic pains about the face or head; by twitchings, spasms, or convulsions; by weakness of muscles, or of a limb; by headaches, restlessness, sopor, lethargy, or watchfulness; vertigo, faintness, and unsteady gait; irritability of temper, loss of memory; imperfect or difficult utterance; flatulence, costiveness, and various dyspeptic symptoms; more or less manifest indications of irritation or inflammatory action in some part of the brain; epileptic seizures, and most frequently apoplectic attacks. (See *above*, § 40, and art. *APOPLEXY*, § 4.)

109. The *paraplegic and general states of palsy* are often preceded by pain in the course of the spine, sometimes resembling, and frequently mistaken for, lumbago; by spasms or cramps of particular muscles; by pain in the neck, or wry-neck; by neuralgia or neuralgic pains; by numbness of the toes or fingers; by attacks of nephritis; by increased sensibility of the surface of one or more limbs, or of the body generally; by costiveness and colicky pains, or obstinate constipation; by retention of, or difficulty of voiding, the urine; by chorea, partial convulsions, or various anomalous nervous disorders; and by the more limited forms of partial palsy.

110. *B. The disorders of the nervous system, and of the general health, accompanying palsy*, are various in different cases, according to the seat of the malady.—*a.* In *hemiplegia* and palsy of any of the organs of sense, the memory, and, in severe or prolonged cases, even the intellectual powers, are more or less impaired, the palsy extending even to the mental powers. This state, however, is the most remarkable in the complication of general palsy with insanity, hereafter to be noticed. The temper and disposition are often changed from their usual characteristics, persons of a mild disposition becoming peevish and irritable, and those who have been irascible becoming placid; in some cases the memory, chiefly of words or of names, is impaired or perverted, so that the patient substitutes those which either are inappropriate, or have an opposite meaning to that which he wished to convey. The powers of attention, and application, and mental energy generally, are usually impaired.

111. The action of the *heart and lungs* is seldom much excited in hemiplegia or cerebral palsy, unless when inflammation of a portion of the brain supervenes upon or attends the lesion causing the hemiplegic state. Nor is the action of these organs oppressed or impaired, unless effusion, so as to cause direct or counter pressure, takes place, or the medulla oblongata becomes in any way implicated. Hence the temperature of the surface of paralyzed parts is seldom lower than natural, and frequently, owing to diminished transpiration

from the surface of these parts, it is higher than in other situations.

112. *Digestion and assimilation* are often but little disturbed or impaired. In some cases vomiting or nausea, with or without flatulence, attends the accession of hemiplegia, but subsequently acidity, heartburn, or flatulence, is complained of. The appetite is but little impaired; it is even frequently keen or craving, and is generally too great for the amount of exercise taken, and of air consumed by respiration, and consequently for complete digestion and assimilation. This keenness or craving appetite I have often remarked as an indication of latent irritation in the substance of the brain. The bowels and liver are usually torpid, and often require powerful chologogues and purgatives to act on them.

113. The *nutrition* of a paralyzed part is often not materially affected when the disease occurs after the growth of the body has been matured. Occasionally, however, some degree of shrinking, or atrophy, exists, especially in prolonged cases, owing chiefly to disuse of the muscles. The nerves are also somewhat atrophied. Very frequently an œdematous state of a paralyzed limb is observed, increasing its bulk, although the muscular and other soft parts may be more or less wasted or atrophied. The urinary functions are seldom much affected in hemiplegia and other cerebral forms of palsy.

114. *b. In paraplegia and general palsy* the attendant phenomena have been already fully noticed (§ 48, *et seq.*), and consist chiefly of lesion of those functions which depend upon, or are influenced by, the part of the chord which is the seat of disease. As the brain continues unaffected until the fatal termination of the disease draws near, so the mental powers continue unimpaired till that period arrives.

115. When the medulla oblongata, or upper part of the chord, is affected, the *action of the heart and lungs* is often much disordered; and if these parts, especially the former, are pressed on, or much disorganized, death by asphyxia is more or less speedily produced. In slighter lesions of these parts, remarkable slowness of the pulse in some cases, and great rapidity of it in others, are often observed.

116. Respiration is usually performed chiefly by the diaphragm, and the quantity of oxygen consumed during the process is very small, consequently the heat of the surface is low, and transpiration from it much diminished. The skin is dry, becomes covered with a branny or furfuraceous substance, owing to rapid exfoliation of the cuticle. When the lesion is seated lower in the chord, or so as not to impede the motion of the chest, and, consequently, not to diminish the action of the air on the blood, the parts below the seat of injury experience diminished or interrupted cutaneous transpiration, and, instead of any diminution of temperature, they present an actual rise of temperature, owing to the interrupted transpiration, the functions of respiration not being impaired.

117. The *heat of the surface* of paralyzed parts depends upon the state of respiration and the consumption of oxygen, in connexion with the amount of transpiration from that surface; for, while the oxygenation of the blood proceeds

without diminution, suppression of the cutaneous transpiration will raise the temperature of the surface on which transpiration is suppressed; but when the oxygenation of the blood is impaired, suppressed transpiration cannot have this effect, or only to a small amount. If the change produced by respiration on the blood be much impeded, the temperature will generally continue much below the natural standard. This appears to me to be the true cause of the different states of temperature of paralyzed limbs in different cases; and it is preferable to account for the phenomenon conformably with established principles, upon which a sound and safe practice may be based, than to mould it so as to suit a preconceived hypothesis, and to make it subserve a doubtful or hazardous treatment.

118. It may be objected, however, that the rise or fall of temperature in a paralyzed or in an inflamed part may be independent, in some degree, of states of respiration; and this is actually the case; for, although the passage of oxygen into the circulation takes place in the lungs, the oxygenation of the blood, or, rather, of certain elements of the blood, occurs chiefly in the systemic capillaries, under the influence of the organic nervous power, the oxygen combining partly with these elements for the nutrition of the tissues, and partly with the carbon of the blood. The change in the capacity for latent heat consequent upon the combination of oxygen with these elements in the several parts of the body is great in proportion to the extent of combination; and, as this combination is strictly a vital process, or at least brought about by vitality, although conformably with chemical laws, so it takes place independently of the cerebro-spinal nervous system. Notwithstanding that this combination and the change of capacity for caloric consequent upon it are independent of this system, and are effected chiefly by vital or ganglionic nervous power, still they may be influenced by the cerebro-spinal system. The passions and emotions show this; but they also prove the predominant influence of the organic nervous system, their physical action—their operation on the circulation and the tissues—being through the medium of this latter system. Fear blanches the cheek and lowers the temperature of the surface; sexual passion produces turgescence of the erectile tissues and heightens the temperature; but these, as well as other mental emotions, change the state of the circulation and temperature by depressing or exciting, according to the nature of the emotion, the organic nervous or vital power in the first instance, the effect upon the circulation and temperature being consecutive. The independence of the organic or vital nervous system of the cerebro-spinal is shown, even in those vital organs which are most influenced by the mental emotions and the spinal chord, in the course of paralytic cases. Thus palsy, even when general, does not extend to the organs of generation. Erections take place in almost all the varieties of the disease, if no other concomitant complaint exist to prevent them; they are even morbidly frequent or constant when the upper part of the spinal chord is congested, inflamed, or otherwise implicated. Pregnancy proceeds in its usual course, and parturition



takes place in the natural way, in cases of paraplegia or general palsy in females.

119. When the upper part of the chord is the seat of lesion, the *stomach* is sometimes so much disordered as to reject its contents. The bowels are obstinately confined, as above noticed (§ 59); the tongue is furred and loaded; the urinary organs remarkably affected (§ 57), and the vital cohesion of the superficial and other tissues below the diseased portion of the chord is more or less impaired, disposing them readily to undergo asthenic inflammation, sloughing, &c. (§ 64.)

120. ii. THE ASSOCIATIONS AND COMPLICATIONS OF PALSY.—As palsy is generally a symptom or consequence of some lesion sustained in a part of the cerebro-spinal nervous system and nerves, it will readily be admitted that it will frequently present itself in practice as an accident or result of an immediately antecedent and intimately related disease, and often be associated with such disease—with apoplexy; with inflammation and softening of the brain; with similar lesions of the spinal chord; with structural changes of the membranes of the brain, and of the spinal medulla; with disease of the cranial and spinal bones; with epilepsy, convulsions, hysteria, and catalepsy; with insanity, imbecility, and idiocy; with rheumatism, lumbago, and congestions of the spinal sinuses; with neuralgic affections; with inflammation of the kidneys, or other parts of the urinary apparatus. In the progress of all these maladies, some form or other of palsy may appear whenever lesions of structure, or even congestions, take place in, or extend to, any portion of the cerebro-spinal axis, or nerves proceeding from it during their course; or, in other words, when palsy is complicated with any of these maladies, it is a consequence of the vascular and organic lesions characterizing or supervening in the progress of such malady. The importance and danger of these complications require that a brief notice should be taken of them.

121. A. Of all diseases, *apoplexy* is the most frequently associated with, and the most intimately related to, palsy, especially to hemiplegia, and to some states of general and partial palsy. The complication of apoplexy with palsy is fully described in the article APOPLEXY (§ 31–49). I have there shown that it generally presents itself as follows: 1st. *The apoplexy occurs as the primary malady, and is either associated with, or followed by, paralysis.* 2d. *The paralysis, in some one or other of its partial states, often in that of hemiplegia, first appears, and is followed, after a very indefinite period, by an apoplectic attack more or less profound.*

122. a. In the first of these complications the paralytic affection may disappear in a short time after the apoplectic seizure, or not until after several days or weeks. It may be permanent, or continue for years, or until another apoplectic seizure carries off the patient; or it may be rendered more complete or general, or it may affect additional or different parts, those first affected being either partially restored or unchanged, by renewed seizures of apoplexy, or by coma, attended by sinking or exhaustion. In these cases death is usually produced by the apoplectic state, or by a comatose sinking, attended by a general palsy, in which, owing, prob-

ably, either to nervous exhaustion, or to counter pressure on the base of the brain, or on the medulla oblongata, or to lesions extending to these parts, the respiratory organs participate. I have described fully, in the article just referred to (§ 34, *et seq.*), the lesions usually observed in these circumstances; and I need not, therefore, allude to them farther than to state that, in the slighter and less prolonged instances, they consist chiefly of congestion and serous effusion; and, in the more severe and permanent cases, of extravasations of blood, softening of portions of the brain, and of extravasation and softening conjoined. In some cases little or no lesion is seen, or at least lesions insufficient to account for the phenomena and for death; and in other cases, in connexion with one or more of these lesions, effusion of serum in the ventricles, or between the membranes; inflammation of a portion of the brain, or of the membranes, and other concomitant or contingent lesions, are observed. (See art. APOPLEXY, § 36, *et seq.*)

123. b. In the second of these forms of complication (§ 121) the palsy in some one or other of its more partial forms, frequently in that of hemiplegia, is the primary seizure, and is generally then caused by alterations in some part of the substance of the brain, especially by softening, hæmorrhage, cysts, tumours, tubercles, and by almost any of the diversified lesions described in the article BRAIN and ITS MEMBRANES, particularly when they have arrived at an advanced state of development. Many of these lesions are followed by inflammation, softening, congestion, or effusion of serum or of blood in the brain or its membranes, causing either a more complete or a more extensive palsy, or spasms or contractions of one or more limbs, or superinducing apoplexy, which may either terminate life, or be removed, leaving the pre-existing palsy more complete or extended than before. (See arts. APOPLEXY, § 46, *et seq.*, and BRAIN.)

124. B. Palsy may become associated with epilepsy; but it is generally a consequence, even when thus associated, of repeated returns of the epileptic paroxysms. Even in the earlier attacks of epilepsy, occurring in young persons, the epileptic fit may be followed by incomplete palsy of the limb, or of certain muscles, especially of an arm, or of the muscles of articulation, &c. In these cases the palsy may soon disappear, and follow the next or subsequent attacks; and may continue without much variation, or become more complete until either hemiplegia, or even more general palsy, supervenes. In some instances the epileptic seizure may present a mixed character, or a state intermediate between apoplexy and epilepsy; or it may be viewed as apoplexy attended by convulsions, a form of seizure which had been overlooked until it was described in the early parts of this work. These mixed forms of seizure are not infrequently followed by palsy. It has been stated in the articles BRAIN and EPILEPSY, that any organic lesion of the brain or of its membranes may be followed by epileptic attacks; and these lesions, in a more advanced stage of development, may occasion either palsy or apoplexy; often both in succession, at very indefinite intervals. The slighter states of palsy consequent upon the ep-

ileptic fit may be viewed as the result of congestion, more particularly affecting that portion of the brain that has most intimate relations to the paralyzed part. Where, however, the palsy is more complete or extensive and permanent, it may be viewed as depending upon similar changes to those which have been alluded to as causing palsy in connexion with apoplexy (§ 121); and if the palsy be attended by contractions or spasms either of the paralyzed or of the sound limbs, inflammatory action or irritation may be inferred to exist either in the vicinity of the cerebral lesion, or in another part of the brain, according to the seat and character of the spasms, &c. In rare instances, the same lesion of the brain that causes the epileptic or convulsive seizure may induce at the same time a paralytic state. These cases usually soon terminate fatally.

125. *C. Inflammation of the brain* may be complicated with palsy; but in this state of disease the inflammation is generally limited to a portion of the brain. Either affection may be primary, and thereby give rise to two states in which this complication presents itself in practice. 1. *The changes consequent upon the inflammation may induce those farther changes upon which the palsy depends*; thus, inflammatory softening favours cerebral hæmorrhage, and this latter usually causes the paralytic state. 2. *The lesion primarily causing the palsy may induce inflammation of the adjoining parts of the brain, and the phenomena usually consequent upon this state*; thus, blood extravasated, or a tumour formed in the brain, will occasion palsy, and inflammatory action will often follow in the surrounding cerebral structure, or in the adjoining membranes, or in both structures, and give rise to the association of the chief phenomena of inflammation of the brain, or of its membranes, with the paralytic state. Both these states of association may present themselves even in the same case; thus, a gentleman, attended by Dr. PARIS and the author, had inflammation of the brain, and after the more acute attack had been removed, hemiplegia supervened. The hæmorrhage, consequent upon the inflammatory softening, and productive of the palsy, after a short time reproduced the inflammation, which was again subdued; but after some months an apoplectic seizure took place, and carried off the patient. In cases of this complication, the membranes may or may not be implicated, according to the seat of primary lesion, or to the nature of that lesion.

126. *D. The complication of insanity with palsy* has been very fully discussed in the article on INSANITY (see § 33-36, and 167-172); and I, therefore, need not farther allude to the subject at this place than to state that the palsy generally does not appear until after the mental disorder; often not until the latter has continued for a considerable time, and assumed a chronic and general form. In some cases, however, insanity and palsy occur almost simultaneously; and in a few the paralytic affection precedes the mental derangement. Palsy thus associated is commonly *general*, or soon becomes such. It is usually incomplete, especially in its early stages, and affects chiefly the muscular system. The sphincters, and, consequently, the evacuations, are uncontrolled by volition. This form or association of palsy is

usually a result of chronic inflammation of the brain, and is distinct from palsy caused by cerebral hæmorrhage, softening, tumours, &c., which, however, may also occasion the more partial, or a hemiplegic form of palsy in the course of insanity; but these latter are not so frequent as the general palsy just alluded to, and fully described in its more appropriate place (INSANITY, § 167, *et seq.*). The paralysis of the insane may be farther associated with epileptic, convulsive, apoplectic, or comatose states, either of which may terminate life, or the patient may sink from vital exhaustion. The appearances observed after death from these complications are minutely described in the art. INSANITY (§ 235, *et seq.*).

127. Palsy is not infrequently, also, associated with *idiocy*, and with *puerile imbecility* (see art. INSANITY, § 522, *et seq.*). In these complications the palsy may be either general or partial; but when it is general, some parts are usually more affected than others, and imperfect development of portions of the cerebro-spinal axis is often seen on examinations of them after death.

128. *E. Although both paraplegia and general palsy* are often produced by the more common consequences of inflammation of the spinal chord and of its membranes, still the inflammation, as well as those consequences, may still continue after the paralytic state has been produced, and thus become associated or complicated with it. The history of cases of this description, and some of those above noticed, suggests this position; and the appearances I have observed during the examination after death sufficiently confirm it. The importance of attending to this circumstance cannot be over-estimated in a practical point of view, as being suggestive of a rational treatment of these cases. The persistence of inflammatory action in the spinal chord and its membranes, particularly the latter, during the paralytic states depending upon lesions of these parts, is often evinced by pain in the spine, by spasms or contractions of the muscles, by pains in the limbs, and by the various phenomena usually attending inflammations. In some instances, the inflammation occasions not merely spasm, contraction, or pain of the muscles supplied with nerves from the part of the spinal chord which it affects, but also more general convulsions; or, when the upper parts of the chord are implicated, epileptic seizures, or coma and asphyxia.

129. *F. Disease of the cranial and vertebral bones*, or of the *periosteum*, sometimes complicates as well as causes palsy, particularly in the scrofulous diathesis. In these cases the disease of the bones extends to the membranes enveloping the brain or chord; and inflammation, with its usual consequences, when affecting these membranes, supervenes and interrupts the functions of, or extends to, the enclosed portion of the cerebral or spinal structure. Thus, I have repeatedly met with instances of caries of the petrous portion of the temporal bone, consequent upon neglected otorrhœa, that were followed by inflammation and abscess of the adjoining membranes and cerebral structure, and by palsy, with various concomitant and consecutive phenomena. Cases of this description not infrequently occurred to me in dispensary practice, and in children



at the institution for their diseases. Lesions of the *cranial bones* associated with, as well as causing palsy, may be the result of disease or of injury. Thus, a portion of the parietal bone was remarkably and permanently depressed in a boy by accident, and coma, with hemiplegia, was the result. The coma soon passed off, but the hemiplegia continued for a time. Ultimately, the palsy also was altogether removed; and, long before he reached the period of puberty, the paralyzed side had become as strong as the other. The depression, however, continued as remarkable as before; yet, notwithstanding this, the subject of this accident became, and still is, a most powerful and talented man, with whom I have been acquainted for more than thirty years.

130. Disease, particularly *serofulous caries of the vertebrae*, is a frequent cause and concomitant of paraplegia, and even of general palsy, as in the case above noticed (§ 68); and not only may the palsy be associated with disease of the vertebrae, but also be farther accompanied with epileptic seizures. A young man several years ago consulted me respecting epileptic attacks, each of which was preceded by the *aura epileptica*, which proceeded from the palm of the left hand to the lower cervical vertebrae. On examining the hand, the palm of it was found swollen, and obscure fluctuation was detected in it. The part was opened, and matter was discharged from beneath the palmar fascia. The fits disappeared for a considerable time; but pain and stiffness in the lower cervical and upper dorsal vertebrae were complained of, and were attended by a diffused swelling. The epileptic attacks returned, and paraplegia, nearly amounting to general palsy, supervened. An abscess pointed between the scapula and spine, which was opened; and the patient soon afterward was carried off by an epileptic seizure. In this case caries of the vertebrae, purulent infiltration of the adjoining muscles, and inflammation of the membranes of the chord, with effusions of coagulated lymph, adhesions, &c., were found after death; and the inflammation of the spinal arachnoid, with serous effusion above the seat of adhesions, had extended to the arachnoid of the medulla oblongata and the base of the brain.

131. *G. Neuralgic affections* of the face, head, or limbs, not only *precede*, but also occasionally *accompany* palsy. The pain sometimes ceases when the palsy takes place, especially if the muscles supplied or connected with the pained nerves are those paralyzed; but it is sometimes only alleviated. The neuralgic pain is occasionally complicated with the palsy, particularly when they occur on different sides of the body. Neuralgic pains may thus accompany hemiplegia, paraplegia, and any of the more partial states of palsy, the latter affection supervening after the former has been of long duration (see art. NEURALGIC AFFECTIONS, § 72). It is only in rare instances that neuralgia appears in the course of palsy, or that the latter is the primary affection.

132. *H. Palsy* is sometimes *associated with rheumatism*, but not so frequently as might appear on a superficial view of the matter. The pains, whether dull, gravative, gnawing, &c., sometimes complained of both before and during paralytic affections, are often mistaken for

rheumatism, or for neuralgia, although they are the not infrequent attendants of that change of structure at the origins of the nerves supplying the pained parts that ultimately produces palsy. The pains may be even felt in different parts from those which are paralyzed; and they are then to be viewed as the extension of inflammation, or of other organic lesions, to parts differently related. The pains in the loins or back, so often viewed as *lumbago*, and felt more or less by persons addicted to venereal excesses or to masturbation, are occasioned either by congestion of the spinal sinuses, or by inflammatory action of the membranes of the chord; and although they are most frequently the precursors of palsy, particularly of paraplegia, still they not infrequently accompany it, and extend either to the sound or to the affected limb, or even to both.

133. *I. Palsy*, or palsy associated with apoplexy, is not infrequently consequent upon *organic disease of the heart*, particularly hypertrophy of the left ventricle, and lesions of the valves or auriculo-ventricular orifices. The remarks which I offered in the art. APOPLEXY (§ 96) on the connexion subsisting between that disease and structural changes in the heart are quite applicable to the complication of those changes with palsy, especially with hemiplegia. In this complication the disease of the heart is generally the primary malady, and more or less aids in the production of the paralytic affection, although some lesion of the vessels or substance of the brain may have pre-existed, or have been cotemporaneous with the cardiac disease.

134. *K. The association of palsy with disease of the kidneys and urinary organs generally* has already been noticed, with reference only, however, to the supervention of disease of the latter upon paraplegia and general palsy (§ 57). But the complication now to be noticed is of a different kind. When the kidneys, either from intense inflammation or from a primary state of inaction or palsy, cease to perform their functions, and retention of urine from this cause results, a state of excrementitious plethora is produced, not infrequently terminating in fatal coma or apoplexy. These may assume the form of general palsy; and, in rare cases, hemiplegia may take place. In these the procession of morbid phenomena is sufficiently manifest; but in others it is much less so, especially in those which present the occurrence of paraplegia consequent upon the nephritic disease. Mr. STANLEY, in an interesting memoir (*Trans. of Med. and Chirurg. Soc.*, vol. xviii., p. 260), has adduced several cases, in which inflammation of the kidneys existed in connexion with paraplegia, and appeared as the primary malady, and yet no change was observed in the spinal chord or its membranes. Some of the cases deserve a brief notice.

135. A man complained of retention of urine conjoined with paraplegia, motion and sensation being lost. Tenderness on pressure was felt at the third lumbar vertebra. After death no lesion could be detected in the vertebrae, spinal chord, or its membranes. The kidneys presented inflammatory changes, with small abscesses dispersed through their substance.

136. A man had retention of urine consequent upon the suppression of gonorrhoea by

injections. He complained of pain in the back, paralysis of the lower limbs, and of the sphincters. He distinctly traced the course of the pain from the bladder upward to the kidneys and across the loins. On dissection, the kidneys were inflamed, with minute purulent depositions throughout their substance. The bladder was inflamed, and its inner surface partly covered by coagulable lymph. The brain and spinal chord presented no disease.

137. A man, aged thirty, stated that he had been suffering for a day or two from pain in the loins, when he was seized with paraplegia extending to the umbilicus. The loss of motion was complete, and the loss of sensation nearly so. The functions of the brain were unaffected. The urine flowed involuntarily, and three pints were drawn off by the catheter. In sixteen hours from the attack of paraplegia the man suddenly died. The kidneys were found gorged with blood and nearly black. The mucous membrane of the urinary passages was congested. The substance and membranes of the spinal chord and brain were sound, vascular turgescence of these parts being but slightly greater than natural.

138. I believe that, if cases of the kind now adduced were carefully observed at an early stage of their course, sufficient evidence would be found of congestion of the veins or sinuses placed between the sheath of the chord and the bodies of the vertebrae. This congestion would of itself be sufficient to cause disorder of the urinary functions and inflammation of the kidneys and urinary passages, which would react upon, and aggravate the spinal lesion. In the examinations of these cases no mention is made of the state of the venous sinuses of the spine.

139. *L. Palsy* is sometimes associated with *hysteria*, and the association has been noticed in the article *HYSTERIA* (§ 35). A remarkable case of this complication was lately attended by Mr. Flockron and myself. A young lady had experienced hysterical symptoms, with irregularity of the catamenia, to which had supervened suppression of this discharge, attacks of vomiting, sometimes alternating with diarrhoea, and complete paraplegia, as respected the power of motion. The sensibility was only slightly affected. The urine required to be regularly drawn off. There was no tenderness in the course of the spine; and all the cerebral functions, the organs of sense, the intellectual powers, and the moral feelings seemed to be in unimpaired vigour and duly regulated. She had been long ill, and had been under the care of various eminent men both in London and in fashionable watering-places. The treatment, which will be noticed hereafter, restored her in the course of a few weeks, and after three or four months she was quite recovered.

140. It is very difficult to explain the connexion between hysteria, or disordered states of the female organs, and palsy. But it is not improbable that many of the symptoms, and particularly those of a paralytic character, arise not merely from irritation propagated from the uterine system to the roots of the spinal nerves, or to the spinal chord itself, but rather from superinduced congestion of the spinal veins and sinuses, the congestion being attended either by interruption to the circulation in the chord,

or by compression, or even by both. This change will account for the frequent connexion also of palsy of the urinary bladder with hysteria, even when paraplegia is not present. Yet even in these cases, pains in the limbs, with weakness and partial loss of power, are often complained of. When the remote causes of hysteria are considered, particularly in connexion with the effects they produce upon the spinal chord and roots of its nerves, the frequent supervention of congestion of the spinal veins and sinuses may be viewed as altogether conformable with the laws of the animal economy.

141. VI. *DIAGNOSIS*.—Palsy, in a simple and primary form, cannot be mistaken for any other malady. It is only when it appears secondarily, or associated with any one of the diseases just mentioned, that the diagnosis requires attention; and even then the object is chiefly to ascertain which is the primary affection, to trace the nature of the connexion between them, and to form some idea as to the structural changes upon which the paralytic symptoms, which are usually sufficiently manifest, depend. It is to this last that our chief attention should be directed; this is the great object of diagnosis, and one which is not only very difficult to determine on many occasions, but almost impossible on some.

142. *a.* When palsy presents any of its more *partial states*, the question of its origin will suggest itself; and the chief point to determine is, whether the affection depends upon lesion at the origin of the affected nerve in the cerebro-spinal centre, or whether it proceeds from disease in the course of, or in the nerve itself. If there be no symptoms of disorder referable to the brain or spine; if neither pain, disordered function, nor sensation can be observed; and more especially, if disease implicating the nerve can be detected, the source of the palsy becomes manifest. In palsy of the face, disease of the portio dura, and tumours or matter pressing upon the nerve, are readily detected. When the ganglionic portion of the fifth pair is implicated, the affection of the eye, and the symptoms mentioned above (§ 19–22), in connexion with the states of the other senses, and of the functions of the brain generally, will readily indicate the seat of the disease. The various circumstances of the case will also aid the diagnosis. Previous injury, the presence of tumours, or of periostitis, the scrofulous diathesis, or manifest scrofulous disease, the occupation of the patient, and the operation of lead or arsenical poisons, &c., severally aid the diagnosis.

143. *b. Hemiplegia* is generally caused by disease in one side of the brain; but it may be produced by lesion in one side of the spinal chord, although very rarely. When it proceeds, as it usually does, from the former source, it is often preceded by cerebral symptoms, or attended by an apoplectic seizure. The chief difficulty is to determine the nature of the lesion producing it; for the several changes, upon either of which hemiplegia may depend, are not attended by determinate phenomena. When it proceeds from hæmorrhage it is usually, as above noticed (§ 39, 40), both sudden and complete in its accession, is often not preceded by pain, and is frequently asso-



ciated with apoplexy. If it proceed from softening, or from tumours or morbid growths of any kind (*see art. BRAIN*, § 111, *et seq.*), it is generally preceded by cerebral symptoms, by various nervous disorders, by pain, &c., and attended by spasms, convulsions, contractions, or pains; its accession is usually slower, and it is at first less complete than in other circumstances. Tubercles in the brain or in its membranes are not infrequently causes of palsy in children from one or two years of age to twelve or fourteen, as stated in the *art. BRAIN* (§ 19, 115), and more recently by Dr. H. GREEN.

144. I may here remark, that considerable lesions, or morbid growths, may exist in or near the periphery of the brain, or implicate chiefly the efferent substance of the convolutions without causing palsy, although coma, convulsions, or epilepsy generally result. I have remarked this circumstance in several cases; but I have never seen any marked lesion of the central parts of the brain without palsy being present.

145. *c. Paraplegia* has been assigned above (§ 53) chiefly to disease of, or implicating, the spinal chord or its membranes. But it was supposed by Dr. BAILLIE, Dr. GOOD, and others to arise much more frequently from disease within the cranium. Many years ago I controverted this doctrine (*see Lond. Medical Repository*, vol. xviii., p. 522, 1822). I then took occasion to state "that, although I admit that paraplegia will sometimes result from lesions seated at the base, or in both sides of the central parts of the brain, still I contend that it most commonly arises from diseases of the spinal chord." "The chief reason of the prevalence of the cerebral pathology of paraplegia appears to be the old physiological opinions respecting the nervous system still entertained by many; and the circumstance of the brains of paraplegic subjects being, in conformity with preconceived notions, the only parts of the nervous masses which, until lately, had attention paid to them. It is by no means unlikely—and many pathologists have recorded the fact—that a patient, who has been for some time paraplegic from lesion in the spinal chord or its membranes, shall die apoplectic, or shall expire from lesions subsequently developed in the brain. This latter morbid structure, instead of being consecutive, may be even co-existent; but, at the present day, I should not expect to hear a pathologist conclude, because he found lesions in the brain, that the paraplegia therefore arose from the cerebral disease only. I would be still more surprised were I to hear the same inference drawn without any examination of the spinal canal or medulla oblongata having been made. Now I do contend that such conclusions have been actually drawn from such inconclusive data as the above by those who suppose—for the inferences of those investigators are but suppositions at the best—that paraplegia is generally seated in the brain." Thus I wrote in 1822, in opposition to the then received doctrine; and now the justice of my views, which even then were based upon tolerably extensive observation, are almost universally acknowledged.

146. Admitting, as I have done, that paraplegia may occur, in rare instances, from disease in both sides of the more central parts of

the brain, or near its base, it will be asked, How is paraplegia from this cause to be distinguished from spinal paraplegia? In many cases, the evidence of the former is negative only. There are no circumstances nor symptoms indicating disease in the spinal chord, membranes, or containing parts, and then we are constrained to look to the brain for it. But where, in addition to this evidence, there are indications, antecedently or concomitantly, of cerebral affection—if any of the functions of sense or manifestations of mind be impaired, or otherwise affected, or if headache or vertigo be present—the source of disorder may thus be conceded to the brain.

147. Where it is manifest that the paraplegia proceeds from disease implicating the spinal chord or its membranes, the question as to the nature of that disease is often solved with great difficulty. When paraplegia is caused by accidents, injuries, wounds, &c., the nature, and seat, and direction of these often assist the diagnosis. The suddenness or slowness of the accession of the malady, viewed in connexion with the presence or absence of pain and tenderness in the spine, will often suggest correct views. Thus antecedent pain, tenderness on pressure, &c., and the continued presence of these, constrictive pains in the limbs or in the abdomen, spasms or contractions of the muscles, &c., will indicate congestion or inflammation in some one or more of the constituent tissues of the part, particularly if the palsy supervene gradually, and if the remote or exciting causes are such as are likely to occasion these lesions. If pain in the back occur suddenly, and is attended almost immediately by paraplegia, extravasation of blood may be dreaded; or the displacement of a previously-diseased vertebra, or sudden effusion produced by disease of the spinal bones, may be inferred. (*See SPINAL CHORD AND MEMBRANES, Inflammation of.*)

148. Debility of the muscles of the spine causing curvatures of the column is rarely attended by any considerable degree of paraplegia. When this palsy is associated with disease of the spinal bones, the curvature is *angular*, owing to caries and absorption of one or more of the bodies of these bones. In the former case attempts to straighten the spine are not attended by pain or risk, and the patient can lie on the back or abdomen without pain. In the latter, such attempts are dangerous, or even fatal; as in a case of caries of one or two of the cervical vertebrae, for which a surgeon was consulted, and an attempt which was made to straighten the part was soon afterward followed by general paralysis. I was afterward called to the patient, who recovered after a most protracted confinement. When palsy is associated with angular curvature, as in a case now attended by Mr. CHILCOTE, which I occasionally see, any attempt to lie on the back, or to straighten the spine, is followed by pain; and in another case just seen by me, such attempts produce convulsions. These attempts always interfere with those processes from which alone recovery is to be expected. (*See art. SPINAL COLUMN.*)

149. vi. CONSEQUENCES, TERMINATIONS, AND PROGNOSIS.—A. Several of the consequences of palsy have been already alluded to (§ 56, *et*

seq.), but as the affection is chiefly a consequence itself of pre-existing disease, it seldom induces farther change unless what becomes speedily fatal; and that change is seated chiefly around, or in the immediate vicinity of the lesion causing the palsy. Owing to such change, the mental powers are often weakened, or altogether lost. In hemiplegia, or attacks of apoplexy or coma supervene; a partial palsy may become more extended; and even imperfect paraplegia may gradually increase and be more complete or be general, ultimately terminating in coma or apoplexy, or in asphyxia from injury to, or counter-pressure on, the medulla oblongata. The principal consequences of palsy, especially when the spinal chord is implicated, are manifested in the urinary organs, the digestive canal, and respiratory functions, and in the weakened state of vital cohesion of the tissues of the paralyzed parts; and these have been severally noticed at length (§ 57-64).

150. *B. The terminations of palsy are chiefly apoplexy, coma, sinking of the vital powers, asphyxia, convulsions or epileptic seizures terminating fatally, and more or less complete recovery.* Apoplexy frequently supervenes on hemiplegia or partial palsy, and either aggravates it or terminates life. A state of gradually ingravescent coma may also terminate these states of palsy, and even general palsy, although this last variety frequently causes asphyxia, death occurring sometimes gradually, at other times suddenly; gradually, from defective oxygenation of the blood and diminished production of carbonic acid, coma usually intervening; suddenly, owing to the arrest of the actions of the respiratory muscles and functions, and of the heart, consequent upon lesion at the origins, and complete paralysis of the respiratory nerves. In both these latter classes of cases the blood after death is fluid and of a dark venous colour.

151. Paraplegia either passes into general palsy and terminates as stated above (§ 150), or becomes fatal, owing to consecutive changes produced in the urinary organs, or to sloughing of the parts upon which the body rests, sinking of the powers of life, and contamination of the circulating fluids arising from these alterations. When the upper portions of the chord or the medulla oblongata become affected, epileptic attacks or convulsions occasionally occur, and even terminate existence, rather by the attending or superinduced asphyxia than by the amount of injury sustained by the brain.

152. *C. The prognosis of palsy depends much upon the grade of severity, or the complete or general character of the malady, and upon its duration.* In forming a prognosis, the circumstances alluded to when noticing the consequences and terminations of the disease should be taken into account. When the palsy is local, and independent of lesions in or near any part of the nervous centres, or where it is caused by any of the metallic poisons, hopes of recovery may be reasonably entertained. But when the disease depends upon organic change of these centres or of their envelopes; when it is complete and extensive; when a whole side of the body is affected; and when it has been of considerable duration, perfect recovery rarely takes place. I have met with this favourable result only in two or three cases.

Yet, although perfect recovery so rarely occurs, the state of the patient may be ameliorated, and the patient may live many years without the occurrence of any of the unfavourable consequences or terminations of the malady, if a suitable diet and regimen be pursued. In all cases, the causes of the attack, and the nature of the antecedent disorders and attendant symptoms, should be considered. When the palsy is attended by great disorder of the digestive organs, when the urinary organs are remarkably affected (§ 57), and when the sphincters are relaxed, when spasms or contractions of the muscles are present, or convulsions supervene, and when the nature of the organic lesion implicating the brain, spinal chord, or their envelopes is manifestly such as cannot be entirely removed, the most unfavourable opinion may be formed of the result, although the ultimate issue may be deferred for a considerable time.

153. The complications, also, of palsy should influence the prognosis. The most unfavourable of these are the associations of hemiplegia with apoplexy or coma; with inflammation of the substance of the brain, as indicated by spasms, contractions, and pains of the limbs; with neuralgia of the nerves of the face or head; with epilepsy or convulsions; with insanity, imbecility, or idiocy; with disease of the heart or of the liver; with lesions of the cervical spine; and with inflammation of the kidneys. If the palsy supervene in the course of these, it may be generally assumed as the result of severe, if not irremediable, organic change in the brain or spinal chord.

154. Palsy of the muscles of articulation, of the tongue, or of deglutition, whether appearing alone or in connexion with hemiplegia, is a most dangerous state of the malady, and often preceeds more complicated and severe forms of the disease, that will soon pass into fatal convulsions, or apoplexy, or asphyxia. Fully-developed *shaking palsy* is rarely materially ameliorated by treatment, although patients afflicted with it may live many years without much increase of the symptoms.

155. Recovery often takes place from the hysterical or uterine complications of palsy, although even in these the absence of all organic lesion of the nervous centres or of their envelopes ought not to be generally inferred, for irritation of the uterine organs, or suppression of the catamenia, may be followed by inflammation and its usual consequences in these parts, particularly in the spinal chord, or by congestion, especially of the venous sinuses of the spine, sufficient to produce interruption of the act of volition from the brain to the nerves of the extremities, owing to the pressure which such congestion may occasion.

156. Recovery from the less complete and least complicated states of palsy from the metallic poisons is sometimes brought about by careful treatment and suitable precautions and regimen. A case of complete hemiplegia consequent upon apoplexy caused by monkshood, respecting which I was consulted many years ago, quite recovered after a protracted treatment.

157. VII. CAUSES.—i. The remote causes of palsy are more strictly the causes of those maladies in the course of which alterations of the



nervous centres most frequently occur, and are so entirely the same as those which I have adduced in the articles APOPLEXY, EPILEPSY, INFLAMMATION OF THE BRAIN, &c., as to require merely to be enumerated at this place.

158. *A.* The *predisposing causes* are chiefly hereditary predisposition, advanced age, the male sex, mental labour, luxurious habits, and sexual indulgences. I have observed a greater frequency of palsy in the children of those who have died of diseases of the brain than in others. Palsy is much less frequent in children and young persons, or in those under thirty years of age, than in persons farther advanced. According to the registrar-general's report, the deaths in the metropolis in two years from palsy were 33 under fifteen years of age, 514 from fifteen to sixty, and 932 at sixty and upward; and from the same authority it would appear that the number of deaths is as great in females as in males. Palsy is most frequently observed in persons whose habits are sedentary, and in those of feeble constitution. It is said to be more frequent in the sanguineous and nervous than in other *temperaments*; but this is not established. There can be no doubt of mental labour, depressed and anxious states of mind, luxurious habits, and venereal indulgences being most influential causes of predisposition to palsy. Indeed, the various circumstances which I have assigned as predisposing to APOPLEXY (§ 77), have a similar influence in respect of palsy. Among these vascular plethora may be mentioned; and when this state is present, hemiplegia, either alone, or complicated with, or consequent upon, apoplexy, is the form of palsy most frequently observed.

159. Various *arts and employments* (see that article) remarkably predispose to palsy, especially all those in which lead, arsenic, and mercury are much used, as painters, plumbers, glaziers, &c., &c.; and in persons thus exposed, the disease occurs at earlier epochs of life than in other circumstances. It is least frequently observed in those who lead a sober and active life, and are much in the open air. It is rarely met with in sailors and soldiers, but this is partly owing to comparatively few of them being far advanced in life. The influence of the *seasons*, or of *weather*, in favouring attacks of palsy has not been shown with any precision; but cold and moist seasons and weather, and cold, humid, and miasmatic localities are certainly more productive of paralytic affections than other seasons, weather, or situations.

160. *B.* The *exciting causes* of paralysis are, 1st. *Physical, mechanical, and external agents*; 2d. *The mental emotions*; 3d. *Pathological states, or pre-existing lesions*; 4th. *Poisonous substances*. These may act (*a*) directly upon the ramifications or trunks of nerves; (*b*) or directly or mediately upon the cerebro-spinal axis.

161. *a.* Of the *physical agents* the most influential is certainly *cold*, particularly when severe in grade, or long applied to any part, or to the general surface. Cold directly depresses the nervous power, and benumbs sensation, thereby affecting the nerves themselves; it may also occasion congestion of the nervous centres, and particularly of the veins and sinuses of the spine, and, consequently, more or

less complete forms of paraplegia, or general palsy, as in the cases already alluded to.\* All applications to the surface of a part that conduct either the animal heat or the electricity from it may excite paralysis of it, particularly when long continued, as sleeping, sitting, or lying on the ground, or on stones; wet or damp clothes; the continued contact of metallic or earthen substances, &c. Pressure of any kind upon a nerve, whether produced by external substances or by tumours, abscesses, aneurisms, dislocations, or other lesions in the vicinity of the nerve, or by disease of the nerve itself, or of its neurilemma, and wounds, contusions, or other injuries of one or more nerves, are occasional causes of local palsy.† Causes of a similar kind, implicating the brain or spinal chord, especially depressions or displacements of the cranial or spinal bones; concussions or other injuries of the cerebro-spinal axis; depending or constrained positions of the head or spine; congestions, tumours, morbid depositions, or other changes in the nervous centres, their membranous envelopes, or bony cases, occasion hemiplegia, paraplegia, or general palsy, according to the seat of lesion as above assigned. To these may be added intemperance, fatigue, or exhaustion, changes of temperature and of the atmosphere, inanition, &c.

162. *b.* The influence of the *mental emotions* in causing palsy is undoubted; but it is not so directly manifested on the brain in all cases as may be at first supposed. The emotions, whether exciting or depressing, act primarily upon the heart and circulation, and through them upon the brain and spinal chord. Undue excitement of the imagination, sudden mental shocks, fits of anger, and venereal excesses, or masturbation, are not infrequent causes of palsy. Indeed, the several states of paraplegia and general palsy are oftener produced by the last of these causes, or by masturbation, than by any other.

163. *c.* *Pathological states*, or lesions occurring in the course of pre-existing disease, as already stated and sufficiently insisted upon, not only in this article (§ 34–53), but also under the heads APOPLEXY (§ 34, *et seq.*) and BRAIN (§ 50, *et seq.*), are the most frequent and immediate exciting causes of the several varieties of palsy in their primary and associated forms. These, in fact, constitute the *chief morbid appearances* furnished by paralytic cases, and consist chiefly of exostosis, tumours, or morbid growths, in the cranial bones (see art. CRANIUM); tumours, effusions of blood, or of serum, fungoid productions, congestions, and the more common consequences of inflamma-

\* The celebrated SCARRON was deprived of the use of his limbs by prolonged exposure to cold during a fit of dissipation. His mental faculties were, however, unaffected, as in most instances of paraplegia, and of general palsy caused by lesion of the spinal chord. The fascinations of his wit were unimpaired, and he became the husband of the beautiful and witty Mademoiselle D'AUBIGNE, afterward the famous Madamo de MAINTENON. SCARRON lived twenty-three years in a paralyzed state.

† See an account of a peculiar form of paralysis in *New-York Journ. of Med.*, vol. ii., p. 34, by WILLIAM P. BUEL. It affected the nerves and muscles of the forearm, the hand, the thumb, and the fingers, producing loss of muscular power, and loss of sensation, partial or complete, from the bend of the elbow to the tips of the fingers. The cause is ascribed to long-continued pressure of the weight of the body upon the nerves of the forearm in sleep.]

tion of the membranes of the brain; congestion and inflammation, extravasations of blood, effusion of serum, abscesses, softening, induration, atrophy, ulceration, apoplectic cysts, tumours, tubercles, morbid or malignant productions, aneurisms, hydatids, watery cysts, sloughing or gangrene consequent on severe injuries in parts of the brain; effusions into the ventricles, or between the membranes; disease of the blood-vessels or aneurismal tumours, ossification of the coats of the arteries, varices or dilatations of the veins or sinuses, and coagula, or fibrinous, or other concretions in these vessels, are the chief lesions which have been found in cases of hemiplegia, and of partial palsy of the senses. The changes just particularized, affecting the spine, or the membranes or substance of the spinal chord, or medulla oblongata, are the usual causes of the spontaneous cases of paraplegia and general palsy, or those cases which occur independently of the more direct effects of external injuries. The occurrence of these forms of palsy in the course of caries of one or more of the vertebræ, owing either to the extension of inflammation to the membranes, to effusion of lymph, or of serum, or to pressure on the chord, owing to the acute angle formed by the consequent curvature, is sufficiently familiar to physicians. But *cancerous or malignant disease of the vertebræ*, consecutive of cancer of the mammae, or occurring primarily in these parts, may also occasion paraplegia. Mr. CÆSAR HAWKINS has adduced three interesting cases of paraplegia from this cause, and my friend Dr. ABERCROMBIE, of Cape Town, has communicated to me a similar case to two of those observed by Mr. C. HAWKINS, which had occurred in his practice. In this instance, the breast was greatly enlarged, was quite adherent to the ribs, and its lower surface ulcerated. A prominence was observed in the situation of the second and third dorsal vertebræ, with tenderness on pressure; paraplegia, followed by its most unfavourable consequences, shortly afterward took place.

164. *Periostitis*, especially *scrofulous periostitis*, is not infrequently productive of partial palsy, and of paraplegia, or even of more general palsy, when affecting portions of the vertebral column. In these cases, as far as my observation has enabled me to state, the bladder is more or less paralyzed, the urine soon becoming alkaline, and neuralgic pains of the limbs are often present to a distressing degree.

165. *d.* Sufficient notice has been already taken (§ 100, *et seq.*) of the *poisonous substances* which occasion palsy. The slow introduction of mineral poisons, as lead, arsenic, mercury, &c., sometimes is followed by this effect; and in some cases, at least, their influence is exerted as much, if not more, upon the nerves supplying the paralyzed limb as upon any part of the nervous centres. The poisonous effects consequent upon the vegetable or acro-narcotic poisons are owing more to contingent lesions sustained by a part of these centres, while they and the circulation in them are under the influence of the poison, than to any effect produced by them on the nerves themselves.

166. *VII. OF CERTAIN POINTS IN THE PATHOLOGY OF PALSY.*—It is obvious that palsy may arise from two distinct conditions of the ner-

vous centres, viz.: 1st, from the *suppression or diminished evolution of the cerebro-spinal nervous power and of volition*, owing to interrupted circulation, to depressed vital influence, or to other alterations, in that part of the cerebro-spinal axis which is chiefly concerned in producing or originating that power; and, 2d, from *whatever may prevent the transmission of cerebro-spinal nervous power and volition* from the parts concerned in producing them to the limbs and organs which they actuate.

167. (a) If it be conceded that the gray substance of the brain and spinal chord be chiefly concerned in *originating volition and the other cerebro-spinal functions*, we may readily admit that, when this substance becomes manifestly diseased throughout the convolutions of the brain, a general state of palsy, more or less complete according to the extent of change experienced by it, may be anticipated; and this is actually observed in all cases where the gray structure is extensively changed, more particularly in those cases of general palsy complicated with *INSANITY*, as shown in that article (§ 235). In these the cerebro-spinal functions—the emotions, intellects, volition, &c.—are more or less impaired, and the gray matter of the brain and spinal chord is generally found atrophied, indurated, or otherwise changed, and the structure especially concerned in the manifestations of these powers is no longer in a state capable of originating or developing them.

168. (b). *The transmission of cerebro-spinal nervous power and volition* may be prevented, although they are produced by injury, disease, or pressure of the medullary substance of the brain or spinal chord, or of the nerves. Most of the lesions adduced when describing the several forms of palsy and their efficient causes act chiefly by arresting or interrupting the transmission of volition; although, even in these or in other cases, many alterations of structure both interrupt the transmission, and prevent the evolution or the production of nervous power and volition; as when the lesion implicates both the gray and the medullary substance, both the origins and the course of certain nerves.

169. The well-known fact that disease on one side of the brain causes palsy of the opposite side of the body, has been attributed to the decussation of fibres in the medulla oblongata. This decussation was supposed to be confined to the anterior columns only. But, although it might account for the crossed paralysis of motion, it could not equally explain the circumstance of paralysis of sensibility following the same law. Sir C. BELL has, however, shown that the middle columns decussate as well as the anterior, and thus accounted for the crossed effect in both cases.

170. It has, moreover, been objected that lesions of the *cerebellum* also produce a crossed effect, although this organ is seated above the point of decussation; and that paralysis of the face follows the same law, and arises from disease in the opposite side of the brain, although the nerves distributed to this part also arise above the decussation. As to the first objection, it may be remarked that the dissections of Mr. SOLLY have demonstrated that numerous fibres run between the spinal chord below the corpus olivare and the cerebellum, which he believes to decussate with their fellows of



the opposite side, forming, in fact, part of the apparatus of decussation. But this discovery establishes merely a direct communication between the cerebellum and spinal chord in the immediate neighbourhood of the decussation, without proving the fact of the crossing of these fibres. As to the second objection, it may be answered in the words of Dr. BENNETT, that Sir C. BELL has shown that the fifth pair of nerves arise below the decussation, and Mr. SOLLY has traced one of the origins of the *portio dura* from the fibres he has described, which run between the spinal chord and cerebellum. Thus the sensitive and motor branches of the face ought to follow the same law as the other spinal nerves, which is consonant with what actually takes place.

171. Cases have been recorded, however, in which paralysis has occurred on the same side as the lesions in the brain. Mr. HILTON has endeavoured to explain this exception by referring it to a disposition of fibres in the decussation; but, as Dr. BENNETT has justly argued, there is strong reason for doubting whether disease in the brain ever causes a direct influence; for of the many thousand cases of cerebral hæmorrhage, tumours, &c., which have been recorded, we are acquainted with twenty-one only in which paralysis is said to have resulted from disease in the same side of the brain as the palsied side of the body, and, on analysis of these, more than one half are imperfect and doubtful. As the instances, therefore, of this occurrence are so few, may we not consider that the palsy even in them was produced in the usual manner, and that the lesion which attracted attention had no reference to the complaint? Numerous instances have occurred of abscesses, softening, and other alterations of the brain having been found, but in which no paralysis had been observed during life; and a still greater number are on record in which there was well-marked paralysis, but no appreciable lesion of structure after death. It is by no means improbable, therefore, as paralysis may be induced without leaving any traces, that, in those few cases where the palsy and the lesion in the brain were in the same side, it was really caused by undetected changes in the opposite hemisphere of the brain; and, as is sometimes the case, that the disease found in the hemisphere of the paralyzed side had not occasioned the loss of motion.

172. Lesions in the vertebral portion of the spinal medulla produce not a crossed, but a direct effect; and when they interrupt the functions of this part of the nervous system, all the parts furnished with nerves arising from beneath the seat of lesion are affected. Hence the paralysis is the more general, the nearer the disease of the chord is to the brain. But disorganization has sometimes gradually proceeded to a considerable extent in the spinal chord as well as in the brain, while such fibres or portions of the former as remained unaffected appeared sufficient to perform the limited extent of function which the state or exertions of the patient required. Cases have even been recorded in which individuals have performed voluntary movements of the lower extremities almost up to the time of death, and yet, on examining the chord, it has been found entirely destroyed. Such statements should, however,

be received with distrust; for, although the presence of sensibility in the lower limbs may be explained in these circumstances (see § 181, *et seq.*), the transmission of volition, so as to act upon the extremities, cannot be accounted for. It is much more probable that the lesions observed had taken place chiefly after death, and had only commenced shortly before it; for the spinal medulla when inflamed, and even in health, often undergoes rapid changes after dissolution. We know, also, that when the spinal chord is inflamed, or is undergoing softening, involuntary, spastic, and automatic movements are produced in the muscles and extremities, that may be mistaken for voluntary motion, and it will hereafter be shown that, even when extensively diseased and incapable of transmitting the usual acts of volition, various reflected movements of sympathy may be made by the paralyzed limbs. Several cases have been recorded, where the spinal chord has been said to have been softened throughout, disorganized, quite diffuent, or even entirely divided, and yet sensibility, and even voluntary motion, have been preserved or but very slightly impaired. The case of DESSAULT, that recorded by M. RULLIER, and others, are of this kind; but they are related with insufficient precision for implicit confidence, and they may, moreover, be explained as just stated, and thus furnish no basis of argument.

173. (c) *The physical conditions of the brain and spinal chord* ought to be taken into consideration in estimating the influence of lesions of these parts of the nervous system, or of their envelopes, in producing paralysis. These conditions are, 1st. The bony and unyielding cases enclosing them; 2d. The membranes interposing between them and these cases; and, 3d. The fluid interposed between the membranes, especially between the arachnoid and pia mater.

174. a. *The unyielding cases enclosing the cerebro-spinal axis* give rise to several accidents and changes consequent upon external injury, notwithstanding the influence of the membranes, of the processes of the dura mater, and of the fluid interposed between the membranes in preventing them. The pressure, laceration, &c., caused by fractures, depressions, &c., of portions of these cases; the concussions, counter-strokes, shocks, and succussions produced by falls on the back, shoulders, feet, and extremities; the direct pressure following the extravasation of blood, or of serum, the development of tumours, or venous congestion and interrupted return of blood; the counter-pressure consequent upon these changes, and exerted chiefly on parts distant from, or opposite to, the seat of lesion or effusion; and the shock sustained by the vitality and nervous power of the frame, upon severe injury of the nervous centres, should all be taken into account when we attempt to explain resulting phenomena; inasmuch as they complicate the effects, and render their causes or sources more obscure and doubtful.

175. β. *The physical influence of the membranes* in preserving the nervous masses they enclose from injury and disease is obvious. They support, secure, and protect their contents; while they interrupt or prevent the extension of injury or disease from the external cases to the contained vital parts. Still, when they are

themselves the seat of disease, particularly of tumours or of inflammation, the pressure or irritation, or the extension of the disease and its more remote consequences, affect more or less the nervous centres and interrupt or disorder their functions, although the interposed fluid tends to prevent or to lessen these effects.

176.  $\gamma$ . *The cerebro-spinal fluid* interposed between the arachnoid and pia mater is not merely requisite to the healthy discharge of the functions of the brain and spinal chord, as shown by COTUGNO, MAGENDIE, and TODD, but is also most serviceable in preventing the extension of injury and disease from the bones and membranes enclosing these organs. The motions alone of the spine would be productive of serious consequences, if this fluid, which is more copiously interposed in this part of the nervous system, did not prevent them from materially affecting the chord itself, and the roots of the nerves which it transmits. When we consider the effects of this fluid upon the functions of the cerebro-spinal axis, it is impossible not to infer that the quantity of it will vary with the states of the nervous masses and of vascular determination to, or congestion of, them and their membranous envelopes. It may reasonably be concluded that, when these structures and the blood supplying them do not sufficiently fill the unyielding cases of the cranium and spine, the fluid interposed between the arachnoid and pia mater will supply the defect, and prevent the existence of any vacuum, and that, on the other hand, when the states of these centres and of the circulation in them are such as give rise to much fulness, the quantity of this fluid will be diminished. Anæmia will thus be attended by an increase of the cerebro-spinal fluid, and vascular turgescence by a diminution of it, the included masses being thereby preserved from much diminution of pressure in the one case, and from much increase of it in the other. Thus, also, in cases of atrophy, partial or general, of the brain or spinal chord, the quantity of this fluid is increased, showing the importance of it to the functions of these parts, while in cases of hypertrophy it is diminished or almost wanting.

177. It is obvious that in health the presence of a considerable portion of the cerebro-spinal fluid is always necessary to protect the nervous centres with which it is in immediate contact. It is very justly remarked by Dr. R. B. TODD, that by the interposition of a liquid medium between the nervous mass and the wall of the cavity in which it is placed, provision is made against a too ready conduction of vibrations from the one to the other. Were these centres surrounded by one kind of material only, the slightest vibrations or shocks would be continually felt; but when different materials on different planes are used, the surest means are provided to favour the dispersion of such vibrations. The nervous mass floats in this fluid, being maintained in *equilibrium* in it by its uniform pressure on all sides, and the spinal chord is farther secured by an additional mechanism, preventing its lateral displacement. The abundance of this fluid at the base of the brain and medulla oblongata protects these parts, the nerves, and vessels, from unequal or excessive pressure and counter-pressure during disease, or from accidents; while a diminution of it favours or even indu-

ces most serious consequences, as shown by the experiments of M. MAGENDIE.

178. From what I have now adduced it may be inferred that the effects often imputed to the abundance of this fluid, particularly in the spinal canal, by several pathologists, when detailing the morbid appearances after death from diseases of the nervous system, have been imputed to a wrong source; that the serous effusion in these cases, as I have elsewhere argued, is neither the cause of pressure upon, nor of induration of, the nervous centres, nor the source of the palsy sometimes observed in these cases; but that it is a result of those changes of the nervous structure and of the local circulation with which it is found associated, in connexion with, or aided by, the unyielding state of the surrounding parts.

179. (*d*) *Of the Influence of the different Columns of the Spinal Medulla and Roots of the Spinal Nerves upon the Sensitive and Motor Powers.*—Since the researches of Sir C. BELL and M. MAGENDIE on this subject, it has generally been supposed that, while the antero-lateral columns of the chord convey the motor power, the posterior transmit sensations. Several pathological facts, independently of the experiments of some physiologists, have, however, made it appear doubtful whether or not the power of motion and sensation are severally conveyed through these channels only, and in the precise manner just assigned. There can be no doubt, however, that volition is transmitted along the anterior columns of the chord, the anterior roots of the nerves and the corresponding nervous fibrils, to the muscles which are acted upon; and that sensation generally is conveyed in an opposite direction, namely, from the surface of the body along the sensory nervous fibrils, the posterior roots of the nerves, and the posterior columns of the chord, to the brain. But, although it seems satisfactorily proved that the acts of volition cannot be fully and precisely performed unless the channels by which volition is transmitted continue sound, or not materially injured, together with the corresponding portions of the fibrous structure of the brain, still it is very doubtful whether or not the posterior columns of the chord are as exclusively devoted to the conveyance of sensation as the anterior are to the transmission of volition. Indeed, the cases recorded by various writers, and especially those by STANLEY, WEBSTER, and others, prove either that the lesions observed in the posterior columns of the chord have taken place at the moment of, or immediately after, dissolution, or that sensation may be transmitted through other channels besides these columns, or even independently of the spinal chord itself. That the former of these alternatives cannot be the cause, at least to any considerable extent, is shown by the history of the cases and the nature of the changes which have been observed. It should, however, be admitted that, where softening of the chord is observed greater doubt may be entertained; for this change, when it has commenced before death, particularly as a consequence of inflammation, will often proceed and extend very rapidly immediately afterward, so as to be both complete and extensive at the time of inspection. Still, conceding all that may be inferred from this circumstance,



pathology furnishes sufficient proofs that sensations may be conveyed to the brain by other channels in addition to the spinal chord, especially when the alterations in the chord, rendering it incapable of discharging this function, take place slowly or gradually.

180. Experimental proofs of the existence of these other channels, and evidence respecting them, cannot be furnished with the force of demonstration, as, however conclusive experiments performed on the higher animals with the view of furnishing such evidence may appear in the eyes of the experimenter, they will admit of other, and often very different, conclusions, and the phenomena observed in the lower animals, particularly those which cannot audibly express their feelings, may be ascribed to other causes, or differently explained. We can, therefore, in the present state of our knowledge, only infer from the history of diseases implicating the spinal chord, and from what we know of various inconclusive and not always truly or correctly observed experiments, that changes produced in parts or surfaces of the body may become objects of consciousness, in certain circumstances at least, without the intervention of the spinal medulla; but as this cannot take place unless the sensation be transmitted by a different channel, it remains to inquire what that channel is, or whether or not various parts of the nervous system may, in certain circumstances, or to a certain extent, perform this function.

181. When we recollect that communicating branches run between the ganglionated or posterior roots of the nerves and the great sympathetic on each side; that ganglionic nerves may be traced in their course from the sympathetic into the spinal ganglia and chord on the one hand, and from the latter into the sympathetic and ganglia on the other, we cannot but infer, not only that sensation may be transmitted, or, more correctly, that impressions on the surface may be conveyed to the brain, so as to excite consciousness, by a different route than that of the spinal chord, especially under circumstances of gradual change in the chord, rendering it ultimately incapable of discharging this function, but that this other route is through the sympathetic nerves and their communications with the posterior roots of the nerves and spinal medulla.\*

\* [The following remarkable case would seem to prove that sensibility is entirely owing to the integrity of the spinal chord; and that, contrary to the opinion of our author, the intervention of the medulla spinalis is necessary to the transmission of sensations from parts below the seat of injury.]

By an accidental fall, Mr. I. S. S. pierced the spinal marrow by a chisel one inch in width, which passed in to the depth of five inches in that space opposite the spinous process of the lower dorsal vertebra on the left side. The wound, at its superior extremity, was half an inch from the spinous process, and one inch at its inferior extremity; so that a line drawn parallel to the spinous processes of the vertebrae, and three fourths of an inch to the left, would have intersected it in the middle. The direction of the instrument was upward, at an angle from the surface of twenty to twenty-five degrees, and to the right of about twelve degrees, penetrating the spinal column, and undoubtedly entirely dividing the chord. The immediate consequence was total insensibility below the wound, with complete paralysis of the lower extremities, bladder, and rectum. The shock that the system received produced great prostration for some forty hours, when reaction took place, and was followed by fever for ten or twelve days. The urine was drawn off by a catheter for about one week after the accident, when the bladder began to resume its

182.—The indirect character of this channel may appear an argument to some against the accuracy of this inference; but we know that, in cases of obstruction to the usual channels of circulation in the vascular system, very circuitous courses are developed in order to preserve an organ or limb, and the nervous system presents many points of analogy with that system, especially a transmission of sensation from the periphery of the body, and from the several organs and structures to the more central nervous masses, and a similar circulation or return of nervous agency in the form of motion and determinate muscular contraction. The analogy may be farther pursued, but the several points are so obvious that they require not even enumeration at this place. Moreover, it should be considered that, in respect of sensations excited in any of the abdominal or other viscera, it is very doubtful whether the spinal chord is the channel by which the impressions or changes in the viscera are transmitted to the brain, or whether the sympathetic nerves and communicating branches between the ganglia are the courses which are pursued. Indeed, there appears little doubt of the latter being the actual channel of conveyance; for impressions on or changes in the viscera, especially those of digestion and assimilation, are as vividly and as rapidly conveyed to, and made objects of consciousness in, the brain, in cases of injury, or even of complete division of the chord, as in sound health.

183. The above considerations may serve as reasons wherefore sensation remains unimpaired

functions. For nearly the same period the bowels had to be relieved by enemata. Returning sensibility was experienced in the skin about the fifth day, and an imperfect use of the limbs about the fifteenth. The patient first commenced locomotion on his hands and knees, then by pushing a chair round, and afterward by means of crutches; but sensibility in the skin and power of motion in the inferior extremities returned very slowly, so much so that, four years and seven months after the accident, he burned his knee very severely, without feeling any pain or being conscious of suffering, by sitting too near a hot fire. Recovery eventually took place, without any curvature of the spine or spinal weakness, the patient being able to get into and out of a carriage and mount a horse without any assistance.

The case is an important one, as it goes to establish the fact that the spinal marrow is the sole channel for the transmission of sensations, and that it may unite, and its functions be restored, after complete division.—(*New York Journ. of Med.*, vol. v., p. 166.)

Two cases of fracture and dislocation of the spine, which have fallen under our care, were also attended with total loss of sensation and motion below the seat of the injury.

Dr. H. A. POTTER relates (*N. Y. Journ. Med. and Collat. Sci.*, vol. iv., p. 174) the case of Mr. E., who was struck by the limb of a falling tree on the back, by which he was rendered insensible, with stertorous breathing, &c. He partially rallied from this state in about forty-eight hours, when it was found that there was no sensation nor motion below the upper part of the thorax. "The patient could not tell when he was pricked nor handled, unless moved so as to stir his neck; in that case the sensation was very great." "He continued for more than three months unable to move a finger or toe, or to tell, by feeling, when he was handled." At the end of this time, Dr. POTTER, by a surgical operation, removed parts of the four inferior cervical and the two superior dorsal vertebrae. Four of the vertebrae were fractured so as to produce compression of the spinal chord. Ossification of the broken fragments had taken place. "Before the operation ended, the patient said he felt as though we were pricking him all over. Sensation appeared to return almost instantaneously, and for the first time that he was conscious of it, below the compression, after the receipt of the injury." In five hours afterward sensation was nearly perfect. The patient lived eighteen days after the operation, and died of disease of the lungs (*loc. cit.*). The opinion of our author, however, is, doubtless correct, so far as it relates to those organs that are supplied with nervous influence by the ganglionic system of nerves.]



ed, or but little affected, in very many cases where the chord is diseased or injured so as to be incapable of transmitting the impulses of volition, particularly when the lesion is high in the chord, and when it has advanced slowly or gradually. They may also account for the rare occurrence of entire loss of sensation in any form of palsy of motion.

184. (e) *Congestion of the venous sinuses seated between the theca of the chord and the bodies of the vertebra* has been already assigned as a pathological cause of palsy, or one of the most important changes upon which the paraplegic states of palsy depend. It seldom is found unassociated or alone after death and in the most complete states of the disease, as it generally superinduces more or less extensive changes in the chord and its membranes before dissolution takes place. Several of the more remote causes of palsy act by producing, in the first place, congestion of these *sinuses*, which were even imperfectly described by anatomists until M. BRESCHET directed more particular attention to their structure and connexions. But the pathological relations of congestion and of obstructions by fibrinous coagula or concretions in these sinuses have been entirely overlooked.

185. It will soon become obvious to those who make the early phenomena of disease objects of observation and study, that whatever depresses organic nervous power will soon be followed by venous congestion; and when this depression—whether primary or consecutive of nervous or vascular excitement—has been preceded or is attended by circumstances producing increased determination to, or fullness of blood in, the capillaries of the chord or its membranes, this consecutive congestion of the spinal sinuses is the more prone to occur. In its primary or uncomplicated states, it seldom produces more serious effects than pain, stiffness, or weakness of the back, loins, and lower extremities, sometimes amounting to incomplete palsy of motion of the latter; often with pain and constriction around the abdomen; and when the weakness or imperfect power of motion is associated with pain, this state is generally confounded with rheumatism or with neuralgia, if the pain is severe and follows the course of a nerve, or with an attack of gout, when it occurs in the gouty diathesis.

186. Congestion of these sinuses occasions, first, retarded circulation in the chord and its membranes; subsequently, an increased serous secretion or effusion between the membranes. Unless the congestion be very great, it can hardly be expected that it should act injuriously on the chord by pressure, or counter-pressure of it against the posterior parietes of the spinal canal. Still, one injurious effect may be produced in this way, particularly when the congestion has superinduced distention of the capillaries of both the chord and the membranes, with increased serous effusion between the latter.

187. In these more extreme cases, when ulterior changes have taken place, it is not unlikely that the *roots of the nerves* will also suffer from unaccustomed pressure, and in those cases the posterior or gangliated roots are the more likely to experience it, and paralysis of sensation will be present in a greater or less degree, and even be the more complete, inas-

much as the lesion implicates those parts of the roots of the nerves which communicate with the sympathetic, as insisted upon above (§ 181). In cases, also, of caries and angular curvature of the spine, where not only congestion of the vertebral sinuses, but also pressure and counter-pressure of both the chord and the roots of the nerves, and even of the nerves themselves, as they pass through the spinal foramina, are apt to take place, palsy of sensation is then present, but only in degree proportionate to the extent of pressure on the roots of the nerves, and only in those cases where the nerves or their roots, especially the posterior, are implicated.

188. Congestion of the spinal sinuses, with more or less of the consequences now mentioned, is a frequent attendant upon *fevers*, particularly the more adynamic and congestive forms of fever, occasioning not merely pains and weakness of the back and limbs, and incomplete palsy of motion of the lower extremities, but also more or less of the affection of the urinary organs already mentioned (§ 57). Many of the cases described as spinal irritation, of hysterical neuralgia, of uterine irritation, &c., actually are instances of congestion of the spinal sinuses, occasioning remote or sympathetic phenomena in addition to those which are more strictly local. These are often removed or partially relieved for a time by the natural recurrence of the catamenia; but when more extensive or severe, or when associated with suppression of this discharge, they sometimes lapse into paraplegia or partial palsy, especially when neglected or injudiciously treated, owing to an increase of the congestion or of its consequences.

189. (f) *Various sympathetic phenomena occur in connexion with paralysis*, especially with the paraplegic states of the disease, that require particular notice. Some of these admit of different explanations, and thus have been differently accounted for, both by former and by contemporary writers. Of these, the *reflex motions*, which sometimes are observed upon irritating the surface of a paralyzed limb, have attracted most attention, and have directed the researches of physiologists more particularly than heretofore to the structure and functions of the *spinal chord*. These researches are fully noticed in the article on the pathology of this part of the nervous centres, with my opinions respecting them; and I therefore need no farther advert to them at this place than to remark that the phenomena which Dr. M. HALL has assigned to a reflex function of the spinal chord were fully recognized by WHYTT, but not explained by him as occurring independently of sensation. He, however, believed that the power of feeling was not limited to the brain, but was extended to the spinal chord. PROCHASKA afterward more correctly appreciated the true source and relations of these phenomena; and in the articles CHOLERA, CHOREA, CONVULSIONS, &c., in this work, the characteristic symptoms of these maladies were explained, and ascribed to reflex actions excited in the voluntary muscles by irritations transmitted to the roots of the spinal nerves and spinal chord. Subsequently to the publication of these articles, Dr. M. HALL's researches appeared. He referred these phenomena to a special organization of

the chord; and his opinion received the support of Mr. GRAINGER, Mr. NEWPORT, and others, although opposed by some eminent anatomists. The structure of the nervous system in the class *articulata* is the chief circumstance that can be adduced in favour of the existence of a spinal organization for reflex actions in the higher animals. But reflex actions—phenomena which I denominated, many years ago (1824), “*reflex sympathies*”—are performed not only by the spinal chord, but also by the *brain*, and by the *organic or ganglionic nervous system*.

190. *a.* As respects the *brain*, no sooner are the impressions on the senses made objects of sensation or consciousness than they are reflected upon, or treasured in the memory, and, either instantly or at some future period, excite to action. The manifestations of life through the medium of an encephalon are the phenomena to which the term *mental* has been usually applied which consist chiefly of impressions on the senses, rendered objects of consciousness and of reflection by this organ, and which subsequently are recombined, compared, &c., and thus often become causes of volition. Many of the impressions on the senses are so strong as instantly to impel to action, without any intermediate state of reflection; or, in other words, the actions or volitions are so instantaneously consequent upon the impressions and impulses, that the intermediate reflections are not made objects of consciousness, or are not remembered. This is especially the case when the impressions on the senses excite the passions, and when the individual has been habituated to act upon them without allowing, or being capable of, intermediate reflection. These reflex actions, even when not directly proceeding from impressions on, or reports of, the senses, are nevertheless the results of such impressions or reports, received, remembered, or reflected upon at some antecedent period.

191. *β.* The reflected actions of the *spinal chord* may occur, as Dr. M. HALL has shown, independently of sensation, although sensation often attends, or is excited by the impressions which occasion them. They may even be so morbidly strong as not to be controlled by the will, when the individual is most conscious of their presence, as in tetanus. The reflected actions of the *ganglionic nervous system* are only objects of consciousness when they are excited by powerful stimulants or irritants.\*

\* [Dr. B. DOWLER, of New-Orleans, has recently attempted to disprove the theory of the reflex function by a series of ingenious experiments and reasonings, which may be found in the 6th vol. of the *New-York Jour. of Med.*, p. 305. These experiments fully establish the post-mortem contractility of the muscles, and that too, in many cases, for many hours after death. Dr. D. denies that experiments on the frog, and other inferior animals, are at all conclusive in establishing the complicated physiology of man; and he shows very conclusively that post-mortem contractility in the human cadaver has no connexion with, or dependance on, the spinal marrow. The following are selected from a large number of cases, illustrating the general phenomena of post-mortem contractility: “R. C., aged 25. In two hours after death, when the arm was extended to an angle of 45° from the trunk, and was struck with the hand, or side of a hatchet, it was carried to the epigastrium; but when the arm was extended upon the floor, so as to form a right angle with the body, he slapped himself upon the mouth and nose. The contractility began to decline in the third hour, and by the fourth hour all motions of the limbs ceased, although the pectoral muscles assumed the ridgy or lumpy form when percussed. An hour after death the thigh was moderately contractile. The leg hung down near the floor; its flex-

192. Thus there may be said to be *three classes of reflected actions*, viz.: 1st. That class of actions which may be denominated *psychical*, or *cerebral*, or which results either directly from impressions made upon the senses, or indirectly or reflectively from these impressions. 2d. That class which may be termed *animal*, or *spinal*, which proceeds from impressions or irritations transmitted to the spinal chord or roots of the spinal nerves, and is reflected thence by the motor nerves to voluntary muscles, and which may occur independently of the brain. 3d. That class which is *organic* or *vital*, which takes place in parts supplied only or chiefly by the ganglionic system, and which is independent of both the brain and spinal chord.

193. *γ.* There are several circumstances connected with the *voluntary actions* as involving *consciousness*, to which farther allusions may be made. The actions which occur during sleep, when the mind is incapable of perceiving impressions made on the senses, unless they be inordinately intense, to which the terms *somnambulism*, sleep-waking, sleep-walking, &c., have been applied, are merely the result of suggestions arising out of previous or recollected impressions and reflections; these suggestions and reflections giving rise to volitions which excite the voluntary organs to action without awakening the senses, or permitting the perception of external objects in a distinct manner. Somnambulists may perform any of the common occupations of life, or may even execute difficult intellectual tasks with much ability. I have seen them compose, sing, play on musical instruments, &c., according to their respective tastes or occupations, and be still unconscious of the various surrounding objects of sense. Consciousness, however, of the act which the somnambulist is performing, and of objects connected with it, undoubtedly exists for the moment, to the abstraction of every other sensation. In this state, the suggestions, mental operations, and the resulting actions are often perfectly performed, as respects the ability of the individual; but, as they commence and are continued during a state of the brain unfavourable to sensation and perception, they are faintly, or not at all recollected. The concentration, also, of the mind on the subject engaging it, still more completely prevents other objects from being perceived. The somnambulist, in fact, *acts* his dream, and often in such a manner as to enable him to shun the dangers attending the action as completely as if he saw them distinctly, and thus avoided them. And yet there is reason for believing that they are not seen by him, but avoided from the circumstance of his having followed an accustomed and well-remembered track, each successive part of which is suggested to him as he proceeds, just as a person passes through a room in the dark, avoiding all impediments in his way from his recollection of their positions.

194. *δ.* Many of the above remarks apply to

ors, after being struck, drew up the heel against the buttock. Heat, for seven hours, from 101° to 102°. Five hours after death, contractility ceased, and rigidity prevailed.”—*Loc. cit.*, p. 319.

Dr. D. also shows, from a number of well-conducted experiments, that the muscles possess the same power of contractility when entirely separated from the trunk, as in the arm and leg.]



dreaming, and in part also to the motions of the body in sleep. Dreaming may, or may not, be attended by movements of the body; but these are generally imperfect or partial, if observed at all, and have reference to the idea passing in the mind. In this case the mental suggestion either fails of exciting precise and corresponding actions and expressions, or excites them so partially or imperfectly as not to amount to somnambulism. The chief difference between dreaming and somnambulism is, that the individual during a state of sleep, or while the senses are closed against perception—or, rather, while the brain is incapable of perceiving the impressions made upon the senses in their usual states of intensity—not only dreams, but also actually executes what he dreams, without awaking from the state of which I have just defined sleep to consist.

195. But the motions of the body during sleep are often independent of dreaming, or of those sensations and suggestions which pass through the mind during sleep, and which are faintly remembered afterward; for obscure sensations may be excited for the moment by external objects or physical causes during sleep, although they are not at all recollected. A person turns or moves while asleep, owing to a feeling of uneasiness, which, although not remembered by him when awakened, has nevertheless been produced so as to cause the change of position. These movements have recently been adduced as instances of reflex actions occurring independently of sensation; but that momentary sensation has not been excited is not established. Even in experiments showing the occurrence of motion after the removal of the cerebral hemispheres, the non-existence of sensation is not demonstrated, inasmuch as sensation has not been proved to be limited to these hemispheres, nor even to exist in them; they have to perform other functions, of which the sentient principle, presiding, most probably, in some other part, as in the medulla oblongata or in its vicinity, takes due cognizance.\*

\* The following observations on the *Forms and Modes of Sensibility* were published in 1824, among my *Physiological Notes*, already referred to in various parts of this work. They may serve to elucidate many of the phenomena which occur in several states of paralysis.

The phenomena considered by several authors as evincing the existence of *sensibility* are referrible only to contractility, with which all classes of animals are endowed, and which, in the lowest orders and in some vegetables, assume the appearance of sensibility. In these latter, however, we have no reason to infer the presence of sensibility merely because they contract under the influence of a stimulus; for the contraction may take place without the existence of this property, from the effect produced by the stimulus upon the organization of the contracting part. Indeed, we cannot suppose that sensibility is present where the parts generally observed to be instrumental in its production are not found to exist. A sensation cannot be supposed to be produced where there is neither an organization suitable to receive, nor a channel to convey, nor an organ to perceive, an impression. We should, therefore, limit this term to those phenomena which the mind perceives or is conscious of when in a state capable of exciting perception or consciousness.

With this limitation, *sensibility* may be called the function of sensation, and a property peculiar to the animal kingdom. The sensations are derived through the medium of the senses, and of the nerves which communicate with the encephalic centre. On this centre the existence of sensibility chiefly depends, the ramification of its nerves, or the subordinate portions of it, being also parts of the apparatus requisite, but not giving rise to this property. As we ascend in the scale of creation, and as the senses and organs of volition present a more intimate connexion with this nervous mass—the encephalon—so sensibility becomes

196. *c. Catalepsy* is a state altogether opposed to the foregoing—is the most complete

more perfect, until in man it reaches an extent greatly surpassing that of other animals.

In man, and perhaps in the more perfect animals, the modes of sensibility seem to vary. These modes may, however, be divided into two conditions, as they are more or less active, namely, *conscious or active sensibility*, and *unconscious or passive sensibility*: the former relates to those impressions, either from within or from without, which give rise to perceptions or ideas; the latter to those that are frequently produced upon the senses and upon the ramifications of the nerves, and, owing either to habit or the want of due attention to them, are not perceived by the mind. In this latter mode of sensibility, the organ receiving, and the channel conveying the impression, perform their offices; but the mind either is not, at the time when the impression is made, in a state to receive it, or receives it so imperfectly, from its weakness or its transient nature, as not to give rise to consciousness.

This mode does not necessarily imply a difference in the degree of sensibility, but the condition in which this property exists, owing either to its being more excited by other impressions, or to its being exhausted at the time when the impression is made. This condition is one to which the highest manifestations of sensibility as well as the lowest may be occasionally subject; it is, however, merely a relative mode of this property; and the relation subsists entirely between the state of the cerebral organ which perceives, and the force and duration of the impression made upon the organ of sense. Thus, when the sensibility is actively occupied with a particular object, and an impression is made at the same time upon a different organ from that through which the perception with which the mind is engaged was conveyed, the second impression may affect the senses in an evident manner, and even so as to influence volition, yet we may be unconscious of its operation, and no active perception may result from it. If, however, the second impression be stronger or more vivid than the first, or if, from various other circumstances, it should excite the cerebral functions, active sensibility or consciousness is the result.

As sensibility, according to this view of the subject, is, in its active state, a term merely expressive of consciousness; and as this faculty is evidently dependant upon the cerebro-spinal nervous system, especially on that more complex part of it which holds relation with surrounding objects; and, also, as we have no reason to attribute the possession of this part of the nervous system to the very lowest orders of animals, particularly to the class Radiata, so we must conclude that, although sensibility is a property of animal life, its higher grades are not possessed by all animals. It may be also stated, that *active sensibility*, being thus considered as expressive of, or comprising consciousness of sensations, and of the intellectual and moral operations, varies in its extent throughout the animal kingdom according as those manifestations are more or less numerous and perfect. How far the *passive mode* of sensibility, or that unattended by consciousness, may be a property of the lowest orders of animals, is difficult to say. We may, however, infer, that as this latter condition of sensibility may take place without an active exertion of this property in the highest animals, so it may result from a less perfect endowment of sensibility in the lower; and as this mode may require a less complex apparatus for its production, inasmuch as its relations are more simple, so it may be possessed by animals whose organization and manifestations do not permit us to conclude that they are capable of evincing sensibility in its more perfect and active conditions. The relations which this form or mode of sensibility holds with the numerous instincts of animals must be evident to all who consider the subject. The relations, however, which evidently subsist between that form of sensibility called *organic sensibility* by BICHAT, and the animal instincts, are much more numerous, more intimate, and more apparent.

*Organic sensibility* refers to those sensations which are produced in different degrees of intensity, owing to the existence of certain conditions of those viscera which are immediately subservient to the preservation of the individual and the species; to nutrition and reproduction, and which are not immediately subjected to the influence of volition. The conditions of the parts exciting organic sensibility are very various, and are the result of irritations arising from the presence of a stimulus, of unnatural actions supervening in particular systems or textures, and of the deficiency of that stimulus or influence to which particular viscera have been accustomed. Many of the changes preceding this class of sensations seem to interest, in the first instance, the ganglionic class of nerves; but, owing to the intimate relation subsisting between this part of the nervous system and the voluntary or sentient part, the impression or change is propagated to the brain. This is the only essential difference which exists between this and the other forms of



and general state of palsy of motion that can exist without terminating existence; but it rarely continues longer than some hours, although it may recur after short intervals, lasting on some occasions for many hours. In this state, the muscles of voluntary motion—even those of the face and the eyelids—will not contract upon irritating them, nor will they be influenced by the will of the patient, which is generally attempted to be exerted when consciousness is not altogether abolished. The sensibility, indeed, is generally not lost during the attack, although it is more or less obscured in most cases. In a patient who is liable to attacks of this complaint, and whom I have often seen during their continuance, the eyelids and all the voluntary muscles retain the positions in which they are placed, but not the least appearance of contraction is manifested upon the most energetic irritation. Still, this lady feels, sees, and hears during the continuance of the seizure. She even wills the action of the muscles, but volition is not transmitted to them. The voluntary muscles of respiration are generally the first to act upon the return of voluntary power. In another case which I had an opportunity of observing during the attack, the sensibility was somewhat more diminished than in the foregoing; but I have not met with an instance of its entire abolition. The sphincters are always unaffected in this disease. The respiratory movements are slight, and perceived with difficulty; the impulse of the heart is weak, and the pulsations generally accelerated and soft, but sometimes slow or irregular.

197. (*g*) *Mechanism and Functions of the Spinal Chord*.—There are other phenomena besides those already mentioned, which occur in paralyzed limbs, and which deserve a brief notice at this place. Dr. M. HALL and Dr. BUDGE

sensibility. It is the brain which perceives in them all; and although stimuli, or the defect of stimuli, may give rise to certain phenomena possessing the characters of the higher manifestations of this property in the organs appropriated to the preservation of the organic system, independently of the sensorium, consciousness, or the more perfect form of sensibility, cannot form part of the results.

Organic sensibility may also be *active* or *passive*; it may or it may not be attended with consciousness; and even the unconscious mode of it may indirectly impel to action, or give rise to many of the manifestations or instincts which characterize the lower animals, owing to the ganglionic centres, either from their organization or connexions, or from both, performing a greater extent of function than usually falls to their share. If, therefore, the passive form of organic sensibility may propel to action without consciousness, or the sensorial sensibility being excited in those animals, we may also account, in the same manner, for many of the instinctive functions being performed when we cannot trace them to the influence of a cerebral organ. Of all the conditions of sensibility, the active organic form is the least under the control of the mental powers. It also, in all its modes of existence, more intimately interests the existence of the individual than the other forms of sensibility; organic sensibility involves a feeling in all its active manifestations instinctive of life or death.

From this it will be readily seen how close a connexion exists between organic sensibility and the animal instincts; it does not, however, belong to my plan to trace the connexion in all its relations.

Of sensibility generally we may observe that, in the human species, it is very variable, even in health; in some persons it is very much exalted, in others very obtuse. It is vivid in early life and in youth; after the age of manhood it gradually diminishes; as old age advances it decreases rapidly; and in persons who have attained a greater age it is present in the lowest grade in which we find it in the species. Its morbid conditions—in respect both of grade and kind—form or characterize many of the most important diseases of the human economy.

have shown that, in cases of paraplegia where sensibility as well as motion is lost, convulsive motions are produced in the paralyzed limbs by tickling the soles of the feet, and even on defecation and micturition. But it is doubtful whether sensibility is entirely lost in these cases, the occurrence admitting of explanation in the manner stated above (§ 181, *et seq.*), and still more readily, if the minute anatomy of the spinal chord, according to the researches of STILLING, VAN DEEN, and BUDGE, be taken into the account. The chord, according to these researches, consists, first, of perpendicular fibrils, forming the white substance of it; secondly, of transverse fibrils, and of very delicate longitudinal fibrils, constituting the cineritious or gray substance of the chord, the traverse fibrils crossing at right angles, and forming a network with the longitudinal both of the gray and of the white substances; thirdly, of corpuscles, of an angular form, with nucleated or projecting processes, scattered in groups through the anterior gray matter only, and most numerous at the origin of the anterior roots of the nerves; fourthly, of transverse fibres, passing directly from the posterior to the anterior gray substance of the chord.

198. The roots of the nerves are direct prolongations of the gray substance. Fibrils pass from the gray, through the white substance, into the roots of the nerves. Dr. STILLING traced fibrils from the posterior roots to the anterior gray masses; and fibrils, almost as soon as they enter the chord, run between bundles of fibrils of white substance to join other bundles of fibrils from adjoining nerves. Others, in fasciculi, form loops with fibrils coming from the next nerve; and others appear as continuations of the transverse ray-like fibrils of the posterior gray substance, while the connexion of the anterior roots with the anterior gray substance is still more distinct. The nucleated processes, or corpuscles of this substance, are in immediate connexion with the primitive fibrils of the roots of the nerves.

199. The afferent properties of the posterior, and the efferent properties of the anterior divisions of the chord, are rendered more manifest by the above results, at which the above-mentioned anatomists have arrived. But, according to Dr. STILLING's experiments, the longitudinal fibrils of the anterior white substance do not transmit volition to the nerves, this office being performed by the longitudinal fibres of the anterior gray substance. As the transverse fibrils are prolonged into the nerves, and as we know that the posterior nerves are necessary to sensation, so it may be inferred that the posterior transverse fibrils are exciters of the posterior longitudinal fibres of the gray substance, and that a sensation, or rather the sensitive impression, is transmitted by the posterior transverse fibrils, and by the longitudinal fibres, to the sensorium; the same relations, *mutatis mutandis*, being conceded to the anterior gray fibres. As centripetal impressions pass from the sensitive nerves along the transverse and longitudinal fibres of the posterior gray substance to the brain, so centrifugal impressions may pass in a contrary direction, that is, from the brain along the longitudinal and transverse fibrils of the anterior gray substance to the roots of the motor nerves.

200. Such being the mechanism of ordinary sensation and motion, according to the recent researches of STILLING, VAN DEEN, BUDGE, and others, it can be no longer difficult to account for those involuntary movements which are produced in a paralyzed limb when the surface of it is irritated, pinched, or tickled, and which have been termed by Dr. M. HALL reflex actions, depending, according to him, upon a reflex function of the spinal chord, which function he refers to a distinct mechanism in the chord. It has already been contended by the author that no such mechanism exists, and that these actions are sympathetic, and result from the conformation of this part of the nervous system, transverse fibrils passing, as shown by the anatomists just referred to, directly from the posterior to the anterior gray substance, to convey impressions from the sensitive fibrils, and to excite the roots of the motor nerves. That no appropriate and peculiar structure exists in the chord for the purpose of performing these sympathetic or reflex movements, beyond what has now been noticed, is the opinion not only of the author, but also of the writers already mentioned, as well as of many others who have investigated the subject.

201. Dr. M. HALL has contended that the spinal chord is the source of muscular irritability, and that this irritability is exhausted by volition. In proof of this position, he states that paralytic limbs are more readily agitated by galvanism and strychnine than sound limbs when the cause of palsy is in the brain, the paralyzed muscles being in such cases more irritable than natural, while they are less irritable when the palsy proceeds from the state of the chord. The irritability is thus considered to be increased in the former case, owing to its not being exhausted by volition, and to be diminished in the latter, owing to the lesion affecting its source. But experience shows the inaccuracy of this inference, for the paralyzed muscles, in cases of cerebral paralysis, are not more irritable than the sound muscles, but, on the contrary, less so, as tested by Voltaic electricity; and Dr. PEREIRA has come to a similar conclusion. In the article IRRITABILITY, I have adduced my views, as promulgated many years ago, respecting the source of this property—have stated that it proceeds from, and depends upon, the organic or ganglionic nervous system; and have contended that it does not arise from the spinal chord and nerves, although it is rendered more energetic and perfect in the voluntary muscles by the supply of nerves which they receive from the chord. The truth is, that the tone, rigidity, and irritability of all paralyzed muscles are more or less impaired, the less so when the lesion is in the brain and high in the chord. Still it cannot be doubted that strychnine or nuxvomica affect these muscles more readily and more remarkably than the sound muscles. These facts may be explained partly by referring to the minute structure of the chord, and partly by the circumstance of this substance being rapidly absorbed and acting energetically on the structure of the chord and origins of the spinal nerves.

202. The fact that mental emotions often excite parts which are paralyzed is also explained by the mechanism of the chord, and by the circumstances so strongly insisted upon by

BICHAT, but since so much overlooked, that mental emotions powerfully affect the ganglionic and sympathetic nerves, and, through them, the spinal chord and the nerves proceeding from it, the sympathetic nerves communicating freely with the chord and roots of the spinal nerves, and contributing numerous fibrils to the latter to be distributed with them to the parts they supply.\* That volition, when continued or energetic, exhausts the irritability of voluntary muscles, is admitted, and hence the sense of fatigue, lassitude, and even of soreness or pain, which often follow such exertion.

203. (h) *The relaxation of the sphincters* occasionally observed in palsy, especially in paraplegia and general palsy, has been viewed as a phenomenon of more general occurrence than it really is. The fact is, that the sphincters are not so frequently relaxed, as they are imperfectly influenced by the will, or are not at all affected by it. They still retain much of their tonicity, but volition is not so energetically exerted on them as to counteract the actions of the hollow viscera when these viscera are excited by an accumulation of their respective contents, or by medicine. The *tonicity* or power of the sphincters has been attributed entirely to the spinal chord, and without reference to any influence they may derive from the organic or ganglionic nervous system. But although they derive a share of their power, more especially the voluntary increase of power, as circumstances may require it, from the cerebro-spinal axis, their continued state of tonicity is chiefly to be attributed to the organic system of nerves. This is shown in paraplegia and in general palsy, in both which the sphincters very often retain a natural condition of contraction; but that contraction is frequently not increased by volition so as to resist the action of the bowels or urinary bladder. In some cases of these states of palsy, the sphincters are not much affected, especially when the palsy is incomplete, or seated high in the chord. Pathological evidence, indeed, clearly leads to the inferences, 1st. That the power of the sphincters is attributable chiefly to the organic nervous system, but that it is increased by volition exerted through the medium of the spinal nerves, especially in circumstances requiring such increase, as when the disposition to the actions of the bowels or bladder has to be resisted; and, 2d. That it is chiefly this latter influence, or that which is exerted through the spinal chord, that is either lost or impaired, in cases where the voluntary contractions of the sphincters are insufficient to prevent the passage of the excretions when the patient wishes to retain them. It is not, therefore, to be inferred that where there is insufficient control over the evacuations, the sphincters are either relaxed or ma-

\* The views published by the author in 1822, in the *London Med. Repository*, and, in 1824, in his *Physiological Notes*, &c., respecting the independent and distinct constitution of the organic or ganglionic class of nerves, as to the functions and relations of this part of the nervous system, and as to the influence exerted by this system on the vascular system on the one hand, and on the cerebral system on the other; in short, the positions thus taken, from researches in various classes of animals, that all organs and parts which are necessary to the life of the individual animal, and to the perpetuation of its species, are supplied by ganglionic or organic nerves in proportion to the importance of each organ, and to the activity of the several organic processes, have been recently fully confirmed by the researches of STILLING, BIDDER, VOLKMANN, WALLACH, HANNOVER, R. LEE, and others.



terially deficient in power; but that they are only insufficiently influenced by volition, relatively to the power which overcomes their natural tonicities.

204. VII. TREATMENT OF PALSY.—There is no disease which more requires an intimate study of its nature and relations before a determination should be formed as to its treatment than the one now under consideration. The seat, grade, pathological condition, and constitutional peculiarities of paralytic maladies are so diversified, that each case should be made a separate study, and such means only as are appropriate to existing pathological conditions ought to be employed. I shall endeavour, 1st. To point out the plans of treatment which are most serviceable in the principal forms, states, and complications of palsy; and, 2d. To appreciate the character and value of the numerous medicines and methods of cure which have been recommended for this disease, and their applicability to the several conditions in which it comes before the physician.

205. i. OF PARALYSIS OF SENSATION.—The means to be employed in this form of the disease should be selected with strict reference to the remote causes, to the pathological conditions inferred to exist in each case, and to the particular circumstances of the individual. If this affection occur in a spare habit of body, if it be unconnected with general or local vascular plethora, and if it have been caused by cold or other depressing agents, the means about to be recommended for the more chronic states of paralysis of motion (§ 213, 214.) may be employed, especially local stimulants and irritants, internal excitants, external derivatives, galvanism, &c. In all cases, however, the strictest attention should be paid to the several digestive, secreting, and excreting functions.

206. If the *senses of sight, smell, or taste* are singly or generally affected, the same principles of treatment should be adopted as are here espoused in respect of *anæsthesia*; the several means being selected or modified according to the peculiarities of the case, and the organ especially disordered.

207. Local congestions are concerned in producing many, probably the majority of cases of *anæsthesia*. If the loss of feeling be associated with hesitation or other affection of the speech, these conditions may be more confidently inferred; and if the *anæsthesia* be hemiplegic, a limited congestion, hæmorrhage, or softening of some part of the brain probably exists. When *anæsthesia* occurs in plethoric and robust habits of body, in persons who have lived fully, or of sedentary habits, or consecutively of suppressed evacuations or discharges, then these pathological states most probably exist, and the affection, if not quickly removed, will often soon be followed by paralysis of motion. In these circumstances, the treatment advised for the acute states of palsy of motion, especially general and local vascular depletions, cholagogue and other purgatives, and derivatives, is that which is most appropriate. Subsequently, external excitants, as sinapisms, vesicants, urtications, &c., or the other means noticed for the more chronic states of palsy (§ 213, *et seq.*), may be prescribed. When *anæsthesia* is associated, as it generally is, with loss of motion, the treatment is in all respects as about to be

stated with reference to palsy of motion, which is then the most important phenomenon, and the one which should chiefly engage attention as respects its immediate cause.

208. ii. TREATMENT OF PALSY OF MOTION, &c.—When the faculty of motion is paralyzed either alone or conjointly with partial or more complete palsy of sensation, the treatment should be directed with the same intentions as have been just mentioned, viz., 1st, with the view of removing the morbid states or the structural lesions inferred to exist in each case which may present itself; and, 2dly, with the object of restoring the transmission of nervous influence to the paralyzed muscles.

209. A. When the palsy is strictly local or partial, the treatment should necessarily depend upon the peculiar features of the case. In this state of the complaint (§ 21) the lesion may be either in the origin or in the course of the nerve supplying the paralyzed muscles; but it may also be limited to the ramifications of the nerve, as when the affection is caused by the continued influence of cold, &c. If the lesion be inferred to exist at or near the origin of the nerve, local depletions, derivatives, alteratives, especially a carefully regulated course of mercury or of the iodides, with sarsa, &c.; external irritants and drains; and a due promotion of the several secretions and excretions, comprise the most efficient means of cure.

208. If the nerve have its functions interrupted by changes in any part of its course, as by thickening of the periosteum, by abscesses, tumours, &c., alteratives, particularly the iodides, with the solution of potash and sarsaparilla; various external applications, particularly the tincture of iodine, or solutions of the iodides, the plaster of ammoniacum with mercury, &c., and other means suited to the nature of the case, may be resorted to, if the ramifications of the nerve be chiefly affected; and particularly if colds have been the cause of the disorder, sinapisms, blisters, or applications containing capsicum or mezereon, may be prescribed, and if these fail, the part may be stimulated by either of the means hereafter to be mentioned (§ 249, *et seq.*).

210. B. The hemiplegic form of palsy, whether occurring primarily and simply, or associated with apoplexy or convulsions, or appearing consecutively of these, is the most common form of the disease, and requires the greatest discrimination in estimating the pathological changes and in prescribing the means of cure. —a. In the acute or early period of the malady, prompt and decisive measures are generally required; yet these should be varied according to the mode of accession and character of the attack, as already noticed (§ 35–40). If the complaint approach in the gradual manner above noticed (§ 35, 36), alteratives and derivatives are chiefly indicated with the view of removing or arresting the lesions which may be inferred to be the causes of the complaint, and of allaying the irritation they may be supposed to occasion. Local depletions, especially by cupping on the nape of the neck; sinapisms or blisters in this situation and behind the ears; purgatives and alteratives; setons in the nape, and mustard pediluvia, are severally indicated. In this form of palsy, vascular depletion, unless local and moderate, is seldom of much service.



Purgatives are generally required; and mercurials, in alternative doses and combinations, especially PLUMMER'S pill with soap, or the bichloride of mercury, in small doses, taken either soon after a meal, or with preparations of sarsaparilla, sometimes either ameliorate the symptoms, or arrest for a time the farther progress of the disease. It is in this form of hemiplegia that the iodides are more particularly indicated. I have given the iodide of mercury, or PLUMMER'S pill, nightly, and the iodide of potassium, with solution of potash and compound decoction of sarsaparilla, during the day, with manifest advantage, a seton being kept open in the nape of the neck.

211. When the attack of palsy seems consequent upon *inflammatory softening of a portion of the brain*, &c. (§ 37, 38), local vascular depletions, or even general blood-lettings, are manifestly required. Active purgatives and mercurials are also requisite; and, in the intervals between the exhibition of purgatives, the bichloride of mercury should be given in small and frequent doses, until the gums become affected, external derivation being also produced by the usual means, while the head is kept cool and elevated. In this form of the disease, I have not seen any advantage accrue from the iodides, especially in the *early or acute stage*, or while inflammatory action continues to exist. In other respects, the treatment in this variety of the disease should be conducted as advised for inflammation of the brain. (See art. BRAIN, § 191, *et seq.*)

212. If hemiplegia occur in a *sudden manner* (§ 39), the treatment should be as prompt and energetic as in cases of apoplexy. In many cases, particularly in robust and plethoric persons, copious general or local blood-letting, or both general and local, is required; and either one or the other, or even both, may be again necessary some days after the accession of the attack, owing to the vascular reaction consequent upon it and the previous depletions, or attending the inflammatory action produced by the extravasation of blood causing the seizure. In this form of palsy the pulse should be carefully watched during the first fourteen or twenty-one days after the accession of the symptoms; and as soon as it acquires fulness or hardness, blood-letting, according to the circumstances of the case, should be repeated. But, in order to prevent the necessity of recurring to depletions, purgatives, external derivatives, and refrigerants or cooling diaphoretics, should also be prescribed at the commencement of the attack. In this variety of the disease I have seen much benefit derived from the bichloride of mercury, either alone, and taken soon after a meal, or with sarsaparilla, until the system became affected by it; but vascular depletions should be premised, and the secretions and excretions duly promoted. In this state of the malady, as well in that which is *associated with, or immediately follows, the apoplectic seizure* (§ 40), the treatment in the early or more acute stage is in every respect similar to that which I have recommended in the article *Apoplexy*, when that malady is attended or followed by hemiplegia. (See art. APOPLEXY, § 146, *et seq.*)

213. *b. The chronic or persistent state of hemiplegia* is seldom altogether removed. The in-

jury received by the fibrous structure of the brain, in the great majority of cases, is such as admits not of the restoration of the complete power of volition over the paralyzed limbs. In this state, setons or issues may be tried; but they should be kept discharging for many weeks before much advantage can be expected from them. At the same time, the iodides, particularly the iodide of potash, may be exhibited either alone or with liquor potassæ, or as already recommended; and the bowels should be kept freely open by means of chologogue purgatives.

214. During this period of the disease, various internal and external stimulants and irritants have been advised, with the view of accomplishing the *second indication of cure* (§ 208); but the selection of them requires great discrimination as regards their respective properties and the existing pathological conditions. The preparations of nuxvomica, strychnine, &c., have been recommended in this state of hemiplegia, but I have rarely or never found them of service in this form of palsy; but, on the contrary, productive of more or less mischief, especially whenever increased determination or fulness of blood in the head was present. They are indicated only when an opposite state of the cerebral circulation is inferred to exist, and in some other forms of the disease. The same may be said of the use of other internal stimulants, when a disposition to increased vascular action or effusion exists in the substance and membranes of the brain; for in such cases the preparations of iodine, aconite, cantharides, serpentaria, phosphorus, camphor, electricity, galvanism, &c., of which more particular notice will be taken hereafter, are very rarely of use, but often injurious. The remarks which I shall have to offer respecting certain modes of cure, and various medicines more or less praised for this complaint, apply so entirely to this period of hemiplegia, that I shall add no more at this place as to the means which may be farther employed in the treatment of it.

215. *C. The treatment of paraplegia* so entirely depends upon the nature of the lesion producing this form of palsy, that a continual reference to such lesions must be had in the observations which I shall have to offer on this subject. I have stated above (§ 53) the several changes causing paraplegia; and it will be seen that these require a treatment appropriate to each individually.—*a.* It is obvious that the means required for paraplegia consequent upon *concussion or fracture of the spine*, or upon *laceration of, or pressure on the chord* by displaced bone, are chiefly surgical at an early period; and that the selection of these means should depend upon the peculiar features of the case, and the extent of local injury. At a later period, when the palsy still continues, the treatment will necessarily hinge upon the physical condition of the parts, and the presumed consequences of the lesions immediately resulting from the injury. In such cases the paraplegia sometimes persists, although the physical condition of the spine appears but little or not at all altered. In these it may be presumed that softening, effusion, or some other consequence of inflammatory action is present in the chord or its membranes; and, consequently, these cases come under the same category as others about to be considered (§ 216).

216. *b.* In cases of paraplegia which commence with severe pains or tenderness in the spine or loins, or with a sense of heat or burning, followed by spasms, numbness, and loss of power, indicating an *acute* or *inflammatory character* (§ 56), a decided antiphlogistic treatment is requisite, especially at an early period. In these, cupping on each side of the spine near the seat of pain or tenderness, repeated according to circumstances, mercurial purgatives and terebinthinate enemata, are the most efficient remedies, especially when these symptoms have not been of long duration. If pain or spasms still remain after a due recourse to these means, calomel, or other mercurials, should be given with opium until the mouth is slightly affected, attention being paid to the states of the urinary bladder and bowels, and of their excretions.

217. In cases of paraplegia of a more insidious character—in those which occur gradually and slowly, or which are consequent upon exposure to cold, or are attributable to congestion of the spinal sinuses, to increased serous effusion, or to chronic lesions affecting the chord, or to scrofulous changes in this part, its envelopes, or vertebrae, the bichloride of mercury as exhibited above (§ 211, 212), or conjoined with the compound tincture of bark; or the iodide of potassium with liquor potassæ and the fluid extract of sarsa, or an alternation of these; stomachic purgatives, warm salt-water baths followed by active friction of the trunk and limbs, and strict attention to the excreting functions, and to the states of the discharges, are the measures which have proved most beneficial in my practice. The bichloride of mercury, or PLUMMER'S pill, should be exhibited until the gums are affected, or until recovery takes place; and, when the motions are tar-like, and are procured with difficulty, calomel should be given with active cathartics, such as the compound extract of colocynth, scammony, &c., sometimes quickened with a drop of croton oil. Blisters, or rubefacient applications, may be placed on the back, and be repeated according to circumstances. The *liniments* prescribed in the *Appendix* (Form. 308, 311) may be applied as *embrocations* in the course of the spine, from time to time, or be rubbed assiduously in this situation.

218. Setons or issues on each side of the spine have been advised, and in some instances have proved serviceable, particularly when aided by a judicious internal and constitutional treatment, but they require discrimination in respect both of the pathological causes of the paraplegia, and the general health of the patient. When the disease appears to have proceeded from exhausting causes, as masturbation, venereal excesses, &c., or to have been aggravated by these, then setons or issues are generally injurious, especially when the constitutional powers are much exhausted. Stimulating and invigorating measures are required in all such instances. In these and similar cases, I have found the tincture of the sesquichloride of iron with the tincture of cantharides; the compound galbanum pill with the sulphate or oxide of zinc; the aloes and myrrh pill with the resinous extract of nux vomica; and the valerianate of zinc lately introduced by Mr. J. SAVORY, of more or less service. Sir B. BRODIE recommends a grain of sulphate of zinc to be given three times a day, increasing the

dose, and to be washed down by a draught containing twenty minims of the tincture of cantharides. In cases of this nature, the preparations of iodine, particularly a weak tincture, or the compound tincture of the pharmacopeia; or small doses of the bichloride of mercury in the compound tincture of cinchona and tincture of capsicum, or an alternation of these, have been of essential benefit. Sir B. BRODIE takes favourable notice of the bichloride of mercury in doses of one sixteenth of a grain three times a day, with a moderate dose of the tincture of cantharides. I have tried this mode of exhibiting the bichloride, but the effects should be watched. The compound tincture of camphor will be conjoined with these two medicines with advantage.

219. *The treatment of general paralysis* in most instances is much the same as that just recommended for paraplegia; for the former generally depends upon similar lesions to the latter, or is merely an extension of it.—*a.* When the general palsy is a symptom of the more violent states of *apoplexy*, the means appropriate to these should be prescribed (*see art. APOPLEXY*, § 135, *et seq.*). When it is the result of *concussion* of the brain, or of the spinal chord, or of *fracture* or other *injury* of the cervical vertebra, the treatment must depend upon the violence of the shock, on the presence of the primary symptoms, or the supervention of reaction—on the state of the heart's action and of the circulation, both locally and generally, and on various circumstances which will influence the experienced physician. The intentions of cure should, therefore, be not only varied, but different, or even opposite in different cases and circumstances.

220. *b.* In cases of general palsy from *caries* of the cervical vertebra, after the acute symptoms have been removed by local depletions, blisters, mercurials, &c., issues, setons, or moxas, &c., should be placed a little distance from the seat of lesion; and an embrocation, consisting chiefly of the compound camphor and turpentine liniments, placed from time to time along the spine. In the case of caries of two of the cervical vertebra referred to above (§ 68) the treatment consisted of active mercurial and other purgatives, of an alternation of a short course of the bichloride of mercury dissolved in the compound tincture of bark, with a more prolonged course of the iodide of potassium and solution of potash, with the fluid compound extract of sarsa. A protracted discharge was procured by means of blisters and savine ointment, applied to each side of the neck just below the occiput. The recovery has been complete. The neck, however, is shorter and much stiffer, obviously owing to absorption and anchylosis of the diseased vertebrae.

221. *c.* When the general palsy is of an *acute* character, or is caused by inflammatory congestion, or by any of the more immediate consequences of inflammation of the membranes or substance of the chord, then local depletions near the seat of pain, and the prompt use of mercurials, of blisters, or of the terebinthinate embrocation in the course of the spine, and of the other remedies recommended above (§ 216, for paraplegia, should not be neglected.

222. *d.* When the disease is *chronic*, or has been neglected, or has not yielded to these means, then the bichloride of mercury, the sul-



phate or the valerianate of zinc, the iodide of potassium, the tincture of cantharides, the tincture of capsicum, &c., may severally be employed as already advised (§ 218). Indeed, the treatment of general palsy, in its several forms, is in every respect the same as that advised for paraplegia.

223. iii. PARALYSIS IN CHILDREN should be treated according to the principles above developed, and with strict reference to the presumed pathological condition. If the palsy be *partial* or *hemiplegic*, and be inferred to have arisen from injury during parturition, or apparently *acute*, the application of a leech behind the ear (of the unaffected side in the hemiplegic variety), and repeated doses of calomel, should be prescribed. Minute doses of the iodide of potassium may be given subsequently, and the bowels ought to be kept freely open. If the palsy be congenital and independent of injury, the iodide of potassium or the iodide of mercury, or the bichloride of mercury, may be tried in minute doses and with due caution. In the more *chronic* cases of infantile paralysis, these constitute the chief remedies, but they should be continued for a considerable period and gradually increased, a course of the one being alternated with that of the other, as already advised.

224. If the infant be able to take the breast, recovery to some extent may be expected, although it may not be complete. I have at present under my care a patient in a fit of gout, aged between forty and fifty years, who was hemiplegic from earliest infancy, but he is unable to state whether it was congenital or caused by injury during parturition. The limbs of the paralyzed side are considerably smaller than those of the sound side, and their movements weak, difficult, and constrained. The imperfect growth of paralyzed limbs in infancy is owing chiefly to the very imperfect use made of them during the epochs of development.

225. iv. TREATMENT OF SHAKING PALSY.—Amendment has not followed any mode of cure which I have tried, and I have tried the most energetic means for this form of palsy, when it appears *gradually* and in a *chronic form*. When, however, the tremour occurs in a more *acute form*, or consecutively of suppressed evacuations, in strong or plethoric patients, as in the case adduced from FRANK (§ 99), or when it is attended by pain in the head or in the course of the spine, then antiphlogistic remedies, particularly local depletions, blisters, or the terebinthinate embrocation in the course of the spine, purgatives, mercurials, &c., followed by the iodides, the bichloride of mercury, or the valerianate of zinc, and a seton in the nape of the neck, may be severally employed, according to the peculiarities of the case, or other energetic means about to be noticed may be tried.

226. In all cases of *paralytic tremour*, the existence of an arthritic or rheumatic diathesis should be ascertained, and the treatment modified accordingly. In such instances, tonics, opiates, and antispasmodics, with ammonia or other alkaline substances, may be prescribed. When the disease has probably arisen from masturbation, or excessive sexual indulgence—the most frequent of its causes—then the preparations of iron with the tincture of cantharides,

or of capsicum, or with camphor, or with the nitro-hydrochloric acids, or the extract of nuxvomica, or opium conjoined with aromatics, may be tried, according to the peculiarities of the case, and to the effect produced; and they may be aided by stimulating embrocations, or plasters applied on the spine, as the *liniments* in the *Appendix* (F. 308, 311), or the *emplastrum thuris comp.*, &c., &c.

227. v. PARALYSIS CAUSED BY POISONS requires a treatment appropriate to the nature of the deleterious agent.—a. When the affection is caused by the preparations of *lead*, the state of the digestive organs first requires attention. (*See art. COLIC FROM LEAD.*) After the alvine secretions and excretions are more or less improved, and their discharge is rendered more regular and healthy, the preparations of *nuxvomica* or *strychnia* may be exhibited, but their effects should be carefully watched. In this disease I have preferred the resinous extract of *nuxvomica* to *strychnia*, and have generally prescribed it in combination with the purified extract of aloes. In aid of these, the external stimulants, hereafter to be mentioned, suitable exercise of the paralyzed parts as far as they may admit of it, and the application of splints, extending from the elbows to the fingers in cases of palsy of the wrist or arm, should not be overlooked. In addition to friction with various stimulating substances, electricity and galvanism, warm salt-water bathing, and warm baths containing stimulating substances, may be employed. Cleanliness and the removal of the cause always should be enforced. During the treatment the regular discharge of the alvine functions ought to be promoted, and the patient should be allowed a generous diet.

228. b. The states of palsy caused by other poisonous substances should be treated conformably with the principles already explained—with strict reference to the states of vascular action and vital power, both general and local. The tremulous form of palsy sometimes caused by *mercury* (*see ARTS AND EMPLOYMENTS*, § 23, *et seq.*) requires similar means to those just recommended for palsy from lead. This observation also applies to the palsy of the extremities sometimes produced by *arsenic*. In all these, internal stimulants, tonics, and restoratives; attention to the digestive and defæcating processes; external excitants, electricity, &c., and nutritious diet, are requisite.

229. Palsy consequent upon *narcotic poisons* should be treated according to the states of vascular action and nervous power. After due recourse to their respective antidotes, &c., local depletions, purgatives, external derivatives, &c., in order to remove congestion of the nervous centres, should be prescribed, and, if the malady still persists, the several alternative, restorative, and stimulating remedies recommended for the *chronic states* of palsy ought to be employed, according to the peculiarities of the case, and the circumstances of the patient.

230. vi. The TREATMENT OF THE COMPLICATIONS OF PALSY requires but few remarks, as the most important of these complications is duly considered in the articles on the diseases of which palsy is a part, or of which it is consecutive. Under the heads APoplexy, INFLAMMATION OF THE BRAIN, and INSANITY, the asso-



ciations of paralysis with these are fully discussed.—A. I have already noticed that *palsy may either follow or precede inflammation of the nervous centres*, and have explained how this may arise (§ 125). Hence it is requisite to watch carefully all cases, especially of hemiplegia, where it is inferred that the palsy is caused by extravasation of blood, particularly during the first three or four weeks of the disease; and, upon the first indication of inflammatory irritation, to have recourse to antiphlogistic measures co-ordinately with the indications for their use. The evidence of inflammatory action in the vicinity of the lesion producing paralysis, at whatever period it may appear, as described above (§ 128), is a sufficient reason for the having recourse to local depletion, purgatives, external derivatives, and alteratives, and for relinquishing tonics, stimulants, or excitants of any kind, should those have been resorted to.

231. *B. The complication of insanity with general palsy* admits of little or no hope, even of partial benefit. Still, the alteratives already noticed, combined with tonics and restoratives, should be prescribed, particularly the iodide of potassium with sarsa, or with bitter infusions; the extract of nuxvomica with aloetic or other aperients; the bichloride of mercury with the compound tincture of cinchona; the valerianate of zinc, and other means already noticed (*see art. INSANITY*, § 444–446). In the association of palsy with *puerile imbecility* or *idiocy*, the case is hopeless, for the reasons assigned above (§ 127).

232. *C. The treatment of disease of the cranial bones, or of the vertebrae, associated with palsy*, may be said to have been already noticed (§ 217), since the same means as have been advised for the more chronic cases of paraplegia, or of general palsy, are also appropriate to this complication. In the more common cases of this kind, namely, in those where the vertebrae are diseased, but little can be done with rational hopes of success beyond what has been recommended above (§ 217, 220). But in the course of treatment, the intercurrent inflammation of the membranes, or even of the chord itself, should be guarded against and watched for, and be promptly opposed by the means already indicated (§ 216, 221).

233. *D. The association of palsy with neuralgia or rheumatism*, or with pains resembling these affections, should always lead to the suspicion of congestion, or inflammatory action, of or near to the origins of the nerves which are the seat of pain, or which supply the pained parts; and when the palsy is, moreover, complicated with *spasms* or *cramps*, the same lesions should be inferred, and a treatment based upon the inference be prescribed.

234. *E. I have already contended that the association of palsy with disease of the kidneys and urinary organs* is most frequent and important; and that the latter morbid condition, even when it is apparently the primary one, is generally only the consequence of congestion of the vertebral or spinal sinuses, causing pressure on the chord, or increased effusion into its sheath (§184, *et seq.*). In these cases the urinary functions may be disordered to a most serious extent, or even for a long time, before the symptoms of paraplegia are evinced, or the

movements of the limbs are materially affected. When the spinal congestion interrupts or otherwise changes the functions of the kidneys, the consecutive excrementitious plethora may occasion either hemiplegia, or coma with general palsy. In some cases the congestion of the spinal veins and sinuses is soon followed by acute congestion, or inflammation of the kidneys, or by suppression or retention of urine, paralytic symptoms not appearing until the renal malady is far advanced. In these circumstances the treatment is obvious. Cupping on the loins, or near the part of the spine chiefly affected, according to the severity of the attack and the habit and constitution of the patient, should always be directed, and afterward terebinthinate embrocations ought to be applied to the loins and spine.

235. *F. The nature of the occasional connexion of palsy, especially paraplegia, with hysteria*, has been already noticed (§ 140, 188). The irregularities often observed in the urinary functions of hysterical patients may often be attributed to the irritation propagated from the uterus and ovaria, either directly by the ganglial nerves to the kidneys and bladder, or indirectly to the spinal chord, and thence to the urinary organs along the nerves communicating between them and the chord. In those cases where the protracted irritation of the uterine organs, in connexion with exhaustion of nervous power, disorders not only vascular action in these organs, but extends itself and its effects upon the vascular system, not only to the spinal chord, but also to the urinary organs, pain or aching in the loins, and even tenderness on pressing the spinous processes of the vertebrae, are often observed; and if the vascular disorder consequent upon the local excitement or irritation advances far, so as to occasion certain of its most prominent effects, numbness, cramps, or spasms of the lower extremities; retention or suppression of urine, sometimes alternating with an unusually large secretion or flow of it; occasional nausea, vomiting, and irregularity of the bowels; irregularity, or difficulty, or suppression of the catamenia; and, ultimately, even more or less complete paraplegia may result. Several cases of this kind have occurred to me, and have long resisted treatment until they were submitted to energetic courses of the alterative medicines above advised (217), particularly the bichloride of mercury, or the iodide of potassium, variously combined, aided by terebinthinate enemata and embrocations, by the extract of nuxvomica, and by such of the remedies already mentioned as were most appropriate to the peculiarities of the case. In the remarkably severe and prolonged instance noticed above (§ 139), for which all the usual means had been exhausted, in addition to several of the means now noticed, a pea-issue was made in the inside of each thigh, and kept freely discharging until the amendment was complete. The recovery was rapid in this instance, and the lady is now in the enjoyment of good health.

236. *G. I have met with several instances of palsy, and especially of hemiplegia, associated with visceral disease.* The connexion between organic disease of the heart and hemiplegia, as well as between the former and apoplexy, is sufficiently obvious; and neither it nor the treat-

ment of the complication requires much comment, inasmuch as our remedial measures should be directed primarily to the cardiac lesion, and subsequently or collaterally to the paralytic affection; the states of these lesions, in connexion with the age, habit of body, &c., of the patient, controlling the plan of treatment and the choice of means.

237. *H. The complication of palsy with hepatic disease* has been observed by me on several occasions, the palsy being generally hemiplegic, and the right side being that affected in nearly all the cases I have seen. Although in some cases the liver has appeared to have been primarily affected, still it is very probable that the loss of power in the voluntary nerves and muscles of the right side may have in some degree affected the functions and circulation of the liver, and, in prolonged cases, ultimately induced disease of it. In these associations the principles of treatment and the choice of medicines will readily suggest themselves to those who have perused the foregoing remarks, and what I have adduced on the treatment of diseases of the liver.

238. Palsy may, moreover, be associated with *scorbutus*, and it is not unfrequently occurs in the *gouty or rheumatic diathesis*, more especially after irregular, displaced, or suppressed gout. In these circumstances, the treatment should be varied according to the diathesis. In the gouty association of the malady the usual means should be employed to develop the gout in the lower extremities.

[Paraplegia not unfrequently occurs in this country in the course of continued or remittent fever, perhaps more often in chronic than acute cases, and where repeated relapses have occurred. If not speedily fatal, it is of difficult removal, and generally obstinately protracted. The most successful treatment consists in rest, repeated applications of cups to the spine, and mild purgatives during the periods of the disease, in which there is often considerable febrile excitement, and afterward moxas. The treatment is, therefore, essentially the same as that of inflammatory affections of the medulla spinalis. In the non-inflammatory stages of the disease, strychnine or galvanomagnetism will be found useful. Sufficient attention is far from being paid to those violent pains in the back, indicative of spinal congestion, in the commencement of our congestive, and even our common continued fevers. External revulsives, cups, leeches, and the warm bath may all be brought into requisition with much advantage in a large proportion of these cases.]

239. vii. THE APPRECIATION AND APPROPRIATION OF REMEDIES FOR PALSY.—In discussing the treatment of the several forms of palsy, it has been, as will be seen above, a principal object to advise the use of such means as appear the best calculated to remove the morbid changes upon which these forms severally depend; and mention has been made chiefly of those remedies which seem to me most likely to produce this effect, and of which I have had more or less experience. It is necessary, however, to a full exposition of the treatment of palsy, to review the application of the more energetic means to certain states of the disease and of the constitution, and to notice oth-

er medicines which have been favourably mentioned by writers of reputation.

240. After devoting due consideration to the *seat and nature of the lesion* of which palsy is the prominent and most manifest phenomenon, it next is of importance to estimate correctly the states of vascular action and of nervous and vital power; to ascertain, as nearly as may be, how far the affection may be considered, from these states, in connexion with its cause and duration, to be *acute or chronic*, and *sthenic or asthenic*. These terms, it is true, are merely conventional; but they nevertheless assist us materially in our attempts at briefly indicating the conditions of the patient, which powerfully influence the operation, and which should, therefore, guide our choice of medicinal agents for this malady.

241. *a. Of blood-letting*, general and local, it may be briefly stated that it is generally required early in attack, especially in acute and asthenic cases, and more particularly in the hemiplegic or sanguineous form of the disease. In the paraplegic and partial states of the malady local blood-letting is commonly to be preferred to general; and in all cases the quantity, as well as manner and repetition of the depletion, should depend upon its effects, the state of the pulse, and habit of body of the patient, as well as upon the predisposing and exciting causes of the attack. We must not, however, inconsiderately prescribe either venesection or cupping in all cases, even of hemiplegia, because we find them to have been advised by CELSUS, ZACUTUS LUSITANUS, HOME, ABERCROMBIE, and many other eminent writers. The most recent of these writers recommends it too profusely, too generally, and too exclusively, at least as regards the inhabitants of large cities and manufacturing towns, wherein the causes of the malady and the asthenic states of a very large proportion of those attacked either admit not of depletions, or require very different or even opposite means of cure. During the treatment of both hemiplegic and paraplegic palsy, intercurrent inflammatory action may appear, and require, generally, depletions by cupping or leeches; and the physician should be alive to such an occurrence when he has recourse to stimulating medicines, in doubtful circumstances, and in young persons.

242. *b. Of evacuates, purgatives and diuretics* are the most appropriate; and of the former of these, the most active should be selected, and such as influence most energetically the principal secreting viscera, as calomel, colocynth, jalap, scammony, &c. In paraplegia, and even in hemiplegia, the bowels are very torpid, and require repeated and full doses of these, and even of still more energetic cathartics, as croton oil or elaterium, in some obstinate cases. In many, recourse should also be had to purgative enemata, particularly to those in which the oleum terebinthinæ is an ingredient. It is not merely necessary regularly to evacuate faecal matters by means of these, but to employ them so as to derive from the cerebro-spinal axis any increased flow of blood to it which may have occasioned or prolonged the attack. Indeed, with these conjoined objects, they are advised by HALLÉ, DALBERG, BRODIE, and others who have insisted on their use.

243. The ancients advised a recourse to *diu-*



etics in palsy, and some of the medicines prescribed by modern physicians, and considered by them to influence the disease merely as stimulants, owe no small share of their good effects to their operation on the kidneys. Of these, the most efficient are the tinctura lyttæ, the preparations of iodine, and spirits of turpentine—substances of which farther notice will be taken hereafter—which require caution in their use, and which are suited chiefly to chronic and asthenic cases, and to the paralytic states.

214. *c.* Of *alteratives*, the most beneficial and most generally appropriate are *mercurials*, *iodine*, and the *iodides* and *sarsaparilla*.—*a.* *Mercurials*, employed so as to affect the system, and chiefly by intunction, have been recommended for palsy by SCHENCK, SCHNEIDER, CAVALLINI, and J. P. FRANK; and, both internally and externally, by VALLISNERI, BURGER, and many others. I have seen them of service, when judiciously prescribed, in both hemiplegic and paraplegic palsy. J. P. FRANK prescribed them more especially for saturnine palsy, in which he has seen them of great service. In acute and sthenic cases, calomel given with antimony, after blood-letting, until the pulse is sufficiently reduced, should be preferred; afterward, the milder mercurials may be substituted; and, in chronic and asthenic cases, the bichloride may be given in the decoction of bark until the gums are slightly affected, especially in scrofulous and rheumatic constitutions. I lately attended a patient in hemiplegia (Mr. G., of Watling-street), for whom I prescribed the bichloride of mercury, in this combination, a frequent recourse to purgatives, and a seton in the nape of the neck, with the best results. His right side was affected, and he now can walk unaided, and writes letters and checks as usual.

245. *(b)* I have prescribed *iodine* and the *iodides* in several cases of the various forms of both partial and general palsy; but in no case of the disease have I ventured to employ them otherwise than in very small doses at first, carefully watching their effects, and cautiously increasing the doses. Dr. MANSON was the first who published cases of palsy in which iodine had been employed; and these cases show not only the good effects of this substance in certain states of palsy, but also its injurious influence in the more acute and sthenic cases, and when prescribed in too large doses. Dr. MANSON employed only the tincture of iodine; but, both before and after the publication of his cases, I had used both this and the iodide of potassium for this disease, as well as for some others, in public and private practice; and more recently the iodides—the iodide of potassium and the iodides of mercury—more frequently than the pure iodine. These preparations, especially the last, are best suited to the more chronic and asthenic cases, or after depletions and other evacuations have been pushed sufficiently far. Even then the doses should at first be small, and the effects upon the pulse be carefully watched. The occurrence of headache ought to cause an interruption in the use of these medicines. The iodide of potassium may be conjoined with liquor potassæ and sarsaparilla, commencing only with one or two grains, and gradually increasing it. I have

even given only one grain in the twenty-four hours with advantage.

246. *d.* *Stimulants* and *tonics* were employed internally for palsy much more frequently by the older writers than by physicians of the present day, who are more conversant than they generally were with the true seat and nature of the lesion causing the paralytic attack. These substances are contra-indicated in all acute and sthenic cases of palsy, and whenever there is reason to infer the existence of inflammatory irritation, hæmorrhage, or vascular extravasation, or even of active congestion, while they may be employed with reasonable hopes of benefit in chronic and asthenic cases, and when the disease has appeared after exposure to cold or to other depressing influences, or has followed exhausting causes.

247. *(a)* Of this class of medicines the resinous *extract of nux vomica* and *strychnine* have been more frequently employed than any other in recent times. Of the two preparations, my experience induces me to prefer the former as more manageable than the latter, and equally efficacious. I have usually prescribed it in conjunction with purgative or aperient extracts. It, as well as other internal stimulants, should never be given in palsy, especially hemiplegia, when the pulsation of the carotids or the temperature of the scalp is at all increased; and if the pulse become strong or frequent, or the face flushed during its use, it should be discontinued, and local depletions, with an antiphlogistic treatment and regimen, instantly adopted. It is most serviceable in paraplegia and in lead palsy.

248. *(b)* The flower of the *Arnica montana* was much praised, and is still much used in Germany and Denmark for paralytic cases. It has received the commendations of ANGELI, DE MEZA, CONRADI, AASKOW, and others; but I am not aware of any other British physician besides HOME who has given it a trial, and his evidence is not much in its favour. The *Rhus radicans*, or *Toxicodendron*, has been recommended in this disease by BRERA, DESGRANGES, VAN MONS, KOK, and ALDERSON; but ZADIG considers it quite inefficacious. A decoction of the *Chenopodium ambrosioides* has been advised by RUDOLPHI, BALDINGER, and LENTIN; *serpentaria* and *capsicum* by FALCONER; *guaiacum* by FOTHERGILL and JOHNSTON; *ammoniacum* by BOURGET; *pyrethrum*, internally, by OXLEY; *cajeput oil*, both internally and externally, by PEREBOOM and THUNBERG; *naphtha* by RAMAZZINI; *camphor* dissolved in turpentine by SCHUMACHER; this substance dissolved in naphtha by REICHSANZEIGER; *musk* by TRUENER, LÖFFLER, and others; *castor* by PAULI; the tinctura lyttæ, internally, by VAUGHAN, MAY, BRISBANE, &c.; *phosphorus* dissolved in ether, internally and externally, by BRERA and GAULTIER-CLAUBRY; and the *nitrous oxide gas* by BEDDOES, HILL, and PINEL. It is very probable that these may severally prove of service when judiciously prescribed, especially in those circumstances of the disease to which I have above (§ 246) limited the use of stimulants and tonics. In the same category *aconite* may also be noticed, it having been recommended by STÖRCK and GREDING; also, *opium* and *belladonna*, which have severally been used by STOLL, THOMANN, and others, in palsy from lead. [The *ergot*, or *secale cornutum*, has



been found very useful in the treatment of paraplegia. It is believed to stimulate the lower portion of the spinal chord, to which, perhaps, its influence over the bladder and uterus is owing. It may be given in daily doses of from fifteen to sixty grains.]

249. The circumstances which admit of the internal use of stimuli also allow a recourse to *electromotive agencies* in the several forms in which they have been employed; and in no disease have they been more generally and more empirically resorted to than in this. *Electricity*, in the form of shock, bath, sparks, &c., although chiefly prescribed by persons ignorant of medicine, has received the cautious sanction of VANDER BELEN, HART, and others, in the most chronic and asthenic cases. MEYER, BANG, and PERCIVAL advise it chiefly for paraplegia and lead palsy; and they, with STOLL, DE HAEN, QUARIN, and FALCONER, doubt its efficacy in other circumstances. The *electro-galvanic* influence was first recommended by VOLTA in this disease; and it was soon afterward adopted by WALTHER, HALLÉ, MARCUS, and GRAPENGEISSER for those cases in which powerful stimulants seemed to be required. [We have derived signal benefit in many cases of local palsy from the employment of electro, or *galvano-magnetism*, applied to the paralyzed muscles in currents of moderate intensity, and gradually increased in force. Although many cases will not be materially benefited by it, there are others which will at once yield to the repeated and judicious application of this remedy.]

250. *e.* The numerous means which may be strictly called *external*, and which have been so generally resorted to in this disease, operate either (1) by rousing the circulation and exciting the nervous influence in the part, as simple or medicated friction; (2) or by deriving irritation or other morbid action from the nervous centres to superficial parts, as issues, setons, &c.; (3) or by a combination of these modes of operation, as blisters, sinapisms, urtication, &c. These means are severally appropriate to most of the forms of palsy; and, when judiciously selected, they may be safely used in the various states and relations of the disease.

251. (*a*) *Frictions* in a simple form, although advised by STOLL and HILSCHER, are seldom employed; for some medicinal substance with which frictions may be used is requisite to impart confidence to the patients in their efficacy. However, they may be advantageously employed by means of the hair-glove, or of the knee-sha, or Indian glove. Frictions of the palsied limbs with various stimulating substances, as with phosphorus dissolved in oil or ether; with camphor, soap, and turpentine; with cajeput oil, camphor, olive oil, &c., have been often advised, and may in a few instances prove of service.

[Dr. GRAVES recommends very highly a liniment of strong acetic acid,  $\text{ʒss.}$ ; spirit of turpentine,  $\text{ʒiij.}$ ; rose water,  $\text{ʒijss.}$ ; essential oil of lemons,  $\text{x drops}$ ; and a yolk of egg in sufficient quantity to suspend the turpentine. This is to be applied by means of a sponge; after a few applications, it produces an eruption of small pimples, and proves very efficacious.]

252. (*b*) *Issues and setons* are, upon the whole, the most efficacious modes of permanent external derivation in palsy, and the most generally

adopted, especially in this country. The former may be made in the scalp itself, by incisions in or near the occiput, pease being afterward inserted; the latter may be worn in the nape of the neck. They have been praised by POTT, APPLETON, LATOUR, SCHREGER, PRICHARD, and LODER; and I have had several occasions of witnessing their good effects. *Moxas*, which have been for ages employed in the East as the usual mode of external derivation, have been strongly insisted upon by LARREY and others in this and other diseases, and have been much employed on the Continent of Europe; but their superior efficacy to issues or setons is very doubtful. [*Moxa* is a remedy by no means to be neglected in paralysis. We have known cases of general paralysis where moxa, applied on each side of the spine, near the second dorsal vertebra, procured immediate benefit.] The *actual cautery*, mentioned by PAULUS ÆGINETA, and others of the ancients, has been recommended, also, by RICHTER, PORTAL, and J. P. FRANK. NERI NERI, a Neapolitan physician of the sixteenth century, directed it to be applied to the occiput in hemiplegia. Among the usual means of derivation, *dry-cupping*, mentioned by CELSUS and others in this disease, should not be overlooked.

253. (*c*) *Blisters*, kept discharging for a considerable period, or frequently repeated, as advised by BOERHAAVE, FORDYCE, and DICKSON; or *artificial eruptions*, produced for a longer or shorter period, by means of tartarized antimonial ointment, or by croton oil, are also frequently of service both in acute and chronic cases; but in the former especially, after local depletions and evacuations have been freely practised. The same remark is applicable to the use of *sinapisms*, and to a frequent recourse to *urtication*, which has been advised by PAULUS ÆGINETA, MUYS, HOME, HUFELAND, and many others, or to *embrocations* containing capsicum, or its tincture, or pyrethrum, all which exert the double effect noticed above (§ 250), when applied to the paralyzed limb, as they should generally be applied, unless in cases where the sensibility and temperature of the paralyzed limb are morbidly increased, as sometimes observed; and then they may even prove injurious, especially in asthenic cases. In these, also, blisters applied to the palsied limb may be followed by sloughing.

254. *f.* *Simple, and medicated, and mineral warm baths* have been much praised in palsy; but it is obvious, from the nature and forms of the disease, that, although they may be of service in some instances, they may be injurious if inappropriately or indiscriminately employed. I have seen them of service in chronic and asthenic cases, and in those states of the disease caused by exposure to cold. Medicated warm baths—with warm and aromatic substances—were most beneficial in a case of general palsy arising from this cause that came under my care. J. P. FRANK notices favourably simple and sulphureous warm baths, and states that those of Baden have been of service in some obstinate cases of chronic palsy. In recent, acute, or sthenic cases, he justly dreads the use of warm baths, whether simple, mineral, or medicated, as he has known apoplexy supervene where they have been injudiciously prescribed. The sulphureous thermal baths of

Baden were recommended by STOLL, chiefly in lead palsy, after electricity had been employed. It may be noticed, farther, that the warm mineral springs of Bath, Toclitz, &c., have been frequently resorted to by paralytic patients, and sometimes with more or less advantage, when neither general nor local plethora or congestion exists, or when opposite states of the vascular system obtain; that sulphureous warm baths have been favourably noticed by BAKER, SUMMERS, TOLBERG, WAITZ, and HUFELAND; that aromatic and spiced warm baths were recommended by RIEDLIN; warm salt-water baths by REIL; and even warm chalybeate-water baths by GRAEFFE, in this malady.

255. *g.* The diet and regimen in palsy should depend entirely upon the peculiarities of the case. In most cases of hemiplegia, in all acute and sthenic cases, or whenever general or local plethora is inferred to be present, both the diet and regimen should be strictly antiphlogistic; a farinaceous and vegetable diet, with simple diluents only, being adopted. In chronic, asthenic, and anæmic cases, light, digestible animal food may be allowed; but in every instance the predisposing and exciting causes should be viewed in connexion with the pathological conditions, and all these should be duly estimated before either the treatment, or the diet, or the regimen is assigned. The chief part of the regimen in all cases is the careful avoidance of the causes (§ 157, *et seq.*) of the disease.

[The treatment of palsy in this country, as in every other, has been very generally empirical, owing to the extreme difficulty of ascertaining in all cases its true pathology. Prof. GEDDINGS, of Maryland, has reported several highly interesting cases which yielded to the influence of *strychnine*. The late Dr. BARTON employed internally, with much success, in the Pennsylvania Hospital, *mustard seed* and *horse radish*. Dr. DELAFIELD, of New-York, has recorded several very interesting cases of partial paralysis of the face, in which cupping, leeching, and blistering over the region of the portio dura, mercurial purgatives, and a seton in the neck were instrumental in effecting a radical cure.—(*N. Y. Med. and Phys. Journ.*, Dec., 1824.) We succeeded in curing a chronic case of hemiplegia of several years' standing, in an old lady of 60 years of age, by an alterative course of mercury, which produced very copious salivation.

There is a form of paraplegia, not particularly noticed by our author, owing to ramollissement of the spinal marrow, from retrocession of gout, which, so far as we have seen, is generally incurable. The symptoms come on very insidiously, and it is often not until irremediable disorganization has occurred that the true pathology becomes clearly established. We have derived most benefit in these cases from an open issue on each side of the spine, with occasional aloetic and mercurial purges, with alterative doses of the iodide of mercury. Where local paralysis has occurred from pressure on the nerves of the part, as in the arm, from sleeping upon it, or carrying a weight upon it for a considerable distance, of which we have seen several cases, we have derived most benefit from moxas, or stimulating embrocations to the limb, with an occasional cathartic and

regulated diet. In the paraplegia supervening on visceral disease, we have found local remedies, as frictions, blisters, &c., to the legs and thighs, more beneficial than applications over the spine itself. Great benefit will often result, both in hemiplegia and paraplegia, from the free internal and external use of sulphur, especially in the form of the natural sulphur waters of our country, as those of Avon, Richfield, and of Western Virginia. Cases of paraplegia, following the remittent gastric fever of children, are often unconnected with spinal disease, especially in those of a scrofulous temperament, and as a general rule, they are very obstinate under the most judicious treatment. In that form of paraplegia connected with disease of the kidneys, our attention should be partly directed to the first link in the chain of morbid action, or we shall be disappointed in the results of our remedial measures. Dr. EBERLE reports two cases of hemiplegia in which he employed, with unequivocal benefit, the saturated tincture of the *Rhus toxicodendron* (*Præc. of Physic*, vol. ii.). Doctor CALHOUN, of Philadelphia, has proposed the use of the tourniquet for restoring the power of muscles debilitated by long-continued inactivity (*Philad. Journ. of the Med. and Phys. Sci.*, vol. i., p. 131). Dr. DETMOLD, of New-York, has recommended a peculiar apparatus of his own contrivance for a paralysis of the lower extremity commonly called "weak ankle," together with the external application of a spirituous preparation of strychnine (*N. Y. Journal of Medicine*, vol. iv., p. 305). Dr. ZABRISKIE, of Queen's county, has published a well-written essay on paralysis from visceral disorders (*Am. Journ. of Med. Science*, vol. ii., N. S., p. 360), in which he recommends general and local bleeding to subdue the phlogosis, followed by mercurials, when these symptoms abate, and counter-irritation, to divert the inflammation. After the inflammatory symptoms have somewhat subsided, he enjoins the use of strychnine, which he thinks is most useful in that form of the disease which is symptomatic of visceral irritation. Doctor B. F. JOSLIN, of New-York, has given a history of two cases of paralysis of the face (*American Journ. of Med. Science*, vol. iv., N. S., p. 322), cured by the local application of strychnine (3 grs. to ʒj. alcohol) to the part three times a day. In the treatment of palsy we are always to be governed by a due regard to its causes, its pathology, and those various circumstances which modify therapeutical indications. In applying galvanism or electricity to the treatment of paralysis, "It is necessary," says M. MATTEUCCI, "to bear in mind two electro-physiological facts. The first is, that an electric current, if transmitted through a nerve for a certain period of time, destroys the sensibility of the nerve, or, in other words, paralyzes it. If allowed to remain in repose, the nerve, after a certain interval, recovers its excitability." It has been discovered, however, by MATTEUCCI, that the excitability may be restored in a much shorter period by passing a second current through the nerve in an opposite direction. The second fact to be borne in mind is, that if the nerves of a living animal be submitted to the passage of the electric current, renewed at short intervals, tetanic contractions are excited; and if the experiment



be continued for some time, the nerves entirely lose their excitability.

"These are the facts," says MATTEUCCI, "which, independently of all theory or hypothesis, should guide us in therapeutical application of the electrical current to palsies. We may, in fact, admit, that in some cases of paralysis the nerves of the affected limb are in a condition similar to that produced by the continued passage of an electric current. We have seen that, to restore the excitability to a nerve which had been deprived of it by an electric current, it is requisite to conduct the current in the opposite direction. Hence, to cure the paralysis, the current should be passed in a contrary direction to that which has produced it. In a paralysis of motion the inverse current should be employed; while, on the contrary, in a paralysis of sensation, the direct current should be used. In a case of complete paralysis, that is, of both motion and sensation, there is no reason to induce us to prefer the one current to the other.

"Theory also teaches us a rule in its application, never to continue the passage of the current too long, lest we augment the disease we wish to cure. The more intense the current, the shorter should be its duration; and as we have seen that the passage of the electric current in the nerves, repeated at short intervals of time, considerably enfeebles their sensibility when continued for a long time, we must take care and not pass from one extreme to another. Theory advises us to apply the electric current of an intensity which should vary with the degree of the malady, and continue its passage for two or three minutes, at intervals of some seconds. After these two or three minutes, during which we shall have communicated from twenty to thirty shocks, we should leave the patient at rest for some time, and then renew the treatment."—(*Med. Chirurg. Review*, April, 1845.) The same principles, doubtless, should regulate the application of galvano-magnetism, as of ordinary electricity.]

BIBLIOG. AND REFER.—*Celsus*, L. iii., c. 27.—*Pliny*, L. xviii., c. 16.—*Paulus Ægineta*, L. iii., c. 18.—*Oribasius*, Synopsis, l. viii., c. 14.—*Avicenna*, Canon, l. iii., fen. ii., tract. i., c. 2.—*Zacutus Lusitanus*, *Med. Pract. Hist.*, l. i., No. 45; et vii., obs. 13, 14, 15.—*Morgagni*, De Sed. et Caus. Morb., Ep. ii., art. 11, 14; Ep. iii., *passim*.—*J. Summers*, A short Account of the Success of Warm Bathing in Paralytic Disorders, 8vo. London, 1751.—*B. Franklin*, On Electricity in Paralytic Cases, Phil. Trans. London, 1757.—*G. Cavallini*, Storia d'una Paralizia curata con l'Unzione Mercuriale, 4to. Venez., 1769.—*R. Charlton*, An Inquiry into the Efficacy of Warm Bathing in Palsies, 8vo. Oxf., 1770.—*J. N. Marquet*, Traité de Apop. Paral., &c., 12mo. Paris, 1770.—*R. Charleton*, Three Tracts on Bath Waters; 2d. On Palsies, 8vo. London, 1775.—*Haller's* Disput. ad Morbos, &c., vol. i., p. 17, 97, 115.—*Percboom*, in *Schlegel*, Thes. Patholog. Therap., vol. i., p. 243.—*B. Chandler*, An Inquiry into the Theories and Methods of Cure of Apoplexies and Palsies, 8vo. Cantab., 1781.—*Hart*, in *Philos. Trans.*, vol. xlviii., p. 786.—*P. Pott*, Remarks on Palsy of the Lower Limbs found to accompany Curvature of the Spine, &c., 8vo. Lond., 1779; and Farther Remarks on the same, 8vo. Lond., 1782.—*J. Jebb*, Select Cases of the Disorders commonly called Paralysis of the Lower Extremities, 8vo. London, 1782.—*C. Cramer*, De Paralyti et Setaceorum adversus eam eximio usu; in *Sandifort*, Thesaur. Dissertat., vol. i., p. 127.—Narrative of the Efficacy of Bath Waters in various Paralytic Disorders, 8vo. Lond., 1787.—*J. Alderson*, An Essay on Rhus Toxicodendron, showing its Efficacy in Paralysis, &c., 8vo. Hull, 1793.—*Vaughan*, in *Mem. of the Medical Society of London*, vol. i., art. 28, 8vo. Lond.—*Falconer*, in *ibid.*, vol. ii., art. 20.—*Fothergill*, in *Med. Observat. and Inquiries*, vol. v., p. 394.—*T. Kirkland*, A Comment on Apoplectic and Paralytic Affections, &c., 8vo. Lond., 1792.—*Rahn*, in *Museum der Heilkunde*, b. iv., p.

397.—*L. V. Brera*, Riflessioni sul' Uso del Fosforo nell' Emiplegia, 8vo. Pavia, 1798.—*Louyer Villermay*, in *Mém. de la Société Méd. d'Emulation*, t. v., p. 430.—*Latour*, in *ibid.*, t. vi., p. 57; Mémoire sur la Paralyse des Extrémités Inférieures, &c., 8vo. Paris, 1805.—*Portai*, Cours d'Anat. Méd., t. i., p. 303; t. iv., p. 118.—*Reiz*, Memorab. Clin., fasc. iv., No. 4.—*J. P. Frank*, De Cur. Hom. Morbis, l. ii., p. 46; et l. v., 2, p. 497; l. vi., l. p. 260; et *Interp. Clinica*, vol. i., p. 145.—*Pinel*, Nosograph. Philosoph., t. ii., p. 93.—*Marcus*, Magazin für Therapie und Klinik, b. i., p. 325.—*F. Frank*, Nuovo Giornale di Milano, t. iv.—*Gaultier de Claubry*, in *Journ. Gén. de Méd.*, t. xvi., p. 18.—*Hufeland*, *Journ. der Pr. Heilk.*, p. 78, 1811.—*M. Baillie*, *Med. Trans. of Roy. Coll. of Phys. Lond.*, vol. vi.—*R. Powell*, *Observat. on some Cases of Paralytic Affection*, 8vo. London, 1814.—*T. Copeland*, *Observat. on the Symp. and Treat. of the diseased Spine, &c.*, with Remarks on the consequent Palsy, 8vo. Lond., 1815.—*Mollie*, Recueil d'Observat. sur l'Apop. et la Paral. guéris sans retour, &c., 8vo. Paris, 1816.—*J. Parkinson*, An Essay on the Shaking Palsy, 8vo. Lond., 1817.—*J. Copland*, in *Lond. Med. Repos.*, vol. xvii., p. 379; vol. xviii., p. 523.—*Merat*, *Dict. des Sciences Méd.*, t. xx., art. *Hémiplegie*.—*Chamberet*, in *ibid.*, t. xxiv., art. *Paralytie et Paraplegie*.—*J. Cooke*, A Treatise on Nervous Diseases, vol. ii.; ou Palsy, 8vo. Lond., 1823.—*D. A. G. Richter*, Die Specielle Therapie, &c., b. viii., p. 621.—*Rostan*, Recherches sur Ramollissement du Cerveau, &c., 8vo. Paris, 1823, *passim*.—*Rochoux*, *Dict. de Méd.*, t. xv., art. *Paralytie*.—*Burder*, in *Lond. Med. and Physical Journ.* for June, 1827.—*Hufeland*, in *Journ. des Progrès des Scienc. Médicales*, t. iii., p. 254.—*Leuret*, in *ibid.*, t. x., p. 167.—*Dugès*, Archives Génér. de Méd., t. xx., p. 258.—*Cazauvieilh*, in *ibid.*, t. xiv., p. 5.—*Pelletier*, in *ibid.*, t. xviii., p. 200.—*Bayle*, in *Revue Méd.*, t. i., p. 33; t. ii., p. 143, 1825; et t. ii., p. 247, 1826.—*Calmel*, de la Paralytic chez les Aliénés, 8vo. Paris, 1826.—*Taliaferro*, *Am. Jour. of Med. Sci.*, vol. vi., p. 99; et *ibid.*, p. 227; et t. viii., p. 236.—*Albers*, in *Johnson's Med. and Chirurg. Rev.*, No. 43, p. 227.—*S. D. Broughton*, Cases Illust. of the Distinct Functions of the Nerves, in *Lond. Med. and Phys. Journ.*, vol. lvii., p. 413; *Trans. of Prov. Med. Association*, vol. ii., p. 300; and *Lancet*, Oct. 1, 1836, p. 34.—*L. F. Calmel*, De la Paralytic, considérée chez les Aliénés, 8vo. Paris, 1826.—*J. Abercrombie*, Pathological and Practical Researches on Dis. of the Brain and Spinal Chord, 3d edit. Edinb., 1834.—*T. Chevalier*, in *Trans. of Med. and Chirurg. Soc.*, vol. iii., p. 102.—*Shaw*, in *ibid.*, vol. xii., p. 105.—*H. Earle*, in *ibid.*, vol. xiii., p. 516.—*E. Stanley*, in *ibid.*, vol. xviii., p. 260.—*Seymour*, *Medical Gazette*, Oct. 29, 1836, p. 151; and Dec. 24, 1836, p. 445.—*R. Graves*, in *ibid.*, May 20, 1837, p. 257.—*Chandler*, *Dublin Journ. of Med.*, March, 1837, p. 164.—*Craigie*, *Edin. Med. and Surg. Journ.*, Oct., 1836, p. 318.—*Todd*, in *Cycl. of Practical Med.*, vol. iii., p. 240.—*B. C. Brodie*, On Injuries of the Spinal Chord; in *Trans. of Med. and Chirurg. Soc. of London*, vol. xx., p. 118.—*W. Budd*, in *ibid.*, vol. xxii., p. 153.—*M. Hall*, in *ibid.*, vol. xxii., p. 191; et vol. xxiii., p. 121–162; and vol. xxiv., p. 83.—*E. Stanley*, in *ibid.*, vol. xxiii., p. 80.—*C. Hawkins*, in *ibid.*, vol. xxiv., p. 51.—*J. Webster*, in *ibid.*, vol. xxvi., p. 1.—*J. R. Bennett*, in *Lib. of Pract. Med.*, vol. ii., p. 274.

PARALYSIS FROM POISONS.—*Borellus*, Cent. iv., obs. 32.—*Hoffmann*, De Nerv. Resolut., opp. iii., p. 203.—*C. Haen*, Ratio Medendi, vol. iii., p. 113.—*Bang*, in *Acta Reg. Soc. Med. Haam.*, vol. i., p. 102.—*Stoll*, Rat. Medendi, part ii., p. 416.—*Falconer*, *Mem. of Med. Society of Lond.*, vol. ii., p. 224.—*Brandis*, Ueber die Wirkung der Eisenmittel, &c., p. 150.—*Percival*, *Essays*, vol. ii., p. 290.—*Murray*, in *Edin. Med. and Surg. Journal*, vol. xviii., p. 167.—*Bateman*, in *ibid.*, vol. viii., p. 376; and vol. ix., p. 180.—*Berat*, Beiträge zur gerichtlichen Arzneikunde, b. iv., p. 221.—*Burger*, in *Horn's N. Archiv*, b. ii., p. 340.—*Merat*, Traité de la Colique Metalique, p. 275.—*R. Bright*, Reports of Medical Cases, &c., 4to, vol. ii., p. 495.—*R. Christison*, A Treatise on Poisons, &c., 3d edit., 8vo, p. 290, 386, 515. Edinb., 1836.

PARALYSIS OF INFANTS AND CHILDREN.—*Cazauvieilh*, in *Archives Génér. de Médecine*, t. xiv., p. 5, 349.—*E. Kennedy*, in *Dublin Medical Journ.*, vol. x., p. 430.—*R. Doherty*, in *ibid.*, vol. xxv., p. 82.—*H. Kennedy*, *Dublin Medical Press*, Sept. 29, 1841.—*M'Cormac*, in *Lancet*, May 27, 1843.—*C. West*, in *Med. Gazette*, vol. xxiii., p. 829.—*Colmer*, in *ibid.*, April 21, 1843. (See, also, the BIBLIOG. AND REFER. to arts. APOPLEXY, BRAIN, Structural Lesions of, and SPINAL CHORD.)

[AD. BIBLIOG. AND REFER.—*Wm. T. Taliaferro*, Paralysis successfully Treated with Moxas, in *Am. Jour. Med. Sci.*, vol. vi., p. 99.—*J. H. Miller*, in *Am. Jour. Med. Sci.*, vol. xiv., p. 321. On Galvanism in Paralysis.—*W. E. Horner*, A Treatise on Pathological Anatomy.—*J. R. Lucas*, in *Am. Med. Recorder*, 1826, p. 239.—*Boston Med. and Surg. Jour.*, vol. xxviii., p. 362.—*S. B. Tobey*, in *Bost. Med. and Surg. Jour.*, vol. xxvii., p. 415 (Case of partial paralysis of the face in a child cured by galvanism, applied by means of "Page's Revolving Armature for Shocks").—*W. J. Barber*, in *Bost. Med. and Surg. Jour.*, vol. xviii., p. 263.—*B. B. Strobel*, in *South. Med. and Surg. Jour.*, 1836.—*H. Chond*



ter, in Bost. Med. and Surg. Jour., vol. xv., p. 91.—S. H. Dickson, Essays on Pathology, Therapeutics, &c., 2 vols. Charleston, S.C., 1845.—R. Dunglison, The Practice of Medicine, 2 vols., 8vo. Philad., 1844.—W. P. Dewees, A Practice of Physic, &c., 8vo. Philad., 1833.—H. A. Potter, in New-York Journ. Med. and Collat. Sci., vol. iv., p. 174.—W. P. Buel, in New-York Journ. Med. and Collat. Sci., vol. ii., p. 34.—R. J. Graves, Clinical Lectures, with Notes, by W. W. Gerhard. Phil., 1842, 8vo.—John Eberle, A Treatise on the Practice of Medicine, 2 vols., 8vo. Phil., 1835.—J. Bell and W. Stokes, Lectures on the Theory and Practice of Physic, 3d ed., 2 vols. Philad., 1845, 8vo.—Samuel Annan, in Am. Jour. Med. Sci., vol. ii., N. S., p. 99.—J. B. Zabriskie, in Am. Jour. Med. Sci., vol. ii., N. S., p. 360.—Detmold, in New-York Journ. of Med., vol. iv., p. 305.—S. Cathoun, in Phil. Jour. of the Med. and Phys. Sci., vol. i., p. 131.—Edward Delafield, in New-York Med. and Phys. Jour., Dec., 1824.—B. F. Joslin, in Am. Journ. Med. Sci., vol. iv., N. S., p. 322.—Alban Goldsmith, Case of paralysis from fracture, in which the spinous processes of two vertebrae, half of the third and the whole of the fourth, were removed by an operation, with partial success, in Am. Med. and Surg. Journ., 1829.]

**PAROTID GLAND—DISEASES OF.**—This gland is often the seat of inflammation, of congestion, of scrofulous enlargement and inflammation, and of several other structural lesions. It is liable to be variously affected by the ingesta, whether alimentary or medicinal; and it is often the seat of symptomatic disease, particularly in the course of those maladies which reduce vital power or contaminate the blood. The diseases of the parotid may be divided into, 1st. The functional; 2d. The inflammatory; and 3d. The structural.

#### I. FUNCTIONAL DISORDERS OF THE PAROTID GLAND.

CLASSIF.—I. CLASS, I. ORDER (Author).

1. These disorders have received but little attention from medical writers; for, unless in a few prominent cases, they seldom attract attention, and even in these they are generally symptomatic of some more important malady to which a primary and principal attention should be paid. The functional disorders of the parotid consist chiefly of *excessive* and *diminished* secretion. Doubtless, an alteration of the *quality* as well as of the *quantity* of the secretion often obtains, but the latter change is more obvious, while the former can be inferred chiefly from the deposits formed from the salivary fluid, either in the ducts or upon the teeth; or from the action of chemical re-agents, which, according to M. DONNE, evince more or less of acidity in inflammatory diseases, with an increase of the animal elements. (See art. SALIVA.)

2. i. DEFICIENT SECRETION OF THE PAROTIDS arises from numerous circumstances and agents affecting the digestive organs or the constitutional powers. Great mental anxiety; heating articles of food, condiments, and beverages; general vascular excitement; and morbid states of the blood, may diminish or altogether arrest the action of the parotids and other salivary glands. Irritation or inflammation of the stomach, or of other digestive organs, sometimes has a similar effect; and numerous stimulating, astringent, and anodyne medicines impair the action of these glands, although in a very uncertain and capricious manner. Deficiency of the salivary secretion also generally attends most fevers and inflammatory diseases, more especially those fevers in which the blood is early contaminated; and in the more malignant maladies, when the action of the parotids is arrested, the glands themselves become swollen and tender. The secretion of these glands is generally diminished in diabetes and dis-

eases of the kidneys. (See arts. SALIVA and SALIVATION.)

3. ii. INCREASED ACTION OF THE PAROTIDS often arises from the ingestion of various articles of food, condiments, and medicines; but when it is caused by food or condiments, it is generally transient and slight. It is often very remarkable and prolonged when caused by medicine, especially by mercurials; and it is usually more moderate and irregular when it is symptomatic of other diseases, as of affections of the pancreas, or of the stomach or duodenum, &c. Seeing, however, that the functions of the parotid are generally affected co-ordinately with those of the other salivary glands, whether quantitatively or qualitatively, they will be more particularly considered in relation to diagnosis and prognosis, under the heads SALIVA and SALIVATION.

#### II. INFLAMMATION OF THE PAROTID GLANDS.

SYNON.—Παρωτίτις (from *παρά*, near, and *οὐς* the ear), Galen. *Parotis*, Vogel, Sauvages, Pinel. *Parotitis*, Darwin. *Cynanche Parotidea*, Cullen, Parr. *Angina externa*, Russel. *Empresma parotitis*, Good. *Cauma parotitis*, Young. *Oreillons*, Parotide, Ourlès, Fr. *Entzündung der Ohrdrüse*, Germ. *Parotit*, Ital. *Mumps*, Branks, *Inflammation of the Parotid*.

CLASSIF.—1st Class, 2d Order (Cullen). 3d Class, 2d Order (Good). III. CLASS, I. ORDER (Author).

DEFIN.—Pain, tenderness, and swelling in the situation of one or both parotids, with symptomatic fever, occurring either sporadically, endemically, or epidemically.

5. i. CAUSES AND HISTORY.—A. Parotitis is most frequently observed in children, and about the period of puberty, and but rarely after twenty-five or thirty years of age, in an acute form, although it sometimes occurs in advanced life as a chronic disease. M. BEGIN thinks that it is more frequent in children of the male than of the female sex. It proceeds, *sporadically*, from cold conjoined with humidity, and from currents of cold air. It is sometimes so prevalent in cold and humid localities, especially during the colder months, as to be *endemic*; and it is occasionally *epidemic* in extensive districts. When thus prevalent, it has appeared in many instances to have been propagated by *infection*, particularly in schools and in ships, &c., where a single case has frequently been followed by very many; but in these circumstances the propagation of the complaint may be imputed to exposure to the same physical agents and atmospherical states; although the removal of a boy from a school in which the disease prevailed to a locality where it was unknown, and the subsequent infection of other children by the one removed, militate against these agents having been the cause, and evince an infectious property. I have seen two instances of the disease appearing in nurses while attending on persons affected with erysipelas of the face and scalp, and in both these the adjacent cellular tissue was much implicated. One or both glands may be affected; and when the disease is epidemic, the maxillary glands are often similarly diseased. The accumulation of morbid secretions or of fecal matters in the *prima via* evidently favours or predisposes to an attack of the complaint. Ep-

idemic parotitis very rarely attacks the same individual a second time. In scrofulous persons, simple or sporadic parotitis often assumes a modified character, and becomes chronic or prolonged. It not infrequently follows scarlet fever and other exanthematous fevers, and then assumes a very severe and troublesome form, particularly after scarlatina, the inflammation often extending far into the adjoining cellular tissue and to the lymphatic glands of the neck.

6. *B. Symptoms.*—*a.* The invasion of the complaint is usually indicated by irregular chills or rigours, followed by lassitude; pain and tenderness, with stiffness in the neck; frequency of pulse; heat of skin; difficulty of mastication, owing to swelling and pain in the situation of one or both parotids; occasionally a somewhat increased flow of saliva; slight difficulty of deglutition, more or less increased when the adjoining glands are affected, and by the usual attendants on symptomatic fever, as thirst, loss of appetite, costiveness, headache, &c.

7. In some cases the symptoms are even milder than now stated. The swelling, pain, tenderness, and tension are slight; the pulse is but little affected; and the organic functions are not materially disturbed. From this state of extreme mildness every grade of severity occurs, until the disease assumes much more intense characters, both locally and generally. In these latter the swelling is great, not merely in the situation of one or both parotids, but extends to the sub-maxillary glands, sometimes also to the tonsils, and to the adjoining cellular tissue. In these cases there are generally much heat and sensibility of the parts, often with more or less redness, and always with difficult mastication and deglutition, owing to the great tumefaction. There are also acute symptomatic fever, with urgent thirst, loss of appetite, severe headache, flushed countenance, &c.

8. *b.* The duration of the complaint varies much in the *simple* and *sporadic* form of the disease; beginning to subside in four or five days in some cases, and continuing to increase during a longer period, or passing into suppuration in others. When it follows the eruptive fevers, especially scarlatina, or when it occurs in the scrofulous diathesis, as it frequently does, it is often of longer duration than in other circumstances, or when it appears epidemically; and it more readily passes into suppuration of a chronic kind, the matter being discharged externally, and but rarely by the external meatus auditorius. In the *epidemic* disease, perspiration usually breaks out on the fourth or fifth day, commencing and becoming more copious about the neck, breast, and head, but often extending more generally. The pain, tension, and swelling of the parotids afterward diminish, and the affected parts return to their natural state.

9. *c.* Suppuration, which is more frequent in the *simple*, in the *consecutive*, and in the *scrofulous* states of the disease than in the *epidemic*, is commonly indicated by a greater intensity of the local symptoms; by marked redness of the more swollen part; by a more central and circumscribed elevation; by the pain being less acute and more throbbing; by the more elevated part of the tumour becoming softer, and ultimately betraying more or less evident fluctuation.

The cellular tissue surrounding the gland or connecting its lobules is generally the seat of suppuration. BICHAT and others have supposed that the lymphatic glands surrounding the parotids are more affected than the parotids themselves; and this may be the case, especially in the *consecutive* (§ 11) and *scrofulous* varieties of the disease. Probably, also, in the *epidemic* form, these parts, with the glands themselves, and the adjoining cellular tissue, are more or less implicated.

10. *d.* Metastasis of disease from the parotids to the testes, mammae, or even to the brain or its membranes, has been often observed and noticed by writers as one of the terminations of the disease, especially when appearing epidemically. When this occurrence takes place, the swelling under the ears rapidly subsides, and either the testis or the mamma on the same side with the affected parotid becomes painful and swollen. When both parotids have been affected, the metastasis has in rare instances taken place to both testes or to both mammae. I have not met with a case in which suppuration has occurred in these parts after metastasis from the parotids. In some instances the parotids have become again affected upon the subsidence of the engorgement of the testicle. I have observed but few instances in which the brain or its membranes have been affected consecutively upon the sudden disappearance of the disease of the parotids; and these recovered under the treatment about to be noticed.

11. *C.* The nature of inflammations of the parotids, in their several modes of manifestation, requires more consideration than has hitherto been devoted to it. That the *epidemic* state of the disease is different in many respects from the primary and simple form is shown by various circumstances, to which I will more particularly allude.—*a.* Simple parotitis, whether occurring primarily from cold or any other cause, or consecutively of eruptive fevers, or of other affections implicating the throat or mouth, is more distinctly an inflammatory disease, and is more strictly local than the *epidemic* malady. It is also more prone to assume all the characters of inflammation of glandular parts, and to pass into suppuration, than the latter form.

12. *b.* Epidemic parotitis is less strictly inflammatory, at least in a large proportion of cases, and is more manifestly congestive; consisting rather in active congestion, or an engorgement of the parotids and adjoining glands, than the simple form of the disease. It is also less a local than a constitutional malady; and this, as well as its more congestive character, is shown by its originating in infection, by its disposition to metastasis, by its definite course, and by its frequently terminating by a distinct crisis. The simple or sporadic complaint is attended by fever, which is merely symptomatic of the local inflammatory action; while the *epidemic* is characterized by fever, which is less a symptomatic than a primary or idiopathic malady, and of which the swelling of the salivary glands is an attendant or local feature, consisting of congestion or engorgement of these glands rather than of actual inflammation. In the epidemic or specific form of the disease, the fever is rarely sthenically inflammatory, but generally is either mild, or partakes more of an adynamic or asthenic character, and requires a different



treatment from the truly inflammatory or simple form of the complaint.

13. *c.* From this it will be seen that I consider *Parotitis*, or inflammation of the parotid, to consist of the following *varieties and states*: namely, 1st. *Simple or Common Inflammation*, occurring, *a. primarily*, or independently of pre-existing disease; and, *b. consecutively*, or following eruptive fevers and affections of the mouth and throat, in both which states it usually presents an acute character; 2d. *Scrofulous Inflammation* of the parotids, or parotitis affecting the strumous diathesis, and usually assuming a chronic or indolent form; 3d. *Epidemic Parotitis*, or that proceeding from a *specific* cause, and presenting a *specific* or distinct and regular course. Indeed, it is doubtful whether this last should be arranged as a local inflammation, or rather as a specific form of fever caused by infection, and characterized by congestion or engorgement of the salivary glands, and a tendency to metastasis to the testicles, and thence to the brain.

14. *ii. TREATMENT.*—The treatment of inflammations of the parotid should vary with the severity of the local symptoms, and with the character of the attendant fever.—*a.* In the *simple form* of the disease, when *primary* and *slight*, moderate warmth, sustained by the application of flannel locally, and cooling aperients and diaphoretics, are generally sufficient to promote resolution. I do not believe that cold applications are beneficial in this complaint; they may even prove injurious. In more severe cases, where inflammatory action is unequivocally manifested in the gland and its vicinity, blood should be taken away locally, and a more strict and antiphlogistic treatment and regimen adopted, as in other cases of inflammation. If suppuration commence, it should be promoted by the usual warm applications, and an early outlet be given to the matter which is formed.

15. *b.* In the *consecutive form* of *parotitis*, particularly that following the anginous states of eruptive fevers, even local depletion should be cautiously prescribed, and with strict reference to its effects. Diaphoretics, stomachic aperients, warm baths, and diuretics are generally required in these circumstances; and if the swelling become sub-acute or indolent, small doses of the iodide of potassium, with liquor potassæ, may be given in the compound decoction of sarsaparilla. If suppuration take place, the matter should be early evacuated, and the iodide and solution of potash may be given in the decoction of cinchona, &c., and change of air, especially to the seaside, advised.

16. *c.* The *scrofulous*, sub-acute, and chronic states of *parotitis* sometimes require the application of a few leeches to the parts, or to their vicinity, and the means just recommended (§ 15) firmly persisted in for a considerable period. BRANDISH's alkaline solution may be substituted, in many cases, for the solution of potash. When there is some degree of anæmia, or when the affection occurs in females about the period of puberty, with delayed or scanty menstruation, the iodide of iron may be taken in the sirup of sarsaparilla, and warm salt-water bathing, or warm salt-water hip baths resorted to.

17. *d.* The *epidemic form* of the complaint is

so slight in some cases as to require merely protection from cold and humidity, and attention to the state of the secretions and excretions. The affected parts ought to be kept moderately warm, and the excretions from the bowels and skin promoted. When the local affection is more decidedly inflammatory, the swelling of the neck being considerable, and the surface generally red, febrile action being also great, a number of leeches may be applied, and their operation promoted by warm fomentations. Cold applications are especially hazardous in this form of the complaint, as favouring metastasis to the testes; and this risk may even be incurred by active purgatives. Antimonial diaphoretics and gentle aperients are the safest means which can be employed in most cases of this affection. If metastasis to the testicles or to the mammae occur, these are also the best remedies, in connexion with the horizontal posture. In these secondary states of disease, the application of leeches, followed by warm fomentations and poultices, is generally necessary. Antimonial emetics are often of service in inflammation of the testes; but when this disease occurs suddenly upon the disappearance of parotitis, the subsequent metastasis of the malady to the brain should be dreaded, as it sometimes takes place; and it may be favoured by the active operation, and consequent perturbation of emetics, and by the application of cold to the diseased testicles.

18. It is possible that *parotitis*, caused by cold and humidity, may assume an endemic form, or may affect a number of persons who are exposed to these causes, or exist in a particular locality. It has thus affected a considerable number of a ship's crew, and it has then manifestly arisen from the once general practice of daily, and even more frequently, washing the decks, now happily abandoned. The cold and humidity produced in a confined space by this practice were the sources of more maladies, especially of rheumatism, erysipelas, fevers, &c., than were recognised in those days. Mr. NOBLE, in his account of *parotitis* endemic in a ship of war, states that the swelling and redness of the neck suddenly subsided on the fourth and fifth days, and were in all the cases rapidly followed by metastasis to the testes, the epididymis and spermatic chord not being affected. In two instances a second metastasis took place from the testes to the brain, the cerebral symptoms being well marked and severe. In no instance did the disease return to the parotids. This remarkable frequency of metastasis was probably favoured by the persistence of the cause originating the disease, and by the use of cold applications and drastic purgatives.

19. *e.* In some instances, especially in aged persons, or in females about or soon after the change of life, the complaint assumes a *chronic static*, obscure inflammation extending to the adjoining cellular tissue, and giving rise to the formation of matter, and even to indolent ulceration, if a suitable treatment be not employed. In these, a few leeches should be applied, and sometimes repeated, and an antimonial emetic exhibited. Subsequently, antimonial diaphoretics may be given, and, if matter form, fomentations, poultices, and an early outlet to the matter are requisite. If the disease become



indolent, or if swelling and hardness remain, the iodide of potassium, with liquor potassæ and sarsaparilla, should be prescribed. The external application of a weak tincture of iodine, or of the iodide of potassium, in the form of ointment, may also be tried; but I have seldom seen this ointment beneficial unless the proportion of iodide has been much smaller than that usually prescribed. Dr. NEUMANN (*Edin. Med. and Surg. Journ.*, No. 93, p. 452) applied a plaster, consisting of eight parts of mercurial ointment, and one of the iodide of potassium, to the swollen gland with great success, during an epidemic parotitis which prevailed in Silesia, having premised an emetic. When parotitis, either simple or epidemic, occurs about the period of puberty, and previous to menstruation, it is apt to become obstinate and chronic, particularly in scrofulous habits. In these cases, the iodides combined according to the peculiarities of the case; local depletion, emmenagogues, horse exercise, warm salt-water bathing, stomachic aperients, &c., are most serviceable.

### III. ORGANIC LESIONS OF THE PAROTIDS.

#### CLASSIF.—IV. CLASS, I. ORDER (*Author*).

20. Structural lesions of these glands, both the consequences of inflammation and independent of this state of disease, are sometimes observed. The most frequent and important of these are enlargements, scrofulous disease, scirrhus, and open carcinoma. To these may be added the congestions and asthenic inflammation, sometimes terminating in sphacelation, occasionally observed in malignant fevers, and frequently in the plague.

21. *A. Chronic enlargement* of the parotid, without pain, heat, or any other indication of inflammatory action, is sometimes met with. In some cases the gland increases to three or four times its natural size. It is difficult to determine how far hypertrophy is owing to change in the lobular structure, or to deposits of lymph in, or change in the nutrition of, the interlobular and surrounding cellular tissue. Most probably both orders of structure, and even the surrounding lymphatic glands, are more or less implicated; and this seems the more likely, since the researches of MURAT and others have shown the granules and minute lobules of the gland to be affected in parotitis. A very remarkable case of chronic enlargement, first of one parotid, and afterward of the other, the first having become much reduced after a considerable time, lately came under my care. The history of this case, as well as of others which I have seen, led me to infer that the enlargement was consequent upon obstruction or obliteration of the canal of the duct. After having had recourse to a variety of means, the enlargement was at last entirely removed by a prolonged course of the iodide of potassium in minute doses with conium. In this instance, from half a grain to a grain only of the iodide was given in the twenty-four hours, a larger dose occasioning uneasiness and febrile excitement.

22. The symptomatic enlargements, congestions, asthenic inflammations, softenings, and even gangrene, sometimes observed in malignant fevers and the plague, were imputed by BICHAT and others rather to alterations in the

connecting and surrounding cellular tissue and lymphatic glands than to change in the granules of the gland itself. But the researches of MURAT and others have shown that these granules are affected from the commencement of simple parotitis, while those of BULARD and CLOT-BEY have evinced that the surrounding lymphatic glands are more especially implicated in the plague, and in other sympathetic enlargements in the region of the parotids.

23. *B. Tumours* of various kinds are sometimes seated in the parotid, and scirrhus and open cancer, commencing either superficially or in the gland itself, or in the lymphatic glands surrounding the parotids, are occasionally met with. These have been the themes of prolonged surgical disquisitions, as well as the subjects of surgical operation. But in this last resource the dexterity or daring of the operator has been oftener displayed than the propriety and success of the undertaking. Comparatively few cases admit of this procedure—in very few ought it to be attempted when the disease is malignant; and in none of a non-malignant nature, without having previously duly tried the means already indicated both in this article and in those on SCROFULA and TUMOURS. (*See arts. SALIVA, SALIVARY DUCTS, and SALIVATION.*)

[It is very important, in the treatment of tumours situated in the parotid region, as well as other parts of the body, to allay all mental anxiety, as it is found that disquietude of mind and perturbation of spirits are powerful causes in promoting morbid growths. As they generally have their origin in mal-assimilation, or faulty secretion and excretion, it is of the first importance to shape our remedies with these ends in view; for, without attending to these functions, local applications will be altogether useless; and even should the tumour be removed, similar deposits will take place in other parts of the body. If the healthy functions of the various secreting organs can be maintained, there is every probability that morbid growths will eventually disappear; at any rate, they will rarely become malignant, or call for a surgical operation. We have for several years been in the habit of treating tumours *medically* rather than *surgically*, and we have met with but very few cases in which extirpation was called for. Where a tumour is so situated as seriously to disturb the functions of parts essential to life, as over the trachea, or within the mouth and about the jaws, its removal becomes not only justifiable, but absolutely necessary. It may be that the presence of the tumour, although not malignant, is the cause of continual apprehension on the part of the patient, which cannot be allayed except by its removal; here it will be in vain to attempt to check its growth by local or constitutional means, and it may, therefore, with propriety be extirpated. By strict attention to hygienic regulations, air, food, exercise, and bathing, with a mild, alterative course of iodine and sarsaparilla, we shall succeed, in a large majority of cases, in allaying the pains and checking the growth of tumours, if we do not succeed in effecting their entire removal by absorption. We agree with our author that a surgical operation in the first resort is never advisable, except under the circumstances above detailed].

BIBLIOL. AND REFER.—O. Valentini, Discorso Med. Chirurgico intorno alle Parotidi nelle Febbri. Perug., 1736.—E. G. Schmidt, Abhandl. von den Geschwulsten am Halse, &c. Brauns., 4to, 1755.—Rochard, in Journ. de Médecine, t. vii., p. 379, 1754.—M. Stoll, Rat. Med., p. iv., p. 263.—Mariotti, Delle Parotidi ne' Mali Acuti, 8vo. Perug., 1785.—R. Hamilton, Account of the Mumps, Trans. of Roy. Soc. of Edin., vol. ii., 4to. 1790.—J. B. Siebold, Hist. Systematis Salivæ Physiolog. et Pathologicæ considerati, &c., 4to. Jena, 1797.—A. L. Murat, La Glande Parotide consid. sous ses Rapports Anatom., Physiolog., et Pathologiques, 8vo. Paris, 1803.—J. Noble, in Edin. Med. and Surg. Journ., vol. iv., p. 304 (Epidemic).—A. Duncan, in Edin. Med. and Surg. Journ., vol. vii., p. 431 (Epidemic).—Murat, in Dict. des Sciences Méd., t. xxxviii., art. Oreillon; et t. xxxix., art. Parotide.—E. Gendron, Mém. sur les Fistules de Glande Parotide, 8vo. Paris, 1820.—Hammersley, in New-York Medical Repository, July, 1822, p. 443.—Rochouzeau, Dict. de Méd., t. xvi., art. Parotide.—Begin, Dict. de Méd. et Chir. Prat., art. Parotide.—W. Kerr, Cyclop. of Pract. Med., vol. iii., p. 260.—A. Duplay, Observat. de Parotides survenues dans le Cholera, in Archives Génér. de Méd., t. xxix., p. 365. 1832.

[For an account of American operations for the removal of the parotid gland, see REES'S edition of COOPER'S Surgical Dictionary, p. 259].

PELLAGRA.—SYNON. *Dermatagria*, Titius. *Scorbutus Alpinus*, Frank. *Ichthyosis Pellagra*, Alibert. *Tuber Pellagra*, Parr. *Lepra Lombardica*, Swediaur. *Elephantiasis Italica*, Good. *Pellagre*, Fr. *Pellarella*, Pelagra, Mal di Misericia, Malattia della Misericia, Mal del Sole, Mal Rosso, Ital.

CLASSIF.—3d Class, 4th Order (Good).

IV. CLASS, IV. ORDER (Author).

1. DEFIN.—A squamous eruption, chiefly on those parts of the body exposed to the sun or air, preceded and attended by disorder of the digestive organs and nervous system; accompanied with general cachexia; a sense of burning pains in the trunk and limbs; ennui and melancholy; intermitting at first, afterward more continued; endemic and hereditary.

2. The antiquity of Pellagra has been a subject of doubt. MOSCATI and others consider that the disease has not been known much before the middle of the last century, while STRAMBIO, who was physician and director of the hospital established near Milan for the reception of *pellagrosi*, states, in his treatises published in 1784-7, that he had seen many *pellagrosi* in the hospital, who assured him that their fathers and grandfathers had died of the malady. Dr. HOLLAND adds, that F. FRAPOLI, physician to the hospital at Milan, in his treatise on the disease, published in 1771, also contends for its antiquity, and supposes it to be the same disorder as the one called *Pellarella*, which is casually noticed in the records of the Milan Hospital for the year 1578. It is certain, however, from the concurrent testimony of all writers on the malady, that pellagra has been rapidly increasing itself since the middle of the last century. Dr. HOLLAND, who has investigated the disease more closely than any English writer, remarks that, at the time when STRAMBIO wrote (in 1784), the *pellagrosi* formed about one twentieth part of the population in the districts principally suffering under the disorder, namely, in the Alto-Milanese, where the country rises towards the Alps. In these districts, Dr. HOLLAND believes, at the time when he wrote (1817), the *pellagrosi* to be one in every five or six of the population. He adds that the disease prevails in some districts much more than in others; that it appeared first in the higher parts of the Milanese territory, and that its ravages there are still greater than in any other part of Lombardy. Some time elapsed

before it was said to have appeared in the Venetian provinces and near the shores of the Adriatic Sea. At the present time it is increasing in every part of Lombardy, as well on the plains as among the hills which rise on their northern border towards the Alps. It also exists in the province of Friuli, the district intervening between the foot of the Carinthian Alps and the northern shore of the Adriatic.\*

3. I. SYMPTOMS.—Pellagra is almost exclusively confined to the lower orders, and chiefly to peasants, and those engaged in agricultural employments.—a. Its first distinct appearance is that of a local cutaneous eruption, generally preceded by languor, debility, and indications of constitutional disturbance and cachexia. The local symptoms usually first appear early in spring, when the midday heat is increasing, and when the peasants are most actively engaged in the fields. The patient first perceives on the backs of his hands, on his feet, and more rarely on other parts of the body exposed to the sun, certain red spots or blotches, which gradually extend themselves, with a slight elevation of the cuticle, and a shining surface, not unlike that of lepra. The colour of the eruption is a more obscure and dusky red than that of erysipelas: it is attended by no other uneasy sensation than a slight pricking or itching, and some tension in the part. After a short time, small tubercles are frequently observed in the inflamed surface. The skin always becomes dry and scaly, forming rough patches, which are excoeriated and divided by furrows and rhagades. Desquamation takes place gradually, and leaves behind a shining, unhealthy state of the affected surface. Towards the close of the summer, or occasionally earlier, the parts have nearly resumed their natural appearances; and but that the farther progress of the malady is familiar to all, the patient might suppose that the mischief had disappeared.

4. With this local affection are connected from the first, general debility, vague and irregular pains of the trunk and limbs, especially in the course of the dorsal muscles and spine; vertigo and headache; irregular appetite and depression of spirits. The bowels are usually relaxed, and continue so throughout the disease. There are no febrile symptoms, and the catamenia of females are generally continued without irregularity; but there are frequent exceptions; febrile symptoms occasionally appearing, and menstruation being more or less obstructed from the commencement; but these occur chiefly in the more advanced course of the malady.

5. The patient obtains a remission, more particularly of the external eruption, during the autumn and winter of the first year; but he almost always experiences a recurrence of the symptoms in the following spring under a more severe form, and with much greater disorder of the constitution. The cutaneous affection spreads, yet still affecting chiefly the hands, neck, feet, and legs, and other exposed parts. The skin becomes callous and deeply furrowed; large rhagades appearing, especially near the

[\* M. GIBERT considers the pellagra of Lombardy to be merely an ichthyosis dependant on a chronic affection of the digestive organs. As it is a disease to which the inhabitants of our country are fortunately strangers, we shall add nothing to the very full and complete history of the disease given by our author.]



articulations of the fingers. The cutaneous affection now resembles an inveterate degree of psoriasis, or of lepra vulgaris, and, in some respects, ichthyosis, with which ALIBERT has classed it.

6. The debility is greatly increased in the second year, often rendering the patient incapable of pursuing his active labours, and rendering him susceptible of all changes of temperature. Partial sweats break out, especially on any exertion. Cramps, spasmodic affections, and pains are frequently complained of; and the mind is despondent and depressed. All the symptoms are aggravated as the heat of summer advances, especially in those most exposed to the sun. They begin again to decline, as in the preceding year, towards the middle or end of autumn; but the remission, as well of the local affection as of the general disorder, is much less complete than before; and the patient continues to suffer during the winter from debility and other constitutional symptoms.

7. The disease may continue for several years thus to remit during winter, and to present increasing or varying grades of exacerbation during the spring and summer, but generally in the third year, or in the fourth or fifth, in some instances, or even later, every symptom is renewed at an earlier period of the spring, and in an aggravated degree. The debility now becomes extreme; the patient is hardly able to support himself; and he is affected with pains in his limbs. All the constitutional phenomena indicate universal cachexia and lesion of the nervous and voluntary powers; the general symptoms now have a close analogy to those of scorbutus. The diarrhœa continues, and augments the debility; and ultimately it assumes much of a dysenteric character, particularly in the latter stages of the malady. The evacuations are offensive and morbid, and preceded by abdominal pains. Aphthæ, thirst, pains at the stomach, &c., are also frequently complained of. The odour of the breath and of the perspiration is extremely offensive. The appetite and digestion are irregular; but they are often less affected than most of the other functions. Dropsical effusions frequently appear at this stage, generally in the form of anasarca, occasionally of ascites. Vertigo, tinnitus aurium, double vision, are now usually present; and all the senses are much impaired. Spasmodic affections, irregular convulsions, involuntary movements of the head and body forward, and even complete epileptic attacks, often occur.

8. *b.* The nervous system presents remarkable disturbance, and the manifestations of the mind are more or less disordered. The pellagrosi complain of a sense of heat in the head and spinal chord; of tingling or darting pains in the course of the nerves; of heat in the limbs, palms of the hands, and particularly in the soles of the feet; of great weakness of the limbs, with trembling when attempting to stand; and sometimes of contractions of the lower limbs. Their looks become sombre and melancholy. Ennui, depression of spirits, and mental imbecility increase with the progress of the malady. Dr. HOLLAND states, that pellagrosi afford a melancholy spectacle of physical and moral suffering at this period. They seem under the influence of an invincible despondency;

they seek to be alone; scarcely answer questions put to them; and often shed tears without obvious cause. Their faculties and senses are impaired; and the disease, when it does not carry them off from exhaustion of the vital powers, generally leaves them incurable idiots, or produces attacks of mania, soon passing into utter imbecility or idiocy. The public hospitals of Lombardy are incapable of receiving vast numbers of the pellagrosi; the greater proportion perishing in their own habitations, or lingering there wretched subjects of fatuity and decay. Where extreme debility and cachexia are the causes of death, as is usually the case, they are attended with colliquative diarrhœa, spasmodic affections, coma, and extreme emaciation.

9. *c.* *Mania and delirium*, consequent upon pellagra, are either *acute* or *chronic*. The acute state sometimes proves fatal in a few days; but the more chronic form seems to retard, in some degree, the progress of the malady, the strength of the patient declining less rapidly. In this state there is always loss of memory and of the powers of attention. Religious melancholy frequently characterizes this form of delirium, with a desire to commit suicide, and usually by drowning. Hence STRAMBIO denominated this morbid disposition by the name of *hydromania*.

10. *d.* Although the disease has been described above as proceeding in its course three or four years, yet it is generally of longer duration. Several intermissions, or remissions, usually occur in its progress. It occasionally remains stationary; and certain of its phenomena sometimes predominate over the others at one time, and others at another time. Thus some relief of his sufferings is experienced by the patient from time to time, although he can entertain little hope of ultimate recovery. Occasionally the cutaneous eruption forms the principal indication of the complaint for several years, it being renewed every spring and disappearing in the autumn. The constitutional symptoms may also continue for some years comparatively slight; and, if the patient be removed to a different locality and to another mode of life, the disease may be farther protracted, or altogether arrested in its progress. It is rarely, however, that these means can be adopted; and the constitutional malady is generally so firmly established in the third or fourth year, that few hopes of benefiting the patient by treatment or by change of climate and occupation can be entertained.

11. *e.* Some cases of the disease assume a more *acute* and more rapid form, particularly in respect of the constitutional symptoms. In these the disease proceeds as rapidly as above described, with all the more severe symptoms; and, although the pulse is often very slow and weak, especially in the more chronic cases, it is sometimes frequent and hard in the more acute. This, however, only occurs when fever takes place in the progress of the malady. This consecutive fever is connected either with a state of gastro-intestinal irritation, or of asthenic inflammation, or with predominant affection of the brain and spinal chord; and is generally attended, at first, by heat of skin and irregular remissions, followed by offensive perspiration. These states of febrile excitement



generally hasten the fatal termination of the malady, usually with all the concomitant symptoms of the last stage of adynamic fever.

12. *f.* In *infants* and *children* the symptoms of the malady are not materially different from those characterizing it in more advanced life. The cutaneous affection of the hands, arms, feet, and legs is the first to appear; is renewed and augmented in successive years, and attended by the various symptoms indicative of a cachectic state of the body. The malady, as in other cases, has in them a fatal termination, unless a change of climate be obtained in an early period of its progress.

13. *g.* Some *anomalies* have been observed in the progress and succession of the symptoms of pellagra. During its first appearance in Italy, the disease was remarkable for the intensity of the cramps and spinal pains, and the trifling extent of the cutaneous affection. At a more recent period this affection became a prominent feature, while disorder of the digestive organs and mania appeared chiefly as secondary symptoms. Different phenomena have also sometimes predominated; in certain years pyralism, and in others it has been displaced by aphthæ, desquamation of the lips, &c. Very recently the various cramps, spinal pains, and convulsions, insisted on by former writers, have been less noticed than previously, while pellagrous mania and delirium are very common, and gastro-intestinal affections are general.

14. *h.* Pellagra may be *complicated* with other diseases of the skin, such as lepra, psoriasis, erysipelas, eczema, purpura, syphilitic eruptions, &c.; and with intermittent and remittent fever, scrofulous affections, phthisis, peritonitis, white swellings of the joints, &c.

15. II. APPEARANCES ON DISSECTION.—Lesions are found chiefly in the digestive canal, nervous system, and skin.—*a.* In the five bodies examined by M. BRIERRE DE BOISMONT, the mucous membrane of the *stomach* was red, intersected by bluish or dark vessels, soft, pulsaceous, and easily removed. The redness was greatest at the large end of the stomach; the mucous membrane was thinner in some cases, and thicker than natural in others. The valves of the duodenum, and the mucous membrane of the small and large *intestines*, were of a lighter or deeper tint, in some approaching to brown. This membrane was generally softened and hypertrophied; it was likewise studded with irregular or round ulcers, surrounded by a reddened base. The subjacent cellular tissue and muscular coat were hypertrophied. The intestines, in all the cases, contained lumbrici. Dr. CARSWELL, in addition to the usual signs of chronic inflammation of the stomach and intestines, found perforations of the stomach from softening in two cases.

16. *b.* The membranes of the *brain*, particularly the arachnoid and pia mater, in these cases, as well as in those examined by STRAMBIO, FANTONETTI, and others, were injected, thickened, and opalescent. The pia mater adhered to the cerebral convolutions, which were slightly atrophied. The substance of the brain was in some cases diminished, in others increased in consistence; the gray substance was injected and deeply coloured; the white substance dotted with vascular points. The cerebellum

was slightly injected and somewhat softer than natural. The arachnoid and pia mater of the *spinal chord* were also injected. The gray substance of the chord was somewhat indurated and injected. The white substance was much softened.

17. *c.* The *skin* of the backs of the hands and feet was like leather, and, when examined with a lens, presented a number of irregular cracks, crossing at acute angles, and placed closely, and sometimes implicating the whole thickness of the corion. Small, thin, yellow crusts, and furfuraceous lamellæ of a dirty white, interposed in some of these small fissures, and adhered firmly. The epidermis was six or eight times thicker than natural, brownish, friable, and dry, and was firmly attached. The sub-epidermic layers were much thickened. The radial nerves were softened, reddish, and infiltrated with serum. The most frequent lesions to the above were the usual signs of recent or of old, general or partial *peritonitis*. Indications of *bronchitis* and *pulmonary tubercles* were also often observed. Enlargements of the *spleen* and of the *liver*, in some cases also of the mesenteric glands, and effusion of serum in the shut cavities, have been occasionally noticed.

18. III. ASTURIAN PELLAGRA—*La Rosa—Mal de la Rosa—Asturian Leprosy*, Thierry, Sauvages, &c.—*Elephantiasis Asturiensis*, Good—is, according to the descriptions of THIERRY and others, merely a variety of pellagra, and, in its local and general characters, still more nearly approaches the *leprosy of the Middle Ages* than the pellagra of Lombardy. THIERRY states that this disease generally appears at the spring equinox, on different parts of the body, with redness and harshness of the skin. It afterward degenerates into rough, dry, blackish crusts, intersected by deep cracks and fissures. These dry and fall off in summer, leaving reddish, smooth, and shining marks, devoid of hair, and depressed below the level of the surrounding skin, resembling the cicatrices of burns. They remain through life. In the spring of every year they are covered anew with crusts, which become more and more painful, offensive, and disgusting to the sight. They often appear on the fore, or most exposed part of the neck, extending to the clavicles and top of the sternum.

19. To these eruptions are added a constant shaking or trembling of the head and upper parts of the body, heat of the mouth, vesicles on the lips, foulness of the tongue, extreme weakness of the whole body, with a feeling of heaviness, and disorder of the digestive organs. Through the night, burning heat, insomnia, groaning without obvious reason, dejection of spirits, melancholy, &c., are complained of. Several suffer slight delirium or hebetude of the senses, particularly of touch and smell. To these are sometimes added slight mania, erysipelas, ulcers, and irregular fever. This malady is often attended, in its advanced stages, with a tranquil state of mania or melancholia. The patient sinks into a state of dejection, in which he forsakes his home, seeks solitude, and is reduced to utter despair. This mental depression usually appears about the summer solstice, and proves fatal sooner or later. A fatal issue is often, also, preceded by

marasmus and dropsical effusion. The local and constitutional symptoms place this malady in a position intermediate between the pellagra of Lombardy and the leprosy of the Middle Ages, although more closely to the former than to the latter.

20. IV. DIAGNOSIS.—Pellagra is manifestly allied, in many of its features, to the leprosy of the Middle Ages on the one hand, and to scurvy, with which, however, pellagra is sometimes complicated, on the other hand. But still, there is an alliance only in certain points. The resemblance, also, which it bears to *erysipelas*, led TRIVUS to define it as a chronic, periodic, and nervous form of that disease; from which, however, it differs widely in its whole history—in local and constitutional symptoms, in its nervous characters and terminations.

21. M. MAYER observes that certain epidemics which have occurred in the north of Europe during the last three or four centuries, and which have been generally attributed to want and to the use of unripe, spurred, and damaged grain, closely resemble pellagra. The resemblance is certainly close in many features, but the difference is great in others. There can be no doubt that local, external, and constitutional diseases, peculiar in kind or anomalous in character, yet varying in numerous modes, grades, and phases, appear in certain localities and at certain epochs, as the several circumstances and agents occasioning them are differently combined, in respect both of the number, grade, and quality of these agents; for it is only reasonable to infer that as causes, agents, and influences are variously associated in number, intensity, and quantity, so will the effects be different, and hence present indescribable forms, varieties, states, and phases, which admit not of distinct or specific limitations as to character, nor of consistent, constant, and uniform manifestations.

22. a. It will appear in the sequel (see *Causes*) that many of the circumstances in which the Italian and Asturian pellagra originate are the same which gave rise to the leprosy of the Middle Ages, and to certain epidemics which have appeared in several countries during the fifteenth and sixteenth centuries. Still, the features of each vary, or even differ. In the true leprosy, the face, roots of the hair, palate bones, nose, are more affected, and the cutaneous disease is more decidedly tubercular; the affection of the skin, of the extremities and face, increasing with the other symptoms, and the mind being less disordered than in pellagra. In the *Italian pellagra*, the mental, nervous, and intestinal affections predominate with the progress of the malady.

23. b. In the *Asturian malady*, the affection of the skin is greater than that of the Italian, and approaches more nearly the severity of leprosy; the affection of the mind is less acute than that of true pellagra, but the termination of all these is nearly equally unfavourable, although their duration is very variable, not only in regard of the respective maladies, but as respects individual cases of each.

24. c. The history of pellagra sufficiently distinguishes it from other diseases of the skin. Chronic *erythema* is never attended by the serious nervous, mental, and digestive disorders characterizing pellagra; and *lepra* and *psoriasis*

are removed to an equally great distance from the Italian malady, even without taking into account the different characters and forms of the eruption in each, and the ultimately fatal issue of pellagra.

25. d. M. RAYER attempts to establish a similarity between pellagra and the epidemic of Paris and its vicinity in 1828, to which the name *acrodynia* has been given. But, although the season of the appearance of the latter was the same as of the former, and although the eruption on the extremities, the pains in the feet and difficulty of walking, the disorders of the digestive organs, closely resembled the same phenomena at an early period of pellagra, yet the absence of the mental disorder, the non-recurrence of the malady, and the general recovery of the attacked, indicate a total difference between the two maladies, the points of resemblance being probably the results of a concurrence of certain causes contributing to the production of pellagra.

26. V. PROGNOSIS.—The circumstances which render the prognosis of pellagra particularly unfavourable are the unequivocal operation of those causes to which this malady is attributed; the circumstance of one or other parent of the patient having died of it; an advanced period of its course; the poverty and agricultural occupation of the affected; previous disease, and the severity of the constitutional symptoms, particularly of the disorder of the digestive organs; general cachexia; emaciation, and mental disturbance; severity of the nervous symptoms, and especially the occurrence of mania, delirium, partial or general paralysis; and, at an early stage, the impossibility of removing the subjects of the malady to a different climate, or to other occupations. Pregnancy and lactation also exert an unfavourable influence on its course and termination.

27. VI. CAUSES.—The hereditary tendency of pellagra is fully admitted by all writers who have observed the progress or traced the origin of the malady. There can be no doubt of the disease being continued in succession through families, even the children of pellagrosi becoming affected, when much exposed to the sun and air, or early occupied in the fields. Writers have differed as to the respective liability of sex; but there seems to be no difference in this respect beyond what may be imputed to occupation and exposure. That these latter circumstances are chiefly productive of the disease cannot be disputed, inasmuch as those only who are subjected to them are affected by it. Doubtless, however, other causes co-operate; but the influences to which persons thus occupied are alone exposed should be viewed as the chief agencies in developing the malady. Some writers have supposed the climate to be the chief cause; but if this were the case, other persons besides agricultural labourers would become affected. This disease has also been attributed to the use of maize; but we do not find that maize has any similar effect in other or similar climates, where it is extensively employed as food. It has likewise been imputed to a rice diet; but the same remark applies also to this opinion. The imperfect and sometimes unwholesome nourishment and the want of animal food, and due proportion



of condiments and stimuli; the insufficient use of salt and other antiseptic substances; and the general wretchedness, privations, and filth of the field labourers in this part of Europe, to all which the malady has been attributed, may certainly concur, in some degree, in developing it; but even these conjoined cannot reasonably be inferred to be the real exciting causes of it, inasmuch as these causes are equally influential, and concur in similar grades of activity in other localities, without pellagra being the result.

23. After considering the various causes and their combinations to which this malady has been imputed, I infer that they may tend to aggravate its severity or to increase the predisposition to its appearance, but that other peculiar and endemic agencies are chiefly concerned in generating it. What these agencies are has not been demonstrated, nor do they, perhaps, admit of precise demonstration, but they appear to me to proceed from the soil and water of the locality. The use of water filtering through certain or peculiar geological formations, or certain alluvial deposits; the labours of the peasants in fields which are saturated with moisture, or which have been inundated during the preceding winter; and the circumstance of those parts of the body which are most exposed, or most commonly immersed in the water and soil or earth which these labourers cultivate, must readily suggest themselves to the minds of those who reflect on the subject as the obvious exciting causes of the disease. That the influence of the sun is necessary to develop the cutaneous affection, may be admitted, and may be explained by the effects produced by its rays, or by the drying effects of the air upon the surfaces covered by the moisture of the soil in which the peasants are employed. It has been objected, particularly by STRAMBIO, that, although the sun and free exposure to the air tend to develop more completely the cutaneous affection, still the constitutional symptoms appear and proceed their course, even when no such exposure is incurred, and when the eruption is either imperfectly or not at all developed.

29. Viewing, therefore, the nature of the water of the localities in which pellagra occurs, together with the state of the soil and the water saturating or inundating the soil, as the chief causes of the malady, it may be admitted that the other agencies, to which so much influence has been imputed by various writers, may in some degree contribute to develop and to aggravate the disease, especially the use of unwholesome food, as of sour or diseased rye bread, or of unripe maize or rice; dirty and ill-ventilated apartments; hereditary predisposition; the depressing passions; privations, misery, and exhausting indulgences. M. SPESSA attributes considerable influence to the habit of the poorer inhabitants of passing the evenings, and even parts of the day during winter, in the dirty and unhealthy cow-houses and stables, by way of escaping from the cold. The effluvium, also, proceeding from the accumulated exuviae of the inhabitants and cattle at the commencement of spring and of warm weather; and when these exuviae are exposed and spread upon the soil as manure, and to which the field labourers are more particularly

exposed, may not be without its influence, and even exceed that insisted upon by M. SPESSA. But, seeing that those persons who are alone affected with pellagra are those only who are much exposed to the agencies to which I have attributed the malady, the inference that these agencies are the principal causes of it becomes inevitable.

30. It may be further added, that similar causes to those which obtain in Lombardy exist also in the *Asturias*, where a similar malady prevails. These are extreme poverty, with its attendants, bad and insufficient food; filth; crowded and ill-ventilated apartments; and agricultural pursuits in the deep and swampy valleys of the country.

31. That the malady should first appear, and be aggravated during spring and summer, can be accounted for by the exposure of the subjects of it at this season to its chief exciting causes, and to the influence of labour, conjoined with increased temperature, in exciting the circulation, and in throwing out, by means of the cutaneous excretion, the morbid materials accumulated in the blood, and disordering vascular action in the digestive organs, in the nervous centres, as well as in parts of the cutaneous surface.

32. VII. TREATMENT.—It is obvious that the chief means of remedying, or even of checking the progress of this malady, are change of the habits and occupations of those who have become subjects of it; change of climate, and removal of the several causes and influences to which it has been imputed, and particularly of those upon which I have above insisted on. The circumstances in which those are placed who become the subjects of pellagra very generally preclude the adoption of these measures, which, however, can be but of little avail at an advanced stage and confirmed state of the malady. When the nervous and constitutional symptoms are fully developed; when the cutaneous eruption is constant, extensive, and severe, and is attended by a peculiar, offensive effluvium or perspiration; when affections resembling or approaching to those of either chorea, convulsions, tetanus, epilepsy, palsy, mania, or melancholia appear; or when severe diarrhoea, or dysentery, or marasmus, or dropsy, or pulmonary disease occur, then removal or change of occupation, or medical treatment, is very rarely of avail; and even at an early stage medicines can produce but little benefit while the patient continues to be subjected to the several circumstances and influences originating the malady. In addition to wholesome and nutritious food, alterative, tonic, and antiseptic articles should be prescribed, aided by warm bathing and diaphoretics. The alkaline carbonates taken in tonic infusions, or in demulcent and bitter decoctions, or with emollient and narcotic substances, are generally of service; but the treatment should vary according to the various prominent affections which complicate the advanced stages of the disease.

33. For the affections of the *digestive canal* the decoction of Iceland moss; various emollients, with or without opiates or DOVER'S powder; fomentations and embrocations on the abdomen, and emollient and anodyne injections are requisite.

34. Affections of the *brain and nervous sys-*



tem, during the progress of this malady, admit not of a recourse to lowering means. In but few cases can local depletions even be prescribed with advantage; but, while tonics, antispasmodics, and alteratives, conjoined with anodynes, as circumstances may suggest, are administered, blisters may be applied to, or issues or setons inserted in, the nape of the neck; or even small bleedings in the more acute cases may be directed from this situation or behind the ears. In most of the nervous affections appearing in the course of pellagra, the preparations of opium, taken with camphor, or ammonia and aromatics, are of essential service, but chiefly as palliatives.

35. For the cachectic habit of body and cutaneous affection, alkalies and alkaline carbonates with sarsaparilla, particularly the compound decoction, in large quantity, or with antimonials; sulphureous warm baths, followed by frictions; milk diet, and attention to the several secretions and excretions, using those means which are most serviceable in improving and promoting them, are the measures which promise the greatest amount of benefit, which, however, can rarely be attained without the removal of the causes which occasion the disease. Even in an early stage of the disease, while these continue to operate, and at an advanced stage even, when these are removed, medical treatment is generally of little or only of temporary avail, at least as far as it has been employed by the Italian physicians.

BIBLIOG. AND REFER.—*F. Frapolì*, Animadversiones in Morbum vulgo Pellagram appell., 8vo. Mediol., 1771.—*Odoardi*, D'una Specie particolare di Scorbuto, &c., 4to. Venet., 1776.—*M. Gherardini*, Della Pellagra Descrizione, 8vo. Milano, 1780.—*G. M. Albers*, Trattato delle Malattie dell'insolito di Primavera, volgarmente dette della Pellagra, 8vo. Varese, 1781.—*C. Strambio*, De Pellagra, Observat. in Nosocomio Pellagrosorum factæ, 4to. Med., 1785; et Dissertazione sulla Pellagra, 8vo. Milan, 1794.—*Jansen*, in *Frank*, Deloct. Opusc., t. ix.—*F. Fanzago*, Memoria sopra la Pellag. del Territ. Padovano. Padov., 8vo, 1789.—*J. Videmar*, De quadam Impetiginis Specie, vulgo Pell. nuncupata, 8vo. Med., 1790.—*P. Dellabona*, Discorso Comparativo sopra la Pellagra, l'Elefantiasi, e lo Scorbuto, 8vo. Venet., 1791.—*L. Soler*, Osservazioni che formano la Storia cstatà di Pellagra, 8vo. Venet., 1791.—*M. Thierry*, Observations de Physique et de Médecine en Espagne, 8vo. Paris, 1791.—*S. C. Titius*, Oratio de Pell. Pathologia, in *Frank*, Del. Opusc., t. xii.—*C. Allioni*, Ragionamento sopra la Pellagra, 8vo. Turin, 1795.—*Leraches* de la Freutrie, Recherches sur la Pellagre, 8vo. Paris, 1805.—*F. Cerri*, Trattato della Pellagra, 8vo. Milano, 1807.—*J. H. G. Schlegel*, Briefe einiger Aertze in Italien, ueber das Pellagra, 8vo. Jena, 1807.—*G. B. Marsari*, Saggio Medico-politico sulla Pellagra, 4to. Venez., 1810; et Lettere al Dr. Thierre sulla Pellagra, 4to. Treviso, 1812.—*A. Boerio*, Storia della Pellagra nei Carnovese, 8vo. Torino, 1811.—*G. Cerri*, Osservazioni intorno all' Saggio sulla Pellagra di Marsari, 8vo. Milano, 1811.—*V. Chiarugi*, Saggio de Ricerche sulla Pellagra, 8vo. Firenze, 1814.—*F. Fanzago*, Memorie sulla Pellagra, 8vo. Pad., 1815; et Istruzione Catechistica sulla Pellagra, 4to. Venez., 1819.—*H. Holland*, in *Transact. of Med. and Chirurg. Society of Lond.*, vol. viii., p. 317.—*G. M. Zechinelli*, Alcune Riflessioni sullo Stato dello Pell., &c., 8vo. Pad., 1818.—*G. Di Filippi*, Memoria sulla Pell., 8vo. Nap., 1819.—*Jourdan*, Dict. des Sciences Médicales, t. xl., art. *Pellagre*.—*G. B. Marsari*, Della Pell. e della Maniera di estirp. in Italia, 4to. Venez., 1819.—*J. C. Strambio*, Natura, Sede, e Cagioni della Pell., 8vo. Milano, 1820.—*Lagneau*, Dict. de Méd., t. xvi., art. *Pellagre*.—*A. A. Spessa*, in *Annali di Omodei*, t. lxiv.—*J. Johnson*, Change of Air in pursuit of Health. An Excursion through France, Switzerland, and Italy, in 1829, &c., 8vo. Lond., 1831, p. 75.—*Briere de Boismont*, De la Pellagre et de la Folie Pellagreuse, 8vo. Paris, 1834.—*W. Kerr*, Cyclop. of Pract. Med., vol. iii., p. 262.—*Rayer*, Dict. de Méd. et Chirurg. Prat., t. xii., art. *Pellagre*; and Theoret. and Pract. Treatise on the Dis. of the Skin. Trans. by R. Willis, 8vo. Lond., 1835, p. 1162.

[AM. BIBLIOG. AND REFER.—American editions of *Cazenave*, *Rayer*, and *Plumbe*; also, *Worcester* on Diseases of the Skin.]

PEMPHIGUS.—SYNON. Περφιξ, πεμφιγος (a small blister or bubble), πυρετος πεμφιγωδες, Hippocrates and Galen. *Pemphigus*, Sauvages. *Febris Bullosa*, Vogel. *Bulla*, *Bullosa Febris*, Morton. *Hidroa*, Piso. *Pompholyx* (Πομφολυξ), Willan and Bateman. *Typhus vesicularis*, Young. *Emphlysis Pemphigus*, Good. *Febris vesicularis*, *Febris Pemphigoides*, Auct. *Fièvre Bulleuse*, *F. vésiculaire*, Fr. *Wassenblasen*, *Blasenfeiber*, Germ. *Penfigo*, Ital. *Vesicular Fever*.

CLASSIF.—3d Class, 3d Order (Good). 4th Order (Willan). IV. CLASS, IV. ORDER (Author).

1. DEFIN.—An eruption of transparent or yellowish bullæ of considerable size appearing in circular or oval erythematous patches, nearly corresponding in diameter with their bases; terminating by effusion of the fluid they contain, and by the formation of lamellar incrustations, or by excoriations.

2. I. DESCRIPTION.—The various appearances assumed by this eruption have led to various divisions and denominations of it, according to the mode of its eruption (*Pemphigus simultaneous*, *P. successivus*)—to the number of the bullæ (*P. solitarius*, *P. confluent*)—to the greater or less rapidity of their course (*P. acutus*, *P. chronicus*)—to the existence or absence of fever (*P. pyreticus*, *P. apyreticus*)—and to the age of the patient (*P. congenitus*, *P. infantilis*). I agree, however, with *RAYER*, *CAZENAVE*, and *WILSON*, in the propriety of considering this eruption under the two heads of *acute* and *chronic*.

3. i. ACUTE PEMPHIGUS.—*P. acutus*, *Febris bullosa*, *F. Pemphigoides*, *F. Synocha cum vesiculis*, Auct.—This is a rare disease. The bullæ almost always stand apart, or are distinct. They are rarely confluent, and they usually appear in succession. They may be partial or more or less general, and may occur on any part of the body, but most commonly on the lower extremities; occasionally, however, also on the arms, the trunk, and the face; most rarely on the soles of the feet, hairy scalp, and genitals.

4. a. The constitutional symptoms vary from a slight degree of languor and listlessness, sometimes of sickness and general uneasiness, followed by quick pulse and mild fever (*Pompholyx benignus* of *WILLAN*), to chilliness or rigours followed by a dry and hot skin with pruritus, by pains in the head and limbs, nausea, thirst, anorexia, tenderness at the epigastrium, very rapid pulse, sore throat, and even slight delirium. In some cases the fever is attended by irritation of the mucous surface of the digestive, respiratory, or genito-urinary organs.

5. b. The eruption usually appears the second or third day from the commencement of the constitutional disorder, or even later, in the form of small red spots, preceded and attended by pruritus, and a parched and hot sensation. The spots increase to circular or oval erythematous patches, varying in redness from a pale to a vivid or dusky tint. In the course of a few hours a vesicle arises in the middle of each patch, and becomes rapidly distended by a limpid serum, and increases to the size of a hazelnut, or even of a large walnut. The bullæ, or blebs, which thus arise are usually circular or oval, and slightly flattened at their summits

They generally correspond with the breadth of the patches on which they appear, and thus conceal them; or they are somewhat smaller than the patches, which thus show around them as a narrow zone, more rarely as a complete areola. The bullæ usually break in a day or two, and expose an excoriated surface, secreting for a few days longer a serous fluid, which concretes into a thin, yellowish scab, and becomes gradually browner and dark; but they sometimes do not burst, and in this case the serum contained in the bullæ assumes an amber or yellowish tint, subsequently turbid and opaque, diminishing in quantity by evaporation, shrivelling and drying up, in the course of a few days, into a thin, dark scab. The rupture of the bullæ, and the time when it occurs, depend upon the situation of their eruption. In about three weeks the scabs fall off, leaving the skin beneath of a dusky red hue, but sound.

6. Bullæ are occasionally imperfectly developed, and appear in the form of circular or oval patches, slightly red and prominent. On passing the finger over their surface, the cuticle is felt loosened by a slight effusion of serum between it and the dermis. The cuticle is detached after a few days, exposing a red spot, covered by a thin and shining epidermic layer.

7. The duration of the disease depends upon the mode of eruption; if this takes place at once, it is no longer than just stated, or from seven to fourteen days; but if the bullæ appear successively, it is longer accordingly, or from three to four weeks. Mr. Wilson remarks that, in the progress of the cutaneous eruption, vesicles are not unfrequently observed on the mucous membrane of the mouth.

8. When the disease is *confluent*, two or more of the bullæ unite and form a *bleb* as large as a hen or a goose egg. In these cases the constitutional symptoms are more severe, and are sometimes attended by irritation of most of the mucous surfaces.

9. *c.* This disease sometimes affects children—*Pemphigus infantilis*—*P. gangrenosus* of some writers—and sometimes assumes a very serious or even fatal appearance. But this severe form occurs chiefly in lying-in hospitals, or in the crowded, dirty, and ill-ventilated dwellings of the poor. In the cases which I have seen in *infants* the bullæ were numerous, more frequently distinct than confluent, and, in a few instances, presenting many of the characters of *rupia escharotica*, but assuming much more acute features, and even terminating fatally in four or five days. When it occurs in lying-in hospitals, it may present a mild form in some cases, and a very acute and dangerous form in others, even in the same ward and at the same time. It then manifestly proceeds from local causes: from the states of the beds and bed-clothes, and the air of the wards.

10. *d. Solitary Pemphigus*—*P. solitarius* of Willan—is very rare. I have seen only one case of it. The bulla rapidly attains the size of an orange. It is preceded by disagreeable sensations of tingling and smarting. The bulla breaks in about forty-eight hours, and is succeeded by a superficial excoriation, passing into slight ulceration. One or two days after the disappearance of the first bulla another arises in its vicinity, and pursues the same course as the preceding. In this way, two, three, or

even more may appear in succession, the disease being prolonged to several days' duration. Willan says that this variety very rarely occurs, and seems only to affect women. The case I saw was in a man, and occurred on the lower extremity. Biett and Cazenave mention a chronic state of this variety.

11. *e. Acute Pemphigus* may occur as a *complication* or *sequela* of eruptive fevers, or be *associated* with other eruptions, as with herpes, and more rarely with prurigo. Mr. Wilson remarks that the small bullæ of pemphigus bear considerable resemblance to the vesicles of herpes phlyctenodes; and the likeness to herpes is still farther increased by the occasional appearance of the smaller bullæ of pemphigus in the form of rings.

[The following case of pemphigus, from GIBERT, gives a very correct idea of the acute and accidental form of the disease:

"A man of sanguineous temperament, 21 years of age, in the habitual enjoyment of good health, went out hunting on the 8th of September, 1811, in the marshes of Bresse, and got, several times, up to his knees in water, being exceedingly fatigued, and in a state of great perspiration. On the following evening a general heat manifested itself, preceded by shivering, and accompanied by pain in the head, and thirst, increasing towards night. The second day, after a remission in the morning, the fever became greater towards the afternoon. The third day the face was more highly coloured, the skin burning hot, the pulse hard, quick, and incompressible. Pricking and itching sensations in the inferior extremities, which appeared slightly swollen, and of a deeper colour than the rest of the body. During the night, restlessness, extreme agitation, heat, and lancinating pains in the legs. The fourth day, the inferior extremities, swollen from the knees to the toes, were covered with red patches, upon which were raised vesicles (bullæ), transparent, of a yellowish white, full of serum, some the size of nuts, others that of almonds, and many merely that of pease, unequally scattered, smaller and more numerous on the feet and malleoli, larger and fewer upon the upper part of the legs. All the red patches are not yet covered with vesicles; on some the epidermis is scarcely, or not at all, raised. They formed a slight prominence, their colour not disappearing on pressure. Those which had vesicles in their centre were surrounded by a red areola, which became narrower as the vesicle extended itself. Between each of these patches the skin preserved its natural colour. The pulse, full and incompressible, beat less quickly than the previous evening; the eyes became painful, slightly red and watery; the tongue dry and whitish; the bowels costive; the urine high-coloured, and scalding. The other functions were unimpaired. Passed a comfortable night, and slightly perspired. The fifth day many of the vesicles increased in size; some on the calves of the legs became confluent. The sixth day, the larger elevations became less full; the epidermis shrivelled, and the fluid which they contained accumulated in the most depending part, when it dried up on their spontaneous or accidental rupture. During the seventh and eighth days, most of the vesicles, faded and shrivelled,



spontaneously opened, and poured out a quantity of yellow, inodorous, limpid serum, leaving their bases exposed, which formed large, red, and painful excoriations, and continued to ooze out a serous fluid for some period. The smaller vesicles did not break, but faded and dried up, becoming white and opaque. The red areola, at the same time, became obscure, and at length disappeared. From the eighth to the tenth day all the scales dried up, and were replaced, some by large, thin, yellowish scales, others (those which were not evacuated) by more thickened crusts. On the falling off of these concretions, which took place in two or three days, there remained upon the skin bright, shining, wine-coloured patches, but without any depth of cicatrix. The severity of the fever was arrested after the development of the eruption; it then became very slight, and returned no more after the sixth day. The urine then became turbid and deposited a considerable sediment. On the seventh day the bowels were relaxed, the stools being thin and frequent; they soon, however, became natural. For the first six days the patient did not leave his bed; on the seventh he left it, and made a good meal without any inconvenience resulting therefrom.”]

12. ii. CHRONIC PEMPHIGUS.—*Pompholyx diutinus*, WILLAN — *Phlyctenoides confluent*, ALIBERT—is met with much more frequently than the acute, and appears much oftener in adults and aged males than in females. It is either limited to a small surface, or spreads more or less over the body. It is painful and tedious in its course, always successive in its appearance, and affects chiefly persons advanced in age and of debilitated constitutions. It often continues for many months or even years, and in some cases appears at a particular season for several successive years; for instance, in the autumn and winter, and declining in the spring.

13. a. The constitutional symptoms of chronic pemphigus are slight compared with those of the acute; some degree of sickness and lassitude, with pains in the head, back, or limbs, precede the eruption during several days; and these symptoms generally vary in degree with the severity or extent of the eruption. The cutaneous disease is often associated with considerable gastro-intestinal irritation; and in aged persons, and in cachectic habits, it is sometimes attended by dysuria or hæmaturia.

14. b. The eruption appears first in the form of small red spots, attended by slight itching. The epidermis soon becomes elevated in the centre of each patch. The base of the elevation of the cuticle gradually extends; and often in a few hours an irregularly shaped bullæ, the size of a filbert, or even of a walnut, is thus formed. Sometimes the bullæ attain the size of an egg. At the end of three or four days some of the bullæ burst, discharge their contents, and leave an angry-looking excoriation of the dermis. In others of them, the serum becomes reddish and turbid, decreases, and dries up, forming a dark scab covered by the shrivelled epidermis. As one crop of bullæ is thus changed, another is produced near to the first; and the disorder thus may be seen in all its stages at the same time, and be prolonged, by successive eruptions, almost indefinitely.

The bullæ are occasionally confluent, especially when they appear on the face; but this seldom occurs. They sometimes attain the size of the palm of the hand, the epidermis peeling off and exposing an unhealthy-looking excoriated surface, which seems difficult to heal, or which heals in two or three days, new bullæ forming and pursuing the same course as the former. In some severe cases the patient is confined to bed, but there is rarely any fever.

15. c. Chronic pemphigus may be complicated with *prurigo*—*Pompholyx prurigenosus* of WILLAN—and with various chronic diseases of the viscera, and in such cases may terminate fatally. It sometimes supervenes on chronic inflammation of the digestive organs, and on partial or general dropsy. When complicated with *prurigo*, it is often a most distressing affection, and in old persons especially may hasten a fatal termination, particularly if visceral disease be also present, as commonly observed.

[The following case from GIBERT was called *eczema* in the first edition of his work, on the “Special Diseases of the Skin;” it is a good example of *pemphigus diutinus*, or the chronic variety of the disease:

“On the 26th of August, 1818, a woman 33 years of age was entered at the Hôpital St. Louis, tainted with a general cutaneous malady, which developed itself without any appreciable cause, and had lasted for 19 months. The commencement of this disease had been characterized by a bullous eruption, accompanied with itching; but for some time previous to her admission it had resembled the form of squamous darts, *herpes squamosus madidans* of M. ALIBERT. The patient, whose skin constantly exhaled a fluid which penetrated and stained her linen, experienced no pain in a state of repose, except in the parts on which the weight of the body rested; but walking was impossible on account of the painful friction which it occasioned. For many months past the catamenia had not appeared. The whole surface of the body, with the exception of the palms of the hands and the soles of the feet, was covered with large, round, yellowish squamæ, under which the skin was rose-coloured, or even of a bright red. There was an abundant secretion of a slightly yellowish fluid under the squamæ, in many points. The hairy scalp was the seat of a desquamation which formed drier and more delicate scales; the sub-cutaneous cellular tissue of the neck was swollen, the skin being red, cracked, and shrivelled; the eyelids were red and deprived of their lashes. The mouth was dry, the tongue very red; it presented in the centre a slight coat of yellowish brown; nevertheless, the appetite and the digestive functions appeared unaffected. The pulse was slightly accelerated, the patient felt very weak, and had a slight cough. Laxative drinks having been exhibited for some days, gave rise to a slight purging; fever broke out, though in a very slight degree; the marasmus and weakness gradually increasing, the patient sank into an adynamic state, after 19 days of treatment and about 20 months of disease.

“On opening the body we found old adhesions in the chest, and some miliary tubercles in the two lungs (in other respects sound); a secre-



tion of calcareous matter in some of the bronchial glands. Two pints of a citron-coloured serum were effused into the peritoneal cavity, which, besides, presented some old filamentous adhesions, between the parietal and visceral portions of the membrane. The external surface of the large intestines, near their concave border, was studded with miliary tubercles. The internal surface of the intestinal canal was, generally, sound, with the exception of some slightly vascular injections in the stomach and colon. There was a quantity of yellowish-white fluid contained in the intestines, and particularly in the colon. The whole canal was shrunk and contracted, and the liver had assumed the *fatty* appearance: the gall-bladder contained a very small quantity of scarcely-coloured bile. The skin, covered with whitish squamæ, had quite lost its redness. This discoloration had already much diminished during life, since the intestinal affection and general debility had made so marked a progress.”]

16. *d.* The contagious variety of pemphigus mentioned by WILLAN — *P. contagiosus* — is merely the symptomatic occurrence of bullæ in certain epidemic and endemic maladies described by authors. Its endemic occurrence has been observed by me on two occasions among infants in a lying-in hospital, on each occasion nearly all the infants in the institution becoming affected; but this prevalence was attributable to local causes, and not to contagion.

[M. ALIBERT has given, under the name of *dartre phlycténôide*, the following description of chronic pemphigus:

“There was, at the Hôpital St. Louis, a commissioner, named Pierre Roger, about 60 years of age. He was attacked with a *dartre phlycténôide*. It showed itself under the form of scattered pustules (*bullæ*) of the size of a nut, upon the trunk, also upon the anterior and posterior parts of the right shoulder, as though a scarf had been worn. The inner side of the arm was equally affected; the neck also, and the hairy scalp. These vesicles, filled with a transparent fluid, shrank, shrivelled up, and spontaneously broke, leaving the reticular tissue exposed. Some days after the drying up of the eruption the skin presented red patches, as if it had been burned with fire or with concentrated nitric acid. The itching was not very urgent, but there was a most uncomfortable feeling of tension over the whole skin. I noticed that all this supervened on a discharge of blood from the rectum. This man had been for a long time exposed to the vicissitudes of the season, and had been unable, owing to his distress, to procure himself even the necessities of life.

“The same author has described under the same name a fatal case of *pompholix diutinus*.

“Anne Brundomy, 57 years of age, presented herself at the Hôpital St. Louis for treatment. She had suffered violent grief at the loss of her husband. One day, after having experienced some digestive disturbance, she was attacked with a spontaneous vesicular (*bullous*) eruption, which gradually extended over the whole surface of the integuments. These vesicles (*bullæ*) were oval, and multiplied so rapidly that they soon became confluent: they

were not surrounded by any inflammatory areola. The eruption was accompanied by a general feeling of intolerable smarting and burning, which became less after it assumed a fatal aspect. *Phlyctenæ* formed on the mucous membrane of the mouth, œsophagus, and whole intestinal tube. The patient had a sensation of burning coals moving about in the intestines: she remained in this wretched state for 19 months, and at last sank, presenting for the last 15 days of her life all the symptoms of continued adynamic fever.”]

17. *e.* The morbid appearances found in fatal cases are entirely those constituting the complications, and usually causing the fatal issue of this affection. M. BIERT and CAZENAVE have often met with fatty liver in their examinations of these cases, with effusion of serum into the chest and other slant cavities.

[It has been stated that blebs, or bullæ, have been met with on the mucous membranes, and particularly on that of the pharynx of those persons who have died of this affection, but this is of very rare occurrence. On the contrary, these membranes will be generally found pale.]

18. II. DIAGNOSIS.—The bullæ which occasionally appear during the progress of *crispelas* are accidental, and are to be distinguished from those of acute pemphigus by the latter being distinct, the surfaces between them being neither tumid, nor red, nor painful. The isolated form of the bullæ and the laminated crusts which they form generally distinguish pemphigus from other eruptions. The bullæ of *rupia simplex* are exceedingly few, and terminate in ulcerations and in thick prominent scabs. In *ecthyma* the epidermis is sometimes raised by puriform fluid to a certain extent; but the purulent nature of the contained matter, the brownish appearance of the apex of the elevations, and the presence of pustules of *ecthyma* at an earlier stage, will sufficiently distinguish the eruption. In *herpes* the vesicles are always formed in groups upon a red and inflamed surface; while the bullæ of pemphigus are generally isolated, and free from surrounding inflammation. Even when the bullæ of pemphigus are small and confluent, so as somewhat to resemble *herpes phlyctenodes*, they are always larger than those of herpes, and some of them present their distinctive characters.

[It is generally easy to recognise pemphigus, if we except the chronic form of the disease, which somewhat resembles chronic *impetigo*, or even *pityriasis*, in its foliaceous desquamation. When it is chronic, and the bullæ are imperfectly developed, and particularly when there are nothing but squamous vestiges, or even consecutive stains, to establish a diagnosis, it requires some care and experience to distinguish the disease. In some instances it has even been simulated by placing small quantities of powdered cantharides on the limbs.]

19. III. The PROGNOSIS of acute pemphigus, when occurring in adults, and without any complication, is always favourable. When met with in infants, in the circumstances above noticed (§ 9), it is often a serious or even dangerous disease. The prognosis of chronic pemphigus should depend upon the constitution of the patient, and upon the existence of visceral

disease. When it is extensive or frequently developed, and affects those debilitated by dissipation or poverty, or when it is complicated with visceral disease, an unfavourable opinion of the result should be entertained. Its severity usually corresponds with the cachectic state of the body affected by it. M. RAYER adduces a case in which chronic pemphigus of the legs, following attacks of hæmoptysis, appeared to exert a salutary influence. Where there is obvious visceral disease complicated with this eruption, the cure of the latter will aggravate and increase the danger of the former. Mr. WILSON remarks that he has seen several cases which have induced him to "believe that this eruption is an effort of the system to rid itself of some morbid disposition." I may add, that I have hardly seen a case in which there was not reason to infer, what I have elsewhere so much insisted on, a more or less morbid state of the circulating fluids, owing either to impaired elimination and excretion, or to imperfect assimilation.

20. IV. CAUSES.—Acute pemphigus attacks infants, children, and young persons most frequently. It has been said to be congenital and hereditary. It is most prevalent in the summer, and in those exposed to the sun's rays. I have often seen it in sailors who have exerted themselves under a tropical sun without any covering to the upper parts of the body. It is usually referred to teething; to improper or unwholesome food; to gastric and intestinal irritation; to over-feeding; to mental emotions; and to amenorrhœa and dysmenorrhœa. It has sometimes resulted from the constitutional irritation caused by vaccination. The endemic sources to which infants are sometimes exposed have been already noticed (§ 9). The symptomatic appearance of pemphigus, in connexion with various fevers, has been occasionally observed.

21. Chronic pemphigus occurs chiefly in aged persons whose systems are debilitated or cachectic, and appears most frequently in autumn and winter. It is usually caused by intemperate habits, by excesses, unwholesome food, by fatigue; anxiety of mind; low, damp situations; living in cellars and ill-ventilated apartments; exposure to cold; and by chronic irritation of the digestive, mucous, and genito-urinary organs. It is more rarely a sequela of the exanthematous fevers. It may follow disease of any of the secreting and excreting viscera, and thus be complicated with it, the morbid elements not being eliminated from the circulation, but irritating and inflaming the cutaneous surface in the particular mode constituting pemphigus; and often affecting, also, the mucous surfaces.

22. V. TREATMENT.—A. In the mild cases of acute pemphigus, but little more is requisite than to exhibit diluents, gentle aperients, warm baths, and diaphoretics, thereby to promote the functions of the several emunctories. When the symptoms are more acute, and the patient is plethoric, a few ounces of blood may be taken away, and purgatives, with the rest of the antiphlogistic regimen, prescribed. In infants, and in cases attended by debility or symptomatic of low fever, the infusion or decoction of bark, with muriatic acid, or with the alkaline carbonates, if the urine be very acid, is gener-

ally beneficial; and when any complication exists, especial attention should be directed to it.

23. B. Chronic pemphigus often withstands the use of very active means; but it is necessary, previously to determining upon the method of cure, to ascertain as nearly as possible the states of the secretions and excretions, and of the several emunctories. The urine should be carefully tested, and the alvine evacuations daily examined. When the biliary and intestinal functions are disordered, means appropriate to such disorder, as blue pill, or hydrarg. cum creta, with ipecacuanha or opium, or with DOVER's powder, should be exhibited. In most cases, warm baths, either simple or alkaline, are of essential service. When the liver is torpid, after a recourse to calomel or milder mercurials, the nitric or nitro-hydrochloric acids may be given with the infusion or decoction of cinchona, or the decoctions of sarsaparilla. If the urine be acid, the liquor potassæ, with the preparations of sarsa, are generally beneficial; and, if the digestive mucous surface be exempt from marked irritation, small doses of the iodide of potassium may be added with great advantage. When there is marked disorder of the digestive organs, warm baths, alteratives, ipecacuanha, and anodynes are generally requisite. When the evacuations are offensive, as well as frequent, care should be taken not to confine the bowels by opiates, but rather to correct the secretions by alteratives, by the alkaline carbonates and salts, and by a spare, farinaceous, and milk diet. If, however, the intestinal irritation be severe, and the symptoms present a dysenteric character, ipecacuanha or DOVER's powder, in frequent doses, may be exhibited, and emollient enemata administered; and, when restlessness and pain are complained of, these means, aided by warm baths, will be still more requisite.

24. When the menstrual discharge is suppressed or interrupted, these measures should be directed to its restoration; but these measures should be chosen according to the peculiarities of the case. In most cases of menstrual obstruction connected with cutaneous eruption, the iodide of potassium with liquor potassæ, and tonic infusions, will prove beneficial, if the bowels be duly regulated by means of suitable aperients; and the biborate of soda, conjoined with any of the preparations of aloes, will often be of use in similar circumstances. M. RAYER has had recourse to the arseniate of soda in obstinate cases of pemphigus; and in these DONOVAN's solution of the iodide of arsenic and mercury may be employed with some hopes of advantage, as I have seen benefit derived from it in one case of this kind for which I lately prescribed it.

25. The observation made above respecting the pathological relations of pemphigus (§ 19, 21) should be borne in mind during the treatment of this eruption, and especially of the chronic states and complications of it; for a morbid condition of the circulating fluids, arising either from insufficient elimination or excretion, or from imperfect assimilation, as fully shown in the articles BLOOD and DISEASE, generally more or less obtains, not only in this, but also in most other cutaneous diseases. This position being unassailable, it should form the basis of our therapeutical operations and all our



efforts ought to be directed to the restoration of the excreting functions to the removal of all obstructions to the discharge of these functions, and especially of the cutaneous functions.

26. *C.* The topical treatment of chronic pemphigus is often of much importance. As a general principle, the serum effused in the bullæ should, as soon as they are fully developed, be let out by puncturing them, for even the partial absorption of it tends to perpetuate the morbid condition of the circulating fluids on which the complaint chiefly depends, while the early removal of the morbid secretion prevents not only this contingency, but also the excoriations and sores which often result from leaving the bullæ uninterfered with. After puncturing the bullæ, warm baths, warm bread and water poultices, or emollient fomentations may be employed, and, subsequently, gently astringent lotions, or absorbent powders, or healing ointments may be applied, according to the circumstances of the case.

[*D.* BULKLEY thinks that, as a general rule, the bullæ should not be opened, and that warm and moist applications to them should be avoided. Should they burst, either spontaneously or by accident, some soothing application must be made to allay the irritation, and especially to protect the excoriated surface from the air.—*Am. ed. of Cazenave*, p. 118.]

27. *D.* The diet in this, as in many other cutaneous affections, should consist chiefly of milk and farinaceous articles; animal food, of easy digestion, should be taken sparingly; but veal, pork, shell-fish, and dried or highly-seasoned articles ought to be avoided. In cases requiring tonics, a more generous diet, and good wine in moderate quantity, may be allowed, particularly if due exercise in the open air be also taken.

BIBLIOG. AND REFER.—*Delius*, *Amoenitates Medicæ*, cas. 9, p. 71.—*C. Lepois*, *De Morbis a Serosa Colluvie et Diluvie ortis*, Obs. 149.—*C. Seliger*, *Ephemer. Nat. Curios.*, dec. 1, ann. viii., Obser. 56.—*Langhans*, in *Acta Helvet.*, vol. ii., p. 260.—*Hoffmann*, *De Affectu raro Scorbuto Pustulari*, supp. ii., p. 2.—*Gilbert*, *Adversar. Med. Pract.* Lugd., 1773, p. 183.—*Dickson*, *Observat.* on Pemph. in *Trans. of Irish Academy*, 1787, p. 47.—*D. Stewart*, in *Med. and Phys. Comment. by a Soc. &c.* Edin., vol. vi., p. 79.—*Finke*, *De Morbis Biliois Anonialis*, &c., p. 118.—*Macbride*, *Method. Introduct. to Medicine*, 4to. Dubl., 1772.—*J. P. Frank*, *De Curandis Morbis Hominum*, l. iii., p. 265.—*Wichmann*, *Beiträge zur Kenntniss des Pemphigus*, Erfurt, 1790.—*C. G. C. Braune*, *Versuch ueber den Pemphigus und das Blasenfieber*, 8vo. Leipzig, 1793.—*L. Ritzler von Brann*, *Ueber die Erkenntniss und Behandlung der Pemphigus*, 12mo. Erf., 1823.—*Ozanam*, *Hist. des Malad. Epidemiques*, t. v., p. 208.—*Loebstein*, *Journ. Complément. des Sciences Médicales*, t. vi.—*Robert*, *Journ. de Méd. Chirurg. et Pharmac.*, t. xxiii., p. 227.—*Savary*, in *Ibid.*, t. xxii., p. 203.—*Jacquemin*, in *Journ. Génér. de Méd.*, t. xxx., p. 264.—*Martius*, *Ueber den Blasenauschlag oder Pemphigus*, 8vo. Berlin, 1829.—*Bateman*, *Synopsis of Cut. Diseases*, 1829, p. 197; and *Delineations*, &c., pl. 33, fig. 2.—*Hinze*, *Sur le Pemphigus des Nouveaux-nés*; in *Bullet. des Sc. Méd. de Férussac*, t. xi., p. 47.—*Bidauld de Villars*, *Recherches et Observat. sur le Pemphigus*; in *Recueil Period. de la Soc. de Méd. de Paris*, t. liv., p. 1.—*Asdrubali*, *Archives Génér. de Médecine*, t. xvii., p. 601.—*Brett*, *Journ. Hebdom. de Méd.*, t. viii., p. 46.—*P. Rayer*, *Theoret. and Pract. Treatise on the Diseases of the Skin*, trans. by R. Willis, 8vo. Lond., p. 208.—*Cazenave and Schedel*, *Manual of Dis. of the Skin*, trans. by T. H. Burgess, 8vo. London, 1842, p. 106.—*Erasmus Wilson*, *A Pract. and Theoret. Treat. on the Diseases of the Skin*, 8vo. Lond., 1842, p. 137.

[*AM. BIBLIOG. AND REFER.*—*Am. Ed. of Cazenave*, *Plumbe*, and *Rayer*.—*Wilson* on Healthy Skin.—*Good's Study of Medicine*, by *Doane*.—*Worcester* on the Skin, &c.]

PERICARDIUM. See art. HEART AND PERICARDIUM.

PERIOSTEUM.—Περίοστεον—*Périoste*, Fr.—*Die Knochenhaut, Beinbaut*, Germ.—*The diseases of the periosteum* have been noticed in the articles BRAIN—*Membranes of*, CRANIUM, FIBROUS TISSUE, and OSSEOUS SYSTEM. When thus treating, in their respective relations, of certain portions of the periosteum, and when viewing them in connexion with the bones which they form and support, the several alterations of structure observed in the periosteum were fully noticed. It now only remains for me to consider inflammations of the periosteum and their consequences.

1. INFLAMMATION OF THE PERIOSTEUM.—SYNON.—*Inflammatio periostei, periosteitis, periostitis*; *Periostite*, Fr. *Die Entzündung der Beinbaut*, Germ.

CLASSIF.—III. CLASS, I. ORDER (*Author*).

2. DEFIN.—*Pain, more or less acute, referred to the surface of one or more bones, with tenderness on pressure; deep-seated swelling, at first obscure, but afterward more manifest; sometimes with redness in the parts covering the more superficial and prominent bones; more or less symptomatic fever.*

3. The conventional division of periostitis into acute and chronic is useful, although every grade of activity and duration obtains in this as well as in other diseases. Periostitis is also simple and primary, or consecutive or constitutional. In this latter case it generally proceeds from previous disease, and is characterized by a certain diathesis, or is the consequence of a specific cause. Thus, periostitis may be serofulous, gouty, scorbutic, or rheumatic, and present certain modifications in its course and consequences as it occurs in constitutions thus characterized. It may, moreover, be specific, or be caused by certain specific causes, as by syphilis and the excessive use of mercury. Due regard to these several states of the disease is requisite in practice, inasmuch as each of them requires a modified treatment.

4. i. SYMPTOMS.—*A. Acute and sub-acute periostitis* often commences in an insidious manner, but it sometimes declares itself very acutely. In the former case there are generally neither chills nor rigours, and the accompanying fever may be slight; in the latter case, chills or rigours are often experienced, with intense pain, complete insomnia, and severe symptomatic fever. The progress of the disease in the one is generally slow, in the other much more rapid: it is often difficult to determine whether or not the inflammation is seated in the periosteum or in the bone itself. Most frequently, I believe the bone is affected nearly as soon as the periosteum, more especially in the serofulous and syphilitic states of the disease. If the bone be superficial and the inflammation severe, swelling, at first hard or resisting, subsequently more superficially soft or doughy as it increases, may be detected in the course of the bone.

5. *a.* The symptoms are much more obscure where the periosteum of deep-seated bones is affected. In these cases, the attending swelling may be obscure or hardly felt, and the existence of the disease can be only inferred from the pain being fixed in or limited to some part of the skeleton, and from the nature of the predisposing and exciting causes. It is difficult to determine whether the disease commences



in the exterior or in the interior surface of the periosteum, unless under particular circumstances, as when the periostitis is caused by certain external injuries, by ulceration, or the extension of inflammation from parts covering the periosteum. In such cases, and when the inflammation extends from the periosteum to the soft parts covering or surrounding it, it may be inferred that the external surface of the periosteum is chiefly affected, and the bone underneath either slightly or not at all. And this condition may be also inferred where the disease attacks the *rheumatic* and *gouty diatheses*; and in these cases, particularly where the periosteum in the vicinity of joints is implicated, serum or fluid lymph often accumulates in the sheaths of tendons, or even within or around the capsules; similar changes, in these situations, have also been observed by me in several cases of *syphilitic periostitis*, complete recovery taking place without any indication of disease of the bones.

6. *b.* In the more acute cases of periostitis, *suppuration* is not an infrequent result. If the external surface of the periosteum be chiefly affected, the swelling becomes more and more manifest, softer, and circumscribed. The tissues external to the primary swelling become somewhat œdematous, or even reddened, and fluctuation, at first obscure, may be detected. In scrofulous constitutions, and when the periosteum of the long bones is affected, especially near articulations, œdema of the joints, or serous effusion under the capsules, or in the sheaths of tendons, is often observed; but these changes may also take place independently of suppuration, as in the rheumatic diathesis, but more frequently in connexion with it, in the scrofulous.

7. *c.* In the more acute cases of periostitis, when there is reason to infer the extension of inflammation to the bone itself, *suppuration* may likewise occur, and may detach the periosteum from the bone; but, in the more intense cases, and in cachetic or scorbutic habits, the morbid action in the periosteum may give rise to the effusion of a turbid serum between the periosteum and the bone, detaching the one from the other to a considerable extent, even before suppuration takes place, and to *gangrene* of the periosteum and *necrosis* of the bone. This result may take place in acute periostitis of any of the more superficial bones, and not infrequently in periostitis of the bones of the cranium and face; but suppuration is a more frequent occurrence. (See articles CRANIUM (§ 4), and OSSEOUS SYSTEM.—*Osteitis*.)

8. *B. Chronic periostitis* usually commences slowly and insidiously, and presents similar constitutional and specific relations to those above alluded to (§ 3). It is more frequently observed than the acute, and is sometimes connected with ulceration, tumours, or other organic changes of the parts external to the periosteum; and is attended by slight pain only, which is often aggravated during the night by more or less tenderness, especially in superficial situations; and by varying or slight symptomatic fever and constitutional symptoms. Chronic inflammation, when limited to a very small extent of the periosteum, may produce various local changes, according to the grade of morbid action, and to the charac-

ter of the secretion infiltrating the inflamed part and contiguous tissues; it may occasion simple thickening and induration, or even thickening with softening; it may give rise to the accumulation of a glairy, soft, or gelatinous or semifluid matter, chiefly external to the periosteum; or to a grayish, homogeneous matter resembling soft cheese; or to a fibrous, cartilaginous, or osseous substance. These even may form apparently between the periosteum and the bone, or in the fibrous structure of the former.

9. In the *rheumatic form* of chronic periostitis, thickening, or fibrous, cartilaginous, or even osseous transformation of parts of the periosteum sometimes takes place, particularly in the vicinity of articulations; occasioning stiffness, or even complete immobility of the joint or joints. In the *gouty state* of the disease, a calcareous or chalky deposit, similar to that which forms around the articular ligaments, and consisting chiefly of the urate of soda, sometimes takes place in the structure of the periosteum, or between it and the bone. In addition to these changes, various others are met with in the bones and in the periosteum, consecutively of chronic periostitis; but I must refer the reader to the notice taken of them in the articles mentioned above (§ 7).

10. The *terminations and consequences* of periostitis are in every respect the same as those shown to follow *osteitis*, and are attended by the same symptoms as accompany them. (See OSSEOUS SYSTEM, § 12-22.)

11. ii. ASSOCIATIONS OF PERIOSTITIS. — The periosteum is very rarely inflamed without an extension of the morbid action, in a greater or less degree, to the bone itself. Hence it is difficult to determine how far the bone is affected until the disease in it has made considerable progress. Much depends upon the diathesis and age of the patient, and the nature of the exciting causes; but when the pain referred to the bone whose periosteum is affected is increased, as in the case of any of the long bones, by sustaining a weight or standing on it, inflammation of the bone itself may be inferred. The association of osteitis with periostitis is most frequent in young persons, children, and the scrofulous diathesis; and the least so in the gouty and rheumatic.

12. When periostitis is seated in any of the vertebrae, or in the sacrum, or, indeed, in any of the bones either incasing parts of the nervous masses or furnishing outlets to the nerves, the consequent swelling of the periosteum and effusion of lymph may so affect the parts of the nervous system contiguous to it, or the nerves as they pass through their respective foramina or outlets, as to interrupt their functions, and to occasion *paralysis* more or less complete. I have seen several cases of paraplegia thus produced, and very recently attended one with Dr. JOHNSON and Mr. LISTON where this complication existed. In these cases the bladder is often affected, indeed always when paraplegia is present. Periostitis may be also associated with *neuralgia*, and in this case the former is usually the cause of the latter, which not infrequently in these circumstances passes into palsy.

13. When periostitis affects the head, as the *pericranium*, of which I have seen two or three

cases, one of them that of a physician in this city, the symptoms are often distressing. The disease may be either acute or chronic, and proceed simply and favourably, as in the case just alluded to; but it also, owing to the extension of the inflammation to the inner table of the skull, or to the effect produced upon the nerves in the vicinity, may be complicated with *epilepsy*, as in a case recorded by Dr. GRAVES. Indeed, epilepsy is not infrequently caused by inflammatory and other changes in the dura mater; and we know that inflammation may be propagated from the pericranium, through the tables of the skull to this membrane, especially after injuries.

14. The complication of periostitis with gout or rheumatism need hardly be mentioned, since the latter are more commonly causes than complications of this malady; and this remark is still more applicable to syphilitic periostitis. Still they should be viewed also as complications requiring a modified and even peculiar mode of treatment.

15. iii. *The changes found in the periosteum* during the several periods of periostitis are briefly these: In the simple and early state of the disease, the membrane is red and injected, without any remarkable thickening or softening. The adjoining cellular tissue is also injected. At a somewhat more advanced period the injection increases and extends to the bone, the adhesion between which and the periosteum is now somewhat impaired. At a still later stage this membrane is redder, thicker, and somewhat softer, owing to some infiltration of lymph or serum; and it is much more easily detached from the bone; and the bone itself is often more discoloured. In the more chronic states of the disease, the membrane is less red, but it is more thickened, is more dense, and more closely adherent to the bone. In scrofulous persons, small abscesses or scrofulous suppuration may take place in the periosteum, and extend outwardly, with or without a more or less serious lesion of the bone.

16. When the disease goes on to suppuration, which may occur in either the acute, the sub-acute, or chronic state, particularly the latter in scrofulous persons, the periosteum is still more thickened, softened, villous at its surface, or even fungous. Suppuration most frequently occurs in the outer surface of the membrane, and proceeds externally; but sometimes it takes place from the internal surface, particularly when the bone is much affected. In this latter case it detaches the periosteum from the bone, causing considerable changes in both, often with perforation of the former, with extension of the abscess externally through the soft parts, and with the death of the bone underneath. In cases of injury of the pericranium, purulent matter is not infrequently collected between this part and the bone, and the inflammation having extended through both tables, advances to the dura mater, between which and the inner table matter often also collects, so that, before the abscess breaks externally, fatal lesions may be produced underneath the bone. In some cases abscess forms externally to the periosteum, and this membrane is thickened, opposing for a time a barrier between the abscess and the bone; but

this is at last overcome, and the bone is more or less destroyed. In this case, periostitis and osteitis are consequent upon the inflammation of the adjoining parts. The other changes observed after periostitis are the same as those found after osteitis, and are described in the article on the OSSEOUS SYSTEM (§ 12-22).

17. iv. *THE DIAGNOSIS* of periostitis is generally easy when the periosteum of superficial bones is affected; but in other circumstances it is extremely difficult. The history of the case, and the relation which the symptoms have with the causes which seem to have produced them, will generally aid in the formation of a correct opinion. When an acute or aching pain is felt in the situation of a bone, and is increased on firm pressure, and during the night; and more particularly when there is a fixed and deep-seated swelling which is continuous with the surface of the bone, it may safely be inferred that either periostitis or osteitis is present, or both; and, although it may be impossible to determine which of the two structures may be chiefly affected, the circumstance is the less important, inasmuch as the treatment is the same, or very nearly the same, for both. It is often much more important to ascertain the existence of certain of the consequences of the disease, particularly of *suppuration*, or of *caries*, or the death of the bone. When the former occurs, redness is often observed at the surface, unless the periosteum be deep-seated, and there is also some degree of œdema of the adjoining parts, followed by more or less distinct fluctuation, particularly when suppuration commences in the external surface of the periosteum. The existence of *caries* is to be inferred from what has been stated on the subject under the head OSSEOUS SYSTEM (§ 16-20).

18. v. *THE CAUSES* of periostitis are altogether the same as those which produce osteitis. They are *constitutional* or *intrinsic*, or *external* or *extrinsic*.—a. Many of the former are chiefly *predisposing* causes, as the scrofulous, gouty, and rheumatic diathesis; but syphilis is not only a predisposing, but also an energetic *exciting* cause; and when it affects the scrofulous diathesis, not only periostitis, but osteitis also, often supervenes. Periostitis may also follow fevers, especially exanthematous fevers of a malignant character. It is not infrequently caused by scurvy, and by various chronic cutaneous affections, when neglected or allowed to proceed to ulceration, particularly in the extremities. All debilitating agents, unwholesome food, exhausting excesses, and the abuse of mercury, also predispose to periostitis.

19. b. *The exciting causes* are chiefly contusions and local injuries of all kinds; chronic ulcers near or over superficial bones; the irritation of abscesses, of tumours, or of tubercles in the vicinity of the periosteum; excessive muscular exertion, sprains, &c.; exposure to excessive cold or heat; and a prolonged or unsuitable exhibition of mercury, especially for syphilis affecting the scrofulous diathesis. Many of the cases of periostitis, osteitis, and consequent *caries* of the bones of the skull and face, which were formerly so frequent, and which are still occasionally met with, are more attributable to the excessive use of mercurials than to the disease for which they were prescribed.



20. vi. TREATMENT.—A. In the *acute* or *early state* of this malady, the antiphlogistic treatment and regimen are requisite, particularly in young, robust, or plethoric persons. Even when we have cause of suspecting the periosteum only to be affected, the intimate connexion between it and the bone should induce us to employ decided and prompt means. *Local depletions* are always requisite, particularly in the simple form of the disease, occurring in a previously healthy person, and they ought to be large or repeated, or be preceded by general blood-letting, especially in robust or plethoric habits. After depletion, *calomel* should be freely exhibited with *antimonials* until the gums be affected, and I agree with Dr. GRAVES in thinking that the calomel is especially required when the pericranium and bones of the head are implicated; taking care, however, not to prescribe calomel so as to risk an injurious effect from it. When the periosteum of the more superficial bones is affected, as those of the head, face, or extremities, the practice of making *incisions* down to the inflamed structure, even before suppuration has commenced, and with the view of preventing this consequence of the inflammation, seems judicious, and is advocated by CRAMPTON, VELPEAU, BEARD, and others. These incisions not only unload the vessels of the inflamed and adjoining tissues, but tend to determine the suppurative process, if this should occur, externally in the direction of the excisions, and thereby to protect the bone. When the inflamed periosteum is, however, deep-seated, such early incisions can hardly be practised, or only may be ventured on when suppuration has advanced. After local depletions, or even when they cannot be prescribed, as in those sub-acute attacks which sometimes occur in debilitated, exhausted, or broken-down constitutions, *blisters*, other *issues*, or the tartarized antimonial ointment, or other means which will produce vesication or irritation, with a *copious* or *prolonged discharge* from the cutaneous surface over the inflamed periosteum, will often prove extremely beneficial; but, as soon as vesication or a discharge is obtained, it should be favoured by warm poultices, and such other means as the peculiarities of the case will suggest, and perpetuated for a considerable period, so as to fully determine its effects. After these antiphlogistic means have been employed, the treatment about to be advised for the *chronic states*, if the disease still continues, should be employed.

21. B. In the *chronic states* of periostitis, the treatment should be nearly the same as that recommended for osteitis; for in this state the bone generally partakes more or less in the morbid action. Such, however, may not be the case to any extent in the *rheumatic* or *gouty states* of the disease, even when assuming more of an acute than of a chronic character; but, in the *scrofulous form* of the malady, the probable extension of the morbid action to the bones requires more especially the treatment advised for osteitis; namely, recourse to the *iodide of potassium*, with *liquor potassæ*, or BRANDISH's alkaline solution, in either of the preparations of *sarsaparilla*, or in bitter infusions. In the rheumatic and gouty states these means are equally beneficial; and

occasionally the *mistura guaiaci* may be advantageously made the vehicle of the other medicines. In these states also, some one of the preparations of *colchicum* may be added to those just named; and a small quantity of *sulphur* with *magnesia* may be taken at bedtime for a considerable period, or until convalescence is far advanced.

22. C. If *suppuration*, either externally to the periosteum, or between it and the bone, should take place, an early exit ought to be given to the matter, and the local treatment proceeded with according to the circumstances of the case. The *iodide of potassium* and *liquor potassæ*, with *sarsa* and *tonics*, should, however, be persisted in, if no urgent reason exist to contra-indicate them; as they generally enable the system to repair whatever local mischief may have been done. In many of these cases, a full dose of some one of the preparations of *opium* will be conjoined with the above, or given at bedtime with benefit.

23. D. In the *other states of organic lesion* occurring in the periosteum, the means now mentioned are generally most efficacious, even when associated with *caries* of the bone. I state this from experience; but I should also add, that I have likewise seen the *bichloride of mercury* prescribed in the *compound tincture of bark*, with *tincture of capsicum*, almost equally beneficial with the iodide, both in the simple and in the advanced and complicated states of periostitis. In cases of *syphilitic periostitis* this salt, either in simple solution or prescribed with *sarsa*, is the chief remedy upon which we should confide, particularly if it be taken according to VAN SWIETEN's method, and soon after a meal. In cases where mercury has not previously been given, or in those where it has been given in inadequate quantity or inefficient form, this mode of treating syphilitic periostitis should not be overlooked. Where, however, mercury has been resorted to in this complicated state of the disease, without marked benefit, the *preparations of iodine* should be preferred and sufficiently tried. As far back as 1824 I employed these preparations with decided success in both syphilitic and scrofulous periostitis; and about this period I prescribed them for a gentleman whose case presented this complication, and had become remarkable for the persistence and consequences of this disease, and the number of medical means and measures he had had recourse to. They proved efficacious in his case, as well as in others, and he is now alive and well. (*See OSSEOUS SYSTEM*, § 23–25.)

BIBLIOG. AND REFER.—Voigtel, Handbuch der Patholog. Anatomie, b. i., p. 127.—Gaudet, in Journ. de Médecine, t. vi., p. 220.—Wilson, Lectures on the Struct. and Physiol. of the Parts composing the Skeleton, and on the Diseases of the Bones and Joints, 8vo. Lond., 1820.—Rayer, in Archives Génér. de Méd. Mars et Avril, 1823.—A. Bérard, in Dict. de Méd., art. *Périoste*, *Maladies*, &c.—P. F. Blandin, in Dict. de Méd. et Chirurg. Prat., art. *Périoste*,—Cruveilhier, Anatomie Pathologique, livrais. xxxv., pl. v. (*Extravasation of Blood between the Periosteum and Bone*).—Parsons, in New-England Med. Review and Journ.; and in Journ des Progrès des Sciences Méd., t. xv., p. 54.—Roche et Sanson, Nouv. Elements de Pathologie, &c. Brux., 1834, p. 238.—J. Hamilton, Dublin Journ. of Med. Sciences, vol. ix., p. 255.—R. Graves, System of Clinical Medicine, 8vo. Dubl., 1843. See, also, BIBLIOG. AND REFER. to articles FIBROUS TISSUE and OSSEOUS SYSTEM.)

PERIPNEUMONIA.—See LUNGS—INFLAMMATION OF.



**PERITONEUM—DISEASES OF.**—The *peritoneum* (περιτόνειον, from *περιτελεω*, to extend around) was not recognised, until a comparatively recent period of medical history, as being often the seat of disease, independently of the parts which it envelops; and, as will be shown in the sequel, the most serious changes to which it is liable were, until modern times, often confounded with other maladies. The greater precision imparted to pathological research since the appearance of the writings of MORGAGNI, and more recently of those of C. SMITH, BICHAT, BARON, and others, and the more accurate connexion of lesions of this membrane with the phenomena or symptoms by which they are indicated, furnished by numerous modern writers, more especially by those referred to at the conclusion of this article, have combined to place our knowledge of the nature, symptoms, and treatment of diseases of the peritoneum greatly in advance of the progress it presented at the close of the last century, or even at the commencement of the present. In this article I shall, *first*, consider the several states of inflammation of the *peritoneum*, and their consequences; and, *secondly*, the structural changes found in this membrane independently of inflammation.

1. INFLAMMATION OF THE PERITONEUM.—SYNON. *Peritonitis*, Vogel, Cullen, &c. *Phlegmone Peritonci*, *Phlegmone Mesenterii*, Prosper Alpinus. *Epiploitis*, Sagar, Sauvages. *Omentitis*, Vogel. *Inflammatio Omenti*, Boerhaave. *Mesenteritis*, *Enteritis Mesenterica*, Sauvages. *Inflammatio Mesenterii*, Hoffmann. *Febris Mesenterica*, Darwin. *Enteritis epiploitis*, Parr. *Cauma Peritonitis*, Young. *Empresma peritonitis*, Good. *Inflammatio Peritonice*; *Péritonite*, *Inflammation du péritoine*, Fr. *Darmsfellentzündung*, *Bauchfellentzündung*, Germ.

CLASSIF.—1st Class, 2d Order (Cullen).  
3d Class, 2d Order (Good). III. CLASS,  
I. ORDER (Author).

2. DEFIN.—NOSOLOG. DEFIN. *Tenderness, pain, heat, and tumefaction of the abdomen, with symptomatic fever; the patient always preserving a supine posture, with the knees drawn up; and the pain being aggravated by pressure, or by actions of the abdominal and respiratory muscles.*

3. PATHOLOG. DEFIN.—*Increased vascularity, softening, or thickening of the peritoneal membrane, with effusion of coagulable lymph, or of a sero-albuminous, or sero-puriform, or sero-sanguineous fluid; sometimes with organized adhesions, &c.*

4. Inflammation of the peritoneum may affect persons of any age, of any temperament, and of any habit of body; it may attack suddenly and acutely, or slowly, insidiously, and chronically; it may be general or limited, or at first partial, and afterward more or less extended; and it may be primary or idiopathic, and consecutive or symptomatic. It may, moreover, be characterized by either of those states of vital diathesis which I endeavoured to establish as important pathological distinctions, when treating of inflammation, and which I ascribed to the nature of the exciting causes, and to the states of vital or constitutional power, and of the circulating fluids. Hence *peritonitis* may also be either *sthenic* or *asthenic* as regards the local action and the accompanying fever.

5. I. ACUTE PERITONITIS.—*Acute peritonitis* in a *sthenic* form often commences in a part only of the peritoneum, but extends more or less to other portions of it. It is comparatively rare, in this state of the malady, that the peritoneal surface is at first extensively affected; but I have seen many cases of the puerperal and erysipelatosus states of the disease, of the *asthenic* form, in which this membrane was more or less extensively implicated at an early period, and more particularly in the puerperal states of peritonitis associated with, or even arising from, contamination of the circulating fluids.

6. *True or primary peritonitis* commences in, and is chiefly confined to, the peritoneum; and, when thus originating, the inflammation more rarely extends to the organs which are enveloped by this membrane. As I have shown on several occasions, the inflammation does not so rapidly spread over the surface of the peritoneum as was generally supposed, unless in the asthenic forms of the disease, although the lymph thrown out from the surface of the part first affected rapidly irritates and inflames the opposite surface, or that coming in contact with it; so that it may be confidently asserted that sthenic acute peritonitis extends rapidly and chiefly by contiguity of situation, and but slowly and less remarkably by continuity of surface. I have often observed the opposite surfaces, or those in more immediate contact, intensely inflamed, while large portions of the surface continuously interposed between the inflamed parts were unaffected.

7. This limitation of the inflammation to opposite surfaces is equally remarkable when the *peritonitis* is consecutive of inflammation of a subjacent tissue or organ; unless, indeed, the circulating fluids have become contaminated and constitutional power much depressed, circumstances tending remarkably and rapidly to spread the morbid action continuously over the surface. In this latter case coagulable lymph is not formed, but a turbid and irritating serum is abundantly thrown out, as will be more fully noticed when I consider certain asthenic and complicated states of the disease.

8. i. SYMPTOMS OF ACUTE STHENIC PERITONITIS.—The symptoms of acute peritonitis vary with the causes which produce it and with the portion of the membrane primarily and chiefly affected. As this form of the disease often originates in, and is limited to, a part only of the peritoneum, although often extending more or less rapidly and generally, I shall first describe the symptoms of the more partial states of peritonitis, and next those of general peritonitis.

9. A. PARTIAL PERITONITIS is most frequently observed after surgical operations, in connexion with incarcerated or strangulated *hernia*, and consecutively of inflammation of the *apex* *idix cæci*, as shown in the article *CÆCUM*, at 1 of *metritis*, *ovariitis*, and *cystitis*. It is often, also, consequent upon, or associated with, *splenitis*, *hepatitis*, *enteritis*, and *dysentery*, and upon chronic ulceration and perforation of the stomach or of an intestine. Indeed, partial peritonitis is often consecutive of inflammation of parts enveloped by this membrane, the disease proceeding no farther, when occurring in a previously healthy state of the frame, than in the production of coagulable lymph, and the

affection and agglutination thereby of the opposite surface, terminating in adhesions which, as will be shown hereafter, time will modify or alter.

10. *a. Partial peritonitis*, consequent upon local injury, surgical operations, or occurring without any very obvious cause, *Peritonitis partiaria traumatica et spontanea*, generally commences with pain confined to a particular part of the abdomen; often with rigours or chills, but sometimes without either; with tenderness on pressure, and with slight fulness. To these soon succeed the usual attendants of symptomatic fever; increased or more constant pain and tenderness; a somewhat swollen, hard, and hot state of the most painful part; nausea, vomitings, and an anxious expression of the countenance, in the most severe cases. The bowels are confined, but stools are usually procured by active purgatives and enemata. The pulse is frequent, small, hard, or constricted. In some instances the complaint proceeds no farther, and either gradually subsides or is followed by indications of circumscribed effusion, or more rarely of purulent collection. In other cases the disease extends, and assumes, with greater or less rapidity, all the characters of general peritonitis (§ 19).

11. *b. Peritonitis connected with incarcerated or strangulated hernia—P. Hernialis—P. ex strangulatione*—presents similar features to the above, being only more intense and rapid in its course. The symptoms of partial peritonitis may exist, in cases of hernia, without any appearance of hernial tumours, and without the bowels being obstructed. In these cases, most probably only a small portion of one side of the bowel is strangulated, the canal not being thereby obstructed. A very interesting case of this kind occurred many years ago in a cook in my family, who had been subject to femoral hernia. She was removed to Guy's hospital, where she remained for a very considerable period under the care of Sir A. COOPER and Mr. GALLOWAY, who agreed with the author in considering the case to be one of partial peritonitis from the strangulation of a small portion of one side of the sigmoid flexure of the colon. No tumour could be detected in the seat of the hernia. She ultimately recovered without an operation. Partial peritonitis, arising from internal strangulation, or even from the strangulation caused by the adhesions or bridges formed by an old partial peritonitis or omentitis, or from the operation of hernia or other local causes, presents the same symptoms as have been already noticed, and usually pursues a most unfavourable course, the inflammation extending with greater or less rapidity, with obstruction of the bowels and its consequences.

12. *c. Inflammation not infrequently commences in that portion of the peritoneum covering the appendix vermiformis and cæcum—Peritonitis partiaria cæci*—and is either more or less limited to it, or extended much farther. In most of these cases the disease arises, as I have shown in the article CÆCUM, from inflammation of the appendix caused by the passage into it of hard substances, as the stones of fruit, gall-stones, &c. The symptoms are chiefly acute pain in the cæcal region, with

distention, great tenderness, fulness or swelling, tormina, costiveness, nausea, and occasionally vomiting with symptomatic fever. The inflammation may continue limited to this portion of the peritoneum and the more immediate vicinity, terminating either in suppuration or in gangrene of the appendix, or it may extend much farther over the peritoneum, and ultimately become general. Several cases illustrative of these states and terminations of this form of partial peritonitis have come before me, and some of them are fully noticed in the article CÆCUM.

13. *d. Inflammation of the peritoneum reflecting over the abdominal muscles—Peritonitis superficialiaria—P. antica—P. externa*—was first noticed by J. P. FRANK, and afterward by HILDENBRAND. They considered that this variety might be distinguished from inflammation of the visceral peritoneum. They remark, that it is attended by extreme tenderness of the abdomen, particularly at the umbilical region; by an extension of the inflammatory action to the cellular tissue connecting this membrane with the muscles; and often by the effusion of lymph into the sheaths of these muscles, causing extreme tension, hardness, and swelling. This variety usually commences with rigours, chills, and irregular heats, preceded and attended by a fixed acute and burning pain, remarkably increased by coughing, and by motions of the trunk. There are marked heat of the abdomen; swelling and hardness, particularly in the course of the recti muscles; occasionally distinct and circumscribed tumours; intolerance of the touch of the bed-clothes, and of the slightest contractions of the abdominal muscles; and symptomatic inflammatory fever, with its usual attendants. The vomiting and obstinate costiveness accompanying some other states of peritonitis are not usually remarkable in this. These symptoms may, however, be present, and be attended by anxiety, nausea, and dyspnoea, as the inflammation becomes more extended, and by singultus, laboured respiration, &c., when it mounts to the diaphragm, as it usually does in the most severe and unfavourable cases.

14. *e. If the inflammation be seated in the peritoneum covering the psoæ and iliac muscles—Peritonitis psoitica—P. partiaria postica*—many of the symptoms already mentioned, with others which are proper to this seat, are complained of. Some of these occasionally resemble those attending hepatitis. Pain is felt in the back, sometimes obtuse, more frequently very acute. It is often referred to either flank, or to some part above the bladder on one side. An obtuse pain, occasionally with numbness, passes through the groin to the thigh, which the patient cannot stretch out without an increase of suffering. The urinary functions are not disturbed, and the bowels are not obstructed. There is more or less tenderness on pressure, according to the situation and severity of the inflammation.

15. *f. Dorsal Peritonitis and Mesenteritis—Peritonitis dorsualis—P. mesenterica*—are the most obscure of the several varieties of peritonitis; but it is very rare to observe inflammation of the peritoneum covering the dorsal and lumbar spine without the mesentery and intestines being more or less implicated.



When the disease originates in this situation, acute pain is felt along the spine, which is much increased upon extending or straightening the trunk, or upon drawing it upward or backward upon extending the limbs, and upon firm pressure of the abdomen. The febrile symptoms are most severe, with marked affection of the stomach and bowels. (See article *MESENTERY—Inflammation of.*)

16. *g.* The *omentum* may be the principal seat of the inflammation—*Peritonitis omentalis*—*Epiploitis*—*Epiploite*, Fr.—but it is extremely difficult to distinguish this state of the disease from that which is more or less extended. Indeed, general peritonitis commonly implicates the omentum; and this is more particularly the case in the asthenic and puerperal states of the disease. Or, if peritonitis commences in this situation, it rapidly extends, in the way already indicated, to all the parts coming in contact with the inflamed omentum. J. P. FRANK states that, in true *epiploitis*, the *epiploon* is generally greatly thickened, and that he has seen it in several instances upward of an inch in thickness. Omentitis is usually attended by acute burning pain of the anterior part of the abdomen, above and below the umbilicus, but chiefly between the epigastrium and umbilicus, with extreme tenderness, a sense of tension, slight hardness, and marked swelling, and by acute symptomatic fever; but these symptoms are also present in most cases of general peritonitis, of which, however, omentitis is often a more or less considerable part.

17. Omentitis may be associated with inflammation of one or more of the contiguous viscera, as of the liver, stomach, colon, or small intestines, and by the symptoms more especially belonging to such complication. Indeed, simple omentitis rarely occurs, unless in connexion with some cases of hernia, it being usually associated with inflammation of contiguous portions of the peritoneum. It should also be recollected that the most severe cases only of omentitis present the acute symptoms just mentioned, and that slighter or *sub-acute* cases sometimes occur, in which the symptoms are milder, but more insidious and equivocal. I have even met with omentitis in a *chronic state*, and nearly limited to the omentum, with the exception of some adhesions to contiguous parts of the peritoneum, covering portions of the bowels and abdominal parietes. These cases have been generally in females somewhat advanced in life, and chiefly in those who have been subject to *umbilical hernia*. The *adhesions* consequent upon omentitis, and the extension of the inflammation to contiguous portions of the peritoneum, may become, even at a remote period after the recovery of the patient, the cause of internal strangulation of a portion of intestine. Many instances of this occurrence might be adduced, if it were necessary.

18. Omentitis, in a very acute form, often extending to contiguous parts of the peritoneum, is frequently observed in the course, or as a consequence, of *hernia*; and when the hernia consists of a portion of omentum and becomes strangulated, the inflammation thus induced often terminates in gangrene, which is either limited to a part of the omentum, or is extended to parts of the peritoneum and in-

testines. Omentitis may likewise, in either an acute or sub-acute state, terminate in *suppuration*. In this case the matter may find its way, by perforation, into the bowels, or externally through the parietes of the abdomen. J. P. FRANK states that he has met with instances of this kind, but they are very rare.

19. *B. GENERAL PERITONITIS.*—The more general states of peritonitis, occurring in a person of good constitution, or in a sthenic form, usually commence with rigours or chills, more or less severe and prolonged, with acute pain, soreness, and tenderness in the abdomen, and aching in the back or limbs. The abdominal pain soon becomes the chief symptom, is sharp, burning, pungent, or cutting, and is attended by a sense of tension, or of heat and distressing distention. It is aggravated by pressure, by efforts to vomit, or to pass a stool, or to pass the urine, or even by the slightest movement in bed. The patient cannot endure the weight of the bed-clothes, or of a fomentation. He lies on his back, with his knees drawn upward, thereby favouring relaxation of the abdominal muscles, and removing a part of the pressure of the bed-clothes from the abdomen. In some cases the pain is less acute, or remits somewhat for a short time, and returns with much severity. In others it is felt chiefly on pressure, or upon any effort; and more acutely after intervals, or when flatus is passing through or distending portions of the intestines. The pain is usually most severe about the umbilicus, or between this place and the hypogastrium; but it continues most acute at the part where it commenced, even when it extends most rapidly over the abdomen, which is hot, distended, and flatulent.

20. As the disease advances and is extended, the pain is increased by respiration, which soon becomes short and superficial. There are also nausea, frequent retchings, and vomiting of the fluids taken, with mucous matters, and sometimes with bile, more or less thirst, and generally constipation. The tension of the abdomen is at first attended by a marked contraction of the abdominal muscles, under the hand of the physician, owing to the increased sensibility being attended by augmented susceptibility, and disposition of the muscles to contract energetically, when the sensibility is excited. Subsequently, or after a day or two, seldom later, but often after a few hours only, the feeling of tension is attended by much distention, which varies in amount, and in the rapidity of appearance, with the intensity, and the general diffusion of the inflammation. The circumstances proper to the patient, however, modify the distention considerably; it is greatest in females of a relaxed habit of body, and soon after parturition; and least in males of a spare habit of body, with strong or rigid muscles. In this state or form of peritonitis the abdominal distention is equal throughout; any irregularity which may be felt arising chiefly from muscular contractions under the hand of the examiner.

21. *Percussion* can hardly be endured; but at an early period, the clear sound which is emitted evinces that the distention is owing to the accumulation of flatus; but this sound becomes more dull as the disease advances, particularly in more depending parts of the abdo-



men, owing to the collection of serum, while it still continues clear, or even more so, around or above the umbilicus. The ear or stethoscope applied in different parts of the abdomen sometimes detect a rubbing or friction-sound, similar to that often heard in pericarditis or pleuritis; and this sound is caused by the motions of the opposite inflamed surfaces during respiration.

22. The countenance is pale, expressive of anxiety and suffering, and the features are sharpened and sunk. The patient continues motionless on his back, the least inclination to either side increasing his suffering; and he is afraid of quenching his thirst, lest vomiting should ensue and augment his distress. Respiration becomes more short, frequent, interrupted, and shallow, the action of the diaphragm increasing the pain. The pulse is frequent, small, constricted, or hard. The skin is hot and dry; the urine scanty, high-coloured, and often turbid.

23. The *course* of general sthenic peritonitis is usually rapid, and characterized by a progressive aggravation of the symptoms; especially of the tenderness, tension, and swelling of the abdomen; and of the sickness and vomitings. The pain and tenderness become more general, and diffused through the abdomen, extending to the back and loins; the face paler and more sunk; the anxiety and distress greater; and the pulse and respiration smaller and quicker. Having reached its acmé, the disease may continue for one, two, or three days, or even longer, nearly stationary, but with irregular exacerbations and remissions. Having, however, become general, and thus far advanced, it most frequently is not the less fatal, even when prolonged, as it sometimes is, to seven or eight days. General peritonitis, however, often runs its course in a much shorter period; in three or four days, or even in less time; but this rapid termination occurs most frequently in the *asthenic* and *puerperal* states of the malady.

24. II. ACUTE PERITONITIS presents certain VARIETIES OR MODIFICATIONS requiring particular notice. The most remarkable of these occur in the *puerperal* states—*Puerperal Peritonitis*—but as they present so many peculiarities, and are so often complicated with other affections connected with these states, I shall treat of the puerperal forms of peritonitis in connexion with those maladies with which they are so often associated, under the general head of PUERPERAL DISEASES.

25. Some authors have noticed what they have denominated *bilious* and *nervous* forms of peritonitis; but these require merely a passing notice. The *former* of these is merely peritonitis occurring in connexion with an accumulation of bile in the biliary organs, and its discharge, chiefly by vomiting, during the course of the disease. The *latter* is characterized by a more than usual predominance of nervous symptoms; of acute pain, of low delirium or of convulsions, of restlessness, and, lastly, of coma, with subsultus of the tendons. It is obvious that these modifications are dependant upon previous disorder and temperament, and may appear in either the sthenic or asthenic forms of the malady.

26. i. ASTHENIC GENERAL PERITONITIS —

*Erythematic* or *Erysipelatous peritonitis* — most frequently occurs in the puerperal states, and will receive due attention in connexion with these states.—a. But it sometimes occurs independently of these, in debilitated and broken-down constitutions; in cachectic habits; in connexion with erysipelas, or with morbid states of the circulating fluids; in the course of exanthematous, adynamic, or other fevers; after spontaneous perforation of the stomach or intestines, or even of any portion of the peritoneum; and after the operation of *paracentesis abdominis*. Under these diverse circumstances asthenic peritonitis presents varied phenomena, as respects both the local and the constitutional symptoms. Still it exhibits many, and these the most characteristic, that are common to all circumstances; and chiefly the appearance of symptoms diagnostic of it after previous disorder, or during a state of ill health; its often sudden accession and rapid progress, and frequently without previous or concomitant rigours or chills; the greater softness, rapidity, smallness, and weakness of the pulse; the cachectic or even livid hue of the countenance and general surface, as when it occurs in the progress of fever; the almost sudden distention of the abdomen, and indication of serous effusion into the peritoneal cavity; the more profound prostration; and the rapid supervention of singultus, with frequent regurgitation of the contents of the stomach, coldness and dampness of the extremities, and other fatal symptoms.

[This form of peritonitis is a very frequent disease in those places where epidemic erysipelas prevails, and is extremely fatal. We have met with several cases of it, some of which ran their course with great rapidity, and one resulted in death in 48 hours. It generally comes on with great gastric disturbance and vomiting, tenderness at the epigastrium, extreme prostration, coldness of the surface, small and frequent pulse, &c. It is most apt to attack females who have recently been lying-in; but it is not confined to them: in some instances, although comparatively rare, it seizes upon males. For a more particular account of this affection, see article EPIDEMIC ERYSIPELAS.]

27. b. When the peritonitis results from *spontaneous perforation* of any portion of the *digestive canal* (see DIGESTIVE CANAL, § 42), or from perforation of this inmembrane covering any of the abdominal viscera, by tubercular softening, disease, or rupture of vessels, or other lesions affecting the organs over which it is reflected, it is usually excited by the escape of fecal, morbid, or other matters into the peritoneal cavity; and, although these matters may not extend much beyond the place through which they passed, yet they excite a spreading or asthenic inflammation, attended by a copious, turbid, serous, or sero-albuminous effusion, the constitutional powers being incapable of forming coagulable lymph, or such as can agglutinate the opposing surfaces, and thereby limit the extension of the inflammation or prevent the diffusion of the matters passed through the perforation over the peritoneum. In all these cases, the pain and tenderness are first referred to the seat of perforation, which is most frequently in or near the

right iliac region; but they rapidly extend, and are followed by all the symptoms just mentioned, which always terminate fatally, sometimes within twenty-four hours, and seldom later than two or three days.

28. c. Peritonitis from *paracæcitis abdominalis* usually presents similar characters, and pursues the same course as that just noticed. It is one of the most frequent varieties of asthenic peritonitis, and is almost uniformly fatal. It is very closely allied in its symptoms and progress to that state of the disease which has been denominated *crystalloplastic peritonitis* by some pathologists, from the connexion sometimes subsisting between erysipelas and asthenic peritonitis. Indeed, the connexion is sometimes obvious, as when erysipelas attacks the parts punctured in paracæcitis, as it sometimes does, particularly when it is prevalent in a hospital, or is epidemic in the locality. In rare cases, also, asthenic peritonitis occurs on the subsidence of erysipelas from external parts of the body. I have met with an instance of it consequent upon the disappearance of erysipelas from one of the lower extremities, and Dr. ABERCROMBIE mentions another. In these, the patients complained of acute pain through the abdomen, with tenderness on pressure, great anxiety, and restlessness, death taking place within thirty-six hours. On *dissection*, the appearances were nearly the same in both instances; the intestines were all distended by flatus; the peritoneal surface was of a dark red, passing to a dull leaden colour, and the cavity contained much turbid serum, somewhat reddened, or of a sanious hue.

29. ii. *Hæmorrhagic peritonitis* has been noticed by BROUSSAIS and others, but it is extremely rare. It is not, however, to peritonitis consequent upon rupture of a blood-vessel, or of a viscus, as of the spleen or liver, that this term has been applied; but to asthenic peritonitis occurring in the hæmorrhagic diathesis, and attended by an exudation of blood from the capillaries of the peritoneum, without rupture. I have never met with a case of this form of peritonitis; but BROUSSAIS states that the symptoms are inflammatory at the commencement, and rapidly pass into those indicating great depression of the powers of life; the pulse soon becoming rapid, small, and soft, and death quickly supervening, with convulsions, cold and damp extremities and surface, and the other symptoms attending the fatal sinking of the asthenic and other states of the malady. The effused blood remains fluid, is mixed with serum, and the peritoneum appears generally affected.

30. iii. *Latent peritonitis* occurs sufficiently often to deserve notice at this place, although less frequently than is supposed by some writers. Indeed, it is very rarely that the disease remains latent when it occurs primarily, and perhaps never when it affects a robust or previously healthy person. It is chiefly when peritonitis attacks persons who are exhausted, cachectic, or otherwise diseased, or who are labouring under some other malady which attracts the chief attention, or who are maniacally or otherwise insane, that the characteristic symptoms are either imperfectly developed or overlooked from their slight or mild form,

and from the more prominent affection of a distant part. It is chiefly from the absence of pain, tenderness, and pyrexia, and from the insidious progress of the disease, that the nature of it is unsuspected. The appearance and expression of the features; an attentive examination of the abdomen by pressure, percussion, &c.; and the position of the patient in bed, will generally disclose, without much doubt, the nature of the malady.

31. iv. THE TERMINATIONS of *acute general peritonitis* are much influenced by the predisposing and the exciting causes; by the state of the patient at the time of attack; by the particular form the disease may assume; and by the several circumstances and influences to which the patient has been or is subjected.—*a. Resolution* of the inflammatory action sometimes occurs, and chiefly when the disease is of the sthenic form, is of a mild character, or less intense than that described above (§ 19); or, although equally severe with it, if the symptoms become ameliorated by treatment. A diminution of pain, tension, and tenderness; less frequent retchings; an improved state of the pulse and of respiration, and a more natural expression of countenance, are favourable indications, especially if they are accompanied by perspiration, a more copious secretion of urine, and freer alvine evacuations.

32. b. In many instances of resolution of sthenic peritonitis, evidence of *adhesions* having formed between parts of the contiguous surfaces is furnished in the continued tenderness or pain, increased by pressure, or accidental shocks, or quick motion, or by turning in bed, that is felt in one or even more parts of the abdomen, although the patient may apparently have nearly, or even altogether, recovered. That these symptoms result from adhesion has been proved by the subsequent history of some cases of this kind; these adhesions becoming the cause of internal strangulation of a portion of intestine, of partial peritonitis, and of the patient's death. In other instances the inflammation, instead of being completely resolved, is only abated, the symptoms gradually subsiding in severity, without recovery taking place. In these the acute passes into the *chronic disease* (§ 36).

33. c. *Effusion* of serum, or of sero-albuminous, or even of sero-sanguineous or sero-puriform matter, more rarely the latter, into the peritoneal cavity, is rather a consequence than termination of the disease. At an early stage the *effusion* is slight, but at an advanced period, and as the powers sink, it becomes more and more copious. The abdominal pain and tension then subside or altogether cease; the abdomen being soft, relaxed, but tumid, and dull on percussion, excepting at its most elevated part, where the sound emitted indicates flatulent distention of the intestines. Fluctuation is sometimes remarked, but occasionally it is obscure, or not evident, owing to the effusion being either traversed by adhesions, or existing between the folds of the mesentery and convolutions of the intestines, or gravitating to the iliac and pelvic regions.

34. d. *Gangrene* very rarely occurs in general peritonitis, even when it is most asthenic in its nature. It appears chiefly when the disease commences partially, as in the appendix



of the cæcum, or from strangulation or local injury. Its occurrence is indicated by sudden cessation of the pain and tension of the abdomen; by hiccough, and by coldness and clamminess of the extremities and general surface; by rapid, weak, small, thready, and intermittent pulse; and sunk, dark, and Hippocratic countenance.

35. *c.* A fatal issue may be the consequence of effusion and its effect upon the system, in connexion with the extent of lesion, and, in rare cases, of incipient gangrene. But it most probably chiefly results from the shock or influence produced upon the vitality of the frame by the great extent of the inflammation and consequent lesions; and this is especially the case when the disease is intense, and the peritoneal surface extensively affected at its commencement, for in these cases the powers of life most rapidly sink, especially when the malady presents an asthenic character. Where effusion is not extensive, and consists chiefly of serum, or of a sero-albuminous fluid, it does not necessarily occasion death, the patient sometimes recovering; the fluid being absorbed, and partial adhesions still remaining, or the disease passing into the chronic form.

36. A fatal issue occurs chiefly when the more intense cases of the sthenic form of the disease have been neglected at their commencement, and the more unfavourable consequences of inflammation have supervened before the treatment has commenced. In these, this issue usually takes place at periods varying from two or three to eight or nine days. In the several varieties of asthenic peritonitis noticed above, this issue generally occurs, unless in a few instances, where the disease is judiciously treated at its commencement, in from one to two or three days. This termination is preceded and indicated by increased alteration of the countenance; by greater rapidity, weakness, and smallness, or irregularity of the pulse; by coldness and dampness of the extremities; and by more frequent vomitings, the contents of the stomach being rejected without retchings or effort, and by mere regurgitation. On the accession of these unfavourable symptoms, the state of the respiration and the occurrence of singultus indicate the extension of the disease to the diaphragmatic peritoneum. The patient is now sometimes restless or oppressed, and the breathing is laboured or thoracic; but he still lies on the back, and makes no effort to move, even when fluids are regurgitated from the stomach, these being thrown over his person and the bed-clothes. The matters thus ejected are fluid, with some mucus and green bile. He soon afterwards either sinks into a state of coma, quickly terminating in dissolution, or he is attacked by convulsive movements, with difficult or laboured respiration, spasms of the diaphragm, and asphyxia, or he sinks with all the indications of vital exhaustion.

37. III. CHRONIC PERITONITIS.—This form of the disease was not duly recognised and investigated until the commencement of the present century. BICHAT was the first who distinctly and correctly noticed it, and Dr. PEMBERTON subsequently described one of its forms. Soon afterwards Dr. BARON fully illustrated the tubercular variety of chronic perito-

nititis; and about the same time BROUSSAIS, MONTFALCON, GASC, and the author, further investigated the disease. Although overlooked as an idiopathic and distinct malady by writers of the seventeenth and eighteenth centuries, still cases illustrative of its nature are to be found in the works of many of them, as shown in a memoir published by me many years ago, containing the history of some cases of it which had occurred in my practice. The writings of COLUMBUS, FANTONIUS, FERNELIUS, BALLONIUS, TULPIUS, LOMIUS, BONETUS, TISSOT, HOFFMANN, BURSERIUS, and MORGAGNI, at the places mentioned in the *Bibliography*, furnish some interesting cases and remarks, illustrating the history of chronic peritonitis, and showing how frequently this malady was confounded with colic and mesenteric disease.

38. i. The HISTORY of our pathological knowledge of chronic peritonitis must nevertheless be considered as very limited. Although the medical writers of the last two centuries furnish no accurate description of this highly dangerous disease, yet their writings are not altogether deficient in proofs of a partial acquaintance with its nature; but they failed in recognising the lesions found on dissection of fatal cases as the results of chronic inflammation. COLUMBUS (*De Re Anat.*, lib. xv.) describes “*Conglomerationem intestinorum, natam videlicet ex ultimis ilei partibus una complicatis, tumoremque in hypogastrio exhibentibus.*” And MORGAGNI adduces several cases (*Epist. Anatomic.*, 39, sect. 24–32) in which he found the intestines agglutinated in one mass, and their coats possessed of an almost cartilaginous firmness. One of these cases occurred after ascites, and sufficiently marks the acute nature of the dropsical affection. TULPIUS (*Observationes*, lib. iv., p. 348) mentions a similar instance in a female who had been affected from an early age with ascites: upon dissection, the peritoneal coverings were everywhere thickened to such a degree as to equal that of the ring finger.

39. MORGAGNI, when adducing the cases just referred to, mentions others from preceding writers, which are, as well as those seen by himself, illustrations of chronic peritonitis occurring without tubercular formations. He describes these cases as unfavourable results of prolonged or repeated attacks of colic and of ascites; and he describes others as forming varieties of abdominal tumours, owing to the thickening and induration of the peritoneal coat, and the agglutination of the intestines to each other and to one or more of the other abdominal viscera.

40. It is singular, however, that MORGAGNI, with all his pathological knowledge, did not attribute the changes in the peritoneum, which he has so fully and even frequently described, and with which he occupies nearly the whole of his thirty-ninth epistle, to inflammation. He is very much puzzled to account for the changes, now universally ascribed to chronic inflammatory action, and enters upon a somewhat lengthy disquisition (sect. 31) in explanation of it. He ascribes the pain to flatulent distention of the bowels; and the agglutination of the opposite surfaces to the pain and distention, which he considers to have caused



an exudation of a glutinous matter from these surfaces. The thickened and indurated state of the peritoneum, often found in connexion with more or less serous effusion, he imputes to the effect produced upon this membrane by its prolonged maceration in an acid or morbid serum. When adverting to the symptoms, he remarks, "Pulsus humilis et debilis potius, et qui, si bene attendas, sibi obscure, dissimilis sit: abdomen autem tensum, et durum, et cum dolore quodam; facies denique insoliti aliquid, sed in aliis aliud, ostendens," &c.

41. HOFFMANN, after describing the more acute affections of the intestinal tube which terminate either fatally or in health, in a very short time, mentions those of a chronic character, which he denominates "dolores chronici, vel colicæ diurnæ." He describes them as continuing during many weeks, and even for the space of a twelvemonth, with various intermissions and exacerbations. On dissection, "the intestines are found constricted, their coats thickened, callous, and scirrhus," &c. (*De Intestinorum Doloribus*, sect. ii., cap. v., p. 180.)

42. Other instances could be also adduced, from BONETUS (sect. xxi., *Observat.* 3-8), from FANTONIUS (*Observationes*, *Epist.* 4), and from the *Acta Academ. Nat. Cur.* (tom. i., *Observat.* 87; et tom. vi., *Observat.* 124), in all of which the intestines, omentum, and mesentery were accreted into one mass. BURSERIUS mentions similar cases, which he considers as arising from an "arthritica, rheumatica, herpetica, scorbutica, vel scabiosa materies, retropulsa." Speaking of these diseases, which he denominates "intestinorum conglomeraciones," he remarks, "Similem (conglomeracionem) vidi in muliere colica chronica jamdiu afflicta, et demum marasmo confecta." (*Institutiones Medicinæ*, vol. iv., p. 362, *et seq.*)

43. JONOCUS LOMTUS furnishes some remarks which may be referred to this disease. "I find it observed," he says, "by some learned men that the peritoneum, or at least those membranes which cover the abdomen and parts of the belly, are likewise afflicted with very grievous pains. These pains, although they in nowise belong to the colic, yet they are equally violent. And these, as they are very severe, so likewise are they very long, and yield to none of those remedies which are proper in the colic, whether medicines, fomentations, and clysters; but generally succeed long fevers, and those kinds of bilious diseases which are not easily solved, and have been often observed to terminate, as it were critically, continued fevers, as well as tertians and quartans. The mesentery may also be seized with an inflammation; at this time there is an inward weight, but no manifest pain; a fever arises, but this is moderate," &c. (*Observat.*, p. 316, *et seq.*)

44. It is not, however, to the scanty details furnished by the earlier writers in modern medicine that we are to attribute the progress made in our knowledge of the pathology of chronic peritonitis: but to the researches of BICHAT, PEMBERTON, BARON, BROUSSAIS, MONTFALCON, GENDRIN, GASC, SCOTTETIN, and HODGKIN, that we are chiefly indebted. Up to the time of the earliest of those writers, this disease was confounded, as I have now shown, with

colic, mesenteric affections, or tumours of the omentum. And it is very probable that the varieties of colic, particularized by many of the older writers under the appellations arthritica, rheumatica, scorbutica, metastica, inflammatoria, symptomatica, diuturna, chronica, endemica, &c., were actually chronic inflammations of this membrane, the disease occurring in the manner indicated by those specific names. In addition to this catalogue of names, others from the same and different authors may be mentioned, as constituting varieties of colic, as colica herpetica, C. ex scabiosa materie retropulsa; C. ex perspiratione retenta, atque ad intestina translata; C. mesenterica, &c., which, most likely, were truly affections of a slow inflammatory nature, attacking this membrane, and either simple or primary, or associated with tubercles. FERNELIUS appears to have been of this opinion; he says: "Ab acri vero erodentique humore, aut etiam ab inflammatione, quisquis ortus fuerit, dolor colicus fixus etiam est, sed cum fibracula, ardore, siti et vigiliis; irritatur esculentis potulentisque calidioribus, a quibus etiam sumpsit originem." And again, "Alii insuper cruciatu quadam similitudine et vehementia colici nuncupantur, quibus tamen non in colo intestino sedes est; sed vel in peritonæum vel in membranis quæ abdomini ventrisque partibus obtunduntur. Hi sane gravissimi sunt, et admodum diuturni, ac neque clysteribus, neque medicamentis, neque fomentis, neque iis remediis quibus qui vere sunt colici dolores, deliniri solet." (FERNEL., *Pathol.*, lib. vi., c. vi., p. 159.) Although WILLIS did not consider colic to be an inflammatory disease, he believed the part primarily affected by it to be the mesentery, "which is highly sensible," he adds, "and through which a morbid matter is conveyed, not by means of the arteries, but by the nerves, and its seat is not the proper coats of the intestines." (*Pathol.*, p. 11, c. xv.) Many a case of chronic peritoneal inflammation probably is, even in the present day, taken for colic, but more especially for diseased mesenteric glands; the size of the abdomen, its irregular hardness, with the hectic, emaciated limbs, and dry, foul surface, being symptoms, which may readily be mistaken, if not carefully inquired into, for those of the latter affection. Indeed, disease of the mesenteric glands may be induced by continued irritation, existing primarily in the serous membrane; and, in the tubercular form of chronic peritonitis, I have shown that tubercular disease of these glands is often also present. It may be also granted that disease sometimes takes place in these glands coetaneously with morbid action in either of the mucous or serous membranes, in consequence of, and depending upon, the nervous influence supplying the capillary vessels distributed to those textures, and upon the state of the circulating fluids; chronic inflammation with tubercular productions resulting therefrom in scrofulous constitutions.

45. Chronic peritonitis not unusually supervenes on continued exanthematous and remittent fevers. I have met with several instances of this connexion. TRISSOR (in his dissertation *De Febris Biliosis*, p. 143) mentions an affection following fever which continued for many months. He gives the following charac-

teristic symptoms: "Accessit diarrhœa sæpe recurrens, tumet frequenter tympaniticè abdomen, et fere semper dolet, ita ut minimam vestium constrictionem ferre nequeat; deletur prorsus appetitus; urget sæpe sitis; parvus est somnus; urinæ paucæ, turbidæ." This case evidently puzzled Tissot; for he asks, "Quænam causa morbi?" He adds, "Tabes succedat, tympanitis, ascitis, icterus, mors." He makes no mention of any dissection. Chronic peritonitis may follow acute dysentery; and even during the continuance of the chronic form of that disease, from an extension of the inflammatory action to the serous membrane. I have met with several instances of this occurrence in the course of practice; and they are often seen in climates where dysentery is endemic; and many cases are recorded by writers in the last century that illustrate this succession.

46. Although chronic peritonitis sometimes occurs as a secondary affection, and is complicated in the manner just alluded to, it appears also as a primary disease. This independence of inflammation of the peritoneum of disease of the contiguous structures did not escape the penetrating mind of JOHN HUNTER. "If the peritoneum," he says, "which lines the cavity of the abdomen, inflames, its inflammation does not affect the parietes of the abdomen; or if the peritoneum covering any of the viscera is inflamed, it does not affect the viscera. Thus, the peritoneum shall be universally inflamed, as in the puerperal fever, yet the parietes of the abdomen, and the proper coats of the intestines, shall not be affected. On the other hand, if the parietes of the abdomen, or the proper coats of the intestines are inflamed, the peritoneum shall not be affected." (*On the Blood and Inflammation*, p. 244.) BICHAT remarks: "L'affection d'un organe n'est point une conséquence nécessaire de celle de sa membrane séreuse, et réciproquement, souvent l'organe s'affecte sans que la membrane devienne malade," &c. (*Anat. Générale*, vol. i., p. 551.) And SPRENGEL observes, "Neque facile ad reliquis intestinorum tunicas transit affectus hujus externi velamenti, unde peritonæi inflammationes sæpius observamus sine ullâ inflammatione tunicarum musculosarum et nervearum." (*Institut. Physiol.*, t. i., p. 343.)

47. ii. DESCRIPTION.—*Chronic peritonitis* appears in two distinct forms: 1st. It occurs *primarily*, and then generally gradually and insidiously, and most frequently in connexion with tubercular formations; 2d. It appears *consecutively*, or succeeds to the acute form of the disease, or to inflammation of some viscus that has extended to the peritoneal covering. As in the acute form, so in this, the inflammation may be either *partial* or *general*. It is most frequently the former when it proceeds from local injury, or from inflammation of a subjacent viscus, and it is often general when it is granular or tubercular, or is associated with serous or dropsical effusion; but the general, as well as the partial state of the malady, may be consequent upon some other disease, particularly dysentery, enteritis, hepatitis, inflammation of the uterus and its appendages, &c. Dr. BARON and M. LOUIS concluded that chronic peritonitis, occurring primarily, is always associated with tubercles. As early as 1821, I combated this opinion, and adduced

two cases which were exceptions to the law which these pathologists believed to exist. More recently, Dr. HODGKIN has stated that the form of peritonitis which is accompanied with copious effusion, occurs without any tubercles; and the same may be said of other cases, in which the concrete product of inflammation had been more considerable. However, it must be admitted that chronic peritonitis appearing independently of injury, of rheumatism, of visceral disease, or of cutaneous eruptions, is generally tubercular, and is observed chiefly in scrofulous constitutions; and that when it is consecutive of these maladies, or appears from the suppression of external affections, it is rarely associated with tubercular formations.

48. A. *The symptoms* vary at the commencement of chronic peritonitis, with the exact nature, seat, and associations of the disease.—a. When it is *tubercular*, it is always insidious, slow, and often latent, until it is considerably advanced; and soon after it is recognised, it often rapidly terminates fatally. At first there is often very little pain, and in some cases none at all. In others, griping or colicky pains are occasionally felt, and frequently after long intervals. A sense of broiling or burning heat is complained of in the epigastric and umbilical regions. The bowels are irregular, more frequently relaxed than confined, the excretions being offensive, deficient in bile, and otherwise morbid. Nausea is often complained of, but vomiting is not frequent unless at an advanced stage of the disease. The matters thrown up are fluid, with mucus and a little green bile, and are more or less acid. The urine is scanty, high-coloured, and deposits a reddish sediment. The tongue is usually red, glazed, and chapped, its surface being often slightly fissured and uneven. The surface of the body is foul, lurid, and dry, but perspires freely during the night. The pulse is quick, small, and weak. The body is always more or less emaciated; the countenance and eyes are sunk; and the extremities cold, attenuated, and slightly livid or dark. A livid or dark circle surrounds the eyes, and the face and whole body appear as if faded or blighted.

49. *The abdomen* is always large or tumid relatively to the rest of the body, particularly at an advanced period of the malady. If the peritoneal cavity contains any fluid secretion, slight or obscure fluctuation will be detected, and there will be dulness on percussion, particularly in more depending situations. When pressing or kneading the abdomen, a doughy state is remarked; and the inclosed viscera and the abdominal parietes feel as if they constituted one mass. Tenderness is often not considerable, but it varies and is more remarkable in one part than in others, and the seat of it varies in different cases, and even in the same patient at different periods. The abdomen often presents irregularities, which are sometimes mistaken for enlarged mesenteric glands. These irregularities are generally owing to the development of larger tubercular masses accreting the intestines, and occasionally by scybalæ in the cells of the colon. These masses of tubercular accretion are often more manifest on examination, when a fluid effusion has been removed by absorption.

50. *Tubercular peritonitis* is often insidious



and slow in its early stages, and may thus be almost *latent* until shortly before death. In these cases, however, there have been generally an irregular state of the bowels, sometimes nausea, morbid evacuations, and more or less emaciation. But these have proceeded without creating alarm, as they were attended by little, or only occasional pain. At last the emaciation, the blighted appearance of the system, and the relaxed state of the bowels, attract attention; or acute symptoms are suddenly complained of, especially acute abdominal pain, increased disorder of the bowels, vomiting, and rapid sinking of the vital powers. As soon as these symptoms supervene, the disease proceeds with variable rapidity to a fatal issue.

51. In a few cases the abdomen seems more flat than usual, but is then always duller on percussion than natural. The surface of the belly is generally warm, dry, and of a livid or dark hue; and in many instances it is traversed by large blue, or distended veins, indicating impeded abdominal circulation. In addition to the inequalities just alluded to, the inguinal glands are generally enlarged, and painful on pressure. The diarrhoea, which was at first slight, occasional, and interrupted at times, or even alternated with slight costiveness, becomes more continued, and less under the control of treatment, for it then, as will appear in the sequel, is the result of ulceration. The stools are always unnatural, and contain undigested matters. Life is soon afterward terminated by gradual exhaustion of its powers.

52. *b.* When chronic peritonitis is *consecutive* of the acute state, or when it appears from the metastasis of disease, or after visceral inflammations, or after suppressed eruptions, or when it is non-tubercular, although *primary*, it usually presents somewhat different phenomena. In these circumstances, the abdomen is the seat of a deep-seated but not very acute pain, which often intermits, and is either increased, or not much complained of unless upon pressure, or when the abdominal muscles are contracted, or when the trunk experiences a shock, as when taking a false step. Nausea and even vomiting are occasionally experienced, and digestion is always difficult, food oppressing the stomach, and producing pains in the abdomen as it passes through the intestines. In some cases, these pains are felt in a particular part, in others their seats vary. Constipation is often present at an early stage; it is subsequently alternated with diarrhoea; but, at an advanced stage, the bowels are much relaxed, and the stools morbid, sometimes containing undigested substances. Emaciation is considerable, and always greater as the disease advances. The countenance is sunk, anxious, pale, and sallow. The skin is dry and unhealthy in appearance, the respiration is laboured, short, or quick, and the pulse is frequent, particularly towards evening and night. When the chronic disease follows the acute, the severe symptoms of the latter gradually subside and lapse into those attending the former, varying, however, with the exciting causes, and the circumstances developing the primary attack.

53. The state of the abdomen varies with the presence or absence of fluid effusion in the

peritoneal cavity. When fluid is present, the abdomen is enlarged, often so as to contrast remarkably with the emaciated limbs, and it is tense, distended, dull on percussion, unless at the more elevated parts. Fluctuation is seldom very manifest, more frequently it is obscure. Occasionally œdema of the lower extremities, and of the more depending parts of the abdominal parietes, is remarked. When there is no fluid in the cavity, the abdomen often appears diminished rather than increased in size. In some it is quite flat, in others it presents a slight or an irregular swelling about the umbilicus, owing to the agglutination of the small intestines. It is generally somewhat dull on percussion, but not more so in the more depending situations. On careful palpation of the abdomen, the experienced examiner will readily feel that the suppleness of health is wanting, and is replaced by an internal resistance or tension, indicating the adhesion of internal parts, while the integuments are loose, and move readily over the more tense parts underneath.

54. *c.* Chronic peritonitis may be *partial* or *general*. The former occurs chiefly after inflammation of some abdominal viscus that has extended to the peritoneal surface. In this case, the lymph thrown out upon that portion of this surface excites inflammation in a part opposite to, or coming in contact with, that first affected, and thus adhesions, or thickening of the opposite parts, or both, may be produced, and the disease proceed no farther, the patient dying at some subsequent period of some complication of this state of partial peritonitis, or of some disease developed at a more or less remote period.

55. *Partial chronic peritonitis* is sometimes observed after enteritis, after inflammation of the colon and dysentery, after chronic ulceration and perforation of the stomach or intestines, after hepatitis, and after inflammations of the urinary and sexual organs. When these maladies induce peritonitis in persons not remarkably debilitated, or otherwise of good constitutions and habits of body, the disease may not only proceed no farther, but it may be so limited, or so latent, as not to give rise to distinctive phenomena indicating its existence, although slight uneasiness and pains, increased on sudden motions, jerks, or muscular actions affecting the abdominal viscera, or on pressure in certain directions, are often present.

56. When, however, peritonitis supervenes upon any of the above maladies affecting scrofulous, cachetic, or broken-down constitutions; or in persons whose excreting organs are torpid or diseased, and whose circulating fluids are contaminated or insufficiently depurated, it usually spreads more or less, and becomes even *general*, and in these cases is attended by more or less of fluid effusion, unless in children, young persons, and the scrofulous diathesis, where it is more frequently accompanied with tubercular formations.

57. *d.* The terminations or consequences of chronic peritonitis are those organic lesions which will be particularly described in the sequel, and which, although most extensive, cannot be individually distinguished by symptoms, as they are variously associated or grouped in most cases, and when either far advanced in



their separate states, or associated, give rise to nearly the same phenomena, which are those characterizing the advanced stage of the malady.

58. *IV. PERITONITIS IN CHILDREN.*—Peritonitis may occur even in the *fetus*, and hence may be *intra-uterine*, and even *congenital*; but it much more frequently appears after birth, particularly between the second and eleventh years of age, and is one of the most important diseases of childhood. It may be either *acute*, *sub-acute*, or *chronic*; and it may be *simple* and *primary*, *tubercular* and *consecutive* or *complicated*. It may also be *partial* and *general*: in other words, in either its acute or chronic states, it may be partial or general, and each of these may be primary and simple, or consecutive and complicated; and, farther, any of these states may exist either with or without tubercular formations, although the chronic form is comparatively rarely seen unassociated with tubercles. Moreover, instances have occurred of simple or non-tuberculated peritonitis having been developed in the course of tubercular disease in other organs, as when simple acute peritonitis proceeds from perforation of the intestines or stomach, occurring in the course of tubercular consumption, or of intestinal diseases, associated with tubercles in various organs.

59. *A. Acute and sub-acute peritonitis* is more frequently a *consecutive* than a *primary* disease in children. It rarely occurs primarily and simply in the previously healthy, but most frequently in the course of, or during convalescence from, fevers, particularly eruptive fevers; and especially of those cases which have presented predominant disorder of the abdominal organs or diarrhœa. It may even occur in the advanced progress of the chronic form, and prove fatal in a short time.

60. *a. Pain* is generally the earliest symptom, and is often at first local or limited, but it soon extends over the abdomen, is increased by pressure and motion, and continues to the termination of the malady. *Vomitings*, which are frequent in the peritonitis of adults, are much less so in that of children, and often do not occur until an advanced period. The *bowels* are seldom much confined, particularly as the disease advances. They are more generally relaxed, and the stools become more frequent and morbid as a fatal issue is approached. *Respiration* is accelerated, but short and shallow. The *tongue* is generally moist, and covered by a whitish or yellowish coating. The *appetite* is lost, and there is always great *thirst*. The *countenance* is expressive of pain, anxiety, and distress. It is pale, collapsed, or sunk. *Nervous symptoms* are rarely observed, unless in very young children, and in these convulsions are the chief form they assume. The *position* of the patient is always on the back, with the knees drawn up.

61. The *abdomen* becomes tumefied very soon after pain is first felt, is always tense, and then sonorous throughout upon percussion. When the peritonitis is *partial*, the swelling and tension are often confined to the situation affected, and this partial state of the disease is most frequently observed in the right flank, or in or near to the right iliac region. As the disease advances, the abdomen, particularly in the sit-

uation of any manifest tumours, becomes more dull than natural on percussion, but the tenderness often prevents this mode of examination from being practised. When the disease is general, flatulent distention increases and is more manifest. Fluid effusion is seldom clearly evinced by fluctuation. The surface of the abdomen is usually warmer than natural.

62. *c. There is always more or less symptomatic fever*, which is seldom ushered in by distinct rigours. The *pulse* is very quick, and commonly the quicker, smaller, and weaker, the more intense and the more general the disease. The urine is scanty and high-coloured, and voided frequently; the skin is hot, dry, harsh, and of a dull unhealthy appearance.

63. *d. The duration* of acute peritonitis varies from twenty-four hours to thirty-eight or forty days. When the disease proceeds from perforation of any part of the digestive canal, its duration is usually the shortest, as in adults. When it continues longer than thirteen or fourteen days, it is either partial, or presents a less severe or sub-acute character. When peritonitis *terminates in resolution*, the general or constitutional symptoms are ameliorated; the pain subsides or altogether ceases, and the abdomen gradually resumes its natural condition. The bowels become more regular, and the pulse slower and fuller. If much fluid effusion have attended the inflammation, the abdomen is longer in resuming its former state. If the disease continue to advance to a *fatal issue*, the swelling and tension of the abdomen increase, the countenance becomes more sunk, the bowels more relaxed, the pain more severe and more general, and the pulse more rapid, smaller, and at last inappreciable.

64. *e. Acute peritonitis* is rarely associated with *tubercles* in children, but the chronic form is very often thus complicated. It sometimes, however, supervenes in the course of tubercular formations in other or even distant organs, especially of ulceration of the intestines, in connexion with tubercular disease of the mesenteric glands, and of tubercular consumption, and it occasionally appears in the progress of the chronic disease, either simple or tubercular. In this latter case, acute symptoms are suddenly developed, the abdominal pains become more severe, the fever, the distention, and the heat of the abdomen are augmented, the pulse is more rapid and smaller, and the countenance is more anxious and sunk. The disorder of the bowels increases, and, with the progress of the organic lesions, soon terminates life.

65. *B. Chronic peritonitis* in children is generally associated with tubercular formations, and is often then more or less general. It may, however, occur without this association, especially when it is partial, and consecutive of inflammation of one or more of the abdominal viscera. It may also follow the acute form of the disease, either from the natural decline in the severity of the attack, or from the treatment resorted to.

66. *a. Simple or non-tuberculated chronic peritonitis* can rarely be distinguished from the tubercular during life, unless the history and circumstances of the case be duly considered. When it seems to follow inflammation of some viscus, or the acute disease, in children of a

previously healthy frame, and free from constitutional vice, then it may be presumed to exist independently of tubercles. As respects the symptoms, there appears hardly any difference between this variety and the tubercular, about to be noticed. In the former, however, distinct tumour, or inequalities in the abdomen, are more rarely or never observed; and there is often less dullness on percussion. In other respects the phenomena and progress of both varieties are the same.

67. *b. Chronic tubercular peritonitis* in children is generally attended by *pain* from the commencement, often before the abdomen presents any swelling, although often also contemporaneously with swelling and tension. The pain is in some cases local, in others general or erratic, but it is not, when local or fixed, always an indication of the chief seat of tubercular productions. The *tongue* is moist, white, or coated with a yellowish matter at its base; less frequently red and glossy. The *appetite* is frequently but little, or even not at all, impaired; it is more generally irregular and capricious. It is sometimes not materially diminished throughout. *Thirst* is generally felt, and it increases with the progress and severity of the symptoms and associated affections. *Vomiting*s rarely occur in this state of peritonitis, although they are not infrequent in the acute. *Diarrhœa* is commonly observed, and it increases as the disease advances, especially when ulceration of the intestines is present, and this is rarely wanting in the last stage.

68. The *abdomen* presents the most characteristic appearances. At an early period its form presents little or no change beyond being somewhat more full and sonorous on percussion. As the disease advances, but at no definite period, the belly becomes distended, and is either sonorous throughout, or is dull in some parts and sonorous in others. When the dullness is found always in the same situation, and is attended by some hardness or doughiness, suspicion of the existence of the disease is generally well-founded. In some cases an obscure fluctuation is felt in the more dull parts of the abdomen, owing to a partial fluid effusion attending the tubercular lesion of the peritoneum. With increased distention and tympanitic sound there is often more or less tension, which is sometimes greater in one side or part than in another, and when it is great the part is elastic rather than hard. As the disease advances, particularly in older children, the abdomen presents many of the changes already noticed. When the tension is very great the surface becomes smooth and shining, and afterward harsh or scurfy, owing to desquamation of the cuticle. The veins in the surface of the belly are then often large and distended.

69. *c. The progress and duration* of this form of peritonitis vary remarkably in different cases. The disease is often far advanced before it excites alarm, and is mistaken for simple disordered function of the bowels, and the pains for those of colic. The flatulent state of the digestive organs generally attending, as well as preceding, the complaint, is frequently considered as the source of all the disorder until serious organic lesions are developed, and then *emaciation, febrile exacerbations, diar-*

*rhœa*, partial or general *night perspirations*, and the symptoms just mentioned, disclose the nature of the malady. The *duration* of the disease can rarely be precisely determined, as the exact period of its commencement cannot often be ascertained. The patient has been frequently out of health for a considerable period before the symptoms were fully evolved, and it is most probable that the tubercular formations connected with the peritoneum commenced about the period of the earliest indication of impaired health. The continuance, therefore, of the malady may, according to my experience, vary from two or three to eight or nine months. Instances of a shorter or even longer duration may occur, but they can be very rare.

70. *d. The termination* of this form of peritonitis is always fatal. But this issue is not owing to the extent of the tubercular disease solely, but partly also to associated disease in other organs, to tubercular formations in other viscera, particularly in the lungs, in other serous membranes, in the mesenteric glands, to ulceration of the intestines, &c.

71. V. COMPLICATIONS OF PERITONITIS.—The several forms of peritonitis may be variously complicated. Peritonitis in the puerperal state, as will be shown in the article on PUERPERAL DISEASES, is most frequently complicated with disease in other organs and parts; but those states of peritonitis already considered are often also complicated, although not so frequently and so extensively as those occurring after parturition. The *symptomatic fever* attending peritonitis can hardly be viewed as a complication, as it depends upon the previous health of the patient, the state of nervous or vital power, and the condition of the circulating fluids; depression of power and contamination or imperfect depuration of these fluids giving rise to an adynamic state of fever, and favouring the extension of the malady and fluid effusion. The *complications* of peritonitis are of two kinds: 1st, those in which the peritonitis is a consequence of the disease with which it is associated; and, 2d, those which consist of extensions of the peritonitic malady. The former are the most numerous, frequent, and important.

72. *A. When peritonitis supervenes* on other visceral disease, and is thereby associated with it, the inflammation may be *limited* to a portion of the peritoneum, or *extended* more or less generally, the limitation or extension depending upon the states of vital power, and of the circulating fluids, as already specified (§ 4).

73. *a. The complication of hepatitis* with peritonitis is generally with the *partial form* of the latter, the former being the primary malady. In this association, as will appear by referring to LIVER—Inflammation of, the diaphragmatic, or the parietal peritoneum, or other contiguous portions, may be affected, and recovery from it is frequent, adhesions between the opposite surfaces only remaining, and these ultimately become more cellular and less extensive. The association of *splenitis* with partial peritonitis, in a slight and chronic form, giving rise to adhesions, &c., is not infrequent, especially in marshy situations.

74. *b. The complication of gastritis* with peritonitis is much less common than that of he-



patitis, but, like it, is much more frequent in warm than in temperate climates. It is, however, a much more severe and dangerous malady. The symptoms are violent, the vomiting is almost constant, the vital depression extreme, and the progress to a fatal issue generally rapid. In the few cases of this complication that I have observed in this country, the peritonitis has been partial.

75. *c.* The association of peritonitis with *enteritis*, or with *inflammations of the cæcum or colon*, is not infrequent, particularly in warm climates, and in persons who have migrated from Europe it is more commonly observed than in natives. In all such cases the disease generally commences in the mucous surface of some portion of the intestinal canal, and extends through the other tunics to the peritoneal coat, agglutinating the opposite surfaces of the bowels with each other, or with those of other organs or parts. In cases of inflammation of either the small intestines, the cæcum, or colon, the resulting peritonitis is most frequently partial, the disease sometimes terminating rapidly in gangrene, especially when the *appendix cæci* is affected, or when strangulation exists. When, however, there is perforation of a portion of bowel, or when this complication occurs in the course of exanthematous or continued fevers, or of dysentery, the disease of the peritoneum is more or less general, and is rapidly fatal, as described above (§ 27, *et seq.*).

76. *d.* The association of peritonitis with *diseases of the sexual and urinary organs*, or with inflammation of any of these organs after surgical operations, often occurs, particularly in persons of a bad state of health or constitution. The peritoneal inflammation may be partial or general, sthenic or asthenic; but, when general, it is usually also asthenic; and it may be associated either with hysteritis, cystitis, nephritis, or with inflammation of the ovaria or fallopian tubes, or with any two or more of them. These complications are almost always present in puerperal peritonitis, and are also sometimes observed in other circumstances. Partial peritonitis not infrequently follows inflammatory and organic diseases of the uterus and ovaria, and when thus associated, or when complicated with inflammation of either the sexual or urinary organs, sometimes terminates favourably, adhesions of contiguous surfaces, however, generally remaining in these, while serous effusions take place in the more unfavourable cases.

77. *B.* Complications seldom arise from the *extension of peritonitis to the organs which the peritoneum invests*; for, when the peritonitis is general and acute, death commonly takes place before inflammation in a distinct form, or other organic change, is developed in any of these organs; and when the peritonitis is partial or chronic, the affection of contiguous or enclosed viscera is more functional than structural. In children, however, and even in adults, both partial and chronic peritonitis may be associated with mesenteric disease, or with tubercles in the mesenteric glands and in the lungs. In these cases, also, there may be a farther complication with ulceration of the intestines, the ulceration sometimes perforating the coats of contiguous convolutions of intestines, and form-

ing fistulous communications between them. It is doubtful, however, whether the peritoneal inflammation or the tubercular formation be primary; it is even not improbable that the former is the consequence of the latter in some instances, although the existence of tubercles in the false membranes, or within the peritoneum, shows that the inflammation has preceded the tubercular productions. In many cases of chronic tubercular peritonitis, the ulcerations and other lesions of the intestines are manifestly consequences of the peritonitis, while in others the ulceration seems to be primary, or the sequence of organic lesion cannot be readily established.

78. *a.* When peritonitis commences about the liver and extends to the diaphragmatic peritoneum, the *pleura* of the same side not infrequently, also, becomes inflamed, partial peritonitis thus becoming complicated with *pleuritis*, and ultimately even with *pleura-pneumonia*. I have met with several instances of these complications in the course of my practice, and in most of them complete recovery has taken place. The association of general peritonitis with pleuritis of one, or even of both sides, is frequent in puerperal peritonitis, particularly as occurring in lying-in hospitals, especially if the disease be not arrested at an early stage. (*See Puerperal Diseases.*)

79. *b.* Tubercular peritonitis in children is sometimes complicated with *tubercles in the membranes of the brain*, with softening of the central parts of the brain, and with serous effusion into the ventricles, or *acute hydrocephalus*. In these cases, of which I have seen several, the lesions of the peritoneum and of the brain and its membranes, were consequences of inflammation in connexion with tubercular productions, in scrofulous constitutions.

80. VI. APPEARANCES ON DISSECTION. — *i.* AFTER ACUTE PERITONITIS.—The changes produced by acute inflammation of the peritoneum vary with the severity or activity of the disease, with the habit of body and constitution of the patient, and with the predisposing and exciting causes; they differ most essentially according as the disease presents *sthenic* or *asthenic* characters (§ 8, 26), as it occurs *primarily* or *consecutively*, and as it has been preceded by, or is associated with, depression of vital power, or contamination of the circulating fluids. I shall therefore describe, 1st, those changes which are observed in the more *sthenic* forms of the malady, or those affecting persons whose vital powers are not exhausted, and whose circulating fluids are uncontaminated; and, 2d, those alterations observed in *asthenic* states of the disease, reserving, however, a more detailed account of these latter, until they come under consideration in the article on *Puerperal Diseases*.

81. *A. After acute Sthenic Peritonitis.*—*a.* The *earliest change* in acute peritonitis is a loss of the polish of the free surface of the membrane, which assumes a dull, opaque, and occasionally a dry-like appearance. Red vessels are seen, either grouped in spots, forming a number of puncta, or in streaks. The surface, appearing dull, or even dry, is, upon a closer examination, found to be covered by a most delicate, unctuous, and slightly viscid exudation. The dense cellular tissue connecting the peritoneum to

the parts underneath, or at least the attached part of the membrane, is the situation in which the increased vascularity seems to commence. Even at this stage, the former is somewhat infiltrated with an albuminous serum, giving the subserous tissue a thickened aspect, in which the membrane itself appears to participate. The peritoneum may be detached from the parts it covers with greater facility than in the healthy state, owing to diminished cohesion, and infiltration of the inflamed subserous tissue. As yet, the minute capillaries, forming puncta, or streaks, or assuming a reticulated appearance, interspersed with red points or spots, consist of the colourless vessels of the membrane enlarged, so as to admit the red globules; but, as the disease advances, the vessels appear more and more superficially. The small spots become more extended, approach each other, and at last coalesce, so as to form patches of various dimensions. The membrane itself is not, as yet, materially thickened, beyond the slight degree just noticed, produced chiefly by the change in the subjacent cellular tissue and its adhering surface. The redness now becomes more intense, deep, and extended. This may be considered as the *first stage* of the changes caused by acute inflammation, and is attended by intense pain, tenderness on pressure of adjoining parts, a quick, hard pulse, and symptomatic fever. It seldom exceeds three days, and sometimes does not endure twenty-four hours, until farther lesions supervene.

82. *b.* The most remarkable of these lesions is the *exudation of lymph* on the inner or unattached surface of the membrane. This is effused in a fluid state, and at first is an increased exudation of the viscid matter already noticed as giving a dull and an opaque appearance to the membrane. This exudation becomes more copious, especially as the surface is more crowded by capillaries injected with red blood. It is generally of a straw colour, homogeneous, gelatinous, semi-transparent, and coagulable, gluing together, as it were, in a slight degree, those free surfaces of the inflamed membrane which come in contact. Sometimes the reddened colour of the surface is heightened by the exudation being red and sanguineous, and adhering closely to it, giving it a villous appearance. Sometimes the exudation is of whitish or whitish-gray colour. With the exudation of lymph, the redness becomes more extended; in some it is nearly limited to the parts covered by, and to those slightly adherent to the opposite surface through the medium of, this exudation. In other cases the redness extends, in a somewhat less degree, in bands or stripes, along the surfaces between the parts covered by this exudation; these intermediate surfaces being either nearly dry or apparently so, and as yet not advanced to the stage of effusion. As the exudation proceeds in the more acute cases, it becomes more abundant, and varies in quantity and density, according to the activity and duration of the disease, and constitutional energy of the patient. It constitutes the *coagulable lymph* of HUNTER and other British pathologists, and the *albuminous exudation* of Continental authors, from the large proportion of albumen which enters into its composition.

83. When this substance is minutely exam-

ined about the fifth or sixth day of the disease, or about the third from the commencement of its formation, it is generally of a pulpy consistence, partially translucent, of a straw-yellow or grayish colour, and, when torn asunder, presents a cellular or cellulo-filamentous structure in its denser parts, from which more or less serous fluid escapes. Separated from the membrane on which it has been formed, its adherent surface is rough, irregular, minutely honey-combed, and marked by more or less numerous minute dots of blood, arising from the disruption of the recently-formed capillaries passing from the inflamed serous surface into the new product. Here we have the most complete example of the formative process being one of the characters of inflammation occurring in persons of a previously healthy state of system.

84. *c.* This exudation, which is fluid when first poured out, and has rapidly assumed the state now described, experiences farther changes during the continuance of life. These, however, vary with the different states of the disease and circumstances of the case. One of the most constant, is the agglutination of the opposing surfaces of the inflamed membrane. To occasion this, it is not necessary that both the opposing surfaces shall have been previously inflamed; for the lymph effused from the primarily inflamed surface, coming in contact with a circumscribed portion of the opposite surface, irritates and inflames it only, and thus increases the quantity of the effused lymph, which becomes a connecting medium between the inflamed surfaces; capillaries, carrying red blood, passing from both surfaces into the effused lymph, so as to change and organize the substance still farther. In cases of this kind, the portions of the peritoneum intermediate between the parts, whose accretion has been thus effected, have frequently presented little or no appearance of inflammation; or have been moistened only by a small quantity of a sero-albuminous fluid, or have contained a larger quantity of a similar effusion.

85. *d.* The *connexion or adhesion* thus formed between the opposite points or surfaces of the peritoneum varies much in its characters with the period which has elapsed since the effusion of the lymph which produced it, and with the surfaces which it exists between. At first the exudation is fluid, but it soon coagulates into a gelatinous, pulpy substance of various density, exhibiting a weak cellulo-filamentous structure, enclosing in its meshes the serous parts of it, and easily separated from the surfaces it either covers or connects. After a time its cellulo-filamentous structure becomes more firm, and is penetrated by minute capillary vessels, shooting into it from the inflamed membrane, to which it is now more strongly attached by means of the vessels passing into it. The process of organization of the plasma or effused lymph has now commenced, and it proceeds more or less rapidly. The vessels penetrating the newly-formed substance are now more numerous, so as to admit of injection in fatal cases; its cellulo-filamentous structure becomes firmer, more opaque, and somewhat whiter; it is firmly attached to the serous surfaces, which it connects more or less closely, and the serous portions of the exuded



lymph contained between the meshes or cellules of the cellulo-filamentous structure, are absorbed. This substance is now nearly altogether albuminous, and, as the inflammation which produced it declines, the vessels penetrating it contract, so as ultimately to convey only the colourless portion of the blood. This contraction of the vessels, after the decline of the inflammation which formed them, is also accompanied by a great reduction of the bulk of the newly-formed substance, if not to its entire removal, especially when the inflammation and the albuminous exudation are limited, recovery from the attack taking place.

86. *e.* In less acute, or, rather, sub-acute or partial forms of peritonitis, or when the more acute symptoms have been subdued, and where inflammation has existed from fifteen to thirty-five days, or even longer, before producing death, the albuminous exudation forms false membranes of a grayish, whitish, or even reddish colour, establishing adhesions between contiguous parts, and varying in thickness from half a line to three lines, generally in proportion to the duration of the disease. When detached from the serous surfaces which produced them, and to which they adhere firmly, these surfaces are found much inflamed, and sometimes dotted with minute specks of blood, owing to the rupture of the connecting capillaries. The false membrane itself is here found firm and elastic, and not pulpy and friable, as in the most acute cases, or in those which have more rapidly terminated in death. In these cases little or no effused fluid is observed, that which may have been poured out with the albuminous formation during the earlier period of the inflammation having been absorbed.

87. According to the violence of the inflammation, to the duration of it, and to the constitution of the patient, sthenic acute peritonitis may give rise to *false membranes, membranous adhesions, cellular adhesions, or cellular bands*, and these may be the chief or only changes produced, beyond the increased vascularity of the membrane underneath. But in many cases other changes supervene. The chief of these concern the morbid productions themselves, the nature and character of the fluids effused, in connexion with these productions, and the state of the membrane itself and of the subjacent cellular tissue.

88. *f.* Where the *false formations* are considerable, and have assumed an *organized* and *cellular structure*, the vessels proceeding to them are very minutely divided when they have reached the peritoneal surface, and are about to pass into the morbid production; but, having passed into it, they again unite and form larger vessels, which ramify in different directions through this production. This distribution has led some pathologists to suppose that these vessels are first formed in the morbid productions, as in the envelope of the vitellus of the incubated egg; but this is not the case, as is shown by the manner in which the capillaries shoot from the inflamed membrane into the lymph thrown out upon its surface (§ 83, 84).

89. The morbid formations become firmer and less vascular, after they have been organized, as the period from their production is prolonged (§ 85). They also become thinner

as they grow older, and their surface assumes the appearance of a serous membrane, while their internal structure is more strictly cellular. When bands of adhesion stretch from one surface to the other, or when laminated productions extend over a large superficies, or connect opposite parts, they are cellular in the centres and serous on their unattached surfaces, and, at all the points of adhesion with the peritoneum, this membrane has lost its serous characters, the sub-serous cellular tissue being continuous with that which forms the centre of these bands, false membranes, or adhesions.

90. The progressive diminution of the volume of those productions with the subsidence of the inflammatory action which produced them, and with the lapse of time, as well as the history of cases, in which there has been sufficient reason to believe that those productions had been actually formed, have led several pathologists to infer that they may be removed altogether. M. VILLERMÉ was the first to contend that the adhesion formed between the surfaces of different organs sometimes separate after a time at their centres, and disappear, and the observations of DUPUYTREN, BÉCLARD, and GENDRIN confirm this inference. I have had reason in the course of practice to concur with this opinion, the justness of which is of practical importance, and should not be forgotten in our management of diseases in which the serous surfaces are implicated; and I further believe, that the diminution and ultimate disappearance of these productions are remarkably favoured by whatever promotes the vital powers, and favours the healthy performance of the several functions.

91. *g.* In acute and sub-acute peritonitis, a *fluid effusion* is either a concomitant or a consequence of the albuminous formation, or both. In cases of partial peritonitis it is most frequently the consequence, particularly of adhesions. In slight and more chronic cases, however, the effusion of a serous or sero-albuminous fluid is often the principal phenomenon. In the more acute cases, the liquid effusion is whitish-gray, or of a whey or milky appearance. In some it is unctuous, thick, or abounding in albuminous flocculi, of a whitish, yellowish, or lemon colour. In others it is turbid, greenish, or brownish-red, containing lighter-coloured flakes, but this effusion occurs more frequently in acute asthenic peritonitis, the colour proceeding from a slight admixture of the colouring matter of the blood. In the most acute cases of the sthenic disease, the effusion of much fluid seldom occurs until the powers of life are much exhausted, or until the extreme capillaries and pores have lost their tone, congestion of the venous capillaries either supervening or having already taken place.

92. In many cases, particularly in partial peritonitis, the adhesions, in their advanced or old states, are causes of irritation to the surfaces they connect, either exciting an increased exhalation from the adjoining unattached portions, or being themselves the seat of exhalation, the spaces between the adhesions becoming filled with fluid, either of a serous, a sero-albuminous, or sero-purulent character, according to the degree of morbid action in the part and the state of the system. This accumulation of fluid in the spaces between the adhe-

sions, or in cavities the parietes of which are lined with an albuminous exudation in the form of a false membrane, is often owing either to a slight return or exacerbation of the inflammatory action after it had subsided to some extent, or to its continuance in a less severe or chronic form, after the more acute stage had been mitigated. But, in either case, congestion of the venous capillaries, and impaired tone of the affected vessels and tissues, are more or less concerned in the production of the fluid effusion. When the accumulation is large, it constitutes a species of *acute dropsy*, and is dependant upon the same pathological states of the containing membrane and surrounding parts as have been explained when treating of the origin and nature of dropsical effusions.

93. The effusions of coagulable lymph, and the consequent adhesions, are remarkable chiefly between the various convolutions of intestines, between the prominent points of these and the omentum, in the pelvic and iliac regions, and between the serous surface of the bowels or of the other abdominal viscera and the peritoneum lining the parietes of the abdomen. In some, the greater number of the folds of the intestines are agglutinated together, and these partially cemented to the omentum, or to adjoining viscera or surfaces, by means of an opaque lymph, of a lemon-yellow colour and pulpy consistence. In others, the agglutination is more partial, and the omentum is shrunk or contracted, and drawn up to the arch of the colon. In some of the most acute and violent cases, the surface assumes a purplish-red or violet colour, and in these the intestines are often united to each other, or to the opposite surfaces, without the intervention of a false membrane, beyond a very thin film of a whitish or grayish albumen.

94. In cases of partial peritonitis, when the disease has been of longer duration, or when the patient has recovered, adhesions more or less extensive, or bands of various dimensions, are often formed between various parts of the opposite surfaces, or between the omentum and one or more of the convolutions of the intestines, between the margin of the omentum and fundus of the uterus, or between other parts, according to the particular seat and circumstances of the partial peritonitis of which these adhesions were the consequences. These albuminous exudations and adhesions present other forms, especially in sub-acute and chronic cases, and are often attended by more or less fluid effusion of a similar description to that now noticed.

95. The *peritoneum itself* is often variously changed, besides being injected in the manner already noticed, and generally the change implicates more or less the sub-serous tissue; indeed, this latter seems often more particularly altered, being *œdematous*, or infiltrated by coagulable lymph in some cases, and softened in others. In these, the peritoneum is frequently also more or less softened, or more readily torn, and somewhat thickened. In the most acute cases, this membrane becomes in places of a deep brownish red or purple colour, or even almost black, but it very rarely advances to *gangrene*, unless in partial peritonitis caused by strangulated hernia, or by inflammation of

the appendix of the cæcum, and then this lesion is limited to the part thus circumstanced, and the peritoneum only participates with the other tissues in the change. M. SCOUTETTEN remarks, that he has met with black gangrenous eschars of a small size, and never exceeding one or two inches in extent. These, however, occur chiefly in the asthenic form of peritonitis, and even rarely in it, as death generally takes place before gangrene can supervene; and in those cases where it is observed on dissection, it is most probably a *post-mortem* change, or at least very shortly antecedent to, or concomitant with, dissolution.

96. The changes just described, particularly as respects the membrane itself and its false productions and adhesions, are often *partial* or limited, and when this obtains, they are observed more frequently in the peritoneum lining the pelvic viscera, the cæcum, and appendix, and next most frequently in parts of that reflected over the large and small intestines, the liver, diaphragm, and either surface of the omentum, and less frequently in the transverse meso-colon and mesentery, that covering the stomach being most exempt from them.

97. B. *The lesions consequent upon asthenic peritonitis* differ materially from those caused by the sthenic form of the disease. While in the latter they are more frequently partial or limited, in the former they are more general, or, at least, extended; while, also, in the sthenic disease, albuminous lymph, false membranes, and adhesions are frequently the chief or only changes, in the asthenic these are very rarely observed, or in a very imperfect and unorganized and unorganizable form. In some cases, a thin muco-albuminous or soft and dark-coloured film is found extending over the surface of the inflamed membrane, and a large quantity of a turbid serum, of every shade of colour, from a whitish or grayish hue to a brownish dark sanguineous or sanious appearance, is effused in the peritoneal cavity. This fluid varies in quantity from a few ounces to several pounds, but it is very rarely above this amount in the acute form of the disease. It seldom contains the large flocculi or masses of coagulated lymph or albumen sometimes met with in the more sthenic form of the malady, unless in those cases which approach more or less to that character.

98. The peritoneum often presents a softened or sodden and somewhat thickened appearance, in which the subjacent cellular tissue participates. It is generally more readily torn, and, in some cases, I have found this greater lacerability very remarkable, particularly when there was much dark discoloration of the surface, which is more or less altered in colour, being commonly of a dark brownish, grayish brown, or purplish tint, the shades varying in different situations. Various other appearances are often observed in this membrane, in the viscera over which it is reflected, and in the fluids effused into its cavity; but, as these most frequently occur in the puerperal states of peritonitis, they are described in the article PUERPERAL DISEASES.

99. ii. LESIONS CAUSED BY CHRONIC PERITONITIS.—When the peritoneum has been chronically inflamed, the lesions which present themselves are very various according to the con-



stitution of the patient, and the duration of the disease. But they differ also most remarkably according as they proceed from an inflammation which has become chronic, consecutively upon an acute form of the disease, and as they result from a slow, insidious, almost latent, and primary state of inflammatory irritation or action, according as they are *consecutive* or *primary*. They differ, moreover, as the peritonitis is simple or associated, as it is *non-tubercular* or *tubercular*.

100. *A. The changes which follow chronic peritonitis consequent upon the acute* vary with the duration and circumstances of the case. — *a.* In some, after the duration of fifty or sixty days, the peritoneal cavity is filled with a considerable quantity of a whitish serum, occasionally resembling partially curdled milk. Numerous bands of adhesion and portions of false membrane presenting the same appearances, and formed as above (§ 81, *et seq.*) described, unite the greater part of the intestines to each other, or line the intestinal peritoneum and omentum. These false membranes often form partial sacs, containing a fluid, the characters of which are various. When the false membrane is detached, the portion of the peritoneum underneath has not so red or so vascular an appearance as in the acute disease; sometimes, indeed, it is hardly coloured. In many of these cases, the quantity of fluid effusion is considerable, and the false membranes are less extensive and thinner, opposite surfaces being united by adhesions or bands, and not by continuous albuminous layers.

101. *b.* In some subjects, a considerable quantity of a yellowish limpid serum, without clots or flocculi, is found in the peritoneal cavity about this period of the disease, but without any trace of false membrane or adhesion, the peritoneum being, however, reddened, thickened, and injected. The omentum, in these, is very much thickened, red and fleshy, and sometimes contains small vesicles or cysts.

102. *c.* In other cases, and particularly at a later period of the disease, the abdomen is distended by the accumulation of serum. The intestines are pushed towards the vertebral column, and sometimes adhere slightly, or more or less extensively, to each other. The peritoneum is generally thickened and papilous, having a grayish, lardaceous appearance, occasionally with bloody striæ and red spots, seemingly formed by slight extravasations of blood. In some of these cases, furrows or broad superficial erosions are formed in the thickened peritoneum. The fluid collected is occasionally clear and yellowish; in some it is turbid, grayish, brownish, or even sanguineous, particularly where the bloody striæ or spots are observed in the thickened membrane. In rare instances *hemorrhage* has occurred, owing to the destruction of small vessels by the superficial erosions just mentioned. These erosions in rare instances become more and more deep, and are converted into *ulcers*, which destroy the membrane and advance to the subjacent tissues, forming the primary peritonitic ulcers of SCOUTETTEN.

103. *d. Gangrene* very rarely is observed in chronic peritonitis, and only when a recurrence of the acute disease takes place, or when acute inflammation attacks the subjacent structures,

and then only limited portions of the membrane are implicated. In these, eschars of a grayish slate or dark colour are formed, their surfaces being covered by a dirty, grayish matter. The eschars in these instances generally extend to the subjacent tissues.

104. *B. The lesions consequent upon primary non-tubercular peritonitis* are, in some instances, not very different from the foregoing, in others they differ materially. — *a.* Very slight *redness* of the peritoneum is often observed, and as frequently this is entirely wanting. When it occurs, it is usually of a brownish shade. If more remarkable, or of a brighter tint, it is then owing to an acute state of inflammation, which had supervened upon the chronic, and terminated life; but, in these cases, other marks of acute action are often found united to the characteristic alterations of the chronic.

105. *b. Thickening* with increase of density is one of the chief changes observed in the primary form of chronic peritonitis. The thickening is owing not only to increase of the membrane itself, that being seldom very great, but also to infiltration and tumefaction of the subjacent cellular tissue, identifying it completely with the serous coat in such a manner that it is impossible to distinguish the exact limits of this membrane, particularly in very chronic cases. The difficulty is also much increased by the organized false membranes often formed upon the peritoneum, and which become ultimately identified with it, in such a manner as themselves to become inflamed and to give rise to similar productions.

106. *c.* The increase of *density* of the chronically inflamed peritoneum is usually considerable, so that it is generally torn with greater difficulty than in the healthy state, or especially after acute inflammation. It is detached also with much more difficulty from the subjacent parts, owing to the increased density of the connecting cellular tissue, and is much less friable than in the acutely inflamed state.

107. *d.* The surface of the membrane is rugose, dull, and presents a number of small elevations, which are perceptible to the touch as well as to the sight, are whitish, somewhat flattened, and irregularly intermixed with brownish specks; these specks resemble those which are observed in acute inflammations, and occasion no elevation of the surface. These small elevations, although generally observed on the surfaces of the thickened membrane, are not confined to these surfaces, being frequently also found on false membranes; they are usually called *granulations*. Some have confounded them with the tubercles which sometimes are developed, either under the inflamed peritoneum, or in its substance, or in the false membranes. They may, however, be distinguished from these latter by the following marks: the small, whitish, flattened granulations arise upon an exhaling surface, and seem to elevate an epidermis whiter and more opaque than the serous texture itself, indicating that they exist in the substance of this membrane. Around them there is always observed a slight vascular injection, very evident under the microscope, and sometimes apparent to the unassisted eye. Upon dividing the membrane, a minute infiltration of whitish serum is observed at the points where the granulations have

been divided, with a slight increase of thickness of the parts of the membrane where they are developed. They are not enclosed in any cyst, but are mere infiltrations into the structure of the part in which they are formed, as first shown and contended for by me in a memoir on chronic peritonitis, published in 1821 (see *Lond. Med. Repos.*, vol. xvi.), and since confirmed by M. GENDRIN and others.

108. *e.* The false membranes found in this state of peritonitis are completely organized and dense. Occasionally they are indurated, of a fibrous or lardaceous structure; in other cases they are entirely wanting, and it is in these latter that the thickening of the peritoneum has taken place, chiefly in the direction or at the expense of the subjacent cellular tissue, the free surface of the membrane appearing as a rugose epidermis of a dull, grayish-white colour, elevated by numerous granulations, and spread over a thickened and indurated coat of the connecting cellular tissue. In other, but rarer cases, the peritoneal cavity is nearly obliterated by dense false membrane, indurated or cellular in parts, or united to the opposite surfaces by large bands; or then by one mass of indurated cellular tissue, having its areolæ filled with a gelatinous substance. In some instances the false productions consist of several layers, of different degrees of thickness and density. They are not always, as M. GENDRIN has shown, closely adherent to the subjacent peritoneum, being sometimes separated from it either by an effused fluid, or then by more recently-effused lymph, owing probably to an acute action having taken place shortly before death.

109. *f.* In a few cases the peritoneum presents a brownish or very dark colour, is less dense and coherent than usual, and is infiltrated, particularly in parts, by a dark-coloured blood. At first sight the membrane seems to be gangrenous, but, on examination, it is not disorganized, its surface being rugose, granulated, and sometimes elevated by small ecchymoses, or clots of dark blood, effused under its surface or in its substance. This change is observed only in persons of a cachectic, scorbutic, or broken-down constitution. M. GENDRIN views this alteration as a complication of hæmorrhagic congestion with chronic inflammation. Occasionally it is accompanied with an exhalation of bloody serum into the cavity, and very rarely with a puriform exudation on the surface. In this latter case it may be presumed that a subacute state of inflammatory action had taken place shortly before death.

[ANDRAL is of opinion that this melanotic deposit, when in layers, is nothing more than false membrane infiltrated with melanotic matter. Others contend that the discoloration of false membrane does not proceed from melanosis, but from a blackening of the blood in the false membrane by intestinal gases and acids. It is also maintained that genuine melanosis in layers on the peritoneum is an independent secretion, forming either a mere pigment on the serous surface, or a more substantial stratum of a jelly-like consistence, enclosed in a delicate web-like membrane of new formation, and capable of being dissected off without injury to the peritoneum itself. It may be doubted whether the melanotic deposits which are

found adherent to the peritoneum, in round pedunculated tumours, isolated or agglomerated, are the result of chronic peritonitis, as they are more commonly situated on the omentum, and covered by a fine membranous film of their own.]

110. *g.* If acute inflammation have supervened upon the chronic, and continued for some days, it may produce not only albuminous formations, but also vascular injection of the part of the peritoneum thus affected. This injection may be either punctated, striated, or even general; and in this last case the surface of the membrane is sometimes lined with a puriform or perfectly purulent matter.

111. *C. Tubercular chronic peritonitis*, although generally assuming a chronic character, does not always commence as such; and, even when it is primarily chronic, as it is most frequently, it may pass into the acute, at least in a partial or limited manner.—*a.* At an early stage of the disease, coagulated lymph, in the form of a soft, false membrane of a grayish yellow colour, and amorphous, is thrown out upon the inflamed surface. The organization of this substance soon commences, but in a morbid state; small whitish grains soon appear in this hitherto amorphous production, which presents a few rudimental vessels. These grains are diaphanous, more dense than the coagulated lymph containing or surrounding them, and from which they are readily separable. When viewed by the microscope, they are seen surrounded by a vascular net. The false membrane forms adhesions to the peritoneal surface that are more intimate where these small grains or concretions, the commencing tubercles, are most numerous. These adhesions soon become very intimate, the false membrane more vascular and more organized; and the inflammation, if of an acute character, passes into the chronic state; and the serous surface, and the false membrane covering it, are still more intimately united, so as to form apparently but one very thick coat, in the substance of which the tubercles are developed and adherent. This membrane is often very vascular, the capillary vessels passing into it being often very large; the tubercles acquiring considerable size, and being much larger than the granulations above described (§ 107). The tubercles do not exist, as is the case with the latter, in the substance of the peritoneum, but are formed within the false productions, and at the same time with them; while the granulations are found only after these productions are fully formed, when seen on the surface of them, and in consequence of their inflammation.

112. *b.* Although tubercles cannot be said to exist in the peritoneum itself, yet they are often found in the sub-peritoneal cellular tissue, and are to be distinguished in this situation, as well as in false productions or membranes, by their being always encysted; the tunic or cyst arising from the condensation of the cellular tissue in which the tubercular matter is effused. When these tubercles form in the mesenteric or omental subserous tissue, they often reach a larger size than when they occur in the sub-serous tissue of the intestines, and are much more numerous. Dr. HODGKIN remarks, that in the latter situation they appear as if the part were sprinkled with parti-



cles of rice. They are often surrounded by a vascular areola, the tint of which varies with the colour of the blood injecting the capillaries forming the areola, and are readily distinguished from the milary granulations found in the peritoneum itself, in the manner above noticed (§ 107).

113. *c.* Chronic tubercular peritonitis is often associated with *ulceration* and *perforation* of the intestines, sometimes so extensive, as I have occasionally observed, particularly in children, as to form direct fistulous communications between distinct but contiguous convolutions. These communications may arise from primary ulceration of the mucous coat advancing to the peritoneal, and producing consecutive, partial, or more general peritonitis, of a subacute or chronic form, independently of tubercular formations; but they are more frequently attended by these formations, and then it is doubtful, at least in some cases, whether the ulceration has commenced and proceeded in this way, or has originated in the situation of the tubercles, which, being softened, are followed by ulceration and perforation of the bowel from without inward. Dr. HODGKIN remarks, that puriform collections, varying from the size of a pea to that of an orange, sometimes form in those situations in which the exudation of concrete lymph is greatest, as in the angular and lateral parts of the abdomen, and that these collections are often attended by ulcerative absorption of those points of the peritoneum in contact with them, the ulceration extending to the subjacent coats, until a communication between these collections and the canal of the bowels is effected. The ulcerations thus consequent, 1st, upon softened tubercles, formed either in the plastic lymph, or beneath the peritoneum; and, 2d, upon the purulent collections just mentioned, may, severally, give rise to communications not only between different parts of the bowels, but even between the intestine and the external surface, thereby producing artificial anus.

114. *D.* After this, as well as after the preceding form of chronic peritonitis, the peritoneal cavity frequently contains more or less *fluid*, which is usually opaque, of a whitish yellow colour, sometimes milky, and occasionally of an unpleasant or even fetid odour, particularly when this membrane has been long inflamed.—*a.* In a few cases the fluid partly consists of a mucopuriform matter, whitish, of the appearance of a semi-concrete albumen, mixed with pus; in others it is nearly puriform, but much more frequently it is limpid, or it resembles clear whey. In very rare instances it is gelatinous, with a thicker gelatinous or slimy coating over all the inflamed surface. The quantity of fluid effused is variable; sometimes it is so great as to distend the abdomen; when in smaller quantity, the cavity is partly filled with false membranous productions of a cellular texture, occasionally infiltrated with pus. In a few of these cases the inflamed cavity has its capacity somewhat diminished by a sinking inward of its parietes, an alteration observed after the disease had appeared to tend toward recovery.

115. *b.* In those cases attended by liquid effusion into the peritoneal cavity, the *omentum* is contracted or corrugated under the greater

curvature of the stomach, and often reduced to a small size. If, however, an old adhesion have taken place between some part of it and an adjoining surface, the omentum is usually found extended in the form of a chord between the stomach and the part at which the adhesion exists.

116. *E.* Dr. HODGKIN remarks, that in chronic peritonitis the *mesentery* is found more or less shortened, by which the intestines are drawn up to the spine; and if a hernia had existed, it will sometimes be found completely reduced. The *intestines* are reduced more frequently in their length than in their calibre. "In extreme cases," he adds, "they probably lose nearly or quite half their dimensions, and the valvulae conniventes are consequently placed close to each other. This contraction of the omentum, mesentery, and intestinal canal seems to depend on the contractions which newly-formed parts undergo after they have become organized or permanent, as in the large cicatrices of extensive burns." This shrinking evidently depends upon the false membranes covering the peritoneum, and partly upon the deposite on the attached surface. The original structures, also, are probably themselves reduced by absorption; partly under the influence of the contraction of the adventitious deposite, and partly under the pressure of the fluid effusion. These contractions were first noticed and explained by Dr. HODGKIN, in his work on "*the Pathology of Serous Membranes*" (p. 152).

117. *F.* *Cartilaginous or semi-cartilaginous induration and thickening* are sometimes met with in parts of the peritoneum in consequence of chronic inflammation. This change is much more rarely seen in this membrane than in the pleura; but it has been remarked by SANDIFORT, PORTAL, CRUVEILHIER, and others. I have met with this change twice in that portion of the peritoneum investing the spleen, and once in that covering one of the ovaries, the situations, I believe, where this change is most frequently observed.

118. *G.* *Ossification of, and ossific deposite in, the peritoneum*, have been noticed by authors, particularly in the omentum, sometimes in connexion with osseous, calcareous, or cartilaginous tumours. Most of these instances are not strictly referable to the peritoneum, this membrane being only consecutively implicated. Others are probably only cases of calcareous deposite under the peritoneum, resulting from ultimate changes in tubercular matter in that situation.

119. *H.* *Gaseous fluids* are sometimes found in the peritoneum, generally in connexion with the effusion of serum, and with one or more of the other lesions already described. The question as to their source has been often agitated; but I agree with BAILLIE, HODGKIN, and others, that although the peritoneum may, in a state of disease, secrete a gaseous fluid, yet that most generally this fluid is the result of cadaveric change when found in this situation. But there still remains another question: may not the gaseous fluid be evolved during the life of the patient from the changes in, or partial decomposition of, the products of inflammation lodged in the peritoneal cavity? This result is by no means improbable, when the quantity,

the nature, and the physical condition of the effused fluids are considered, and when the inefficiency of the vital influence in this disease to prevent those changes to which these fluids are prone is taken into the account. My experience of this disease, particularly in its asthenic forms, and in the puerperal state, leads me to infer that the effused fluids actually undergo in the peritoneal cavity, during the life of the patient, and at an advanced stage of the malady, such changes or such partial decomposition as produce gaseous fluids, which aggravate the symptoms, and which, by their partial absorption, contaminate the blood. Many years ago I contended that this was the principal source of the gaseous fluids sometimes found in the peritoneum and pleura in connexion with the products of inflammation; and the opinion is now entertained by several pathologists.

120. VII. DIAGNOSIS.—The *diagnosis* of peritonitis is often extremely difficult, particularly the partial and chronic states of it. Partial peritonitis, whether acute or chronic, is so frequently consequent upon, and associated with, inflammation of the organ or organs which the inflamed peritoneum invests, that it is often difficult to form a correct idea as to the part affected, either solely or principally. Still, the history of the case, in connexion with its causes and the early symptoms, and the grouping of the existing symptoms especially characteristic of peritonitis, particularly the abdominal pain, tenderness, swelling, and tension; the position and aspect of the patient; and the states of the pulse, stomach, and bowels, when duly weighed, will generally guide the physician to a correct conclusion. Even in those cases which are consecutive of inflammation of the enclosed viscus, and which are strictly partial, the characteristic phenomena of peritonitis are usually present, although more or less limited to the situation affected. These are the acute, burning, or sharp pain, swelling, tenderness, and tension; the position best calculated to take off pressure from the seat of disease; the sharp and anxious countenance; the quick, sharp, hard, constricted, or small pulse; the short, small, frequent, and thoracic respiration; the dread of coughing, sneezing, or of a full respiration; the retchings, vomitings, or flatulent eructations; and the symptomatic fever, in various grades of severity, according to the intensity and extent of the inflammation, whether partial or general; the chief difference being in the limitation or extension of the local symptoms.

121. When inflammation of one or more of the abdominal viscera is followed or attended by these symptoms, the inference that the peritoneum investing them is implicated, or has become chiefly affected, will generally be correct; and if these symptoms appear primarily, without any marked functional lesion having preceded them of the organs invested by the peritoneum, to which the symptoms are limited, it may safely be inferred that the peritoneum of that region is primarily and principally attacked, and the treatment should be directed conformably with this conclusion. The diseases for which peritonitis is most liable to be mistaken are, enteritis, gastritis, colic, rheumatism of the abdominal muscles, neuralgia and hysterical pains in the abdomen, &c. Of all

these the diagnosis between enteritis and peritonitis is the most difficult.

122. A. *Enteritis* is with great difficulty distinguished from peritonitis; and in many cases the diagnosis can hardly be made, especially in that state of enteritis where the peritoneal covering of the small intestines is chiefly affected. (See art. *INTESTINES*, § 31, 69, 74). CULLEN, WILSON PHILIP, and others have insisted upon the difficulty of the diagnosis in these cases; and when the peritonitis is limited to the serous covering of the intestines, or has commenced in this situation, it is certainly and necessarily very great; for the disease is, in truth, a partial peritonitis, becoming more and more extensive. Many of the diagnostic symptoms so strongly insisted upon by authors, who have copied their descriptions of disease from those who have written before them, instead of writing from their own observation, either are fallacious or occur only in certain circumstances. Thus the greater sensibility or tenderness of the abdomen, and the more acute pain, said to distinguish peritonitis from enteritis, cannot be depended upon, for these will depend, in either case, upon the susceptibility and sensibility of the patient and the intensity of the disease. Neither can the states of the bowels be always viewed as offering any indication of importance. The confidence, indeed, with which diagnostic symptoms have been advanced by some recent writers tends more to mislead than to instruct the inexperienced. After long experience and tolerably close observation, I may remark, that all diagnostic symptoms, particularly between these diseases, should be cautiously estimated; and although it may not be of much importance, as respects the treatment, whether or not the one malady be distinguished from the other, still something may be gained, in this regard, as well as respects the prognosis, by a greater precision of information.

123. In the more general states of peritonitis the diagnosis is often not so difficult as in those just adverted to, or when the intestinal peritoneum is inflamed. Here there are often observed, although not always, greater and more general, and more superficial pain of a burning or acute kind; greater sensibility to pressure; more remarkable swelling and tension of the abdomen; less tolerance of motion of the body and of the abdominal muscles; a greater dread of coughing, sneezing, and of a full respiration, and less motion of the diaphragm, than in enteritis. Vomitings or retchings are generally not so early nor so frequent in peritonitis as in enteritis, although often equally so in an advanced stage of the former; but in many instances they are not very urgent until the disease is verging towards a fatal termination. The bowels are usually constipated in both maladies, unless in the more asthenic states of peritonitis, when they are sometimes even relaxed, especially in the low, infectious form of puerperal peritonitis.

124. B. The other diseases which are said sometimes to simulate peritonitis can hardly be confounded with it, if due attention be paid to the symptoms.—a. *Gastritis* will not be mistaken for it if the abdomen be carefully examined; for the seat of pain, the desire of cold fluids, the thirst, and early vomitings, always following the ingestion of fluids, will generally



indicate the affection of the stomach. If the peritoneal coat of this viscus is inflamed, the disease may be considered either as a form of gastritis, or as partial peritonitis, according to the views of the physician; but this portion of the peritoneum is the most rarely affected, at least alone, and in this climate. Some aid may occasionally be afforded in this case, as well as in others, by *auscultation*; for, although the motions of the diaphragm are generally slight, yet sometimes an imperfect or obscure rubbing sound is heard, with the respiratory movements, in the sthenic forms of peritonitis; and when much affusion takes place, and *percussion* is tolerated, a dull sound is emitted where the affusion is considerable. These modes of examination may assist in distinguishing peritonitis from the diseases just noticed, as well as from colic and some other maladies.

[We believe that Dr. BEATTY, of Dublin, first called the attention of the profession to this physical sign in peritonitis in the year 1834. (*Dublin Jour. Med. & Surgical Science*, Sept., 1834.) "In Jan., 1832," says Dr. B., "a woman, aged 30, was admitted into my ward for the diseases of females, in the City of Dublin Hospital, labouring under dropsy of the left ovary. The tumour filled the abdomen from the pubis to the ensiform cartilage, and was remarkably hard and unyielding. A few days after admission, she was attacked with severe pain in the belly and febrile symptoms, which continued for a week, and required the abstraction of blood, and other antiphlogistic treatment, before she was relieved; during which time a remarkable sensation was communicated to the hand when applied over the umbilicus and its neighbourhood. The sensation was that of a grating or rubbing together of two uneven and rather dry surfaces, and was rendered most evident by ordering the patient to take a full inspiration, thereby causing the abdominal parietes to move more freely over the surface of the tumour. By the application of the stethoscope, a loud and distinct 'frottement' was audible, extending over a space of about five inches in diameter, with the umbilicus for a centre. In a few days the pain and inflammatory symptoms subsided, under the treatment employed, and, with them, the sensation just described, and the audible phenomena altogether disappeared."—*Loc. cit.*

SEMENTINI states, that in all cases of peritonitis, in whatever part of the abdominal cavity the inflammation is seated, there is pain in the pubes and upon the great trochanters; which, if not spontaneously felt, is always developed by pressure, and of which the severity is directly proportionate to that of the peritonitis. This fact, if, indeed, it be such, may be explained by the relation of the nerves of the parts, in which the pain is felt, to the peritoneum, and by its connexion with the fasciæ and muscles about them. In addition to its value in the diagnosis of even the most obscure and latent cases of peritonitis, in all of which, we are told, this sign is present in a degree proportioned to the severity of the disease, Dr. S. has found it of value as an indication of treatment, and has obtained great benefit from the application of leeches and blisters over the trochanters, instead of on the abdominal walls.

—*Annali Univ. di Med.*, Sept., 1840.]

125. *b.* Certain states of *colic* sometimes resemble peritonitis, especially when the former is attended by much abdominal distention and pain; for I have seen in some instances the tenderness on pressure so great, owing to the stretching of the peritoneal covering of the bowels by the flatus distending them, as to resemble peritonitis. In these the absence of fever, the state of the pulse, the cool or natural temperature of the abdomen, and other concomitant symptoms, will guide the physician. Still, the occasional supervention of peritonitis or enteritis in these cases should be kept in recollection. In the more common states of colic, when pressure is tolerated, or even gives ease, there can be no mistake as to the nature of the disorder. (*See art. COLIC.*)

126. *c.* A *hysterical form of colic* and a *hysterical state of neuralgia* may somewhat resemble peritonitis, chiefly owing to the apparent tenderness of the abdomen, which, however, is tolerant of firm pressure unexpectedly made on it. In these cases the presence of other hysterical symptoms, the borborygmi, and the flatulent state of the digestive canal; the situation of the pain, and its connexion with uterine irritation, and occasionally with tenderness in some portion of the dorsal or lumbar spine; the absence of fever and of several other inflammatory symptoms; the states of the urine and of the catamenia, &c., will generally indicate the nature of the disorder. I have, however, met with cases of hysterical colic, in connexion with dysmenorrhœa, where the extreme tenderness, the acute pain and tension in the lower regions of the abdomen, the retchings and vomiting, and the disturbance of the circulation induced a dread of inflammation of the portion of the peritoneum reflected over the uterine organs; and, most probably, the congestion of these organs had so affected the peritoneal covering, either by stretching or injecting it, as to develope its sensibility, the removal of the congestion by the supervention of the discharge removing, also, the suffering with the cause.

127. In all cases, when the abdominal tenderness of *hysteria* most closely simulates peritonitis, a remarkable incongruity of symptoms is observed. The states of the countenance, of the pulse, of the tongue, of the evacuations, and of respiration are inconsistent with peritoneal inflammation. The breathing is hurried and laborious, and not suppressed, short, and shallow, as in peritonitis; the pain and tenderness shift, or suddenly appear and as suddenly depart; the catamenia are usually more or less disordered; and leucorrhœa is often present. In the hysterical affection the state of the temper and of the moral feelings, and the frequent occurrence of other hysterical symptoms, often of themselves sufficiently characterize the disorder.

128. *d.* *Rheumatism* rarely affects the abdominal muscles, but when it does it may be mistaken for peritonitis, owing to the intense pain felt on pressure and motion. Dr. PARR states that the pain in rheumatism of these muscles is felt chiefly at their origins and insertions, shooting to the false ribs and spine of the ilium. This, however, does not agree with my observation; for I have considered the sheaths and aponeurosis of the abdominal mus-

cles to be the chief seat of the rheumatic affection in those cases which I have seen. A careful examination of the abdomen, the state of the countenance, and the absence of retchings, and of the chief symptoms characteristic of peritonitis, will readily indicate the nature of the disease. It should, however, be kept in recollection that acute rheumatism of these muscles may be followed by peritoneal inflammation. Such instances are rare, but I have met with two or three. The pains and girding sensation, or feeling of tension around the abdomen, often attending irritation and inflammatory action in the spinal chord or its membranes, can hardly be mistaken for peritonitis, if the least attention be paid to the history and symptoms of the case.

129. VIII. PROGNOSIS.—A. At an early period of *acute sthenic peritonitis*, much confidence may be entertained in a favourable result, although considerable danger should be apprehended until the good effects of active and prompt treatment become apparent. If, however, those effects are not manifested soon after the measures have been resorted to that I am about to advise at an early stage of the malady; if the disease have advanced far before suitable treatment was adopted; if indications of any of the unfavourable terminations mentioned above (§ 32, *et seq.*) have appeared; and if the case presents the *asthenic* form, or a complicated state, an *unfavourable prognosis* should be given; but hopes of recovery should not be entirely relinquished. The prognosis of peritonitis occurring in the *puerperal state* depends upon various circumstances peculiar to this state, and must be considered in connexion with PUERPERAL DISEASES.

130. The most *favourable indications* are furnished by the symptoms already enumerated of resolution of the inflammatory action (§ 31) by a subsidence of all the painful and urgent symptoms. On the other hand, if the symptoms increase in severity, especially after judicious means have been administered; if the heat of the abdomen augment, or is more harsh; if the vomiting become more urgent; the pulse more frequent, smaller, irregular, or intermittent; the countenance more anxious and collapsed, or the extremities cold or clammy; if the breathing be very short, interrupted, painful, and attended by distress and restlessness; if singultus supervene with or without meteorismus, or a pumping-up of the contents of the stomach, or eructations of fluid matters, and if constipation be obstinate, no hopes of the recovery of the patient should be entertained.

131. The causes of the disease, and the various circumstances and complications attending and characterizing particular cases, should be duly estimated before we form or give an opinion as to the result. Thus, peritonitis caused by perforation of the stomach or intestines, or that appearing in the advanced course of continued and exanthematous fevers, or following abscess in, or the rupture of, any viscus, rarely or never admits of complete recovery. Peritonitis, also, following surgical operations involving the peritoneum, and that caused by or consequent upon, or connected with, erysipelas, is attended by very great danger, particularly in the crowded wards of an hospital, or in an impure atmosphere. Various other circum-

stances of only casual occurrence will also weigh with the intelligent physician when he forms his prognosis in any case.

132. B. The *chronic forms* of peritonitis very rarely admit of recovery in any case which is distinctly characterized. The slighter or even partial states, following the acute, may, however, be removed more or less completely by careful treatment and regimen, especially when affecting persons not far advanced in life, and of an otherwise good constitution; but the more general form of primary chronic peritonitis, and still more particularly the tubercular complication of it, should be considered as entirely hopeless, although life may be prolonged for some months.

133. IX. CAUSES.—The causes of peritonitis are many of those which most frequently occasion inflammation of other internal viscera and external parts (*see* INFLAMMATION, § 91-121); but there are some causes which determine more especially the development of this disease, and which may be more particularly adverted to.—a. Many of these *act directly* upon the seat of inflammation; as wounds, operations,\* bruises, lacerations, ruptures, displacements, strangulations of parts, &c., implicating the peritoneum more or less; great or unusual stretching or distention of this membrane; the passage into its cavity of matters foreign to it, as blood, chyle, bile, fæces, pus, tubercular matter or other morbid secretions, &c.; invaginations of portions of the bowels, or stricture or undue pressure of parts of them, or of the omentum by tumours, bands of old adhesion; inordinate and continued pressure by or on surrounding or adjoining parts, and prolonged and unusual exertion of the abdominal muscles, &c.

134. b. Other causes *act from contiguity*, as pre-existent disease of some viscus covered by the peritoneum, especially dysentery, diarrhœa, and ulceration of the stomach or bowels; enlargements or tumours of subjacent parts; inflammation of any of the viscera or structures enveloped by this membrane, particularly of the intestines, urinary bladder, uterus, ovaria, liver, and spleen; and malignant or other structural lesions of adjoining parts. This class of causes generally occasion partial or limited peritonitis.

[Peritonitis from perforation of the serous membrane is not an unfrequent affection, and may generally be distinguished by the suddenness of the attack, and the rapidity with which the disease runs on to a fatal termination, in spite of all medical treatment. The causes of this accident are, 1st, external injuries, either of the solid or hollow viscera of the abdomen, or of the parietal peritoneum merely; 2dly, rupture of the bladder from distention, and of the uterus during parturition; 3dly, rupture of some portion of the digestive tube, from softening of its coats; 4thly, ulcerative perforation of the serous membrane, arising either from disease in any part of the subdiaphragmatic portion of

[\* Most cases of the Cæsarean section terminate fatally, from consequent peritoneal inflammation. Operations for tying the iliac arteries often cause death in the same way, as in a recent case, where the internal iliac was tied by Mr. LISTON, of London, for a wound of a superficial artery of the thigh, received in a duel. Owing to the great danger of this result, operations for removing ovarian tumours are, in our judgment, altogether unjustifiable, and should be abandoned.]



the digestive tube; from suppuration of the solid viscera opening into the peritoneum; from ulceration of the bladder, or ovaries; or from perforation of the diaphragm by purulent collections on its thoracic surface. There can be no doubt that ulcerative perforation of the intestinal tunics often takes place, especially in typhoid fever, without an escape of the contents of the canal into the abdominal cavity, owing to adhesions being formed between the two surfaces of the peritoneum at a point corresponding to the situation of the ulcer. Again, owing to inflammatory adhesion, and subsequent ulceration of different portions of the intestinal tube, we sometimes find communications thus formed, the fecal contents thus passing across the serous membrane without entering its cavity. We often meet with perforating ulcers of the digestive tube communicating with the solid viscera, as where the base of an ulcer of the colon is formed by the tissue of the kidney, and ulcers of the stomach resting on the spleen, or of the duodenum on the liver; in all these cases effusion into the abdominal canal is prevented—a cicatrix is formed, and the health of the individual preserved. In these cases circumscribed peritonitis only ensues, and they are generally the consequence of chronic disease, so that time is afforded for the exudation and organization of lymph.

This disease most frequently, however, occurs from a perforating ulcer of the lower portion of the ilium, consequent on acute disease. The following remarks of Louis are worthy of record: "The patients who have been the victims of this disease were young and vigorous, with the exception of the first, who was weak and of a lymphatic temperament; they had a good constitution, were rarely ill, not addicted to excess, and presenting a sanguine, a bilious, or a lymphatic sanguine temperament. Almost all had been but a short time in Paris. The causes of their disease were unknown. If we except a single case, it commenced as a slight, continued fever, and presented no severe symptom before the period of the perforation; in but one patient was there a severe diarrhœa, which was, however, of but short continuance; in another it had been moderate; still less in the subjects of the second and sixth cases, and not occurring in the remainder. Those with whom the diarrhœa was for a short time severe had slight pains in the epigastrium, and more severe pains in other portions of the abdomen, while in the remainder they were very slight, or not at all present before the period of perforation. Three of them believed themselves convalescent, and were considered so for some days, when the symptoms of this lesion occurred. A fourth seemed to have been cured rapidly of a slight enteritis; so that not only in these four subjects nothing occurred which could lead to the anticipation of the disease under which they sank, but it would have been absurd, from the mildness of their symptoms, to have apprehended any serious consequences; and at this moment we have before us the history of many patients who have died from an acute perforation of the intestine, and who, with this exception, presented no symptom which could distinguish them from analogous cases, where there was a rapid return to health. If the period of the formation of these ulcerations can-

not be accurately determined, we shall scarcely be far from the truth in supposing that it coincides with the first symptoms of the disease, from which it would result that the progress of these ulcerations has been very rapid, and that they have arrived at their last period in from twelve to twenty five days, rarely later.

"At a certain period of the disease, on account of which the patients had entered the hospital, they experienced suddenly an exquisite and tearing pain of the abdomen, rapidly followed by alteration of the features, nausea, and vomitings, &c. These symptoms continued with greater or less violence from twenty to fifty-four hours, presenting remissions which were more or less well marked, and indicating a most intense peritonitis, produced by a violent cause acting in a hidden manner, just as occurs when an irritating substance is applied to the surface of the peritoneum. It is by the reunion of these signs that the lesion that now occupies us has been recognized by M.M. LERMINIER, CHOMEL, and MARTIN SOLON, under whose care the patients were. From these circumstances it appears that we may regard the following as characteristic signs of perforation of the intestine: *if in an acute disease, and in an unexpected manner, a violent pain of the abdomen suddenly supervenes, if this pain is exasperated by pressure accompanied by rapid alteration of the features, and more or less promptly followed by nausea and vomiting, we may believe and announce that there is a perforation of the intestine.*" (*Recherches Anatomico-Pathologiques*, Paris, 1826.)]

135. c. Certain causes occasion peritonitis through the organic and vital actions, and the circulating fluids, there being, however, a predisposition in the peritoneum, or some part of it, to become affected, or pre-existing circumstances determining the inflammatory action to this membrane. Many of the causes just enumerated may be merely determining influences in developing the morbid action in this situation, other causes affecting primarily the vital and circulating functions, and producing the inflammatory diathesis or constitution. Of these latter, the most frequent and influential are, exposure to cold, humidity, or both conjoined, and to currents of cold air; sleeping on the ground or in the open air, or in damp beds or bed-clothes; sitting in wet clothes; the contaminating or infecting influences of foul air, or of animal miasms upon injuries, wounds, &c., communicating either directly or indirectly with the peritoneum; the suppression of accustomed discharges or evacuations, and of determinations of blood from more external parts; the retropulsion of cutaneous eruptions, of rheumatism, erysipelas, &c.; repeated attacks of ague, occasioning vascular determinations to the liver and spleen, and unusual stretching of the investing peritoneum, favouring the super-vention of inflammation of it; changes in the state of the blood, as respects both quantity and quality; and the puerperal states, and the various circumstances attending them. (*See PUERPERAL DISEASES.*)

136. X. TREATMENT.—Having described the several states of local and general morbid action characterizing this malady, their varying consequences, and their complications, each of

which requires a different or modified plan of treatment, it becomes necessary that the means appropriate to each of them should be fully stated. In every case, however, the treatment ought to be conducted according to its individual features and circumstances; but in all, the measures should not only be efficient, but they should also be promptly employed, and with due reference to the stage and progress of the disease, and the other peculiarities of the case.

137. i. TREATMENT OF ACUTE PERITONITIS.—*A. Acute sthenic peritonitis*, whether partial or general, requires a prompt recourse to measures calculated, 1st, to arrest the inflammatory action locally, and the general febrile commotion; 2d, to prevent the most injurious consequences of inflammatory action from supervening, and to remove them, as much as may be possible, if already they have more or less taken place. These objects comprise all the indications which have been paraded by some writers, and which can rarely be individually followed or even mentally recognised in the course of practice; the intention being to take the shortest and most efficient method of accomplishing these ends. It should always be recollected, when treating this form of the disease, that, although most frequently commencing in a partial or limited form, it may rapidly become more and more extended, sometimes unexpectedly; and that the surest means of preventing this extension are active and prompt measures relatively to the constitutional powers of the patient.

138. a. *First. To arrest the morbid action*, whether more or less extensive, or of longer or shorter duration, the most antiphlogistic measures are required, and should be energetically employed, particularly in the more violent cases, and during an early stage of the disease, or before indications of much effusion into the peritoneal cavity, or of a very general extension of the disease, present themselves. In these latter circumstances the powers of life are often too far depressed by the extent and severity of the morbid action—the constitutional energy has sustained too severe a shock, at least in many instances—to admit of very active antiphlogistic means, or too copious depletions, especially at such an advanced stage of the disease as these changes characterize. During the earlier periods of this form of the malady, and particularly in young and robust or plethoric persons, *venesection* should be resorted to, in the manner so frequently recommended in this work (see article *Blood*, § 64, *et seq.*), and blood taken until a marked impression is made upon the pulse, but short of fainting, for the reasons elsewhere assigned. Immediately after the depletion, full or even very large doses of *calomel* and *opium*—from five to fifteen, or even twenty, grains of the former; and from one and a half to three, or even four, of the latter—ought to be given. These will generally have the effect of allaying irritability of the stomach, of equalizing the circulation, of procuring perspiration or a relaxation of the skin, and of keeping down the vascular action to the point to which it was brought by the blood-letting.

139. If these effects are not produced in the course of a few hours, and more especially if the pulse still continue hard or constricted,

and the abdomen tense and tender, or if the pulse should begin to rise, and the pain to increase or to return, *blood-letting* should be again practised, generally in smaller quantity, and be followed, as before, by a repetition of the *calomel* and *opium*, in the same, or in somewhat reduced doses, according to the effects produced by the former. In this disease, and more especially at an early period of it, the physician should not be deterred from blood-letting by the smallness of the pulse; for the pulse will become fuller and softer, and often less frequent, as the depletion proceeds. It may be necessary, in some cases, to repeat the blood-letting a third time in the manner already recommended, and to follow it by the *calomel* and *opium* as before; but in most instances of this form of the malady this will not be requisite, and in many, where a doubt may exist as to its propriety, leeches may be placed on the abdomen, in numbers according to the severity and other circumstances of the case; and be followed by fomentations, &c., and by *calomel* and *opium*, in doses suggested by the quantity and effects of those already taken, and by the period which has elapsed between the exhibition of them.

140. Having carried vascular depletion as far as may prudently be attempted, and having employed *calomel* and *opium* as now advised, the disease will be either entirely or partially subdued. If, however, pain, distention, and tenderness of the abdomen still remain—if the stomach be irritable, and the bowels constipated, the gums or tongue indicating no incipient mercurial action—the *calomel* and *opium* may be again exhibited in quantities suggested by circumstances, and several folds of flannel should be wrung as dry as possible out of very hot water and freely sprinkled with spirits of turpentine, and placed over the abdomen, and covered by oiled silk or by napkins, so as to confine the terebinthinate fumes as much as possible to the part. This *fomentation* ought to be applied as long as it can be endured, and even be repeated in many cases. The admirable effects of it have been proved to me on many occasions at this stage of the malady, both before and since I wrote in favour of it in 1821. (See a *Memoir on Terebinthinate Remedies in Disease*, in Lond. Med. and Physical Journ., vol. xlv., p. 107, 185.)

141. The usual effects of this application, after the measures advised to precede it have been duly employed, are a diminution of the abdominal pain, distention and tenderness, and of the irritability of the stomach; a reduction of the frequency of the pulse, which becomes fuller and softer; and a general diffusion of heat, usually with perspiration over the surface and extremities.

142. b. It is possible still that the above energetic means may fail, both in arresting the progress of the malady and in affecting the gums and tongue in the way which is desired. It should, however, be recollected that many cases will proceed favourably, and to complete resolution, without any mercurial effect upon these parts; but when such effect begins to appear, it should be viewed as a favourable indication, and the *calomel* should either be relinquished or much reduced in quantity, as this effect may rapidly increase. If, however, neither of these beneficial influences appears to



follow, depletions being no longer admissible, and the terebinthinate embrocation having also failed, a *blister*, or the vesicating fluids recently introduced, may be applied over the abdomen, and vesication be promoted by a warm bread-and-water poultice. Afterward, the cuticle should be removed, if the symptoms persist, and mercurial ointment be applied, either on the surface of a poultice or in the usual way. The object in thus persisting in the use of *mercurials*, as now proposed, is not only to aid in arresting the inflammatory action, but also to prevent the more serious of those consequences, namely, albuminous exudations and serous effusions, which frequently result. They should be exhibited from the commencement of treatment, in full, or in frequently repeated doses, conjoined with opium, so as to aid the blood-letting in making an early and energetic impression on the disease, and not be delayed until an advanced period.

143. I have been called to cases where blood-letting has been pushed too far, with the mistaken idea that the frequency of the pulse is to be reduced by it. But, although this effect is often observed when blood-letting has an immediate influence on the disease, and in healthy or robust persons, yet in other circumstances, particularly in weak, or nervous, or irritable constitutions, the pulse will more frequently become quicker, and even sharper, from the repetition of it.

144. *B.* There are *three symptoms* which often increase the difficulty of treating peritonitis and augment the severity of the disease, and which are often aggravated by the mode of treating them. These are the irritability of the stomach, the constipation, and the flatulent distention of the bowels. To each of these I advert.—*a.* The *sickness and retchings* at an early stage of the malady are best encountered by calomel and opium as above advised, and by turpentine fomentations, after bleeding has been duly resorted to, aided in some cases by *creasote* conjoined with the calomel and opium, or by *hydrocyanic acid*. The attempts to allay this symptom by effervescent draughts are generally futile, for the stomach readily reacts upon the distention caused by these draughts and throws off the ingesta. Neither ought much fluid or cold fluids to be given; the mouth and throat should be merely rinsed with tepid fluids, or small quantities of them only be sipped. The retchings or pumping up of the contents of the stomach, characterizing a fatal issue in extreme cases, and often associated with singultus, will not be removed, and seldom even alleviated by any means whatever.

145. *b.* *Constipation* is frequently removed, even when most obstinate, by the treatment I have advised, without having recourse to purgatives. I have often seen much mischief result from the officious interference of the practitioner in these cases; the irritability of the stomach and the severity of the disease being heightened by repeated endeavours to operate on the bowels by drastic purgatives given by the mouth. It is best, at an early stage of the disease, to wait the effects of the treatment advised above for a reasonable period, and then to have recourse to *enemata* containing spirits of turpentine, with castor or olive oil, or with both, in a thick decoction of barley. These

may be repeated from time to time, until the bowels are sufficiently evacuated, without any dread of the complaint being aggravated either by their frequency or the amount of the ingredients. At a somewhat advanced period of the disease, particularly when the irritability of the stomach has been removed by the calomel and opium, and much flatulent distention of the bowels still continues, from two or three drachms, or half an ounce, to six drachms each of spirits of turpentine and castor oil may be taken on the surface of milk or peppermint water, and repeated according to circumstances. I have often seen this medicine productive of great advantage; and, at a still more advanced stage of the malady, it has remained on the stomach, although vomitings, unattended by effort or by retchings, were present, and every thing besides was instantly rejected.

146. *c.* *Flatulent distention* of the abdomen may continue, and perpetuate pain and tenderness after inflammatory action has been removed or much reduced. In these cases the flatulence is the result chiefly of the lost tone or contractility of the coats of the bowels; and the distention by gaseous fluids of the tender and inflamed peritoneum, or of the peritoneum independently of inflammation, develops the sensibility of this tissue, and indicates a greater amount, or a longer persistence, of inflammation than actually obtains. A recurrence to blood-letting in any form in such circumstances, which, as I have had reason to know, is not an infrequent practice, and was formerly much more so, is generally most injurious. The good effects of *terebinthinate enemata* and *embrocations* in these circumstances are almost always remarkable, and are still more so when the spirits of turpentine are taken internally, either as just advised or in other forms, in which I have so often prescribed this medicine and recommended it in the course of this work.

147. *d.* It was advised by the late Dr. Sutton of Greenwich, and by some German physicians, by whom I have seen many years ago the practice adopted, to apply *cold* or *evaporating lotions*, or *ice*, to the abdomen in peritonitis. If the practice is admissible at all, it is in this form of the disease, and at an early stage of it, that it should be employed. My recollections of it are not, however, such as would induce me to recommend it, while my experience of the practice I have prescribed above has been so long and extensive as to fully warrant my commendations. Dr. Symonds, however, remarks that, in some cases, cold evaporating lotions have seemed preferable to other applications, the evaporation being accelerated by blowing the surface by a common bellows; and that he has placed the patient in a warm bath, sufficiently long and shallow for him to lie extended, and for the tumid abdomen to rise above the level, so that a jet of cold water could be poured upon the latter. "The relief," he adds, "has been most striking, even when the disease was too far advanced for a cure." (*Op. Cit.*, p. 145.)

148. *e.* When the disease yields, as it usually does, to the above means, when early employed, and the indications of resolution appear, little more is requisite than attention to the state of the secretions and excretions, which should be promoted by gentle alteratives and

aperients, aided by an occasional recourse to oleaginous or emollient enemata. As the pulse usually continues frequent for some time after the other symptoms subside, owing to loss of blood and debility, this circumstance should neither create alarm nor lead to an officious or unnecessary interference. A premature recourse to tonics or stimulants, or to an exciting diet or heating regimen, would be injurious, and lowering measures, on the other hand, would only protract convalescence. In this state mild diaphoretics and diuretics, as the camphor mixture, with the liquor ammoniæ acetatis and spiritus ætheris nitrici, will generally prove both safe and beneficial; while the functions of the skin should be promoted by warm baths, by warm clothing, by flannel worn next the skin, and by avoiding the exciting causes. The lower extremities should always be kept warm; and the bowels and urinary functions ought to receive the strictest attention long after the patient has recovered.

149. *C.* The second object, namely, to prevent the injurious consequences of peritonitis, and to remove such as may have been already produced, is best accomplished by a prompt and judicious recourse to the measures already recommended. But the physician may have been called too late to prevent these consequences; the disease may have advanced to that stage at which one or other of the more unfavourable results described above (§ 33, *et seq.*) has either supervened or is in progress. If effusion have taken place, or is even proceeding, blood-letting in any form may be of little use, or even injurious. Still, it may be practised with due caution while the pulse retains some power and is not very frequent, and when the patient is young, and his vital powers not remarkably depressed. In similar circumstances, also, calomel and opium may be prescribed and repeated from time to time; although, at this late period of the malady, the mercurial effect on the system may not be readily, or even at all, produced. A few grains of camphor, added to the calomel and opium, will often be of service in these cases. The terebinthinate fomentation over the abdomen, and terebinthinate enemata, a terebinthinate draught, also, being occasionally given, are most important measures in these circumstances, whatever may be the amount or the exact nature of the lesions produced by the inflammation. Ysicatories, followed by poultices, with or without mercurial ointment, as circumstances indicate, may be applied to the abdomen, as above advised (§ 142); but they require discrimination, especially as to the period of their application. In most instances they should be large and efficient. In some cases a prolonged discharge from them may be procured in the usual way; and, when the gums have not been affected by the mercurials previously given, the application of mercurial ointment to their surfaces, the cuticle being removed, will often produce a local and constitutional effect. In other cases a repetition of blisters may be requisite, while mercurial alteratives and aperients, as Plummer's pill with soap, the bi-borate of soda with the watery extract of aloes, &c., and oleaginous or emollient enemata, are being employed. In some instances, especially when much liquid effusion has taken place in the peritoneal cavity, I have di-

rected the following embrocation, sprinkled on two or three folds of flannel, to be applied over the abdomen, and kept there for a considerable time, or even worn for some days, when the amount of irritation produced by it admits of its continued application. In other circumstances a repeated recourse to it should be insisted on:

No. 307. R Linimenti Camphoræ comp.: Linimenti Terebinth.; Olei Olivæ, ʒʒ, ʒss; Olei Cajuputi, ʒss. M. Fiat Embrocatio vel Linimentum.

When the physician is called late in the disease to a case of acute peritonitis, it is prone to pass into the chronic state; and this may be the most favourable result which can be anticipated from the extent of lesion already produced. In these instances the treatment about to be mentioned as appropriate to the chronic disease is in many respects the same as that now advised, and should be resorted to, taking care, however, not to reduce the powers of life so low as to render them unable to resist the extension of the morbid changes.

150. *D.* The treatment of acute asthenic peritonitis (§ 26) is rarely entered upon with any hopes of advantage, unless at the commencement, or at an early stage of the malady; and then the most energetic means are required to arrest its progress, and even they will frequently fail if they be not employed with discrimination, the extension and course of the disease being extremely rapid, and effusion quickly supervening. This form of peritonitis occurs most frequently in the puerperal state, both sporadically and epidemically, and especially in lying-in hospitals, where it often spreads throughout the wards (*see PUERPERAL DISEASES*). Instances, however, of this form of peritonitis are observed in other circumstances, especially in connexion with erysipelas, and with other maladies already alluded to (§ 26). In these the chief object is to arrest the extension of the morbid action by those remedies which will make the most powerful impression, and in the shortest period, upon the organic nervous and vascular systems: an impression which shall enable these systems, at the same time, to resist the extension of the local mischief, and to remove the changes which have already taken place. After having made trial of various remedies and methods of cure in this form of the disease, the means which I have had reason to confide in are, a combination of camphor, calomel, and opium in large doses, repeated every four, five, or six hours, according to the features of the case; in some instances sulphate of quinine, camphor, and opium in frequent doses; epithems or fomentations of warm spirits of turpentine over the abdomen, renewed or repeated according to circumstances; terebinthinate enemata, and occasional doses of spirits of turpentine by the mouth, with or without castor-oil, or other medicines. I have employed this treatment since 1823, modifying it with the peculiarities of individual cases; but it is more fully described in the article on the several forms of fever and of peritonitis in the puerperal state. (*See PUERPERAL DISEASES.*)

151. *E.* Peritonitis from perforation of the stomach or intestines may assume various forms, according to the circumstances under which the perforation occurs.—*a.* As I have shown above



(§ 27), if it result from chronic ulceration of any portion of the digestive canal, it may be limited to that portion of the membrane more immediately surrounding the perforation; and, coagulable lymph having been effused, that part becomes agglutinated to the opposite surface, and effusion of the contents of the canal into the peritoneal cavity is thereby prevented. In this case the symptoms only of *partial peritonitis* are manifested, and the disease may assume an acute, sub-acute, or chronic character. An instance occurred in my practice of a female who lived between two and three years after peritoneal symptoms, caused by ulceration and perforation of the stomach, appeared; she was treated chiefly by *opiates*, and upon dissection the peritoneum, for a considerable space around the large perforation, was thickened, adherent to the opposite surface, and almost cartilaginous. (*See art. STOMACH.*)

152. *b.* In many cases, however, especially when the perforation takes place in the course of continued or exanthematous fevers, and of phthisis, the constitutional powers and the state of the circulating fluids are such as generally admit not of the production of coagulable lymph, and the formation of adhesions between the opposite peritoneal surfaces. In these circumstances, a portion of the contents of the digestive canal escapes into the peritoneal cavity, occasioning a rapid form of *general asthenic peritonitis*. Sometimes, however, the disease continues for a time more or less limited, acute pain and tenderness being confined chiefly to the region in which they were first experienced. In this case some hopes may be anticipated from treatment. Dr. GRAVES and Dr. STOKES first suggested the most rational principle and means of cure in this state, namely, to enable the constitution to produce coagulable lymph, by which the opposite surfaces of the peritoneum may become adherent, and to keep the bowels quiescent until this end be attained. The most efficient means to accomplish these intentions are, frequent and full doses of *opium*, and the remedial, dietetic, and regiminal measures usually employed to promote the strength of the patient, accommodated variously, so as to suit the peculiarities of particular cases.

153. *E. Peritonitis consequent upon paracentesis abdominis*, or other operations, especially if there be any connexion between it and erysipelas (§ 28), generally assumes the asthenic form, and should be treated upon the principle of enabling the constitution to form coagulable lymph, and of assisting the powers of life to resist the extension of the malady. With these views, *opium*, in full and frequent doses, should be given, and the usual remedial and dietetic means of supporting the vital powers ought to be employed. In short, the treatment advised above (§ 150) should be adopted, and modified so as to meet the exigencies of each case.

154. *ii. TREATMENT OF CHRONIC PERITONITIS.*—*A.* In a few cases only of the *general and tubercular forms* of the disease can it be hoped that very great advantage will be procured from treatment. Much, however, may be done in alleviating the more unpleasant symptoms, especially the attendant diarrhoea, and even in prolonging the life of the patient. In some cases, particularly where the powers of the pa-

tient are not much reduced, *local depletions*, by means of leeches, repeated as circumstances will suggest, will be of considerable service; but venesection can rarely be attempted. I have found most benefit to be derived from the *turpentine liniment* or *embrocation* recommended above (§ 140), with the addition of a little of the *iodide of potassium* and *vinum opii*. It should be perseveringly used, and be aided, particularly when there is much liquid effusion, by the *iodide of potassium* given internally with *opium*, or with the *compound tincture of camphor and sarsaparilla*. *Opiates* are indispensable in most instances, and more especially when the bowels are much relaxed. They may be given as just recommended, or alone, or with absorbents, mucilages, and emollients. I have employed the *iodide of potassium* in this disease since 1824, but it is most beneficial when taken in very small doses, and when long persevered in. Even in moderate doses it is prone to develop an acute state of peritonitis; and in this case the application of leeches, of turpentine fomentations with *opium*, &c., to the abdomen is indispensable, in order to subdue the acute or sub-acute action thus produced, the *iodide* being relinquished.

155. *B. Partial chronic peritonitis*, existing either simply, or associated with chronic visceral disease, is often either permanently removed or reduced to a state which is inconsistent with the performance of the functions, even of that organ, the peritoneal surface of which has been more or less implicated. The disease may degenerate into adhesions of a loose or cellular kind, which may not interrupt materially the offices of the connected organs. Still, these adhesions may excite farther change, may occasion inflammation, or may themselves be the seat of it. It is not infrequently observed that inflammation of a viscus covered by the peritoneum extends to this membrane, or the inflammation may commence in and be limited to a portion of the peritoneum in an acute or sub-acute form, and, being either neglected or only partially removed, continues for an indefinite time afterward in a chronic state. In this case, attention to the functions of the organ affected or consecutively implicated, the occasional application of a few *leeches* when pain or tenderness are felt, followed by warm *fomentations* or the *terebinthinate embrocation*; by *opiates* with *alteratives*, cooling *diaphoretics*, and *diuretics*, and such other means as the seat, severity, and associations of the disease will suggest, are the means upon which the chief dependence should be placed. In some instances of this partial state of chronic peritonitis, the *iodide of potassium*, or the *iodide of mercury*, in small doses, may be tried subsequently to a due recourse to the means just mentioned, with the view of reducing adhesions; but the effect should be carefully observed. Partial chronic peritonitis is most frequently observed in the peritoneal coverings of the spleen, liver, and female sexual organs, as a consequence of inflammation of the subjacent viscera, and is there more readily removed by treatment than in other situations; or, at least, is more easily reduced to a state of comparative innocuousness.

156. *iii. THE COMPLICATIONS OF PERITONITIS* require attention in both the *acute* and *chronic*

states of this disease. It is chiefly, however, in the partial forms of peritonitis, or early in the more general malady, that these complications become objects of the greatest importance. In every case it is necessary to ascertain, as far as may be, the organ or part primarily affected, and the extent of the superinduced disease; for in many the primary malady will perpetuate the consecutive affection of the peritoneum.—*a.* When *hepatitis* extends to the peritoneum covering the convex or the concave surface of the liver, the portions of the membrane reflected over the diaphragm in the one case, and over the stomach, colon, and duodenum, &c., in the other, are often implicated (§ 71-74). The disease may even extend farther, not merely as regards the peritoneum, but as respects other parts. Thus I have seen diaphragmatitis, pleuritis, and ultimately pleura-pneumonia, follow hepatitis, on the one hand, and partial or even general peritonitis supervene on the other. In these circumstances, and especially before the disease has thus extended, every effort should be made to bring the system under the influence of mercury as soon as possible, while at the same time the constitutional powers should be aided in resisting the farther extension of the malady. In addition, therefore, to judicious vascular depletions, calomel, camphor, and opium should be exhibited as above advised (§ 139, *et seq.*), and be aided by terebinthinate fomentations and enemata.

157. *b.* The association of peritonitis with inflammation of the cæcum, or of the appendix cæci (§ 74), is one of the most frequent and important which comes before the physician. In many instances, as I have shown in the article CÆCUM, the impaction of a hard body into the appendix perpetuates the inflammation of it, as well as of the peritoneum, and prevents a favourable result, however judicious the treatment may be. When the partial peritonitis caused by the disease of the CÆCUM (see that art., § 18-20) is acute, the treatment already recommended (§ 138, *et seq.*) for simple sthenic peritonitis, or that advised above for the complication with hepatitis, should be adopted. I may refer the reader, also, to the treatment recommended by me for inflammation extending to the peritoneum, in the article CÆCUM (§ 32). In the more chronic state of this association, the means already prescribed for partial chronic peritonitis (§ 155) may be adopted, due attention being paid to the secreting and excreting functions of the liver and bowels.

158. *c.* The associations of enteritis, and of acute or chronic dysentery with partial peritonitis, are very common (§ 74); and even in general peritonitis, both the small and large intestines are often more or less affected. These complications are generally the most difficult to manage; for, if the bowels be obstinately constipated, attempts to move them by drastic purgatives frequently aggravate the disease. The treatment in this case should be directed almost entirely to the inflammation, and consist of those means which I have advised for the sthenic form of it (§ 140, *et seq.*), aided by suitable enemata. When the inflammation has been allayed, and the bowels still remain confined, such mild laxatives as may solicit, rather than force, the action of the bowels, only ought

to be employed. On the other hand, if the bowels are much relaxed, or if diarrhœa or a dysenteric state be present, the arrest of the increased discharge from the mucous surface of the bowels may increase the morbid action in the peritoneum, while the persistence of the diarrhœa may arise from ulceration, which has either already caused, or will aggravate, the peritonitis. The early history of cases of this kind is the chief guide of the physician, aided by the extent and severity of the peritoneal symptoms. If the diarrhœa be merely an attendant on the peritonitis, as it sometimes is in the asthenic form of the disease, attempts ought not to be made to arrest, or even to moderate it, unless it be excessive, and exhaust the patient; whereas, if the peritonitis, in any form, supervene on diarrhœa or upon dysentery, the persistence of the latter, whether ulceration or perforation exist or not, will aggravate the peritonitis; and, therefore, while the chief attention ought to be directed to it, strenuous efforts should also be made to moderate or remove the disorder of the bowels. In the first case, the bowel affection depends upon the peritonitis, and the treatment, as I have advised, should be directed with promptitude and activity to this latter—to the primary and chief disease. In the second case, the disorder of the bowels has not merely caused, but still continues to perpetuate and to aggravate the peritonitis, and ought, therefore, to be moderated or controlled even where it might not be prudent at once to arrest it, supposing this to be in our power. In this complication, whatever may be the sequence of morbid action, an extensive experience has proved to me that the terebinthinate remedies, used both internally and externally, are most to be depended upon when judiciously prescribed. That the right use may not be made of them, in respect both of the circumstances and period of the disease in which they should be used, and the modes of exhibiting and combining them, and hence that they will sometimes disappoint many who may have recourse to them, I can fully believe. But in these contingencies they participate with all our other most efficacious remedies. Opium, with ipecacuanha in large doses, when the bowels are much disordered; appropriate enemata, and other means already noticed, adapted or combined so as to meet the exigencies of particular cases, are also important adjuvants in the treatment of these complications.

159. *d.* The association of peritonitis with inflammation, or with organic lesions of the urinary and sexual organs (§ 75), is not infrequent, especially among females, and in the puerperal state. In ordinary circumstances the associated peritonitis is generally consequent upon the visceral disease, and is commonly partial, unless in puerperal or cachectic states, or in the course of fevers, where it often rapidly becomes more or less general. It sometimes, also, passes into a chronic form, especially when it is consecutive of organic lesions, or is independent of the puerperal condition. In these several associations the treatment should partly depend upon the extent of the peritoneal affection, and upon the degree of vital power characterizing the disease. When the asthenic and diffusive form is present, the treatment advised above is most appropriate (§ 150); but when the more sthenic



and partial or limited state of morbid action exists, then the means already recommended (§ 140) are those which are most beneficial for this state of complication. In either case the peritonitic disease claims the more immediate and the chief attention, as upon the limitation or extension of it depends the recovery or the loss of the patient. It being arrested, or more or less subdued, the treatment should be more strictly directed to the primary lesion of the sexual organs; and the functions of these organs ought to be promoted, especially as respects the menstrual discharge. Even after the disease is apparently subdued by the vascular depletions, &c., prescribed above, still pain or tenderness often recurs, especially about the expected catamenial period, and is sometimes attended by scanty or difficult discharge. In such cases leeches should be applied below each groin, and be followed by fomentations, as already advised (§ 140), by small doses of the bichloride of soda in camphor and orange-flower water, and by such other means as the peculiarities of individual cases will suggest.

160. iv. TREATMENT OF PERITONITIS IN CHILDREN.—A. The principles of treatment which I have advocated for adults are also applicable to children. In the latter class of subjects, however, *acute peritonitis* generally assumes a *sthenic* or *phlogistic* character, unless when it follows eruptive fevers or mesenteric disease, when a subacute and diffusible state is often assumed, not infrequently lapsing into the chronic form, particularly in the scrofulous diathesis. In the more *sthenic* of these states of disease, local depletions, calomel, terebinthinate fomentations and injections, emollient warm baths, with the other means already advised, according to the circumstances of the case, are the measures upon which our dependence ought to be chiefly placed. When peritonitis follows the maladies just mentioned—when it presents, either locally or as regards the constitutional symptoms, the *asthenic*, *diffusive*, or *subacute* state—calomel with camphor, and with opium in small doses, when the age of the patient will admit of this last, and terebinthinate remedies in the several forms already prescribed, and duly repeated or continued, are the principal means of cure.

161. B. If the disease pass into the *chronic* state, or assume this form primarily—if it be *tubercular*, as it most frequently is, or *simple*, and attended by fluid effusion into the peritoneal cavity—a cautious recourse to *iodine*, especially to the proto-iodide of mercury, to the iodide of potassium, with liquor potassæ and sarsaparilla, and a frequent or continued use of the terebinthinate embrocation over the abdomen, as above advised (§ 140, 141), either with or without the iodides externally, should in no case be neglected; but they should be perseveringly employed, and the iodides ought to be given only in very small doses, especially at first, and be aided by change of air, and exposure to light and sunshine. When chronic peritonitis is attended in children by diarrhœa, when it is far advanced, and its tubercular nature manifest, then ulceration, or, at least, a state of lesion almost precluding hope, may be inferred. Our treatment should then be directed to the alleviation of urgent symptoms; to the moderation of the attendant diarrhœa and pain by means

of absorbents and opiates, by hydrarg. cum creta with compound ipecacuanha powder, and warm baths, or fomentations over the abdomen.

162. v. CONVALESCENCE from any of the forms of *peritonitis* requires the utmost care and caution, especially in respect of *diet* and *regimen*. During the continuance of the disease, particularly in the acute form, bland or emollient fluids only should be allowed. The compound decoction of barley may be taken in small quantities; and, when a relaxing effect upon the bowels is desired, then about a drachm of oleum olivæ may be given on its surface three or four times in the day, or oftener. In the acute state of the disease, this, or simple barley, rice, gum-water, rendered agreeable with liquorice powder, is all that is required, both as drink and as aliment. In the chronic states, however, or during the early stage of the convalescence from the acute, the same watery decoctions, with small quantities of ass's or other milk [rennet whey], or weak arrow-root, or other farinaceous substances, may be allowed; and, subsequently, according to the progress of the case or the amount of debility, mutton, or veal, or chicken broths, or beef-tea, in small quantity, with dry toast, or with boiled rice or stale bread, may be cautiously permitted. The greatest caution should be used in returning to animal food; and that which is the mildest, least stimulating, and most digestible only should be allowed, in small quantity, once in the day. All heating or stimulating beverages, and flatulent or ascescent vegetables, ought to be avoided. Chocolate or cocoa-nibs should be substituted for tea and coffee; and, in the case of infants or children, ass milk warm from the animal, either pure or diluted, is one of the best articles of food, as well of drink, that can be administered.

163. During the course of, as well as convalescence from, this disease, a perspirable state of the surface ought to be preserved by flannel worn constantly next to the skin, by warm baths rendered emollient by an alkali, by decoction of marsh-mallows, or infusion of linseed, &c. If the bowels, after recovery, continue irregular or constipated, the emollient decoctions or infusions may be employed as enemata, to which oleum ricini or oleum olivæ may be added; and small doses of these, particularly of the latter, may be taken frequently, on the surface of any suitable diluent or demulcent, until a regular action shall be established.

#### XI. ORGANIC LESIONS OF THE PERITONEUM, INDEPENDENT OF INFLAMMATION.

##### CLASSIF.—IV. CLASS, I. ORDER (*Author*).

164. i. DESCRIPTION.—The lesions of the peritoneum which have already been noticed have chiefly been those which are consequent upon inflammation in some one or other of its several forms or types. Tubercular formations are, however, an exception; and these have been noticed only incidentally, and in as far as they are associated with chronic peritonitis, particularly in scrofulous constitutions. A brief notice only will be taken of those changes which are not essentially caused by inflammation, as they are generally, especially in the circumstances in which they usually present themselves, but little influenced by medical treatment. Certain of these changes affect rather the attached surface, or the sub-peritoneal tis-

sue, than the peritoneum itself; while others consist in the presence of fluids altogether foreign to the peritoneal cavity.

165. *A. Various changes of colour* are occasionally presented by the peritoneum, which are independent of inflammation. — *a. Yellowish* or even *greenish tints* are sometimes observed in those parts of the membrane in the more immediate vicinity of the gall-bladder, and are owing to the exudation of bile. The extent and the intensity of the colour generally depend upon the colour and quantity of bile contained in the gall-bladder and ducts, and upon the duration of the period from the death of the patient. Various shades of colour are often observed in the peritoneal surfaces of the liver and spleen, and are generally owing, when they are very deep or dark, bluish or brownish, to venous congestion of these organs, or to accumulations of black viscid bile in the hepatic ducts. These deep shades of colour are most remarkable in warm climates, after hepatic, periodic, and other fevers. — *b. The peritoneum* may also present a *reddish hue* without having been inflamed. This always is owing to the escape of blood, from accident or rupture of vessels, into the peritoneal cavity; and hence its nature is apparent. It is always a *post-mortem* change.

166. *B. The sub-peritoneal cellular tissue* is not infrequently the seat of various changes, which, although sometimes connected with, is oftener independent of, inflammatory action. — *a. Edema* of this tissue is occasionally observed in consequence of chronic disease of the heart, liver, lungs, or kidneys; and is most conspicuous in those situations where the cellular tissue is most abundant and loose; as in the vicinity of the pancreas, kidneys, and sexual organs.

167. *b. Minute transparent vesicles*, varying from the size of a millet-seed to that of a pea, or even of a marble. They occur most frequently about the Fallopian tubes, ovaries, and broad ligaments. *Serous cysts* are not infrequently found between the folds of the broad ligaments, and sometimes attain the size of a large orange, simulating ovarian disease, and constituting one of the forms of encysted dropsy. (*See art. Dropsy*, § 206, 212.)

168. *c. Tubercles and scrofulous tumours* are the most frequent and important organic lesions primarily occurring in the sub-peritoneal cellular tissue independently of inflammation, although, with all other morbid formations in the same situation, generally inducing chronic inflammatory action in their progress. Scrofulous tubercles in this situation, and when well defined, seem to be encysted, owing to the condensation of the cellular tissue directly investing them. Dr. HODGKIN states, that these scrofulous tubercles or tumours are most frequently seen, and are the largest, between the folds of the mesentery; but they obviously implicate the glands in that situation. They also attain a considerable size in the omentum. Under the peritoneal coat of the intestines they are generally small, but numerous. Dr. HODGKIN considers the small miliary granulations, which I have described above (§ 107), as consequences of inflammatory action, and which are found, both below and in the peritoneum, to be incipient tubercles. I have already endeavoured to distinguish between those granulations which

seem to result from chronic inflammation and scrofulous tubercles.

169. *C.—a. Malignant deposits, or formations of a scirrhus or fungoid character*, occur occasionally on the attached surface of the peritoneum, and sometimes they extend from the subjacent structures, and invade this membrane. Dr. HODGKIN remarks, that in the former case the tumours which result are often remarkable for their size, number, and diffusion; but that, even in these, some portions of the peritoneum more frequently escape than others. Thus, these morbid growths are not so often met with on the parietes as in the omentum, or in the intestines; and, when formed in the parietes, they are generally of a smaller size. Neither the mesenteric glands nor the other organs invested by the peritoneum are apt to become affected by the extension of the disease. These growths are sometimes, although not necessarily, attended by serous effusion into the peritoneal cavity, causing distention, which is occasionally very considerable. When the disease is propagated from the primarily affected organ, it is generally to the vicinity only; thus, in scirrhus of the pylorus, a sprinkling of minute scirrhus tubercles is often seen under the peritoneum in the neighbourhood; and in malignant disease of the uterus, the convolutions of the intestines which happen to come in contact with it often exhibit growths of a corresponding character beneath their peritoneal coat.

170. *b. The free or internal surface* of the peritoneum is very rarely the seat of malignant growths. Dr. HODGKIN, however, met with two instances in which it was the seat of these growths; but in these, malignant formations also were found in organs invested by this membrane, and were manifestly developed primarily in these organs. In one case, in addition to fungoid disease of the kidney, there were small malignant tubercles situated in and beneath the peritoneum, and others seated on the free surface of it; and in the other case these tubercles were scattered beneath the peritoneal coat of the intestines, and on its free surface, the chief and primary fungoid tumour being in one of the ovaries.

171. *c. Melanosis*, also, is sometimes met with, invading, rather than primarily affecting, the peritoneum; and it is chiefly observed on the attached surface of the membrane, to which it has extended from the subjacent structures and cellular tissue; where, however, it presents the usual characters assigned it when treating of it elsewhere. (*See art. MELANOSIS.*)

172. Although scrofulous tubercles and scirrhus and fungoid productions affect the peritoneum independently of inflammation, and appear in those circumstances, and from causes which are fully developed in the articles devoted to those several subjects, still they not infrequently are found accompanied with more or less abundant effusion of serum, and with bridges, or films of adhesion, indicating, the latter especially, that a chronic form of inflammatory action had been excited by their presence and in their vicinity.

173. *D. True hydatids or acephalocysts* are sometimes produced beneath the peritoneum, and occasionally they attain a very large size so as to resemble encysted dropsy, from which



they are with difficulty distinguished during the life of the patient, especially when they form between the folds of the broad ligaments of the uterus. They are met with chiefly under the peritoneal covering of the liver, beneath that of the spleen, in the broad ligaments, and in the mesentery; but the first is their most frequent seat. They may burst into the peritoneal cavity without producing any signs of inflammatory action; but a chronic and limited state of inflammation may be occasioned by them. In either of these situations they may pass through those changes which have been described when treating of them. (*See article HYDATIDS*, § 15-25.)

174. *E. Ecchymoses and small bloody points* are occasionally found in the peritoneum, owing to minute extravasation of blood, caused by diminution of the tone of the capillaries and of the vital cohesion of the sub-peritoneal tissue, and probably, also, of the peritoneum itself. They are most frequently observed under and in the peritoneal coat of the small intestines, but are also sometimes met with in other situations. They occur chiefly in purpura hæmorrhagica, in adynamic fevers, and in scurvy, in which last I have observed the ecchymoses assume the form of vibices, or patches, as large as half-crown pieces. Dr. HODGKIN remarks, that he has seen the peritoneum sprinkled with small bloody points, not only in purpura, but also in jaundice.

175. *F. Various substances foreign to this situation are sometimes found within the peritoneal cavity.*—a. The most common is an accumulation of *serous fluid*. This fluid may result from increased exhalation of serum, arising from congestion, or impeded return of blood from the abdominal viscera, consequent upon disease of the liver, heart, lungs, kidneys, &c. In these circumstances, the effused fluid contains comparatively but little albumen; and when this is the case, and the more watery and limpid the effusion, the less prone the peritoneum is to be irritated or inflamed by it. Still, a state of chronic inflammatory action is sometimes induced by the state and quantity of the effused fluid, affecting chiefly the omentum and mesentery, and occasioning more or less shrinking of these parts. The disposition, also, to chronic, or even to acute asthenic peritonitis, occasioned by serous effusion into the peritoneal cavity, is further evinced by the frequency of its supervention upon *paracentesis abdominis*. It has been stated above (§ 101, 102) that the effusion of fluid into this cavity consequent upon inflammatory action is often very great; but in this case, whatever may be the form of inflammatory action producing it, the fluid contains more or less albumen, occasionally, also, blood globules or colouring matter, and even pure or dissolved blood, although much more rarely; and the peritoneum is altered in structure, or it presents other morbid products.

176. *b. Blood*, fluid or coagulated, recent or partially altered, pure or mixed with serum, &c., is in rare cases found in this cavity; but generally in consequence of rupture of some one or other of the invested organs, or of an aneurism. BROUSSAIS contended that it is sometimes effused in considerable quantity, owing to a hæmorrhagic peritonitis, or to a state of

action partaking of both an inflammatory and a hæmorrhagic character. This may be probably the case, but on rare occasions. Hæmorrhage may also occur into this cavity to a considerable extent, owing to the ulceration attending some states of chronic peritonitis, of which I have met with a remarkable instance. When blood is effused into the cavity owing to wounds, injuries, &c., it always rapidly produces inflammatory action, which is followed by the effusion of coagulable lymph, if the powers of the constitution are not remarkably depressed; and this lymph may limit or surround the blood effused, and thus in some respects isolate or encyst it, and thereby even confine and ultimately repair the mischief. The effused lymph, by subsequently becoming organized in the manner described (§ 82-84), may even give rise to various changes in the blood surrounded by it, similar to those remarked in coagula found some time after extravasation into the parenchyma of organs.

177. A partially decomposed blood, mixed with more or less serum, or a sanious fluid, is in rare instances found in the peritoneal cavity unconnected with inflammation, and chiefly in the same circumstances and in the same cases as have presented ecchymoses of the peritoneum. This state of the effused fluid I have seen only in scurvy, purpura, adynamic fevers, malignant puerperal fever, and malignant small-pox; and in these circumstances the sanious or bloody state of the effusion, as well as the ecchymoses, is owing as much to alteration of the blood as to the impaired vital cohesion of the peritoneal surface and capillaries.

178. *c. Chyle, bile, urine*, and even the *amniotic fluid*, have been found in the peritoneal cavity, but only in consequence of wounds and injuries of the peritoneum and parts involving the vessels concerned in transmitting, or the organs containing, these fluids. Rupture of the fundus of the urinary bladder, or of the uterus, is necessarily followed by the escape of the contents of these organs into the peritoneal cavity. *Purulent matter* is sometimes found in this cavity independently of inflammation of the membrane, owing to the bursting of an abscess, especially of that of the liver. *Tubercular matter* is in rare instances found in this situation, owing to perforation of the peritoneum, particularly after scrofulous or tuberculous disease of the mesenteric glands, and in chronic tubercular peritonitis. The *alimentary, faecal, or gaseous contents of the stomach* or the *intestines* occasionally escape into the peritoneal cavity, and even *intestinal worms* are also, in rare cases, found there, owing to perforation of these viscera, either no adhesions, or partial adhesions only, having existed between the opposite peritoneal surfaces adjoining the perforation. In all cases of the passage of these foreign substances into the peritoneal cavity peritonitis is quickly induced, and extends with a rapidity co-ordinate with the acidity, quantity, and diffusion of the foreign substance and the susceptibility of the patient.

179. *d. It has been shown above (§ 119) that gases* are sometimes found in the peritoneal cavity, causing more or less true peritoneal *tympanitis* or *meteorismus*, owing to the partial decomposition of a portion of the products of inflammation, especially when these product

are long retained. This source of the gases sometimes found in this cavity is now generally admitted by pathologists. But it has been supposed—been contended for by some and denied by others—that air may be secreted on the free surface of the peritoneum, independently of inflammatory action. PORTAL, COMBALUSIER, FRANK, and others have adduced instances of the accumulation in this cavity of air, independently of either disease of the membrane or perforation of the digestive canal. There is no doubt of the secretion of air from the digestive mucous membrane, independently of any obvious structural disease of it; and while the possibility of a similar phenomenon occurring in respect of the peritoneal coat of the digestive tube may be admitted, the rarity of its appearance cannot be questioned. SCOUTETEN believes that he has found air in the peritoneal cavity without any lesion of the membrane; but was it secreted there before death, or produced afterward? M. RIBES considers that an elastic fluid exists in the serous cavities, arising from the vaporization of a portion of the secreted serosity with which they are provided.

180. *c.* Perfectly detached bodies or concretions, generally of a rounded form, are sometimes found in the peritoneal cavity. They are of a semi-cartilaginous, cartilaginous, or even bony character. They vary in size from that of a pea to that of a cherry. Dr. HODGKIN remarks respecting their formation, that “they commence as an isolated clot of coagulated lymph, the smooth convex surface of which has contracted no adhesion, either to the serous or to any other portion of false membrane. In process of time the surface acquires a sufficiently membranous and firm consistence; and the detached body, instead of forming a clot of cheesy matter, contracts, losing its serous or watery part. If this take place rapidly, and materially reduce the size of the detached body, the surface exhibits an uneven and corrugated appearance. When of small size, they more often retain their smooth surface, an increasingly firm structure, which becomes loaded with earthy matter, as I apprehend, by a process of endosmosis. These detached bodies may be seen in the most recent state, wholly consisting of coagulable lymph, having a cellular character, infiltrated with serum, and presenting the figure and size of an egg-plum, somewhat flattened; but I have never seen them, in the firm and advanced stage which I have described, larger than a pea or a marble.” (*Op. Cit.*, p. 53.)

181. Now without questioning that some of the bodies, in their recent or soft state, or in that of lymph, are produced in the manner for which Dr. HODGKIN has argued, or consist of portions of lymph thrown out with, or isolated by, a liquid effusion produced at the same time, still the subsequent changes, whether cartilaginous, or earthy, or bony, cannot be explained conformably with this opinion, even although the process of *endosmosis* be called in aid of it. I believe that the lymph, formed in a greater or less clot, or mass, and with more or less serous effusion, continues connected with the peritoneum by a narrow neck or pedicle, through the medium of which successive changes take place in it; and that, with the condensation and contraction of this mass, the pedicle also

shrinks, becomes thinner, and is at last destroyed or broken off, the body ultimately being altogether detached. That it should undergo the successive changes of cartilaginous, osseous, or earthy degeneration, after its complete separation from the living structures, as Dr. HODGKIN supposes, is countenanced neither by analogy, nor by observation, nor by what is known of the process of endosmosis.

182. *ii.* THE SYMPTOMS of those organic lesions of the peritoneum which have now been described are extremely equivocal and obscure. Many of these lesions are detected only after death, and are associated with alterations of other or connected organs or parts, which assume a more prominent place in that state of more or less general disturbance, or of cachexia, which is usually present. Where there is effusion of fluid into the peritoneal cavity, this may be readily detected, but it may be complicated with one or other, or even with more, of those changes of the membrane which have just been noticed, and which the effusion may mark, or which may not be evinced by any characteristic phenomenon. When the alteration is of a malignant kind, it will generally be attended, at least at an advanced stage, by a cachectic, anæmic, and languid or debilitated state of the frame. Even when a distinct tumour is present, its exact seat will frequently be undeterminable, and it will be equally impossible to ascertain the extent to which the peritoneum is implicated by it. The matter can at best be one of inference, to which the physician will be led by a number of varying circumstances, many of them peculiar to individual cases.

183. Of all these lesions, probably hydatids, seated beneath the peritoneal covering of the liver, is that which is ascertained with the greatest certainty during the life of the patient. Yet this is not always the case, for much depends upon the particular part to which these parasites are attached, upon the size of the tumour they produce, and upon various attendant circumstances. But the symptoms are stated in the article LIVER (§ 232). Some of the lesions, while they only partially, or even to a small extent, invade the peritoneum, are seated chiefly in organs or parts enveloped by this membrane; their precise seat being indicated chiefly by the way in which particular functions are disturbed, and the amount of the disturbance. If the lesion consist of a deposit of morbid or heterologous matter, occasioning more or less tumour, the seat and relations of it, viewed in connexion with the kind and extent of disordered function, and with the evidence of constitutional disturbance manifested in both the nervous, vascular, and cutaneous systems, will generally furnish some indication of the nature of the malady, particularly when aided by the state of sensibility evinced during a careful examination of the different regions of the abdomen and pelvis, and by percussion. Still, the amount, as well as the exact nature, of the peritoneal lesion may not be made apparent; and it may not even be easy to ascertain whether or not the alteration be one proceeding from chronic inflammation, or one or other of those which I have now considered as being independent both of inflammatory action and of its usual results. It is chiefly by comprising within our mental vision all the circumstances



and phenomena characterizing the causes, origin, progress, and full development of the case, that an approach can be made to a just view of the nature of the distemper.

184. iii. THE CAUSES of the organic lesions which I have viewed as altogether independent of inflammatory action, although sometimes associated with, or productive of, a state of asthenic or chronic inflammation, vary according to the nature of the existing lesion; each of these lesions proceeding from predisposing and exciting causes, which are more or less peculiar to it. Thus the *tubercular*, the *scirrhous*, or the *fungoid deposits*, formed beneath or invading the peritoneum, proceed from causes which are enumerated in the articles devoted to these diseases. The same remark applies to *hamorrhagic*, *hydatidic*, and other changes implicating this membrane; these appearing from the same causes and in the same circumstances as give rise to them in other situations. Of all the alterations of structure, however, which have now been briefly noticed, it may be stated, in general terms, that they commonly proceed from, and are characterized by, both at their commencement and during their course, a condition of the vital powers and of the circulating fluids that have been fully described in the articles *DEBILITY* and *DISEASE*. *Debility*, appearing either primarily or consecutively, as shown when treating of this subject, or, in other words, depression or exhaustion of vital energy, by occasioning those changes in the assimilating, the circulating, and depurating organs and functions, which I have fully developed in the articles *BLOOD* and *DISEASE*, gives rise to the several alterations of structure just described; one or other of them appearing, according as the predisposition resulting from original conformation, temperament, age, and modes of living, and as the influences exerted by air, climate, mental emotion, previous or concomitant disease, &c., determine its character or relations.

185. iv. THE TREATMENT of organic lesions of the peritoneum, like the consideration of the causes producing them, should have strict reference to the nature of the alterations inferred to be present in each case. Still, the same principles are applicable to nearly all of them—whether of prevention, of alleviation, or of cure. It has just been stated that all these lesions generally originate in depression or exhaustion of vital power, and in its more immediate consequences in the assimilating, circulating, and depurating functions and organs; and a reference to those articles where these distempers are fully discussed, and with due reference to their causes, will fully confirm the general statement now made. It must, therefore, be manifest that a continuance of the primary morbid condition will necessarily aggravate or increase the consecutive changes, and thereby favour the development of the specific organic lesion, and its inroads upon the constitution. On the other hand, it must be equally evident, that whatever has the influence to remove the primary morbid condition; to rally or promote the depressed or exhausted powers of life; to aid the assimilating, circulating, and depurating functions, will most efficiently resist the progress of the organic mischief, and even overcome it ultimately (although we should seldom be so sanguine in our expecta-

tions), when it has not advanced so far as to impede the functions of life, or when it is not of a nature which precludes hope of ultimate success. By enabling the constitutional energies to resist the advancing evil, we may succeed in prolonging the contest; we may very considerably prolong life, even when we cannot hope to avert an ultimately fatal result.

186. Having determined the principle of treatment, the means which range themselves under it are readily suggested; the selection of them depending upon the inference drawn from previous and existing phenomena as to the nature of the particular case. The number and varying characters of the alterations just described, the different and even changing circumstances in which they appear, and the numerous visceral maladies with which they are generally complicated—these maladies often being the original evils from which the peritoneal lesion springs, or by which the membrane is invaded—preclude the possibility of noticing the several methods of treatment, the numerous means of cure or of palliation, and the interminable modes of combining these means that may be employed in these pathological conditions. I can only indicate the general character of the means which experience has shown to be most beneficial, and notice a very few from among these means which deserve to be employed.

187. I have just now contended that the only remedies which should be resorted to in the organic lesions of the peritoneum are those which support or rally the depressed powers of life. Unfortunately, many of these lesions invade the peritoneum consecutively of a protracted existence in some one of the viscera enveloped by this membrane, and not until vital depression and constitutional contamination have made considerable progress; or they may not come before the competent adviser until reasonable expectations of cure are precluded, either by their nature at their commencement, or by the amount of disorganization. Still, in either case, the chief indication is nearly the same for all, namely, *to enable the powers of life to resist as long as possible the farther progress of disorganization; and, when the case admits of the attempt, to aid them in removing whatever alteration of structure may have already taken place.* It is very obvious that this object can be attained only by those means which support, or rally without exhausting, vital energy; and which at the same time aid the due performance of the several digestive, assimilating, and depurating functions. Care should be taken always to keep the stomach in good humour, by the aid not merely of *medicine*, but also of suitable *diet* and *beverages*. The *medicines* most appropriate to the peculiar features and complications of the case should be selected, and their influence upon the functions of digestion and excretion carefully observed. Although tonic or restorative medicines are requisite, yet those which are the best suited to the circumstances of the case, and the temperament or idiosyncrasy of the patient, ought to be studied. Where there is increased irritability of the system, with a frequent or excitable pulse, the milder vegetable tonics or bitters only will be tolerated; and these may be prescribed with calnants, as the hydrocyanic acid, HOFFMANN'S anodyne, or with henbane, conium, morphia, or

other preparations of opium. If more or less anæmia be present, chalybeate medicines, selected and combined according as the peculiarities of the case suggest, are the most appropriate. It will be often beneficial to combine alteratives with tonics or restoratives; and the choice of those is generally difficult, as those which depress vital power or irritate the stomach are generally prejudicial. The preparations of sarsaparilla and of iodine are the most efficacious, when judiciously administered; but the latter should be prescribed in very small doses, especially at first, and the iodide of potassium be preferred. This medicine may be given with the liquor potassæ or with sarsaparilla, or in tonic infusions or decoctions; or with the liquor potassæ in HOPKINSON and ABOTT'S\* pale ale, a beverage which I have for many years recommended in several disorders characterized by more or less debility. When the iodide of potassium is found to agree with the patient, the iodides of mercury may also be given in small doses at bedtime, with an anodyne or opiate. If anæmia exist, the iodide of iron should be prescribed in the sirup of sarsa, and the advantages of light and sunshine enjoyed as far as may be prudent. The several emunctories ought to be duly aided in their functions; the regular action of the bowels and of the kidneys promoted; and the insensible perspiration increased by wearing flannel next the skin, and by keeping the extremities always warm.

188. If the stomach be irritable, creasote may be given, with or without opium or acetate of morphia; or hydrocyanic acid may be prescribed in demulcents or emollients; and such beverages be selected as will support the strength, and agree best with the digestive organs. In some cases, the pale ale just mentioned may be made the vehicle of various medicines, according to the exigencies of the case; but in every instance, and particularly when the stomach is weak and irritable, tea ought to be avoided. Chocolate or cocoa-nibs are preferable; or a little milk, with seltzer, soda, potass, or magnesia water. The choice of these or of mineral waters should depend upon the nature of the case, and especially of the visceral disease characterizing it. The diet and regimen must be regulated by the same circumstances.

BIBLIOG. AND REFER.—*Tulpius*, *Observ. Med.* l. iv., cap. 41.—*Graham*, in *Philosoph. Trans.*, No. 460.—*Meckel*, in *Mém. de l'Académie à Berlin*, 1753, p. 102.—*Morgagni*, *De Sedibus et Causis Morborum*, *Epist.* xvi., 30; xxii., 18; xxxviii., 52; lviii., 20.—*Licetaud*, *Hist. Anatomi.* *Med.* vol. i., Obs. 2, 3.—*Sandifort*, *Observat. Anat. Pathol.*, vol. iii., No. 3; et *Mus. Anatom.*, vol. i., p. 246.—*Bang*, in *Act. Reg. Soc. Med. Hafn.*, vol. i., p. 93.—*De Haen*, *Rat. Medendi*, &c., pars vi., cap. 4.—*Stoll*, *Rat. Medendi*, &c., vol. i., p. 290.—*J. Hunter*, *On the Blood*, &c., p. 244.—*J. G. Walter*, *De Morbis Peritonæi et de Apoplexia*, 4to. Berl., 1785.—*S. Hulder*, *De Morbis Omenti*, 4to. Gott., 1786.—*Parr*, in *Medical Dictionary*, vol. ii., p. 21.—*Bichat*, *Anat. Générale*, t. i.—*J. P. Frank*, *De Curandis Hom. Morbis*, l. ii., *Order iv.*—*Portal*, *Cours d'Anatomie Médicale*, &c., 8vo. Paris, 1804, t. v., p. 126; et *Mémoires sur plusieurs Maladies*, t. iv., p. 249.—*R. T. H. Laennec*, *Hist. d'Inflamm. du Péritoine*, 8vo. Paris, 1804; et in *Journ. de Médecine*, vol. v. Paris, 1803.—*Jahn*, in *Stark's Archiv.* b. ii., st. 2, p. 131.—*Neumann*, in *Hufeland, Journ. der pract. Heilkunde*, b.

xx., st. 2, p. 37.—*C. R. Pemberton*, *On Diseases of the Abdominal Viscera*, ch. i., 8vo. Lond., 1807.—*Greiner*, in *Annalen der Heilkunst*, 1811, p. 513.—*F. J. V. Broussais*, *Histoire des Phlegmasies Chroniques*, t. ii. Paris, 8vo, 1808.—*T. Sutton*, *Tracts on Delirium Tremens and Peritonitis*, &c., 8vo. Lond., 1813.—*Double*, in *Journ. Génér. de Méd.*, t. xxiii., p. 378 (*Cartilaginous induration*).—*Gase and Monfalcon*, in *Dict. des Sciences Médicales*, t. xi., 8vo. Paris, 1817, art. *Péritoine et Péritonite*.—*Moncrieff*, *Transactions of Medical and Chirurgical Society of Edinburgh*, vol. i., p. 260.—*M. Dowel*, in *Dublin Hospital Reports*, vol. ii., p. 321 (*Acute Peritonitis consequent upon Rheumatism*).—*J. Copland*, *Memoir on Chronic Peritonitis*, with cases, &c.; in *Lond. Med. Repository*, vol. xv., p. 372, 8vo. Lond., 1821.—*D. A. G. Richter*, *die Specielle Therapie*, &c., b. i., p. 650.—*J. Baron*, *An Inquiry into the Nature of Tuberculated Accretions of Serous Membranes, and the Origin of Tubercles and Tumours*, &c., 8vo. Lond., 1819; and *Illustrations of the Inquiry respecting Tuberculous Diseases*, &c. Lond., 8vo, 1822.—*J. Abercrombie*, *Pathol. and Practical Researches on the Diseases of the Stomach and Abdominal Viscera*, 8vo. Edin., 1828.—*Gibert*, in *Nouv. Bibliothèque Médicale*, t. ix., p. 392 (*shows the ill consequences of allowing the presence of the menses to interfere with the institution of blood-letting*).—*Andral*, *Clinique Médicale, Maladies de l'Abdomen*, t. iv., p. 539.—*Roche et Sanson*, *Elémens de Pathologie Médico-Chirurgicale*, &c., 8vo. Paris, t. i., p. 555.—*Scoutetten*, in *Archives Génér. de Médecine*, t. iii., p. 500; et t. iv., p. 392; et t. v., p. 537.—*Legallois et Bouillaud*, in *ibid.*, t. iv.—*Lombard*, in *ibid.*, t. ix., p. 191.—*Broussais*, *Gasc. Abercrombie, Pemberton, and Monfalcon*, *revd. in Johnson's Medico-Chirurg. Review*, vol. i. p. 161.—*R. Bright*, *Reports of Medical Cases*, 2 vols., 4to. Lond., 1827–31, p. 453, et *passim*.—*Louis*, *Recherches Anatomico-Pathologiques*, 8vo. Paris, 1826 (*Peritonitis from Perforation of the Digestive Canal*).—*Graves*, *Dubl. Hosp. Reports*, vol. v.; and *Dublin Journ. of Medical Science*, vol. ii.—*Chomel*, *Dict. de Médecine*, t. xvi.—*Scoutetten*, in *Lond. Med. Repository*, vol. xxii., p. 333.—*A. N. Gendrin*, *Histoire Anatomique des Inflammations*, 2 tomes, 8vo. Paris, 1826; t. i., p. 61, et *seq.*—*Dugès*, *Dict. de Méd. et Chirurg. Prat.*, art. *Péritonite*.—*Clarus*, *De Omenti Laceratione, et Mesenterii Chordapso*, Leips., 1830.—*E. Gintrac*, *Observ. sur les Mal. Organiques du Péritoine*, &c.; in *Mém. et Observat. de Méd. Clinique*, Bordeaux, 8vo, 1830.—*J. Cruveilhier*, *Anatomie Pathologique*, fol. Paris, 1833, livrais. xiii.—*M. Adam*, in *Cyclop. of Pract. Med.*, vol. iii., p. 291; and *W. Stokes*, in *ibid.*, vol. iii., p. 308.—*A. Velpeau*, *De l'emploi des Mercuriaux dans le Traitement de la Péritonite*, 8vo. Paris; and in *Archives Génér. de Médecine*, t. xix., p. 535.—*Gauché*, in *ibid.*, t. xxi., p. 277.—*T. Hodgkin*, *Lectures on the Morbid Anatomy of Serous and Mucous Membranes*, in 2 vols., vol. i., of Serous Membranes, 8vo. Lond., 1836; sect. vi., p. 138.—*Symonds*, in *Library of Medicine*, vol. iv., p. 141, 8vo. Lond., 1840. (See the BIBLIOGRAPHY and REFERENCES to article PUERPERAL DISEASES for the literature of Puerperal Peritonitis.)

PERITONITIS IN CHILDREN.—*J. B. T. Baumes*, *Traité de l'Amalgamement des Enfants*, accomp. de l'élévation et dureté du Ventre, &c., 8vo., 2d edit. Paris, 1806.—*G. Gregory*, in *Trans. of Med. and Chirurg. Society of London*, vol. xi., p. 262.—*Billard*, *Maladies des Enfants Nouveaux-nés et à la Mamelle*, &c., 8vo. Paris, 1828, p. 449.—*M. Adam*, *Cyclop. of Pract. Med.*, vol. iii., p. 299.—*Cuming*, *Trans. of King and Queen's Coll. of Phys. in Ireland*, vol. v., p. 48.—*J. Stewart*, *Practical Treatise on the Diseases of Children*, 8vo. New-York, 1841, p. 266.—*Barthos et Rilliet*, *Traité Clinique et Pratique des Maladies des Enfants*, 8vo. Paris, 1843, t. i., p. 555; et t. iii., p. 400.

[AMER. BIBLIOG.—See American works on the Practice of Medicine, referred to under other Diseases; also, "A Treatise on the Practice of Medicine. By George B. Wood, M.D., Prof. of Mat. Medica and Pharmacy in the University of Pennsylvania; 2 vols., 8vo. Phil., 1847."—Many valuable cases and essays on Peritonitis are scattered through American periodicals, especially the American Journal of Medicine, which the reader may profitably consult.]

PESTILENCE.—Under the head *pestilence* I comprise certain maladies which have appeared as wide-spreading and devastating epidemics, but which have surpassed all other epidemics in their rapid extension, in their fatality, and in the duration of their prevalence. Nor have they appeared only as most fatal epidemics, for they have continued, in countries favourable to their perpetuation, to appear from time to time in a much less alarming and obtrusive manner; occurring for a time only in few or widely-scattered instances, and at more

\* I recommend this beverage in preference to the various imitations of it which have more recently appeared, because I know that it is pure, well fermented, and prepared from the best materials. The utmost precautions are also taken against adulteration. For many years it was the only article of the kind, and it is still the most wholesome.



distant intervals, until certain favourable circumstances, arising out of predisposition, atmospheric constitution, or some unknown, but more generally-diffused influence, have arisen and rendered what had been either unsuspected or but little feared, suddenly most manifest, diffused, fatal, and appalling. To these irruptions, to their rapid extension, and to their great fatality, the generic term *pestilence* may be justly applied; and the history of medicine, in recent times, furnishes *three maladies* to which this term is especially applicable, namely, the recent distemper, which has generally, but injudiciously, been called *cholera*, *yellow fever*, and the *plague* or *pest*. To these might be added, perhaps, small-pox, scarlet fever, measles, and some other infectious fevers; but these diseases only occasionally, or even very rarely, and then only in peculiar circumstances and in certain races, assume forms which, as respects either malignancy, prevalence, or fatality, can entitle them to be placed in the same category with those now about to be considered.

1. If the *history of pestilences*, or of *pestilential epidemics*, be studied in Grecian, Roman, and Arabian writers, and in the writings of the fourteenth and fifteenth centuries, it will be manifest that the *causes* to which these pestilences were imputed are nearly the same as have been assigned in modern times. HIPPOCRATES ascribed epidemics generally to the food, drink, and air; and GALEN, with LUCRETIVS, AVICENNA, and others who copied him, considered atmospheric heat, and the miasms exhaled from the soil and from the putrid bodies of animals, as the chief causes of all pestilences. AVENZOAR enumerates, as their sources, a warm and humid air, unwholesome food, and emanations from stagnant water and from dead bodies. HALY ABBAS assigns the same causes as AVENZOAR, but attributes a share of the influence to the nature of the seasons. From HOMER to the present time, considerable influence in the production of pestilences has been imputed to great heat of the sun and to very hot seasons. DIODORUS SICULUS ascribed the plague of Athens and the disease which attacked the Carthaginian army in Sicily to the excessive heat of the sun, to exhalations from the soil, and emanations from the bodies of the dead. AMMIANUS MARCELLINUS considered extremes of heat or of cold, of drought or of moisture, exhalations from the earth, and the effluvia from the dead and from putrid animals, as the chief causes of pestilential epidemics. But, although these were assigned as the chief causes of pestilences by nearly all the ancient writers, still others, and particularly infection and contagion, were also viewed, as I have shown in the articles EPIDEMIC INFLUENCE and INFECTION, as contributing to their propagation. THUCYDIDES, as Mr. ADAMS, the learned translator of PAULUS ÆGINETA, remarks, evidently considered the plague of Athens infectious, for he mentions that physicians were more attacked by it than others, as having most intercourse with the sick; and he describes the terror which the citizens felt to approach the affected, and intimates that it was often contracted by such intercourse. Many historians, poets, and physicians among the ancients, since THUCYDIDES, have considered pestilential epidemics to be infectious—not always, however, by contact but

more generally by emanations from the sick, which contaminate the surrounding air, as shown in the article INFECTION (§ 11, *et seq.*). MARX, OMODEI, ADAMS, and others have referred to the opinions of the ancients on this subject, in order to disprove what had been falsely alleged by a few writers of small reputation, that the doctrine of infection or contagion was altogether modern. That the ancients, however, entertained correct views of the matter is evident from a reference to the writings of ARISTOTLE, LIVY, PLINY, DIONYSIUS of Halicarnassus, DIODORUS SICULUS, APPIAN, PLUTARCH, QUINTUS CURTIUS, DIO CASSIUS, EUSEBIUS, MARCUS ANTONINUS, CHRYSOSTOM, SENECA, and ISIDORUS HISPALENSIS. The last of these remarks, that “*Pestilentia est contagium quod quum unum apprehenderit celeriter ad plures transit.*” “*Pestilentia est morbus latè vagans et contagio suo quæ contigerit interimens.*”

2. A belief in the infectious or contagious nature of pestilential fevers and some other diseases was entertained by ARÆTEUS, CÆLIUS AURELIANUS, GALEN, AETIUS, PAULUS ÆGINETA, and by several of the Arabian medical writers. Mr. ADAMS remarks, that the result of his examination into the opinions of the ancients on this subject leads him to the conclusion that all, or at least the most intelligent of the medical authorities, held that pestilential epidemics are communicated, not by any specific virus, but by the contamination of the surrounding air by effluvia from the sick. As to this, as well as to other sources of pestilential diseases, the ancients did not differ materially from the best informed of the moderns. Indeed, faithful observers in all ages must have arrived at nearly similar conclusions; for, although various subordinate circumstances may have changed with the progress of time, and some causes may have assumed more intense, and others less prominent forms, still the chief and efficient sources and influences must have been reproduced in the succession of ages after indefinite intervals in those states and combinations which develop and propagate either pestilence or less malignant epidemics. If we consider the changes continually taking place near the embouchures of rivers with the progress of time, the deep and exuberant soil that is there accumulating, and the frequency of inundations; if we reflect upon the circumstances affecting the physical conditions of large cities, and upon the contaminations of the air, water, and soil, arising from these and other crowded and ill-ventilated places of human resort, we shall find causes sufficient to explain a portion of the morbid phenomena, but not the whole, which present themselves to the physician, especially during warm and humid states of the atmosphere, and under the influence of certain electrical conditions, or of unusual stillness of the air. Yet even these are not of themselves sufficient to account for all the phenomena which occur during the prevalence of destructive epidemics. Conceding all that can be contended for as to the baneful influence on the human constitution of exhalations from rich, deep, and humid soils into a warm, stagnant, and moist atmosphere; of effluvia from the exuviae of living human beings and other animals congregated in masses in camps, cities, and towns; of emanations from dead and putrefying bodies, in-

sufficiently covered by the soil, and diffusing their elements through the soil, and transmitting them to the atmosphere within or around these localities; and of the water of these places impregnated with putrid animal matter; granting, in their full force of pestilential generation, the infecting influence of these causes, still an additional cause is required to explain many of the phenomena falling under the cognizance of the physician; and that cause often presents itself in a manner that cannot be mistaken, and, in many instances, in such a way as admits not of dispute. That other and most influential cause, often superadded to or generated by the foregoing, is *infection*, or, as I have shown in the article on this subject, the effluvium or miasm which emanates from the sick, contaminates the surrounding air, and the patient's day or night clothing, and thereby propagates to the healthy a disease similar to that from which itself proceeded, and often in circumstances and in situations where the other sources of the disease cannot have existed.

3. If the circumstances, physical and moral, characterizing congregations of our species, whether in camps or in cities, in ancient times, be considered as far as we possess the information, and be compared with those which exist in respect of similar congregations and localities at the present day, we shall find that, although a few causes of malignant disease are no longer in operation, others have sprung up, and have become excessively injurious, notwithstanding that numerous influences aid in counteracting or limiting the mischief. Many of the rites, even of religion and of superstition, during early ages and in pagan countries, tended remarkably to diminish the sources of infection and of pestilence. The embalming of the dead by the Egyptians and other ancient nations, the laws rigidly enacted by Moses and enforced by Jewish rulers, the burning of the dead by several nations, and the modes of sepulture adopted by the Chinese from the earliest ages, were all more or less calculated to prevent the bodies of the dead from proving sources of destruction to the living. But with Christianity, and with the superstitions which were successively ingrafted upon the purest and most sublime doctrines, sprang up practices of the most injurious tendency to public health, and these have now, particularly in large towns, advanced so far as to become matters of traffic with some of those who profess the greatest anxiety for the souls, if not for the health, of their species. The desire of depositing the dead within the consecrated sphere of spiritual instruction, or of boasted inspiration, became general, and the places of such deposit also became, especially in recent times, a source of emolument. Thus religion was made, even by the sanctimonious, the handmaid of Mammon; and often, in no lengthened process of time, the accumulated bodies of the dead furnished pestilential emanations, diffusing sickness and death among those who congregated in their vicinity. Thus, also, sleek hypocrisy, in the garb of sanctity, lured its victims within the sphere of infection, thereby increasing the rate of mortality, and at the same time augmenting its revenues by swelling the general mass of animal corruption, and multi-

plying the sources of infection. I have shown elsewhere (see articles ENDEMIC and EPIDEMIC INFLUENCES and INFECTION) that the accumulation of human exuviae, and the interment of the dead among the living, and in places of frequent public resort, occasion, in the course of ages, a state of the soil which is most productive of noxious emanations, especially under the influence of a hot sun, and a warm, stagnant, and humid atmosphere, and which, moreover, contaminates the water in the vicinity. Thus ancient cities have generated the sources of their own decay, which circumstances have retarded or accelerated, according as these sources have been counteracted or augmented by legislative measures either of a beneficial or of an injurious tendency.

PESTILENCE, CHOLERIC.—SYNON. *Pestilential Cholera, Pestilential Asphyxy, Asphyxia Pestilenta*, Author. *Epidemic Cholera*, Auct. Var. *Spasmodic Cholera, Cholera Spasmodica*, Auct. Var. *Epidemic Spasmodic Cholera*, Hawkins. *Cholera Asphyxia, Asiatic Cholera, Indian Cholera, Malignant Cholera*, various authors. *Convulsive Nervous Cholera*, Gray. *Hyperanthraxia*, Clanny. *Cholera Morbus, Cholera Epidemique, Cholera Asiaticque*, Fr. *Die Epidemische Cholera, Asiatische Cholera*, Germ.

CLASSIF.—II. CLASS, III. ORDER (*Author in Preface*).

4. DEFIN.—i. NOSOLOGICAL.—*Anxiety and oppression in the chest, epigastrium, and præcordia; disturbance of the bowels, with nausea, faintness, giddiness, and depression of vital power; frequent ejections of an offensive fluid, resembling rice-water, from the bowels and stomach, followed by spasms, tremours, distress; a cold, clammy, purplish, and shrivelled state of the surface; coldness and rawness of the expired air; a sense of painful or burning heat at the epigastrium, with urgent thirst, and rapid disappearance of the pulse; the distemper being often preceded by indigestion and diarrhœa, and frequently followed by febrile reaction, affecting chiefly the brain and abdominal organs.*

5. ii. PATHOLOGICAL.—*A discharge from the bowels and stomach of the watery portion of the blood; more or less complete paralysis of the lungs, and arrest of the changes effected by respiration on the blood, and of the hepatic and renal secretions; depression of the heart's action; the circulation of a thick, dark, or venous blood through the arteries, with congestion in the large veins, and imperfect circulation through the capillaries, owing to the thick, glutinous state of the blood; the congestion of the viscera in many cases being followed by an obscure or asthenic reaction, affecting chiefly the encephalon and abdominal viscera.*

6. I. INTRODUCTORY REMARKS.—Circumstances had induced the author to pay more than ordinary attention to the nature and progress of the pestilential cholera, from its irruption in Bengal to the present time. He had perused with the utmost care much of what has been published respecting it; and an opportunity had been afforded him of examining the reports and documents relating to it sent, from 1817 till 1827, by the medical boards and superintending surgeons of the three Indian presidencies, to the Board of Directors of the East India Company. He had frequent opportunities of observing and treating cases of the malady in this



country, and of examining the bodies of the dead. During these inquiries, he was particularly struck by some important facts, respecting which he conceived that much misapprehension and error were entertained and widely disseminated, and which required refutation. The first of these is connected with the origin and nature of the distemper. Many suppose it to be the common spasmodic cholera of warm climates, in an epidemic form merely, an opinion entertained by able writers, both in this country and on the Continent, until they had opportunities of witnessing it. This opinion was, however, opposed to the author's experience of the forms of cholera met with in warm and insalubrious countries, between which and the recent pestilence there is a very marked distinction; and it was contrary to the belief of the oldest European residents in India, and of the natives themselves, who might have been supposed to know something of the usual manifestations of cholera among them, unbiassed by preconceived notions, or by medical system and authority. Instead of looking upon it as an aggravated form of cholera, they regarded it, wherever it broke out, as an unheard-of pestilence and scourge; and at its appearance whole villages and towns were deserted in consternation to escape its infection; while the greater part of the English practitioners, having been taught to consider cholera to consist of purging, vomiting, and spasms of the lower extremities, and finding these symptoms present in the distemper they were called to treat, believed it to be that disease merely, in an aggravated form, without taking into consideration much more important phenomena uniformly presented by it, and without sufficiently advert- ing to the fact that these symptoms are often slight, or nearly altogether wanting, in the most severe cases.

7. So strongly was the author struck by this misapprehension, that in the beginning of 1822, when editor of the Medical Repository, after noticing various facts connected with the disease, he observed, "A careful review of the symptoms of this disease convinces us that the deranged actions which take place in the system during its continuance, are no more those to which the term cholera morbus ought to be applied than they are those belonging to fever. It appears that this malady is the result of a peculiar cause, which impresses the vital energies of the system in such a manner as to subvert the power of reaction in many cases, and to render it imperfect and unavailing in others, without the assistance of art. The cause of the disease seems to act as a poison on the extensive surface of the bronchiæ and air-cells when the system is most liable to its attack; and, in many instances, it appears to destroy its victim in a few hours." (*Lond. Med. Reposit.*, vol. xvii., p. 407.)

8. That the author's opinion was neither prematurely advanced nor inaccurate, has been shown by the subsequent researches of the most eminent observers. He had treated many cases of spasmodic cholera in a warm and most insalubrious climate, and had experienced the disease most severely in his own person; and while he recognised in these cases the accurate description of PAISLEY, CURTIS, GIRDLESTONE, and Dr. JAMES JOHNSON, he never met with, in

any of them, the pathognomonic symptoms of the late pestilence. In this opinion he is borne out by the experience of every well-informed and candid observer who has seen the disease in this country, and who will readily concede that it is altogether distinct from the severe forms of common cholera. (*See art. CHOLERA.*)

9. The second error, which has been extensively propagated, both in this country and abroad, is, that the malady never exhibited any proofs of infection in the East. Knowing, however, from the best sources of information, that this statement is erroneous, the author has gone fully into the refutation of it, and has shown that much mischief has resulted from this opinion, and from the fact that, although evidence of its infection was everywhere furnished in India, no means of limiting the extension of the pestilence, no sanitary measures, were adopted in our Indian empire. That the distemper should extend less rapidly there, and exhibit its infectious property in a less remarkable manner than in Europe, was to be expected from free ventilation, and other circumstances tending to diminish the chances of infection, particularly among Europeans in warm climates.

10. A third error very generally entertained, both on the appearance of the distemper and in the present day, is, that it is caused by some unknown constitution of the air. But we have no instance on record of an epidemic of nearly thirty years' duration, without any interruption, unconnected with infection. Although the author admits that the pestilence is greatly aggravated by certain states of the air, to which the term epidemic is strictly applicable, notwithstanding our ignorance of the precise nature of these states, yet there seems no doubt that it is propagated, and prevails to a certain extent, independently of an epidemic concurrent influence. We know that some diseases are simply infectious without being epidemic; that others are both infectious and epidemic; and others are epidemic, and only contingently infectious. But the author believes that, like eruptive and typhoid fevers, this distemper is infectious, is not essentially epidemic, although it will, during favourable states of the atmosphere, &c., assume epidemic characters, and be modified accordingly. An attentive review of the various manifestations of the malady in India, throughout Asia, in Europe, and in America, seems to justify this view, and to confirm the conclusion as to its being a specific disease, arising from a specific cause, but promoted and disseminated more widely by the aid of various concurrent causes, among which epidemic, or unhealthy constitutions of the air; dirty, crowded, and close apartments; and crowding of the sick, are the most prominent.\*

(\* Whatever character cholera may have assumed on the other side of the Atlantic, and especially in India, we think we shall be borne out in the assertion that, in this country, it was essentially epidemic, and propagated by atmospheric influences, independently, in general, of infection. Thus its first approach was marked by a general prevalence of derangements of the digestive organs, which few, indeed, escaped, and which continued to prevail as long as the disease itself continued. When the epidemic influence was slight, cholérine, as it was called, prevailed, marked by languor, furred tongue, impaired digestion, colicky pains, and perhaps diarrhoea; but when this epidemic influence had attained a certain degree of intensity, then well-marked cases of cholera occurred, usually among the lower and intemperate classes; other cases soon occurred, not ex-

11. II. PROGRESS AND MORTALITY.—i. *Progress*.—Pestilential cholera first made its appearance in Jessore, a populous town in the centre of the Delta of the Ganges, and cut off the majority of those whom it attacked. It spread from the town in all directions, and reached Jaulnah, on the Madras side of the Indian peninsula, in June, 1818, and Bombay in August of the same year. It continued to spread and to prevail throughout all parts of India and the adjoining countries, and still prevails in many districts, although in various degrees of severity, and with intervals of complete immunity to its presence. Indeed, it may be said to have become naturalized in India, forming one of the diseases of the country.

12. During 1818 it visited, in an easterly direction, the Burmese Empire, the kingdom of Arracan, and the peninsula of Malacca. In 1819 it appeared in the isle of Penang, in Sumatra, Singapore, the kingdom of Siam, Ceylon, and the isles of France and Bourbon. During 1820 it reached Tonquin, Cambogia, Cochinchina, Southern China, Canton, the Philippines, &c. In 1821 it visited Java, Bantam, Madura, Borneo, and numerous other places in the Indian Archipelago. In the years 1822, 1823, and 1824 it appeared at Tonquin, Peking, Central and Northern China, the Moluccas, Amboyna, Macassar, Assam, and various other Eastern countries and islands. During 1827 it prevailed in Chinese Tartary. In all these countries and places its prevalence and fatality were unprecedented in medical history.

13. In July, 1821, it reached, in its western course, Muscat, in Arabia; and, during the remainder of the year, visited various places in the Persian Gulf. In the following month it appeared in Persia, and, during 1822 and 1823, 1829 and 1830, it prevailed in several of the principal cities of that empire. It broke out in Bussorah and Bagdad in July, 1821, and in 1822 and 1823 ravaged most of the populous cities of Mesopotamia, Syria, and Judea.

14. In 1822 it reached to within 150 miles of the Georgian frontiers of Russia, and in 1823 appeared at Orenburg and Astrachan, beyond which it seems not to have extended until August, 1823 and 1829, when it reappeared at Orenburg, the capital of the province of that name, situated on the Tartar frontier, about 400 miles north of the Caspian, and about 1000 miles north of the places where it prevailed extensively in 1822. Its prevalence and fatality in this province were great, upward of a tenth of the inhabitants having been seized, and about a fourth part of those attacked having died of it. At the same time that the disease appeared in Orenburg, it was raging in several Persian provinces and Tartar tribes in Central Asia, from which it was supposed to have been introduced into Orenburg. At the commencement of 1830 the disease had entirely ceased in the Russian dominions; but towards the beginning of autumn it broke out with increased violence on the Georgian frontier of Persia, having appeared, in June, in the Persian province of Ghilan, on the southern shore of the Caspian, from the various southern ports of

which it extended northward along the westward Caspian shore until it reached Baku, Tiflis, Astrachan, and numerous other towns in its progress into the heart of the Russian Empire. After attacking a number of places, it has continued to spread westward and northward through Russia, Poland, Moldavia, and Austria; visiting Moscow, Warsaw, and other places in Poland, and extending, in May, 1831, to Riga and Dantzic, and, in June and July, to St. Petersburg and Cronstadt; early in October to Berlin and Vienna, and subsequently to Hamburg, &c.

15. The distemper appeared for the second time in Astrachan near the end of July, 1830; and before the end of August upward of 4000 persons died of it in the city, and 21,270 in the province. After ascending the Volga it reached Moscow, became prevalent there at the end of September, and continued till February, 1831. It attacked about 9000 persons in this city, of which number more than one half died. It reached Riga in the middle of May, and St. Petersburg on the 26th of June. From Astrachan it extended to the northern coast of the Black Sea, and in the course of the rivers into the central parts of Russia. It reached Poland in January, 1831, followed the Russian army in the subjugation of that country, and proved destructive in Warsaw and many other places during April and May. At the end of the latter month it appeared in Dantzic. In June it prevailed in Lemberg, Cracow, and other adjoining parts, extending through Galicia and Hungary, and reaching Berlin and Hamburg in August and September, and Vienna in the same months. It appeared at Smyrna in September, and soon afterward in Constantinople. The pestilence was conveyed by a caravan from Mecca to Cairo in August, 1831, some thousands having died on the road, and by the middle of September 10,400 Mohammedans, besides Jews and Christians, had died of it in this latter city.

16. Pestilential cholera appeared in England on the 26th of October, 1831, at Sunderland, a month afterward at Newcastle-upon-Tyne, and in December at Hetton, Houghton-le-Spring, North Shields, Tynemouth, South Shields, Gateshead, and other places. The first cases reported in London occurred on the 13th or 14th of February, in the immediate vicinity of the shipping. In Scotland the pestilence first appeared at Haddington about Christmas, 1831, and in Leith and Edinburgh about the 22d of January following. Although instances were adduced of sailors belonging to ships which had arrived from Riga, Cronstadt, Hamburg, and Dantzic, and on board which individuals had died of the malady on the passage, being those first affected at the sea-ports in the north of England, still there is every reason to believe, from the information given me by several captains of ships who had left these foreign ports during the period when the distemper was prevailing there, that the infection was conveyed to many places in both England and Scotland in the clothes and bedding belonging to sailors who had died either in these foreign ports, or on the passage of the ships back to this country, the clothes and bedding of the sick and dead having been preserved without any purification, and given up to the relatives.

empting those of temperate habits, and who had never been exposed to the disease until it reached its acme; then the malady gradually died away, marked by the same tendency to bowel complaints which characterized its approach.]



17. From this country the pestilence was conveyed in an emigrant ship across the Atlantic to Quebec, many of the emigrants having died of it on the passage.\* It appeared at Quebec on the 8th of June, 1832, and on the 10th at Montreal; and thence it extended to Kingston, on Lake Ontario, and all the surrounding parts. New York was attacked by it on the 24th of June, and Albany on the 3d of July. About the middle and end of July it spread to Newcastle, on the Delaware, to Philadelphia and several other cities, and thence to nearly all North and South America. It appeared at the Havanna in February, 1833.

18. The pestilence appeared at Calais on the 12th of March, and was believed to have been brought from England. On the 26th it broke out in Paris, where it carried off about 20,000 persons by the end of September, no precautions having been taken to prevent its extension, a general belief of its non-infectious nature having been erroneously entertained. During 1833 and the early part of 1834 it raged throughout Spain, and was very destructive in Madrid. It visited several parts bordering on the Mediterranean in 1834, and reappeared in London and in some other places in this country, as well as in North America, in the same year. It was most destructive in Rome in 1837, the number of deaths varying, for many days, from 200 to 300 daily. It spread to various other countries not mentioned in this brief sketch, between the years 1831 and 1837; and few places were entirely exempted from it, excepting those which were placed under strict quarantine. It still prevails (1845) in several parts of the East Indies.

19. ii. *The prevalence of this pestilence and the mortality among those attacked varied remarkably in different localities, and in different races of the species, and were variously estimated by different writers. The mortality, as well as liability to attack, was certainly greatest among the poor and ill-fed; and among the dark races and those presenting the lower grades of constitutional power and of vital resistance to depressing agencies. The proportion of attacks to the population, and fatal cases in the whole number of attacked, were differently estimated, according as those cases which consisted chiefly of diarrhœa, or of the incipient stage, were comprised in or entirely left out of the account. Owing to these circumstances, nothing can be stated with any precision as to this point. In Arabia one third of the inhabitants of the towns which this pestilence visited was said to have died of it. In Siam, Java, and the Mauritius the number seized was extremely great, as well as the mortality. In China its fatality was still greater, especially in the more densely-inhabited places, owing chiefly to the neglect of precautionary measures. In Persia one sixth of the population of the principal cities and towns was cut off by it; and from one fourth to one third of the population of Mesopotamia was said to have perished. In Bassorah and Bagdad, situate in unhealthy localities, and in a humid at-*

mosphere, a third of the inhabitants was carried off by it in little more than a month. At Erivan and Tauris it destroyed about one fifth of the population. But in more elevated and healthy situations it was much less fatal. In Syria its ravages were extremely varied; in some places one half of the inhabitants were swept away, while in others, as in Tripoli, only one perished out of every 200. During the prevalence of the pestilence in the southern and eastern provinces of Russia, in 1830, the mortality was also various. At Tiflis three fourths of the sick, at Astrachan two thirds, were carried off. Out of 16,000 attacked in the province of the Caucasus, 10,000 died; at Moscow one half, and at Orenberg one fifth only perished. According to the author last quoted, out of 54,000 and upward attacked in the provinces of Russia, in 1830, more than 31,000 died. In Hungary alone about 400,000 persons were said to have been seized, and more than half the number to have died.

20. In Astrachan one third of the cases were said to have been fatal; among the Don Cossacks two thirds. At Moscow the mortality varied greatly, being at first so high as nine tenths of the cases, and afterward sunk gradually to a third. When the disease first appeared in India, the mortality was also extremely high; but its prevalence, as well as its fatality, gradually abated after 1821. Exceptions, however, to this amelioration presented themselves in various places; and at the same period, when the rate of mortality did not rise above 8 or 10 per cent. in some parts, from one fourth to two thirds of the persons seized by it died in other places.

21. Of the prevalence and mortality of the distemper in this country, Dr. W. MERRIMAN has furnished the following table from the Reports sent to the Privy Council Office. It must have been evident, however, to all who paid attention to the matter at the time, that the reports were not even approximations to correct statements; for, to my own knowledge, several deaths from the disease in my own neighbourhood occurred without having been reported as such, and very numerous cases were treated successfully during the early or premonitory stage which were either not viewed as cases of the malady or not returned as such. The *prevalence and rate of mortality*, as far as my own observation enabled me to judge, were remarkably increased by previous ill health, by debility, and by advanced age. The number of cases which occurred before puberty was very small, and from that age to thirty the proportion of recoveries was greatest. From forty to fifty the proportion of deaths increased remarkably, and after fifty years of age but few recovered. But much appeared to depend upon the violence of the attack at the beginning.

	Cases.	Deaths.	Recoveries.	Population of places affected.
England,	49,594	14,807	33,790	2,753,956
London,	11,020	5,273	5,745	1,424,696
Wales,	1,436	498	938	101,603
Ireland up to } March, 1833, }	54,552	21,171	33,381	

[\* It is by no means certain that the cholera was conveyed across the Atlantic in an emigrant ship, as stated by Dr. Copland; all attempts to trace the introduction of the disease into Quebec in this manner have proved unsatisfactory.]

[The following table, compiled by Prof. J. JACKSON of Philadelphia, exhibits the cases and deaths in Quebec, Montreal, New-York, and

Philadelphia, with the ratios of cases and deaths to population and to each other.\*—(*Amer. Jour. Med. Sciences*, vol. ii., p. 291.)]

Date of report and place.	Population.	Cases.	Deaths.	Ratio of cases to pop.	Ratio of deaths to cases.	Ratio of deaths to pop.
Sept. 2. Quebec,	32,000	5783	2218	1 in 517	1 to 2½	1 in 14½
" 21. Montreal,	28,000	4440	1904	1 in 651	1 to 2½	1 in 14½
Aug. 28. N. York,	140,000	5814	2935	1 to 24½	1 to 2	1 in 47
Sept. 13. Philad.,	160,000	2314	935	1 to 70	1 to 2½	1 in 173

22. III. DESCRIPTION OF PESTILENTIAL CHOLERA.—The nature of this pestilence is best inferred from a faithful history of the phenomena manifested by it during its progress, and of the changes it produces in the organization, and from the means found successful in limiting its extension and in restoring the frame to its healthy state when subjected to its attack. In conducting an inquiry into the phenomena and nature of this pestilence, I shall confine myself to the more important topics of the subject, and endeavour to arrive at inferences founded on careful observation and extensive experience.

23. Since the first irruption of the malady in the Delta of the Ganges, during its various manifestations in India and other parts of Asia, and in its different visitations of northern and western countries, whether observed in British India, in Siam, Java, and the adjoining islands; in China, in Tartary, in Arabia, Persia, Syria, or in Russia, England, and other countries of Europe, or in America; whether attacking the Hindoo, Mussulman, the Malay, the Mongul, the Asiatic, Caucasian, or the European branches of this race, the characteristic features of the disease have been uniformly the same; modifications as respects grade, or intensity of attack, and as regards the severity and the occurrence of the consecutive fever, being the chief sources of distinction. Age, constitution, and varying degrees of predisposition frequently occasion different manifestations of certain functions, or peculiar forms of disturbance, yet still the principal phenomena continue but little modified excepting in degree; and it is not until consecutive changes are induced in the system by the morbid actions characterizing the disease, that any marked difference manifests itself, such difference evidently proceeding from pre-existing states of the internal viscera, innate vigour of constitution, and the remedial means employed to remove the attack. This uniform character of the malady indicates a specific cause, with which, however, several others may combine, favouring its action by disposing the frame to its invasion, by re-enforcing its activity, or calling it into operation after the body has been exposed to its influence.

24. The specific cause producing the disease may be supposed not only to be thus re-enforced by other causes, some of them of no mean influence, but itself may vary considerably in intensity, producing, *ceteris paribus*, effects of co-ordinate severity, yet still acting with a certain

relation to the predisposition of the individuals exposed to it. This may be more clearly illustrated by taking for granted the operation of a certain infectious product or poison, the existence of which will be shown in the sequel. This product or effluvium emanating from the bodies of those attacked with the disease, often in a form rendered manifest to the senses of the observer, necessarily varies as respects concentration and quantity, dilution in the air, and rapidity of dissipation by means of ventilation; its effects, therefore, may reasonably be supposed to vary equally in grade, the state of predisposition to become affected by it being the same. Where, however, the predisposition is great, as after great fatigue, during mental depression, &c., a less concentrated and abundant effluvium proceeding from the affected, will produce a more intense effect than this principle in its most active and concentrated form, acting upon a person but slightly predisposed; while this intensity of cause will altogether fail of producing any marked effect in the strong, the unpredisposed, or the person whose moral confidence and equanimity generally repel the invasion of any form of infection.

25. Thus, therefore, the manifestations of the malady will be modified chiefly in grade, and scarcely at all as respects its form. In these respects the efficient cause of the disease is perfectly similar in its operation to the causes of other infectious diseases familiarly known, and frequently observed in an epidemic form; when the poisonous emanation is concentrated and intense, the subject being also predisposed to its invasion, its effects are rapidly produced, remarkably severe, and speedily arrive at a termination. On the other hand, when weak or much diluted, or when the predisposition of the subject is slight, its operation is slow, and the train of morbid actions of longer duration and diminished severity. Thus I have seen a person struck down nearly inanimate by the infectious effluvium proceeding from the bodies of the sick, and concentrated in a close apartment, and death following in a few hours without the energies of life being rallied; and similar results have been often observed by others. Owing, therefore, to the intensity of the efficient cause of the disease, to the number of concomitant causes which may re-enforce its action, and to the state of predisposition of those exposed to them, the modified results which I am now about to detail will present themselves.

26. i. A. *Symptoms*.—The *invading* or *preliminary symptoms* of the disease generally consist of pallor and collapse of the countenance, with an expression of anxiety; slight pain of the forehead, noise in the ears, and vertigo; sickness, heat, and pain at the epigastrium; oppression at the chest, with frequent sighing; nervous agitation, remarkable loss of muscular power, general uneasiness; colicky pains in the abdomen, with slight diarrhœa, at first feculent, but afterward watery or serous; sickness at stomach; slight cramps of the legs; oppressed, weak, small, slow, or creeping, and sometimes intermitting pulse, and coldness, clamminess, or humidity of the surface. These symptoms are of varied duration—of one, two, or even three days, sometimes of several hours

[\* The above table does not include the whole period of the epidemic, but may serve to give a comparative view of the disease in those cities respectively to the dates mentioned. The population of New-York is estimated not from the usual ordinary number at the above period, but of those remaining in the city.]



only, and at other times not of as many minutes. In some cases they have been scarcely remarked, the patient having been struck down almost lifeless, with a dark or livid state of the surface, and all the symptoms characterizing the fully-formed state of the disease.

27. Dr. SMITH observes, that several of those about to be attacked may be seen with a peculiarly dark ring round their eyes;\* and others state that the features evidently collapse, and the expression becomes anxious for a day or two, or at least for hours, before they sicken. At Orenburg, dyspeptic symptoms are stated to have preceded its attack, and a similar observation has been made in other places. Various authors have said that stomach and bowel complaints, of a less serious nature, often preceded a fully-developed seizure for a day or two; and that these complaints have likewise occurred in the place where this pestilence has prevailed, and been removed by treatment, or disappeared spontaneously, without being followed by the fully-developed distemper. This, indeed, agrees with my own experience during the prevalence of the malady in London; for although but comparatively few were carried off by the pestilence, yet very many experienced severe indigestion, flatulence, and diarrhoea, with marked vital depression, sometimes with slight spasms; these ailments being either removed by restorative and astringent medicines, or successfully resisted by the powers of the constitution. And I may add, that there were very few medical men who did not experience these symptoms in their own persons—at least the dyspeptic symptoms, if not the diarrhoea—during the period of their attendance on cases of the distemper.

28. *B. The fully-developed state* of the malady consists of great vertigo, nervous agitation, oppression at the chest and præcordia, with complete loss of muscular energy; cramps, commencing at the fingers and toes, and rapidly extending to the trunk; slow, thready, and weak pulse; great collapse of the countenance, the eyes being sunk deep in their sockets, and surrounded by a dark circle; vomiting and purging of a fluid resembling whey, or rice-water, containing whitish flocculi [or green, porraceous-like matter]; a peculiar sharp and contracted state of the features, and wild and terrified expression of countenance, arising from a feeling of rapidly-approaching dissolution. The whole surface, particularly the hands, face, and extremities, assumes a leaden, blue, or purplish tint, varying in shade with the intensity of the attack and complexion of the person; the extremities are shrunk, shrivelled, sodden, and the skin is deadly cold, damp, and raw to the touch; the nails assume a bluish-white hue; the pulse is either reduced to a minute thread, or is entirely lost at the wrist, and often

[\* This is not a dark ring, but an actual dark-blue or black cavity below the lower eyelid, and the pure result of the intensely morbid activity of the absorbents every where, and which here have removed a portion, or all, of the fatty cushion of the globe of the eye, thus leaving the blue veins visible through the skin. This blue colour below the eye is frequently seen in the morning, in nervous temperaments, from some previous anxiety of mind and feverishness, and, therefore, quickened action of the absorbents, producing the same result to a certain degree. The same marked activity of the absorbents, and consumption of the subcutaneous fatty matter, causes the remarkable symptom of puckering of the skin in this disease.—T.]

can with difficulty be felt in the neck; the course of the large superficial veins is marked by flat lines of a darker tint than the adjoining surface; a burning heat and inexpressible anxiety are complained of at the epigastrium; the patient tosses about incessantly, from a feeling of intolerable weight and anguish round his heart; he struggles for breath, and often lays his hand on the stomach and chest, referring his agony chiefly to those situations; his voice is nearly gone, and his respiration is quick, irregular, most laborious, and imperfect; the inspiratory act being effected by an immense effort, and expiration being quick and convulsive. The patient calls frequently for cold water, speaks in a plaintive whisper, and utters only a word at a time, the lungs not containing air enough for a sentence. The tongue is always moist, often white and loaded, and generally flabby and cold. A thermometer introduced below the tongue indicates an animal temperature frequently of ten or twelve degrees below the standard of health. The sense of touch is generally greatly obscured, and deafness is often present. If blood be obtained in this state, it is black, flows by drops, is thick, and feels colder than natural; and the air which is expired is cold and raw. Vomiting and purging, which are far from being the most dangerous symptoms, and are often the most remarkable in the least urgent cases, are generally slight, or at least not profuse, in those attacks where the sinking of the vital energies is the most rapid and the greatest, or are readily allayed by medicine. The integuments of the abdomen are often raised into irregular folds, while the epigastrium and hypochondria, with the whole abdomen, are commonly, especially in the intensely severe cases, drawn inward and upward upon the chest.\* The spasms are generally of a more or less passive kind, but they sometimes, particularly in the loins, legs, and thighs, present a tetanic rigidity. They are often slight, or nearly absent, in some of the most rapidly fatal cases, or replaced by a constant tremour. There is occasionally a low whine of suffering expressed. The secretion of urine is totally suspended, as well as the biliary, the salivary, and lachrymal fluids; and a peculiar earthy odour issues from the body, with a singular fetor of the perspiration and evacuations.

29. These are the symptoms in the more severe attacks, varying, however, somewhat in degree, and with the occurrence or non-occurrence of previous diarrhoea. When the intense attack takes place without previous diarrhoea, then the vomiting and purging of watery or rice-coloured fluid—from the escape of the watery portion of the blood from the digestive mucous surface—are most marked; the quantity of this fluid thrown out, both upward and downward, in a few minutes, being often extremely great. If the remedial means succeed, the animal heat is slowly restored, the pulse becomes fuller, and the colour of the surface more natural; but if these means fail, rapid extinction of the functions takes place. Frictions even then may reduce the lividity of the part to which they are applied, but that of the face and hands

[\* BROUSSAIS correctly describes this sensation as similar to a band drawn tightly across the epigastrium, as if compressing the stomach against the spine.—T.]

increases. The lips and cheeks sometimes puff out in expiration, as in apoplexy; and, towards the close of the scene, the respiration often becomes slow, with a quivering of the tendons of the extremities. The mind is generally undisturbed, the patient feeling merely a certain degree of apathy towards the close, and a desire to be left to his fate. At last he is unable to swallow; he then becomes insensible, and he dies after one or two long, convulsive sobs. In some cases, when the patient has been thus rapidly cut off, without any rallying of the energies of life, convulsive motions of the muscles have been remarked an hour or two, or even longer, after expiration had ceased.

30. Such is the history of the disease when it terminates life without any reaction of the nervous and muscular systems, the patient generally dying in from six to twenty-four hours; but both in the East and in Europe, particularly the latter, or among European residents in India, a consecutive state of disease, attended with efforts at reaction of an imperfect or malignant character, was not unfrequently observed. It was rarely evinced in the weak Hindoo, or in the previously debilitated, of whatever race, but sometimes in the stronger or less predisposed in India, and often in Europe, and in England, especially in the robust and young.

31. From the aggravated state which has been now described but very few recover, particularly if that state have existed as long as three or four hours before active treatment has been resorted to. A thread of pulse, however small, is almost always felt at the wrist, where recovery from this state is to be expected. Hiccough, coming on in the intermediate moments between the threatening of death and the beginning of reaction, is a favourable sign, and generally announces the return of circulation.

32. In less severe cases the pulse is not wholly extinguished, though much reduced in volume; the respiration is less embarrassed; the oppression and anguish at the chest are not so overwhelming, although vomiting, and purging, and the cramps may have been more intense. The coldness and change of colour of the surface, the peculiar alteration of the voice, a greater or less degree of coldness of the tongue, the character of the liquids evacuated, are invariably well marked in all the degrees of violence of attack of this pestilence. In no case or stage of this disease have I observed shivering; nor have I heard, after inquiry, of more than one or two cases in which this febrile symptom took place.

33. *C.* The consecutive phenomena of this malady vary considerably. In the East, when recovery took place from the previous state, it was often rapid, and without much subsequent disease having been experienced. The numerous writers, however, in the reports from the medical boards of the three Indian presidencies make particular mention of a consecutive fever, characterized by nervous and malignant symptoms, such as I am about to enumerate, and which was very commonly observed to follow the attack in Europe. They also state that the malady often passed into visceral disease and dysentery, and that the danger was not over, although they succeeded in rallying the powers

of life. According to Drs. BARRY and RUSSELL, after the blue or cold period has lasted from twelve to twenty-four, seldom to forty-eight hours or upward, the pulse and external heat begin gradually to return; headache is complained of, with noise in the ears; the tongue becomes more loaded, redder at the tip and edges, and also drier. High-coloured urine is passed with pain, and in small quantities; occasionally is nearly or altogether suppressed; the pupil is often dilated; soreness is felt on pressure over the liver, stomach, and belly; and an offensive odour is exhaled from the surface; in short, the patient is now labouring under a continued malignant fever.

34. A profuse critical perspiration occasionally comes on from the second or third day, and leaves the patient convalescent; but more frequently the quickness of pulse and heat of skin continue; the tongue becomes brown and parched; the eyes suffused and drowsy, with a dull flush, stupor, and heaviness of the countenance, resembling typhus. Dark sordes collect about the teeth and lips; and sometimes the patient is pale, squalid, and low, with the pulse and heat below natural, but with the typhous stupor. The urine is suppressed. Delirium generally supervenes, and death takes place from the fourth to the eighth day, or even later, in the very person, too, whom the most assiduous exertions had barely saved in the cold stage. Dr. REIMER states, that of twenty cases treated under his own eye, who fell victims to the disease, seven died in the cold stage, and thirteen in the consecutive fever. This proportion nearly agrees with that observed in my own practice, or among the cases to which I was called. In two cases which I attended most extensive erysipelas complicated the consecutive fever. I agree with the observation of Drs. BARRY and RUSSELL, that persons employed about cases in this typhoid stage are never attacked with ordinary fever, but with a genuine cold, blue cholera.

35. In another class of cases serious disorders of the secreting organs of the abdomen, particularly of the liver and of the digestive tube, supervene, instead of the low nervous fever now described. The evacuations from the bowels become of a dark, blackish, offensive, and highly irritating kind, and attended frequently with discharges of a bloody fluid, with mucus, and extremely urgent irritation of the rectum, the consecutive symptoms assuming nearly the character of dysentery. Sometimes an inflammatory or sub-inflammatory state of the stomach and bowels takes place either alone, or accompanied with great tenderness in the region of the liver, and disorder of the biliary secretion. In other cases these symptoms assume very nearly the form of bilious or gastric fever; and in a few this state of disease is associated with inflammatory congestion of the lungs. When these states of consecutive disease are severe, they not seldom carry off the patient; and, where recovery takes place, are frequently accompanied with tedious convalescence.

36. *D.* The points of difference between the manifestations of this pestilence in India and in Europe appear to be chiefly the following: 1st. The precursory dyspepsia and diarrhoea appear not to have been so frequent in India.



especially in dark races, as in Europe. 2d. The evacuations seem to have been more profuse and ungovernable in the violent attack in the former than in the latter, although the characters of the evacuations were entirely the same. 3d. Restoration to health from the cold state, without passing through consecutive fever, was by far more frequent in India than in Europe, nor did the consecutive fever there so generally assume a typhoid type. 4th. The proportion of deaths in the cold, compared with those in the consecutive stage, was far greater in the former than in the latter country; and, 5th. The proportion of medical men and hospital attendants attacked seemed greater in Europe than in the East. Relapses, also, in the hospital attendants were not unfrequent; while convalescence was generally perfect and rapid elsewhere. Mr. JAMESON states, in the Calcutta Reports, that, although relapses were not uncommon, there seemed to exist an immunity from second attacks, but this is not fully ascertained.

37. It may, perhaps, be difficult to explain the frequency and the modified state of the consecutive disease now described as it was observed in this country and throughout Europe. Much, perhaps, may be owing to the state of predisposition, the intensity of the cause, and the constitution of the affected; something, also, may be attributed to the effect of treatment in the early stage of the malady, particularly the more general employment of blood-letting and large doses of calomel: means evidently calculated to remove the oppressive congestion of the vital organs, and reanimate the functions of the secreting organs and emunctories of the frame, but which seemed not to have been so generally nor so decidedly resorted to in Europe as in India. Something, also, may be imputed to the greater vital resistance made to the noxious influence exerted by the poisonous miasm causing the distemper upon the frame, by the European constitution, than by the more delicate constitution of the dark races.

38. ii. *The Prognostic Symptoms.*—A. Those symptoms which indicate a *favourable* termination of the disease are, increase of the firmness and fulness of the pulse; returning animal heat to the surface; a tonic character of the spasms, or active retchings; not very urgent feelings of heat and anxiety at the epigastrium and precordia, or a diminution of these symptoms, and of the pressing desire for drink; the occurrence of hiccough; a more natural and a livelier state of the countenance and surface of the body; greater freedom of respiration, and a diminution of the rawness and coldness of the respired air; a free evacuation of the bowels, with the appearance of a return of the biliary secretion, and especially the evacuation of urine and amelioration of the tremours, restlessness, and general distress. These generally indicate a decrease of danger in the early stage of the disease, and returning vascular reaction; but this state may proceed to a fatal issue with all the symptoms of congestive and adynamic continued fever.

39. Typhoid symptoms, such as low delirium, black sordes on the teeth and lips, dry, parched skin, &c., may, however, come on, and the patient sink. The non-accession of these symptoms; the occurrence of a copious,

warm perspiration; the return of the natural secretions and evacuations, as of the salivary, bilious, and urinary secretions; the absence of serious affections of any of the viscera contained in the abdomen, particularly of the liver, stomach, and bowels; and a return of the functions of the nervous, assimilating, circulating, and respiratory organs to their natural state, are the chief guides of the physician in forming a favourable prognosis.

40. B. On the other hand, an *unfavourable* issue must be looked for when the prostration of strength, the coldness and blueness of the surface, the sinking and irregularity of the heart's action, the collapse of the countenance, the coldness and rawness of the expired air, the oppression and difficulty of respiration, the anxiety and restlessness, &c., are great or, individually, extreme; and especially if, with great intensity of these phenomena, the retchings and spasms are slight, or the latter consist chiefly of tremours, or irregular clonic contractions. An oozing from the mouth of the fluids from the stomach, unconscious evacuations or relaxation of the sphincters, the breathing consisting of convulsive sobs or being stertorous, with puffing of the cheeks or lips, and inability to swallow, indicate approaching dissolution in the cold or early period of the disease.

41. The occurrence of low delirium, or of coma with collapse of the countenance, and all the symptoms of malignant continued fever, consecutive of the cold stage, are extremely unfavourable, especially when attended by suppression of urine, by great stupor, dark sordes about the teeth or lips, by convulsive tremours of the tendons, and restlessness. These symptoms show that the congestion of the nervous centres, which occurred in the preceding periods of the disease, together with the thick and otherwise morbid state of the blood itself, has been followed by serious disturbance of the capillary circulation in the substance of the brain and of its membranes, probably conjoined either with effusion beneath or between the arachnoid membrane, or with continued congestion of the veins and sinuses of the encephalon. The continued suppression of urine is manifestly owing as much to the change produced in the blood, by the evacuation of the watery part of it by the bowels, as to a paralyzed state of the kidneys.

42. The supervention, also, of tenderness, pain, &c., in the region of the liver, or in that of the stomach, a very morbid and irritating state of the alvine evacuations, with blackish, bloody, and mucons discharges, attended with tremours, &c., all indicate, respectively, the consecutive appearance of inflammation, or inflammatory congestion of the liver, of the stomach, and bowels (§ 46), and evince a marked tendency to disorganization, and call upon the practitioner for the employment of the most decided means of cure. Although these consecutive phenomena show a most serious state of disease, yet recovery will sometimes take place from it by the assistance of well-directed means.

43. iii. *Morbid Appearances observed after Death.*—The morbid changes observed after death from this pestilence are in every respect the same, both in Eastern and in European coun-

tries. When the cold stage proves fatal, or death takes place within four-and-twenty hours from the seizure, but little change of organization can be detected, although the viscera are much altered in *appearance* from the healthy state. The surface of the body usually presents the same aspect as mentioned when describing the fully-formed stage of the malady, being livid, corrugated, constricted, and humid. The lungs are commonly found collapsed, condensed, sometimes remarkably shrunk, and always loaded with black blood of an oily or ropy consistence, and very closely resembling tar or treacle. The cavities of the heart are filled with a black blood, and they frequently contain polypous concretions. Blood of a similar appearance is generally found in the arch of the aorta and other large arteries. The blood-vessels of the brain and its membranes are more or less gorged with dark blood, particularly toward its base. The arachnoid membrane is frequently deprived of its transparency. A serous fluid of various quantity is often found effused between the convolutions of the brain and in the lateral ventricles. Similar appearances to those detected in the cranium are also found in the vertebral column.

44. The abdomen, upon being opened, generally emits a peculiar offensive odour. The stomach and different parts of the bowels are frequently partially, but considerably contracted; at other places greatly distended with flatus; the internal surface of the stomach sometimes seems but little affected. A whitish or yellow fluid matter, resembling the evacuations, is often observed in different parts of the alimentary canal, which occasionally contains much air, but neither bile nor fæces.\* The internal surface of the intestines is commonly lined by a tenacious muco-albuminous matter. The colon is frequently much contracted, generally throughout. The mucous membrane and sub-mucous cellular tissue of the digestive canal present evident marks of congestion, in some cases approaching to a sub-inflammatory state, but generally in spots or patches of various sizes, the colour of these varying from a very dark venous congestion to a more roscate hue. Decided signs of inflammation are always wanting, even in the most remarkable of those congested states. The glands of BRUNNER and PEYER, as well as the solitary glands, are greatly enlarged. Both stomach and bowels are frequently of a paler colour than natural, both in their inner and outer surfaces. The liver is generally pretty full of dark-coloured blood; the gall-bladder often much distended with tenacious ropy bile, of a dark yellow or green colour. The gall-ducts are sometimes contracted, at other times not. The appearance of the pancreas, spleen, and kidneys is various, frequently differing but little from their natural state; in other cases somewhat gorged with blood. The urinary bladder is always contracted and empty. The vena porta and all the large abdominal veins are loaded with black blood, resembling tar.

45. The chief change observed in cases terminating fatally in the blue stage of the distemper is in the *blood*, which has lost the greater part of its serum, which, as it has exuded from the digestive mucous surface, has left an albuminous coating over the mucous membrane, and that remaining congested, thick and treacle-like, in the large veins.

46. In cases the duration of which extends from one to three days, the same leading appearances as now described are observed, but often with considerable additions. The vessels of the stomach in these are found loaded with blood, presenting a surface sometimes of a pale pink hue, sometimes of a deep blue, at others of so dark a tint as to resemble sphacelus of the membrane, from which, however, it was readily distinguished by the firmness of the texture. Similar changes are found in the small intestines, and but very rarely in the larger. In many, evidence of congestive pneumonia is found, which is usually latent before death. In those cases in which coma occurs, serum is sometimes effused in larger quantities than already alluded to, but occasionally congestion only of a very black fluid or semi-fluid blood is found. Those who die of the consecutive disease show few appearances that are different from such as are usually observed in other cases, attended with corresponding symptoms. Those cases which have evinced, during the secondary fever, marked disturbance of the brain, generally present, after death, greater vascularity of the substance of this organ and of the membranes than natural, with the congestion of blood in the veins and sinuses, and effusion into the ventricles and between the membranes, particularly between the pia mater and the arachnoid reflected over it. In some cases the brain seems dusky or mottled, and the veins turgid, with dark semi-fluid blood. In those terminating fatally, with hepatic disturbances, the liver is generally of a dark-brownish or sodden appearance. In some cases it is of a purplish black, somewhat enlarged, its veins filled with dark semi-fluid blood, and the ramifications of the hepatic duct loaded with a dark-green or greenish yellow bile. The stomach and bowels, particularly the latter, are contracted and thickened, the inner surface softened, of a dark-red or purplish colour, in patches or streaks; sometimes excoeriated, partially detached from the muscular coat, and covered with a muco-sanguineous fluid, in those who have died with consecutive gastro-enteric or dysenteric symptoms.

[The pathological changes observed in subjects dead of cholera in this country correspond closely with those described by Dr. COPLAND. Prof. HORNER, however, of Philadelphia, has published a very elaborate account of these changes in the *Am. Jour. of Med. Sci.* (vol. xvi.), in which he maintains the following propositions:

1st. That the vascular derangements and phenomena of cholera, as exhibited in the alimentary canal, are confined almost exclusively, if not entirely, to the venous system.

2d. That in the earlier stages a lining membrane of coagulating lymph exists in the small intestines at least, if not in the stomach and colon also, and that this lining resembles the membrane of croup.

\* The complete suppression, suspension, or extinction, as it were, of the urinary and biliary functions, is equally characteristic of yellow fever. Not so in typhus; here the kidneys only are paralyzed, while the liver, though torpid, responds to aperients or enemata, and even a diarrheal tendency is not unusual.—T.]



3d. That, in addition to the enlarged and tumefied follicles described by M. BOVILLAUD, and a similar enlargement of the intestinal papillæ described by M. SERRÈS, a copious vesicular eruption, entirely distinct from both, and easily distinguished from them, exists in the mucous membrane of the stomach of the small intestines, and of the larger; and that this vesicular eruption, consisting of small spheres, seldom more than the sixth part of an inch in diameter, is probably the essential morbid character of the disease, as is the case with the eruption of smallpox and other affections.

4th. That the follicular system of the alimentary canal is not the principal fountain of the sero-fibrinous discharges, commonly called the cholera fluid, but that the latter comes from the capillaries of the venous system. Prof. DICKSON, of Charleston, S. C., remarks, in relation to Prof. HORNER's observations, that he is "unable to yield an unhesitating credence to details differing in their alleged uniformity from, and thus contradicting, all former accounts, which, until now, agreed in the ascription of extreme irregularity to the local affections in cholera."—(*Essays on Pathol.*, vol. ii., p. 84.) We have made numerous autopsies in this disease, and have not only found the glands of PRYER morbidly developed, but the small, isolated follicles much enlarged, giving rise to the appearance of vesicles and vesicular eruption, as described by Prof. HORNER. Was not the membrane described by Prof. H. probably the epithelium, and might not its detached portions give rise to the flocculent appearance noticed in the discharges?]

47. IV. DIAGNOSTIC CHARACTERS.—Much misapprehension of its nature and origin has arisen from viewing the pestilential cholera merely as a modification of, if not identical with, the form of cholera not unfrequently met with in India and other warm climates, and occasionally in this country, to which the terms *spasmodic cholera* and *mort de chien* have been applied. Many writers, particularly those who argue against its infectious nature, have considered this pestilence merely an epidemical occurrence of that form of cholera. It is true that, in the spasmodic cholera, the secretion of bile is either altogether or nearly interrupted; or, if it be at all discharged into the bowels, that it is so vitiated as to prove extremely irritating to their internal surface, the spasms, retchings, alvine evacuations chiefly arising from intense irritation of the organic nerves supplying the digestive tubes and the abdominal viscera, together with accompanying congestion of these vessels. In that disease there is every reason to suppose that the absence of bile is to be imputed to spasm of the common bile duct, rather than to a suppression of the secreting and excreting functions; while, in pestilential cholera, these functions are altogether arrested, and the discharge of bile is interrupted, independently even of any spasm of the excreting ducts, the biliary secretion being suspended as well as the urinary, owing not only to a paralyzed state of the liver and kidneys, but also to the state of the blood being such as not to admit of circulation through the extreme capillaries, and to the loss of its serum.

48. In the spasmodic, or severe form of sporadic cholera, the discharges from the stom-

ach and bowels are certainly either not coloured by bile, or but little, excepting at the commencement, and when the disease begins to yield; but they are accompanied with a different train of symptoms. The spasms are more tonic, and confined more to the muscles of the abdomen, and of the thighs and legs, than in the pestilential disease; and, in the former, the vertigo, deafness, headache, marked affection of the respiratory function and of the circulation, characterizing the latter, are entirely wanting.

49. In sporadic or bilious cholera the very dark, thick, and ropy appearance of the blood; the cold, wet, and shrivelled state of the surface, and its leaden, dark, or purplish colour; the almost total absence of pulse at the wrist; the very marked and rapidly-increasing collapse of the powers of life; the disagreeable and earthy odour of the body, even during the life of the patient; the burning sensation between the scrobiculus cordis and umbilicus; the complete arrest of the glandular secretions; the cold tongue and mouth; and the coldness of the respired air, which characterize the pestilential disease, are entirely absent.

50. In one the powers of life are certainly very much deranged, and the circulation and functions of the internal organs greatly disturbed; but in the other all the derangements and their attendant symptoms are of a much more alarming and malignant nature; the balance of the circulation is much more completely overturned, the circulating fluid itself much more sensibly and seriously diseased; the respiratory functions infinitely more disturbed; the spasms of the voluntary muscles more general, and more clonic as respects their nature; the purging and vomiting slighter and of shorter duration, and forming a less prominent feature of disease; the surface of the body more deprived of its vitality, of a much darker colour, and more collapsed and shrunk; and the powers of life are more completely overwhelmed, and sooner sink altogether, than in the severest forms of cholera observed to occur occasionally in warm climates, or in temperate countries, under circumstances favourable to their appearance.

51. In this pestilential malady the powers of life are insufficient of themselves, even although assisted by the administration of stimulants, to overcome the congestion of the internal organs, and restore the circulation in the surface of the body and in the extremities; and while the large secreting viscera in the abdomen remain engorged by the thick and viscid blood thrown in upon them from the external surface, and their vital powers thus overwhelmed, their functions of secretion must necessarily be arrested; and thus they are unable to remove the load oppressing them by one of the modes in which congestion of secreting organs is usually overcome.

52. In the severer forms of cholera, occurring sporadically, the derangements, being less malignant than in the present malady, are more readily removed by an energetic and appropriate treatment. Here the exhibition of large doses of calomel, opium, and stimulants is generally sufficient to allay the inordinate action of the stomach and bowels, to restore the balance of the circulation, to remove spasm,

and to excite the secreting function of the liver. But in this pestilence the lungs are completely paralyzed, the changes produced by respiration entirely suppressed, the blood is thick and vitiated, the large vessels, particularly the large venous trunks, and the cavities of the heart, are so engorged with blood as to be unable, particularly in their state of deficient vital energy, to react upon the distending fluid, and to throw it, particularly in its state of morbid density and tenacity, into the extreme vessels of the secreting organs and external surface, unless internal and external stimulants of the most powerful kind be employed; and even these are very often inadequate, of themselves, to fulfil the intention with which they are employed, and occasionally are productive of mischief, unless the engorgement of the internal viscera be early removed by vascular depletion and external medication, which, while they relieve the heart and empty the large vessels, enable them to react upon their contents, and recall the flow of blood from the centre to the circumference of the frame. Hence it is generally indispensable, in this very formidable disease, to exhibit stimulants and antispasmodics internally, with artificial heat and stimulating frictions, in order to rouse the vital energy of the system, while we remove the vascular load by means of emetics and evacuations of blood, and afterward endeavour to excite the functions of the liver, and restore the secretions generally.

53. Among the other characteristics intimately connected with the nature of this pestilence, and calculated to distinguish it from all those states of disease to which the term cholera has been usually applied, may be particularly noticed the prevalence of the pestilence in all seasons, countries, and climates; the affection of the head, nervous system, and respiratory organs, characterizing the commencement of its attack; the uncommon and sudden diminution of the animal temperature, which often sinks below the heat of the surrounding air, both on the surface of the body and in more internal parts; the remarkably sudden and rapid depression of the powers of life; the continued restlessness and distress referred to the præcordia and epigastrium; the mental apathy and indifference to the result; the vertigo, stupor, and deafness; the blue colour and shrunk appearance of the surface of the body; the state of the respiratory actions, and peculiar groan or whine of the affected; the unquenchable thirst and burning at the epigastrium; the sodden, raw, wet, and shrunk state of the surface; the rapid exudation of a watery fluid from the skin, and digestive mucous surface; the states of disease by which it is very frequently followed; the unprecedented mortality, notwithstanding the most energetic and judicious treatment, and the use of those means by the aid of which nearly all the cases, even of the most severe forms of intertropical cholera, generally recover; and, lastly, the appearances observed after death, particularly the collapsed state of the lungs, the blackness of the blood, the fibrinous concretions in the cavities of the heart, the morbid secretion lining the internal surface of the intestines, the flaccidity of all the soft solids and of the substance of the heart itself, and the congestion of black

blood on the large nervous centres. (See § 43, *et seq.*)

54. The secondary fever and consecutive phenomena (33), which follow upon the cold and blue stage of the malady, also furnish remarkable proofs of dissimilarity between this pestilence and the severe forms of cholera observed in hot countries, or in temperate climates after very hot and moist seasons. After these latter the patient recovers without any consecutive disease, and frequently the tumult of the frame leaves it benefited by the changes it induces; but in the present pestilence the consecutive states of disease are as dangerous as the blue stage; and, even when assuming a typhoid or febrile character, they do not communicate a febrile disease, but the distinct and specific pestilence now treated of. This important feature was happily insisted upon in the reports of Drs. BARRY and RUSSEL, and is one of itself sufficient to distinguish this pestilence from every form of cholera.

55. Various attempts have been made to trace a resemblance between this disease and some of those which have occurred in former ages, and of which very imperfect accounts have been furnished by writers; but, upon referring to the meagre details which have been given of them, I am unable to trace any close resemblance between them—far less identity. Mr. ORTON has endeavoured to find out a very close similarity between this pestilence and that which ravaged England and some parts of Europe at various periods, between the years 1483 and 1551, and which obtained the name *Sudor Anglicanus*, *Ephemera maligna sudatoria*, *Sweating sickness*. In certain phenomena the similarity is close, but in others altogether wanting; but as it cannot lead to any practical results, I will not further pursue the subject.

56. It may be important, however, to be aware that poisoning from acrid and narcotic substances, and particularly tobacco, or those belonging to the class of animal poisons, occasions symptoms which, in many respects, closely resemble those characterizing this pestilence. But the difference will be apparent upon inquiry into the history and premonitory symptoms of the attack, and by observing the collapsed, shrunk, dark, and wet state of the surface of the body; the sodden, shrivelled, damp, and raw state of the extremities; the spasms, the oppressed respiration, the sunk appearance of the epigastrium, and of the hypochondria; the peculiar character of the matters ejected; the cold, raw state of the expired air, and the black, viscous condition of the blood, all of which characterize this pestilence, and are either altogether absent from every other kind of attack, or never similarly associated.

57. After attentively considering its phenomena and nature, I would conclude, 1st. That this malady, as respects the causes which occasion it, and as regards the pathological states which constitute its various grades or stages of intensity, is quite distinct from all the forms of cholera, whether the common *bilious* variety, or the more severe form, usually denominated *spasmodic*, the *mort de chien*, &c.; and that, therefore, the name cholera should be discarded from all scientific descriptions of it.

58. 2d. That the accounts which we possess



of the epidemics and pestilences which have ravaged various countries in former times do not furnish us with the history of any disease which may be considered as identical in its nature with this pestilence; and that it must, owing to this circumstance, and to the uniformity of its characteristic phenomena, be viewed as being of modern origin, and *sui generis*.

59. As it is important that the name of a disease should not be such as may risk its being confounded with another, different from it in its nature, symptoms, and termination, so I consider that some other name than that at present applied to it should be given it. As to the particular appellation which may be employed, I conceive that one pointing to its chief pathological states, and its prominent tendencies, ought to be preferred. The intense influence of its exciting cause upon all the respiratory actions and functions, as well as upon the actions of the heart and state of the pulse, and its marked tendency to propagate itself, and to terminate fatally, have induced me to apply to it the name of *Asphyxia pestilentialis*, or *pestilential asphyxia*.\*

60. V. CAUSES AND NATURE OF PESTILENTIAL CHOLERA.—There are few subjects which have given rise to greater diversity of opinion, or to more discussion, than the causes of this disease. Suppositions have been adduced, and reasoned from, as established and admitted facts; and repeatedly observed occurrences and corroborated evidence have been explained away or denied, even by those who have given us merely vague hypotheses and chimerical speculations in their place. It must be evident that but little truly important can be stated in respect of the causes and nature of this malady, without previously inquiring into, and coming to some conclusion as to its infectious or non-infectious nature. I shall, therefore, inquire, in the first place, into the evidence which has been adduced as to its possessing an infectious property from its commencement in Jessore, and as to the extent and character of this property. Its predisposing and concomitant causes will next come under consideration; and, lastly, various topics connected with its nature will be discussed.

61. i. *The infectious nature of Pestilential Cholera demonstrated*.—The infectious or non-infectious nature of this disease is one of the most important topics to which public attention can be directed; and one which, owing to the manner of viewing it, adopted both in this country and on the Continent, requires the serious consideration of the informed part of the community. Knowing that much important information had been furnished by the medical observers of the disease in India, which was entirely overlooked, I carefully examined the reports to the Medical Boards of the three Indian presidencies. I had also an opportunity of referring to the medical reports at the India House. From those sources, therefore, and from others within my reach, I can state that much misappre-

hension of this terrible disease had gone abroad, and been propagated by authorities that should have been more accurately informed on the subject. I can truly state that, although my attention has been much engaged by this disease, since the time of its eruption in the Delta of the Ganges, I approached this topic with my mind entirely unbiased, and desirous of adopting that view of it which well-ascertained facts should most fully support. When, therefore, professional authorities have stated opinions which have misled, and will still further mislead, those who have it not in their power to detect their unsoundness, it becomes the duty of those who have detected the true character of these opinions to place the particulars within the reach of the misinformed. One able writer remarks, as an acknowledged and proved fact, "that by an overwhelming majority of the British medical officers, who have witnessed epidemic cholera in the East Indies, this disease is not considered to be of a contagious or infectious nature. A few incidents occurred which excited suspicions in the observers that it might really, after all, possess this property. But scarcely a single person has advocated the doctrine of contagion with any earnestness." The same writer afterward stated, that "the almost unanimous and earnest recommendation of British practitioners was not to consider the cholera contagious." In another country an eminent physician, in an elaborate memoir on the disease, read very recently before the "Académie Royale de Médecine" of Paris, states, as a well-ascertained matter, "that in India the medical men and attendants on the sick were not more frequently seized by the disease than others of the community." Other instances of gross misstatement, made both by foreign and British writers, may be adduced, but these will suffice. Now, when we turn to the great authorities on the subject—to the official depositories of the origin and rise of this pestilence—we find that all the reports, the Bombay, the Madras, and the Calcutta, favour the infectious nature of the disease more or less. It is true that a majority of the surgeons and assistant-surgeons in India, who sent reports to their respective medical boards, state that they do not believe the disease infectious; but a large number of them give a very different opinion, while the reasons assigned by many for believing the disease to result from other causes than infection are actually favourable to the existence of an infectious property. Even where they have argued against its infectious nature, they have often adduced the strongest evidence, although unconsciously, of its possessing this property.

62. When I entered upon the present inquiry, and commenced with the reports from the three presidencies, in the order of their appearance, and before I had seen the disease in this country, I had not completely made up my mind on the subject of its infectious nature. But, in order to come to a just conclusion, I had recourse to the earliest and the best information, and read and noted every individual report which these bulky publications contained; and so far are the remarks just quoted wide of the truth, so far are the medical men of India nearly unanimously against the belief in cholera possessing an infectious property, that the members of the

[\* The radical mischief and lesion, no doubt, begins in the lungs, from the poison inspired, which immediately, through the pneumo-gastric and other nervous connexions, simultaneously implicates the stomach; the respiratory organs thus can not eliminate the carbon and hydrogen of the blood, and the stomach is no longer capable of furnishing to the respiration the elements of combustion; hence the entire train of morbid phenomena.—T.]

Medical Board of Bombay, in the preface to the reports sent to them, and published at Bombay in 1819, state that the disease had extended from Poonah to Panwell, a considerable village in the main line of communication between Poonah and Bombay; that a man who had left Panwell and arrived at Bombay, a distance of about fifteen miles, was soon afterward attacked by the disease, and communicated it to those attending him; that it was traced in parts adjoining Bombay, and on the island, from village to village, by the arrival of persons affected with it from places where it was known to prevail; and that there were places which, from want of this sort of communication, had, up to the time of the report, entirely escaped. From the foregoing and other data, the members of the Bombay Board—the first to furnish information respecting the disease—conclude that “It appears to them incontrovertible, that this disease is capable of being transported from one place to another, as in cases of ordinary contagion or infection, and also to possess the power of propagating itself by the same means that acknowledged contagions do, that is, by the acquisition of fresh materials with which to assimilate.” (*Bombay Reports, &c.*, p. 10, 11.) In the same reports we find Captain SYKES stating that he ascertained that the disease did not break out in any village “until that village had communication with a neighbouring place in which the disease existed;” and he furnishes several instances proving this fact. Besides, he states that the attendants on those first seized in his company were attacked, and that it spread from one of his servants to five, while the gentlemen in the next tent had not one affected; and he remarks that he could add similar instances to those now adduced. (*Op. Cit.*, p. 118.) Mr. COATS, surgeon, in a letter to the president of the Bombay Medical Board, states, that the idea most prevalent was that the disease was brought from Jaulna to Aurungabad, and that its progress could be traced distinctly through the villages on the chief road from Nagpore to those places (p. 145). He afterward states that the information as to the extension of the disease by infection was not only furnished by Europeans, but that some Brahmins had given similar information without any particular inquiry on the subject having been made of them. From these and other facts, he concludes by considering the disease infectious; and that, “If it was occasioned merely by a distempered state of the air, it would have spread over the country with some regularity; but the epidemic seems generally to have travelled in lines along the post-roads, and always to have required a succession of subjects for its propagation. In Candesh, where there is not sufficient population and but little intercourse between the villages, its progress was slow. At Pundergoor it made its appearance at the time of the great Jatra, and was spread at once in all directions by the pilgrims returning to their homes.” (*Op. Cit.*, p. 150, 151.)

63. Dr. JUKES states, that the disease travelled along the high-road from the Deccan to Panwell, and that he has not heard of any village in the Conkan that has had the disease but by intercourse with places in which it had been already prevalent. “If it be something gen-

eral in the atmosphere,” he remarks, “why has it not hitherto made its appearance in some two distant places of the province at the same time? Nothing of this kind has, I believe, been observed: it still seems to be creeping from village to village, rages for a few days, and then begins to decline.” (P. 173.)

64. Dr. TAYLOR reports that, “whenever the disorder appeared in any particular spot or family, a considerable proportion of the family or neighbours were attacked within a very short period of each other: on many occasions I have seen three or four of a family lying sick at once” (p. 195.) Dr. BURRELL informs us that in the short space of six days every attendant, in his hospital, on the patients affected with cholera had the disease. (*Bombay Report*, p. 9.) And Mr. CRAW states that every one of the attendants, thirty in number, in the hospital of the 65th regiment were attacked.

65. The next report which issued from India was edited by Mr. JAMESON, and was published at Calcutta in 1820. This gentleman, while he reasoned in an extremely loose manner against the existence of an infectious property having been evinced by the disease, and without furnishing proofs of its absence, actually adduces evidence of that property which he is endeavouring to disprove. Thus, where he is stating in general terms, and without any reference to reports from the different medical offices in the establishment, that the disease did not seem to be more prevalent in the tents or hospitals of the divisions of the army, in which the sick were treated, he communicates the following important fact in a note: “A Sepoy died of the pestilence. Five of the corps, who had shown no signs of illness, were employed to carry the body to the grave. They were all seized with the disorder during the ensuing night, and all died.” (*Calcutta Rep.*, p. 130.) Mr. JAMESON, instead of appearing as the editor, or publishing reporter, of the opinions sent to the Calcutta Board, states his own views, endeavours to explain away those which are different from them; and thus the publication, which in the title-page professes to be a report, conveys not a single line of information from any one on the Bengal establishment, excepting this writer himself. The work, therefore, can not be looked upon as furnishing the opinions of the majority of medical men in this part of India, inasmuch as we find no authorities or opinions contained in it but those of Mr. JAMESON himself; and these are evidently so perfectly at variance with one another, and with the ascertained laws by which those diseases which are familiarly recognised as infectious are governed, that we cannot, even although we receive some of the facts which he adduces, consider him as an authority on this subject. In all his remarks he seems to suppose that contact is requisite to the propagation of contagious diseases, and that, because some persons in contact with the sick so frequently escape, the cholera is not contagious. He overlooks the influence of predisposition, which is so remarkably influential in all maladies which perpetuate themselves; and he entirely forgets the operation of those causes which often come in aid of the poison or effluvia exhaled from the bodies of the diseased, even after the exposure of a healthy person to



it, and which frequently determine its action or call it into operation, when, without such reinforcement, it may have failed in producing its specific and deleterious effects. Could this gentleman ever have had any experience of diseases admitted by all to be infectious—had he ever seen smallpox, measles, or scarlet fever? Notwithstanding those misapprehensions, and the evident bias which he betrays in favour of pestilential cholera being non-infectious, numerous facts escape him eminently calculated to support the opposite doctrine. Thus he informs us that the medical staff present with the Hansi force was “*persuaded*” that the infection extended to it from the Meerut detachment, which caught the disease on passing through Delhi, where it prevailed. And at another place he informs us that the centre division of the Bengal army were infected by a detachment which joined it while subjected to cholera. He endeavours, however, to explain away this occurrence; but it is evidently shown, and even admitted by himself, that the pestilence was introduced into this division, either by this detachment, or by some of the Rajah of Sumpster’s troops, which were affected, and mixed with some regiments of the division.

66. After proceeding through a number of pages, in which Mr. JAMESON reasons against the infectious nature of the disease, what was my surprise when I found him, towards the conclusion of his observations on the subject, express himself in the following manner: “This much, however, may be affirmed, from a review of the whole progress of the epidemic in this quarter, that the infectious medium, in whatever it consisted, was confined within a very circumscribed circle, and was very slowly extended to healthy parts of the atmosphere. If, setting aside the circumstances militating against it, we take it for granted that the infection was truly received by the centre and Hansi divisions from the detachments above mentioned, we must believe that the disorder, although not communicable by contact from person to person, was so from one large body to another large body; and that whenever the poison got head among a number of men, it assumed some new quality, so as, when mixed with the atmosphere, to become infectious. What constituted this additional quality we can not pretend to determine; but in support of its existence, we may quote the predilection of the epidemic for cities and camps; the infection of the left division, and the Nagpore and Meerut troops, immediately after entering into the diseased medium at Jubbulpore, Nagpore, and Delhi; and the similar case of the troops and followers in attendance upon the governor-general being attacked shortly after communicating with an infected village in the Gorruckpore district. To the same account may be placed the progressive march of the disorder from one part of an infected place to another, as in the centre and Hansi divisions, and more particularly the Rajpootana force, in which the virus seemed to be regularly propagated from corps to corps. In some instances the suffering body would appear to have sickened immediately upon coming into the poisonous medium, as was the case with the Nagpore troops, who were affected on the very day in which they encamped at the infected village

of Gaongong; but more frequently one or two days would seem to have been requisite to bring the virus into action. Thus the Meerut detachment entered Delhi on the 29th, and was not affected till the 31st; thus, too, the Hansi troops had not the disease till the 6th, the day after the junction of that detachment. Again, by those abetting the opinion of the disorder being communicated to the centre division by the Shergur detachment, it is stated that the first cases occurred on the 11th, two days after its junction. Lastly, the followers of the troops in personal attendance on the governor-general in April first suffered on the 23d, three days after encamping near the infected village.” (P. 144–146.) This surgeon afterward adds, that the disease recently appeared in a detachment of the Rajpootana force under such circumstances as at first seemed to warrant a suspicion of the existence of contagion. Now it appears somewhat surprising that the secretary of the Medical Board of Calcutta, sitting under the eyes of the governor-general, should have been allowed to issue his ipse dixit as to the non-infectious nature of a most devastating pestilence, then in its full strength, when these facts were in his possession, and when many others of a still more convincing character of the infectious nature of the distemper had passed through this very board in their way to the India House, in Leadenhall-street, where I had an opportunity of consulting them in 1827.

67. The foregoing quotation will be found to differ but little from the conclusions which an attentive consideration of the subject has led me to entertain. I have thought it right to be thus particular in the investigation of this subject, because upon the adoption of correct ideas respecting it will mainly depend the employment of successful measures to circumscribe, entirely to prevent, or counteract the disease. And I hesitate not to maintain that, owing to the very loose manner in which this subject has been considered, and to the neglect of means which the due interpretation of the information furnished even by the most skeptical as to the existence of infection, among the reporters to the India medical boards, ought to have led, are to be imputed, in no small degree, the propagation of the disease not only throughout India, but also to other parts of Asia, to Europe, and to America. I have thought it most advisable to go to the original sources for information as to this and various other topics, because the opinions of the Indian reporters were generally derived from an extensive and varied experience of the disease during a number of years, and they were not certainly previously biased in favour of contagion, that being a property which the diseases of India seldom present. While, also, the information which they furnish is of a superior description to that which has appeared elsewhere, the impossibility of obtaining it in this country—particularly the reports, the most valuable part of it—has induced me to refer to them in preference to other authorities. Having shown the identity of the Indian with the European pestilence, the arguments derived from facts observed in the one are equally applicable to both; and, therefore, I pursue the present topic, and farther demonstrate, from the valuable and voluminous reports published

by the Madras government, the inaccuracy of the opinions which have gone abroad respecting the disease in India, and which have vitiated the doctrines and paralyzed many of the measures, both preventive and curative, which have been adopted in Europe.

68. Mr. SCOTT, the editor of the reports which were transmitted to the Madras Medical Board, and were published at length at that presidency, has given an able summary of the evidence which was furnished to him, in conjunction with the results of his own observation. The value of the information here conveyed, its accordance with the most accurately observed facts connected with the manifestation of the disease in Europe, and the difficulty of access to the original, will be a sufficient apology for the length of the following quotations: "Bodies of troops in motion have been attacked, and have retained the disease, while it was unknown to the fixed inhabitants of the country through which they passed. One of two corps in a camp has been attacked, and the other has escaped the disease. Ships arriving from other parts of the world have never suffered under the assumed epidemic constitution of the atmosphere before reaching the shore." "Diseases avowedly infectious, such as smallpox, measles, &c., have not at all times the power of spreading epidemically; for while it is certain that their exciting causes are never wholly extinct, it is only at particular periods that these diseases become epidemic; but we are unacquainted with the circumstances under which this power of epidemic propagation arises. The same may be the case with cholera. All the atmospheric phenomena, and other circumstances brought under the head of occasional causes, have, with little or no interruption, existed from the beginning of time until now, without producing cholera; consequently, the superaddition of a new cause must be inferred. An European, proceeding on his journey to Trichinopoly, on the 15th October, was taken ill about a mile from the Mount, brought back to the house where he had passed the day, and there died. On the 17th the wife of that person, on the 19th the owner of the house, and on the 21st his wife, all experienced attacks of cholera, but recovered. Several of the native servants also suffered. The instances of the disease appearing at places immediately after the arrival of corps and detachments which were suffering from it are very numerous. For example, it appeared at Jaulnah immediately after the junction of a party from Nagpore, among whom it prevailed. It appeared at Aurungabad, and at Malligaum in Kandeish, after the arrival of parties who had left Jaulnah at the time the disease was prevalent there, and among whom it had broken out on the march to these places. It appeared a second time at Malligaum, after the junction of the 1st battalion of the 5th regiment, in which cholera prevailed. It appeared at Secundrabad after the arrival of a detachment suffering from it, and it appeared afterward in the villages through which the detachment had moved. It appeared at Gooty, where no case had been observed for six months before, immediately after the arrival of the first battalion of the 16th regiment of foot, in which it prevailed with great mortality. It is remarkable that the same formidable

type of the disease which prevailed in the marching corps was communicated to the corps at Gooty. It also spread on that occasion to the adjacent villages. It also appeared in a detachment of artillery, previously perfectly healthy, upon their encamping on the ground which had been immediately before vacated by the 1st battalion of the 8th regiment, in which corps the disease prevailed. The bodies of several persons who had died of cholera remained exposed on the ground when it was taken up by the artillery. The prisoners in a jail, enclosed by a high wall, have escaped cholera, while it prevailed all around them; and the inhabitants of certain hilly ranges have also escaped the disease. These have been said to have interdicted all intercourse with the people below. When cholera is once established in a marching regiment, it continues its course in spite of change of position, food, or other circumstances. Its approach to a town has been traced from village to village, and its first appearance in a town has been in that quarter which was nearest the track of its progress. The sudden appearance and disappearance of cholera, however unlike the progress of known infectious diseases, is not admitted as being irreconcilable with the doctrine of infection, especially if the disease be of sudden invasion after the application of the exciting cause. The relations who have attended on people ill of cholera, as well as the nurses appointed in military corps for that duty, and in general those whose employment has led them to be much with the sick, have been observed, in very many instances, to be attacked with cholera during, or shortly after, their attendance. The sick in hospitals labouring under other diseases have likewise been observed to be attacked with cholera, especially those who lay near the patients ill with that disease. Sometimes whole families have been swept off successively.\* Servants have often been observed to sicken after attending their masters." (*Madras Reports*, p. xlviii., *et seqq.*)

69. This, however, is only a portion of the facts and circumstances advanced by Mr. SCOTT in proof of the infectious nature of this pestilence. In addition to the foregoing, I may add the opinion of several able and experienced surgeons and physicians, contained in their reports to the Madras government: Superintending Surgeon DUNCAN states, that "the 34th regiment carried the pestilence with them from Bellary to Nundydroog, and there was no trace of the disease in any village on the road. Since the regiment passed, every village on the road has been attacked by cholera." (*Madras Rep.*, p. 111.) Mr. TRAIN adds, that "the attacks have shown a great disposition to run in families, and even among the attendants on the sick, and have in such cases been much more severe than usual." (P. 131.) Mr. ENGLAND observes, that "the disease has been greatly felt among the attendants on the epidemic patients at various places." (*Op. Cit.*, p. 170.) He also notices the extension of the disease from troops and travellers to places, on the

[\* This rapid transmissibility and maturity of the disease in persons to whom it is communicated is another peculiar feature in its contagious character. This extreme rapidity of development is in perfect keeping, also, with the often astonishingly rapid termination of the disease, in death.—T.]



roads through which they had passed, and other facts similar to those already recorded in proof of its infectious nature.

70. Mr. CHAPMAN, after stating facts perfectly in accordance with those furnished by the reporters already quoted, adds, that he feels most confident of having experienced the attack of the disease, under which he had with difficulty recovered, from infection. Being anxious about a patient, he remained with him for several hours, watching the progress of the disease. He felt nausea on quitting him, but attributed it to the peculiar fetor evolved from the evacuations. On the following morning he was attacked with cholera, which nearly proved fatal. He proceeds: In the same detachment, a woman, anxious about the safety of her child, slept in the hospital tent, in which several choleric cases were present; in the morning she was attacked with the disease, and died. Three orderlies, also, slept in the hospital, and in the morning one of them was attacked, but recovered. "Thus it will be seen, four persons sleep in an hospital containing the infection of cholera, and that two are on the following morning attacked with the disease; whereas from the whole camp, consisting of 1500 or 1600, not five cases had occurred." "That the disease is contagious appears to have been observed by the natives themselves, and it thus commonly happens that the sick are avoided by those whose duty does not call on them to attend. A village in which cholera is prevailing is usually evacuated for a short period, until the disease is annihilated; these, and many others, are the proofs of their opinion of its contagious nature." (P. 189.)

71. Mr. STOKES, in his comprehensive report, states several well-ascertained facts, showing the infectious nature of the disease. The case of Mr. RUMBOLD, assistant-surgeon, is almost demonstrative of this property. He had been visiting some very bad cases, when he was seized with sickness at his stomach, and giddiness; and coming out of the tent, he fell down faint, and from that period he believed himself infected with the malady. He soon became one of its victims. The sickness and faintness with which Mr. RUMBOLD, in a state of high predisposition, "from fatigue of mind and body," was affected, may be easily accounted for by the information which Mr. STOKES gives in the following page. He states, that in the worst cases "a peculiar and offensive fetor was observed to issue from the body, particularly when it was covered with much sweat; it was very disagreeable when first perceived, and seemed to hang about the nostrils, exciting, long after, an unpleasant sensation." (P. 211.) In another place, he remarks, "It was found among many who came to the hospital, that some time previous to their being attacked, the disease had existed in the family to a greater or less extent, or some one branch had been ill or died of it. In others, it had spread progressively through the whole, or nearly; and among those who officiated as orderlies or attendants at the hospital, several were attacked, and some died." (P. 217.)

72. Mr. PATTERSON observes as follows: "I feel convinced that a corps on its march, catching the exciting cause, will carry it along with the corps for weeks, and to a very considerable

distance. Let this corps be halted on the finest spot of ground possible, let healthy corps join this, at short and regular intervals, and I feel convinced the disease would attack those healthy corps in a few days, and according to their respective arrivals. If this be not contagion, I do not know what name to give it." (P. 224.)

73. Dr. DAUN, while he refrains from giving any opinion as to the contagious nature of the disease, states the following facts in proof of it: "On the 10th, when in attendance on O'Brien, I became indisposed in such a way as to lead me to apprehend an attack of the epidemic. On the 12th, Mr. Gray was attacked, after having been up part of the night with Thomas Flannigan. Mr. Gray was, during his illness, constantly attended by lieutenants S. and M'D., who have since had both of them attacks of the epidemic, and no other officers except them at this station have been attacked." (*Op. Cit.*, p. 273.) And, lastly, as respects the official reports, Mr. KELLIE furnishes both facts and arguments, many of them similar to those already adduced in support of the infectious character of the pestilence. (P. 68-77.)

74. The above evidence I consider amply sufficient to prove that the disease, even from the commencement of its ravages, evinced unequivocally infectious properties. If my limits would permit, I could also demonstrate from the same sources that the eyes of many were shut, by previously entertained dogmas on the subject of contagion, against this property; and that several, even where they were arguing against its existence, were actually adducing important facts in support of what I have been cautiously led to believe, namely, that the disease manifested a tendency to propagate itself by means of a morbid effluvia exhaled from the bodies of the affected, similar to what is evinced by measles, and fevers whose infectious properties have been well ascertained and generally admitted.

75. It appears extremely singular that, notwithstanding the evidence which has been now quoted, in the very words of the reporters to the different Medical Boards, no means of preventing the propagation of the malady were resorted to during the number of years it has existed in the East. Surely the doubts even of the skeptical ought to have led to a careful inquiry; and most certainly the natives of the country, and the European population under the British dominion, had even a *right* to expect that those placed to watch over their health, and to devise measures for its preservation, would have attended to the unequivocal opinions expressed by a number of the best-informed medical officers in the service; and that, although a great difference of opinion existed among them, this very circumstance should have led to more intimate inquiry and a careful sifting of the truth. At all events, the error—if error it could be called—should have been on the safe side; and the Medical Boards, superintending surgeons, or others to whom the duty appertained, should have pointed out the importance of preservative measures to the government, and to civil or military officers placed over districts and corps, and have adopted the suggestion of one of their most able medical officers, who has stated the following in one of his reports to the

Madras Board: "Whether or not the disease in question be contagious is a subject of infinite importance; but where the slightest gleam of doubt obtains, it is surely better to adopt the means usual for the purpose of preventing its propagation, by appropriate *quarantine* of troops on the line of march, by preventing their immediate entrance into stations when under the influence of cholera. By these precautionary measures, I conceive it possible to preserve the lives even of thousands of individuals." (P. 189.) That no precautions of any description were taken in India to prevent the propagation of the disease, may be stated without any reservation; and hence, most probably, the reason of its extension over so very large a portion of the whole globe.

76. Before leaving this part of the subject, it may be as well to take a hasty glance at the opinions expressed by some other authors who, having observed the disease in India, have written respecting it. Mr. ORTON, who published at an early period of the epidemic an able work on it, referred it to electro-aerial influence. He now states his belief in its infectious nature. Mr. ANNESLEY expressed himself in his publication against the doctrine of infection, and imputed the disease to a similar state of the air to that assigned by Mr. ORTON, without being able to point out in what this state consisted. But "de non-apparentibus et non-existentbus eadem est ratio." Mr. ANNESLEY, however, appears not to have directed that attention to the subject of infection in relation to the disease which would impart much importance to his disbelief in its existence. In proof of this, I may merely refer to the circumstance of his quoting the letter of a correspondent, containing the following remarkable proof of infection, without adding any explanation or remark: "We have, however, been particularly fortunate till our arrival at this station, not having lost a man, or having one seriously ill, though we had been under canvass above five weeks. We fell in with a battalion of native infantry who were suffering from cholera; the next day six Europeans were attacked, the number increased daily, and most of the first cases proved fatal." Dr. KENNEDY, from extensive experience of the malady among both native Indians and Europeans, states facts and arguments in proof of its infectious nature, and he justly places particular stress upon the peculiar odour exhaled from the bodies of the affected, as indicating the generation of a principle calculated to propagate the malady.

77. I have now shown, from the chief sources, that the disbelief of infection, in respect of the pestilential cholera, was not general in India; that the productions which issued from the three Medical Boards very strongly favoured, and, indeed, proved the existence of this property; that two out of the three actually insisted upon the activity of its influence; and that, therefore, the dangerous opinion, so very generally propagated, and even acted upon, both in this and foreign countries, that the authorities in India did not consider the disease infectious, is entirely without foundation in truth.

78. The identity of this pestilence with that which has ravaged the East has been proved, and, indeed, is scarcely anywhere called in question. Some authors have supposed that it

has acquired new properties and characters since its first appearance and early prevalence in India, and that its infectious property is one of these. But I am entirely convinced that this is not the case. Even varieties of the disease cannot be admitted; for it is essentially the same, presenting merely gradations of intensity, and modified effects according to these gradations.

79. Several writers have supposed that the disease has originated in a number of distinct and far distant places from those causes to which the disbelievers in infection altogether impute it, and to which I shall direct a brief attention (§ 97, *et seq.*); and that it has, owing to the combination of those circumstances and causes which are generally admitted to be productive of infection, assumed this character; or, in other words, that the malady was not originally infectious, but that it has had this property superadded to it from the circumstances of imperfect ventilation, neglect of cleanliness, and crowding together of the sick. There cannot be the least doubt of those being fertile sources of an infectious principle, and that they tend greatly to aggravate all diseases, whether infectious or non-infectious; but I have remarked, in the course of my inquiries, and of my personal observations, and in the accounts of various observers, that the propagation of the malady from the affected to the unaffected frequently took place, although not to the same extent, or with the same malignity, in open, and airy, and thinly-inhabited situations, and during opposite states of the atmosphere as respects both humidity and temperature.

80. I shall next adduce proofs of the infectious nature of this pestilence in other parts of Asia, in Europe, and elsewhere. But I shall be very brief, because, the identity of the malady in both hemispheres having been fully and generally admitted, and its infectious nature in India having been completely proved, it must necessarily possess the same character in Europe, unless counteracted by powerful means; and, therefore, a minute detail of facts is not required. Several authors have insisted on the proofs which have been furnished of the introduction of the disease into the Isle of France by the *Topaze* frigate, and the circumstance of about 20,000 of the inhabitants having been seized with it, above two thirds of whom died, no precautionary measure having been resorted to; but that when the malady had been propagated to the adjoining island of Bourbon, a sanitary cordon was established, and only 256 persons were attacked. When the disease appeared in Aleppo, in 1822, the French consul, M. DE LESSEPS, convinced of its infectious nature, placed himself, his family, and all those who wished to join him, in strict quarantine, in a place adjoining the town. This colony, consisting of about 200 persons, remained perfectly secure from the disease, although 4000 persons died of it in the city. If it proceeded from some unknown state of the air, as supposed by the anti-infectionists, to what cause can we impute the escape of those who had so secluded themselves, for they surely must have breathed the same air as those who were affected? M. HUBENTHAL states, that a peasant having arrived from Arkatal, on the borders of



Persia, at the village of Neskutshne, to visit an uncle, was seized, the night of his arrival, with the disease. The persons engaged in restoring the heat of the body by frictions, &c., four in number, were attacked on the following day, and three of them died. Precautions were taken by the police to arrest the progress of the pestilence in the village, and it spread no farther. If the causes of the seizure had existed in the air, or state of the locality, how came all the inhabitants, excepting those who had been exposed to the inhalation of the effluvia from the affected person, to escape?

81. According to the reports of the Medical Board of Ceylon, the disease made its appearance in 1819, in Jaffnah, in Ceylon, imported from Palamcottah, with which Jaffnah holds constant intercourse, and thence it was propagated over the island. In August, 1820, the Leander is stated to have called at Trinquamalee from Pondicherry, and to have landed several of her crew affected with cholera. Trinquamalee, soon afterward, was infected, and the pestilence was again propagated over the island. The Island of Sumatra was believed to have been infected in 1819, from the intercourse carried on between Achem and Malacca, across the intervening strait; and it seems to have reached Penang and Singapore towards the end of the same year, in the same manner. Dr. LABROSSE states that the prisoners in the jail of St. Denis, in the Isle of Bourbon, who were employed in the removal of the dead bodies, all died of it; that, at the lazaretto, two servants alone escaped; and that in the hospital it was communicated to the attendants and other patients. M. MOREAU DE JONNES states that it was imported into Muscat, in Arabia, by the English East India ships; and Dr. SALINAS says that it was carried into the port of Bassorah, in 1821, by a vessel from India, and that it spread from this port, extending from town to town, even as far as the coast of Syria. When the pestilence reached Manilla in 1820, where it was believed to have been imported by ships whose crews had been, or were infected, those vessels in the harbour which abstained from intercourse with the shore entirely escaped. At Bankok, the capital of Siam, it was said to have been introduced by the ships trading there from British India. It was supposed that 40,000 persons were attacked in this city and vicinity. Its appearance in Java, in 1821, was likewise considered to have been owing to the unrestricted intercourse of infected vessels, particularly the junks trading to Samarang, whence the pestilence spread over the island, carrying off upward of 100,000 of its inhabitants. Its irruption in Canton in 1820, in Macao in 1823, in the Moluccas in the same year, and in various places in the Persian Gulf, and on the coast of the Arabian peninsula, was generally attributed to vessels which had arrived from infected places.

82. Dr. MEUNIER states, that at Bagdad, where a third of the inhabitants was attacked, none were affected but those who approached the sick. Dr. REIMANN says that there was not a single instance of a town or village in Russia which contracted the malady without previous communication with houses or persons affected. Drs. RUSSELL and BARRY, who were sent by the British government to St. Peters-

burg, in order to investigate the nature of the disease, state that the number of medical men and hospital attendants attacked with cholera in that city was extremely great, particularly in ill-ventilated hospitals; and they, as well as Dr. WALKER, who was sent to Moscow, express their belief in its infectious property. The report from these gentlemen to the Privy Council, dated the 20th of September, at St. Petersburg, has been kindly allowed me for perusal by Sir WILLIAM PYM, and it abounds in proofs, remarkably in accordance with the quotation from Mr. SCOTT's report (§ 68), demonstrating the infectious nature of the disease.

83. The director of sanitary police at Petersburg, Dr. REIMANN, after expressing his conviction that the Russian pestilence is entirely the same as that which has been so fatal in India, states that most decisive proofs have been furnished him that it has not been of indigenous production, but has been introduced by persons who have arrived from infected places on the borders of the empire. He farther states that he is convinced of its being less active and less fatal, according as the place in which it is introduced is more airy, elevated, clean, and free from the usual cause of insalubrity; while its increased fatality in low, moist, thickly inhabited, and dirty places has been demonstrated on numerous occasions. The personal and domestic cleanliness of the inhabitants has also a most remarkable effect upon the infectious property of the malady and its fatality. In proof of this, Dr. REIMANN states, that in a village almost entirely peopled by Jews, 700 deaths occurred from among few more than 800 who were attacked. These conclusions are perfectly in accordance with the laws of all infectious diseases, and are entirely such as *a priori* reasoning would lead us to adopt.

84. In September, 1823, the disease first appeared at Astracan, and the Russian government resorted to preventive measures in order to arrest its progress. Whether or not those measures were the cause of its disappearance may be difficult to determine, but it did disappear, and it was not until 1830 that it showed itself again in that city. In 1828 the pestilence broke out in Orenburg, and was supposed to have been introduced either by the caravans which arrive there from Upper Asia, or by the Kirghis Cossacks, who are adjoining this town, and among whom it was said to have prevailed at this time. During the winter the number seized was not great; but in the spring of 1829 it raged severely, and extended to the villages in the province. During its prevalence in this part of the Russian Empire, many of the physicians, who at first did not believe in its infectious properties, were induced to change their minds, chiefly owing to the circumstance of its appearing in places very soon after the arrival of persons affected with it. Several instances of this description have been recorded by Dr. LICHTENSTADT among the official documents published by him. Another circumstance evincing the infectious nature of this pestilence was the peculiar irregularity of its course; and to this may be added its extension in the lines of the principal roads and channels of traffic.

85. The introduction of pestilential cholera into Astracan, in 1830, was traced to a vessel

which arrived from Baku, a town on the shore of the Caspian, and at that time affected with cholera. This vessel lost eight of her crew on the voyage, and the sick were brought to the lazaretto; a day or two after which the pestilence first appeared in this populous town. According to Dr. SOLOV, it attacked the suburbs on the 27th of July, and gradually extended to the nearest villages, and thence over the whole government. It proceeded through the Cossack stations and towns on the highway to Moscow, and up the streams of the Volga, at the mouth of which Astracan is situated. Its extension was attributed to the fugitives from the places successively attacked. After visiting the principal towns, and committing unheard-of ravages on the high roads to Moscow, the pestilence reached that city at the end of September. Towards the end of 1830, or soon afterward, a body of troops from Koursk, a province at that time affected with the pestilence, was marched against the Poles. These troops carried this scourge along with them, affecting the places in their line of march through Podolia and Volhynia. In this way the towns of Astrog, Zaslaf, and Luck became infected; and from the last of these places the disease passed the Bug into Poland. Here it appeared with the invading Russian army, and was communicated to Lublin, Siedlec, Praga, the Polish army, and Warsaw.

86. The following is an extract from a letter written by a clergyman, who witnessed the disease in Saratoff, and published in the *Quarterly Review* for November, 1831: "Scarcely had we heard of the breaking out of cholera in Astracan, than the news came to us like lightning that it was coursing the Volga, and that it was severe, and had already reached Zaretzin. Without a dread of the presence of the angel of death, the vice-governor, the medical inspector, and the government as well as the hospital surgeon, at once went into the infected places of this province. On the evening of the 6th of August we heard that three persons had been seized with cholera who had left Astracan, and were carried to our hospital. On the 7th, others were reported to have been carried off by this malady with such frightful rapidity as to have impressed all minds with deep consternation, especially those who dwelt in the second division of the town. The disease soon appeared in the third division, and seized so many that the hospital could no longer contain the sick, and killed so rapidly that they scarcely survived six hours. The evil came so suddenly on us, that we had no time for taking precautions; our governor and our surgeons were gone to meet it afar off, in order to preserve our city, but it was already among us before any regulations could be made, or any means of opposing it could be devised. It could scarcely be reckoned an epidemic, depending on some change in the atmosphere, for many places were left untouched in our neighbourhood, while in Saratoff there was scarcely a family who had not to lament the loss of some of its members.

87. "In the very commencement of the epidemic, all our four surgeons were seized with it; two died on their journey to Zaretzin, and one here. From this moment fear and anguish took possession of the public mind. They who

could flee from the city, fled; and, as the malady was not considered contagious, servants, labourers, Tartars, and Russians were permitted to rush into the country. My congregation, which consisted of 550 individuals, was reduced to 150. Many of the fugitives died on the road, and spread the malady whithersoever they went. From the 10th of August the malady increased in virulence; the daily mortality of 4 rose to 5, 12, 20, 80, 120, 200, and one day to 260, and decreased in the same gradual mode. Up to the 30th of August, 2170 persons died. While all around was infected, Sarepta, in which the quarantine regulations were most strict, escaped, and yet this disease is not called contagious."

88. From among other evidence—indeed, I may say a mass of evidence—that furnished by Dr. REIMANN, of St. Petersburg, as to the extension of the disease through Russia, may be adduced: "The cholera was brought to Astracan by ships, and it has spread itself over Russia from Astracan by the emigration of the inhabitants, principally those of the lower orders. This is the chief cause of its propagation in Russia; it has never shown itself in any place except where it has been brought by travellers who came from infected places. *We have not a single instance* of a town or village which, without communication with houses or persons affected, has contracted the disorder. Several places surrounded by the disease have preserved themselves from it by a rigid insulation."

89. The introduction of the pestilence into St. Petersburg is referred by Drs. BARRY and RUSSELL to the arrival of vessels from places on the Volga where it prevailed. In that capital the infectious nature of the disease was shown, not only by the mode in which it was propagated in various quarters, and by its introduction into, and extension through, the prisons and hospitals of the city, but also by its exclusion from some places by a rigid insulation. Among numerous other instances the following may be mentioned: Up to the 13th of July, fifteen hospital physicians were attacked by the disease; and "the proportionate number of attendants of all descriptions on the sick who have been taken ill with cholera is fully greater than that of the medical men." "There were 150 pupils on the officers' side (Military Academy at Cronstadt), which is kept perfectly distinct from the school for petty officers and sailors. The gates were shut on the 19th of June, and as strict a quarantine as possible maintained to the 6th of August (O. S.). No case occurred among the pupils, who are from nine to twenty years of age."

90. In a letter from Dr. RUSSELL (*Medical Gazette* for November 11th, 1831), the following remarkable fact is communicated: "The son of a villager in the government of Pensa, who was coachman to a nobleman at fifty versts' distance, died of cholera; the father went to the place to collect the effects of the son, and brought home with him his clothes, which he put on and wore a day or two after his arrival at his native village. He was shortly thereafter seized with cholera, and died of it: three women, who had watched him in sickness, and washed his body after death, were also seized, and died of the disease. The doctor arrived in



time to see the fourth case; and, finding that the disease spread on that side of the village, he had the street barricaded on the side where it had not reached, and interdicted all communication to the two sides of the village. In that side in which the disease first broke out, upward of 100 cases of cholera occurred, of whom forty-five died, but it did not appear on the other side of the barricade." And Drs. BARRY and RUSSELL report, that "the Navarino corvette, Captain Nachinoff, 200 men, had been placed two miles to the eastward of Cronstadt during the epidemic, to question and examine all craft from St. Petersburg. She had eleven severe cases of cholera, of whom eight died. Her first and second cases occurred on the 26th of June (O. S.). These two men belonged to the boat that examined the vessels coming from St. Petersburg, on board many of which they had been. The next men who fell ill were of those who carried the two first cases to the hospital in town." These are but a very few from the many facts of the same description now before me.

91. With regard to the appearance of the disease in Berlin, the following extract of a letter from Dr. BECKER of that city, dated the 29th of September, 1831, furnishes information: "I am a most decided contagionist, and it is the force of facts which has made me so; for on the authority of your Indian practitioners I formerly believed the cholera not to be contagious. The appearance of the disease in Berlin, and the manner in which it has spread, is also very remarkable, and affords supplementary evidence in favour of contagion. The conclusion at which I have arrived is, that the *efficient* cause of the Asiatic or malignant cholera is always a virus, the production of *human effluvia*, and which, according to common medical language, undoubtedly deserves the name of a *contagious principle*; but that this virus, in order to produce the disease, requires, first, like the contagion of the small pox, measles, typhus fever, and even the plague, a disposition of the atmosphere favourable to its development; and, secondly, a peculiar disposition of the animal economy in every person who is exposed to it. This disposition appears to be brought on by previous disease, particularly bowel complaints, by excessive fatigue, cold, errors in diet, drunkenness, fear, &c. One young physician has been one of the first victims of the cholera, a decided anti-contagionist; he carelessly exposed himself, died, and, as if his case was to be a warning proof of the fallacy of his opinions, his death was immediately followed by that of his landlord and two children, and the illness of the servant-maid in the house, the only instances of the disease in that street." In a report subsequently given by Dr. BECKER (*Medical Gazette*, 12th of November, 1831), it is stated distinctly that the disease was introduced by the vessels navigating the River Spree, which runs through the city.

92. The introduction of the disease into this country was certainly owing to the clothes and bedding of sailors, who died of it at Riga, and other northern continental ports, or during the voyage from these ports, having been too generally preserved and delivered up to their friends, upon the return of infected vessels to British ports. Of this fact, already adverted

to (§ 16), several proofs of an incontrovertible nature were furnished me by two masters of vessels, on board of which several cases of cholera occurred during the voyage from infected ports. These masters were at the time, conformably with the then prevailing opinion, persuaded that the distemper could not be propagated by the clothes of those who had died of it; but facts soon afterward occurred which demonstrated to them the propagation of the malady in this manner as well as by direct communication with the affected. Soon after the opening of the first cholera hospital in the vicinity of London, near Bermondsey, I passed a considerable time with the patients first admitted, and was present during the inspection of two fatal cases. I drove thence in an open carriage, and saw two relatives, residing in an airy situation in Pentonville, a distance of from three to four miles; and yet the persons whom I visited, after so long a drive in the open air, complained to me, instantly upon my entering their apartment, of the offensive odour which proceeded from my clothes. I was cautious in not mentioning the source of this odour, and no suspicion was entertained by them of the cause. But the following day I was called to them, and found them both in an early stage of the distemper, from which they ultimately recovered with difficulty. Precautions were taken against the farther extension of the malady in this house, and no case occurred in the vicinity until some months afterward. Other proofs of infection occurred to my observation; but it is unnecessary to advert to them at this place. I shall hereafter state briefly the conclusions at which I have arrived after the closest attention I could devote to the subject.

[There have been various hypotheses suggested in relation to the nature of the agent to which cholera owes its origin, each of which numbers its ardent supporters, and is maintained with all the array of facts and arguments that can be summoned in its defence. Some, for example, regard the disease as entirely atmospheric, depending on changes in the ponderable or imponderable elements of the air, without the addition of some new ingredient. Others, again, consider the *materies morbi* to be a modification of vegetable miasma, produced by peculiar causes of heat, moisture, &c., acting on the productions of the soil. A third sect believes that the agent is some latent matter, evolved from the crust of the earth, and produced by volcanic and other changes, according to the views of epidemic causes, as laid down by our countryman, NOAH WEBSTER. Another party, still, regard it as strictly an agent, depending for its spread, like the virus of smallpox, on *canine rabies*, or direct contagion; understanding by this some morbid element eliminated from the human system, and propagated by actual contact or close proximity. This party, of which Dr. COPLAND may well be regarded as the leader, believe that other causes, such as endemic influences, atmospheric vicissitudes, &c., have but a limited effect, and are not essential to the development and action of the *materies morbi*. Its transmissibility, if they are to be believed, is only possible through human intercourse. Lastly, Dr. HOLLAND and some others have attributed the origin and spread of cholera to *insect life*,

existent in the atmosphere under certain circumstances; while others, still, have traced it to eating bad *rice*. Every medical man who has devoted any attention to the subject must be aware of the numerous and almost insurmountable difficulties with which it is beset. The agents about which we are inquiring are subtle, invisible, uncognizable by any methods known to science. We are able to form but very vague conceptions of the various conditions in which the bodies receiving these agents are placed, either by changes in themselves, or by physical alterations in surrounding media. Anomalies meet us on every hand; and when we have flattered ourselves that we have arrived at a general law, we unexpectedly find so many exceptions that we are obliged reluctantly to abandon it, and seek for another. The views we shall take of this disease, as well as of yellow fever, may not find favour with the advocates of either of the exclusive hypotheses above mentioned, but as they are those which we honestly entertain, after a careful investigation of the subject, we shall proceed to state them as briefly as we are able.

I. The disease—we speak of it as it prevailed in this country—was essentially *atmospheric*; in other words, it was an epidemic, depending chiefly on certain unknown atmospheric causes for its extension.

This is proved by its history and progress. In the fall of 1831, influenza prevailed to a great extent, appearing first in November and continuing until January, 1832, proving very fatal to the old and infirm. This complaint was characterized by very great irritability of the digestive organs, so that antimonials and purgatives were badly borne; and the scarlatina, which prevailed during the same season, was marked by the same intestinal irritability, and often presented instances of collapse and unexpected death, similar to what was afterward observed in cholera. Cases, also, of cholera morbus, and dysentery of an aggravated type, were extremely common during the winter, many of which terminated fatally. The common cholera, which is generally endemic in Montreal in summer, made its appearance in April. Diseases throughout Canada and the United States were characterized by a low typhoid type, essentially different from that of former years.

The epidemic cholera first made its appearance on this continent at Quebec, on the 8th of June, 1832, when eight cases occurred, and fifteen on the subsequent day; and so rapid was its stride that it reached its acme on the 15th day of June, seven days after its first appearance. During the latter part of May and the first week in June, according to Dr. ROBERT NELSON, diarrhœa was a common and predominant symptom in every form of disease that prevailed at Montreal; and on the ninth of that month cholera, in an epidemic form, burst upon that city; and so rapid was its progress, that in nine days it reached its height, a fact, perhaps, difficult to explain upon the doctrine of contagion alone. The same intelligent physician informs us that, during the same night of its first appearance, it attacked numerous persons, in various parts of the city, remote from the port and from each other, and having no communication with the port or

place of landing. In two weeks eight hundred persons had died of it. It continued its progress from one place to another, along the St. Lawrence and the lakes, outstripping the progress of travel and emigration, and appeared in Detroit early in July. With respect to the appearance of cholera in Quebec, which Dr. COLLAND says was conveyed in an emigrant ship (§. 17), it was stated in the Quebec Mercury, at the time, and the statement was afterward confirmed by the testimony of the most respectable physicians of that city, that, although the first cases were among emigrants, all attempts to trace it to any vessel had been unsuccessful, and that the sickness on board the Carrick and other vessels suspected, was ship-fever, small-pox, &c. In the first two weeks of its prevalence there were one thousand deaths.

The cholera first appeared in the city of New-York on the 26th day of June. The patient, an intemperate Irishman, had not been out of the city for some weeks, but was attacked after a debauch and falling into the dock. He came under our care, and died at the medical mansion in Greenwich, more than two miles from the place (Cherry-street), where other cases occurred the ensuing day.—(See *Commercial Advertiser of June 28-9, 1832.*) The disease reached its climax in this city twenty-seven days after its commencement. The disease broke out at the almshouse establishment at Bellevue soon after its first appearance in this city, 27th of June. The patient first attacked had not been out of the house for some time previous, and of course could not have been exposed to any foreign causes of the disease. The same remark will apply to its first appearance among the inmates of the state prison at Sing Sing, where it broke out on the 17th of July, and proved extremely fatal. We are authorized in stating that the disease originated in the establishment, not only from the rigid discipline which is there enforced, and which renders it highly improbable that any foreign communication should take place which could escape detection; but especially from the testimony of the superintendent and physician of that institution that the disease was not introduced from abroad, but originated within the prison.\*

It is worthy of remark, in this connexion, that the cholera made its appearance in New-York sixteen days after the first case occurred in Quebec, and without having shown itself at any intermediate spot between Canada and this city, all the intermediate cities on the sea-board of the provinces of New Brunswick, Nova Scotia, and of the states of Maine, Massachusetts, and Rhode Island, remaining wholly exempt. The first case of the disease at Albany occurred on the 3d of July, having been preceded for weeks by the general prevalence of diarrhœa.

According to the best authorities, the first case of the disease in Philadelphia was observed as early as the 5th of July; but, according to Professor JACKSON, it did not assume an epidemic form until the 27th of the month, when the epidemic influence acquired its full sway,

[\* See *Reports of Hospital Physicians and other Documents in relation to the Epidemic Cholera of 1832*, p. 26. (Published by order of the New-York Board of Health 1832.)]



and cases were daily developed. The epidemic obtained its acme about the 6th of August, from which time it rapidly declined. "Taking the 27th of July as the proper commencement of the epidemic," says Professor J., "in Philadelphia, and the 1st of July as the same epoch in New-York, we have twenty-seven days for the transmission of the epidemic. The distance in a direct line is between eighty and ninety miles." (*Am. Jour. Med. Sci.*, vol. ii., p. 291.) The same writer remarks, that "the routes or lines of communication leading from the St. Lawrence to the United States do not appear to have been the means of conducting it into our territories, or infecting our cities, notwithstanding the number of emigrants and others who penetrated into the country in those directions."—(*Loc. cit.*) The cholera did not make its appearance in Boston until about the middle of August, and then only in a sporadic form; the whole number of cases of it, as stated in the annual report of deaths, being 78.

During the same month it appeared at Baltimore, Washington, and various other places in the United States. About the 1st of October it suddenly broke out at Cincinnati, and nearly at the same time at Madison, Louisville, and St. Louis. It reached New Orleans late in the month of October. Leaving the Ohio, it visited Tennessee, Illinois, Indiana, and Kentucky, Lexington, Maysville, and other towns suffering very severely.

It would not be difficult to show that the cholera appeared in many places besides those above mentioned, without the possibility of tracing it to any foreign source, as at Grenville, on the Ottawa River (C. E.).—(*Bost. Med. and Surg. Jour.*, vol. ix., p. 55.) Such are some of the reasons which induce us to believe that this disease was an epidemic depending mainly on some unknown distemperature of the atmosphere, whose laws have never been satisfactorily investigated or explained.

II. Cholera is, under certain circumstances, hereafter to be pointed out, *contagious* or *infectious*; using these terms, with Dr. COPLAND, as synonymous. We see no incompatibility whatever in attributing its spread to both of the above-mentioned causes, and we think that physicians have unnecessarily taxed their ingenuity in attempting to limit its spread to a single cause. All admit that the *typhus* or *ship* fever is generated by confining many persons in a small compass without due regard to ventilation, cleanliness, and proper food, and that it is, moreover, *contagious*; that is, capable of propagation to those who have not been under the influence of the same predisposing causes. Scarlet fever, measles, and hooping-cough are instances of epidemic diseases, being also propagated by personal contagion, while they owe their origin and general prevalence to some unknown constitution of the air. Cholera, yellow fever, and plague belong, in our judgment, to the same category. It is idle to attempt to account for their spread upon one principle only. There is nothing, moreover, *unphilosophical* in our position. *One cause*, doubtless, might be sufficient to produce equally devastating effects; although we know of no simply contagious disease which bears any analogy in its rapidity of extension and fatality to that of cholera; but the question at issue is, are the facts of

the case reconcilable upon either hypothesis singly? We repeat that they are not. In the operations of nature, we not unfrequently find the same results brought about by several causes; as heat and light by the rays of the sun, by friction, and electrical and chemical action. We shall quote a few examples, where the disease was propagated, beyond all question, by contagion.

On the 31st of October, 1832, the brig *Amelia*, bound to New Orleans from New-York, was wrecked on Folly Island, about twenty miles from Charleston. Some of the passengers laboured under cholera, which prevailed at New-York when she sailed. They were all landed safely, and lived in the few buildings on the island and in tents. There they continued to sicken with the disease. A boat's crew of wreckers had gone to the stranded vessel to save her cargo, and, on their return to town, one was seized with cholera and died. The rest of the crew were ordered to the island to perform quarantine with the persons landed from the brig, and one was taken on his way and died in the boat. There were four negroes on the island. Three physicians were sent from the city to attend the sick, and a detachment of the city guard was detailed to enforce the quarantine. Of the wreckers, thirteen in number, several were attacked, and eight died of cholera. One of the physicians was seized with it, but recovered. The nurse of the wrecker, above mentioned as dying in the city, himself sickened and died, after being sent to the island. Of the four negroes residing there, three died; of the guard sent down, eighteen in number, ten were sick, and one died.\*

On the 17th of July two females left New-York in a packet for Newport, where they arrived well the next day. After being detained a week at quarantine, they were permitted to land on the 25th. They were both sick with cholera when they landed, of which they both died on the same day. On the 30th, Mr. FOSTER, who had assisted in burying them, was attacked with the same complaint, but recovered. Immediately after this his wife and three children were attacked with cholera, of whom the wife and two children died. (*Reports on Cholera*, &c., N. Y., 1832, p. 19.) The disease was also communicated to two persons at the hospital, where two of the above patients had been removed, both of whom died. The town of Newport was, at this time, perfectly healthy, and there was no ground to suspect the operation of any general or local cause.

Dr. ELLWOOD, of Rochester, states that a man who had attended some friends sick of cholera in that city, went to Mendon, a small village sixteen miles east of that place. He died of cholera the following night. There had been no case of the disease there before this. Of six persons who attended him during his sickness, and buried him, not one escaped an attack, and four died within a week. There were afterward thirteen deaths by cholera in a population of only one hundred and fifty persons. (*Loc. cit.*, p. 20.)

At Manchester, Ontario county, New-York, a similar fact was observed. A lady arrived there, and died five days after leaving New-

[\* *Essays on Pathology and Therapeutics*, &c., by SAMUEL HENRY DICKSON, M.D., vol. xi., p. 92.]

York. Her sister, who resided at Manchester, and was with her during her illness, died two days after. (*Loc. cit.*, p. 20.)

In Oneida county, New-York, some Indians were employed to bury a person who had died of cholera in a canal-boat, six of whom died of cholera very soon after. In all the above instances there had been no cases of cholera previously within many miles of the places mentioned.

The above, and numerous facts of a similar kind, oblige us to adopt the doctrine of contagious contagion, with the full conviction, moreover, that contagion *per se* is utterly inadequate to account for the phenomena attending the prevalence of this disease. It is a malady, we believe, propagated, as a general rule, by other agency than that of reproduction by the human system; and yet at times, and under particular circumstances, by no means fully understood, it is so reproduced, and acquires contagious or infectious properties, so called. At any rate, the fact has been, in our judgment, fully established that the disease cannot be localized and restrained by quarantines; theory and experience both demonstrate the inutility of preventive measures of this kind. The cholera is contagious just as typhus fever is contagious, in crowded, unventilated dwellings, amid filth, intemperance, and poverty; rarely in cleanly, airy apartments, the inmates of which are regular and temperate, well-fed and well-clothed.]

93. ii. *The Infection of pestilential Cholera, assisted by predisposing, concomitant, and determining Causes.*—It may be briefly premised, that this disease is never produced without the presence of a certain leaven, or morbid matter, which, emanating from the bodies of the affected, and floating in the air, is respired by those about to be attacked. This is the clear and only inference connected with its transmission that can be deduced from the body of evidence now placed before the reader. Those who argue against its transmissible nature cannot show, since the irruption of the pestilence in India, down to its arrival in this country, and transmission thence to America, a single instance of its appearance in any place without the previous communication with an infected place or persons, of a nature to propagate the malady.\* The non-infectionists place great reliance upon the circumstance of the disease having, in several places, spared a large number of those who have come within the sphere of its influence. But they must be aware that a similar circumstance is uniformly met with during the prevalence of all diseases acknowledged infectious. All who are exposed to them are not equally, and many are not at all liable to be affected by them; and the person who may not have been susceptible of the infection to-day may be susceptible to-morrow, owing, very frequently, to the causes about to be noticed. This pathological fact is familiar to every observer in respect of small-pox, measles, scarlet fever, and the true typhus—diseases whose infectious nature is very generally admitted; and wherefore should it be otherwise in respect of the present pestilence? The same fact, moreover, has been

remarked of all pestilences of which we have any accurate information in medical annals. In illustration of this I may notice what has fallen under my own observation. During the dry easterly winds which occasionally prevail on the west coast of Africa, it is frequently impossible, and always difficult, to infect the system with smallpox, even by inoculation; and when the operation succeeds, the disease is usually mild and the eruption distinct; whereas, during the moist, close, and sultry weather following the rainy season, it spreads with the utmost rapidity; the effluvium from the bodies of the affected appears to be carried to considerable distances, and transmitted readily by means of various media, the disease being generally confluent, and most fatal.

94. The circumstance of so many persons escaping, besides being referable to this non-predisposition, may likewise be explained by the circumstance of free ventilation, the perfusion of currents of pure air, by modes of living calculated to oppose the invasion of the infectious effluvium, and by being habituated to the influence of this principle. We frequently observe that persons constantly present in places contaminated by an infectious effluvium are less liable to be attacked than those who are suddenly introduced from a purer air, but at the time predisposed to infection. This has often been demonstrated by the experience of others as well as of myself. Thus, on the first occasion of my visiting the cholera hospitals and cases of the disease, a sensible effect was produced upon my respiration, pulse, and digestive functions, that was less and less manifested on each successive exposure to the concentrated emanations from several of the sick placed in one apartment. A similar fact was observed by others; and, although it was very remarkable in this distemper, it has also been noticed in respect of other infectious maladies. Thus, a person confined in a close apartment with the true typhus fever was visited by a friend; the visitor, upon entering the apartment, [smelt] a peculiar, disagreeable odour, which occasioned a slight faintness and nausea, followed by headache, indisposition to action, &c. This slight indisposition continued for several days, when, about eight or nine days afterward, typhus fever was fully developed. The person thus infected was kept in an airy apartment, and directions given as to ventilation, &c., with the view of preventing its extension; and the means employed succeeded as far as regarded the members of the family; but, when convalescent, a friend was admitted, and this person caught the disease. What the ultimate progress of the malady was in respect of this third person I had no means of knowing; but I have no doubt that the disease was communicated, in these two instances, if not in the one first referred to, while none of the constant inmates of the families were infected.

95. Another circumstance showing the operation of a specific cause in producing the pestilence is its uniform and specific character in all climates, seasons, and localities (§112). [The cholera is no more specific and uniform in its character than many diseases acknowledged to be epidemic, and caused by some conditions of the atmosphere.] If the efficient

[\* This statement can by no means be borne out by facts as observed in this country.]



causes of the disease were diversified, or consisted of the contingent combination of several, we should naturally expect a similar diversity of effects and a constantly-varying malady, both at its commencement and during its advanced progress; but such has been shown not to be the case (§ 53, *et seq.*). The efficient cause is specific, the disease itself is specific, and only modified as respects severity or grade, and the manifestation of certain subordinate phenomena, by the intensity of this cause, by certain predisposing, concomitant, and determining influences, and by the habit and temperament of the affected (§ 97–101, *et seq.*).

96. Having stated that the pestilence is not communicable to any excepting to those who are circumstanced or disposed so as to allow the invasion of its exciting or specific cause, it will now be necessary to notice those circumstances which co-operate in this manner; and this is the more necessary, as those who deny the infectious nature of the disease refer it altogether to certain influences which *predispose* the frame to the action of the specific cause, which re-enforce or *accompany* it, or which, owing to their presence *after* exposure to it, determine its operation, or bring it more rapidly or more efficiently into action, when it might otherwise have failed of its effect.

97. Many of the earliest reporters and writers on this pestilence, who disbelieved in its infectious nature, had recourse to the state of the seasons in India to account for its occurrence. Some referred it to the prevalence of easterly winds, with long-continued or heavy falls of rain, by which the air was rendered moist and vitiated; others, to sudden or extreme variations of the electrical conditions of the atmosphere, which variations were mere suppositions, and not matters of corroborated observation; not a few, to the extrication of some peculiar terrestrial miasm, projected in distinct or remote places from one another, and proceeding in singular currents, so as to involve a part of a village, or a detachment, or even company of a regiment, while the vicinity was intact; and several could detect no other cause for it but exhalations proceeding from low, moist, and swampy situations, and other sources of malaria, rendered peculiar by some unknown cause, or productive of this peculiar disease from errors in diet or incautious exposure. Now it should be kept in recollection that the existence of all, or any of these, was merely supposititious; that proofs were never adduced, and that the commonest meteorological observations were generally wanting. There was no uniform relation observed, either in this country or in the eastern and western hemispheres, between the appearance of the malady and marked variations in the barometer, thermometer, or hygrometer, even in the few places where these were registered; but the irruption of the pestilence was often observed in states of season, weather, and atmosphere opposite to those to which it has been confidently imputed. Even admitting that all the above-mentioned causes were actually in existence (and I believe they were frequently present), particularly during the severer irruptions of the disease, they merely show the truth of a part of my doctrine, viz., that the infectious nature of the disease was more stri-

kly evinced during conditions of the situation, season, and atmosphere, of acknowledged insalubrity; that whatever tended to lower the energies of the frame, as such causes indisputably do, favoured the operation of the infectious effluvium issuing from those affected by this pestilence, and rendered it more prevalent when they were concentrated or uncommonly active; and that, in this respect, as well as in many others, the infection of pestilential cholera observes the same laws as other infectious maladies, as scarlatina, measles, &c., manifesting itself in isolated cases only during healthy states of season and atmosphere, and spreading to a greater or less extent during seasons of marked insalubrity, and during peculiar constitutions and vicissitudes of the air.

98. So far, therefore, from disputing the influence of many of those causes to which some highly-respectable authors have imputed this malady, I fully admit their operation, even although their existence is more a matter of inference than of observation. I deny, however, that they are sufficient for the production of the destructive effects characterizing this pestilence, and contend that as no such effects have, in the history of our species, been known to result from them, so we cannot with justice admit that they are alone capable of producing them so as to generate this pestilence: I view them merely in the light of predisposing and concomitant causes coming in aid of a more powerful agent, which, emanating from the bodies of the affected, contaminates the predisposed in such a manner as to give rise to the same morbid actions as those which generated it; that these imputed causes favour the operation of this infecting agent, 1st, by predisposing the frame to its influence; 2d, by re-enforcing or assisting its action; and, 3d, by determining or calling into operation the infecting principle. The predisposing and re-enforcing influence of the different causes already referred to cannot be denied. We know, or, at least, observe too much of their influence in respect both of contagious and infectious diseases which are familiar to us to doubt their operation as regards this distemper; indeed, their action would be a matter of undoubted inference to the well-informed physician, independently of the results of observation.

99. But, besides the *predisposing and concurring causes* noticed above (§ 97), there are others not yet enumerated, of equal influence, not only in favouring the operation of the efficient agent of the malady, but also in calling it into action after the frame has been exposed to its invasion. The chief of these are, anxiety and depression of the mind; fear of the disease; physical and moral debility; low living and unwholesome diet; constitutional debility or laxity of the bowels; previous disorder of the digestive organs; neglect of personal and domestic cleanliness; deficient or filthy clothing; exposure to cold; the immoderate use of intoxicating liquors, or excess of any description; sleeping on the ground, or in low, ill-ventilated apartments, or in the open air; the use of cold, indigestible, or unripe fruits; cold drinks when the body is overheated; fatigue; sudden arrest of the cutaneous exhalations, however produced, &c. Either of these, whether acting shortly before, or at the time, or even

soon after the body is exposed to the invasion of the infectious effluvium, will favour the production of the malady, particularly if several of them act in conjunction, and if, at the same time, those causes, whether proceeding from the state of the locality or of the air, to which allusion has been already made, are also present.

100. One of the most remarkable of predisposing causes to an attack is *advanced age*, as well as one of the most unfavourable circumstances as respects hopes of recovery. Instances of attack previously to puberty were comparatively few; but the frequency of the seizure after 40 years of age increased in proportion to the advance in age, and the mortality in a still greater proportion (*see* § 21); so that after 55 years recovery was rare.

101. It has been already stated that a great number of the medical men called upon to treat this pestilence have imputed it chiefly to atmospheric causes, denying altogether the influence of infection; and the chief arguments which they advance, in order to show the absence of this property, have been and are about to be referred to (§ 97-99, and 102, *et seq.*). I verily believe, nevertheless, that this malady is infectious in a similar manner to measles and scarlet or typhus fever; that is, not by contact, but from the inhalation into the lungs, along with the air, of the morbid effluvium given out from the body or bodies of the affected. We know that the mere contact of persons suffering from the diseases now mentioned will not communicate them even to the predisposed; while the presence in the air which is breathed of a scanty portion of the effluvium given off, during their progress, from the affected, will often produce them; and such, I am convinced, is the case with the pestilential cholera. We farther know, that it is not easy to communicate these acknowledgedly infectious diseases by inoculation when access of the morbid effluvium to the lungs is prevented. It, therefore, can be no matter of surprise to learn that M. Fox, and others of the young physicians who visited Warsaw, failed to propagate the malady by inoculation, or by tasting the matters vomited by the affected; even although the tasting matters vomited, under any circumstances, might well have turned the stomachs of many. Indeed, though cautiously convinced of the existence of the infectious nature of the pestilential cholera, I would have inferred that inoculation, or the introduction of the morbid secretions into the stomach of healthy persons, even were they predisposed to an attack of the malady, would have failed, in accordance with the laws which infectious diseases observe, to communicate it, provided the effluvium proceeding from the bodies of the affected be prevented from passing into the lungs. I as firmly believe that it is the inhalation of this effluvium into, and its influence on, the lungs of the predisposed, that paralyzes the nervous energy and functions of this very important and vital organ, occasions the singular collapse of it observed after death, and evinced during life by the state of the hypochondria, epigastrium, and respiratory organs, prevents the changes which the blood is destined to undergo in the lungs from taking place, and gives rise to all the consecutive phenomena of the attack, as I am confident of any fact in pathology.

[While in attendance upon the Greenwich Cholera Hospital, in 1832, a medical gentleman, Dr. C., from Vermont, called on me and requested the privilege of seeing some of the cases. I accordingly accompanied him through the different apartments, in which there were about 70 patients in all stages of the disease. This occupied about twenty or thirty minutes; and on reaching the door, after completing a hasty examination of the cases, he suddenly complained of faintness and nausea; in a moment more I perceived him staggering, and likely to fall. I accordingly supported him in part while he sunk upon the floor, apparently in a perfect state of asphyxia. By the application of cold water, stimulants, &c., with the aid of a horizontal posture, he soon revived sufficiently to be removed in a carriage to his hotel, where he was immediately seized with cholera in its worst form, and barely escaped with his life. This gentleman had reached town only an hour previous to his call at the hospital, had not been previously exposed to the disease, nor had he any fear of an attack. I regarded it, and still do, as a very striking example of the influence of cholera effluvium, when intense, in affecting the human system, even if not predisposed.]

102. iii. *Arguments of those who contend that the Disease is not Infectious, farther noticed.*—I have adduced above (§ 61, *et seq.*) sufficient evidence of the infectious nature of this pestilence, and have stated, under the head of concurrent causes, those to which solely the anti-infectionists impute the disease. I have now to notice, more particularly than I have yet done, certain arguments on which they rely in favour of their doctrine; and, first, they contend that, having had sufficient and admitted proof that cholera has not hitherto been an infectious malady, either as occurring in warm or temperate climates, wherefore should it change its nature, and become infectious at the present time? The ready answer to this is, that it is granted that the common cholera, whether that connected with a vitiated state of the biliary secretions, or that more severe form of the disease most frequently met with in warm countries, and denominated spasmodic cholera, or *mort de chien*, is not infectious; but that this can be no reason why this pestilence, which is distinct from cholera, occurring from other causes and under other circumstances, possessing also very different characters, among which those of cholera are merely a part, and the least important part, should present this very important feature.

103. Secondly, they contend that, if this malady were infectious, a greater number of those who come near the affected would be attacked; and because, under circumstances already alluded to (§ 93, 94, 95), so many do escape, that therefore the disease is not infectious. This is the chief argument on which Mr. SEARLES, referring to what took place in his own hospital at Warsaw, relies, in support of his opinions as to the non-infectious nature of the disease. But as respects the escape of a large proportion of those who are exposed to the infection, this pestilence resembles all other known infectious diseases, not excepting even the most virulent.

104. Much stress, also, has been laid upon the fact of the disease not having been communi-



cated by inoculation, and by tasting the ejections; but this proves nothing, and is merely an illustration of what ought to be known to every medical man—that diseases which do not generate a specific virus cannot be easily propagated in this way. Who, I would ask, would expect to communicate measles, scarlet fever, or typhus fever in this way? Who would expect to be affected by even a concentrated morbid virus on receiving it into the stomach? It is well known that the matter of smallpox and the poison of serpents may be thus applied without effect. That so many, or that all even, of the attendants in an hospital should escape, is only what most medical men of any considerable range of observation would expect, reasoning from their experience; this point, however, has already been disposed of (§ 93, 94, 95, 101). But the facts are, even on this point, as respects this pestilence, opposed to the doctrine of the non-infectionists; for it has been proved on numerous occasions, several of which have been noticed when demonstrating, by direct proofs, the infectious nature of the disease, that a very large proportion of the medical men and hospital attendants were attacked, notwithstanding the absence of all dread with which medical men and their attendants view disease, and their habitual exposure to animal and other insalubrious effluvia.

105. Thirdly, the non-infectionists argue that numerous instances of the true pestilential cholera have occurred, which could not be traced to exposure to communication direct or indirect with those previously affected. This may be the case in a few instances; but how difficult is it to prove mediate infection, or that which takes place through the medium of fomites; and it may be asked, on how many occasions are persons liable to be affected by an infectious principle, without being able to account for the manner in which it took place, or to refer to the individuals whence it emanated, or to the media through which it was conveyed? We know that infectious diseases may occur almost immediately after the impression of the exciting cause, or not until after many days, or even weeks, according to the state of predisposition in relation to the intensity of the cause, during which interval certain latent or almost imperceptible changes are going on in the frame; therefore, during so indefinite a period of interval between exposure to the cause and the development of disease, how can all those attacked refer to the particular occasion on which they were exposed to infection?

106. Fourthly, the anti-infectionists refer to the occurrence of epizooties, in proof of a noxious emanation from the earth, which, floating in the air, affects both man and beast, and occasions this pestilence. I grant that emanations may, and sometimes do, arise from the soil, and affect man as well as the lower animals; and that, when this phenomenon takes place, it may be a concurrent cause of the pestilence, so far as to increase the predisposition to infection, and the fatal tendency of the disease. But, from a careful review of the occasions on which epizooties have been observed contemporaneously with the prevalence of this pestilence, I can state that they have been few, and merely coincidences, which by no means affect the question at issue. It should be kept

in recollection that several of the seasons preceding and during the prevalence of pestilential cholera have been usually wet, and that increased mortality among the lower animals is often observed at such times. Many even of the instances of such coincidences on record are so vague, and so deficient in accuracy of details and dates, as to deprive them altogether of importance in the discussion of the subject. Besides, during the very long prevalence of this malady over the whole globe, it would have indeed been wonderful if the coincidence of epizooties with it had not been observed.

107. Fifthly, another circumstance made use of by the non-infectionists is that of so many who have observed and treated the disease having espoused their side of the question. To this I may reply, that a very large number of those who have enjoyed this advantage have not had, even in India, as may be ascertained by referring to the reports of the Medical Boards, and to the documents at the India House, that extensive experience which we in this country suppose. It should be recollected that a large proportion both of natives and native troops were treated by their native doctors. Besides, are we to expect those comprehensive views of the history and modes of propagation of a disease from those who have seen but a little, and described only what they have seen; or from those who dispassionately investigate the origin, the causes, the phenomena, and the relation of all that has been observed and recorded, and cautiously weigh the evidence on either side of a disputed topic connected with it? The captain of a company, or even a colonel, performs an important part, individually, in an army during a general engagement; but he can know little, personally, of the disposition, changes, and evolutions of all its parts, and of the plan of strategy, according to which it first acted, or was led to change its operations, in order to meet or counteract those of its opponent. Like the commander-in-chief of the whole army, we, who collect, compile, arrange, and digest facts, on both the one side and the other of a disputed subject; who observe closely what has occurred within the sphere of our own experience; who compare, weigh, and meditate upon the whole evidence, personal as well as testimonial, with our minds uninfluenced by prematurely conceived ideas, are the best suited to investigate, and to conclude respecting them. Placed, by the number of accumulated facts, and by minds accustomed to view and to investigate the difficult operations of nature, on the elevated table-land of human science, we may be admitted to be more able to take in a comprehensive view of the causes and nature of disease, and to come to accurate conclusions respecting it, than many of those who, as observation has shown, have drawn hasty inferences from a few and very imperfectly investigated occurrences.

108. Sixthly, the non-infectionists also argue that if the disease had been infectious, its propagation would have been prevented by the measures resorted to. To this argument I reply, that the disease, during its prevalence in the East, was never expected to be confined by sanitary measures; that it was not until it reached Astracan that any such measures were

attempted, and then only imperfectly; and yet these succeeded for eight years in preventing its entrance into that place; and that, where rigorous quarantine has been adopted, the measure has succeeded, several instances of the success of such measures having already been adduced.

109. The non-infectionists farther state that several continental states and authorities, convinced of the inutility of quarantine, have relinquished it. Granting this to be the fact, it merely shows, what any thinking person must admit, the impossibility of preventing the introduction of the disease into a populous town, situate in the vicinity of others, and of a thickly-inhabited country, between which there must necessarily still be, even under the most strict quarantine, a constant intercourse of some kind or other, either by land or water, and perhaps by both. There can be no doubt, if the testimony of several well-informed persons, cognizant of the facts, are to be relied upon, that the distemper was introduced at several seaports of this country by the bed and body-clothes of those who died on board mercantile ships, that had been preserved and given up to the relatives of the deceased. But a strict quarantine and purification of these effects only could have prevented this mode of communicating the distemper; and in no instance were these observed. Indeed, many ships arrived, during the latter part of 1831, in British ports, from infected places, having lost individuals from among their crews on the voyage home, and the fact was often either concealed or not attended to, the infection either proceeding farther, or not, as circumstances concurred to favour it.

110. But let me turn for a moment to the causes which the non-infectionists substitute for an infectious principle. Some argue in favour of a certain distemperature, epidemic condition, or altered state of the air, being the cause of the disease. Now these are mere suppositions. But grant them to exist, how would they explain the progress and propagation of the pestilence? The air is a very mobile fluid, sweeping along frequently at the rate of seventeen and eighteen miles an hour, and being constantly renewed, both in a horizontal and in a vertical direction, unless in situations where it can be confined. But the disease has not been propagated in the course of winds, or with the rapidity which such a source would suggest: it has advanced slowly, and at the rate at which human intercourse takes place, in the lines or channels of such intercourse, and in the quarters where intercourse with previously infected parts has occurred. It has usually spread in a town, visited prisons or sequestered places the last, but affected them severely when introduced; and it has entirely avoided those who placed themselves altogether apart from the rest of the community.

111. If the constitution of the air were the cause, how came isolated places, in the middle of infected towns, or in the track of the progress of the disease, to escape? How could the disease be barricaded, as it was in some towns in Russia, and shut out from certain districts and streets? How could it spread and travel along one side of a river, in the line of public intercourse, and never appear on the op-

posite side, or, if it did appear, wherefore did it, either first or merely, at the point where communication with the opposite banks takes place? When introduced into a country, wherefore should it break out first in seaports having intercourse with previously infected places, or in towns having inland communication with parts thus circumstanced? If the air were the source, how was its noxious property retained after passing hundreds, or even thousands of miles, as in the case of the appearance of the disease in the Isle of France; or wherefore did it, after this passage, respect the adjoining islands? How came the disease never to appear in any place without previous intercourse with a previously infected part, if it arose from a generally diffused state of the atmosphere?

112. Others, again, impute the pestilence to the exhalation from the bowels of the earth of some peculiar miasm. But the above arguments are equally weighty when directed against this supposition; for, independently of such exhalation being a mere assumption, as well as the foregoing, and putting out of the question the fact that not a vestige of evidence has ever been adduced of any peculiar change of the atmosphere from its usual condition, or of any miasm, exhaled from the interior parts of the earth, having been observed simultaneously with the appearance of the malady, these causes, even if they did exist, could not account for the specific and uniform characters which it has always presented, in every situation, temperature, and elevation above the level of the sea, in all latitudes and longitudes, and from its commencement constantly up to the present time. A distemperature of the air, whether from foreign gases, electrical states, or whatever other cause, surely could not for such a period, or under such a variety of circumstances, be so uniform and specific. Exhalations from the interior of the globe, whether proceeding from a great internal fire, from the action of circumambient agency, solar or lunar, or both, or from the electrical changes taking place in the more interior masses and constituents of our planet, surely could not, in all places, at all periods of this epoch, at all elevations, and under every combination of circumstances, be so uniform in their effects, so specific in their action, as the character of this pestilence shows its exciting cause to be.

113. If a noxious exhalation, proceeding from the more interior parts of the globe, caused the disease, it must on some occasions have risen through the depth of the ocean to have affected the crews of ships. Could this have taken place without it being changed by the medium through which it passed?

114. Where we find a distinct agency—a specific effluvia, exhaled from the bodies of the affected, of which we have certain proofs, not merely as respects the manner of its operation, but also as regards its impression on several of our senses—wherefore should we have recourse to suppositions essences and to vain imaginings to account for the propagation of the disease?

115. It may be supposed that more space has been devoted to this part of the subject than it deserves. It is, however, of the most transcendent importance; for upon accurate views respecting it altogether depends the success of



measures to prevent the extension of the pestilence, and even to remedy it where preventive measures have failed. Besides, as this pestilence is placed in the same category with true yellow fever and the plague, both by those who argue for and by those who argue against infection, the evidence for or against this property in respect of it applies also to the others.

116. Having devoted much attention to the phenomena of this pestilence, and to the circumstances characterizing the dissemination of it, and having had extensive experience in it during its prevalence in this country,\* I proceed very succinctly to state the conclusions at which I arrived as to its causation and propagation.

117. (a) The distemper was caused by infection, which was traced in many cases—in most of those which I saw in private practice: it was manifestly infectious according to the definition I have given of INFECTION, in the article devoted to the consideration of this topic (see § 3, *et seq.*).

118. (b) It was not caused or propagated by immediate or mediate contact—by a consistent, manifest, or palpable virus or matter; but by an effluvium or miasm, which, emanating from the body of the affected, and contaminating the air more immediately surrounding the affected person, infected the healthy who inspired the air thus contaminated, especially when predisposed in the manner above shown (§ 99).

119. (c) This morbid effluvium or seminium of the distemper—this animal poison emanating from the infected—was often made manifest to the senses of smell, and even of taste; it attached itself to the body and bed-clothes; remained so attached for lengthened periods, if these clothes were shut up in confined places; and reproduced the disease when the air respired by predisposed persons was contaminated or infected by the clothes imbued by the effluvium or poison.

120. (d) The disease was thus propagated in numerous cases; and, as I was convinced in my own person, even by the clothes of the

physician, without himself becoming affected. An infected or contaminated air—infected in the way just shown—caused an attack, without immediate or mediate contact, which was entirely innocuous, provided the air contaminated by the affected person was not inspired.

121. (e) Placing the hand upon any part of the surface of a person in the cold or blue stage of the distemper was often followed by a peculiarly unpleasant or tingling sensation in the course of the nerves of a healthy person, but this would not occasion infection, if breathing the contaminated air surrounding the affected was avoided.

122. (f) When the poisoned air was breathed by a healthy person for the first time—especially the unpleasant air in the wards of a cholera hospital, or that surrounding the dead body, or that contaminated by the evacuations, a morbid impression was often felt and referred to the chest and epigastrium, giving rise to frequent forcible inspirations or expansions of the chest. This impression and its immediate consequences generally disappeared after a recourse to stimuli, or full living; but were followed by some grade or other of the distemper if other depressing agents, as fear, &c., or high predisposition, favoured their development.

123. (g) On occasions of subsequent exposure to the efficient cause of the malady—of breathing the infected air—this morbid impression was somewhat less manifest; and each successive exposure was followed by less evident effects, unless the morbid effluvium was more concentrated in the respired air.

124. (h) The operation of the morbid effluvium or animal poison was violent in proportion to the concentration of it in the air respired, and to the weakness of the person inspiring it, and to the grade of predisposition.

125. (i) There is no evidence to account for the generation of the choleric poison in the first instance, and there is as little of its reproduction *de novo*, on subsequent occasions. It is also impossible to form a correct idea of the period during which the infectious miasm or seminium may be retained by clothes closely shut up from the air, or by the dead and buried body, and be still capable of infecting the healthy.

126. iv. *The Disease considered in relation to its exciting Cause, and the Effects of this Cause on the Vital Functions and Blood.*—The intimate relations and nature of this pestilence can only be inferred from a careful examination of symptoms or phenomena, in connexion with their exciting cause, and with its effects, both direct and consecutive, upon the frame. The uniformity of the symptoms, under every circumstance of locality, climate, and constitution of the affected, would point, as stated above (§ 53, 95), to one specific or principal cause. But in what does this consist? The manner of the attack, the selection observed in its victims, the circumstances connected with the seizure, the characteristic symptoms which it presents, and various other considerations, strongly indicate, independently of the evidence adduced in proof of it, the existence of some animal poison or effluvium proceeding from the diseased and infecting the healthy. But in what way this poison, or leaven of the disease, first originated, there are no certain data from which to venture

\* On the introduction of the pestilence into this country, I was desirous of observing it in the cholera hospitals within my reach, especially in those first established; and my friends at the Privy Council Office furnished me with every facility in accomplishing my intention. I saw also many cases in private practice, both in my own vicinity and in various parts of the metropolis and suburbs.

[The editor may also be allowed to refer to his own opportunities of witnessing this disease. At the commencement of the cholera in New-York, 1832, he was appointed by the "Board of Health" to organize a cholera hospital in the northwestern part of the city, then called Greenwich, which he did, and was connected with the same during the prevalence of the epidemic. The cases treated from July 6 to September 5, 1832, were 350, of which 204 were cured, and 146 died; of these there were 193 cases of collapse, of which 66 were cured, and 127 died; 135 of these occurred in intemperate persons, of whom 109 died, and 26 were cured; 58 cases of collapse occurred in temperate persons, of whom 40 were cured, and 18 died. Of the whole number, 204 were intemperate, and 146 either temperate or their habits unknown. Seventeen nurses were attacked, of whom 2 died, and 15 were cured; 52 died of consecutive diseases; 3 puerperal women died; and 42 died within six hours from admission. Of the whole number, 50 were children, 37 blacks, 91 Americans, and 222 foreigners. Including hospital and private patients, in 1832 and 1834, we have treated or watched the treatment of more than 1000 cases of cholera; made numerous autopsical examinations; and for forty days and nights ate and slept among the sick, the dying, and the dead. We state these facts that the reader may judge whether we act presumptuously in questioning on some points the doctrines of our author in relation to the character, treatment, &c. of this disease.]

an inference. Did it originate about the period of the first irruption of the pestilence in the Delta of the Ganges, and propagate itself by extending its influence to the predisposed ever since, without any subsequent generation of the principle *de novo*, assuming more destructive features under circumstances which predispose to, or facilitate its transmission, as moist, unhealthy, or epidemic states of the air, &c. &c.? Or does this disease arise in distant and unconnected places at nearly the same time, from some peculiarity of the air, or of its electrical states, or from some foreign material extricated from the earth, or floating in the atmosphere; and, having produced the fully-formed disease, an effluvium emanates from the affected body, capable of inducing the same train of morbid actions as those in which itself originated, the infectious principle being thus generated *de novo* on numerous occasions? That an infectious property is evinced by the disease cannot be doubted by any one who intimately examines its phenomena, particularly in connexion with their origin, or who has attended to his own sensations during and after respiring air contaminated by the effluvium from the sick, or after inhaling the miasms from the excretions or from the bodies of the dead; but whether this principle originated with the first eruption of the malady, or has been reproduced on numerous occasions subsequently, the disease which reproduces it proceeding from a very different cause, is a difficulty which will not readily be solved. It cannot be believed, however, that, where the symptoms of the disease are uniformly the same, the causes which occasion it should be so entirely opposite as are aerial influence and an animal poison generated in the bodies of the diseased; or, in other words, that very different and very opposite causes should be *uniformly* followed by the same effects on every occasion and combination of circumstances, the disease at the same time generating a cause which shall perpetuate it, of a very different nature from those in which itself originated. Indeed, we have no evidence of the reproduction of this principle in distant and unconnected places, from causes different from itself, inasmuch as there is no evidence of the disease having ever appeared under such circumstances, or, in other words, without communication with previously infected places; and hence we have no right to infer that a contingent combination of causes will reproduce this principle, until we have evidence to show that it does.

127. But in whatever way this question may be answered, if, indeed, it be ever satisfactorily answered, is not very material, as respects the nature of the malady. Whatever may be the exact origin of the efficient cause, there seems little doubt that it is inhaled into the lungs with the inspired air, where it acts as a poison, depressing the energy of the nerves supplying this organ, destroying the expansile actions it performs during respiration, and impeding those changes which the blood undergoes in the lungs. That the vital energy of the nerves distributed to the respiratory, the circulatory, and the secreting organs is either uncommonly depressed or entirely annihilated, is shown by the nature of the characteristic symptoms constituting the malady. The state of the respi-

ratory function, particularly the laborious inspirations and rapid expirations, the coldness of the expired air, the involuntary and forcible retraction of the epigastrium and hypochondria, and the inexpressible oppression and anxiety referred to the chest, all indicate that the vital actions of the lungs are nearly suspended, and that the state of collapse and congestion, presented by them soon after death, had actually commenced during life. The impaired actions of the heart, the small, weak, and nearly abolished pulse, and the black colour of the blood, evince a suspension of those changes produced upon this fluid during respiration, and demonstrate not only a paralysis of the nervous energy of the lungs, but a marked diminution of the nervous power actuating the heart and arteries; the loss of vital or nervous power being necessarily followed by a suspension of the changes produced upon the blood in the lungs, by congestion of the abdominal viscera, by an exudation of the watery or serous part of the blood from the digestive mucous surface, and the discharge of it from the stomach and bowels, and by a total cessation of all circulating and secreting actions, owing to the loss of organic nervous power, and to the change in the state of the blood. The vital or ganglionic class of nerves (which forms a sphere of intimate union with each of its parts, supplies the lungs, the heart, and blood-vessels, and all the digestive, assimilating, and secreting viscera, and when powerfully impressed in any one part experiences a co-ordinate effect throughout the whole) is primarily and chiefly affected. Hence the alteration of all the natural secretions so rapidly supervening upon the morbid impression made by the efficient cause of the disease on the nerves of the lungs; hence the almost total abolition of circulation, assimilation, and secretion; hence the congestions of the large vessels and vital organs; and hence, also, the rapid extinction of voluntary power, as a necessary consequence of the suspension of those changes which, being produced in the blood, support the nervous energy and all the voluntary and vital actions. The retchings, evacuations, and spasms so generally observed, frequently follow upon any sudden diminution of vital power, and upon congestions of the nervous centres, and seem to answer wise purposes in the economy, inasmuch as they tend, by their influence on the circulation, to bring about a natural restoration of the vital actions, and to throw off the injurious load by which the springs of life are oppressed. They are efforts of nature to expel what is injurious, or to rally what is sinking. Where the powers of life are not too far reduced, these efforts will be energetic, and often successful, as very frequently remarked in respect of the less dangerous cases of this pestilence; but when the vital energies are far sunk, or where the serous portion of the blood is so far drained off by the digestive mucous surface as to render the blood unfit for circulation in the capillaries, these efforts will generally prove weak and inefficient, even when assisted by rationally devised means.

128. Whatever may be the exact nature of the exciting cause, and whatever may be its mode of operation on the frame—whether this cause primarily affects the organic nervous system, and the blood consecutively through the



agency of this system, as now maintained—or whether it passes at once into the circulation from the air-cells of the lungs, and affects the organic nervous system secondarily, there cannot, at least, be any doubt of the very remarkable changes produced on the blood in the course of the distemper. The analyses of the blood, of the bile, and of the evacuations by M. LE CANU, Dr. O'SHAUGHNESSY, and others, show that, at an advanced period, the blood has lost one half of its serum, a considerable portion of its fibrin, and most of its carbonate of soda; while the rice-water-like evacuations consist chiefly of the serum of the blood, containing albumen and carbonate of soda, and other saline ingredients which are deficient in the blood. When the disease has gone on to the febrile or reactive stage, then urea accumulates in the blood, and even in the bile, owing to the paralyzed state of the kidneys. It is not improbable that a considerable change is going on, in a latent manner, in the blood before the serous portion of it is discharged from the digestive mucous surface; and that this change takes place chiefly in the lungs, and affects the vital relations subsisting between the serum, fibrin, and colored globules, as well as between the capillary vessels and blood circulating through them; and that the fully-developed period of the malady is the result, 1st, of this change, and, 2d, of the evacuation of the serum and other ingredients of the blood; capillary circulation in vital organs thereby becoming arrested. This state of the blood, in connexion with the impaired functions of the lungs, of the kidneys, and of the liver, is evidently the source of the consecutive fever.

129. It has been now shown, both by reference to the appearances displayed by investigations after death, and by connecting these with the phenomena presented by the disease during life, that the requisite changes are not produced upon the blood by respiration; and that the emunctories, which remove from the circulating mass those materials which would prove highly injurious and irritating to the frame if they were allowed to remain in it, have their functions entirely suspended; while, at the same time, the serous portion of the blood escapes from the digestive canal in so large a quantity as to change the physical condition of the blood in the vessels, and thereby to interrupt the circulating functions in vital organs. Can it, therefore, be a matter of surprise that, when reaction of the vital powers of the system is brought about, very great disturbance, not only of the circulating system, owing to the altered state of the blood, but also of the encephalon, and of the different emunctories, is immediately manifested? Indeed, these consecutive states of disease, which have been well illustrated by observation, are entirely in accordance with *à priori* inferences in pathology.

[Whether we suppose the cause of cholera to consist in a contagious miasm, emanating from the bodies of the sick, or some peculiar morbid principle, or change in the elements of the atmosphere, the manner in which it operates upon the human organism is purely a matter of hypothesis. We fully agree with Mr. COPLAND that the disease is an infectious one, but then it is only so under peculiar and rare circumstances, and when some conjunc-

tion of causes, or elements which we do not as yet understand, is brought about. We have known the disease apparently originate *de novo* in many places where it could not be traced from abroad, and hence we conclude that, like typhus fever, its prevalence is owing to two distinct causes, although its phenomena are identical. It is not certain, however, by any means, that the aerial poison which causes cholera produces its effect by a direct impression on the respiratory nerves; it is far more likely to be attracted into the circulation, and produce its effects upon the solids of the system, and the large secretory and excretory organs, through the medium of the blood. We incline to the latter hypothesis. Prof. PAINÉ, of New York, in his very able work, entitled "Letters on Cholera Asphyxia" (1842), expresses the opinion that the proximate cause of cholera consists in a simultaneous modification of all the organic powers and functions, produced by some unknown morbid poison, acting either directly on the properties, or transmitted indirectly through the nervous system. He supposes the primary impression to be made on the organs of sensation and sympathy, and, perhaps, through the organic properties of that system. This change, so produced, he considers not merely a *depression* of the vital powers, but that there is probably an *alteration* of their specific character, as seems to be denoted by the remarkable derangement of some of the functions.

Although there is abundant evidence that the organic system of nerves is profoundly affected in all its ramifications, there is equal reason to believe that the cerebro-spinal system is but slightly influenced by the choleric poison. Spasms occasionally occur in places during the prevalence of cholera, and this, too, without any other symptom denoting the epidemic influence, but there are evidently fewer lesions of that system through the whole progress of the disease than of the organic and sympathetic. The brain and the nerves issuing from it undoubtedly serve to transmit the impression which they receive to other parts of the body, but if we look at the mind we shall find it "sitting unimpaired and serene amid the ruins of organic life." "Respiration is only performed by the voluntary muscles, pulsation has long ceased in the extremities, the heart has become inaudible to the stethoscope, yet the integrity of the mind remains undisturbed, and the indifference with which it contemplates the wreck over which it presides proves that at least its peculiar and last abode in the body is still its own undivided possession."]

130. I conclude this part of the inquiry by stating the inferences which may be drawn from an extensive view of what is known of this pestilence, as it has appeared in Asia and in Europe, and from intimate observation of its phenomena, as they lead to various considerations calculated to arrest its progress and to remedy it, when an attack has not proceeded too far in the destructive processes in which it has been shown to terminate.

131. A. The pestilential cholera seems to have been propagated by an animal miasm or effluvium of a peculiar kind, emanating from the bodies of the affected; and this effluvium, being inhaled with the air into the lungs, par-

alyzes these organs, and acts as a poison on the class of nerves which supplies the respiratory, the assimilating, the circulating and secreting viscera, vitiating also the whole mass of blood, and thereby occasioning a specific disease, which in its turn gives rise to an effluvium, similar to that in which itself originated; which, also, in like manner perpetuates its kind, under the favourable circumstances of predisposition, aerial vicissitudes, &c., and thus a specific form of disease is propagated far and wide, as long as predisposing, concurrent, and determining causes favour its propagation.

132. *B.* The morbid impression of this effluvium or poison upon the nerves of organic life, and probably the effect of its introduction, also, into the current of the circulation, are of a sedative kind, rapidly destroying the vital energy of the former, and vitiating the latter, and thereby giving rise to the characteristic phenomena of the malady.

133. *C.* The impression of this effluvium on the organic class of nerves, and the vitiated state of the blood, may be viewed as the proximate cause, not only of the disturbance evinced by the respiratory, the secreting, the assimilating, and the circulating functions, but also of the morbid actions of the stomach and bowels, and the copious serous discharges from these organs, as well as of the muscular spasms, the sinking of all the vital and animal powers, of the shrunk and collapsed state of the surface of the body, of the black, thick state of the blood, and of the rapid depression of the animal temperature.

134. *D.* The states of the perspiration and skin, and the discharge of the serous portion of the blood by the stomach and bowels, imparting the peculiar appearance of the evacuations, proceed from the alteration primarily produced in the vitality of the frame and in the condition of the blood; and it is chiefly through the medium of the cutaneous surface, of the liver, of the kidneys, and of the mucous membranes, assisted, perhaps, also by the other secreting viscera, that the morbid change of the blood is remedied, and impurities removed from it.

135. *E.* The advanced stages, or the consecutive or febrile symptoms of the disease, whether those chiefly depending upon the state of the nervous functions, or of the circulation within the brain, or proceeding from the condition of the abdominal viscera, arise partly from the shock received by, and the depression of, the vital energy of the frame in the early stage, partly from the congested condition of the large veins and important viscera, and partly, if not chiefly, from the alterations which had taken place in the blood during the early stages of the malady.

136. *F.* The effluvium or seminum, which propagates the distemper, is generated in the progress of the changes produced in the blood, and is emanated or discharged from the mucous surfaces of the lungs and digestive canal, and from the cutaneous surface, along with their respective exhalations and excretions; and this seminum, by contaminating the surrounding air, or woollen cloths and animal products, capable of attracting and retaining for a time animal effluvia, as shown above (§ 92), affects those of the healthy who are predisposed, either

constitutionally, or by antecedent, concomitant, or determining influences, or on whom this efficient agent acts in an intense or concentrated form, or is aided by accessory or concurrent causes.

137. *VI. TREATMENT OF PESTILENTIAL CHOLERA.*—The means of cure which should be employed, in order to secure even a moderate share of success, ought to be appropriately prescribed, and strictly directed to the various pathological states and stages which the disease presents in different habits and constitutions, and in its various grades of severity. It is, in some measure, owing to a neglect of this strict appropriation of the numerous plans and means of treatment recommended, and to the empirical manner in which they have been administered, that opinions have been so different as to the utility of the greatest number of them, even at an early period of the malady; at a far-advanced stage, very few remedies, indeed, have hitherto been employed with any remarkable benefit. In order that the means chiefly depended upon by the numerous writers on this malady may be more strictly referred to the circumstances under which they seem to be indicated, and often to have really proved beneficial when early employed, I shall *first* succinctly state the chief forms and stages of the disease, with reference to various grades of intensity, and existing pathological conditions; I shall *next* briefly notice the methods which have been employed by various authors; and, *lastly*, detail, with strict reference to these different states and stages, the treatment I venture to recommend, according to my own experience and observation.

138. *i. Grades and Stages of the Malady, with reference chiefly to Curative Measures.*—The mode of attack, as well as the severity of the disease, vary materially, according to the intensity of the exciting cause, the nature of the concurrent causes, the state of predisposition, and the strength of the patient's constitution.

139. *A.* The invasion of the disease generally presents itself in *three* different grades, owing to the above causes.—*a.* The *first* and least dangerous grade or state of invasion is the most gradual, and is usually that of a common diarrhœa, varying in duration from a few hours to one or two or even more days, accompanied with oppression in the chest, and anxiety at the præcordia, and collapse of the countenance and surface of the body. If these symptoms be neglected, they soon pass into those characteristic of this malady, viz., marked and sudden loss of pulse; oppressed and difficult respiration; muscular spasms or tremours; shrunk, wet, and leaden appearance of the surface and extremities; sunk eyes, and watery vomiting and purging, with great distress. This is generally the *least severe* form of the malady, and is commonly met with in the younger and more robust class of subjects. For the sake of distinction, I shall term it the *slightest* grade, or that characterized by premonitory diarrhœa, &c.

140. *b.* The *second* state of invasion is the most frequent, and is generally ushered in by cerebral symptoms, such as giddiness, noise in the ears, by a remarkable oppression of the chest, weight at the epigastrium, and a great depression of the pulse and of all the vital en-



ergies, rapidly followed by spasms, commencing at the farther parts of the extremities, and accompanied with watery purging and vomiting, and all the symptoms described above (§ 28). This is the common form or degree of severity of the malady.

141. *c.* The *third* state or form of invasion is the most sudden and fatal. The patient is suddenly seized, as if struck by lightning, or by a severe blow on the epigastrie centre. His vital powers are immediately laid prostrate; inordinate discharges of serous fluid take place from the bowels and stomach, with cramps and spasms of the voluntary muscles; and he is usually found without pulse at the wrist; with most laborious respiration; shrunk, purplish, raw, wet, and cold condition of the surface of the body; and collapsed, terrified state of the countenance. This *severest grade* of the malady generally seizes on the old, the debilitated, or most highly-predisposed persons, and often terminates life in a few hours, with a most rapid and continued sinking of all the functions.

142. This *last* form or state of the disease is generally beyond the reach of medicine; it is chiefly in the two former that medical means avail. These *three* modes of invasion and grades of the distemper should be distinctly borne in mind, as requiring very distinct and decisive modes of cure. Besides attending strictly to these *STATES* of the disease, as indicated chiefly by the modes of its *INVASION*, the practitioner is required to notice attentively,

143. *B.* THE PERIODS OR STAGES which mark its course.—*a.* The *first* or premonitory stage, or the incipient state of diarrhœa, during which, in addition to much vital depression and imperfect discharge of the vital and natural functions, the serous portion of the blood is being effused from the digestive mucous surface, constituting, as well as the more sudden and rapid effusion of serum, a serous hæmorrhage from the digestive canal.

144. *b.* The *second*, or the cold and blue stage, is that of *extreme depression*, the symptoms indicating the utmost sedative effect of the exciting cause of the disease on the vital powers, with a morbid state of the circulation. The extreme degree of this period constitutes the *third*, or severest form of the malady (§ 29, 141), it being so marked as to entirely overwhelm life in a short time, without any other period or stage supervening.

145. *c.* The *third period* is that of morbid reaction, and is evinced by returning warmth and pulsation, and diminution of the leaden state of the surface.\* It passes either into convalescence, or into exhaustion and disorganization. This period, as stated above (§ 29), may not appear in the severest forms of the disease. But when it does supervene, it presents the symptoms already described, when treating of the consecutive phenomena of the malady (§ 33). In many instances, life is not destroyed by the morbid state forming the first period of the disease; nor is it so completely overwhelmed as to prevent all reaction; but the reaction which is produced, being accompanied with the morbid state of the blood, the principal part of its serum being lost, and with a considerable

share of the congestion of vital organs characterizing the preceding period, is necessarily imperfect, and readily passes into an adynamic state of sub-inflammatory action, affecting chiefly important and vital organs, and often assuming the form of malignant fevers complicated with visceral disease.

146. *d.* The *last stage*, or that of exhaustion and disorganization, is always a consequence of attempts at reaction, which are, however, often imperfect, and extremely morbid in their nature (§ 33, 34), owing to the marked impression made by the exciting cause on the vital energies, and chiefly to the very evident deterioration of the blood. This stage takes place more or less rapidly, and, when once present, the fatal tendency is great, and is very rarely arrested by treatment. In a very large proportion of cases, the febrile symptoms arising from reaction are accompanied with more or less of congestion, or of a sub-inflammatory state of some vital organ, frequently of several, as of the encephalon, alimentary canal, liver, lungs, &c., and when the consequent collapse terminates in death, these organs manifest the nature and extent of their disturbance.

147. It should be kept in recollection that the *third stage*, or that of reaction, as well as its consequences, namely, exhaustion and disorganization, can only occur in the *first* and *second* grades of the disease, or in those cases which have not proved fatal from the *second* or cold stage. The *third* stage is identical with, and presents the phenomena described as forming the consecutive states of the disease (§ 33). Owing to the important features it often assumes, it requires a more particular notice: 1st. A congestive and sub-inflammatory state of the encephalon and spinal marrow, assuming the characters of typhoid, or malignant nervous fever, and proving the most frequent and fatal form of the second period; 2d. A bilious or bilio-nervous form of fever; 3d. A sub-inflammatory state of the stomach or of the bowels, and frequently of both conjoined; and, 4th. An irritative or sub-inflammatory state, with congestion of the lungs, accompanied with oppression and pain in the chest, cough, and viscid expectoration.

148. The *exhaustion* into which these stages gradually pass, and which forms the fourth or last stage of the malady, is generally attended by symptoms indicating more or less congestion, particularly of those organs which manifested the chief disturbance during the period of reaction. Its accession is often rapid. It requires to be accurately recognised and promptly met, in order to ensure any share of success in combating it; and even then success very rarely results.

149. When death occurs in the first stage, as it often does in the highest grade of the disease, the chief changes are observed in the blood, the lungs, and vascular system (§ 43, 45), the vital functions being so rapidly abolished, from the impression of the exciting cause of the malady, that the morbid influence can be evinced only on this system, and there chiefly as respects the state of the circulating fluid, a sufficient length of time to produce disorganization to any very remarkable extent not having elapsed between the invasion and termination of the disease. But when death takes

[\* But in objection to the classification of the author the very first invasion is frequently that of marked inflammatory symptoms of general fever and violent, painful spasms.]

place after the period of reaction, organic changes are observed in various important viscera (§ 46), which, however, with the disturbance of vital functions, and in which they chiefly originate, only partly account for the fatal result. The thick and venous states of the blood, owing to the remarkable loss of serum and to the arrest of the changes produced

by respiration on the blood, manifestly interrupt the capillary circulation in vital organs, and occasion the phenomena of the advanced stages of the distemper, and ultimately death.

150. It will be necessary to acquire precise ideas of the foregoing *forms* and *stages* of the malady, in order to devise appropriate means for counteracting their fatal tendency.

*Synopsis of the Forms and Stages of Pestilential Cholera, depending upon the severity of attack.*

*First grade.*—With marked premonitory symptoms, particularly diarrhœa, &c. (§ 26, 139).

*Second grade.*—Commencing with giddiness, faintness, &c., rapidly followed by the characteristic features of the disease (§ 28, 140).

*Third grade.*—The seizure sudden and intense (§ 29, 141).

*First stage*, or preliminary diarrhœa, which may be readily arrested without farther disturbance beyond indigestion, &c.

*Second stage*, or that of extreme depression or failure of the circulation (§ 28), often quickly passing into dissolution, but sometimes followed by the

*Third stage*, or reaction, or febrile affection, with suppression of the urinary and biliary secretion (§ 33).

A.—Reaction with typhoid, or maligno-nervous febrile affection (§ 34).

B.—With gastro-enteric affection, &c. (§ 35).

C.—With bilious affection, &c. (§ 35).

D.—With pulmonary affection, &c. (§ 35).

E.—With two or more of these conjoined.

*Fourth stage*, or that of vital exhaustion and disorganization, often terminating in death.

Most frequently consisting of the stage of depression only, rapidly terminating in death, and more rarely followed by reaction and the stages and states above enumerated.\*

151. ii. *Notice of various Modes of Treatment employed in different Countries.*—M. BENOIT states that he found the combination of camphor, laudanum, and sulphuric ether, with the external use of sinapisms to the epigastrium and extremities—means employed by numerous practitioners—successful in the visitation of the pestilence at Manilla, in 1820. Mr. CRAW (*Bombay Reports*) speaks very favourably of large doses of ammonia and musk. Dr. PEITSCH (*Fodéré*, p. 261) states that his practice in Java showed the uncommon efficacy of two parts of spirits of mint, one part of spirit of lavender, and one of laudanum, taken in doses of a spoonful, until the vomiting ceased. Mr. MILWARD (*Bomb. Rep.*) informs us that he found magnesia, in doses of four scruples, remain in the stomach and procure natural evacuations, other means having failed. Dr. MAHIR, of the Polish army, employed large doses of opium and prussic acid, with lavements of asafetida. Several physicians in Russia, Poland, and Germany had recourse to moxas, or the actual cautery applied either along the spine or on the scrobiculus cordis, but with as much benefit as may rationally be expected from such means. Many of the physicians at Warsaw ascribed good effects to the magistery of bismuth, while others stated it to be more injurious than beneficial.

152. The treatment which was recommended by Mr. CORBYN, and very generally adopted in India, consisted of from fifteen to twenty grains of calomel, washed down with sixty drops of laudanum, and twenty drops of the oil of peppermint, in two ounces of water. He prescribed full blood-letting in Europeans, and repeated the above medicines every three hours until relief was obtained. The oils of peppermint and cajeput were very generally used in India, and they seem to have been frequently serviceable, but as adjuvants merely.

153. Mr. ANNESLEV confided in blood-letting employed early in the disease, and in large do-

ses of calomel, with moderate quantities of opium, followed by warm, stimulating purgatives. His object in prescribing these medicines was to remove the tenacious muco-albuminous matter lining the internal surface of the intestines, which he viewed as obstructing the canal. But he ascribed undue importance to a change contingent upon the advanced stage of the malady, the existence or removal of which could but little affect its course.

154. Mr. SEARLE advised the patient to be placed between very warm blankets in an airy apartment; and, as he considers a deranged state of the stomach is generally connected with the origin of the attack, the free evacuation of this organ to be among the earliest intentions to be fulfilled. For this purpose he recommended, whether the patient has vomited or not, that he should drink freely of warm water in which common salt has been dissolved—about a table-spoonful of the salt to half a pint of hot water; that bleeding should be practiced, and, after the stomach is evacuated, that a full dose—about twelve grains—of calomel be exhibited, and washed down with hot brandy and water, and that this be repeated every hour or two, until an improvement is observed, when it may be given in smaller doses, and either in conjunction, or alternately, with some mild aperient. For the sub-inflammatory states of the encephalon, or abdominal viscera, frequently supervening during reaction, or the third stage of the malady, he recommends the employment of moderate, general, and local depletion, with injections and counter-irritation, by means of sinapisms. He found the cramps relieved by compression.

155. Mr. Goss, of the East India Company's

\* [Professor JACKSON, of Philadelphia, makes five grades or periods of the disease, viz.: 1st. Of incipient irritative, or the premonitory stage; 2d. Of confirmed irritative, or forming stage; 3d. Of incipient concentration, commencing collapse, or algid state; 4th. Of complete concentration, confirmed collapse, or perfect algid state; 5th. Of reaction, or febrile state.—*Am. Jour. Med. Sci.* (vol. ii, p. 306).]



service, states, that hearing the patients complaining of the excoriating nature of the fluids evacuated, he suspected this property to depend upon the presence of some acid, and that he, therefore, exhibited about a drachm of the carbonate of soda with fifteen grains of the carbonate of ammonia; the patients, who were very few, and their cases slight, all recovering under this mode of treatment. He likewise had recourse to full blood-letting, occasional doses of calomel and jalap, to frictions and counter-irritants applied to the abdomen and lower extremities. He states that emetics had failed in some instances in which he had employed them, but had succeeded in others. He appears to have employed the ipecacuanha powder merely, without combining it with diffusible stimuli, and therefore his failure in the most severe cases was to be expected.

156. Dr. RAIMANN, of St. Petersburg, states that blood-letting, with calomel and opium, and external heat and irritation, were among the most successful means employed against the disease in Russia. Warm baths were of equivocal service, unless at the very commencement of the seizure, or in the slightest cases. They generally exhausted the patient instead of restoring the circulation to the surface in the more severe cases.

157. M. Vos, who practiced in Batavia, found blood-letting of service among Europeans only: it was injurious in the natives. The remedies from which he derived the greatest advantage were calomel with opium, followed some time afterward by warm stomachic purgatives and injections. M. MARGEOT, who observed the disease in the Isle of France, prescribed, every two hours, two drachms of the sulphate of soda in a glass of honey-water, until bilious evacuations appeared. He gave diluents liberally, and administered emollient injections frequently, with the view of promoting the action of this salt. M. ROBERT, who adopted this practice, added to it the occasional exhibition of a draught with ammonia; and M. GALDEMAR employed a draught with olive oil, sulphuric ether, and camphor.

158. Mr. BOYLE, who treated the disease in India soon after its first appearance, finding, in the post-mortem examination which he first made, that the gall-ducts were obstructed by a thick viscid bile rather than by spasm, was led to exhibit emetics and procure full vomiting, in order to remove this obstruction of the passage of bile to the duodenum; and the advantages which he obtained from the practice induced him to recommend it in preference to other means which he considered subordinate to it, and requiring to be varied according to the circumstances of individual cases, the use of emetics being always requisite. To this gentleman the credit is due of having been the first to recommend emetics for the disease.

159. Several of the American practitioners, who had visited India and China during the prevalence of the pestilence, prescribed powdered carbon and burned cork in milk, and conceived that benefit resulted from the practice. This substance, however, as well as many others to which a certain degree of credit was attached, only seemed of advantage, it being apparently successful in the slighter cases of the disease, in which the morbid actions induced

in the frame operated their own cure, through the aid of the powers of the constitution. This practice, however, was strongly recommended by Dr. JACKSON, an authority of the greatest weight in dysentery and chronic diarrhoeas, in which affections it appears to have been extremely serviceable.

160. When the disease appeared in Persia, the native practitioners had recourse to cold affusions, and cold acidulous, or iced fluids, of which the patients were allowed to drink at will. At Bussorah, M. MORANDO prescribed cold applications over the organs chiefly affected, at the commencement of the attack, and blood-letting, both general and local. M. MEUNIER, at Bagdad, treated the disease by means of venesection, leeches applied to the pit of the stomach, mucilaginous and opiated draughts and injections, and hot fomentations. A similar practice to this seems to have been very generally adopted by medical men in Syria, Mesopotamia, and Aleppo. Of the effects, good or bad, of the cold affusion as adopted in Persia, I can find no precise information. But, judging from the great benefit I have seen derived from the cold affusion on the head, in cases of poisoning by opium, even when life, apparently, is nearly extinct, this practice seems to me not so irrational as many may suppose. It is, at least, one of the most energetic means with which I am acquainted of removing congestion of the vessels within the head.

161. When the disease appeared at Astrachan, in 1823, the medical commission prescribed the following practice: A large blood-letting; a dose of calomel, with sugar or gum Arabic, and followed by from forty to sixty drops of laudanum; twenty drops of the oil of peppermint, given in two ounces of the aqua melissæ; frictions of the epigastrium, with an ammoniacal liniment; scarification and cupping over the abdomen; frictions of the limbs and surface generally, with camphorated spirit; mucilaginous injections, with about thirty drops of the tincture of opium, and calomel in doses of from ten to twenty grains. This practice, which was altogether based on that very generally employed in India, was likewise adopted when the disease invaded Russia in 1830; but on this occasion blood-letting was found less beneficial than formerly, and warm sudorifics, and the external application of heat, were more depended upon.

162. Dr. KEIR, who had great experience of the disease at Moscow, derived advantage from blood-letting in the young, plethoric, and well-fed, and in the common or intermediate grades of the malady, particularly when employed early, or before the pulse left the wrist. In the most intense grade, or when resorted to late, or when the pulse had disappeared from the arm, it often seemed prejudicial. Full doses of calomel with opium, followed by stimulants, purgatives, and injections, and accompanied by the external and other means usually employed by the Indian practitioners, formed the principal part of the treatment adopted by him.

163. When the pestilence appeared in Warsaw, the medical authorities there had recourse to very nearly the same treatment as stated in the preceding paragraph (§ 162). Subsequently, many adopted, and several afterward relinquished, the plan of Dr. LEO, which was to give

three or four grains of the sub-nitrate of bismuth every two hours. According to M. BORSSEAU, the hydrocyanic acid, the hydrocyanate of zinc, oxygenated water, and oxygen gas were all tried in this city without benefit; and I may add, that laurel-water, phosphorus, both internally and externally, moxas, and the actual cautery to the spine and epigastrium, were also made trial of without any remarkable advantage. M. BRIERE DE BOISMONT recommended (when vomiting continued urgent) the cuticle to be removed by means of liquid ammonia, and the denuded surface to be sprinkled with one or two grains of the acetate of morphine.

164. Mr. FINLAYSON derived advantage in one case in Ceylon from passing a galvanic current through the lungs. Galvanism certainly deserved a fair trial in this disease; but the instances in which it was resorted to in this country did not furnish evidence of its success.

165. Dr. BARRY, having very frequently observed congestion, inflammation, and softening of the spinal marrow, in a greater or less degree, in his examination of fatal cases of the pestilence, was led to recommend the application of the actual cautery to the back, opposite the lower dorsal and upper lumbar vertebrae: it had been employed on the Continent with some success. He also advised full vomiting, and for this purpose preferred a strong solution of common salt and water, given in doses of six ounces. Warm, dry applications to the skin, and continued friction, he considered very beneficial, while vapour and hot-water baths he believed to be worse than useless. Bleeding, as well as large doses of either opium or stimulating liquors, he believed to be dangerous in the utmost state of depression, when the powers of life are reduced to the lowest ebb, and consequently easily annihilated; but previous to this state, or when reaction is supervening, he considered blood-letting beneficial to the patient.

166. The following account of the experience of several physicians at Warsaw, abridged from that given by M. DE BOISMONT, is important, as showing the results of different kinds of practice:

Dr. JANIKOWSKI treated sixty-six cases. He bled the robust and those with evident congestion, and gave every three hours two grains of calomel, with one of opium, with warm stimulating diluents, sinapisms on the epigastrium, and frictions of the limbs with irritating liniments. In some cases he gave the nux vomica in doses of half a grain, every fourth hour, in an emollient decoction, and, he conceived, with some advantage. He lost twenty, chiefly old persons, of the number treated. Dr. KOEHLER had sometimes recourse to blood-letting, but depended more upon the preparations of ammonia. He also prescribed calomel with opium, and in some cases large doses of the sub-carbonate of potash. The farther results of his experience are not given. M. LE BRUN treated about sixty cases, of which he lost nearly one half. The disease was, however, far advanced before they came under treatment. He confined chiefly in blood-letting, warm diluents with opium, and camphor combined with calomel. Of twenty cases treated in private practice five died. The remaining forty were

hospital cases. Dr. ENOCH treated forty-three cases, of which five were hospital patients. He lost only seven cases, chiefly aged persons. The most of his patients were bled, and treated with calomel and opium at first, and afterward with calomel and rhubarb. He directed sinapisms to the epigastrium and extremities. Dr. JASINSKI treated thirty cases, of which ten died. In his earliest cases he employed blood-letting when he thought it indicated, or leeches to the painful part of the epigastrium, with small doses of calomel and opium, and the infusion of valerian. In the cases which occurred subsequently, and which were generally more intense, he prescribed leeches to the abdomen, the magistrery of bismuth internally, and sinapisms and frictions to the extremities. Dr. KACZKOWSKI, physician-in-chief to the Polish armies, had recourse in the most severe cases to large blood-lettings, to calomel in doses of three or four grains, with half a grain of opium every two hours, with the external use of sinapisms, stimulating cataplasms, moxas, &c. He also frequently prescribed, every two hours, small quantities of DOVER'S powder with mint ptisans, and large doses of magnesia; and states that he derived advantage from the nux vomica, given with the mucilage of gum Arabic and sugar or sirup. He lost one sixth of his patients, among whom, however, he seems to have included several cases which evidently either did not belong to this disease, or consisted of the slight form, or of the incipient stage.

167. Most of the individual means and plans of cure noticed above were had recourse to when the disease appeared in this country, but generally with that want of success, especially in the severer and more advanced cases, which led to the relinquishment of them, and to the trial of other medicines and different combinations. *Blood-letting*, which had been advised both by Indian and European physicians, was resorted to, but with very equivocal benefit; for it was only in slight cases, or in an early stage of the disease, and in young, plethoric, and robust persons, that it seemed to be of service; and in these either equal advantage would have been derived from other means, or recovery would have been brought about by the powers of the constitution. The same remarks apply also to the use of *opium*. This remedy could only be viewed as an adjuvant of other means, and it was often a valuable one, in aiding to check the diarrhoea, in the slighter cases and earlier stages. But when the attack was violent, and when the collapse was great, it either failed of producing any effect, or occasioned an injurious one.

168. The failure of the more usual means led to the adoption of warm *emetics* by several physicians, especially of those consisting of large doses of mustard, or of the substances usually employed with this intention, conjoined with powerful stimulants. But in the more violent seizures, or at an advanced period of the disease, they did not appear to me to be productive of any benefit.

169. Indian practitioners, owing to their predilection to the use of *calomel*, especially at the period of the outbreak of the pestilence in India, and to the absence of bile in the evacuations, had recourse to this medicine, generally



in large or very frequent doses, and in conjunction with opium. They imputed too much importance to the absence of bile, looked upon this as the chief source of mischief, instead of viewing it as a part only of the general circle of consecutive disturbance, and aimed merely at removing a symptom without directing attention to more general and important morbid conditions. In certain states, however, of the malady, hereafter to be noticed, and in certain combinations, it was often of more or less service.

170 Dr. GRAVES, impressed with the little efficacy of the means previously recommended, and with justice believing that it was of the first importance to arrest the discharge of the serum of the blood from the digestive mucous surface, recommended full doses of the *acetate of lead* to be given with opium, varying the quantity and frequency of the dose with the severity of the case. Previously to the publication of this method, I had been employing the *sulphate of zinc*, with opium and extract of logwood, and *sulphate of alumina*, in similar combinations, with this intention; but my experience hardly enables me to decide as to the comparative merits of either, for each was efficacious in the less violent cases, and inefficient when the collapse was extreme.

171. The saline treatment advised by Dr. STEVENS for malignant fevers, with a confidence which subsequent experience has not justified, was sufficiently tried in this pestilence, and in several cases by myself. The ascertained deficiency of the saline ingredients of the blood, in the fully-developed distemper, he proposed to restore by giving every half hour or hour half a drachm of sesquicarbonate of soda, a scruple of muriate of soda, and seven grains of chlorate of potash, in half a tumbler of water. The trials which I made of this medicine did not furnish greater success than that derived from others. The state of vital action; the complete arrest put to the function of absorption from the alimentary canal, and the general relaxation of the capillaries and of the digestive mucous surface, with the consequent serous exudation, did not admit of the passage of saline solutions or fluids from this canal into the circulation.

172. Knowing the deficiency not only of the saline ingredients of the blood, but also of the serum, and believing that the deficiency could not, in the existing state of vital action, be supplied by the alimentary canal, Dr. O'SHAUGHNESSY was thereby induced to propose the injection of saline solutions into the vascular system. The solution most generally used consisted of half an ounce of muriate of soda, and four scruples of sesquicarbonate of soda in ten pints of water, at a temperature varying from 104° to 112° or 118°; and the whole was injected slowly, and generally during somewhat more than half an hour. Several cases which I attended were thus treated, two of them of medical men; but none recovered ultimately. Dr. MACKINTOSH, of Edinburgh, treated many in this way; and, in the institution to which he was attached, of 156 patients in whom this plan was employed, twenty-five recovered. Most probably these were all hopeless cases; but, as far as I could learn, this plan was not much confided in generally in the metropolis,

and was employed only as a last resource. When recovery did follow after a recourse to it in these circumstances, the event could not fail of attracting particular notice; yet, as recovery did also occur, although in rare instances, even in the worst cases, apparently from the powers of the constitution rather than from the means employed, the degree of success evinced by this method was more or less questioned. Phlebitis, which always proved fatal, supervened in some cases.

173. The effect of the injection of the above solution into the mass of blood was always remarkable on the disease. All the symptoms subsided, or entirely disappeared, except the excessive evacuations. These, however, returned, or became still more profuse; until a very short time after the injection, the whole of the fluid had passed off by the bowels, and all the phenomena reappeared, generally with increased violence and extreme vital depression, often rapidly passing into dissolution. This circumstance shows that the disease did not merely consist in the loss of the serum of the blood, but in an alteration of the blood still more materially affecting its vital constitution, and most probably originating, as I contended in the work published in 1832 on this distemper, in the altered vital condition of the ganglial or organic nervous system, and implicating the vascular system and circulating fluids consecutively.\*

174. iii. *Treatment chiefly confided in by the Author after observing the Effects of various Means and Methods.*—When the disease is prevailing in any locality, disorder of the stomach and bowels should receive early attention, and be treated with great decision. Strict attention to my own sensations during and after the impression of the morbid exhalations from the evacuations, and from the bodies of the sick or dead, and the experience of many of my friends when their attention was directed to the matter, convinced me that the morbid impression first made upon the organic nervous system was characterized by depression; and that the consequence of such depression, and of such other change in the state of this system as may have taken place in addition, were soon afterward manifested in the vascular system, and in the several digestive, assimilating, and excreting functions, if the primary morbid impression was not removed by powerful stimulants and tonics. It is necessary, therefore, not only to develop vital resistance and action by these means as soon as the earliest indications of depression appear, but also to restrain frequent or increased evacuations from the bowels, as being the most prompt modes of preventing these changes from taking place in the blood, which soon induce the most serious and fatal results.

175. When the disease is more fully developed, it is necessary to combine our means judiciously and energetically, to bring several agents into action at the same time, to direct them to different organs and opposite parts of the frame, and thereby to fulfil, directly and contemporaneously, several intentions and in-

[\* We tried the injection of saline solutions into the vascular system, after the plan recommended by O'SHAUGHNESSY, in 13 cases, with the effect above described; the patients were all in a state of hopeless collapse. Of these one only recovered.]

dications. In all circumstances it is requisite, even to a moderate share of success in the treatment of this pestilence, to prescribe the means of cure appropriately to existing morbid conditions—to the pathological states and stages of the malady—and not empirically, or without reference to the known operation of these agents on the diseased actions which we employ them to remove.

176. *A. Treatment in the mildest Form and earlier Periods of the Distemper.*—(a) it has been stated above (§ 27) that the attack in its mildest form, and in young, robust, or previously healthy persons, was very frequently ushered in by diarrhœa and general depression of the vital powers, with or without nausea, vomiting, or spasms; and that, if these symptoms were removed by energetic means, the disease generally proceeded no farther. In most cases, however, in connection with diarrhœa and depression of vital power, there was also more or less congestion of vital organs, especially of the lungs, liver, and large venous trunks; and hence it became necessary to remove this congestion, while we endeavoured to restrain inordinate discharges from the alimentary canal, and to allay spasm when present; the *intentions of cure* being thus—1st. To arrest purging and vomiting; 2d. To remove congestion and oppression of the viscera, and to determine the circulation to the surface and extremities; and, 3d. To restore the secretions and excretions to a healthy state.

177. The first of these indications should be fulfilled by exhibiting warm astringents and stimulants, conjoined with the remedies usually prescribed for DIARRHŒA (*see that article*, § 26, 30); of these means I have found the sulphate of zinc, with capsicum and opium, the most efficacious, especially when exhibited in frequent doses. The opium should be given in small or moderate doses, so as to support, but not to depress, the powers of life, and always with aromatics and astringents—with capsicum, aromatic confection, confection of black pepper, extract of logwood, sulphate of alumina, acetate of lead, &c. The sulphate of zinc, when conjoined with cayenne or black pepper, or with other aromatics and opium, will not readily excite vomiting. But if an *emetic* effect be produced by the quantity thus prescribed, the circumstance will not prove injurious; but will tend to remove internal congestions, and to fulfil the second and third indications, without increasing the intestinal discharges.

178. In cases where vascular plethora exists, a moderate blood-letting may be instituted, so as to bring the mass of the circulating fluid more nearly to the state of the moving powers; but it should be prescribed with caution, and only for young, robust, or plethoric persons, and either at an early stage or in the slighter form of the malady. If these means do not speedily arrest diarrhœa and other symptoms, they should be aided by the application of dry warmth and frictions to the surface of the body. Dry warmth may be applied by placing the patient instantly in bed, and elevating the bedclothes around him by two or three common hoops, or pieces of whalebone, and then introducing one end of a wide tube, at the other extremity of which the flame of a spirit-lamp or candle should be made to pass; or bags of hot

salt, or of hot bran or oats, may be placed around him.

179. The removal of congestion and the equalization of the circulation will be promoted by employing assiduously, at the same time that external heat is being applied, frictions of the abdomen, chest, and thighs, with a liniment composed of two ounces each of liquid ammonia, of olive-oil, and spirits of camphor, with three ounces of spirits of turpentine, and from three to six of hard soap and cayenne pepper, to which about two or three drachms of cajeput or lemon oil may be added. Or hot flannel, soaked in a mixture of these, may be applied over the abdomen and over the insides of the thighs, and renewed until warmth is restored. If the attack be attended by spasms of the muscles of the abdomen or thighs, this mixture may be used either as a liniment or as an embrocation, as now advised. The external applications should be assisted by the internal administration of ether, camphor, ammonia, calomel, opium, aromatic spirits, and essential oils, either singly, or in such forms and combinations as the circumstances of particular cases may point out.

180. If the irritability of the stomach continue, and if the attack be severe, flannels wrung out of hot water, and immediately soaked with the embrocation just now described (§ 179), or with warm spirits of turpentine, ought to be instantly applied, as warm as possible, over the stomach and abdomen, and retained there, or renewed, until a decided effect is produced. This is the most powerful means I am acquainted with, and the most successful in procuring reaction and restoring the heat of the body.

181. The foregoing means frequently accomplish the last of the intentions of cure enumerated above (§ 176), by fulfilling those which preceded it. But we should never consider the patient to be placed in a fair way of recovery by bringing about reaction merely, unless the suppressed secretions be also restored. It should be kept in recollection that an early effect of the exciting cause of the disease is to vitiate the whole mass of blood, and that this morbid state can be removed only by supplying the loss of the serous parts of the blood exuded from the mucous surfaces, and by exciting and calling into active and healthy action the functions of the secreting organs, particularly those of the abdomen. In order to attain this end, large doses of calomel, followed by purgatives or aperients, are required.

182. Calomel was commonly employed in India, and generally in conjunction with opium, in some form or other, and certainly few remedies succeeded better, either there or in Europe, in allaying the vomiting, when the disease was neither unusually severe nor too far advanced. In cases of moderate severity, and when given early in the attack, it seems to have been remarkably beneficial in restoring the secretions of the abdominal viscera, particularly of the liver; and in these, in conjunction with bleeding, it seems to have had no mean share in preventing the consecutive states of disease, into which this pestilence so frequently passed, more particularly the nervous, congestive, or malignant state of fever sometimes supervening. Mr. OGLEBY (*Bomb. Rep.*, p. 210) remarks,



that where the calomel affected the mouth, the consequent symptoms of bilious fever were not observed. Its good effects will be promoted by combining it, as above (§ 179), with camphor, carbonate of ammonia, and small, or at least moderate, doses of opium. Large doses of this last medicine are injurious in a disease, one of the chief characters of which is great depression of the vital energies.

183. If the means here detailed arrest the malady, or bring about reaction, the treatment must be greatly modified or altogether changed. If they fail of producing either of these effects, the additional means about to be recommended for the *third* form of the disease must be resorted to (§ 200, *et seq.*).

184. (*b*) The *third* stage,\* or that of reaction, being brought about, the chief intentions of treatment are, 1st. To prevent it from proceeding too far; 2d. To promote the secretions, particularly those of the liver and kidneys; 3d. To guard internal viscera from the congestive, sub-inflammatory, and disorganizing states often attendant on this stage; and, 4th. To promote the return of the healthy functions of the alimentary canal.

185. The above objects are obtained by the cautious employment of blood-letting, either general or local, but more frequently the latter, in this stage of the disease, particularly if it have not previously been resorted to, or when it is clearly indicated, and when the pulse is not very soft, broad, and open—states which forbid blood-letting; by calomel exhibited in the states of combination already noticed, or with ipecacuanha; by aperients or purgatives, combined with gentle tonics and antispasmodics, and by vapour baths. If cerebral, typhoid, or nervous affection supervene, opium, unless in small doses, and combined with camphor, or with calomel also, seems to be contra-indicated.

186. In the stage of reaction attended by cerebral symptoms, particularly if the vessels of the conjunctiva be loaded, leeches should be applied to the posterior parts of the head and temples, and purgative medicines be employed with the view of removing the congestion of, and the determination to the head, and of increasing all the abdominal secretions and excretions; and external derivatives resorted to, in order to relieve the internal viscera from the load which oppresses them. In this particular state of the disease, as well as in its early stage, active enemata are especially indicated. They should be repeated, without being discouraged by the circumstance of their not being retained. The end will be obtained at last, if we persevere in a judicious manner. I have frequently seen marked advantage derived, in this state of the disease, from the subjoined formulæ:

No. 308. R Asafetidæ, ʒij.; camphoræ rasæ, gr. xii. tere cum decocti avenæ, ʒviij.; dein adde olei terebinth. ʒss. ad ʒjss. Misce, et fiat enema.

No. 309. R Olei terebinth., ʒj.; olei olivæ, ʒjss.; camphoræ rasæ, gr. xv.; decocti avenæ, ʒviij. M. Fiat enema.

187. Derivatives are of the utmost advantage in the state of reaction with dangerous cerebral affection. Belonging to this class of means, blisters and sinapisms have been most commonly resorted to, the former applied between the shoulders, the latter over the epigas-

trium and insides of the thighs. M. RANQUE has strongly recommended certain rubefacient and irritating applications to the abdomen, and M. DE BOISMONT has approved of them. They are required equally during the first stage, particularly when the vomiting and spasms are very urgent, and during this period when the head is much affected. Of this class of means, the warm turpentine embrocations applied to the abdomen and insides of the thighs, as noticed above (§ 180), are to be preferred, as being most quick and decided in their operation. The liniment already mentioned (§ 179), or the former of the two prescribed below,\* may likewise be assiduously rubbed over the spine and lower extremities; the latter on the insides of the thighs only, as it is more apt to remove the cuticle than the former. When the turpentine fomentation is not used to the abdomen, the liniment may be applied to this situation. In this period of the malady the *kidneys* may not sufficiently discharge their functions, although this is not so frequently or constantly observed as in the severer grades, where this condition is one of the most dangerous that presents itself, and the most difficult to remedy. When, however, it does occur, the embrocations and liniments already mentioned should then be applied to the loins.

188. When the stage of reaction is accompanied with gastro-enteric affection, or with the additional complication of marked affection of the liver, or disturbance of its functions, or if it assume the nearly allied form of bilious fever, the external medicaments recommended above are also requisite. If the stomach and bowels are chiefly affected, the application of leeches to the epigastrium will be necessary previous to the employment of these, or of other external or internal means; and emollient injections should be occasionally thrown up. Small doses of opium, combined with camphor and the blue-pill, or the hydrargyrum cum creta, may also be given from time to time.

189. Very nearly the same treatment as now stated is required when the symptoms indicate a congested or sub-inflammatory state of the liver. The application of leeches to the epigastrium and right hypochondrium; full doses of calomel given at bedtime, combined with small quantities of camphor, and an aperient draught the following morning, or a few hours afterward; the use of warm diaphoretics at short intervals; aperient and emollient injections, and the external means recommended above (§ 187), will generally be requisite.

190. If the consecutive affection assume a dysenteric character, leeches to the perinæum or særum, emollient and diaphoretic medicines, and mucilaginous injections will be found extremely serviceable. As the dysenteric form of the stage of reaction is frequently either associated with, or dependent upon, a very acrid and otherwise morbid state of the secretions poured into the bowels, and sometimes on an affection of the liver, the occasional exhibition of a dose of calomel with JAMES'S powder, and

\* No. 310. R Linimenti saponis co.; linimenti camphoræ co., ʒā, ʒjss.; olei terebinth., ʒij.; saponis duri, ʒij.; olei limonis et olei cajuputi, ʒā, ʒjss. M. Fiat linimentum.

No. 311. R Camphoræ, ʒij.; solve in tinct. cantharid. et Tinct. capsici, ʒā, ʒij.; dein adde linimenti sapon. co., ʒss. et gradatim, miscendo, liquoris ammon., ʒvj.; olei olivæ, ʒx. Misce, bene et sit linimentum.

\* See note, p. 124, *supr.*

the use of aperients, will be indispensable, in addition to the other internal and external means of cure already particularized.

191. When the stage of reaction is attended with pulmonary affection, local depletion, and the exhibition of those medicines which, while they increase the secretions of the skin and the abdominal viscera, occasion a derivation of the blood from the congested organ, will then be necessary. The most energetic of those are calomel, or the blue-pill, with ipecacuanha, camphor, and hyoscyamus, followed by active purgative draughts and injections, and the application to the insides of the thighs of the liniments or embrocation already prescribed. In these cases the decoction of senega may be given with emollients and aromatics, or the ammoniacum mixture, with liquor ammoniæ acetatis, the camphor mixture, the spiritus ætheris nitrici, and the vinum ipecacuanhæ.

192. Upon the whole, the treatment of the stage of reaction in its various forms of manifestation, as well as the state of *collapse* into which it so rapidly passes, must be directed according to sound views of morbid actions, of therapeutical indications, and of the operation and appropriate application of remedies, as in similar or analogous cases and circumstances of disease. As to the treatment of the *last period* of the malady, or that of collapse, it will be preferable to defer any remark until some notice has been taken of the treatment of the more violent forms of attack.

193. *B. Of the Treatment of the severer Grades of the Disease.*—The same objects or intentions of cure as have been recommended for the slighter grade of the malady (§ 176) will be applicable to the early periods of the severer grades, and very nearly the same agents will be required to fulfil them.

194. Here, also, I recommend astringents and stimulants, and upon the same grounds, with the same views, and in the same or similar forms of combination as those already described (§ 177). If the astringents chiefly confided in, more especially the sulphate of zinc, occasion or increase vomiting, the circumstance is not to be regretted. In some cases it may even be promoted, with the view of equalizing the circulation and overcoming visceral congestions. In young, robust, or plethoric persons I would even propose a moderate venesection, at the same time that vital resistance and reaction are promoted by stimulants and external derivatives; by it the load which oppresses the springs of life, and prevents their reaction, is lightened, and the mass to be moved is thereby brought to a nearer relation to the state of the moving power. But while the mass to be moved is thus reduced, care must be taken to rouse the moving power by a judicious administration of stimulants, of which full vomiting, excited by the means already noticed, the application of external heat (§ 178), hot epithems and fomentations on the abdomen (§ 179), and frictions with hot liniments or warm cloths (§ 180), are among the most efficacious.

195. Blood-letting, however, should not be attempted in persons who are advanced in life, in the debilitated, the previously ill-fed, the drunken, and in those inhabiting low, marshy, and unwholesome situations, or who live chiefly

on a poor vegetable diet. Even in those from whom the abstraction of blood is admissible, the strength, habit of body, the previous health of the patient, as well as the state and progress of the disease, should be duly considered, and the effects of the loss carefully observed, and the quantity cautiously regulated accordingly. Blood-letting ought never to be attempted where there appears evidence of the loss of a large portion of the serum of the blood from the alimentary canal, or when the pulse at the wrist is small and weak. At the time of its being instituted, as well as afterward, and in those cases where it should not be practiced, internal medicines should be administered, in addition to the external means already noticed, in order to rouse the energies of the nervous and vascular systems; and thereby, while the second and third intentions of cure are being fulfilled, congestion will also be removed. Of the various internal stimuli which have been recommended—and almost every one in both the mineral and vegetable kingdoms of nature has been tried—the most eligible, and, I believe, the most successful, are camphor in large doses, opium, ether, the preparations of ammonia, the aromatic and essential oils, particularly the oils of peppermint, cloves, cajeput, the spirits of mint, lavender, cardamoms, &c.; solutions of phosphorus in ether, or in oil;\* the magistery of bismuth; large doses of musk; the hot spices, and numerous warm and aromatic plants, in various forms of combination, &c. Most of those may be conjoined with the astringents already recommended (§ 177), and taken either in the form of pill or mixture. In many cases it will be advisable to give also stimulating beverages, especially those to which the patient has been most habituated, as any of the several spirituous liquors diluted with warm water, sugar, &c.; hock, Champagne, sherry, or Madeira wine in Seltzer, soda, or potash water. In this state of the disease, particularly when the depression of the vital energies is extremely great, the assiduous application of the turpentine fomentation to the abdomen, as well as of the hot liniments to the insides of the thighs (§ 179, 180), and the administration of injections, as stated above (§ 186), in conjunction with the internal exhibition of the stimulants now mentioned, will also be requisite, and, when appropriately prescribed, will often prove highly beneficial.

196. It is unnecessary to enter farther into detail as to the treatment of the early stage of the severer grades of the pestilence. It may, however, be remarked, that in addition to the medicines already noticed, others have been employed. Among these the most deserving of mention are, musk in large doses, with camphor or ammonia; infusion of valerian with camphor or asafetida, particularly as an enema; the decoction of guaiacum, in a similar combination and mode of exhibition; warm infusions of rosemary, mint, and lavender, with spirit of nitric ether; and various other vegetable infusions and essential oils. They may be exhibited either by the mouth or in enemata.

\* No. 312. R Phosphori, gr. j. ad ij.; solve in æther. sulphur., ʒij.; olei terebinth., ʒij., et adde olei olivæ, ʒij., ss.; pulv. gum. acacie, ʒi.; aquæ menth. pip., ʒiv.; olei cajeputi, ℥xii.; syrapi zingiberis, ʒj. Misce secundum artem. Capiat ocellaria ij. larga omni bihoro.



197. (b) When imperfect *reaction* occurs—for reaction is seldom or ever freely and openly developed—it presents the same manifestations, in respect of vital organs, that have been already described (§ 184, *et seq.*); and the treatment, which has been recommended as appropriate to each of the states in which this stage of imperfect reaction shows itself, is equally applicable here, and is directed to the accomplishment of the same intentions as in the first or slightest grade of the malady. The typhoid state of fever, which frequently presents itself, requires the remedies described above (§ 186, 187); and the congestive and sub-inflammatory states of the liver (§ 189), stomach, bowels (§ 188), and lungs (§ 191) generally demand the means which are applicable to them respectively. In this state of the malady the secretion of *urine* is very generally suspended, or at least is very scanty, especially when the discharge of serous fluid from the bowels has been abundant, the blood being incapable of furnishing the fluid material of urinary discharge. The chief object of treatment is, therefore, to change the morbid condition of the circulation by means of the secreting viscera, and by furnishing the stomach with a sufficient quantity of medicated or simple diluents, whence the inordinate loss of the serum of the blood may be replaced, and the functions of secretion supplied and promoted. At the same time that these views are being acted upon, those organs which suffer congestion and a sub-inflammatory state of action, arising from the depressed state of the vital powers and the morbid condition of the blood accumulated in or circulating through them, must be, as far as possible, preserved from disorganization. This latter object is best attained by cautious local depletions, by rousing, and, at the same time, controlling the functions of the different emunctories, by expelling morbid matters from the *prima via*, and transferring irritation to parts which cannot be materially injured by it.

198. In this, and, indeed, in all stages of the disease, as long as the sensations of heat at the epigastrium and thirst are complained of, the patient should be allowed such fluids or beverages as may prove most grateful to him; and these may be made the vehicle of the medicines already advised, and taken at a temperature which is most agreeable to him—generally in small quantity at a time, and frequently. I have often allowed fluids to be taken, either cold or slightly warm, with small quantities of the nitric and hydrochloric acids, when the medicines given at the time were not chemically incongruous with them. The Anglo-Indian practitioners have lauded these beverages; but I have experienced but little benefit from them unless during convalescence, when they tended to restore the torpid functions of the liver. During the period of imperfect reaction I have found more benefit result from a liberal use of diluents containing liquor potassæ, or the alkaline carbonates, or the baborate of soda; these appearing to favour the passage of fluids into the circulation, to correct the state of the blood, and to excite the action of the kidneys.

199. During the consecutive fever, as well as at an early period of convalescence, the bowels may become torpid, and require warm stomachic aperients, such as the decoctum

aloes compositum with a little cinnamon water; equal parts of the compound infusions of gentian and of senna, or the *mistura gentianæ composita*; and any of the preparations of mercury which the state of the patient may suggest. The “*drogue amère*,”\* a tonic aperient tincture long used among the Jesuit missionaries in the East, obtained much reputation in this period and grade of the pestilence, as well, indeed, as in all its grades and stages, where a stimulating aperient was indicated, and was much employed by Anglo-Indian practitioners: it was generally given in doses of half an ounce to an ounce, in camphor water, or in any suitable vehicle.

200. *C. Treatment of the Third, or most intense Grade of the Malady.*—In this grade the depression of the energies of the frame is as profound as is consistent with the continuance of life. The means of cure, therefore, ought to be most promptly administered, and energetically devised. The objects proposed to accomplish them are in every respect the same as were stated when treating of the stage of depression in the slighter grade of the disease (§ 177); but still more energetic agents are requisite to attain them than have yet been recommended, and most frequently even the most active we can devise are entirely unequal to the accomplishment of the ends we wish to attain. Indeed, the vitality of the several organs is so extremely depressed as to be incapable of being influenced by any moderate agent; the structures are far advanced to the state presented by them immediately after death; and the blood is no longer capable of being circulated. Treatment is, therefore, entered upon with feelings of despair; still, as recovery from this state does occur in rare instances, it is our duty to employ rational means to attain this end as long as life continues.

201. In this grade of the malady the stimulating *emetics* already recommended (§ 177), with the view of exciting full vomiting, which the powers of the constitution are of themselves incapable of effecting, should be employed early, if at all, with the intention of producing reaction; using at the same time stimulating frictions, the turpentine fomentation to the whole abdomen, as hot as it can be made; the hot-air bath, and the internal stimulants already prescribed (§ 195), or some of those about to be noticed (§ 203).

202. Blood-letting is advised by some writers as early as possible in this grade of the malady, and denounced by others. My own experience and that of many practitioners in this country are decidedly against its adoption.

[*Emetics* and blood-letting invariably proved injurious in the treatment of cholera, so far as we have observed. If bleeding is practiced at all, it should be at a very early stage of the disease; but at that period we have other remedies equally successful, and on all accounts less

\* No. 313. R Aloës socot., ꝑiv. vel ꝑv.; gum. myrrhæ, gum. mastiches, benzoini, aa, ꝑij.; rad. calumbæ concis., rad. gentianæ, aa, ꝑij.; croci stigmat., ꝑj.; spirit. vini Gal., lbix.; spirit. vini Hollandiæ, lbij. Macera per mensem, exprime et cola. This excellent tincture furnishes an illustration of the principle, first clearly explained and inculcated by HOFFMANN, that purgatives, particularly aloes, have their purgative action greatly increased by being combined with bitters and tonics.

objectionable. The vital forces are not to be reduced, by loss of blood or any other debilitating evacuation, if it can be avoided. The vapour bath is a remedy of decided efficacy in the early stages of this disease, and may be depended on with more confidence than almost any other remedy. We have treated many cases successfully with no other means whatever, allowing the patient to keep warm in bed, and take rice or barley gruel, or chicken water. Cathartics are unsafe, unless those of the mild-est description; antimony in any shape is poisonous. The same remark will apply to the more irritating articles of the cathartic class.]

203. When the means already noticed fail, or seem inadequate to arrest the violence of attack, others which have sometimes succeeded in similar states of morbid action, particularly when they cannot prove detrimental, should be prescribed. I would, therefore, recommend a bolus, consisting of from ten to fifteen grains of camphor, an equal number of grains of calomel, two grains of Cayenne, one grain of opium, and ten drops of any essential oil, as of mint, cajeput, &c., to be given with a sufficient quantity of conserve of roses. This may be administered after full vomiting, if it can be quickly procured, but without any regard to its continuance. If this bolus be retained, another may be given, and repeated in from one to two, three, or four hours, according to the urgency of the attack; but if rejected, it should be immediately repeated, until it at last remains. Not more than three or four of those boluses ought to be given, and frequently two will be sufficient.

204. Simultaneously with the administration of the above, thirst should be quenched by a frequent recourse to whey, to Seltzer water or soda water with milk, by spruce-beer, or by other diluents; and dry heat may be employed, and the turpentine fomentation applied, as hot as possible, to the abdomen and chest; and friction of the spine and thighs with any of the liniments prescribed above (§ 187), made warm by plunging the vessel containing it in hot water, resorted to. From one to three hours after the exhibition of the bolus, a draught, consisting of from two drachms to half an ounce each of spirits of turpentine and castor-oil, or of olive-oil, with a few drops of the above essential oils, and forty grains of magnesia, should be taken in mint water; and if it be rejected, another should be given, and repeated; if again rejected, in half an hour afterward; if retained, not until from six to twelve hours, when another may be taken. I have seen cases where the most urgent vomiting existed, and yet the above remedies (although both the bolus and the draught were taken at the same time) allayed, instead of aggravating, this symptom. Besides, it is our object to obtain full vomiting at first; therefore this cannot be viewed as an unfavourable operation of the medicine, if it should follow the exhibition of the first doses of it. In order to promote the influence of these means, a lavement, consisting of ten to twenty grains of camphor, or a drachm of asafetida, half an ounce to an ounce and a half of the spirits of turpentine, and an equal quantity of olive-oil, in a suitable vehicle, should be administered, and repeated according to the circumstances of the case. Much will depend upon the succession in which these remedies are given, the pe-

riods which are allowed to elapse between their exhibition, and on the doses and the decision with which they are prescribed. The hot turpentine fomentation, assisted by hot air and frictions with stimulating substances, is the most powerful means I am acquainted with of procuring reaction, restoring the heat of the body, and relieving the viscera from congestion.

205. The internal remedies now recommended, as well as the external means so frequently insisted upon, have been employed by me in many hundred instances of malignant and extremely dangerous diseases, and I have found them the most efficient of all others with which I am acquainted, when judiciously combined and administered, in rousing the energies of life, restoring the secretions, removing the congestion of internal organs, and in subduing that unhealthy sub-inflammatory state of action which often occurs in fevers, and in diseases proceeding from infection and animal poisons, and which generally advances rapidly to fatal disorganization. In aid of the above remedies, and particularly when the energies of the constitution seem to react, although most imperfectly, *effervescent draughts* with the sesquicarbonate of ammonia, and the pyroligneous acetous acid in mint or cinnamon water, or in an infusion of cloves, the ammonia being in excess, may be given from time to time, and a *large blister* applied over the epigastrium upon the removal of the turpentine epithems.

206. I would also recommend, both in this most severe grade of the malady, and that next it in degree, the administration of medicinal substances in the state of vapour, and medicated gases through the channel of the respiratory organs. It has already been shown that it is through these organs that the specific cause of the disease invades the frame, and that they suffer in a most remarkable manner from its impression, having their functions altogether paralyzed, and their substance remarkably congested at a more advanced stage. If this view be entertained, the means of individual prevention which are hereafter recommended will appear the more deserving of adoption, and the directing of medicinal agents to this quarter will, at least, not be considered unreasonable or undeserving a fair trial. Perhaps the inhalation of the nitrous oxide gas, or common air with a slight addition of oxygen, will be the most energetic remedies that can be employed in this way. Other means, also, which will readily suggest themselves to the well-informed physician, may be used; and among others, the vapour arising from gently heating a strong solution of camphor in aromatic vinegar, or the vapor of the aromatic preparations of ammonia, may be mentioned; and shocks of galvanic electricity may be passed through the chest.

207. Besides the use of frictions with hot cloths, or dry substances, or with liniments, which will not occasion cold by their evaporation—means which have already been advised—the application of hot air, or of hot salt or bran, or hot oats, around the body, have all been recommended. In cases where the hot turpentine fomentation, or common sinapisms, have no effect, or in this most intense grade of the malady, without waiting for the effects of less active means, the subjoined cataplasm\* may

\* No. 314. R Pulv. sinapeos, libss.; pulv. capsici annui



be applied over the abdomen. A trial may also be given to medicated vapour baths; to baths, with the fumes of some of the volatile essential oils extricated by heat; and to dry-cupping in the course of the spine, with the view of removing congestion within the spinal canal, as well as of the kidneys and other parts. It may be remarked, that in the most severe attacks, or when far advanced before medical aid is procured, scarcely any means, however well and energetically devised and practiced, will prevent a fatal result; while the less severe visitations will generally be removed by any of the remedies enumerated, when judiciously combined and employed. There is reason to suppose that the slightest grade of the malady will even, by means of the vomiting and tumult excited in the frame, operate its own cure; and hence the reputation acquired by various mild or inefficient medicines and methods of treatment. There are few diseases, perhaps, which, while they preserve a perfect identity of character, present a greater range in grade than this; excepting, indeed, those maladies which propagate themselves in a similar manner to it. Indeed, it is chiefly to the mildness of the attack that we are to attribute the imputed success of such remedies as successive draughts of warm milk, olive-oil, the GLAUBER salts, common salt, and various other mild preparations. In the more intense visitations, where the depression of the vital energies of the frame and the vitiation of the blood are extreme, remedial agents should possess a co-ordinate degree of activity, in order to produce any effect whatever on the system.

208. If the above energetic means be judiciously put in practice, and brought to act simultaneously on different parts of the body, or prescribed in due succession and states of combination, as the scientific, zealous, and experienced practitioner may consider appropriate to the grade and stage of the malady, signs of reaction will sometimes manifest themselves; and then—particularly if it have not previously been employed, or when the state and circumstances of the patient furnish no reason against it—a small blood-letting, either general or local, may be cautiously resorted to. If the stage of reaction be brought about, however imperfectly, the same intentions of cure, and the same measures to fulfil them, which I have already described when treating of the various manifestations of this stage in the less intense grades of the malady, should be appropriately employed against each of them respectively, as they may supervene in this most severe form of the pestilence, although success from the most active and judicious measures can seldom be expected in this stage of the malady, more especially if the urine still continue suppressed, or means to supply the lost serum of the blood be still unavailing.\*

pulv. zingiberis, ʒi. ʒj.; acidi acetici pyrolignei q. s. ut fiat cataplasma, dein adde olei terebinthine, ʒij. Misce.

The following compound tincture of camphor and opium seems well suited to the worst grades of this malady, in doses of one or two drachms, given in any suitable vehicle.

No. 315. R Opii pulveriz., ʒij.; camphora, ʒvj.; corticis canellæ confusi; croci stigmat., ʒij.; caryophyllorum; pulv. capsici, ʒiss.; potasse sub-carbon., ʒij.; olei anisi, ʒj.; spirit. vini tenuior. (vel sp. vin. Gallicæ, vel sp. vin. Hollandiæ), Oij. Macera leni cum calore, per dies viij. ad xii.; dein exprime et cola.

[\* It is questionable if the vitiation of the blood, after it

209. As the exhaustion of strength is extreme, and as every muscular effort increases it, and as fatal syncope may soon occur in the most severe grades, from being raised to the erect, or even sitting posture, means ought to be adopted to preclude the necessity of the patient's removal from the recumbent position for the purposes of evacuation. The discharges should be received in a bed-pan; and when medicines are exhibited, his head and shoulders should be raised no higher than is requisite to the accomplishment of the object. Mr. SEARLE very justly remarks, that attention to this injunction cannot be too strictly enforced, and states that two patients under his own observation lost their lives from neglecting it.\*

210. It not unfrequently happens that the active stimulants which we prescribed in the stage of depression, particularly in the more intense grades of the malady, together with the natural tendency of the disease, occasion inflammation, or a sub-inflammatory state of the stomach and bowels. When this occurs, the epigastrium and abdomen become extremely tender, and even tumid. Great irritability of the stomach is also present, and is increased after the ingestion of stimulating substances. In cases of this kind, venesection, the application of leeches, followed by the hot fomentation or the cataplasm prescribed above (§ 179, 207), and, upon their removal, by a large blister; the exhibition of calomel combined with small doses of camphor and opium; purgative or aperient injections, often repeated, and sinapisms or stimulating liniments to the lower extremities, are among the chief remedies.

211. In the treatment of this as well as of the following stage, all means will prove inefficacious as long as the urine is either suppressed or secreted in very small quantity. The defect of this excretion proceeds rather from the want of serum in the blood, than from a paralyzed or congested state of the kidneys; therefore the beverages already advised (§ 195, 198) should be freely administered, and be made the vehicle of medicines in order to supply the loss, and dry-cupping followed by stimulating embrocations applied to the loins.

212. *D. Treatment in the Last Stage, or that of Exhaustion and Collapse.*—In those cases in which efforts at reaction, or consecutive excitement, are manifested, exhaustion often rapidly supervenes, owing to the depressed and weak powers of life, to the morbid state of the circulating fluid, and the deficiency of serum. Hence the necessity, during the imperfect manifestation of excitement or reaction, to support the powers of life, even while we have recourse to small general or local depletions, to allow a free use of whey, or other diluents containing saline substances, as Seltzer and soda water, and to act upon the secretions by means of

has separated or disunited the crassamentum or serum to a certain degree, can ever again be so repaired as to render it possible for the vital fluid to reabsorb any substance whatever that may be introduced into the alimentary tube, or otherwise to supply the lost serum.—T.]

[\* In connexion with this subject, it may be remarked, both in this disease and in yellow and other infectious fevers, that a great number of cases are made to have a fatal issue by neglect of such injunctions, and by removing patients when in this extreme state from one locality to another, as often happens in transporting them from the place where they are seized to the quarantine or lazaretto, &c.—T.]

purgatives given by the mouth, and in the form of injections; hence the propriety of removing the local determinations and congestions with which the attempts at reaction are more or less accompanied, by means of external derivatives and counter-irritants, employing tonics at the same time that we endeavour to restore the suspended secretion, and thereby to purify the blood, and to derive it from the seats of congestion. It is obvious, however, that these ends cannot be attained while the physical condition of the blood is such as not to admit of secretion or even of due circulation, while the blood is deprived of one half of its due quantity of serum. Therefore, due care should be taken to administer, by the mouth, and by injections, suitable diluents, and to persist in the exhibition of them, especially of those already mentioned (§ 195, 198), in hopes that a portion of them will be carried into the circulation, and supply the deficiency of the watery portion of the blood.

213. As all attempts at reaction must necessarily soon lapse into profound exhaustion, when made during inordinate depression of the powers of life and a morbid state of the blood, characterized, not merely by loss of the serum, but also by an accumulation of urea, carbon, and other effete materials requiring removal by the several emunctories, so the objects entertained should be to supply a due quantity of fluid to the circulating mass, and to conjoin with, or dissolve in, that fluid, such substances as will most powerfully and readily excite the action of the excreting viscera, particularly the kidneys and liver, and thereby remove the impurities accumulated in the blood. We ought, therefore, to resort to these means as early as possible, and in such modes and combinations as are best calculated to attain these objects. If, however, exhaustion proceeds rapidly, stimulants and permanent tonics, given internally; antispasmodic and tonic injections; hot air, hot cataplasms and fomentations; and the other internal (§ 195, 207) and external stimulants, described when treating of extreme depression, occurring early in the disease (§ 201–203), may be resorted to. Yet the vital depression will never be removed while the urine is suppressed or scanty, without administering diluents as advised above (§ 204), and saline purgatives and aperient enemata. It is in this state of the disease that the warm tonic and purgative medicines prescribed above (§ 199) prove most serviceable, and that the patient requires to have his energies kept up by light nourishment, by grateful diluents and beverages, with a moderate quantity of wine, which latter may also be administered occasionally with injections.

214. In the more extreme cases of this stage of the disease, oil of cloves, or of mace, or of rosemary, or of British juniper, or of rue, or lavender, to be applied warm, over the abdomen or epigastric region, and allowed to remain there, or to be renewed, according to the effect produced. In the more urgent cases, a cloth moistened with the warm oil may be placed in this situation, and kept closely applied by means of a compress, which will tend to prevent its rapid dissipation. In milder cases the oil may be combined with camphor and some one of the plasters in common use, as the galbanum, the pitch, or ammoniacal plaster, and

these applied and renewed from time to time. I have seen, in cases of extreme vital exhaustion, with depression of the animal warmth, from other causes, the skin of a recently-killed animal, particularly that of a sheep, wrapped round the body of the patient, the wool outward, and advantage derived from the application. Even this or similar means may be tried as a last resort.\*

215. *D. During convalescence* from this disease, care should be taken to prevent relapses. It is very frequently observed that at the commencement of convalescence, the patient is tormented with an uncommon craving for food. This should be restrained, and but little, or at most a moderate quantity only, and of a light, digestible kind, allowed to be taken. The se-

\* I have adverted, in another part of this work, to the influence of the animal warmth of young healthy persons on those who are debilitated, or are labouring under extreme exhaustion. Since that was written, I chanced to find this mode of treatment strongly insisted upon by SYDENHAM (*Observat. Med.*, i., 4, § 40), and as follows, in the "*Medical Notes and Observations*" of SYDENHAM, just now published for the first time by Dr. GREENHILL, of Oxford, the learned editor of his works:

"*De Methodo medendi Morbos per Accubitum Junioris.* Cap. 16. May ye 19th 1662 I was called in ye night to Mrs Change, whom I found very ill of a Cholera Morbus; she had many ugly Symptoms, as coldness of the Extreme parts, talking a little idly, intolerable Sickness, & felt a tingling in her Fingers & flesh outwardly. I judge it dangerous to use Diluents especially by Clysters in a Women [*sic*] soe green (she having not lain in a Month) & ye Disease pressing soe hard upon my heels; Soe I ordered her to take a warm Cordial, & that a good draught of it, & her Husband to lie close to her Back naked, and her sonn of 12 years close to her Belly, & to lay on more Cloths & to warm her Leggs & Hands with hot Cloths: She immediately fell into a moderate Breathing, & all Sympt. ceased: & after enjoying her to keep her bed ye next day, & to eat & drink nothing save a small Quantity of Barly-broth a day for 2 days she perfectly recovered.

"February 1661 I was called to Mrs Hulston, who after a very Chronical fever was fall'n into a very fatallike Diarrhea; I saw it was to noe purpose to give astringents seeing ye Disease proceeded from a Decay of natural heat, therefore I took this Course, viz. I caused her Sonn a plump hot Lad of 13 years of age, & her Nurses sonn of 6 or 7 years to goe to bed to her naked, & to lie ye one close to her Belly, ye other close to her Back, wch they did, & as long as they continued with her she had noe stools: but ye Boys rising at any time ye Looseness would immediately return. I commanded that she should persist in ye Course till her cure should be compleat, (the Boys relieving one another by turns in ye daytime) & soe she fully recovered not only of her Looseness but also of her Sickness in general.

"The very same course I took with one Mr Little, who had a fever abt 7 weeks, & at yt time Age 1662, soe far spent yt his Drs judged him a Dead-Man: He was ancient & having been much purged with violent Medicaments, he was as weak as ever I saw any yt recovered; I (having to noe purpose made attempts to lay his fever by inward Medicines & to raise his strength by Cordials) told his wife that nothing could preserve his life but ye putting a Boy to bed to him: soe she procured a Link boy to lie very close to him all night, & ye next morning I found his fever almost off, & his Eye & Countenance more lively, upon wch I pronounced all danger to be over, yett afterwards upon my giving him a Clyster & upon ye recess of ye Boy he began to relapse; but ye Boy being got again & I giving noe more Clysters he perfectly recovered.

"The very same way had I cured before Bp. Monk's Lady, who was an aged Woman of a very feeble & thin habit of Body, & had an Ague wch (tho' gone) had soe weakened her yt her Physician Dr. Ridgley looked upon her as dead; when I was sent for she had also spitten some purulent matter & blood wch they shewed me (in abundance) upon ye Napkin. I told ye Dr yt I apprehended yt nothing could save her life, but a speedy transplantation of some young Spirits upon her, to wch he readily agreed, & a Girl of 13 years was put in close to her Breast, upon this she recovered very speedily both of her Unspiritedness & her Coughing: But ye Girl fell sick, wch was attributed to her lying wth ye Lady, tho' I was confident to ye Contrary, having never known any Mischiefe yt way; however she had first coming out upon her Petechia, & afterwards large Ulcers upon her Breach; But Dr Ridgley & I recovered her."



vere nature of the attack, the derangement of the digestive mucous surface, and the disturbance accompanying it of all the digestive organs, must necessarily leave them for a time incapable of discharging their functions in a regular or active manner. They should, therefore, have no more imposed upon them than they seem capable of performing.

216. It frequently happens that, owing to neglect of this precaution, and occasionally to too early exposure to the vicissitudes of season or of weather, or to cold, chills, or wet, after an attack of this malady, a relapse occurs and carries off the patient. Care, therefore, should be taken to protect the surface of the body, and particularly the extremities, from cold during convalescence, to regulate the diet and regimen of the patient, and to promote the return of the healthy action of the stomach, bowels, kidneys, and other secreting viscera. In order to accomplish this last object, gentle tonics will be necessary; and as the functions of the bowels generally require aid, this should be afforded by combining aperients with tonics, and by gradually increasing the quantity and nutritious quality of the food.

No. 316. R Pilulæ hydrarg., ℥j.; Pilulæ aloës cum myrrha, ʒss.; Saponis Castil., gr. x. Fiat pilulæ, xii., quarum capiat binas alternis noctibus.

No. 317. R Quinina sulph., ℥j.; Pilulæ aloës cum myrrha; Extr. gentiænæ, āā, ʒss.; Pulv. capsici, ℥j.; Olei caryoph., q. s. Fiat massa æqualis et divide in pilulas xxx., quarum capiat binas omni meridie; vel

No. 318. R Infusi gentiænæ co.; infusi senne comp., āā, ʒiij.; potassæ sub-carb., ʒj.; tinct. cardam. co., ʒss. M. Fiat mist. cujus capiat cochlearia, iij. vel iv., hora somni vel primo mane.

217. After the frame has been fortified to a certain extent by these means, and the functions of the bowels and the secretions are brought to a healthy state, the shower-bath or the salt-water bath may be employed, in order to bring about a complete restoration of the energies of the constitution. Whichever of the two kinds of bathing be adopted, active friction of the surface of the body should follow upon coming out of the bath, and moderate exercise be taken in the open air, either on foot or on horseback.

[In the United States the treatment of cholera has been equally various and unsuccessful as on the other side of the Atlantic. For example, the treatment pursued in the four cholera hospitals in this city, in 1832, was very different, corresponding with the pathological views of the physicians attached to them, and yet the lowest mortality was, perhaps, equally great as that generally observed in Europe.

Hospitals.	Cases.	Cured.	Died.
Greenwich Hospital . . . .	350	204	146
Park Hospital . . . . .	590	312	278
Rivington-st. Hospital . . .	410	231	179
Corlear's Hook Hospital. . .	281	93	184
Bellevue Hospital . . . . .	447	232	315

Thus the mortality at the Greenwich Hospital, of all received, was 41·10 per cent.; of the Park Hospital, 48·60; Rivington-street Hospital, 43·60; Corlear's Hook Hospital, 65·40; Bellevue Hospital, 57·50.

There were local causes, however, which might account for the increased mortality at Corlear's Hook and the Bellevue Hospital, apart from any differences in the mode of treatment.

Among the various remedies employed were bleeding, opium, mercury, purgatives, emetics,

ice, brandy, camphor, ammonia, ether, tobacco, external heat and friction, infusion of saline substances, non-purgative salts, sinapisms and blisters, asafoetida, enemata, &c. At one time in the Greenwich Hospital, frictions with strong mercurial ointment, incorporated with camphor and capsicum, were thought to prove more successful in certain cases of collapse than any other; but this was eventually found equally unsuccessful as the other methods previously employed. Indeed, the exposure, with the alarm and agitation caused by powerful friction, long continued, together with the dangers arising from over-mercurialization, counterbalanced any beneficial effects arising from the practice. We know of no one remedy adopted in the treatment of the disease in this city which deserves, from the results, to be ranked above all others.

Uncommon success in the management of this disease has been claimed for Dr. CARTWRIGHT, of Natchez, who states that he treated more than three hundred patients without a single death, by giving freely *calomel*, *capsicum*, and *camphor*. Dr. DICKSON also speaks very favourably of these articles, especially of capsicum, which, he says, was the most relied on in the southern and southwestern parts of our country, often combined with morphine, quinine, ether, &c. The quantities of camphor, calomel, capsicum, and morphine were carefully adapted to the age of the patient and the apparent urgency of the case. We consider the evidence in favour of these remedies amply sufficient to entitle them to the first rank in the treatment of this fatal malady.

The indications are sufficiently obvious, viz.: to arrest the alvine evacuations; to relieve irritation of the gastro-intestinal membrane; to restore the suspended secretions; to equalize the circulation; to relieve the nervous disturbance; and to support the general strength. The most important indication, undoubtedly, is to check the escape of the serous portion of the blood into the intestinal canal, which is to be done by inviting the fluids to the external surface of the body by powerful sinapisms, and by internal astringents, of which capsicum, rhatany, tannin, acetate of lead, and opium are the most important. To meet the first indication, we think galvanism or electricity worthy of trial. A combination of calomel, capsicum, and morphine tends to check exhalation into the bowels, determines to the surface, relieves pain and irritation, and sustains a moderate, general, diffusive excitement. Calomel allays gastric irritation, especially when accompanied with the exhibition of ice, while it, at the same time, promotes the biliary secretion. We have oftener succeeded in checking gastric distress and vomiting by administering small pieces of ice, than by any other remedy. It should, however, be aided by a sinapism over the stomach, and by immersing the feet and legs in a strong, hot mustard bath. We have also derived very great benefit in these cases from small quantities of cold carbonic acid water, and the effervescing draught. Hot drinks should never be allowed. In the diarrhœa which ushers in a choleric attack, we found it sufficient to direct the patient to keep his bed, using the stimulating foot-bath, mustard to the bowels, and warm diaphoretic drinks, with, per-

haps, a little chalk mixture, or an occasional pill of calomel and opium. We treated about eighty cases of cholera, in the incipient stage, in this manner, in the orphan asylum of this city, without losing a patient. The diarrhœa was invariably checked by determining to the surface in the manner above mentioned. Two cases attacked in precisely the same way, previous to our attendance, speedily ran into collapse, and terminated fatally. In our own case we several times resorted to the same simple means, with the same results. Hence we cannot but regard the cholera as one of the most generally manageable diseases which we have to treat, provided it be taken early in hand. The stage of collapse, in which about half of our cholera patients were received into the hospital, is really the dying stage. Occasionally, however, when the epidemic influence is at its height, cases will occur which baffle all the resources of art. We have seen such march on to a fatal termination in the course of three or four hours, without being affected in the slightest degree by the most powerful remedies. Of several such cases, treated in conjunction with Prof. PAINE, see *Med. and Phys. Commentaries*, vol. iii. For a very full and satisfactory account of the disease as it prevailed in this city, including pathological appearances, treatment, &c., see the above very able work, *passim*. Also, on the treatment, Wood's *Practice of Medicine*, vol. ii., p. 664.]

BIBLIOG. AND REFER.—Reports on the Epidemic Cholera which has raged throughout Hindostan and the Peninsula of India, since August, 1817. Published by the authority of Government. Svo. Bombay, 1819.—J. Jameson, Report on the Epidemic Cholera Morbus, as it visited the Territories subject to the Presidency of Bengal, in the years 1817, 1818, and 1819. Drawn up by order of the government, under the superintendence of the Medical Board, Svo. Calcutta, 1820.—W. Scott, Report on the Epidemic Cholera, as it has appeared in the Territories subject to the Presidency of Fort St. George. Drawn up by order of the government, under the superintendence of the Medical Board, folio. Madras, 1824.—Corbyn, *Medico-Chirurgical Transactions*, vol. xi., part i., 1820.—R. Orton, An Essay on the Epidemic Cholera of India, Svo. Madras, 1820. Second Edition, with a Supplement. London, 1831.—J. J. Deville, Mém. et Observat. sur l'Epidémie de Choléra Morbus qui a régné au Bengale pendant l'été de 1818, Svo. Lond. Bat., 1819.—J. Boyle, A Treatise on the Epidemic Cholera of India, Svo. Lond., 1821.—A. Moreau de Jonnes, Notice sur la Maladie Pestilentielle importée aux Iles de France et de Bourbon, et désignée sous le nom de Choléra Morbus de l'Inde, Svo. Paris, 1821.—T. Brown, On Cholera, more especially as it has appeared during late years in British India, Svo. Edin., 1824.—W. Ainslie, Observat. on the Chol. Morb. of India, Svo. Lond., 1825.—J. Annesley, Sketches of the most prevalent Diseases of India, comprising a Treatise on the Epidemic Cholera of the East, &c., Svo. Lond., 1826; sec. ed., Lond., 1831.—R. H. Kennedy, Notes on the Epidemic Cholera, Svo. Calcutta, 1827.—A. T. Christie, Observations on the Nature and Treatment of Cholera, Svo. Edinb., 1828.—L. J. M. Robert, Guide Sanitaire des Gouvernemens Européens, ou Nouvelles Recherches sur la Fièvre Jaune et le Choléra Morbus, &c., Svo. Paris, 1826.—B. Hawkins, History of the Epidemic Spasmodic Cholera of Russia, &c., Svo. Lond., 1831.—L. Rodin, Précis sur le Choléra Morbus, et sur la Contagion, &c., Svo. Paris, 1831.—H. Ranque, Mémoire sur un Nouveau Traitement du Choléra Morbus, et des Affections Typhoïdes, &c., Svo. Paris, 1831.—C. Searle, Cholera, its Nature, Cause, and Treatment, clearly and concisely explained. Second edition, Svo. Lond., 1831.—G. H. Bell, A Treatise on Cholera Asphyxia, or Epidemic Cholera, as it appeared in Asia and in Europe, Svo. Edinb., 1831; and Letter to Sir Henry Hallford, Bart., &c., on the Tendency of the proposed Regulations for Cholera, on the Nature of the Disease, &c. Edinb., 1831.—H. Young, Remarks on the Cholera Morbus, its Symptoms, Causes, and Treatment, &c., Svo. Lond., 1831.—J. R. Lichtenstadt, Die Asiatische Cholera in Russland in den Jahren 1830 und 1831, &c., Svo. Berlin, 1831.—J. Goss, Practical Remarks on the Disease called Cholera, now existing on the Continent of Europe, Svo. Lond., 1831.—G. W. Lefevre, Observations on the Nature and Treatment of the Cholera Morbus,

now prevailing epidemically in St. Petersburg, Svo. Lond., 1831.—T. J. Pettigrew, Observations on Cholera, comprising a Description of the Epidemic Cholera of India, the Mode of Treatment, and the Means of Prevention, Svo. Lond., 1831.—Brière de Boismont, Relation Historique et Médicale du Choléra Morbus de Pologne, comprenant l'Apparition de la Maladie, ses Progrès, ses Symptômes, son Mode de Traitement et les Moyens Préventifs, Svo. Paris, 1831; Observations sur le Choléra Morbus, recueillies et publiées par l'Ambassade de France en Russie, Svo. Paris, 1831.—F. G. Boisseau, Traité de Choléra Morbus, considéré sous le Rapport Médical et Administratif, ou Recherches sur les Symptômes, la Nature, et le Traitement de cette Maladie, et sur les Moyens de l'éviter, Svo. Paris, 1831.—F. E. Podère, Recherches Historiques et Critiques sur la Nature, les Causes, et le Traitement du Choléra Morbus d'Europe, de l'Inde, de Russie, de Pologne, &c., spécialement appliquées à l'Hygiène Publique, Svo. Paris, 1831.—A. Moreau de Jonnes, Rapport au Conseil Supérieur de Santé sur le Choléra Morbus, les Caractères et Phénomènes pathologiques de cette Maladie, les Moyens curatifs et hygiéniques qu'on lui oppose, son Mode de Propagation, &c., Svo. Paris, 1831.—M. Bunavi, Trattato delle varie Specie di Cholera Morbus, Svo. Turin, 1831.—P. F. Kerauden, Mémoire sur le Choléra Morbus de l'Inde, Svo. Paris, 1831.—C. Horn et G. Wagner, Instructions sur le Choléra Morbus, contenant les Moyens de s'en préserver, d'en guérir, et d'empêcher sa propagation. Traduite par M. L. Paris, Svo. Paris, 1831.—Desruelles, Précis Physiologique du Choléra Morbus, &c., &c., Svo. Paris, 1831.—Larrey, Mémoire sur le Choléra Morbus, Svo. Paris, 1831.—B. Zoubroff, Observations faites sur le Choléra Morbus à Moscou, Svo. Moscow, 1831.—G. F. von Wedekind, Ueber die Cholera im Allgemeinen und die Asiatische Cholera insbesondere, 12mo. Frankfurt am Main, 1831.—C. F. Harless, Die Indische Cholera nach allen ihren Beziehungen, geschichtlich, pathologisch-diagnostisch, therapeutisch und als Gegenstand der Staats und Sanitäts-Polizei dargestellt, Svo. Braunschweig, 1831.—M. G. Weyland, Traité sur le Choléra Asiaticque, &c., Svo. Paris, 1831.—Edinburgh Medical and Surgical Journal for April, July, and October, 1831.—W. Macmichael, Is the Cholera Spasmodica of India a contagious Disease? Svo. London, 1831.—J. S. Borchardt, Kurze Darstellung der Cholera, Svo. Berlin, 1831.—J. Lizars, Substance of the Investigations regarding Cholera Asphyxia, Svo. Edinburgh, 1832.—J. Copland, Of Pestilential Cholera, its Nature, Prevention, and Curative Treatment, &c., 12mo. Lond., 1832; and Foreign Quarterly Review, art. *Pestilential Cholera*, Oct., 1831.—D. M. Moir, Practical Observat. on Malignant Cholera, as that Disease is now exhibiting itself in Scotland, 2d ed., Svo. Edinburgh, 1832.—T. Molison, Remarks on the Epidemic Disease called Cholera, as it occurred in Newcastle, Svo. Edinburgh, 1832.—T. Thackrah, Cholera, its Character and Treatment, with reference to the Disease as now existent at Newcastle, Svo. Leeds, 1832.—W. Haslewood and W. Moody, History and Medical Treatment of Cholera, as it appeared at Sunderland, 1831, with Cases and Dissections, Svo. Lond., 1832.—W. B. O'Shaughnessy, Report on the Chemical Pathology of the Malignant Cholera, containing Analyses of the Blood, Dejections, &c., of Patients labouring under that Disease, Svo. Lond., 1832.—F. W. Becker, Letters on the Cholera in Prussia, Svo. London, 1832.—T. M. Greenhow, Cholera, as it appeared in the Towns of Newcastle and Gateshead, with Cases illustrative of its Pathology, &c., Svo. Lond., 1832.—W. Ainsworth, Observations on the Pestilential Cholera, as it appeared at Sunderland in 1831, and the measures taken for its Prevention and Cure, Svo. Lond., 1832.—W. R. Clanny, Hyperanthrax, or the Cholera of Sunderland, Svo. Lond., 1832.—F. Cobb, Report, &c., on the Subject of the Epidemic Cholera now prevailing at Newcastle and its Neighbourhood, Svo. Lond., 1832.—W. Fergusson, Letters upon Cholera Morbus, with Observat. on Contagion, Quarantine, &c., Svo. Lond., 1832.—W. H. C. Gray, Dysenteria Serosa, or Convulsive Nervous Cholera of Hindostan; its Progress from Asia, 1817, to England in 1831, and its Remedy, Svo. London, 1832.—J. Webster, On Epidemic Cholera, its contagious Character, Treatment, &c., 12mo. Lond., 1832.—W. Russell and D. Barry, Official Reports made to Government on the Disease called Cholera Spasmodica, as observed by them in their Mission to Russia in 1831, &c., Svo. Lond., 1832.—Tachon, De la Mortalité du Choléra Morbus dans le xi Arrondissement de Paris, &c., Svo. Paris, 1833.—P. Voisin, Mém. sur le Choléra Morbus à l'Hôpital St. Louis, Svo. Paris, 1833.—Brière de Boismont, Des Premiers Secours à donner aux Personnes atteintes du Choléra, Svo. Paris, 1832; et Relat. Historique et Médicale du Choléra Morbus de Pologne, Svo. Paris, 1832.—J. Bouillaud, Traité Pratique, Théorique et Statistique du Choléra Morbus de Paris, Svo. Paris, 1832.—L. C. Roche, Mém. sur le Choléra Morbus épidémique observé à Paris, Svo. Paris, 1832.—A. V. Gendrin, Monog. du Choléra Morbus Epidémique de Paris, Svo. Paris, 1832.—J. Delpech, Etudes de Choléra Morbus en Angleterre et en Ecosse, Svo. Paris, 1832.—Martyn Paine, Letters on



the Cholera Asphyxia in New-York, 8vo. New-York, 1833.  
 —A. Smith, The Cholera Spasmodica as observed in Paris, 1832, 8vo. New-York, 1833.—*Beaumont*, Mém. sur la Formation et la Contagion apparente des Atmosphères Cholériques, 8vo. Paris, 1833.—*W. Leigh*, Narrative of the Cholera at Bilston, 8vo. Wolverhampton, 1833.—*D. B. Bullen*, Pract. Observat. on the Epidemic Cholera at Cork, 8vo. Lond., 1832.—*Brown*, in Cyclop. of Practical Medicine, vol. i., 1832.—*F. Corby*, Treatise on the Epidemic Cholera in India, 8vo. Calcutta, 1832.—*J. W. Francis*, Letter on the Cholera Asphyxia of New-York, 8vo. New-York, 1832.—*J. Hamet*, Official Reports on the Cholera at Dantzich, 8vo. Lond., 1832.—*J. Keir*, A Treatise on the Cholera of Moscow, in 1830, 1831, 8vo. Edinburgh, 1832.—*J. M. S. Kennedy*, A Lecture on the Cholera at Ashby-de-la-Zouch, 8vo. Ashby, 1832.—*H. McCormac*, Observations on the Spasmodic Cholera, &c., 8vo. Belfast, 1832.—*D. M. Moir*, Proofs of the Contagious Nature of Malignant Cholera, 8vo. Edinburgh, 1832.—*H. Gaultier*, The Origin and Progress of the Cholera at Manchester, 8vo. London, 1833.—*J. P. Needham*, Facts and Observations on the Cholera in York, 8vo. London, 1833.—*W. Twining*, A Practical Account of Epidemic Cholera, 8vo. Lond., 1833.—*R. Cranfield*, Pract. Observations on Cholera, and on the Treatment of the Disease, 8vo. Dublin, 1834.—*J. B. Kell*, On the Appearance of the Cholera at Sunderland in 1831, with some Account of that Disease, 8vo. Edinburgh, 1834.—*J. Parkin*, Mém. sur le Traitement Curatif de Cholera Epidémique, 8vo. Mont., 1835; Rapport sur le Choléra dans Paris et le Département de la Seine, in 1832, 4to. Paris, 1834.—*C. Y. Haines*, Practical Remarks on the Treatment of Malignant Cholera, 8vo. Cork, 1838.—*Griffin*, in Med. Gazette, April 14, 1838, p. 113.—*Bellingers*, in Brit. and Foreign Med. Review, Jan., 1838, p. 234; Med. and Chirurg. Review, Jan., 1838, p. 164.—*G. Budd*, In Library of Pract. Med., vol. iv., p. 103.—*W. Merriman*, in Trans. of Med. and Chirurg. Society, vol. xxvii., p. 405.

[AM. BIB. AND REFER.—Essays on Pathology and Therapeutics, being the Substance of the Course of Lectures delivered by *Saml. Henry Dickson*, M.D., Prof. of the Inst. and Pract. of Med. in the Medical College of the State of South Carolina, 2 vols., 8vo, p. 588-651. Charleston, 1845.—A Treatise on the Practice of Medicine, by *George B. Wood*, M.D., Prof. of Mat. Med. and Pharmacy in the University of Pennsylvania, 2 vols., 8vo. Philadelphia, 1847.—*Moore Hail*, in Bost. Med. and Surg. Journ., vol. vi., p. 59.—*Joseph Comstock*, *Ibid.*, p. 269, and vol. vii., p. 149.—*N. P. Willis*, Account of Cholera in Paris, *Ibid.*, p. 279, 302.—Mass. Report on Cholera, by Drs. *Warren*, *Shurtleff*, *Shattuck*, *Hayward*, and *Randall*, *Ibid.*, p. 320.—Cholera in Canada, *Ibid.*, p. 340.—Report of Drs. *Bigelow*, *Ware*, and *Flint*, a Boston Committee to visit New-York, and investigate the Nature and Treatment of Cholera, *Ibid.*, p. 353.—*J. A. Allen*, in *Ibid.*, p. 367, and vol. vii., p. 165, 213.—*Thomas Miner*, On Cholera, in *Ibid.*, p. 395, and 375, et vol. vii., p. 21, 44, 63.—*Henry Bronson*, in *Ibid.*, Account of Cholera at Albany, p. 379.—*John Ware*, Account of Cholera in New-York, in *Ibid.*, p. 411.—History and Progress of Cholera in New-York City, *Ibid.*, p. 353, 369, 386, 402, et vol. vii.—*James Morgan*, in Boston Med. and Surg. Journ., vol. vii., p. 14.—*Charles A. Lee*, in *Ibid.*, p. 17.—*W. Turner*, Account of Cholera at Newport, *Ibid.*, p. 26.—*Martyn Paine*, in *Ibid.*, p. 35, 74, 95, 196, and Letters to *J. C. Warrin*, on Cholera Asphyxia, as it appeared in the City of New-York, 8vo, p. 160. New-York, 1832.—An Account of the Progress of Cholera in the United States. See Bost. Med. and Surg. J., vols. vi., vii., viii., ix., x., xi., xii., xiii.—*C. Jewitt*, in *Ibid.*, vol. vii., p. 64.—*E. G. Davis*, On Saline Injections in Cholera, *Ibid.*, p. 222.—*E. M. H. Ellis*, On Cholera, in *Ibid.*, p. 349.—*J. C. Howard*, in *Ibid.*, p. 282, 351.—*B. James*, in *Ibid.*, p. 160.—*L. W. Sherman*, *Ibid.*, p. 331.—*J. E. Stevenson*, *Ibid.*, p. 181.—*A. F. Holmes*, History of Cholera in Montreal, *Ibid.*, vol. viii., p. 53.—*C. Hooker*, in *Ibid.*, p. 378.—*B. F. Rose*, *Ibid.*, p. 119.—*T. S. Savage*, *Ibid.*, p. 202.—Facts and Observations upon Spasmodic Cholera, addressed by the Board of Health to the Inhabitants of the City of Quebec, &c. Quebec, 1832.—Information for the People on Cholera, including a Sketch of its History, Symptoms, Preventives, and Treatment. Philadelphia, 1832.—*C. R. Gilman*, Hints to the People on the Prevention and Early Treatment of Spasmodic Cholera. New-York, 1832.—Remarks on the Cholera, embracing Facts and Observations collected at New-York during a visit to the city expressly for that purpose. Providence, 1832.—Report of the Committee of the Kappa Lambda Society, appointed for the purpose of preparing an account of the mode of Treatment of Epidemic Cholera, June, together with an additional Report, presented Aug. 15, 1832. New-York, 1832.—*Ashbel Smith*, The Cholera Spasmodica, as observed in Paris in 1832, comprising its Symptoms, Pathology, and Treatment, illustrated by Cases. New-York, 1832.—*Edward Warrin*, Sketch of the Progress of the Malignant or Epidemic Cholera, from its arrival in America, with Tables illustrative of its Progress in the principal Cities it has visited. Boston, 1832.—*A. Brigham*, M.D., A

Treatise on Epidemic Cholera, including a History. Account of its Origin and Progress to the present Period. Compiled from the most authentic Sources. Hartford, Conn., p. 368, 1832.—*Elisha North*, On Cholera, in Boston Med. and Surg. Journ., vol. vii., p. 197.—*Daniel Eastman* in *Ibid.*, Reports of Hospital Physicians, and other Documents in relation to the Epidemic Cholera of 1832. Edited by *Dudley Atkins*, M.D. New-York, 1832, 8vo, p. 200.—*G. R. B. Horner*, Account of the Cholera which occurred on board the U. S. Ship John Adams (Am. Journ. Med. Sci., vol. x., p. 257).—*Joseph M. Smith*, A Discourse on the Epidemic Cholera Morbus of Europe and Asia, &c., 1831.—*C. W. Pennock* and *W. W. Gerhard*, Observations on the Cholera of Paris, Am. Jour. Med. Sci., vol. x., p. 319, 521.—*Paul M. Eve*, in *Ibid.*, p. 524.—*J. P. Hopkinson*, in *Ibid.*, 533.—*C. A. Lee*, On Cholera, in *Ibid.*, 544, and vol. xv., p. 256.—*James Jackson*, Jr., Cases of Cholera, collected at Paris, at the Hospital la Pitié. Boston, 1832, 8vo, p. 212.—*L. Munsell*, in Am. Jour. Med. Sci., vol. ii., p. 251.—*J. C. Skinner*, in *Ibid.*, p. 252.—*W. Channing*, On the Camphor Treatment of Cholera, in *Ibid.*, p. 254.—*H. W. Bazley*, in *Ibid.*, p. 257.—*James McNaughton*, Letter on Epidemic Cholera of Albany, addressed to *Thomas Spencer*, M.D., in *Ibid.*, p. 260.—*Chas. T. Jackson*, in *Ibid.*, p. 266.—*Samuel Jackson*, in *Ibid.*, vol. xi., p. 275; vol. xii., p. 76.—*J. B. Zabriskie*, On Cholera, in *Ibid.*, p. 355.—*Henry Bronson*, Observations on the Chlorides and Chlorine, as "Disinfecting Agents," and as preventives of Cholera. Boston, 1832, p. 12, 8vo.—*H. Chapman*, Lecture on Cholera Morbus, in Am. Jour. Med. Sci., vol. xii., p. 281.—*Hunting Sherrill*, On Epidemic Cholera, as it prevailed in Dutchess County, New-York, 8vo, 1832, p. 38.—*Hugh L. Hodge*, On Cholera, in *Ibid.*, p. 386.—*James Cauper*, in *Ibid.*, p. 261.—*John S. Brown*, Observations on the Original Causes of Malignant Cholera, *C. S. Francis*, New-York, 1835, p. 41.—*W. E. Horner*, on the Anatomical Characters of Asiatic Cholera, with Remarks on the Structure of the Mucous Coat of the Alimentary Canal, in Am. Journ. Med. Sci., vol. xvi., p. 58, 277.—*Robley Dunglison*, The Practice of Medicine, A Treatise on Special Pathology and Therapeutics, &c., 2 vols., 8vo. Philadelphia, 1844.—*Thomas Spencer*, An Address on Diarrhea Serosa (Cholera), before the New-York State Med. Society.]

## PESTILENCE, HÆMAGASTRIC.—SYNON.

*Pestilentia hæmagastrica* (from *aîμα*, blood, and *γαστήρ*, the belly), Author. *Typhus icterodes*, Sauvages, Cullen. *Febris flava*, Auct. Var. *Synochus icterodes*, Young. *Causus*, Moseley. *Febris flava Americae*, I. Frank. *Epanetus malignus flavus*, Good. *Fièvre Jaune*, *Typhus Jaune*, *Fièvre Matelotte*, *Mal de Si-am*, Fr. *Gelbes Fieber*, *Schwarzes Erbrechen*, Westindisches fieber, Germ. *Fiebre gialla*, Ital. *Fièvre Amarilla*, *Vomito negro*, *Vomito prieto*, Span. *Hæmagastric Fever*, or *Pestilence*, Author. *Yellow Fever*, *Black Vomit*, *Malignant Yellow Fever*, *Pestilential or Bulam Fever*, *Epidemic Yellow Fever*.

1. DEFIN.—After chills [or rigours], shivering, and languor, severe pain in the orbits and forehead, also in the [back], loins, and limbs; rapid pulse, flushed face; glassy, suffused eyes; peculiar burning heat of skin, and frequently delirium; nausea and vomiting, with epigastric pain, costiveness, great anxiety, restlessness, and watchfulness; subsequently hiccough, black vomiting, scanty or suppressed urine, hæmorrhages from the mucous canals, lemon or muddy yellowness of skin, generally terminating in death in its most severe form.

2. PATHOLOGICAL CHARACTERS.—An infectious miasm or animal poison, specifically affecting the organic nervous and vascular systems and the vitality of the structures; impairing the crasis and constitution of the blood and the vital cohesion of the tissues; and more especially implicating the stomach and digestive mucous surface, and leaving the frame protected from a second attack, if recovery take place.

3. The origin, nature, and treatment of this pestilence have attracted the attention of the medical profession, and even of governments, in a remarkable manner for many years. The

ravages of it, during 1793 and 1794, in the West Indies and the United States, and the subsequent recurrences of these ravages both in America and in Spain, have furnished most important subjects for investigation, and have engaged the abilities of several eminent physicians, both in this and in foreign countries. Notwithstanding the volumes of descriptions and of controversy which have resulted, opinions are still unsettled respecting the source and true nature of the disease. It may be reasonably inquired, what are the causes which have so long retarded our knowledge of so important a subject? These, it may be presumed, are in many respects the same as those which usually stand in the way of our advancement in every other department of human science. The subject presents also difficulties which are peculiar to itself; and not a few sources of error are attributable to many of the writers who have attempted to furnish information respecting it, or to enter the lists of controversy. There are, perhaps, but few of the numerous disputants on either side of the question who can at the present day be quoted as authorities, deserving in every respect implicit confidence. The majority of them entered upon the inquiry—if, indeed, due inquiry or research were ever attempted—with judgments previously biased. Others possessed neither that amount of scientific education, nor that tutored state of intellect, which are requisite to medical observation in all circumstances, and particularly in those connected with investigations into pestilential visitations. Where it was most necessary that the relations subsisting between the geological formations, the soil, the locality, the climate, and the meteorological vicissitudes of a country, and the states of the brute, as well as the human inhabitants, should be comprehensively yet accurately observed, in respect of their healthy condition, of prevailing diseases, and of epidemic visitations, many of the elements requisite to the formation of sound views have either been overlooked, or purposely exaggerated, or even misrepresented: some have drawn sweeping conclusions from narrow fields of observation; and many have erred, more or less, in considering this pestilence in too close connexion with those maladies which have existed previously or appeared subsequently to its prevalence. The importance of ascertaining differences, as well as of marking points of similarity, upon which specific differences, or identity of nature, may be based, has been overlooked; and much too frequently a few features of similarity have been seized, and identity of character has been thence assumed, without duly estimating the numerous differences associating themselves with each of these features. It must not, however, be forgotten that occasionally there appeared in the arena individuals whose opinions will always obtain respect, and who added to their scientific and medical reputation by the discussion, and who evinced, by an honourable spirit and temperate zeal, that truth was the sole object of their inquiries.

4. In thus regretting that the visitations of this pestilential fever—which I have above denominated, from its prominent pathological characters, Hæmagastic Pestilence or Fever—have not always been observed, during their rise, progress, and decline, by persons altogeth-

er qualified for the undertaking; and that the subject has been viewed as seldom from the “elevated table-land of human science,” as with minds entirely divested of prejudice or preconceived opinions; it must also be admitted that the amount of scientific acquirement actually brought to the task of investigation has often tended more to entangle than to elicit the truth. The little that is known, or rather our want of knowledge, of the nature of malaria, of the constituents of emanations from the soil, and of other imputed sources of pestilential diseases—the mist of ignorance and of prejudice involving these agents and exaggerating their influence—their inferred operation, without further proof of their existence than certain effects which have been imputed to them, either upon insufficient data, or even without the smallest evidence—combined to mislead those who generally repose on the authority of others, and to prevent those salutary measures of prevention being undertaken which can be based only upon sound views of the source and nature of pestilence. The undue weight of insufficient or false authority, the array of imperfectly observed phenomena and “false facts,” and the prevalence of hastily preconceived opinions, of false theory, and of premature generalization, have swayed the minds of many from obvious truths and natural conclusions into errors of the most deplorable kind, and plunged not merely towns and districts, but populous cities and kingdoms, into the deepest abyss of misery. Concentrated marsh or terrestrial exhalations, according to many of those who most plumed themselves on their science and philosophy, produced plague in Egypt and other parts of the Mediterranean coasts, gave origin to yellow fever in the West Indies, the United States, and in Spain, and was the only cause of pestilential cholera over the globe. The influence of this cause, and its power to produce all these and many other effects, were as firmly believed in by them, and with less, certainly with no greater reason, than TERTULLIAN believed in the power of the devil to produce similar distempers: “Inducere potest morbos et sanitates. Viscerum actiones potest inhibere latenter, et venenis nobis ignotis corpus inficere.” And what have been the results? The history of pestilential yellow fever on both sides of the Atlantic during little more than half a century is the reply—a history the more humiliating to medical science, and to human nature, the more intimately it is investigated. Whether a belief in the influence of terrestrial exhalations, as presumed by the pseudo-lights of medical knowledge, or confidence in the power so dreaded by TERTULLIAN and some other fathers of the Church, actuated those whom circumstances unworthily and most unhappily clothed with authority on many important occasions, is not material as respects the results; for, as either belief must necessarily have led to similar consequences, and as neither agency could be controlled by available means of prevention or counteraction, so they were left to their own course, and thus gave rise to effects of the most deplorable kind. If the simple truth had been seen, and the dictates of common sense been followed, measures calculated to prevent the extension of pestilence at its earliest appearance would have been taken, and success-



fully carried out on many occasions; but, unhappily, truth and common sense are as seldom the basis of theory, as they are the incentives of human actions. The simple fact that certain distempers were communicated from one person to several, from a few to many, might have been viewed as sufficiently intelligible, and considered as sufficient grounds for a disregard of all opposing views which had no other basis than vague hypothesis, certainly none stronger than that confided in by TERTULLIAN, and have led to attempts at isolating the affected, and thereby protecting the healthy. But, before proceeding to the discussion of the topics to which this train of ideas would lead, and which will more appropriately be considered in the sequel, I must *first describe* the pestilence now under consideration.

5. I. DESCRIPTION.—*Hæmagastric or continued yellow fever* resembles scarlet fever in some respects, and more especially in the several degrees of malignity and the modifications it presents, in different individuals, during the same epidemic. Generally, the higher the grade of atmospheric temperature in which it occurs, the more stagnant the air, the closer the situations and the apartments, the greater has been the prevalence and the mortality of the pestilence. It manifests, also, a greater predilection for some constitutions than for others, attacking some in a very mild, and others in a very malignant form. Sir W. Pym states that this peculiarity was very remarkable at Gibraltar in 1804, where, in some instances, whole families fell victims to it, while others, equally numerous, under the same treatment, escaped with a slight attack. The same was remarked at Seville, Cadiz, and other places, and in other epidemics. The states of constitution and temperament giving rise to this predilection are not so manifest as to permit anything being stated with precision respecting them. Owing, however, to temperament, sex, age, and constitution, in some measure, and to other *predisposing and concurring causes* hereafter to be mentioned, this distemper presents certain *grades or modifications*.

6. i. The *mildest form* of hæmagastric pestilence is most frequently observed in children, and, during some epidemics, in females, although occasionally females have suffered most severely. It generally makes its appearance with languor and slight chills, soon followed by heat of skin; quick and full pulse; uneasiness in the loins and limbs; severe headache, confined chiefly to the orbits and forehead; a peculiar shining or drunken appearance of the eyes; hot, dry skin; a loaded but moist tongue, with little thirst; sickness at stomach, with costiveness, and a feeling of uneasiness, not amounting to pain, at the epigastrium, and a sense of rawness or soreness in the fauces and in the course of the œsophagus. These symptoms may continue from twelve to twenty-four or thirty-six hours, when the patient, having taken only some purgative and febrifuge medicines, or an emetic, falls into a refreshing sleep, from which he awakes in a gentle perspiration, free from pain and fever, and complaining of debility, from which he rapidly recovers.

7. ii. The *more severe* and more frequent form appears more suddenly, and the symptoms are

much more violent. The attack is ushered in by shivering and rigours. The pain in the orbits and forehead is excruciating; severe pain is also complained of in the loins and calves of the legs; the face is flushed; the eyes are glassy, suffused, or apparently inflamed; the pulse is rapid; the skin burning hot and dry; and the tongue is loaded, but moist, with little thirst. A few hours afterward uneasiness or stomach, with nausea and vomiting, supervenes; followed by severe pain and tenderness at the epigastrium, with a sense of rawness, heat, or inflammation in the fauces and down the œsophagus; great anxiety, restlessness, and watching, with a desire of sleep. The bowels are constipated, the evacuations scanty and deficient in bile; the urine dark-coloured, and small in quantity.

8. If the disease be judiciously treated, these symptoms often become ameliorated on the second or third day, the patient falling into a sleep, from which he awakes refreshed, with a perspiring or moist skin, and nearly free from all the symptoms. Debility only remains, the recovery from which is generally rapid. In many cases, however, either a partial amelioration only occurs, or the more complete subsidence of the symptoms is of short duration, the patient in a few hours beginning to be troubled with flatus in the stomach, and distressing hiccough. Not unfrequently the patient is suddenly and unexpectedly seized with faintness, sickness, and painful retchings, followed by vomiting, at first of whatever had been taken into the stomach, but soon afterward of a brownish fluid, resembling dirty water, mixed with a dark-coloured, flaky matter, which floats upon its surface; and at last by a matter resembling coffee grounds or thin pitch. At this time, also, a great change takes place in the countenance, which assumes a putrid, dingy, and bloated appearance, which is most remarkable in those of a florid or sanguine complexion. A light yellow or lemon tinge appears under the eyes and ears, and soon spreads down the neck to the chest, and over the whole body. The vessels of the conjunctiva appear relaxed, and distended with blood. The vomitings continue, and the quantity of fluid ejected much exceeds that which has been drunk. They often return without being excited by ingesta; or even suddenly or unexpectedly, and when the patient has just before considered himself relieved from them. In the latter hours of the disease, they are attended by a peculiar loud and hollow noise, which is heard at a considerable distance. During this state the patient is generally sensible to surrounding objects, and aware of his fate. He is restless, continually tossing about in his bed, with an expression of despondency in his countenance. He looks anxiously and inquiringly around for relief, but unable to express all his misery and his wants. At last, worn out with restlessness and fatigue, he sinks without a struggle.

9. iii. The *third form* of attack also commences with shivering or rigours, and is an aggravation of the symptoms of the second from the beginning. In this form the face is more flushed, and the burning heat of skin is greater than in the preceding. The sickness at stomach, hiccough, and black vomiting appear much

earlier. The bowels are obstinately constipated, and resist strong purgatives; the motions being watery, of a dirty colour, and rarely feculent or bilious. Violent delirium often occurs early in the attack, and hæmorrhages frequently take place at an early period from the nose, mouth, eyes, ears, and even from all the outlets of mucous canals. The tongue is often clean, moist, livid, or red, and raw-like, or covered with dissolved blood. The action of the kidneys is suppressed, either little or no urine being secreted. The countenance changes to a livid and yellowish hue, with yellowness of the skin. In the most severe of these attacks the patients may be carried off on the second, but generally on the third day, sometimes in convulsions.

10. In phlegoric persons and in the sanguine temperament the attack is often most violent; and in addition to the symptoms just mentioned, the countenance appears bloated and heavy, with an unnatural expression, or wild and agitated. The heat of the surface, which was at first great and pungent, falls first in the extremities, and afterward over the whole body, especially after the occurrence of black vomiting; and ultimately it sinks below the natural standard. The skin becomes compacted, losing its vascularity, and is insensible to the irritation of blisters. It is rarely dotted with petechiæ, but much oftener streaked with yellowish lines, particularly in the course of large blood-vessels, or is covered by patches of a bluish or leaden colour, especially in flaccid parts. The sense of internal distress increases as the febrile action subsides. Distention of the hypochondria, and explosions of flatus from the stomach, are frequent, with occasional obscure hiccoughings. Sometimes the vomitings are hardly complained of until the more febrile symptoms begin to abate, when they become unrestrainable: the matters ejected are then muddy or turbid, like unstrained coffee; occasionally they are of inky blackness, like the juice of the cuttle-fish. The evacuations by stool sometimes also present a black appearance at this stage. In the more severe states the disease frequently terminates fatally within the fifth day. In the less severe cases signs of an imperfect crisis sometimes appear about the seventh day, and improve to favourable indications, but occasionally they are arrested in their course, and superseded by an unfavourable train of symptoms, as hæmorrhages from the throat, gums, mouth, and sometimes from other outlets of mucous canals. The blood is dissolved, dark, incoagulable or grumous, particularly at a far-advanced period of the disease.

11. iv. The *fourth form* of the pestilence seems a modification of the symptoms by temperament and habit of body, although the precise conditions of these cannot always be assigned, the phlegmatic, apparently, most frequently exhibiting it. In this the symptoms are not so violent as in the third form, but they are equally fatal. It often commences insidiously, the patient complaining for hours, or even longer, of nothing but languor or fatigue, which is followed by chilliness or rigour, with pains in the loins and calves of the legs. The headache is not very severe. The pulse is quick and small. The heat of skin is very lit-

tle increased; but there are great anxiety and oppression at the præcordia, and an indifference to surrounding objects. The bowels are obstinately confined, and the secretion of urine is arrested. The tongue is often unnaturally clean, and of a clear, shining, vermilion colour. Hæmorrhage appears early from the nose, gums, or mouth, and is sometimes attended by petechiæ and vibices. There is little or no thirst, but great irritability of stomach, with hiccough and black vomiting, attended sometimes, as the distemper proceeds, especially towards the fatal close, by an involuntary discharge of the same appearance from the bowels. The peculiar change of countenance, with yellow skin, takes place as in the other states, and is frequently accompanied with a low muttering delirium. The temperature of the surface generally falls below the natural standard as the disease advances. Distress at stomach and intolerance of pressure over this region are generally present. The bowels are almost insensible to the action of purgatives, which either produce no effect or only watery evacuations—sometimes cold, ropy, and black, as if mixed with powdered charcoal. As the distemper advances, the pulse sinks in frequency, becoming weak and small. In some instances it sinks below the natural frequency, and becomes irregular or intermittent. Death in this, as well as in the preceding state, may occur as early as the second day, especially when the brain is the prominent seat of morbid action; but it more frequently occurs on the third or fourth day, or not until the fifth, sixth, or seventh. A favourable change is remarked chiefly on the third, fifth, or seventh day.

12. v. The above are the chief states of the distemper commonly observed, modified, however, or the one passing into the other, according as constitution, concentration of the cause, and varying concurring circumstances aggravate the seizure. Certain anomalies may, however, occur; but modifications in the type are not observed. They are, however, noticed by some writers, and others, as Dr. Jackson, have described a form in which the symptoms are at first remittent, but become continued in the course of the malady. When treating of the more severe states of remittent fevers, especially as they occur within the tropics, and beyond the tropics in localities and seasons favouring the development of the more intense or malignant forms of remittent fever, I have shown, that the passage of that type into the continued is extremely frequent, especially when vital organs become more and more implicated, and when the disease increases in prevalence, so as to assume an epidemic character, the fever, with this change of type, generally also presenting in the worst cases the chief features of the true hæmagastric pestilence, particularly yellow skin, and in rare cases even black grumous vomiting. (*See art. FEVER, REMITTENT, § 233, et seq.*) These facts are admitted by the non-infectionists, and are indisputable. But it is not proved, that, with this change of type, and with the supervention of these features, the fever, which certainly was non-infectious as long as it was remittent, becomes infectious as soon as it becomes continued, unless a number of affected persons are so circumstanced, especially from crowding and



imperfect ventilation, during very warm and humid states of the air, as to contaminate the surrounding atmosphere; and thereby either to superadd the additional cause of a morbid effluvium exhaled from the sick to existing marsh miasmata, or to generate a morbid poison or vapour, which is of itself capable, independently of marshy or other miasmata, of infecting the healthy, and of disseminating the distemper. It is almost impossible on some occasions, and certainly difficult in all, to ascertain, beyond the reach of controversy, whether the one contingency or the other obtains; still, the observing physician will generally arrive at just conclusions on the subject, and act in such a manner as the great responsibilities reposed on him will justify.

13. That a superadded property, or at least a change of character, should result from the circumstances just alluded to, may be rationally inferred; for the aggravation of symptoms and the development of new features, in these altered circumstances, have frequently been observed, are undoubted, and are the chief sources of much of the differences of opinion, and of the discussions which have appeared since the end of the last century on the subject of yellow fever; for, owing to them, and to causes sufficiently noticed above (§ 12), these aggravated states of remittent fever, either passing into, or originally assuming more or less of a continued form, have been confounded with the true or infectious yellow fever—with the pestilence now under consideration. The circumstances, moreover, of the latter being developed only during those high ranges of temperature, and in those situations which render remittents thus malignant and prevalent, has increased the difficulty of distinguishing the one from the other, and has led several writers, who have observed the simultaneous prevalence of both maladies in the same locality—a circumstance by no means infrequent in the West Indies and in some other countries—to describe both as varieties merely of one distemper, and to ascribe the properties possessed only by the one to the other also. As much ambiguity has arisen from this source, I will notice more particularly than can be done when treating of the *diagnosis* of this pestilence, certain symptoms which require attention, as well as others which are only occasionally remarked. Such diversities or modifications of character evidently result from diversity of the predisposing and concurring causes, from the concentration of the infectious agent, or the dose of the animal poison conveyed in the atmosphere, and from the idiosyncrasy or constitution of the infected.

14. *Suddenness of attack* is one of the prominent characters of the malady; there seldom appearing any premonitory ailment, at least of such severity as to attract particular notice. In some cases, however, a feeling of fatigue or lassitude, with headache and costiveness, are complained of for a short time previously. *The pains* felt in the head, loins, limbs, and often, also, in the large joints, generally precede or accompany the chills, shiverings, or rigours attending the seizure; and these are often very severe, but they appear to change their character, without being less distressing, as reaction takes place. *The seizure* usually occurs in the night or morning, but there are numerous ex-

ceptions to this period. *The pulse*, during the cold or incipient stage, varies. It is small, frequent, and irregular during the incipient state of chilliness or rigour, during which the temperature of the skin over the trunk is generally increased, although it is much lower in the extremities. The pulse becomes more frequent, sometimes very quick, as reaction is developed, but it is also broad, open, soft, or very compressible. As collapse supervenes, it is soft, weak, or irregular, ultimately becoming small, feeble, or suppressed. The pulse, however, in this stage of exhaustion varies much in different cases, owing to the loss of a considerable portion of the serum and hæmatosine of the blood by vomiting, and according to the amount of such loss, as well as to the impaired irritability of the heart. *The tongue* varies in its character as the disease advances, and often, also, at the commencement, as well as at the close of the distemper, it presents different appearances in different cases. It is frequently, at first, furred or loaded in the middle or root, but moist and red, or inflamed, at the point and edges. It is in some moist, red, purplish, and clean; in others it presents a dry streak in the middle, and in many, and those the most unfavourable, it is of a vermilion red or purplish red colour, covered in a few instances with an exudation of fluid blood, either at an early or at an advanced stage, according to the violence and danger of the attack. It often has a raw appearance, and is more or less swollen or flabby.

15. *The countenance* varies in appearance and expression with the progress of the distemper, and the age, habit of body, and temperament of the patient. At the commencement of the seizure, the face is usually pale, and the features somewhat sunk; but as soon as the chills and rigours cease it becomes full, flushed, and turgid; the lips tumid and red; and the eyes protruded, prominent, bright, and inflamed, with exquisite pain at the bottom of the orbits, and in the forehead. As the disease advances, the countenance assumes a peculiar *pale lemon colour*, which, in the most unfavourable cases, passes into a *livid, muddy, or putrid appearance*, which has been aptly likened by Sir W. Pryn to that presented by the face in the childish diversion of snap-dragon. In thin, emaciated, and aged persons the features become sunk, especially as the disease advances; but in others, unless when the quantity of dark fluid thrown off the stomach is very great, the face continues tumid to the last, particularly when the fatal progress of the malady is rapid. A sense of constriction is often felt in the *chest*, and anxiety at the *præcordia*; and towards the close there is a continued movement of the hand over the *præcordia* and chest. *The breathing* is often laboured, occasionally deep or spirous, with a peculiar groaning or moaning; and the voice is frequently altered. A burning heat is usually felt at the epigastrium, and not infrequently in the course of the *œsophagus*. Everything is rejected from the stomach, and the patient tosses his head and limbs about. *Stools* are always procured with great difficulty early in the distemper, and while reaction continues; but after the deceitful calm, about to be noticed (§ 17), they often become more free, and sometimes involuntary. They are always

scanty at first, offensive, watery, and deficient in bile; but they frequently are black and watery, sometimes with small, lighter-coloured flocculi in the last stage, and when black vomit has taken place. The *urine* is at first scanty and high-coloured, and in the worst cases it is entirely suppressed, none being secreted, owing either to a paralyzed state of the kidneys, or to the quantity of serum lost by the blood, as in the pestilential cholera, by the frequent and copious discharges from the stomach. The patient generally feels severe pain in glans penis and urethra when the urine is suppressed, or passed only in a few drops. The *blood* is always more or less changed—most remarkably after the calm occurring on the third day. Even at the commencement and during reaction, it does not coagulate, or does so imperfectly and loosely, and is deficient in fibrin. It afterward becomes still more loose and defective as to crasis, and ultimately very dark, partially dissolved, and grumous; and apparently insufficient in quantity, in many cases, to distend the veins. The *perspiration* and the *evacuations* are very offensive, and have a peculiar sickly odour, which thoroughly imbues woollen and cotton clothes, and the patient's bedding.

16. The *mental manifestations* are variously affected in different persons. In some, violent delirium occurs; in others, low delirium, occasional wanderings of the mind, or waking dreams, are remarked; in many, the mind is not materially affected throughout, unless inasmuch as the patient may be despondent, taciturn, depressed, or apathetic. An early conviction of a fatal issue, indifference to the result, and a calm apathetic resignation to his fate, are frequently observed without any farther mental disturbance, the patient's intellects continuing unimpaired to the last. In some, the violent delirium present during an early period disappears, and the mind afterward remains calm until death.

17. Slight *exacerbations* are sometimes remarked in the evening, and ameliorations in the morning; but these are rarely so considerable as to amount to remissions, the disease generally pursuing a continued course until the third or early in the fourth day, when a deceitful *calm* appears. The pulse then often falls to nearly its natural frequency, sometimes even below it; the eyes lose their brilliancy. The heat of skin also sinks, especially in the extremities, when it often falls below the natural standard. This calm usually continues all the fourth day, and the patient, feeling some returning craving for food, thinks himself convalescent; but lemon-yellowish of the skin, sometimes delirium, mental depression or apathy, faintness upon being raised up, or upon being placed on the night-stool, vomitings, and hiccough often appear about the following evening or night; sinking of the pulse and temperature, especially in the extremities, black vomiting, suppression of urine, and other fatal symptoms, supervening more or less rapidly. In many cases the heat of surface sinks remarkably, and the extremities assume a livid appearance, the pulse being hardly felt in the limbs.

18. In the above description of this malady I have followed my own observation and recollection, aided by notes taken during my attendance upon cases which came before me

within the tropics. Some of these cases occurred in a vessel in which I was a passenger, and in circumstances which strongly favoured a belief in an infectious source, as will hereafter be alluded to. The numerous descriptions of the disease which I have perused vary somewhat, especially in certain subordinate particulars, most probably owing to the varying features of the distemper in several epidemics, and in different climates, localities, and constitutions. The chief difference, however, consists in the severity of attack, and the intensity of affection evinced by the blood and digestive organs. The most dangerous cases are not those in which the symptoms are most violent, in respect of vascular or nervous excitement; but those in which the vital powers are most depressed, the blood most changed, and the black vomit most early, copious, and frequent. (See § 9-11.) The differences between these and the slightest grade (§ 6) are very great; the degree of fatality of the disease in America, West Indies, Spain, or Africa, depending upon circumstances about to be mentioned.

19. vi. Several of the writers on this distemper have divided it into certain *stages* or *periods*. These stages are often well marked; but in many cases they are hardly manifest. In the most violent seizures, the patient is suddenly struck, and the distemper proceeds rapidly without reaction, or nervous or vascular excitement, to vital and structural dissolution, with every indication of extreme vital depression, of vascular contamination, and of impaired or nearly-lost irritability and cohesion of the tissues. When either the powers of the constitution are sufficient to resist the overwhelming influence of the pestilential poison, or the dose of this poison is weak relatively to the state of vital resistance, then vascular reaction takes place, with or without nervous excitement, and a division of the progress of the malady into stages or periods, according to the successive changes in the states of morbid action, may be made with justice. But writers are not agreed as to the precise division which should be adopted. Some recognise merely two stages, viz., that of *excitement*, and that of *collapse* or *exhaustion*. Others contend, and with much justice, that the stage of *invasion*, or that period which is characterized by chills, rigours, or an alternation of chills and heats, and which, in a few cases, is preceded by a sense of mal-aise, fatigue, and headache, for a shorter or longer period, should be viewed as a distinct period. I am of this opinion, and am confirmed in it from having had an opportunity of almost constantly observing, in several cases, the phenomena during this stage, and its frequent passage into the next, or that of excitement or reaction. Other authors have considered the delusive calm ushering in the period of vital exhaustion as a distinct stage; but it rather indicates the passage of reaction into collapse, the subsequent severity of the symptoms being merely the efforts made by the vital resistance of the constitution in endeavouring to overcome the morbid changes which oppress and ultimately overwhelm it.

20. It has just been remarked that, when the infectious agent is very powerful relatively to the constitutional powers of the patient, the attack may then be so violent, and its subse-



quent course so malignant, as to deprive the vital energy of all power of reaction. In this case the *invasion* is sudden and severe, and is attended by general tremour, dread, terror, or despondency; the vital depression of this period passing into vital and even structural dissolution, with greater or less rapidity, and either with no attempts at reaction, or with weak and abortive efforts merely; the symptoms of the first period insensibly passing into those of the third. In those cases, which are much the most numerous, in which reaction or excitement occurs, and which are generally met with in the young, robust, plethoric, and in persons whose health has been previously good, the following division of the periods of the distemper, with their chief characters, may be made.

21. **FIRST PERIOD**—*or that of invasion: Character.*—Chills, rigours, or shivering, or alternation of chills and heats; headache, with pains in the loins and limbs; fear and timidity; universal trembling; tremour of the tongue when held out, and inexpressible terror in the most severe or fatal attacks.

22. **SECOND PERIOD**—*or that of vascular reaction and excitement: Character.*—Very frequent, full, broad, or bounding, but soft or very compressible pulse; a loaded and pasty tongue, with redness at the edges and point; æsthetic heat of surface; rending or throbbing headache, with red, suffused, protruding, and brilliant eyes; pain at the epigastrium and anxiety at the præcordia; racking pains in the loins and limbs; tossings and watchfulness; general redness, turgidity, and suffusion of the face; sometimes delirium; vomitings and thirst, obstinate costiveness, and scanty, pale stools.

23. **THIRD PERIOD**—*or that of vital exhaustion: Character.*—Often an amelioration of the above symptoms during the third or fourth day, followed by an increased frequency of vomiting; a lemon hue of the skin, with dirty, lurid, or livid patches as this stage advances, the matters ejected becoming in some instances black; distressing singultus; low or muttering delirium, or resignation or apathy to the result, or a desire of dissolution; quick, small, feeble pulse, which is sometimes at last irregular, intermitting, or slow; raw, red, livid, moist, or dry, and clean tongue; faintness, especially on moving; loss of temperature in the surface and extremities; irregular, laborious, deep, and moaning respiration, the expired air being raw and colder than natural; scanty or suppressed secretion of urine; small, black, watery, and involuntary stools; exudations of blood from the mouth, nostrils, anus, vagina, &c.; a peculiar offensive odour from the body and evacuations; the appearance of large livid or discoloured patches, terminating in dissolution, with marked putridity, the body exhaling a tainted odour.\*

24. vii. The *duration* of these stages is various. The *first* is seldom longer than a few hours; but it may be hardly of an hour's duration, or so slight as not to attract particular attention. The *second* stage varies from two to three days—it is seldom longer, and it may be even shorter than the time named. It may be, as above noticed (§ 20), altogether wanting, or

imperfectly manifested. The *duration* of the *third* is still more indeterminate. It may be only a few hours, or it may be two or three days, or even somewhat longer, it altogether depending upon the violence of the attack and the powers of the constitution. In slight or favourable cases, this stage may not be remarked, or merely a few of the milder symptoms may only be noticed. In the most severe or fatal cases, this stage follows closely upon the first, and is attended by most of the malignant symptoms just enumerated, as early as the second or third day; and in some epidemics by others, but occasionally only. The *whole duration* of the malady varies from three to eight or nine days, but in rare instances it has been protracted to ten or twelve days.

25. viii. The *sequelæ* ascribed to the distemper by some writers deserve notice, only to observe that I do not believe in their existence. The debility consequent upon the attack cannot be justly viewed as belonging to this category, more especially as convalescence is generally rapid and complete. The visceræ congestions, obstructions, and enlargements mentioned as sequelæ of yellow fever by several authors rarely or never occur after the true hæmagastric distemper, although they are frequent after severe forms of remittent fever (see FEVER, § 237, *et seq.*), attended by yellowness of skin. They have been mentioned in connexion with hæmagastric pestilence, owing to the circumstance of it, and the worst cases of the seasoning fever of hot climates, and of remittent fever, having been confounded with each other by these writers. This circumstance also explains much of the imputed frequency of *relapse* in this pestilence; for the debility attending convalescence or recovery from it, renders the patient predisposed to be affected by the miasmata causing remittent fever; and hence, when hæmagastric fever prevails, as it usually does, in situations where remittent fever is endemic, and in seasons when it is most prevalent and malignant, recovery from the former malady is extremely likely to be followed by an attack of the latter; and, more than this, the one disease is very liable to be mistaken for the other.

[The symptoms of yellow fever, as it prevailed in this city in 1822, have been described with great accuracy and minuteness by Dr. P. S. TOWNSEND, of New-York, from his own careful and repeated observations; and as they differ in some respects from those detailed with such particularity by our author, we present a brief analysis of them in this place.]

The invasion of the disease was generally sudden, and at night; sometimes in the morning, and most usually like that of an ordinary fever, with, or sometimes without, chill; gaping, yawning, loss of appetite, languor, hurried respiration, faintness, nausea, and in some instances vomiting of bilious matter, or rejection of drinks and food; most usually acute pain in the head and back, and sometimes violent affection of the nervous system and severe rigours. *First stage.*—In this stage there was commonly considerable excitement, especially in full habits, and nervous or sanguine temperaments; severe pain in the head, especially the forehead, back, and loins, often extending down to the calves of the leg. The eye was usually in-

\* [The peculiar offensive odour and "putridity" of which Dr. COPLAND speaks have not been noticed by writers on the disease in this country.]

flamed, and tinged or swollen, and often at the same time dull and suffused with tears, and a drunken appearance, the interstices between the red vessels of the adnata remaining white, and the cornea natural or uncommonly brilliant. In some cases the adnata was so crowded with blood-vessels as to appear bloodshot; after a while the eye assumed a deep greenish and dirty yellow colour; but in some instances it was almost natural in appearance. In a few instances the pupils were unusually dilated, and in others the eye was intolerant of light.

The *tongue* was generally thick and somewhat swollen, more frequently pointed than broad; most usually, in the beginning, covered with a dirty white or lead-coloured fur, darker towards the base. In some instances the tongue was besmeared with a thin, white, moist slime or paste, until towards the termination of the disease.

The *pulse* varied from 90 to 120, and in children 150; sometimes it was as low as 80, 60, and 55 from the beginning of the attack, in which cases the stage of excitement had not existed at all; it was generally full, but not strong. Where the pulse was unnaturally slow, the skin was cool from the beginning.

The *skin* was flushed, generally hot, and somewhat dry, in this stage; the degree of temperature corresponding with the force of the circulation; often moist throughout, and rarely, if ever, characterized by the biting, stinging heat and dry surface of typhus.

*Respiration* hurried, in proportion to the violence of the excitement, and almost invariably attended with deep sighing.

The *bowels* were generally constipated in this stage, but after they had been opened the evacuations continued, often natural in colour and quantity, without fetor, but rarely bilious, soft, or liquid during the whole progress of the disease.

The *stomach* was usually calm, but sometimes a constant nausea or sense of oppression at the præcordia, accompanied occasionally with eructations and cardialgia; and sometimes great gastric distress from the beginning of the attack, producing violent spasms and retraction of the abdominal vessels and legs on the slightest pressure.

*Urine* variable; often natural in every respect, but in many cases scanty and high coloured; in some few copious and natural.

*Countenance*.—Most usually natural and flushed; often a wild stare and gaze of the eye, but often entirely natural to the last.

*Position and Actions of the Patient*.—Invariably lies on his back, and has an inclination to throw his arms above his head.

*Intellect* generally undisturbed; occasional delirium, attended with coma, if the excitement was great.

*Second stage*.—In some cases the first stage was protracted till the fifth day, but most usually it continued from 24 to 48, or even 72 hours, at which time there came on a sudden prostration of all the animal forces, producing a state of collapse.

The *countenance* is more or less pale and shrunk, and the patient becomes calm and composed, and, though languid and debilitated, entirely free from pain.

The *blood* retires to the internal organs, and

there is a strong tendency to hæmorrhage from loss of tone in the contractility of the capillary vessels and the dissolved state of the blood. The *eye* loses its red colour, begins to assume a yellowish hue, first at the outer angles, while at the same time the yellowness extends down from the alae of the nose to the angle of the mouth; also around the eyes and borders of the lips, and between the lower lip and chin. The *tongue*.—The fur often remains moist, and still of a dirty white or leaden colour, but it most usually accumulates and becomes, at the same time with or before the adnata, of a brownish-yellow hue, and dry and darker towards the base, surrounded almost invariably by a moist, clean, red, or livid margin, extending along the sides and round the apex of the superior surface; the papillæ on the apex also frequently inflamed and swollen. The *lips* at this period are most usually dry and cracked, or somewhat parched; while the *pulse* sinks to 90, 80, or 70, rarely lower, varying a little more or less, from day to day, becoming at the same time soft and easily compressed. It was never observed to be intermittent but in a single case attended by Dr. FRANCIS. The *skin* became comparatively cool, but still retained a higher temperature than natural. The heat and moisture of the surface were unequally distributed, the feet and hands often becoming cool, while the body over the epigastrium was preternaturally warm. In a great majority of cases, especially those of a mild character, the yellowness did not extend farther than over the face, blending with the partial flush which still remained, giving the countenance a yellowish red or damask hue. But in the severest cases it became of a greenish hue, and extended down the sides of the neck, over the scalp, to the chest, shoulders, and arms, gradually growing deeper, and spreading over the trunk on the eighth, ninth, and tenth days, but not reaching the lower extremities until just before or even after death. When this colour is perfectly formed, it has, if the complexion of the patient be fair, a pale lemon colour, and is of a greenish, mottled, or bruised appearance; in some instances darker, and resembling a vegetable stain; in others the appearance of a dead body which has begun to putrefy. Where the deep yellow tinge spread entirely over the trunk, the disease proved almost invariably fatal. Petechiæ about the forehead, cheeks, and neck, especially on the backs of the hands, and on the arms and chest, were often observed, and occasionally a vesicular eruption about the corners of the mouth.

The respiration continued perfectly natural and easy, except that the sighs became deep, long, and frequent. The *stools* occasionally became fetid and dark, but often remained natural to the last. At this stage of the disease the patient began generally to reject his drinks and medicines, and about the third or fourth day of the disease to complain of a soreness, tenderness, slight burning, or irritability at the pit of the stomach, pressure over which caused great distress, as well as very cold or hot drinks; at the same time, the heat seems to be concentrated in the region of that organ. In most cases this irritability was unaccompanied with nausea, but sometimes there were distressing flatulence and cardialgia from the beginning of the



disease. The *urine* was now generally diminished, and of a deep yellow colour, where the yellowness had extended over the trunk, and sometimes it was entirely suppressed for a few days; mostly a fatal symptom.

The *countenance* was usually more or less anxious and melancholic, or marked by an expression of pensive sadness; hardly ever entirely deprived of its florid colour, though somewhat modified or changed to a damask hue, by being blended with the yellow. The intellect was often more or less affected; sometimes muttering delirium was present, but never long continued; also more or less coma at times; most usually constant pervigilium, occasionally interrupted by dozing; the eye frequently had a wild, fixed gaze, and the patient appeared inattentive to what was passing; disinclined to talk, but always promptly answering questions. Convulsions occurred in one case only.

*Third stage.*—This stage continued from two to four, five, six, or even to seven or eight days. The transition from the second to the third stage is much less perceptible than from the first to the second; the symptoms being all rather aggravated than changed. The countenance becomes more anxious, the adnata of the eye of an unnatural green-yellow of the deepest hue, and entirely clear of red vessels, which, contrasted with the brilliant colour of a blue or hazel cornea, gives the look an unnatural and grotesque appearance. The wild stare is rarely seen at this period.

The aspect of the face does not materially change, but the yellowness in fatal cases, and sometimes in severe cases that recover, gradually extends down the body and limbs. Occasionally there is furious delirium; and sometimes the skin, circulation, and other organs all appear to assume their natural and healthy functions. Exacerbations and remissions, as the frequency of the pulse, heat of skin, &c., were frequently observed, giving the disease somewhat the character of a remittent. The extremities now begin to lose their heat entirely, and are covered with a cold, clammy moisture, which finally extends over the forehead, shoulders, chest, and thighs, the surface at the præcordia still retaining its heat. The tongue cleans, or sloughs off, and becomes dry, and of a fiery, deep red colour, sometimes moist, but very frequently having its surface parched brown towards the base, and rough to the feel. The gums and inside of the lips become spongy, and of a deep florid red colour, while the lips externally, perhaps, are pale or livid. Blistered surfaces now become red, as if inflamed, and in many cases the conjunctiva lining the eyelids becomes deeply injected with blood. Blood, also, of a bright florid hue and watery consistence, distilled, in many cases, from the gums and nose, and besmeared the tongue, or becoming dry on the teeth and lips, incrustated them with a black sordes. If the stomach become more irritable, as most usually happened at this period, the patient complained of a distressing burning, and incessant, though not acute, or darting sensation at the præcordia, causing him to wince or cry out on the slightest pressure. Sighs are more frequent, also hiccough. The distress and burning sensation at the stomach generally increased about the sixth, seventh, or eighth day, the patient reject-

ing every thing swallowed; he now begins to vomit up, from time to time, a reddish-brown, turbid-looking, insipid, and perfectly inodorous matter, resembling coffee-grounds, or blood that has undergone partial change. In this coffee-ground matter was often observed transparent pieces of gelatinous matter, here and there streaked or tinged with florid red blood.\*

The alvine discharges, which had been dark and offensive at first, often became perfectly natural in smell, colour, and quantity, and continued so to the last; there was nothing particularly offensive in the breath, sweat, stools, urine, or other excretions, as in typhus; nor was there any foul cadaverous effluvium from the body, as in that disease. The restlessness and inquietude now increased in fatal cases; the face, cheeks, and lips became bloated and livid, and the respiration hurried and painfully laborious, as in some cases to resemble asthma; the muscular strength is wonderfully retained, so that the patient is often able to walk about a few moments before dissolution; while the intellectual faculties, though somewhat obtunded, are still retained in comparative integrity to the close of life. Frequently the patient lay tranquil and unconscious of danger, and expired without a struggle. As remarked by Dr. RUSH, "in some the last hours of life were marked with great pain and strong convulsions, but in many more death seemed to insinuate itself into the system with all the gentleness of natural sleep."—(See TOWNSEND on *Yellow Fever*, p. 143 to 168.)]

26. II. APPEARANCES AFTER DEATH.—These vary remarkably with the form and character of the malady.—*A.* In the most malignant and rapidly fatal cases, a lemon tint of the surface, with livid or dark blotches, is generally observed. The ears, fingers, penis, scrotum, and in some the hands and arms soon become of a dark or brownish hue. The *muscles* are softer and flabbier than natural, of a dirty or dusky hue, and are easily broken down by pressure. The substance of the *heart* is similarly changed. Softening or greater friability of the tissues, soon after death, is generally remarked, and is extended to all the organs and viscera. The *body* seldom appears to suffer any diminution of its bulk, as in other fevers; and when the

[\* "When the coffee-ground matter," says Dr. TOWNSEND, "was examined by the solar microscope, it appeared to be an inorganic mass. Strained through coarse linen, and dried on paper, it retained its dark brown and red colour, and, by the mucus which it contained, adhered to the paper in streaks. When the residuum of the first straining had been passed through fine muslin, and an impression taken off with white paper, I found it to be of a dark-brown powder in fine particles, resembling minute scales of smoky mica, both in the colour, feel, and general appearance. I am inclined to believe that the matter of black vomit consists chiefly of the red globules of the blood, which, from the dissolved condition of this fluid when poured out from the exhalants, have easily separated from the other constituents, and become decomposed, or disintegrated by lying in the stomach, or by the action of the gastric juice or other secretions of this organ. There is also more or less of the same kind of dissolved blood, which oozes from the gums, nose, &c. We see, also, that this blood, which distills from the nose and gums, acquires the same colour as black vomit, but becomes dry on the lips and teeth, in consequence of exposure to the air; whereas the matter of black vomit is held in a fluid state by the heat and secretions of the stomach. Sometimes the formation of the matter of black vomit is first announced in the alvine discharges, succeeded soon afterward by the ejection of the same matter from the stomach."—*An Account of the Yellow Fever as it prevailed in the City of New York in 1822*, p. 153. By P. S. TOWNSEND, M.D.]

fatal issue has been rapid, and the quantity of black matter vomited not very great, the several viscera are more or less congested, and the body seems even more tumid than natural, as well as discoloured, presenting a marked putrid or malignant aspect, and indicating a remarkably rapid loss of the vital cohesion of the several textures. In such cases as present any diminution of the bulk of the body, the muscles are paler, softer, and more flabby than usual; the viscera paler and softer, and even somewhat shrunk; and the blood-vessels contain very little blood. In these cases, a very large portion of the blood has been exuded from the digestive mucous surface, and been thrown off during life, in the form of black vomit, or of passive hæmorrhages from the alimentary and other canals.

27. The *liver* is changed chiefly as regards its cohesion and degree of congestion. It is almost always softer and more friable than natural; in some cases congested, in others pale, according to the quantity of blood evacuated during life, in the form of black vomit. Light olive-coloured patches are sometimes observed in it. The *gall-bladder* most frequently is shrunk, and contains little or no bile. The *spleen* and even the *pancreas* are somewhat softened; and the former frequently congested. The *œsophagus* and *stomach* present discoloured streaks or patches, of a dirty purple, dark, or livid colour, in their inucous surface, and the latter viscus often contains more or less of a similar fluid to that constituting the black vomit. In cases where the quantity of this fluid thrown off has been great, the stomach, intestines, and other viscera are paler, but also much softer than natural. The *small* and *large intestines* are often contracted in parts, and occasionally intussuscepted. In other respects they offer the same appearances as noticed in the stomach, but in a less degree. They often contain small quantities of fluid similar to that voided shortly before death; but this presents neither a bilious nor a fœcal character. The *epithelium* of the digestive mucous surface seems to be more or less detached in the several portions of the canal; and the mucous membrane is softened and readily separated from the adjoining tissue. The *follicular glands* are not prominently affected, farther than being somewhat enlarged in some instances. In those cases which present congestion of the chief organs, as of the brain, lungs, auricles of the heart, liver, and kidneys, slight serous effusion, sometimes sero-sanguineous, is occasionally, also, found in the *chief cavities*, particularly the pericardium and arachnoid, and but rarely in the peritoneal and pleural cavities. The *urinary bladder* is always empty and contracted.

28. *B* The more protracted cases of this pestilence present changes depending much upon the symptoms during life, and most upon the continuance or amount of black vomit, and of black fluid discharged by stool. In many instances the appearances found agree in all respects with those above described. In others, the *liver* and *spleen* are remarkably congested and softened. In some, the liver is changed more or less in colour as well as softened. It is often of a pale olive hue, or it presents a mixture of yellow and green, and of dark green in streaks. AREJOLA mentions a change of colour in the

liver to a reddish brown. But the other changes detected furnish no evidence of inflammatory action in this organ. Dr. GILLKREST notices a remarkably pale colour of the liver in females and children, and a marked absence of bile from the biliary ducts. The *gall-bladder*, however, frequently contains bile of a thick consistence and dark, tar-like appearance. The *stomach* often contains the matter of the black vomit. Its mucous surface, as well as that of the *duodenum* and *œsophagus*, is frequently discoloured in patches, in a few instances paler than usual, and in all much softened. The epithelium of these parts is generally detached; and Dr. JACKSON remarks that he has found the villous coat often abraded, loose, and partially separated. A black, jelly-like substance is sometimes found in the *intestines*. Dr. GILLKREST states that this substance is sometimes found in the jejunum, but oftener in the ileum, and that it is occasionally found in both the stomach and the ileum, the intervening jejunum not presenting a trace of it. He adds, that he has found this substance in these situations even in cases where no black vomit had existed before death. The glands of PEYER are generally unaffected. The villous surface of the *colon* and *cæcum* is generally softened, discoloured in parts, and covered by an adhesive black substance. Frequently, on removing this substance, the membrane underneath is seen paler than natural. In a few cases, the fluid contained in the bowels is of a reddish tint, and more nearly approaches the appearance of blood. The intestinal canal is often irregularly contracted in parts, more rarely with portions intussuscepted, and in some instances, in addition to the matters now mentioned, an albuminous, dirty pale substance is found in the colon.

29. The states of the *heart* and *lungs* depend chiefly upon the quantity of blood exuded during the last stage in the form of dark vomit. When very much has been evacuated, but little change of these organs is observed beyond collapse and softening. In other cases more or less congestion is frequent, the blood being fluid, grumous, but not always very dark. False polypi are sometimes found in the cavities of the heart. Within the *cranium* congestion is the most common change, but this is not constant. Occasionally slight opacity of the arachnoid, with slight serous effusion, and in rare instances, sero-sanguineous exudation, are remarked.

30. These are the chief alterations found in cases of true hæmagastic pestilence, when the examination has been made a few hours after death; but farther changes take place, and are often confounded with the foregoing, when the inspection has been delayed even some hours later. The disease is rarely observed, excepting in such high ranges of temperature as preclude delay in *post-mortem* examinations, if the changes which appertain to the disease are the objects of investigation. Doubtless, however, the circumstance of rapid dissolution of the structures after death, and the ascertainment of the parts which are the first to experience such rapid change, are matters of great moment in estimating correctly the nature of the malady; and so highly do I consider their importance, that I am desirous to direct more at-



tention to them than they have hitherto received.

31. III. DIAGNOSIS.—From the description now given, it will be perceived that sporadic, occasional, or scattered cases of this distemper, and the earliest of those occurring when it assumes the form of a devastating pestilence, will often be recognised with great difficulty, and be liable to be mistaken for the more malignant cases of *remittent fever* (see art. FEVER, § 233, *et seq.*); or even for the *inflammatory seasoning fever* (§ 359, *et seq.*) to which Europeans are subject when they migrate to intertropical or warm climates. The difficulty is chiefly owing to the mildness of the symptoms in some instances, and to the circumstance of yellowness of the skin, and vomiting of a dark brown or black fluid being observed in many of those cases as well as in the true hæmagastrie disease. The mild character of the symptoms in some persons, the disease appearing merely as an ephemeral fever, or in a form but little more severe, is analogous to what is observed in respect of other infectious maladies, which frequently assume a most malignant character, as smallpox, scarlet fever, &c.; nevertheless, the infectious effluvium proceeding from mild cases propagate the malady equally with that from the most virulent, and often give rise to the latter, while the latter frequently occasion cases of the former character, the violence of attack depending chiefly upon the predisposition of the individual affected.

32. There are certain phenomena which serve more especially to distinguish this pestilence from the malignant cases of fever with which it has frequently been confounded, and from which it is distinguished with great difficulty, especially in warm climates and localities, and in hot seasons. The former is more silent, insidious, yet rapid in its course; the latter more open and phlogistic. As soon as the body appears to be infected by the hæmagastrie distemper, there are furnished indications of a greater or less shock sustained by its vitality, and of a marked contamination of the circulating fluids, and even of the soft solids; and these indications appear earlier and more decidedly in this distemper than in the fevers for which it is liable to be mistaken. Jactitation, mental depression, apathy or delirium, appear much earlier, and in a more marked degree at the outset. The lemon colour of the skin is also earlier; and such also is the case with the nausea and vomiting, which is more distressing than in those, and the quantity of fluid thrown off, at first, and sometimes throughout, colourless, or nearly so, is much more considerable, without reference to what has been taken into the stomach. It is evident that the fluid ejected is chiefly an exudation or secretion from the stomach; that its great amount must more or less diminish the serous portion of the blood; and that in those cases which are attended by black vomit and discharges of blood from mucous canals, the diminution of, and other changes in, the blood, must be still more considerable. In these, more especially, the vomitings often occur without retchings or effort.

33. The character of the pulse is of importance; and in respect of it, the rapid rise in frequency soon after the attack; the soft and

asthenic condition; the weakness, inequality, irregularity, and subsequently the slowness, the intermissions and smallness of it, are more or less remarkable. The red, suffused state of the conjunctiva, with brilliancy of the eyes in the young and robust, but without this brilliancy in the aged, and at an advanced stage; the lurid redness or suffusion of the features, in the former class of subjects, and the depressed and anxious expression in all; the severe pain, deep in the orbits, and the drunken-like appearance of the eyes; the red, raw, clean, and smooth, or bloody state of the tongue; the pain and soreness of the throat, pharynx, and along the œsophagus; the acrid burning sensation at the stomach, constriction in the chest, and anxiety and burning pain at the præcordia; the thick, compacted feeling furnished by the skin, the diminution of its sensibility at an advanced stage, and the dingy tint of it, with leaden or livid patches, at last; the singultus; the scanty secretion, or complete suppression of urine; the costiveness, absence of bile from and state of the stools; and the flaccid, leucophlegmatic, swollen, and pallid appearance of the soft solids, without very evident emaciation in most instances, but with an appearance of morbid plumpness, or turgidity in the more malignant and rapidly fatal cases, serve farther to distinguish the malady.

34. Vibices and livid patches are characteristic both of the pestilence itself, and of the advanced and fatal period of it, and depend upon the alteration that has taken place in the constitution of the blood, as well as in the vitality of the capillary vessels, both venous and arterial. The delirium is generally different from that observed in the worst forms of remittent fever. It is characterized by a peculiar imbecility, fatuity, and apathy, and by faltering of the voice, or stammering. Furious or violent delirium rarely occurs unless in the early stage of febrile excitement. The pupils of the eyes are usually dilated, especially during an advanced period of the malady, and frequently even at an early stage, when the conjunctiva and countenance are suffused and injected—a state of the pupils which is not observed in yellow remittent fever. The pains in the legs are also different from that complained of in other fevers, and are generally felt where the gastrocnemii and soleus muscles unite to form the tendo Achilles.

35. The yellowness of the skin, in the hæmagastrie pestilence, is either a pale yellow or a dingy tint, often presenting patches of a dirty yellow or livid hue: in the *yellow remittent fever* the colour is more complete and deep than in the former, and more manifestly the result of biliary disturbance; while the discoloration of the pestilential malady arises from vital exhaustion, manifested chiefly in the capillaries and in the blood itself. M. Guyon very justly remarks, that in the latter the colouring of the skin is owing to the presence of blood which stagnates in the capillaries, or which escapes from them, and is nothing else than the tinge of a contusion; while in the remittent fever the colour is owing to the presence of bile, and is that of true icterus. This alteration of the blood and of the vital condition of the capillaries is evidently the source of the black vomit, and of the dark colour of the evacuations, in the

last stage. The singular spasmodic force with which the fluid is often ejected from the stomach; the presence of hiccup when the dark matter is less copiously thrown off; the peculiar dark stain which this matter imparts to linen, and which is not easily removed; the raw and unpleasant odour, which, as Dr. W. BARRY remarks, "is so peculiar, that, on entering the chamber, the state of affairs becomes immediately manifest," serve farther to distinguish the malady. The early appearance of a dingy yellowness on the neck and chest, and the state of the patient's mind, even when there is no delirium, are also worth remarking. The sufferer is generally either unconscious, or quite indifferent to his hopeless condition, and expresses himself as being much better, until vitality, receding from the extremities and external surface, ceases altogether in the central organs. During the last flickerings of the expiring flame, there are often observed incoherent expressions, violent straining of the eyeballs, and convulsive motions, rapidly passing into dissolution.

36. About the end of the second day, or during the third day, the patient begins to complain of a violent pain in the testes, with contractions of the spermatic chord towards the abdominal ring. On examination, the testes feel much diminished in size, are drawn towards the abdomen, and the scrotum is flaccid and empty. The surface of the scrotum soon after becomes very painful, and an excoriation takes place on the surface, chiefly of the most depending part, from which much offensive puriform matter issues. At the same time a similar discharge often takes place from the urethra, which ceases as the symptoms become favourable, but which becomes bloody, ichorous, and insufferably fetid, when dissolution ensues. The most violent attacks are generally attended, in the last stage, by an offensive and ichorous discharge from both the scrotum and the penis, these parts frequently becoming more or less sphacelated and gangrenous shortly before death.

37. A. Besides the *diagnosis* depending upon the presence of certain symptoms characterizing the hæmagastric pestilence, which are not observed in the worst forms of *remittent fever*, the origin and course of the former, compared with those of the latter malady, should not be overlooked. Malignant or bilious remittent fevers, even in their most intense grades, proceed entirely from malaria, or emanations from endemic sources of disease of a more or less concentrated kind (see *ENDEMIC INFLUENCES*), and present more or less marked *remissions*. In many of the situations furnishing these emanations, dead animal matter, as well as dead vegetable matter, aided by a deep, rich, absorbent soil and great humidity, performs an important part. Still the resulting malady does not produce a specific effluvia, capable of itself to propagate a similar disease, at least in ordinary circumstances; and if ever such a phenomenon occurs, it can take place only under peculiar circumstances, which furnish a new and superadded cause, as shown above (§ 12, 13), this cause giving rise to a very different malady from that which arose from endemic causes, however concentrated or intense.

38. On the other hand, the hæmagastric pestilence appears independently of endemic or terrestrial sources or malaria, and proceeds from an infectious or contagious poison, which, however formed *originally* (see, hereafter, § 139, *et seq.*), infects the healthy by contaminating the air immediately surrounding those already affected; or which, being absorbed and retained by other bodies (as shown in the article *INFECTIO*, § 16, 17), is afterward given out from them on exposure to the air, thereby contaminating and infecting the air and adjoining objects.

39. The *course*, also, of hæmagastric pestilence is generally different from that of yellow remittent fevers. The former malady is not only much more sudden in its seizure, but also more insidious, silent, *continued*, and rapid in its course than the latter. The one, even in its most intense grades, as I have observed them in Africa, where they are most malignant, very rarely ending fatally before the eighth, ninth, or tenth day; the other generally terminating life before the first of those days, and frequently as early as the second day. Mr. FRASER, whose experience of this pestilence in Gibraltar was frequent and extensive, observes that a variety of very striking symptoms, rarely seen in the fevers of the country—such as tremours and nervous agitations; singultus; extraordinary mental aberrations; an unexampled range of hæmorrhages; affection of the urinary evacuation, vomiting becoming seemingly vicarious of urinary discharge; a peculiar odour perceptible on approaching the sick, this odour being presumed to occasion the infection of the healthy; quick and perfect recoveries from violent attacks, with little or no risk of relapse, or of consequent visceral diseases—sufficiently distinguish this malady from all others. He farther adds, that the seizure of this malady is characterized by peculiar dejection of countenance, pain in the orbits, often attended by a peculiar delirium, similar to the effects of narcotics, or of poison on the nervous system, causing albor, tremour, anxiety, sighing, singultus, and sudden death. The course of it, he says, resembles that of the exanthemata, viz., a synochal stage of sixty hours, suddenly terminating in apyrexia, or running into malignant or putrid symptoms, unattended by remissions, but with vespertine exacerbations, and with a fallacious calm, similar to that which marks mortification, and closing generally, in fatal cases, before the seventh day; recovery protecting from a second attack. While, on the contrary, *endemic* or *yellow remittent fever* is a disease of high arterial action (in the Mediterranean), with that turgescence of countenance which usually attends pneumonia, with a general sense of fulness in the encephalon, and throbbing of the temple, but with little delirium; is much more prolonged in its course, and accompanied with heat of surface, and often with bilious yellowness; sometimes terminates in intermittent fever, or in visceral disease; is very prone to relapse, and second attacks are common. (See art. *FEVER*, § 225, *et seq.*)

40. It is not only upon the characteristic symptoms, *continued type*, and course of this pestilence, compared with those of remittent fevers, that the diagnosis is to be based, but also upon the cause, origin, and propagation of it—upon its infectious nature—*infectious* in the



sense which I have attached to the term (see *art. INFECTION*, § 13, 16), or contagious, without direct or immediate contact between affected and healthy persons; a property admitted not to exist in respect of remittent fevers, even of the worst forms. This subject, however, as it involves the most important considerations, and as having called forth the most virulent and ungenerous discussions, will receive a fuller consideration in its more appropriate place.

41. *B. Hæmagastric pestilence* differs from the *plague*, in being attended by more violent febrile excitement; in the absence of carbuncles and buboes, the lymphatic glands being enlarged only in the most intense and fatal cases, and in few instances only; and in the occurrence of the black vomit, which is very rarely observed in the latter pestilence. Undue importance has been attached to the circumstance of the former appearing during a high degree of temperature, which would put a stop to plague; for, although hæmagastric pestilence generally requires a high range of heat, still it will often continue to prevail, after it has become epidemic, during very temperate states of the atmosphere. Doubtless, however, the plague will continue to prevail during low ranges of temperature—ranges which will altogether arrest the progress of the hæmagastric pestilence.

42. *C. The milder cases of this malady* are distinguished with great difficulty from *common continued fever*, for some of these not infrequently assume the form of ephemeral fever, or of simple inflammatory fever; others, that of bilious or gastric fever; others, that of the seasoning or ardent fever of Europeans recently arrived in warm climates; some resemble adynamic fever, and others true typhus. The predominant affection of a particular organ; the more sthenically inflammatory character of all the symptoms, especially of the pulse; the more diffused pain in the head and forehead; the states of the eyes, of the evacuations, and of the skin, attending *inflammatory fever*, will readily distinguish it from this pestilence. When this fever occurs in Europeans lately arrived in a warm climate, or assumes a more intense form, or that of *seasoning fever*, the diagnosis may be much more difficult; especially when, as is not infrequently the case, much biliary derangement and gastric irritability are present. In these cases the conjunctiva and skin may become yellow; and blood may be exuded in some instances from the digestive mucous surface, and impart a black grumous character to matters ejected from the stomach, or evacuated from the bowels. Here the diagnosis is difficult, particularly when such cases occur only occasionally. Still, the close observation of even a few cases will enable the physician to recognise the character of the disease, which is always preceded by distinct præmonitory symptoms, is inflammatory at the commencement, and is attended by a free discharge of bile—phenomena which are not met with in this pestilence. Seasoning fever is, moreover, of longer duration than this malady; and in many localities, or during or subsequent to the rainy season, generally presents more or less, or lapses into, a remittent type, and is often followed by visceral diseases—occurrences

which are not met with in the hæmagastric malady.

43. *D. Hæmagastric fever* can hardly be confounded with *typhus* or *typhoid fevers*, for the prominent symptoms, the course and duration of each, are altogether different. Dr. BANCROFT, whose writings on this pestilence, and on the causes of pestilential diseases, have misled the inexperienced, and long mystified many, has stated the circumstances in which the former differs from the latter; but his statement (see p. 51 of his work) betrays a remarkable ignorance both of true yellow fever and of typhus. Indeed, I doubt much his having seen a case of true hæmagastric fever when he published his *Gulstonian Lectures*, delivered at the College of Physicians in 1805, and which constitute the substance of his work on yellow fever; or, if he had seen any cases of this pestilence, he must have confounded them with the more malignant cases of remittent fever, as his remarks on the diagnosis, and much of his description of the former, are much more applicable to the latter than to it; indeed, throughout his work he evidently confounds the hæmagastric malady with malignant remittent fever, and considers them identical diseases; for he nowhere attempts to distinguish between them; and he merely points out, in a manner the most imperfect, certain points of difference between yellow fever, plague, and typhus; but in a way altogether worthy of the Corypheus of the non-infectionists.

44. The symptoms which have been above enumerated (§ 7, *et seq.*) solely appertain to this pestilence, and so certainly indicate it, that, should a patient present them in a country liable to be afflicted with it, or in an European sea-port, holding intercourse with parts in which it is epidemic, during warm or temperate seasons, we may be assured that a case of it has occurred; and this assurance should give rise to measures hereafter to be indicated. If the case be a solitary one, or if only a very few such occur—and if isolation and other early precautions be taken, this may be the result—the fact may be disputed in the special-pleading mode in which the subject has been recently discussed; and the more especially if the patients recover, or if no examination of the bodies of those who have died has been made; for in these the black vomit and several of the other pathognomonic symptoms may have been wanting. The circumstance of the disease, particularly when epidemic, frequently assuming a mild form, should not be overlooked; for among a certain number of cases at the outbreak of the pestilence, a small proportion may only present the black vomit, several of the rest appearing only as a simple ephemeral fever. As M. Louis has well observed, in respect of the Gibraltar epidemic of 1828, although some of the symptoms of other diseases are similar to those of yellow fever, the symptoms taken together, and their progress, are very different.

45. In *typhoid fevers* vomitings are rare, while in this malady they are very common, frequent, and urgent; and, in the worst cases, they are peculiar (§ 8). Diarrhœa, more or less abundant, occurs in a large proportion of the cases of typhoid fever, and often also at the commencement of the disease; while an op-

posite condition of the bowels is observed in true yellow fever. The stools are also very different, both in colour and character, and are never so dark or blackish as in the latter malady. The form of the abdomen is natural in hæmagastric fever; there is usually more or less meteorismus in typhoid fevers. In true typhus there is a peculiar eruption on the surface of the body, a characteristic delirium and other febrile symptoms, and extreme prostration, not observed in the other malady. While typhus and typhoid fevers are slow in their course, the hæmagastric pestilence is rapid.

46. *E. Gastritis* may, in some circumstances, especially in warm climates, or when associated with hepatitis, be mistaken for hæmagastric fever. In both diseases there are more or less frequent vomitings, attended by burning epigastric pains, anxiety, &c.; but the duration of gastritis is generally longer than that of this fever, and the anxiety is less. The yellowness of the skin is absent, unless when gastritis is complicated with hepatitis or with disease of the biliary ducts; and when such is the case, the yellowness is a true jaundice, and not that of this pestilence. Besides, the intense pain of the orbits, the appearance of the eyes, the blackish stools, the suppression of urine, and, in fatal cases, the black vomit of this latter malady, are not present in the former.

47. In *hepatitis* there is yellowness of the surface, but with these are also more or less severe pains in the right hypochondrium, and an increase in the volume of the liver, as may be readily ascertained by examination of the trunk and by percussion, no such increase taking place in this pestilence. Then the severe pains in the orbits and the injection of the eyes at the commencement, the anxiety, and the several nervous symptoms, so constant in this latter, are not observed, while the course of it is so much more rapid than that of hepatitis.

48. *G.* In fatal cases the *post-mortem* examinations generally will decide the question as to the existence of the hæmagastric malady; for in them the presence of the peculiar black matter in the stomach or intestinal canal, or in both; the absence of material alteration of Peyer's or Brunner's glands; and the usually *yellow colour* of the liver, independently of other very manifest organic changes, are especially characteristic of this malady. M. Louis observes, "that if the liver be found of a more or less pale yellow, its cohesion and consistence natural or increased, all doubts as to the disease should be removed." But the consistence of the liver is not infrequently diminished, and the colour of the liver is rather that of rhubarb than a pale yellow, and is often such as described above (§ 27, 28). The pale yellow colour of the liver, considered so diagnostic of this pestilence by M. Louis, was also insisted upon in the very excellent work of MM. FRANÇOIS, BALLY, and PARISSET on this malady, as they observed it in Barcelona in 1821; but in the numerous dissections they made during that epidemic—one of the most prevalent and destructive on record—they particularly notice the rhubarb colour of this organ.

49. iv. *PROGNOSIS.*—It is only from a very close and attentive scrutiny of the several symptoms individually, and of their combination, as constituting the general state of the

patient, that a correct opinion can be formed of the event in this malady.—A. The expression and appearance of the eyes, the general aspect of the countenance, the torpor of the system, the depression of the spirits, and the imbecile state of the mind, described under the last stage of the malady (§ 16), afford the worst, and the reverse of these symptoms the most favourable, prognosis. Tremours of the hands and lips; restlessness; violent spasmodic contractions of the legs or arms; aphthæ, resembling curd, on the tongue or gums; dark spots or specks around the mouth or on the upper lip; hæmorrhages from the nostrils, mouth, anus, urethra, or vagina, or from the eyes, ears, or pores of the skin, especially when the blood is dark, decomposed, or ichorous, or has an offensive odour, and the parts from which it proceeds have a raw or a sphacelated appearance, and sphacelation of the scrotum or penis, are fatal symptoms.

50. Pain in the fauces and throat, descending in the course of the œsophagus, with redness of the tongue and pharynx; a burning pain in the region of the heart, especially when attended by great agitation, or by an expression of despair in the countenance; a change of voice, from the usual manly sound to a weak treble, or to a tone much weaker, softer, lower, and shriller than the natural one, the words being drawled out in a strange whining manner, particularly when this change of voice occurs early in the disease; very scanty, offensive, and discoloured urine, or its dark, greenish, blackish hue, or its suppression, or its passage in drops with severe pain above the pubis and in the urethra, with retraction of the penis; petechiæ, vibices, livid spots and patches on the surface; enlargement of the glands of the groins, armpits, and angles of the jaws; vomiting of black, grumous, or flaky fluids, are, even when existing singly, most dangerous symptoms; but when several of them are present, they preclude hopes of recovery.

51. When the disease appears with early symptoms of malignancy; when the pain in the head is intense, and confined chiefly to the lower part of the forehead, the orbits, and eyeballs, the conjunctiva being red, and the face deeply flushed; when a violent or a melancholic or despondent delirium occurs early, or a fixed opinion that death will ensue is entertained; when the pulse is full, very soft and very rapid; or irregular, unequal, intermittent, or, at least, slower than natural, small and weak; when the skin is very harsh and hot at the commencement, and cold at an advanced period, the patient complaining of burning internal heat; when the tongue is red, smooth, flabby, or covered by a sanguineous exudation; when yellowness or a mottled state of the skin, patches of discoloration, and black vomit appear, and especially if either or all supervene early in the disease; when exudations of uncoagulable blood take place from the mouth or other outlets of the body, or the quantity of black fluid thrown up is great; when singultus is attended by extreme anguish and restlessness, or with muttering, moaning, or with a weak, sharp, or wild, unnatural tone of voice; when the urine is suppressed, or the evacuations are black, grumous, or watery; when the extremities become livid, cold, or mottled, and the patient



lies on his back; then, whether these symptoms appear either singly or combined, recovery very rarely takes place, and never when the lips are cherry-red and tumid, the eye glassy or glistening, the skin damp, flabby, torpid, and presenting streaks or patches of a livid, greenish, or violet colour, and when a nauseous odour issues from the body. Recovery is also never observed after violent hiccough occurring late in the distemper, especially if it be attended by discharges from the stomach without effort, or with loud, flatulent eructations.

52. *B.* On the other hand, hopes of recovery may be entertained when the distemper is mild at its outset, or during the first three days; but even in some such cases the malady proceeds so insidiously as suddenly to present many of the most unfavourable symptoms on the fourth or fifth day, more especially yellowness of the skin, black vomit, suppression of urine, &c. The longer the stage of excitement continues, provided that the symptoms do not increase in severity, the event is the more likely to be favourable; and this may be expected with more reason when an agreeable, warm, and general diaphoresis breaks out; when the irritability of the stomach ceases; when the eyes become more lively or natural, the discharges more healthy, and the urine more abundant. On the contrary, when the stage of excitement quickly or abruptly passes into the state of apyrexia preceding the stage of vital exhaustion, the worst form of this last stage, with delirium, coma, and the several signs of malignancy above enumerated (§ 23), may be expected. If unfavourable symptoms do not appear before the fifth or sixth day, very reasonable hopes of recovery may be entertained. Mr. FRASER, whose experience of this pestilence has been most extensive, states that he "never had reason to be apprehensive of the issue after the sixth day, unless fatal symptoms had already set in."

53. If epistaxis occur early, or during the stage of excitement, and be moderate, and attended by amelioration of the cerebral or other symptoms; if the pulse is neither very rapid, nor very weak, nor very soft during the second day; if the skin remain at an early stage soft, and without the caustic heat above mentioned; if a miliary eruption break out; if a quiet sleep takes place, uninterrupted by vomiting; if the patient lie on the side, and draws the clothes around him; if the urine be voided in some quantity, and without pain in the urethra or glands; if the evacuations become more copious, feculent, or bilious; if the tongue, from being dry, turn to moist, hopes of recovery may be entertained; yet a guarded prognosis should nevertheless be given.

54. *C.* Dr. JAMES CLARK, one of the earliest and most experienced writers on this malady, observes, that if the yellowness appeared in 24 hours or 36 hours after the first attack; if the case had been left to nature, or the patient had been bled, and no powerful remedies attempted, recovery never took place. The sooner the febrile stage ended, he adds, when the case was left to nature, or only simple remedies were used, the greater the danger; and, on the contrary, the sooner the fever was subdued by powerful remedies, acting in an evident and decisive manner, the greater chance the patient

had to recover. If the debility was not great after the febrile stage, and the yellowness did not appear before the fourth or fifth day, the sick generally recovered. Many also recovered after the yellowness, and even after bleeding at the nose; but in all his practice he recollected only four patients who recovered after black vomit had appeared (p. 18). Of the cases which I had an opportunity of treating many years ago, one only recovered after this symptom had fully and unequivocally manifested itself. It should, however, be remarked, that vomiting of a dark grumous fluid, occurring with or after yellowness of the skin, not infrequently occurs in the last stage of malignant, bilious, or remittent fever (*see FEVER*, § 233, *et seq.*); and that recovery occasionally takes place in that fever, even after these symptoms have appeared. But the case is very different in the true hæmagastrie pestilence. Most of the instances of recovery which we hear of from the black vomit, are recoveries from these states of yellow or remittent fever which have been confounded with this pestilence.

55. Dr. CHISHOLM states that the critical periods or days are more distinctly marked in this malady than in any other observed in warm climates. The cessation of the disease, and the death of the patient, he remarks, always happened on the odd days; but the change in the state of the symptoms which preceded either event took place on the even days. Thus, if the patient was worse on the evening of the second day, he would die on the third; if worse on the fourth, he would die on the fifth; and so on as far as the fourteenth day. In the same manner, if the patient was better on the second, fourth, or sixth day, the resolution of the disease would happen on the following days.

56. *Pregnant females* always experience abortion, which is attended by excessive hæmorrhage, when attacked by this pestilence, and very seldom recover; and when women are seized by it the first fortnight after delivery, recovery rarely or never takes place. Dr. JAMES CLARK states that, during the epidemic in Dominica in 1793 and 94, children, adults, and old people, labouring under smallpox, were generally attacked by this pestilence "about the time that the secondary fever usually comes on; and that none recovered but those who had begun to take bark and wine after the eruptive fever, and continued this remedy and a nourishing diet for some time after. It made no matter whether the smallpox were of the confluent or distinct benign kind. All fell victims to this disease who were not treated in the manner just mentioned."

[The individual prognosis in this disease, as Dr. DICKSON truly remarks, is much modified by circumstances. In the sanguineous and plethoric the disease is apt to attack with more violence, and run its course with greater rapidity. The intemperate, with scarcely an exception, succumb beneath an attack. It is even controlled, in some degree, by national habits and modes of life. The Germans, Scotch, and Irish stand a much poorer chance of recovery than Spaniards, Italians, and Frenchmen. The Englishman and the American from northern latitudes occupy a middle ground, generally speaking; the more recently a person is from the north, in places where the disease prevails,

the more severe will be his attack. The malady proves extremely fatal among young children.

Dr. DICKSON has also called attention to the state of the stomach, as of paramount importance in inflammatory cases; every thing depending on its powers of retention and tranquillity. Where there is great burning at the epigastrium, with nausea and retching, and tenderness on pressure, the prognosis is bad. The pulse is not much to be depended on; but when it becomes small, quick, and irregular, it indicates danger. So also does a moist and relaxed skin. In bad cases, the febrile paroxysm is very short; after this has subsided, the super-vention of febrile excitement is a favourable sign. But a sudden collapse, or gradual sinking of the strength at this crisis, attended with black vomit, shows a fatal result. A spontaneous suppression of urine, the defect of renal secretion, is almost uniformly a fatal sign. The black vomit, though not pathognomonic of yellow fever, is always, nevertheless, a most unfavourable sign, whenever it occurs in this disease, whatever may be the condition of the patient in other respects. Dr. DICKSON states that he has met with as many as ten recoveries of patients who had black vomit; he has met with it, also, repeatedly in bilious remittent fever, gastritis, and enteritis, in one case of varioloid, one of catarrhal fever, one of pregnancy, and two of dropsy. We have observed it in several instances in other affections, and recently in a fatal case of peritonitis.]

57. V. MORTALITY.—But little can be stated respecting either the numbers attacked in a locality where this pestilence prevails, relatively to the amount of population, or the proportion of deaths to recoveries. It is obvious that, as regards the extent of diffusion of the distemper among the community, much will depend upon the means resorted to of guarding against it. As respects the epidemics which have occurred in Europe, and in some other places, the greatest fatality has been remarked among the early cases, or when the spread of the disease is reaching, or has reached, the utmost limit. Toward the decline of the epidemic the proportion of recoveries increases; and this may be owing either to the less predisposition of the affected; to the depression of the temperature about the close of an epidemic; to the most susceptible, the most timid, and most exposed to the exciting and concurrent causes, having been the earliest attacked; or to the joint operation of these circumstances. Much, however, will depend upon the ventilation, cleanliness, and measures of prevention adopted; and more especially upon the avoiding of all those causes which tend to contaminate the surrounding atmosphere, and even of those articles which the foul air may imbue.

58. Dr. ROCHEAUX states, that at Barcelona, during the early part of the epidemic there, in 1821, the mortality amounted to 19 out of 20 attacked; but it diminished to much less, and at the close of the epidemic was two thirds. Dr. KILLKEST remarks, that at Gibraltar, in 1828, very few recoveries occurred among the earlier cases in the Civil Hospital. "Of the first 35 Jews received into the establishment," but one recovered. The unusual rate of mortality among this people may partly be referred

to their very general (constitutional?) despondency when attacked by dangerous or epidemic maladies. In this epidemic at Gibraltar, one half the cases died in several of the military corps. It is stated by the physician just quoted that, of the first 134 cases treated in Murcia in 1803, not more than three or four recovered.

[In 1804, in Gibraltar, out of a population of 9000 civilians, but 28 persons escaped an attack, and the mortality was one in three. The disease proved nearly as fatal in Antigua, in 1803. Three out of four died of it in Jamaica, under the care of Dr. HUME. In Philadelphia, in 1820, 83 out of 125 died of it, which is about two out of three. In the city of Charleston, according to Dr. DICKSON, the average mortality is about one in five or six of all attacked. But, as in cholera, the fatality of the disease varies greatly in different localities of the same city. Thus, in Philadelphia, in 1820, out of 12 reported cases in one vicinity, there was only a single recovery; of 70 in another locality, 30 recovered, and three out of four recovered in another vicinity. The general average of deaths from yellow fever where it prevails is about one third.]

59. The greater malignity, and consequently the greater fatality, of the cases have been observed not only at the commencement, but also at a far-advanced period, of some epidemics; as if the violence of the distemper had received a fresh impulse. Dr. TOWNSEND states this to have obtained in New-York in 1822, the proportion of deaths to the affected being, as late as October, as three to four. On the other hand, a milder form of the malady has been more frequently observed in some epidemics and localities than in others. This circumstance may be partly attributed to the intensity and concurrence of those causes which predispose to, and determine or aid the more efficient and specific cause of the distemper, especially of a warm, confined, stagnant, and humid atmosphere; want of ventilation and of cleanliness; crowded sleeping apartments, &c. (§ 71); dread of the disease; the season, temperature, and situation. Much, however, of the different degrees of malignity said to exist in different epidemics, and in different climates and places, may be imputed to the circumstance of the malignant states of remittent fevers on the one hand, and the inflammatory remittent and continued fever on the other, being often confounded, by some writers, with hæmagastric pestilence, when either of the former has become remarkably prevalent, and has been attended, as they sometimes are, by yellowness of the skin.

60. Some of the epidemics of yellow fever said to have occurred in the West India Islands, and in parts of the American continent, have been much milder than the visitations of this pestilence have been in Spain during the early part of the present century. But it is by no means fully ascertained whether all the epidemics observed in the western hemisphere were actually the true yellow or hæmagastric fever, or merely an unusual prevalence of endemic or remittent fever, rendered more continued by intensity of attack, predisposition of the affected, and other circumstances. No doubt several of these epidemics were the pestilence under consideration. Their symptoms, remarkable



prevalence, and fatality proved that some of them were this distemper; but others were of a different nature; and probably some of them resulted from the crowding of a number of human beings in a confined space, either in barracks, or in transports, or between the lower decks of ships of war, in a high range of temperature, and without sufficient renewal of the air. Numerous instances of malignant and even of pestilential fever of an infectious nature have occurred in this manner, and have been recorded by writers, and some of them have been noticed in the articles on EPIDEMICS.

61. Still the degree of mortality has varied much in most of the visitations of this pestilence which have been observed during the last half century, and must be attributed to the concurrence of several causes, especially to the predisposition of the attacked, the season and locality, to crowding of the population and of the sick, and to the amount of ventilation both before and after the seizure. The extent to which treatment may influence the proportion of deaths can hardly be estimated; and yet it doubtless, also, has very considerable effect. A recourse to "heroic remedies," in the language of some contemporary foreign writers, is certainly not attended with marked success; but much depends upon the nature of such remedies. For many years past medical practice was considered excellent in proportion to its activity, or, more justly speaking, to its violence; copious blood-lettings, large and frequent doses of calomel, &c., constituting sound and judicious, as it was no doubt active, practice in the eyes of the inexperienced.

62. All that can be said as to the rate of mortality in various epidemics and visitations of this pestilence, as far as the data have been furnished, may be stated as follows: 1st. Where the infection has been introduced among the natives of temperate countries, either removed to a warm climate, or during a very warm season, and especially if the population thus predisposed be dense, or living in a close, crowded, and ill-ventilated locality, and if the air be very humid as well as very warm, and much more so if it be stagnant or imperfectly renewed, the distemper has been not only the more violent, more rapid in its progress, and more fatal, but it also has been more rapidly spread. Thus the results have been most disastrous in towns where these circumstances have existed; and in ships of war, and in transports, particularly after storms or states of weather which induced the closure of gun-ports and hatches, thereby preventing the renewal of the air, and favouring the development of concomitant causes. The spread of the distemper has been the more general or almost universal, and the proportion of fatal results has been the greater, the more the above circumstances have predominated, the more completely ventilation, segregation, and cleanliness were neglected, or imperfectly attained; and the greater the panic or dread of the distemper.

63. 2d. When the distemper has appeared in a population of which a greater or less proportion has been formerly attacked, or has resided long in a warm climate, or consists of dark-skinned races, although such residence and race by no means confer immunity, as proved on many occasions; also when it has appeared

in more temperate countries, at a time when the cold season is fast approaching, and where due ventilation, segregation, and other due precautionary measures have been taken, and confidence has been secured, it is much more limited in its diffusion, milder in its character, and less fatal. Thus removal to a more open and elevated locality, the strict quarantine of the infected, free ventilation, a lower range of temperature, and a cooling regimen, have severally tended both to limit the extension of the malady, and to diminish the proportion of fatal cases; while opposite circumstances have invariably increased both the one and the other.

64. VI. CAUSES.—Although this distemper is owing to a certain specific cause—and the existence of this cause will be demonstrated in the sequel—still the infection of the previously healthy will be favoured by other causes, which either *predispose* the system to the invasion of the specific cause, or *determine* or aid the development of this cause, if the system have previously been exposed to it. Thus the same influence may either *predispose* the frame to the reception of the infection, or *determine* the development of the malady, the infection having been received, but not manifested.

65. A. Of these causes or influences, which are rather *predisposing* than determining, the most important are age, sex, constitutional peculiarities, mental emotions, temperature, seasons, &c. The influence of these is apparent not merely in certain epidemics, but more or less in all, whether occurring within the tropics or appearing in temperate countries. Certain of these predisposing and determining causes are *intrinsic*, or appertain to the individual; others are *extrinsic*, and implicate more or less whole communities.

66. a. Age has a considerable *predisposing* influence in this as well as in several other epidemic distempers. Adult age presents a greater degree of susceptibility to infection than either childhood or old age; and this is manifested both at the commencement and during the height of an epidemic. Towards the conclusion of very general and devastating epidemics, a larger proportion of children and aged persons is observed to be attacked than at an earlier period of the epidemic; but this is owing, as in the epidemic of Barcelona in 1821, to the circumstance of the increased proportion of these classes remaining unattacked, or liable to be infected towards the close of the epidemic; nearly all those of adult and middle ages having caught the distemper. The more rapid and general infection of adults, and those at the prime of life, is probably in part owing to their greater exposure to the existing cause of the distemper; nevertheless, more or less of increased susceptibility of infection appears to exist during these epochs of existence, than in any other. A similar circumstance obtains in other infectious fevers, and shows that the primary impression of the exciting cause is made upon the organic nervous system; for if this cause acted directly on the blood, the aged and debilitated, the susceptible and the non-susceptible, the protected and the unprotected, would be equally liable to the contamination. Nevertheless, when the infectious effluvia is concentrated, or the exposure to it is more than usual, both children and old persons are attack-

ed, and some infants at the breast do not escape.

67. *b. Sex.*—The frequency of seizure in the two sexes differs much in different epidemics, owing very probably to the varying degrees of exposure of each to the exciting cause. In the epidemic of Barcelona, females were as frequently infected as males, but a greater proportion of the former recovered. Much will necessarily depend upon the state of society in the place where the distemper prevails; but in most epidemics a less prevalence, as well as less fatality, is remarked among females, as well as among children, than in adult males. This is probably owing in part to the state of the female constitution during the period of uterine activity.

68. *c. Constitution, Habit of Body, and Race.*—It has been remarked in almost every epidemic that persons of a robust constitution, those of a rigid fibre, the plethoric, and sanguine temperament, were the most frequently attacked, and had the disease in the severest form. However, when the pestilence became general in any locality, it has spared no constitution nor habit of body, excepting that which had previously been attacked. The greater immunity of the *negro race* has been often remarked, but with insufficient precision. Individuals of this race have, however, not infrequently been attacked, both in the West Indies, Africa, and in America; but the distemper in them has assumed a milder character (§ 6).

69. *d. The depressing passions*, more especially fear of the disease, the loss of relations, anxiety, disappointment, &c., all tend remarkably to predispose the system to the operation of the exciting cause. Irregular modes of living, excesses of any description, prolonged abstinence, fatigue of body or mind, and want of the requisite repose, exert a similar influence, although not so remarkably as the depressing emotions of the mind, and, with these, act both as predisposing and determining causes.

70. *e. Pre-existing disease*, and general feebleness of constitution, or debility in any form, certainly have no influence in predisposing to an attack, but rather prevent it. MM. BALLY, FRANCOIS, and PARISSET state that this was very obvious in the epidemic of Barcelona; and that in their numerous inspections of bodies dead of the distemper, old visceral or pulmonary disease was very rare. They, however, remark, that syphilis did not protect from an attack; and that setons and issues appeared not to possess a prophylactic influence. They found that a few of the patients in the portion of the general hospital set apart for the insane were attacked, showing that insanity did not prevent the seizure of this pestilence. The chief of the *intrinsic* influences now mentioned, which seem to act also as determining causes, or which appear to aid the operation of the specific cause on the frame subsequently to exposure to this cause, are, the depressing emotions of the mind, excesses of any description, want of the natural repose, fatigue, and prolonged abstinence.

71. *B. Of the extrinsic influences or agents*, which tend not merely to predispose the system to the action of the specific cause of hæmagasttric pestilence, but also to aid in developing the effects of this cause, *warm, humid, and stagnant*

*states of the atmosphere* are the most remarkable. This pestilence has generally prevailed during high ranges of temperature, and at that season, and in those localities, in which considerable humidity was associated with warmth; and these with a still or calm state of the air, or with crowded habitations and imperfect ventilation. Such has more particularly been the case when this distemper has become epidemic in countries without the tropics. Within the tropics all sheltered situations near the level of the sea, or near the sea-coast, present at all seasons the conditions, in respect of warmth or of humidity, requisite to the epidemic prevalence of the malady. Still, although these conditions are required for the development and dissemination of the infection, they are not either individually or conjointly capable of producing the distemper, without the operation of the specific exciting cause. They are merely the atmospheric conditions required to give the infectious germ activity.

72. The *seasons* which are characterized by a high range of temperature and much humidity, as summer and autumn, are those in which this pestilence has become prevalent in temperate climates, when the infection has been imported or conveyed thither. A low range of temperature and dryness of the air, although attended by much heat, have been found, on the other hand, to check the propagation of the distemper, and even to prevent its development. When the infectious seminum has been introduced in a crowded locality during degrees of atmospheric warmth and humidity favourable to the evolution and propagation of its effects, and when the consequent epidemic has become very general, the distemper often continues to rage, although the temperature of the season has fallen much below that observed during its outbreak, or even below that which is believed requisite to its development. This has been remarked in respect of epidemic visitations of the pestilence, both in Spain and in the United States. That unusually high ranges of temperature have no influence alone in producing the malady, may be inferred from the facts observed in connexion with the prevalence of it, both in hot and temperate climates; for the periods of its appearance in the one, and the seasons of its occurrence in the other, have not been always, or even generally, characterized by unusual warmth. Indeed, a careful perusal of facts connected with the outbreak of the distemper in Africa, the West Indies, in Spain, and in America, fully convinces me that excessive warmth is not concerned in its production more than a somewhat lower grade, a high degree of heat, as I have just stated, being only one of the conditions requisite to its prevalence, but then the presence of the efficient agent—the infectious seminum—is indispensable: this is the seed; warmth and humidity are merely the conditions of the soil requisite to its germination; and although the former may lie dormant for a time until the latter give it activity, still it is not less the efficient, the specific, and the undoubted cause of the pestilence.

73. *C. Infection.*—According to the definition I have given of this term in the article INFECTION, there can be no doubt in the mind of the unprejudiced, after a due examination of



the evidence respecting it, as to the dissemination of this pestilence by infection. My limits will not permit me to detail, circumstantially, or even fully, all the facts which have been adduced by most respectable authorities, proving the propagation of this malady by infectious emanations proceeding from the affected, but I shall adduce sufficient evidence to show that the true hæmagastric pestilence spreads in this manner, and that the evidence of its infectious nature is similar to that by which the infectious nature of scarlet fever or smallpox is proved and admitted. But smallpox, scarlet fever, and some other infectious diseases, are among the most common maladies in our climate, and can no longer be prevented by measures in any way tending to embarrass traffic and mercantile speculation, while this pestilence, plague, and pestilential cholera are foreign to this and most European countries, and the only modes of preventing their extension to these countries hitherto attempted have been such as more or less hamper commercial undertakings at certain seasons and with some foreign parts. It cannot be denied by any one who has attended to the subject of quarantine, especially as it has been agitated in recent times, and with a due knowledge of the influence which the ruling passion—the desire of amassing wealth—exerts upon all the more generous and social emotions of the mind, that the restrictions imposed upon trade, arising out of precautions against the introduction of pestilential infections, have been the chief causes, directly or indirectly, producing the opposition to the doctrine of the infectious properties of pestilence; and that all that has been written to disprove this doctrine—and written with no small virulence by some—has not proceeded from a firm conviction of the justice of the cause espoused, but are either special pleadings subservient to sordid purposes, and to the gratification of disappointed feelings or of private resentments, or the outpourings of minds teeming with mistaken views, arising out of imperfect observation and hastily-formed opinions, and excited by a desire of acquiring notoriety in a contest involving the interests of the whole community.

74. Let any one altogether unprejudiced as to the infectious or contagious properties of pestilential maladies, attentively peruse most of what has been written respecting them in this and in other countries, carefully examine the evidence adduced before committees of the House of Commons, or in other places, and critically weigh the import and truth of the conclusions arrived at by commissions sent to investigate facts on the spots of their occurrence, and the various circumstances connected with the facts adduced—let any one who possesses sound common sense, with some share of science, but who is at the same time entirely free from the undue influences of prejudice, of temper, and of interest, inquire into the matter—and I cannot believe that he can arrive at a different conclusion from that to which I have arrived, after the best attention I have been able to bestow upon this most important and much-discussed subject. Whoever may enter upon this very unpleasant investigation with these moderate qualifications, which, however necessary, are quite sufficient to the

formation of just conclusions respecting it, will be surprised to find that, among members of a learned profession, so much ignorance should be displayed in the literary character of some of these writings, in the scientific and professional execution of others, and in the illogical inferences of many of them. The duly qualified and candid investigator will detect statements made without proof, facts assumed without evidence, and supposititious agents believed in as real existences, and these made the bases of reasonings altogether inconclusive even as regards the conduct of the argument. He will find things, facts, and diseases dissimilar from one another, and presenting no connexion either as to nature or to sequence, viewed as identical with each other. He will detect the suppression of important facts and circumstances, and an undue prominence given to others of a doubtful character. He will remark the imputation of motives which did not exist, and ignorance of those which influenced, if they did not impel the writers. He will observe the precipitancy with which the young, the inexperienced, and the ignorant have rushed into print, and attacked, with disgusting flippancy and intemperance, much abler and better-informed writers. In every medical periodical existing during the late war, he will find accounts of a disease never seen by the describers, their own mistakes proceeding from profound ignorance of the name and nature of the malady seen by them, serving as the basis of their lucubrations and of their arguments. And he will, moreover, be grieved to remark the opinions of learned and experienced men either misrepresented or impugned in jejune and paltry performances, evincing a most remarkable ignorance of the language in which they are written, and a still greater ignorance of that from which they profusely and inappropriately quote. In thus attempting to reach the pure spring of truth at the bottom of the deep well of research, he will have to penetrate not only through the rubbish thrown in by unfaithful, by mistaken, and by ignorant inquirers, but also through the accumulated filth of uncandid and intemperate controversy.

[We stated, under the article "Infection" (p. 405, vol. ii.), that the weight of medical opinion in this country is opposed to the doctrine of Mr. Copland, that yellow fever owes its spread to a specific infection of an insalubrious nature, emanating from the bodies of those already infected. It may, after all, appear that the controversy in relation to the mode in which yellow fever is propagated is merely one about words; that it originates in not agreeing upon the meaning of the terms employed; and that, if these were logically defined, and then used only in the sense of the definition, there would really be found to be no difference of opinion in the profession, but, on the contrary, entire harmony. It is very evident that Dr. Copland uses the terms infection and contagion in a sense different from that in which they are employed by American medical writers, making, as he does, the former a generic term, and contagion merely one of the modes in which it takes place. Now, if we understand by a contagious disease, one which is communicated under any circumstances of atmosphere, whether pure or impure, by contact or otherwise, as

smallpox, measles, hooping-cough, &c. ; and by an infectious disease, one whose communication depends on an impure or vitiated state of the air, there would be perfect unanimity of opinion as to what category yellow fever would properly belong : no one would think of calling it a contagious disease ; but, like plague, cholera, and typhus fever, it would at once be ranked under infectious maladies. If these diseases are ever communicated in a pure atmosphere, it is only an exception to a general rule, and, as such, should not be considered a valid objection to such distinction, *exceptio probat regulam*. Let it then be admitted that yellow fever is propagated, or, if you please, communicated through an impure atmosphere only, whether it be by a process analogous to fermentation or assimilation it matters not, yet, if the above distinctions are followed, the disease should be called an *infectious*, not a *contagious* one. In using this latter term we unnecessarily open a wide door to controversy, and become involved in discussions merely about words. But if we give that latitude to the meaning of the terms employed, as indicated by our author, we are at once involved in an endless sea of controversy, without a pilot or a helm. As then, after all, there is not that difference of sentiment which is generally supposed on this subject, it being rather apparent than real, we regret to notice the severity of language employed by Mr. CORLAND toward those who seem to differ from him in relation to this matter. We do not believe that there is any good reason for impeaching the motives or doubting the sincerity and honesty of those who have expressed opinions apparently at variance with those of our author ; we shall regret to find that the example here set, of vituperating those who seem to differ with us in opinion, finds many imitators in the profession.]

75. a. *The history of the various manifestations of this pestilence conveys to the experienced physician a certain degree of evidence as to their infectious characters, although the circumstances connected with them have been very imperfectly recorded. The earliest notice of the appearance of the hæmagastric pestilence in the West Indies is made by LIGON, in his "History of Barbadoes." He states that it broke out early in September, 1647, and that, before the expiration of a month, the living were hardly able to bury the dead. After the year 1647, no mention is made of this malady until 1686, when it was said to have been imported to Martinique from Siam, and was then called the "Maladie de Siam." M. DESPORTES, who practiced during many years in St. Domingo, says that it appeared in Martinique in consequence of a large fleet from Siam which arrived there with a "malignant or pestilential fever, of which a great number of the sailors perished ;" and several French writers state that, having been communicated to the inhabitants of Martinique, it was afterward carried to St. Domingo. Captain PHILLIPS states that this malady prevailed in Barbadoes in 1694 ; and Mr. HUGHES, on the authority of Dr. GAMBLE, mentions the prevalence and fatality of it in 1695 ; and the circumstance of its being called the *new distemper*, or *Kendal's fever*. Dr. THRAPHAM, in a work on the health of Jamaica*

in 1679, says, that "about eight years since, when the victorious fleet returned from the signal Panama expedition, they then brought with them a high, if not pestilential fever, of which many died throughout the country ; but this being a foreign distemper brought from abroad, the causes of which I could not so well judge of, but conclude Jamaica more happy than to be annoyed therewith, directly and originally" (p. 81).

[Dr. DOWLER, of New Orleans, remarks, that "Mr. WEBSTER, who has collated the various authorities in relation to the origin of yellow fever in America, shows, in his work on Pestilence, that when the whites arrived in New England, in 1620, some of the Indian tribes had been reduced from 30,000 to 300, two years previously. The survivors asserted that the sick bled from the nose, and turned yellow, like a garment of that colour, which they pointed out as an illustration. Their statement as to the great mortality which the malady caused was fully confirmed by the number of recent, unburied skeletons strewed about their towns.

"This author, at a later period, after more thorough investigation, reiterates the statement, 'that a pestilential yellow fever prevailed among the nations of New-England, about two years before the settlement made by the English, is a fact as well attested as any historical fact on record.'

"The settlement of Virginia preceded that of New-England. Some of the colonists in the former, before those of the latter arrived, had witnessed the almost entire destruction of many Indian towns by an epidemic, which, though vaguely called the plague, was probably the yellow fever. No diagnostic criteria have been transmitted to our times by which this conjecture can be satisfactorily decided. With respect to the New-England epidemic alluded to, the case is different ; three of the most salient characteristics of yellow fever, viz., great fatality, yellowness of the skin, and hemorrhages, are enumerated distinctly. There is nothing improbable in admitting this statement, fatal as it may be to the doctrine of imported contagion. The Indians, even the Southern Indians, are, as I know from personal observation, sometimes the victims of yellow fever, when recently from rural situations. It is almost certain that the native Indians of the South, constantly resident in large towns, would be little, if at all, liable to this disease, while the same description of persons in northern towns would, like the whites of the North, enjoy no such protection. The localities which develop yellow fever are urban, not rural. Hunting and war, the elements of savage life, are but little favourable to a dense town population. Hence, savages seldom suffer from this disease. It cannot, however, be denied that very small towns are liable to suffer.

"The infrequency of yellow fever among the savages of America cannot be inferred from the silence of authors on the subject, with but few exceptions, for nearly two centuries. The difficulty of getting information from them in relation to their maladies will, in a great measure, furnish a sufficient explanation.

"In 1746 the Mohegan tribe was wasted by this malady, which began with pain in the head and back, followed by fever, and on the third or



fourth day with intense yellowness of the skin, black vomiting, and bleeding from the nose and mouth. This fever commenced in August and ended with the approach of cold weather. Albany, in New-York, was at the same time the theatre of a similar visitation, as was the Seneca nation of Indians the year before. If the circumstances of savage life were equally favourable to the production of yellow fever as those of civilized life, still, however, the difficulty of obtaining from hostile savages any authentic information in relation to it will explain one of the causes which have clouded its early history among the nations of North and South America, together with those of the islands washed by the Caribbean Sea and the Gulf of Mexico.”]

76. Don ULLOA affirms that this pestilence was unknown at Carthagená and Porto Bello before the year 1729. Medical literature furnishes very few instances of the appearance of this pestilence in the West Indies during the eighteenth century, until the dreadful outbreak in 1793. Still we are not to infer that occasional visitations of it did not take place, although no published record of them exists; indeed, imperfect notices of such visitations are to be met with in several works; still they appear to be few and far between, and evidently prove that they have not been the results of endemic causes, or of circumstances connected with locality or season, and to have been altogether different from the maladies arising out of these causes and circumstances.

77. Dr. CURRIE, in his work on Bilious Fever, states that “a contagious fever, called the yellow fever, has occurred at Philadelphia six times since the first settlement of the city; viz., in the years 1699, 1741, 1747, 1762, 1793, and 1797.” GOUGH, in his history of the Society of Friends, says, “that the fever which prevailed in 1699 had, for a considerable time before, been very mortal in the West India Islands.” Dr. LIND states that, in the year 1741, “the disease was introduced by means of a trunk of wearing apparel received from Barbadoes, which had belonged to a gentleman that died of it in that place; and that the disease spread from the family that received the trunk into the town, and destroyed above two hundred of the inhabitants.” Mr. LARDNER, mentioning its prevalence in 1747, adds, “that many, whose business and families would permit them, fled from the city.” In an account of the prevalence of this pestilence in 1762, communicated to the College of Physicians by Dr. REDMAN, it is stated that the disease was introduced about the end of August by a mariner, who arrived from the Havana ill of it, and took lodgings near the new market, below Pine-street. It was confined principally to the vicinity of the new market and the street west of it, spreading gradually from one family to another, till toward the end of September.”

78. Dr. LINING, of Charleston, has described this distemper in a letter to Dr. WHITE, and given the following account of its appearance in that city up to the period at which he wrote: “This fever does not seem to take its origin from any particular condition of the atmosphere, independent of infectious miasmata; for within these twenty-five years, it has been only four times epidemical in this town, viz., in the years

1732, 39, 45, 48, though none of those years (excepting that of 1739, whose summer and autumn were remarkably rainy) were either warmer or more rainy (and, some of them, less so) than the summers and autums were in several other years, in which we had not one instance of any person being seized with this fever. But that this is really an infectious disease seems plain, not only from this, that almost all the nurses caught it and died of it, but likewise, as soon as it appeared in town, it soon invaded new-comers, *those who never had the disease before*, and country people when they came to town, while those who remained in the country escaped it, as likewise *those who formerly felt its dire effects*, although they walked about the town, visited the sick in all the different stadia of the disease, and attended the funerals of those who died of it. And, lastly, whenever the disease appeared here, it was easily traced to some person who had lately arrived from the West Indies, where it was epidemical.” (*Essays, Phys. and Lit., &c.*, vol. ii., p. 370.) Dr. WARREN gives similar testimony to that now stated by Dr. LINING respecting this pestilence as it occurred in Barbadoes and adjoining islands during the early part of the last century. (*See Treat. on the Malignant Fever in Barbadoes and neighbouring Islands, &c.*, by H. WARREN, M.D. 8vo. Lond., 1740.)

79. Although this pestilence has frequently broken out in the West Indies and in several of the seaports of the United States during the last century, still considerable intervals, especially as regards individual towns and localities, intervened between its appearance. DE LA FOSSE makes no mention of its occurrence in St. Domingo between the years 1775 and 1785. Dr. CHISHOLM asserts that no contagious fever, nor any epidemic of the character of this pestilence, appeared in Grenada from the year 1763 until 1793; and Dr. GILPIN, who resided many years in this island previous to 1793, confirms his assertion.

80. That the West Indies were not very unhealthy for many years previously to 1793, is shown by the testimony of Dr. DAVIDSON, who, in a letter to Dr. MEASE, of Philadelphia, states that, in the more healthy islands of St. Kitts, St. Vincent, and Barbadoes, soldiers have arrived from Europe and remained there for years in the enjoyment of good health, notwithstanding their debaucheries. And Dr. WEIR, director-general of army hospital, states “that he arrived in Jamaica in 1785, from which time till 1792 only one officer died out of four regiments quartered in that island; that the troops were in general healthy; that although fevers were frequent, they were not fatal,” and that no fever of a bad type occurred during these years, until 1793, when this pestilence appeared. Dr. THEODORE GORDON served in Barbadoes, Dominica, and Jamaica during five years preceding the occurrence of this malady in 1793, and considered the health of the troops remarkably good, the chief diseases being remitting and intermitting fevers, dysentery, and affections of the liver. That this malady is not a constant resident in the West Indies, although frequently appearing there, is farther shown by Dr. J. HUNTER, Dr. FRANKLIN, Dr. GORDON, and others, who have found troops remain during several years remarkably healthy; and

yet, in the most healthy seasons and localities, this malady has occurred and swept off many hundreds in a very short period. Its outbreak in these islands, after many years of immunity from it, occurred in February, 1793, in Grenada, at a time when bilious remittent fever does not prevail; at which time, also, and for a considerable period afterward, all the other islands continued healthy. But after the appearance of this pestilence, every station, however healthy before, suffered severely from the contagion. It did not reach Dominica until the end of July. Barbadoes was unaffected until the beginning of 1794; and St. Domingo did not suffer from it until late in this year; and then in consequence of the introduction of the contagion by a detachment of troops from the island of Guadaloupe, where it was raging. This pestilence appeared in Philadelphia in the month of July, 1793, and during the latter part of that year and 1794 it reached most of the West India islands.

81. The reappearance of this malady in the West Indies, after an immunity from it during many years, was attended by many distressing results, owing to the circumstance of its having been confounded, by superficial and inexperienced observers, with the common remittent fever of the country. We frequently find, upon referring to reports of medical officers, that the pestilence broke out and was most destructive among regiments which had marched into barracks in which it had already prevailed. Thus the 35th regiment landed in Guadaloupe on the 12th of May, 1795, and on the 30th of June of the same year, in six weeks, it had lost 136 men. The 2d regiment landed at Martinique in March, 1805, and in the following May it had lost 97 men. These men landed during the prevalence of this pestilence in these islands, and, without any exposure, they instantly, and without marching or service, occupied quarters in which this malady had prevailed; but, as it was supposed not to have been infectious, the highly-predisposed troops were instantly introduced to the operation of its efficient cause. The distemper was viewed as having been free from infectious properties, and as being the common seasoning fever of the climate, and no precautions were taken, in these instances as well as in many others, against its dissemination. Numerous other instances might be adduced of the dreadful effects resulting from monstrous ignorance on the part of those who ought to have been informed by the experience and judgment of those who had gone before them, if they were incapable of arriving at rational inferences by their own unassisted reason; but the subject is humiliating to human nature, especially when viewed with reference to medical doctrine and to professional character. In those days, and even down to the present day, the arrival of Europeans within the tropics was generally inferred to produce what was called a *seasoning fever*—a name imposed upon all fevers, however occurring, within the first twelve or eighteen months after the change of climate—a name, moreover, applied very frequently to conceal ignorance, or even to mislead. But fever solely depending upon change of climate merely, irrespective of infectious or other miasms, is neither so immediate in its invasion of new comers, nor so rapid in its course, nor so

malignant, nor so fatal, as the pestilence now under consideration. In this I speak from observation in two quarters of the globe. But to proceed with the evidence as to the infectious nature of this distemper.

82. Dr. J. STUART, who practiced during many years in the island of Grenada, both before and after the prevalence of the pestilence in that island in the years 1793, 1794, and 1795, states, in a letter to Dr. CHISHOLM, "As to the character of this fever, my experience has fully satisfied me that it was specifically distinct from every form of the indigenous bilious remittent which I had ever observed, because it appeared at a season of the year which I had always found healthy during a period of nineteen years' residence in the colony; because it did not appear particularly in those situations where bilious remittent fever usually prevailed during the unhealthy season of the year; because there was an evident difference in the character and type of the two diseases; because I never knew this fever terminate in intermittent, as remittent or bilious fever commonly does; and because I did not find the same mode of treatment successful in both kinds of fever." Dr. STUART goes on to remark, "that a thorough belief existed in the minds of all the medical gentlemen in Grenada that the malady was infectious," one only, and he merely *at first*, doubting this property; that he himself and several other medical men contracted the disease in their attendance on the sick; and "that the malady, in his decided opinion, was propagated by visiting infected apartments, or by the near approach to, or contact of, people labouring under it." (See Dr. CHISHOLM's *Letter to Dr. HAYGARTH*, p. 24.) Dr. GORDON, of St. Croix, government physician to the Danish West India Islands, concludes his remarks on the malignant pestilential fever prevalent in these islands and in North America near the close of the last century, by stating his belief in the importation and diffusion of infection, "by ignorance, perversity, selfishness, or the abstraction of the sentiment of public good; by the abuse of all preventive measures in the promotion of the speculations of cupidity and the calculations of venal men; by the prostration of truth and humanity, and the eluding the laws of quarantine."

83. Dr. DANCER, of Jamaica, after a close examination of the opinion emitted respecting the malignant pestilence of 1793–6, states most decidedly "that it is an imported disease, and is communicable by contagion." He adds, "that it has no apparent connexion with local causes; that it has appeared in the healthiest seasons and localities, and has prevailed least in unhealthy and marshy places."

84. b. Dr. CHARLTON, president of the Medical Society of New-York, states, in a letter to Dr. HOSACK, of the 9th of September, 1803, "I have practiced physic in this city since the year 1762. The fevers that have usually occurred in summer and autumn during this period were intermittent, bilious remittent, and nervous or typhous fevers. I never saw a case of yellow fever in the course of my practice before the year 1793." He adds, that he always considered the yellow fever as "a disease of foreign origin;" and that he "never met with a case of it in the country but which could be clearly traced to infection from the city."



85. Dr. S. BARD, who commenced practice in New-York in 1766, remarks that, although he observed hospital and jail fevers there during the revolutionary war, he never saw a case of true yellow fever until 1795; that he considers it a distinct idiopathic disease, and not a variety or grade of any other; and that he believes it to have been an imported malady. Dr. HOSACK states that Dr. LEDYARD at first believed this pestilence, as it appeared at New-York, was generated in the place; but subsequently had reason to change his belief, as all his observations at the health office satisfied him that it was exclusively derived from the West Indies (p. 32).\*

86. It has been supposed that the fatal prevalence of the pestilence chiefly in cities, towns, and localities near the level or on the margin of the ocean is a proof of its origin in such situations, and that it does not admit of appearing at any considerable distance from these places; but that it would frequently be propagated through inland districts if the malady possessed infectious properties. The truth, however, is, that it has not unfrequently been conveyed to places around, and inland, from the sea-ports where it broke out and prevailed in Africa, America, and the south and east of Spain. Dr. STRATTON met with numerous instances of the propagation of the pestilence, when it appeared at Philadelphia in 1797 and 1798, to persons residing at considerable distances, and who had not visited the locality in which it prevailed. Thus he states that twenty-seven persons had retired from Philadelphia and Washington with the disease, and fifteen received the infection by communicating with them. "One young lady fled from Wilmington into New Jersey, was attacked about a week after, and communicated the malady to her uncle, her nurse, and a young man who visited her. Two of the four died." And he adds, "there have been many instances of the pestilence being brought from Philadelphia to Jersey, and of its being communicated from the persons thus infected to others; and, if it may be thus conveyed from the former to the latter, I see no difficulty in supposing that it may be brought from some other place to Philadelphia."

87. The College of Physicians of Philadelphia, in 1798, came to the following conclusions: "1st. That the pestilential yellow fever lately prevailing in that city differs essentially from every other disease which is common to North America, and agrees in its most essential symptoms with what is called the yellow fever in the West Indies. 2d. That it has been regularly traced to the vicinity of some vessel or vessels from the West Indies, or to persons or clothing connected with them. 3d. That the principal peculiarities of this fever are its contagious nature, the progress of the symptoms, and the mortality consequent on it.

\* The statistics of our quarantine establishment at Staten Island have an important bearing on the subject of the infectious character of yellow fever. From the year 1806 to 1844 inclusive, there were 101 arrivals of sickly vessels at quarantine, that is, of vessels on board of which there had been one or more cases of the fever. 155 cases of the disease were introduced from these vessels into the hospital, and 174 sailors or passengers sickened after their arrival. Of those who communicated with the vessels from on shore, 31 sickened, and five only who had no communication with them. Of the total number, 399, 179 were cured, and 150 died.]

4th. That to prove the contagious nature of this disease would be equally useless as to prove the contagion of the plague. 5th. That, in all their observation and practice, they know of no case where the autumnal bilious remittents of the country have proved contagious. 6th. That, although these are sometimes attended by violent and dangerous symptoms, this striking characteristic of contagion being always absent, they never become an object of public dread or concern." Preceding these conclusions, these physicians put the following pertinent questions: "Where do we see the first appearance of this pestilential fever? Is it among the marshes to the southward of our city, or in the neighbourhood of our wharfs? Is it in the confined alleys, or on the salubrious banks of the Delaware at Kensington? Is it not always near those places where vessels from foreign countries are found? Do the fevers common to the country steal on insensibly, infecting one person after another in a family and in a neighbourhood? Are they equally severe in seasons so opposite as in 1797 and 1798?" They likewise remark, "that very erroneous opinions have arisen from confounding this pestilential fever with the malignant remittents of the West Indies and America;" and they further subjoin proofs of the importation of the infection in 1798.

88. Dr. BANCROFT insinuates that Sir W. PYM had formed his ideas as to this pestilence from the accounts furnished by Dr. CHISHOLM, of its introduction into Grenada. Sir W. PYM, however, witnessed its appearance in Martinique in 1794, before he had even heard of Dr. CHISHOLM; and his extensive experience of it in the West Indies fully confirmed this physician's account of it. Indeed, when Dr. BANCROFT first wrote upon this distemper, it is even doubtful whether or not he had ever encountered it, or seen any other fever than the remittents of warm climates, which he had confounded with it; at any rate, his experience of it was very limited. Sir W. PYM's account of his experience of this pestilence, both in his own person and in the several armies and expeditions with which he served in the West Indies, conveys the strongest internal evidence of his thorough knowledge of the origin and nature of it. Of his later experience in Spain and the Mediterranean, and of the successful measures which were on several occasions adopted in order to extinguish this calamity, it is unnecessary here to speak, as they will partly appear in the sequel.

89. Sir W. PYM distinctly states that, when this malady broke out in the islands where he served, in 1794 and 1795, other physicians, both English and French, considered it distinct from the endemic of the country. He mentions, respecting one of these isles, that it originated in three companies of the 70th regiment, quartered in bomb-proof barracks, and extended from them to men in hospital with other complaints, and, in succession, to the surgeon and hospital attendants. It next invaded the troops quartered in more elevated situations in the same fortification; while the only persons in the town of Fort Royal that suffered from the distemper were officers who had joined the mess or visited the sick officers of the 70th regiment. Sir W. PYM advised the

men to be encamped on an elevated and airy place at a distance from the town; and in a few days the malady disappeared from the camp, and the regiment continued free from it until the arrival of convalescents from the hospital with their blankets and knapsacks, which, having been distributed among the different companies, communicated the pestilence so very generally that, in a very short time, none escaped it but those officers who either had it very slightly, or had resided some years in the West Indies.

90. This was the first regiment which had suffered from this distemper in that campaign; but the infliction was viewed as a seasoning fever by some; as the endemic of the country, aggravated by fatigue, by others; as the result of malaria, or of any thing else under the sun, excepting what it really was, by many. The few who entertained correct views were disregarded, and were not in positions to procure attention from ignorant superiors, and the results were exactly what might have been anticipated. The distemper extended, "and soon ran through every corps that had arrived from England, and even through the regiments that had been some years in the West Indies; with this difference, that the last-mentioned suffered a smaller mortality." Nevertheless, the total loss of the army, in the course of a few months, was not less than 6000 men. "The inhabitants, also, suffered severely; but the mortality was small among the natives and those long resident in the island; but the newly-arrived, sea-faring persons, and men belonging to transports, suffered in as great a proportion as the military." He adds, that people of colour also suffered from fevers, but in a much slighter degree, and less dangerous form. "During 1794 and 1795, re-enforcements continued to arrive, and, from occupying the same barracks and quarters with the troops which had suffered from the disease, the contagion was frequently communicated to them immediately upon their arrival, and there were many instances of officers and men not surviving a week after debarkation."

91. The opinions of several physicians are adduced by Dr. BANCROFT in favour of the non-infectious nature of this pestilence; but, upon referring to them, it will be found that they actually support a very opposite doctrine; and that their ideas, as to a non-infectious character, had reference entirely to the remittent endemics of which they were treating, and not to epidemic yellow fever—a piece of sophistry of the most dishonest and contemptible kind. Thus Dr. GILLESPIE, who is thus misrepresented by this author, and adduced by him as an evidence against infection, states that "infection could in many instances be traced, and appeared to operate as well through the medium of terror as that of the *effluvia emitted from the bedding and persons of the patients*. Of this a melancholy instance happened in an armed sloop, into which a draft of about fifty men had been judiciously sent to cruise, and thereby to be preserved from sickness; but the *contagion having been carried on board* previously to her sailing, and being destitute of medical aid, the men were attacked in succession, and three fourths of them died;" while in other armed vessels in which similar drafts had been sent

with the same intention, the people continued in good health. Dr. PASCALIS, who is also quoted by Dr. BANCROFT in favour of non-contagion, states as follows: "It has appeared to me, as well as to many practitioners, that a considerable number of the cases could not be traced *but to a contagious power of the fever itself*: such were the cases of whole families, who seemed preserved as long as they had no patient in their houses, and who all perished or were sick, without exception, as soon as they admitted among them any one affected with the disease. This deplorable effect has been seen in the most wholesome parts of the town (Philadelphia), and at any period of the season; so that, in many instances, where the disease seemed most universal, by care and precaution, people were preserved; while in the country they fell victims to their unre-served intercourse with patients when the epidemic was fast decreasing in every part of the town." Dr. LEMPRIERE, another of Dr. BANCROFT'S authorities, testifies, in opposition to the special pleadings of this writer, that "he could not admit a doubt in his own mind of the disease being of a contagious nature;" and M. GILBERT adds, that "he cannot deny that the malady may be communicated by the expired air, or by the contact of matters impregnated by the miasms exhaled from those affected."

92. Of the several outbreaks of this pestilence in the United States, it is unnecessary to state more than has been already advanced, especially as the details connected with one of them are in every respect similar to those of the rest, as well as to those connected with the appearance of the distemper in Europe. The localities in which the malady first broke out in North America have been viewed as the sources from which it emanated, independently of importation or infection, by those who argue against this property, and who consequently consider it incapable of being thus propagated or imported; and, however small the grounds furnished them for believing that these localities were or are capable of furnishing the exhalations, miasmatic or terrestrial, or however denominated, still they contended that it acknowledged this and no other source—that it was propagated by the air of the locality, contaminated by exhalations from the soil and matters covering or existing in that soil, and not by emanations proceeding directly from the bodies of the sick, or imbibed by substances capable of retaining them for a time and afterward imparting them to the surrounding air. That the distemper, however, appeared in various places in that country where no evidence of terrestrial exhalation could be produced, and even where the presumption of such having ever existed seemed absurd, unless, indeed, it can be credited that a specific flatus or gaseous poison may be exhaled at certain particular parts of the earth's surface, without affecting the senses in a perceptible manner, or all who may be within its sphere, and produce a certain specific effect, identical in every respect, on all occasions, and in all quarters of the globe. However gross and absurd this assumption may appear, it actually forms the base upon which the non-infectionists found their doctrine. If the truth of this doctrine be for a moment conceded, it necessarily follows



that this terrestrial exhalation or poison may proceed from any situation, soil, or place, without reference to physical condition or geological formation, seeing that its specific effects have appeared in all kinds of locality whenever the range of temperature favoured their evolution. The yellow, or hæmagastric, fever broke out in September, 1811, at Perth Amboy, in New Jersey, U. S., a town and surrounding country presenting none of the endemic sources of disease, but holding frequent communication with the West Indies. On this occasion, the Board of Health at New-York, consisting of several of the most eminent men and physicians of that city, recommended the mayor to issue his proclamation interdicting all communication between the city of Amboy and the city of New-York; and to appoint a committee to inquire respecting the malignant and infectious fever which had appeared in the former city. Dr. MANNING, physician in Amboy, reported to the committee that it was the pestilential yellow fever; that "there was but one opinion with either the inhabitants or physicians as to its origin, namely, that it was derived from some of the West India vessels which had been lying at the wharfs; and that the brig Ocean, from St. Bartholomew's, and the ship Favourite, from the Havana, lying alongside of the Ocean, were generally supposed by the inhabitants to have introduced it." He stated that there were no local causes to which this calamity could possibly be referred; that the city is very elevated; the soil chiefly composed of sand; free from all lodgments of water; the streets wide; and the houses for the most part spacious; and that the whole town exhibited an uncommon degree of cleanliness. He further reported that the citizens were so perfectly convinced that the fever was imported in the vessels at the wharfs, that they were removed to the stream; and that the persons first attacked were frequently on board of the vessels above named. The committee, after visiting Amboy, reported, "that other persons taken ill had been exposed either directly by being on board the vessels, or by visiting those who were ill of the disease." About this time, also, the Board of Health of Philadelphia issued a proclamation, prohibiting all communication between Amboy and the city and county of Philadelphia, on account of a pestilential disease prevailing in the former city, and imposing a quarantine of fourteen days on all persons after leaving Amboy, before they could be admitted into Philadelphia.

[In 1820, Dr. Beck, of this city, was sent by the Board of Health of New-York to Middletown, Conn., to investigate the nature and origin of a malignant fever which had prevailed in that place to some extent, and which was reputed to be yellow fever. Dr. Beck reports that thirteen cases had occurred in that city, seven of which proved fatal. The disease was pronounced to be unequivocal yellow fever, and to have been introduced by the brig Sea Island, from the West Indies, on board of which three persons had died of the disease. Dr. B. states that, in his opinion, the existence of the disease was owing to the presence of this vessel. (*Hosack's Med. Essays*, vol. ii., p. 61.)]

93. *c.* Of the earlier occurrences of this pestilence in the *south of Europe*, but imperfect information has been furnished. It appeared in Lisbon in 1723, black vomitings being the most prevailing and fatal symptom. Dr. KENNEDY, physician to the English factory there, states "that it was very contagious in the lower parts of the city, going through a family, and very few families escaping," especially in the ill-ventilated streets. It showed itself at Cadiz in 1764, and did not again appear in that city until 1800. A vessel arrived there in August of that year from the West Indies, and on board of her some persons had died of the yellow fever on the passage. After her arrival at Cadiz, the whole crew, passengers, and pilot were landed, and died of the disease. The infection rapidly spread throughout the city, and extended to several neighbouring and inland towns.

94. This pestilence appeared at Malaga\* in 1803. The governor of that city informed his relative, the consul-general of Spain in London, that it was brought there by a French ship from the West Indies. After disappearing during the winter, it reappeared in the following summer. In this year, 1804, it spread from Gibraltar to Cadiz, and to several parts of the Mediterranean, to Leghorn and St. Lucar. Sir W. PYM, then superintendent of quarantine at Gibraltar, met with one case of the distemper in this fortress in 1803; and, as Dr. HENNEY remarks, this may not have been the only case; for many attempts were made to impose upon the authorities and keep them in ignorance, and the malady was at that time prevailing at Cadiz and Malaga, cities not far removed from Gibraltar.†

\* The introduction of the pestilence into Malaga in 1803 is stated by Dr. AREJULA to have commenced in the house of C. Verduras, a noted smuggler, who had brought from one of the vessels in the bay, and secretly conveyed to his house, a person labouring under a disease of which he soon afterward died. It was subsequently discovered that the body was privately buried in the adjoining church of St. Peter. On the 26th of August, and next three days, the son of the smuggler and two other men, associates of his, were attacked, and two died. Soon after the death of the son, on the 3d of September, his mother and two sisters sickened with the same symptoms, according to the report of the physician. Verduras the father died on the 15th of September, and his daughter and another son, who also had been attacked, died on the 19th. While the distemper was thus running through this family, persons adjoining and friends of the family were seized, the malady spreading gradually from this house and locality. Dr. AREJULA states that the person who was secretly landed and died in Verduras's house was buried by and with the connivance of the curate, who was himself taken ill a few days afterward, and died, together with the physician who attended him; "and in like manner, every person connected with the curate's family was taken ill and died; even the sacristan and his wife, as well as the boy who attended the priest at the altar." Those, also, who entered the Church of St. Peter, where this person was buried, to hear mass on St. Michael's day, were all taken ill, and a great part of them died. This church was, therefore, shut up, and continued closed until December, 1805, when Dr. AREJULA entered it, and directed the fumigation of it. The account furnished by this physician was confirmed by the researches of Sir J. F. ELLOWES, who obtained the same information as he had obtained, and traced the distemper to the same source.

† The facts connected with the introduction of the pestilence into Gibraltar in 1804 are thus stated by Sir JAMES FELLOWES: "From the confession of Santos, the person first attacked, and from the oath of a respectable witness, it appeared that Santos had recently left an infected house at Cadiz; that he had been three times in company with a person actually labouring under the disease on the 23d and 24th of August; that he arrived at Gibraltar on the 25th, was taken ill on the 26th, and was seen by a French practitioner, Mr. JARO, on the 27th, and that in less than eight days after his being attacked, his mother, two aunts, one

95. The deaths among the military and their families during the two preceding years were 35 in 1802, and 56 in 1803; but in the last four months of 1804 the deaths were as follow, from this pestilence: Officers, 54; soldiers, 864; soldiers' wives and children, 164; civilians, 4864; being altogether 5949. Dr. NOOTH and several surgeons, both military and naval, believed that this pestilence, which had thus in four months carried off nearly half the population, to have been local as to origin, and non-infectious; while Sir W. PYM and Sir J. FELLOWES, and the surgeon of the artillery, gave their decided opinions that it was highly infectious, and that it had been introduced from abroad. But the scientific and experienced reader—especially if he have ever seen cases of this pestilence—will be much surprised, and at once know how to estimate Dr. NOOTH's opinions on these topics, when he reads in that physician's first official report that he considered the fever "as decidedly inflammatory as it possibly could be;" that he believed many of the medical officers to have lost their senses for believing the malady contagious and of a putrid character; that he laboured to convince the public that there was nothing to be dreaded from a communication with the sick; and that he (evidently then a stranger to the malady!) dictated peremptorily to the medical officers below him (for, most unfortunately for thousands, he was at the head of the medical department) the mode of treatment they ought to pursue. In his *second* official report something of the results of these hastily-formed opinions and measures becomes apparent; for he states the losses in certain corps to have been "enormous," and, among the inhabitants, the ravages of the distemper "as beyond description terrible." He, moreover, now begins to waver as to the source of the malady, and either gives very opposite opinions, or is altogether ignorant of the meaning of the terms which he employs. Thus, after stating that he had himself "contracted the fever in that focus of contagion," he adds that "the disease by no means seems to be infectious, but the whole atmosphere on the rock is pestiferous; and I am inclined to think that, in addition to the ordinary causes of contagion, we may consider a large limekiln in the upper part of the town as aid and part in the general mischief!" And this is Dr. BANCROFT's great authority for the local and marsh origin of this pestilence, and for its non-infectious nature! The whole of the four letters to the surgeon-general written by this physician—this infliction on the profession and the military service—abounds with similar drivellings and peculiarities. How admirably successful his endeavours to restore "the lost senses" of his "weaker brothers in medicine!" and "to convince the public that nothing was to be dreaded from communication with

the sick," must have proved, may be inferred from the fact that, out of the civil population of this important fortress, amounting to nearly 14,000, only twenty-eight escaped an attack of the pestilence, and twelve of these had previously been affected either in the West Indies or in other parts of Spain. Fortunately for this place, at the height of a sanguinary war, Sir W. PYM and Sir J. FELLOWES arrived to save 1200 of the soldiers, by segregation, from an attack of the distemper. Mr. KENNING, surgeon to the royal artillery in this fortress, published a detailed account of the introduction and subsequent progress of the pestilence; and Mr. BURD, who was at the head of the medical department of the navy, wrote officially to Lord NELSON commanding the fleet, cautioning him against communication with ships from Gibraltar. But, although Dr. NOOTH's "*weaker brothers in medicine*" were bound to obey their superior officer, as to his measures, they were not constrained to conform to his opinions.

96. Although this pestilence had appeared several times at Cadiz, after long intervals, and at Malaga, places only about forty or fifty miles east and west of Gibraltar, when it might have been inferred that this fortress could not have escaped if the cause of the mischief had existed in the atmosphere, and that no police or quarantine regulations could have excluded it; yet we find that this place, as well as many adjoining places in Spain, had escaped up to 1804, owing to such regulation in parts, if not altogether. Measures of purification were adopted after the subsidence of this epidemic, and proved successful, so that the garrison enjoyed perfect health from that time until 1810. In this year the pestilence ravaged Cadiz\* and Carthage; and during its prevalence there, four transports from the latter port, two of them having on board deserters from the French army, anchored in the bay of Gibraltar. Sir W. PYM put them in quarantine, and the distemper appeared in all of them in a few days. He instituted measures for the separa-

\* In September, 1810, the harbour of Cadiz was crowded with ships from several ports of Europe and America, and several regiments of British troops were in the town. On the 11th the physician to the Board of Health discovered some persons with fever similar to that of 1800 and 1804; and it appeared from the reports that this malady was infectious, having spread gradually in the quarter where it broke out, four out of five of the first family attacked having died, the only surviving individual not having been seized; and it having been ascertained that he had passed through the disease in 1800. Sir J. FELLOWES communicated this information to the British authorities; and measures, such as the circumstances of affairs allowed, were adopted to preserve the health of the army and of the crews of British ships; but these precautions, owing to various circumstances, could not be sufficiently enforced. The British troops, however, continued free from the disease, although it surrounded them until the end of October. Dr. SNOW, physician to the army, in his official report states, that, "as far as his experience extends, and from all the information he has been able to collect, he thinks this disease contagious; and that nothing but the very active measures which were taken to check it in the beginning could have prevented its destructive influence from being more severely felt by the troops." Dr. PLENDERLEATH, physician to the forces, had charge of the hospital at the hospicio at Cadiz, and he reports that the fever then prevailing was identical with that of 1800 and 1804; that it was violently contagious; and that the dangerous consequences to the army were prevented by the timely precautionary measures adopted; the army having lost only 25 men, although upward of 4000 were carried off by it from among the inhabitants. The Spanish physicians also believed the disease to be contagious, and imported.

brother, and two sisters, all residing in the house, were also seized with a disease of a similar nature" (p. 103). "The malady spread from the house of Santos to the adjoining buildings, while the rest of the garrison were totally exempt from it. For several days the distemper was confined to the range of buildings to which it had been traced, and where Santos lived; and it was observed to make a gradual progress among the different families who resided there, and to spread to the sheds in the neighbourhood." The farther progress of the distemper to the military as well as civilians may be learned in Sir JAMES's work. (See p. 104, et seq.)



tion of the healthy, and for preventing communication with the fortress. Notwithstanding these, the disease appeared on shore; but a strict supervision was instituted, and the sick were separated from the healthy, and removed to the neutral ground. A cordon of troops was placed around the infected part, and proper persons appointed to superintend the purification of houses, furniture, &c., and to report the appearance of the distemper. Owing to these measures, the pestilence was arrested before it had infected many in the fortress. In 1804 the infectious nature of the distemper was denied by the head of the medical department, and communication with the sick encouraged, and nearly all were infected, and nearly one half died. In 1810 the infectious character was recognised, the infected were segregated and removed to an airy locality, communication with these was prevented, the healthy protected, and the mischief was very soon arrested.

97. In 1813 the disease again made its appearance, and its commencement and progress were described by Dr. GILPIN and Mr. FRASER, deputy inspector of hospitals. The persons who brought the pestilence into the garrison were ascertained. One of them was ill when he arrived, and he communicated the distemper to those residing in the same house; thence it extended to both sides of the street in which the house was situated. All escaped who cut off communication with the infected. Of 500 persons confined to the dockyard, not one instance of infection occurred, although this was the spot most likely to be productive of terrestrial effluvia, and that suffered the most in 1804, owing to communication having been then unrestricted. When the pestilence appeared there were about 5000 persons within the walls who had been subjects of it at a former period; and, after a careful inquiry, there did not appear to be one well-authenticated case of a person having been infected a second time, at the termination of the epidemic. At its commencement nearly 8000 persons left the garrison, the greater part of them encamping upon the neutral ground. Very few cases occurred among them, and these chiefly after their emigration, and from previous infection. The strong breezes and current of air in this place were expected to prevent the accumulation and concentration of infectious effluvia, especially in tents, and, consequently, to arrest the progress of the malady; and the results proved the correctness of the inference.

98. In August, 1811, the disease appeared at Carthagea, and Mr. VANCE, who had been infected by it in the West Indies, was sent to that city to report respecting it. He stated that it had not been confined to any particular part of the town, and that no persons were exempted from it but those who had been previously affected by it. He, however, mentions the important facts, that bilious remittent fever, which has been so frequently confounded with this distemper, also prevailed at this place, and that many soldiers were in the Royal Hospital labouring under the jail fever. Mr. VANCE imputed the appearance of the malady in Carthagea this year to the general neglect of destroying the bedding, clothes, &c., of those who had died of it during the previous autumn, the infection lying dormant during the cold

weather, and until called into activity by the summer's heat. He farther states, that the malady was introduced into Murcia, where it became destructive, by refugees from Carthagea, and that these cities had been placed in quarantine by the Spanish authorities.

99. Of the hæmagastric pestilence that has appeared on several occasions in Gibraltar and other parts of Spain, and has created so much interest and controversy, it may farther be remarked, that much additional information to that already furnished by Sir W. PYM, Dr. GILPIN, and Sir J. FELLOWES has been adduced by Dr. HENNEN, Mr. REDMOND, Mr. FRASER, &c., and by the reports of the several commissions sent to inquire into the nature and source of the outbreaks of this pestilence in the south of Spain and Barcelona. And it may be premised, that the several epidemic manifestations of it which have occurred in the West Indies, in the ports of the United States, in Africa, and in several places in Spain, being admitted to have been identical as to nature, it necessarily follows that the evidence as to its source and propagation in one locality or epidemic equally applies to all other localities and epidemics. Mr. REDMOND states, in his letter to Sir W. PYM, that the fever under which the 54th regiment suffered in Gibraltar in 1804, and again in Jamaica in 1808, was the same disease, and that it was infectious on both occasions. Of this he adduces the most convincing proofs. He notices the circumstances of the fever having been introduced by infection into the regiment in Jamaica in 1808; that it infected all who had not previously been attacked by it; that, in a few weeks, his two assistants, and twenty out of twenty-one hospital attendants, were infected; and that none of those who had had the disease in Gibraltar were attacked in Jamaica.

100. In the reports made by order of the governor as to the first appearance of the pestilence in the fortress, Mr. KENNEDY, who recognised its nature, and watched its progress from the commencement, adduces the following evidence: At the beginning of September of 1804 the distemper appeared in the vicinity of Boyd's Buildings; and a bombardier and his wife, residing next door to the house of the person Santos, said to have imported the malady from Cadiz, where it then prevailed, and who was then labouring under it, were the first attacked in the artillery. Those who visited the bombardier and his wife were the first taken ill in that corps; and that part of the corps quartered nearest to their residence was the most unhealthy. Mr. REDMOND, surgeon of the 54th regiment, traced the disease from man to man, and reports as follows: Whenever a man was admitted into hospital his comrade or bed-fellow soon followed. When an officer was affected, the servant was also affected; the same could be said of husband and wife. Of twenty-six persons employed as the hospital servants of this regiment, not one escaped. When officers and families in this corps avoided communication no disease appeared, but the moment they neglected this precaution they were no longer safe. Two families lived in seclusion at Europa, and escaped until, on the setting in of the rains in November, they returned to town, when the

whole were attacked, excepting one who had been in the West Indies.

101. Dr. HENNEN states the following demonstrative and undeniable facts: 1st. The deaths among the military in Gibraltar on the 1st of October, 1804, were upward of 130; and among them the garrison chaplain, who was attacked three days after attending a woman in her last moments. The five persons who carried the body to the grave were attacked on the fourth day, together with eight others who attended the funeral. Colonel FYERS, who at first had considered the malady non-contagious, was induced by these proofs of infection to change his opinion. He removed his family, consisting of fourteen in number, to Europa, established a strict quarantine, and they all escaped; while De ROLLE's regiment, who were encamped within forty yards of them, but not prevented from communication with the inhabitants and the rest of the troops, had no less than 442 cases out of a strength of 635, the mortality being 197. 2d. Capt. DODD's family, seven in number, and Mr. STRAITH's, three in number, lived in detached houses, and avoided all communication, the distance between the houses being 300 yards. On this intermediate space the 54th regiment was encamped. Of this regiment, consisting of 747 men, 456 were attacked, and upward of 100 died; and yet not an individual of DODD's and STRAITH's families on each side of this corps was affected.

102. It should be recollected that Dr. HENNEN was no partisan; but he adduced the facts which came officially before him at Gibraltar with praiseworthy candour. He farther states other circumstances resembling the foregoing, and remarks, "That the sole cause, therefore, could not have existed in the atmosphere breathed in common by all, whether soldier or civilian, is rendered highly probable." The following facts farther demonstrate the truth of this inference. The Spanish troops doing duty at the Lines, 3000 in number, within one mile and a quarter of the garrison, had no sick. At San Roque, five miles distant, with a population of 6000, no sickness appeared during this epidemic period at Gibraltar. At Algeiras, ten miles distant by land, and five or six across the bay, the disease appeared on the 7th of October, 1804, the prevalent opinion being that it was imported from Malaga and Cadiz. At Los Barrios, four or five miles from Algeiras, no precautions were used, and the disease extended thither and to Smeras, another small town about twenty miles distant; while at San Roque, and in the Lines opposite Gibraltar, all communication with Gibraltar, on the one hand, and with Algeiras, on the other, was completely cut off, and the distemper never appeared. Dr. HENNEN\* adds, "if these facts are not in

\* Dr. HENNEN, who was at the head of the medical department of the garrison at Gibraltar when the epidemic pestilence of 1828 broke out, and who died of the distemper at an advanced period of this epidemic, must have seen enough in the course of the early part of it to confirm his opinion as to the infectious nature of it, or to establish his belief in this property if it were previously not quite determined; for in an official communication to the military secretary of the governor, he writes as follows:

"Gibraltar, 24th Sept., 1828, 9 o'clock. Immediate.

"Sir: Nothing has yet been done about the infected bedding at the naval hospital. Pray allow me to order it over the line wall at Camp Day instantly, as much loss of life may be the consequence. The barrack master's plan of

favour of segregation and moderate quarantine, I know not what can be deemed so; at least they convey to my own mind the most perfect conviction upon these points." (P. 107.) It was stated, moreover, by Sir J. FELLOWES and by Mr. BENYON, surgeon of the 10th regiment, "that every master of a transport who had business in the house of the agent for transports, whose family was attacked with the malady, caught the fever, while all those vessels in the mole, which had no communication with the shore, escaped."

103. That the clothes and bedding of the sick will propagate the distemper is shown by the following circumstance: A quarantine encampment of those who had not passed through the fever was formed in Gibraltar on the 9th of November, 1804. These men, with the exception of the 13th regiment, took their bedding with them; but the 13th, by the precaution of their colonel, left their old dirty bedding behind, and brought clean blankets in lieu: not a man of this corps was attacked; while on the 22d of this month, five men of other corps were seized, and within the three following days every regiment, except the 13th, had men taken ill. (HENNEN, p. 40.) In whatever light this fact may be viewed, it suggests a most requisite precaution; and that such a precaution should have been neglected may be viewed as one of the many evil results arising out of the doctrine so assiduously inculcated by the heads of the medical staff on the outbreak of the pestilence (see § 95). The non-infectionists argue that the malady is not propagated by emanations from the sick, either direct or by fomites, and hence that no such precaution as the one now stated is requisite. That it was most requisite—that the neglect of it in this and on numerous occasions in America, the West Indies, Africa, and in Southern Europe, was most calamitous—even most murderous, is apparent to any reflecting mind. Ten times as many lives have been sacrificed during the last sixty years by the abettors of a most erroneous doctrine—by following the false glare of what has been ignorantly deemed the lights of science, instead of adopting the suggestions of common sense—than have been lost on the field of battle.

104. Mr. FRASER, the experienced chief medical officer at Gibraltar during the epidemic of 1813 and 1814, writes as follows: "The features of the epidemic; its course through families; the early and almost universal seizure of the medical officers, clergy, and rabbis, and of those immediately employed about the sick, if not emancipated by a previous attack; the sickening of washer-women, the good effects of seclusion, and the remarkable escapes of those who took particular precautions, led to, and finally confirmed the belief of the infectious nature of the malady." He farther states, what my own observation has confirmed, "that, of the number of medical authors who deny the contagious properties of the disease in their closets, many yield to the ineffable impression made by the immediate view of the epidemic calamity," and acknowledge the communicability of it by their fears, by their acts rather

taking it direct to the sand-pit is fraught with danger. It should be steeped in the sea for sixty hours at least before it goes to any place, when it may be mixed with other beds

(Signed) J. HENNEN, M.D."



than by their words—by “their personal manners; their care of those dear to them; the placing of their patients under observation; and the adoption of other means, which could originate solely in a latent belief of infection.”

105. Dr. AREJULA, an eminent Spanish physician, and author of a work on this pestilence, states, that “a regiment of dragoons in the centre of infected places in 1800, continued in uninterrupted good health during the whole time of the continuance of the epidemic, guarded from its dangers by the good sense and vigilance of its commanding officers, who formed a cordon from the corps itself for the protection of its own quarter.” This fact is quoted by Dr. JACKSON from Dr. AREJULA’s work, with the remark, “that it is imposing, and, if the truth of it were authenticated officially by the signature of the officer who commanded, it would go far to decide the question under discussion.” But the fact respecting the immunity of those shut into the doekyard in Gibraltar in 1813 (§ 87) is equally strong and admits of no doubt. Why does Dr. JACKSON throw doubt upon a fact stated by so respectable a physician as Dr. AREJULA is known to have been, when he might have ascertained the accuracy of it when he was at Cadiz not many years afterward? It is, however, duly credited by Mr. FRASER, who must have possessed some means of ascertaining the truth of it. Indeed, the fact does not repose upon the testimony of Dr. AREJULA alone, nor does it require the confirmation of Mr. FRASER, for it should be known that it was witnessed by the French commission sent to the south of Spain in order to investigate the nature of this epidemic, and was adduced, in the report of that commission, with many other facts, proving the introduction and infectious nature of this malady; which report is published in the original French in Sir W. FLEMING’S work on this pestilence, and ought to have been known to Dr. JACKSON\* long before he either went to the south of Spain or wrote upon this distemper, seeing that it was published both in Paris and London long previously, and again noticed by the French commission sent to Cadiz to report on the epidemic there in 1819.

106. M. PARISSET, in his report of the progress of the pestilence in Andalusia in 1819, states, that it was in all respects that of an epidemic diffused by contagion. That, having appeared at a single point, it extended itself like an in-

\* Dr. JACKSON was sent to the south of Spain in 1819 to inquire into the pestilential epidemic prevailing there at the time. He returned to England and wrote a very laboured work respecting this distemper, in which the various modifications of it, according to the temperament and habit of body, are described, with numerous arguments, pleadings, &c., against infection, now and then, however, with certain admissions, proving the opposite doctrine to that for which he argues. What reliance may be placed upon his opinion as to the matter I shall leave the reader to determine, after having read a paragraph, to which I have already referred, actually admitting the presence of infectious properties in this pestilence, and which concludes as follows: “I was indisposed myself on various occasions, never in health, though my visits to the sick were desultory and comparatively few.” (See p. 49 of his work.) This having been the case, as Dr. JACKSON admits of himself, how was he enabled to describe so fully, I cannot say so accurately, this distemper? and how came he to support a most important, but dangerous, doctrine as to the origin and nature of a pestilence, the occasions of his seeing and judging which he admits to have been “desultory and comparatively few?”

undation, and gained in succession places near its source, and progressively those more distant, respecting only such places and persons as protected themselves from communication with those already infected. Thus, appearing first in the Isle of St. Léon, it pervaded Cadiz, where no means of arresting its progress had been taken; attacking two thirds of the inhabitants, it was conveyed to Xeres and Seville. In the last named of these cities, measures were employed to arrest its diffusion, and in Xeres similar measures were adopted, but not so strenuously carried out as in Seville; and the results in both these cities were proportionate to the vigilance and promptitude with which those measures were enforced. M. PARISSET farther states, that the pestilence appeared in no town or village adjoining Cadiz, Xeres, or Seville, without previous communication with one or other of those infected cities, or with some other place already infected; that in populous towns the distemper prevailed in proportion to the freedom of communication with those primarily attacked; and that, wherever all communication was cut off in due time, no instances of the malady occurred. (PARISSET, &c., p. 64–67.) It may be mentioned that, in the case of this epidemic, as well as of others, the distemper did not appear in distinct and separate points or localities at the same time, unless communications had previously existed between those and some other places already infected. M. PARISSET goes on to remark, that in 1819, as well as in 1820, wherever the distemper appeared, it commenced in some individual who communicated it to those who waited upon or nearly approached him, and that those sickened with it either in succession or together. Thus the inhabitants of the same apartments, then those of the same house, then the adjoining houses and those opposite, then the adjoining streets, &c., were infected in succession. One quarter of a town, or street, or house, being infected, persons proceeding thence into other quarters or streets, or coming from these into the infected houses, either were themselves infected, or carried the infection with them. This able writer farther observes: “Open the work of Dr. AREJULA, a treatise founded on the most authentic documents and the most enlightened observation; read what this very eminent physician has adduced respecting the origin and progress of the malady in Cadiz in 1800; in Medina Sidonia in 1801; in Malaga in 1803 and 1804; and pass on to the appearances of it in the last year (1804) in Ronda, Antequerra, Montilla, Espejo, Rambla, and Alicante, in all which places it was introduced from Malaga; follow his recitals respecting the epidemic of Carthage in 1804, showing the transmission of the infection to Vera, by the wife and daughter of an officer who arrived at the latter place during the prevalence of the pestilence in the former, and who were taken ill soon after their arrival at Vera; the relations of them, the inhabitants of the same house and those of adjoining houses, being successively infected; peruse other facts of a similar nature adduced by this physician, and compare them with those which have occurred in Andalusia and elsewhere, and it will be impossible for the candid mind to resist the conclusion that this malady is eminently contagious

inasmuch as it rests upon evidence the most conclusive that can be offered; and upon facts as positive and incontestable as historical facts can be."

107. Don J. A. FERRARI, physician in Xeres, in his account of this pestilence as he observed it in that city, has offered some very judicious observations and recorded several important facts respecting the topics now under consideration. "Xeres," he states, "is situated at an elevation of about sixty feet above the level of the sea. It experienced the yellow fever in the years 1800, 1804, 1819, 1820, and 1821. There are no morasses, marshes, or other sources of insalubrity within its boundaries." Whence, then, did this distemper proceed in those years? If it is proved that heat alone, however excessive, cannot produce it; and if this city is free from those local causes to which it has been imputed by the anti-contagionists, no other source or cause of it proper to this city having been shown to exist, whence did it arise? It is satisfactorily proved that, in all these years, the distemper existed, previously to its appearance in Xeres, in Cadiz, Malaga, San Fernando, and Puerto Santa Maria; and Dr. FERRARI shows that Xeres was infected from these places. In order to decide the questions of importation and contagion, he remarks, "it will be necessary to prove, in the first place, the arrival of some infected person in some particular quarter, and this is precisely what I shall endeavour to demonstrate from the facts which took place in this city during the five epidemics which have been experienced in it since 1800, and which have fallen under my observation. In all these the mode of invasion has been the same. The malady had appeared in some of those towns, from which the infected person, who introduced the contagion into Xeres, had removed; as fully proved by the municipal Board of Health in this city (the evidence and documents to this effect being lodged in the library of the board); and it has uniformly happened that the fever began in that quarter only where such person had lodged." "At the time of its appearance, or before its progress had extended, the malady existed only in the quarter in which it was first seen. Confining itself to that for some days, its progress slowly increased, following the direction of the street in which it first appeared; and of the houses adjoining the first infected. When it had spread through the city its propagation increased in proportion to the great number of communications which the increase of sick occasioned; and during all these periods it was uniformly observed that the disease began with units, proceeded by tens, and concluded by hundreds. When we consider," he adds, "that the distemper has always appeared in the seacoast towns having intercourse with the West Indies, and extended itself to the adjoining towns and villages having had a communication with these, and not in those which have no such intercourse, or with which all communication has been cut off; nor with those in the centre of the peninsula, nor in any other save coast towns, although the latter may be less exposed to heat than the former; if it has been observed that its prevalence in Xeres took place only at the period when its importation could be traced; that during the time when the inter-

course was less and the navigation less common, the disease was also less frequent; and if the patient suffers the distemper only once, as in the case of the smallpox, can we doubt of its importation and contagion?"

108. Dr. FERRARI thus states the results of his observation: "1st. That the cause of pestilential yellow fever is a poisonous miasma of a peculiar kind. 2d. That this contagious poison is the effect of the union of certain causes, developed by a high range of temperature. 3d. That the high temperature is only a necessary condition, but not the exciting cause. 4th. That as, in this city (Xeres), there does not exist, nor has ever existed, that union of circumstances necessary for its production, this distemper is not spontaneous, but has been imported as often as it has been experienced. 5th. That, from its mode of invasion, communication, and propagation in this city, we are necessarily led to consider it contagious; and, 6th. That, although it is certain that contagion, and not heat alone, may reproduce this pestilence, the reproduction is neither so frequent nor so easy as is supposed."

109. This pestilence appeared in Barcelona in 1821, and extended to several places in the vicinity, and a commission was sent out by the French government, consisting of four eminent physicians, to inquire into its source and nature; and in 1823 a very detailed account of it was published by the commission, forming, perhaps, the best treatise extant on this distemper. This commission consisted of MM. BALLY, FRANCOIS, PARISSET, and MAZET, the last of whom died at Barcelona. Barcelonetta first experienced the malady, although this suburb is remarkable for its cleanliness and dryness, and soon afterward the port; these places having the most frequent intercourse with the shipping. About the end of April, 1821, many vessels left the Havana and Vera Cruz, where this pestilence was then prevailing, for several destinations; a large number proceeding to Barcelona, where they arrived about the end of June and in July. During the voyage to Europe many of the sailors died with the black vomit; their clothes and bedding being generally preserved and brought in the vessels. Notwithstanding these occurrences, free communication became established between the port and the ships, and between the ships themselves. These facts, as well as the following, were furnished by the authorities in Barcelona to the commission, but were mostly verified by it in various ways. The ship "Grand Turk" had conveyed a number of negroes from Africa to Cuba; these negroes suffered severely from malignant dysentery. Having landed them at the Havana, she departed thence for Barcelona, and arrived in sixty-one days, having lost several of her crew by yellow fever on the passage. Soon after her arrival the captain received on board his wife, children, and a servant. The whole of this family were very soon afterward taken ill, and died at Barcelonetta. The mate also entertained on board of this vessel his wife, and his wife's sister and brother. Twenty-four hours afterward his wife's sister and brother were attacked with fever, and both died with black vomit; several other persons were also seized after visiting this vessel. Now the commission assert that they went on board this



vessel and heard these facts stated by the captain and mate; and they, moreover, furnish farther details of the infection conveyed in other vessels which arrived either about the same time as this or soon afterward, and communicated to persons holding intercourse with them; and of the various circumstances which occurred in connection with the appearance of the pestilence in the city, all tending to explain the rapid extension of it, and the very inefficient measures taken to restrain its progress. It is impossible for me to advert to the numerous facts and circumstances bearing on the topics under discussion adduced by this commission. They may be perused in detail in their able work. From these they contend, 1st. That the pestilence which desolated Barcelona and several places in the vicinity in 1821 is the same distemper as the malignant yellow fever of the West Indies, and as the epidemics which have desolated the south of Spain at various periods since 1800. 2d. This pestilence is eminently contagious. 3d. That it was imported into Barcelona by the vessels which left the Havana on the 28th of April, 1821, and soon afterward. 4th. That the germs of this distemper conveyed by these vessels reside either in those actually sick of it, or in their clothes and bedding or other effects similarly contaminated, or in the air respired in these vessels by those visiting them.

110. Now these facts have surely either been unknown to, or, if known, entirely suppressed by Dr. O'HALLORAN, who has professed to give an account of the Barcelona epidemic, and who has espoused the doctrine of local origin and non-infection. This writer states that persons sickened of the pestilence who observed the strictest seclusion; and that the attendants on the sick, the nurses in the hospitals, and the washers of clothes and bedding "generally escaped the impression of the malady." Notwithstanding this most unblushing assertion, the facts, as verified by official documents and by medical men of high character, are of the most opposite description; namely, that very few of the nurses and attendants on the sick escaped; that next to these confessors and priests in attendance on the sick were most frequently attacked; and next to them medical men. Thus the Capuchins were constantly engaged in assisting and confessing the sick, and their whole number, sixty-three, were infected, and twenty died; and, so far from his assertion being correct as to the failure of seclusion, I may state that the evidence of its success is the most complete. The following convents, the Capuchins, Los Angeles, Santa Theresa, San Juan de Jerusalem, the Hieronymites, and the Carmelites, observed the strictest seclusion, and not one of them had a single inmate infected; while all the other convents which communicated with the city had the greater number of the sisters attacked. Thus the Magdalen, consisting of fifteen sisters, lost ten, all having been infected. The sisters of Jerusalem, consisting of twenty-eight, had eleven deaths, and the others in nearly the same proportions. The French commission state that at least twenty-two physicians and surgeons died at Barcelona of the pestilence, besides medical pupils, assistants, and apothecaries. In the military hospital almost none

of the assistants to the physicians and surgeons escaped the disease, and many of them died. One of the members of the commission stated, that the great mortality among the medical men at Barcelona was an illustration of what he had witnessed during the epidemic yellow fever of St. Domingo in 1802, which carried off, in eighteen months, 206 physicians and officers of health.

111. In consequence of a decree of the Cortes of the 13th of December, 1821, requiring the authorities of Cadiz, Malaga, Barcelona, and the principal cities which suffered from the hæmagastric pestilence to consult the scientific bodies, and the most celebrated physicians, regarding the existence of contagion, medical juntas were formed in these cities and several other places; and all these convocations decided that this distemper is unquestionably contagious; that it is exotic and imported; and that the best means of preserving the country from its ravages is the establishment of regulations which may prevent the entrance of the pestilential infection.

112. It is of the utmost importance to the community, as well in temperate countries as in tropical regions, that the subject so long agitated as to the nature of this pestilence, should be put to rest. The questions, as to the origin and diffusion of it, have been explained in so different, and even so opposite a manner, during the early part of this century, and discussed so frequently and so variously—in a calm and philosophic temper by a few, with intemperance and an incoherent want of argument by many, with manifest ignorance of the subject and even of the language in which they wrote, by not a few—that they have been received as matters of the utmost doubt and uncertainty by those who have mere authority only to guide them to a just conclusion, without having suffered that experience and toiled in that field which might have enabled them to judge for themselves. Much that has been written upon the subjects embraced by the questions at issue has tended to mystify, rather than to enlighten; to involve in utter confusion when attempting to explain what was already clear and unmistakable; and to gloss with a false science what was manifest to common sense. Let the writings of the apostles of non-infection, especially as regards this distemper, be adverted to, and the mode in which they handle a very simple question be considered. In our simplicity we believe that, when one subject becomes infected with smallpox, or measles, or scarlet fever a short time after having been near to one or more persons already affected by either of these maladies, the infection has been communicated by these persons, whether the disease in question be epidemic at the time or not; and that, when persons who have recently experienced either of those maladies, or when the clothes of some one who has recently died of it, have been conveyed into places where the disease did not then exist, but where it soon afterward broke out and prevailed, the infection of that particular malady was actually introduced. Now, observing these occurrences so frequently as to become familiar in respect of these distempers, and knowing that occurrences identical with these in every particular have taken place in regard to this pestilence

can we be so blinded by a false doctrine or by prejudice as not to infer that the latter belongs to the same category as the former—that the one is infectious as well as the other; more especially when, like them, it attacks the same frame only once, as long since stated by many observers, and now satisfactorily determined and admitted? But the enlightened observers of what is going on in the “bowels of the earth” consider this view of a scientific subject too common-place for their credence, and see it otherwise; and, in one sense of the word, although not in that which they would attach to it, much more profoundly. They either avoid allusion to this mode of communication altogether, or endeavour to explain it conformably with what they would term scientific views; and in place of what is based on incontrovertible evidence—upon what is palpable and unmistakable—they substitute hypothesis and mystery, and adduce vague and unintelligible explanations to veil what is manifest, and to prevent the adoption of measures which alone can protect the lives of thousands, however they may for a time affect the pecuniary interests of the few—of the speculator and the capitalist, the modern curses of the general community. With no other object than the promulgation of truth, the surest basis of national prosperity, as it is of all human science, I proceed to notice the last appearance of this pestilence in Gibraltar, respecting which the closest inquiries have been instituted both by a board of British officers and by a commission of physicians sent by the French government; and I shall adduce nothing but what has been satisfactorily proved by the most irrefragable evidence.

113. By the official returns there arrived at Gibraltar between the 1st of June and 1st of September, 1828, several vessels from Cuba and ports of Spanish South America, on board which at least ten deaths occurred during the passage. The ships more especially suspected were the *Meta*, the *Hyperion*, and the *Dydden*. They had come direct from Cuba and the Havana; having been from forty-six to fifty-four days on the passage. Shortly before leaving the Havana, where this pestilence was then raging, the *Dydden* lost four or five of her crew by the distemper; and at least one of the men engaged to supply their places came directly from the hospital, where he had laboured under this malady. During her passage to Gibraltar of forty-six days, nine persons were ill, and two died. This vessel was put in quarantine; but the quarantine appears not to have been rigidly enforced; for, during its continuance, she was visited by smugglers; and at its termination, if not before, dirty clothes were landed to be washed; and two sailors were admitted into the civil hospital from this vessel evidently ill of this distemper, although it was either not recognised, or not entered in the books of the hospital as such, by the medical attendants. From the smuggler and washer-woman, to whom the foul clothes were sent, and from their families, the disease spread; and to them, as well as to others who held communication with the importers of infection, it was traced much more correctly than it could be possible to trace the early progress of an epidemic of smallpox or scarlet fever, the infectious nature of which is undisputed.

114. It was satisfactorily proved to the boards of inquiry and to the French commission, as shown by their reports, that, in addition to these facts, the mate of the ship was ill while in quarantine, and not reported to the inspector; that one of the men who went on board to assist in navigating her to Cadiz was taken ill a few days afterward; that the clothes of the men who died on board this ship were sold to sailors who landed from her about the 6th of August while at Gibraltar; that the sister of a sailor who had landed from this vessel, and who had had the black vomit fever in the Havana immediately before he embarked from that place for Gibraltar, received a bag of foul clothes belonging to that sailor, and fell sick on the 20th of August; that the health guard, Teste, who was placed on board this ship on the 27th of July, declared to several persons that she brought the yellow fever to this garrison; that the sister of this health guard, who, on the 11th of August, assisted to wash his clothes, which he brought from this ship, fell sick on the 21st; that the first persons attacked were the connexions of sailors and health guards, and persons who had recently been on board ships, and washer-women; and that the ship *Dydden* was admitted to *Pratique* on the 6th of August, and the first case of the pestilence occurred on the 12th of the same month. It cannot be disputed that, when the sailors of this ship landed at Gibraltar with the clothes of the men who had died of this distemper on board her, all the collateral circumstances favourable to the propagation of it were present, namely, the sultry calm of a southern autumn; the peculiarly sheltered, unagitated, and humid state of the atmosphere at this season; the steady high range of the thermometer, and the abundance of subjects liable to receive infection from not having experienced the protecting influence of a previous attack. From the above evidence; from the circumstance of this fever being identical with the black vomit fever of the West Indies, and with the epidemic fever, which have committed such ravages in this garrison and in the south of Spain at different periods; from the fact that it is essentially different from every fever indigenous in any part of Europe in its mode of attack, its symptoms, its duration, its consequences, and its anatomical characters; and, above all, from its affecting the same individual only once during life, it was rationally inferred that this malady was imported, and was not of local origin.

115. These inferences were further supported by the considerations: 1st. That not one case of fever identical with this pestilence had occurred in Gibraltar within the thirteen years preceding 1828, excepting four, which occurred in lightermen and Jews who had been in the habit of having intercourse with West India ships; although it is presumable that during that period all the physical causes inherent in the place, and capable of generating disease, had been in as full action as at the breaking out of the epidemic; and although the population was more dense, and the houses less commodious during these years than in 1828, as proved by undoubted evidence. 2d. That there was no evidence to show that there is any source of malaria within the Gibraltar territory, or that the effluvia arising from drains, even when they



were most offensive, had any share in producing the distemper. The general conclusion, that this pestilence was imported into Gibraltar in 1828, and that it was afterward propagated by direct communication, and by means of the clothes of persons affected by it, is conformable with facts observed in numerous other places, and with the results of enlightened observation and rational reflection, with the dictates of good common sense.

116. Dr. JACKSON, in his work on this pestilence, especially as it appeared in the south of Spain in 1829, evidently considers, and in this respect errs with many others in thus considering it identical with the endemic of the West Indies, and differing merely in its epidemic form; that it is the endemic heightened in degree, and rendered more prevalent owing to the intensity and diffusion of the terrestrial cause. It is painful to observe how injuriously this impression has acted on his mind while describing the true pestilential disease; for in that description he has mixed up many of his recollections of the West Indian endemic, and has wandered into lengthy lucubrations as to the type of the malady, and as to the influence of temperament in modifying its form, and has furnished the most undoubted internal evidence that he entertained no distinct views of the distemper, inasmuch as the whole is laboured, and in many places quite unintelligible. He remarks, that "there is not one practitioner in one hundred, who has resided for years in the West Indies, who believes that the concentrated endemic of that country, usually called the yellow fever, is a disease which possesses the power of propagating itself from person to person within the tropics." Certainly there is not. It is well known that all the writers on West India diseases during the last and present centuries admit this, but many of them—nay, the majority—also admit, what is the fact, that the severe endemic of that climate is not this pestilence; that the former is liable to be mistaken for the latter; and that both are often confounded together, although they are as distinct, indeed more distinct, from each other than measles and smallpox. And in this Dr. JACKSON errs with the minority, using at the same time terms which involve a theory, or mean nothing. Thus his "concentrated endemic" must either mean the more malignant form of remittent, which I have described, from frequent observation of it in warm climates, in the *art. FEVER*, by the name of *malignant remittent*, and which I know well is neither infectious nor the pestilence now under consideration, the differences between which have been long since pointed out by many very intelligent and experienced observers (*see* § 39, 121, *et seq.*).

117. Those who rightly contend for the infectious nature of this pestilence view it as entirely distinct from the endemic and sporadic malady or remittent which resembles it, in some respects, as shown above (§ 39). The non-infectionists, on the other hand, consider both diseases to be the same; the endemic or sporadic malady being, as they believe, heightened in degree under peculiar circumstances of the soil and situation, and of the atmosphere. They contend that these circumstances are sufficient to account for the phenomena observed in the epidemic or true pestilential disease without

calling in the aid of infection. As the infectionists themselves admit the non-infectious nature of the endemic or sporadic fever which occurs in warmer climates, and which often appears in more temperate countries, during hot seasons, and assumes many of the characters of hæmagastic pestilence, the problems to be solved are: 1st. Is the latter distemper also non-infectious? 2d. As it is admitted that the former arises from terrestrial emanations or malaria, during high ranges of temperature and a humid state of the atmosphere, altogether independently of infection, does the latter distemper also acknowledge only the same sources, when they are rendered more intense?

118. What has already been adduced may appear to the unprejudiced sufficient to solve the above problems. Phenomena, circumstances, and facts cannot be annihilated by special pleadings, by confident assertions without proofs, and by vague hypotheses; and when we find that these have been chiefly confided in by the non-infectionists, and that they have confounded together two diseases possessing very distinct and altogether different characters, and in their various pleadings, have imputed to one malady that which does not belong to it, because it appertains to the other, are we not compelled to believe either in the innocence of their ignorance, or in the guilt of their sophistry and unfairness? I shall leave the reader to adopt either alternative he pleases after perusing the following coquettings with infection by the greatest authority which this party can boast of, desiring only that the postulates, and the terms either of "no-meaning," or involving some crude hypothesis, may not be overlooked. Dr. JACKSON ruminates as follows: "The general atmosphere of an epidemic circle is charged with a material of an unknown quality, distinctly offensive to health and animal life. The epidemic influence is general throughout a given district, more concentrated at some points of the district than others, from causes totally unknown to us, or only partially known. The atmosphere in the apartments of the epidemic sick, particularly if these apartments be crowded and ill-ventilated, may be supposed to be charged with this offensive material in a comparatively higher proportion than the common atmosphere, inasmuch as it has there less opportunity of being diffused. That, however, is only supposition; the following is fact: *Persons of every habit, but more especially persons of susceptible habit, who enter into the apartments of those who are ill of the epidemic fever, rarely fail to experience unpleasant sensations at stomach, viz., distention and irksomeness; not infrequently uneasiness in the bowels; suspension or change in the natural functions; headache, heat, pain of the eyes, thirst, white tongue, disturbed sleep, and dreaming, amounting to reverie.* These beginnings of the morbid act are local; and, as such, they are for the most part removable by the prompt application of remedies that act locally, that is, by emetics, purgatives, or others, which produce decided changes in the secreting surfaces of the alimentary canal." "It is not said that the impressions which produced indisposition on these occasions were impressions from the cause of yellow fever; it is evident that the general atmosphere was epidemic; and it was probable that the atmosphere of the sick ward

was so in a higher degree than elsewhere ; or, if not so, that the diseased act was there suffered to explode with more facility, in consequence of the diminished coercive energy of the atmosphere which filled the sick apartments" (p. 49).

119. I have copied the above verbatim ; the postulates and nonsequiturs will be readily recognised without much logical aid. If the passage which I have put in italics is not a convincing proof of infection, especially when recorded so innocently, so unconsciously, by the arch non-infectionist, I know not what else can be considered as such. But wherefore should Dr. JACKSON say as above, that "emetics, purgatives, or others which produce decided changes in the secreting surfaces," act only locally ? His experience surely should have proved the contrary. The reader will farther perceive the "no-meaning," or absurdity into which he lapses at the conclusion, when he attempts to escape from the very obvious, the palpable effects admitted by himself to be produced by the emanations from the sick. But he goes on farther to admit as follows : "The yellow fever, during the reign of epidemic influence, often strikes like a pestilence by the mere concourse of people in a close place ; and, if a mass of sick persons be collected into a hospital during the epidemic season, the common emanations from the sick bodies, whether saturated with contagious particles or not, often act offensively on those who enter the circle, and often appear to be the cause of the explosion of a disease which, without such accessory or changed condition of the medium in which men live, would have probably remained dormant for a time, and perhaps forever. The instances of persons who have lived in apparent good health in simple epidemic atmospheres, and who have become sick soon after they entered into the circle of a crowded assembly, or the crowded wards of a hospital of sick, are numerous, and so well marked that they stagger, on a superficial view, the opinion here contended for, of the non-contagious nature of the yellow fever" (p. 44). To be sure they do, and, being admitted by Dr. JACKSON, they become evidences of infection as strong as "proofs from holy writ." But the superficial view, which he here deprecates, may, nevertheless, be the just one ; at all events, I leave the more profound doctrine of the *fons et origo mali e profundis*, which he considers the truly scientific and credible one, for the adoption of those who,

"By the glare of false science betrayed,  
That leads to bewilder, and dazzles to blind,"

can see no truth in that which is a topic of general belief, which has good common sense to recommend it, and which is based on established facts, and supported by numerous collateral evidences and analogies.

120. I have already, and perhaps sufficiently, adverted to the circumstances of the great majority, if, indeed, not all of those who believe in the non-contagious nature of the hæmagasttric pestilence, having confounded this distemper and the more malignant forms of remittent or endemic fever with each other (§ 121-123), and of the infectionists having considered that this pestilence is distinct from the latter ; that it is infectious, but that the endemic is non-in-

fectious, and of local origin ; and that, while the same person cannot be infected by the former oftener than once, he may be attacked by the latter twice, or even oftener, especially under circumstances which will appear in the sequel. To these topics it is necessary more particularly to advert.

121. *d. That this pestilence is not identical with the endemic or remittent yellow fever of Africa and America*, I can assert, from my own observation and the testimony of the most experienced writers. The results of my observations are certainly in accordance with the evidences furnished by Mr. BOYLE, and several of his contemporaries in the British settlements in Western Africa,\* in so far, at least, as that the former distemper is distinct from the endemic fevers of Sierra Leone and the west coast of Africa. The hæmagasttric pestilence appeared at Sierra Leone in 1823 and 1829, presenting identical characters, in its invasion, progress, and termination, with those observed in the West Indies, North America, and the south of Spain ; and although it was most fatal among the crews of vessels, and those recently arrived, yet it carried off many of the old residents and coloured population, and of those who had undergone the seasoning and remittent of the country, and who were considered safe from any return of these. The above writer and Dr. W. BARRY agree in stating this to have been "a fever, not entirely new, but extremely rare" in that country ; and that it appeared during the healthy season, when the endemic remittent fever is not prevalent. That this pestilence was infectious at Sierra Leone is shown by the conviction to this effect of the educated and respectable part of the population ; by the history of it in the Bann and Eden ships of war, and in many other vessels ; and by its extension from the Bann to the military in the Isle of Ascension, and to other ships. There is generally much difficulty in distinguishing the malignant remittent of Africa from this pestilence, owing to the imperfect remissions of the former, and to the presence, at an advanced stage of fatal cases, of many of the symptoms characterizing the early and rapid progress of the latter ; and hence the epidemic is generally advanced, or has extended to many, before its nature is recognised. Opinions as to the origin of these two epidemics in Sierra Leone were by no means consistent with each other. The disease was said to have commenced among the inland native population, and to have extended to this town and the shipping, as well as to places to the northward of it on the coast.

\* Misstatements having appeared, although of slight consequence, respecting the author's visit to Western Africa, he thinks it due to himself explicitly to state that he never had the honour or advantage of being in any public service, or in any service whatever ; that his passages to and from Africa were altogether at his own private cost, and were dearly paid for before embarking, in both instances ; and that his travels between the several British settlements and other places, as well as his residence in the former, were also at his own charge and expense. He may farther state that, having obtained his degree in medicine after a continued residence of seven years at the university, he has exercised his profession in no other capacity than that of physician ; and that he employed the time which intervened between that of leaving the university and that at which he joined the College of Physicians of London, and commenced practice in the metropolis, in travelling, unaided and unpatronised, in various countries, with the view of obtaining medical knowledge.



There can be no doubt of the fact of the prevalence of this distemper among the natives of those places before it appeared at Sierra Leone, but it was milder, less prevalent, and less fatal among them than among Europeans. On the other hand, the grand jury of this port state in their presentment, as respects the epidemic of 1829, "that they attribute the present unhealthy state of Freetown to the practice of landing slaves from the prizes in the centre of the town, where they are necessitated to remain under the disease with which they are afflicted in a small yard, not more than 120 yards square."

122. It would be more tedious than instructive for me to adduce even a part of the evidence now before me of the distinct nature of this pestilence from the endemic remittent yellow fever of warm climates. Every writer, from LINING to the present time, who has espoused the infectious nature of the former, and all those whose opinions I have noticed above, both British and foreign, agree in admitting the distinction, while many of the non-infectionists either cannot recognise a difference, or do not choose to do so, as it militates against their doctrine. I shall only adduce the opinion of M. GUYON, one of the chief physicians attached to the French army which occupied Cadiz in 1827 and 1828; because he states that he formerly believed in the identity of this pestilence with the malignant form of remittent fever; but that his observation and experience in Spain had convinced him that he was wrong. He remarks:—"Not that, with all my belief as to these diseases being identical, I had failed to perceive well-marked differences between the one and the other; but it must be owned, such is the influence of an opinion already formed, that, of the facts connected with it, we see only the side favourable to that opinion. The differences between these two maladies are many;" and he forthwith proceeds to point them out with much accuracy. Much of the misconception which formerly existed respecting these maladies was owing to the unfortunate names given to them, especially to the application of the term yellow fever, which, as will be seen from what has been adduced from various writers, was generally applied to this pestilence, although the yellowness of the surface was more remarkable in the severe endemic remittents, not only of Africa and America, but also of the south of Spain and shores of the Mediterranean.

123. The remittents, whether bilious, gastric, malignant, &c. (*see FEVER, Remittent*), with which this pestilence has been confounded, are diseases depending upon the nature of the locality—upon exhalations from the earth's surface and its productions, varying, however, in character and severity, with the temperature, humidity, and stillness of the atmosphere, and most probably also with the electrical states. But this pestilence is produced in all cases by an animal poison—by an infectious miasm generated by, and emanating from, the affected; and contaminating the immediately surrounding air, and various animal or other substances capable of imbibing it and of imparting it to the atmosphere, but requiring certain states of the air as regards temperature, humidity, and stillness for its dissemination;

and thus, as it will be more fully seen from what has been stated respecting *remittents*, and from what has been already adduced as to this pestilence, the one proceeds from a distinct and specific cause, the other arises from terrestrial exhalations, of various grades of concentration, producing co-ordinate effects. This pestilence, wherever it appears, presents certain prominent features, like smallpox or scarlet fever, however it may vary like them in severity and in certain subordinate characters. If it proceed from terrestrial exhalations, as the non-infectionists suppose, how is it that it does not appear in many situations where these exhalations are the most indisputably produced, and are as remarkably favoured by a humid, warm, and still atmosphere as in those places where it has occurred the most frequently? And wherefore is it not observed within the tropics, in the eastern hemisphere, where the most malignant as well as the most mild forms of remittent fever are prevalent at some season or other?

124. Dr. WILSON, who observed this pestilence in the West Indies, states that 117 cases occurred within a few weeks, and that "though they varied much in violence, and in many other points, they were uniformly continued, and that nothing like remission could be detected in any of them" (p. 180). JACKSON, BANCROFT, FERGUSON, and others, however, believe in obscure remissions, confounding this malady with remittent fevers; and hence arguing most illogically against the protection from it afforded by a previous attack. They farther contend that reasons for not detecting remissions are to be found in the "violence of cerebral action and speedy gangrene of the stomach;" or in the circumstance of the functions having been overwhelmed and extinguished. Now cerebral action is often not violent. The power of the brain is rather depressed than excited; and it is well known that the stomach is not found gangrenous in those cases in which the examination of the body after death is not too long delayed. Besides, in a large proportion of cases, there is neither overwhelming nor extinction of the functions, but a slight grade of febrile actions, in many instances followed by quick recovery; and yet, even in these, no remissions occur. But this topic requires no farther illustration. Another important circumstance evincing the marked distinction between this pestilence and the worst forms of endemic fever, is the fact that recovery from the former is generally rapid and complete, without the visceral enlargements and obstructions so frequently observed to follow the latter. The morbid appearances after death are also different; for, while the liver and spleen are generally more or less congested, enlarged, and softened by the endemic remittent, these organs are even paler and less vascular than natural, although often somewhat softened in common with the rest of the textures, in the hæmagastric pestilence.\*

\* Dr. IMRAY states that, in the epidemic of this pestilence which he observed in Dominica in 1838, the yellow hue extended over the body, but was deepest in the neck, shoulders, and breast, with here and there dark irregularly-shaped spots and blotches, these parts and the scrotum assuming, immediately after the extinction of life, a greenish colour and livid appearance, while the yellow tinge over

125. *e.* That this distemper attacks the same individual only once, a previous infection protecting the system more decidedly from a future seizure than even smallpox or scarlet fever from a second attack of these maladies, has been remarked by every experienced writer since LINNÆ, and is an additional proof of the two propositions which I have endeavoured to establish, namely, 1st. That this malady is propagated, like them, by an infectious emanation or animal poison; 2d. That it is different from the more malignant forms of remittent or endemic fever, which is produced by terrestrial exhalations, which is non-infectious, and which attacks the same individual oftener than once, especially if he have had a change of climate after the first attack. Dr. JAMES CLARK, who had great experience of this malady in the West Indies during the latter part of the last century, and who has carefully distinguished it from the remittents of these islands, states, "that those who recovered of this fever were never attacked a second time, at least no instance occurred of it in our island, nor in any of the other islands, as I have been informed" (p. 19). The truth is, that no recent writer has denied this fact, excepting those who have confounded this pestilence with remittent fever, and who, having seen repeated attacks of this latter malady in the same person, and believing both maladies to be identical with each other, have fallen into the sophism of believing that what was true of the one was also true of the other. The protection afforded by a first attack, although recognised by several writers before Sir W. PYM, was never duly insisted upon and turned to a beneficial account, until his services were so usefully exerted in the early epidemics of Gibraltar. About the same time that he was acting upon this knowledge to the advantage of many thousands, the Spanish physicians also became aware of the fact, from observing that all those who had suffered from the distemper during former epidemics were not infected by it subsequently. Notwithstanding the numerous evidences of this important fact, adduced both in Europe and Amer-

ica, and by the French medical commissions, still the truth of it was disputed by the non-infectionists; for they believed, and believed truly, that the admission of it would be the surrender of one of the strongest positions which protected their doctrine. But the determination of this fact, so as to place it beyond the cavils of a party and the special pleadings of the prejudiced, was undertaken by Sir W. PYM at Gibraltar; and, notwithstanding the opposition of writers already passed into oblivion, is now established as one of the most undoubted truths in medicine. He acted upon it in Gibraltar in 1810, and was thereby enabled to cut short at once an incipient epidemic. "He separated the first sick and the suspected from the healthy population, using, as his instruments of separation, those who had acquired the necessary immunity in some former epidemic. This proceeding now forms the basis of the sanatory law in Spain, and has been successfully repeated in Barbadoes, in 1821, by Mr. GREEN." (Sir D. BARRY, *loc. cit.*, p. 97.)

126. *f.* Much, indeed the greatest part, of the numerous calamities of which this pestilence has been the cause has arisen from the manner in which the crews of ships have been disposed of in respect both of the appearance of it in ships while at sea, and of the communications of the crews and of their personal effects with the ports to which they are destined. Of the latter of these topics sufficient notice will be taken hereafter; but it will be necessary to the full consideration of the infectious nature of this distemper, that some notice should be taken of its appearance in ships of war, in transports, and in other vessels. I have perused most of the accounts of the outbreaks of this malady on board of ships to which references are made in the BIBLIOGRAPHY to this article, and I have been particularly struck, not only by the very imperfect manner in which so very important a topic as the origin of the distemper on shipboard has been considered in most instances, but even by the neglect of it altogether, the reader being either left quite in the dark and to his own inferences, or he has intruded upon him various suppositions or false facts in the shape of foul ballast, bilge-water, chips, shavings, &c., which have been considered quite sufficient to account for the accumulated horrors which have been witnessed. Amid the numerous distressing details through which the reader who wishes to investigate the subject will be doomed to labour, he will find very few who impute this distemper to any other source than to the above, or to some other cause equally absurd, and quite as inadequate as they are to explain the results. Although the ships which have been the subjects of these dreadful visitations have proceeded very shortly before from ports in which this pestilence was prevailing, or have recently received persons on board from, or otherwise communicated with, these ports, or with other vessels containing cases of the malady, or even although they have been actually lying in the harbours of the towns where the pestilence was prevailing, still these writers could see nothing to account for the appearance of it on board the ships of which they had the medical care than some one of the supposititious causes now mentioned, which, even if

the whole body was deepened. Black vomit was not so constant as the yellowness of the surface; but it occurred in the majority of the fatal cases. "On examination after death, even when black vomit had not occurred, the stomach was always found to contain that fluid; and, in all probability, in most of those cases that ended very rapidly, with but little gastric disturbance, dissection would have revealed the presence of that fluid in the stomach. This deadly symptom usually occurred on the third or fourth, sometimes on the second day." When the dark vomit came in contact with the patient's linen or sheets, it left a dark, indelible stain. In the endemic remittent of the island (he adds), "yellowness of the skin not unfrequently takes place, but is unaccompanied with that peculiar lividity of the neck, shoulders, and breast" which is so frequent in this pestilence; black vomit occurring very rarely in the endemic remittent.

To the above distinctions, Dr. IMRAY adds that this latter disease is seldom so sudden in its attack as the former, is usually ushered in by chills or rigours, and is marked throughout by distinct remissions and exacerbations; but in this pestilence, any sensation of cold was seldom experienced, either at the commencement of the attack or subsequently; and no remission was ever observed until the period of deceitful calm, when all pain and febrile excitement subsided. "This state, however, was never followed by an exacerbation, but seemed to proceed from loss of excitability and exhaustion of the vital energies." The above is a very correct and precise diagnosis of the two maladies, which have been so ignorantly, if not dishonestly, confounded with one another by so many writers against the infectious nature of the hæmagastic distemper.



proved to exist altogether in their fullest force, are quite inadequate to the production of the effects, often too weakly or too lightly noticed. Let any one who feels duly the responsibilities of the medical character read the accounts so frequently furnished us by the chief actors in the scenes which they describe—the statements of black vomit or yellow fever having broke out; of the greatest part, or the whole, of the crew having been attacked, and of nearly the half having died—without any rational explanation of the occurrence being attempted, without any idea of or reference to infection being entertained, without any evidence to show the absence of infection, or that it had not been introduced; and, what is still more monstrous, without any satisfactory attempt, or even without any attempt at all, having been made to limit the mischief, or to prevent the extension of the infection to the healthy; and having thus read the dry details of facts thus furnished him—facts barren as to the minds of most of the narrators, and of them only—let him then come to the conclusions, if he can, that all has been correctly observed and rightly inferred, and that measures of prevention have been sagely, or even at all adopted.

127. This pestilence appears in the crews of ships of war, or transports, or other vessels, and is readily recognised by the rapidity of the fatal result, by the black vomit, &c. The ships are at the time either in a port, or have recently left a port in which it was prevailing. One ship is provided with pig-iron ballast, and, therefore, as it cannot be viewed as the cause, bilge-water, or chips, or shavings, below the limber-boards, which generally exist in all vessels, are most logically inferred to be the cause of the distemper. Another ship has shingle ballast, and lo! the source of mischief is discovered. A third has neither shingle, nor chips, nor shavings, nor even bilge-water to furnish an explanation, and as the idea of infection cannot for a moment be tolerated by the very scientific surgeon, he therefore arrives at the very transcendental conclusion that the pestilence which has seized the whole crew, himself, and assistant, and killed nearly half, is nothing else than the effects of a "*ligneous principle*" developed from wood by a high temperature! While the men are dying like rotten sheep—in equal numbers and with equal rapidity with these not very sagacious animals—the commander is alarmed, all are amazed, explanations are required of the learned doctor, and in almost every case the reader will find that some one or other of the above causes is assigned by him. Infection suggests itself to common-sense people, and probably to the commander; but the unfortunate surgeon's common sense is overlaid, is smothered, by vicious authority and worthless writings. Besides, he thinks infection a "vulgar error," and its recognition below the dignity of science; or, if it intrudes itself upon his mind as the pestilence progresses, he feels that he has already committed himself, and cannot retract without practically exposing his ignorance. He therefore sticks to his explanation, even acts upon it, and afterward, perhaps, writes a book to prove his sincerity. All the while, as the imputed cause is supposed to have already produced all the bad effects that will ensue,

either nothing is attempted to get rid of it, or, if any attempt be made, the measures connected with such attempt tend only to diffuse, or to concentrate the infectious poison, which either was not dreamed of, or not guarded against, nor in any way restrained nor counteracted. Indeed, on too many occasions the prevention of disease in the public service is considered beneath notice: it has formed no part of professional education; and when the information, which has been acquired chiefly with the view of passing an examination, has to be applied to great or pressing emergencies, the cure of cases as they rapidly occur is attempted by certain heroic remedies, while measures of prevention are either never thought of, or very imperfectly employed.

128. Now the reader may suppose that the above is an extravagant, an exaggerated statement of singular or rare occurrences, and of the notions which they have suggested to the very scientific observers. But let him peruse the voluminous writings on the subject, if he can command the patience or the temper necessary to the drudgery, and then let him decide. In some instances he will find it admitted that no cause for the evil could be detected in the ships themselves, and that, therefore, there was no cause for the existence of the pestilence; or, in other words, that the most terrific effects were produced without agents. They will, however, think that I am now actually doing the celebrated persons who have thus distinguished themselves a gross injustice by this statement; but they are themselves the perpetrators of the act. In Dr. WILSON's book on this pestilence he will find sufficient evidence to this effect. This writer has favoured us not only with his own opinion, but also with the official opinions of Dr. BANCROFT, Dr. ADOLPHUS, and Dr. MACNAMARA as to the appearance of this pestilence on board of certain ships of war. Now these physicians held the highest medical appointments in the West Indies; and, as we ought to find the highest amount of medical knowledge in the highest places, their opinions deserve respect—at least until we know them; but, unfortunately, after that knowledge is acquired all respect vanishes in spite of the most anxious efforts to retain it. As the reader may be fortunate in this respect, let him peruse the official reports of these physicians in Dr. WILSON's work (at p. 141-147); and let him endeavour to give as much credit as the amount of his credulity may permit to this writer's doctrine of the "*ligneous origin*" of this pestilence; for he avers that, if this origin be not admitted, "we shall be under the necessity of contemplating and endeavouring to counteract a disease regarding the origin of which we know nothing; we must look upon this sweeping pestilence as an effect without a cause, excepting such a cause as that which smote the fourteen thousand Israelites in their tents." One would have supposed that, after this apparent endeavour to discover a cause, some attempt would have been made to show that the malady did not arise from infection or contagion, either directly or indirectly introduced on the occasions in question, before the "*ligneous origin*," or "*principle*," or product not arising from dry-rot—this something proceeding from wood, but not recognised by the senses—

this essence not seen, but believed in, nor detected chemically or otherwise—this ignis fatuus so alluring to the doctor, yet so destructive to his patients—could have become the object of a devoted faith, of a firmly-rooted belief. But no such attempt is made; and although the ships of war were lying at Port Royal, Jamaica, when this pestilence first appeared in them; and although it is well known that it was more or less prevalent in this place, and in several of the ships in this port at the time, yet no notice is taken of the probability of infection having been conveyed on board the ships of war which were so terribly ravaged by it; and there does not appear that any attempt to prevent its introduction was made at any time. Indeed, on these occasions, as well as on most others, the adoption or non-adoption of measures of prevention rests with the commander of the vessel, or with the surgeon, under the sanction of the former; and where neither the one nor the other believes in infection, no restraints are imposed. It would appear from the official reports of the high medical functionaries above named, that they did not believe in infection. It is well known that Dr. BANCROFT has written voluminously, but it may not be equally well known that he has not written either candidly or truthfully, in disproof of infection. By the official reports on the ships of war at Port Royal, just alluded to, neither he nor his coadjutors have done themselves much credit. They have most entirely and most signally damned the cause they wished, at least professed, to support. Dr. BANCROFT furnishes, "*proprio Marte*," the most damaging proofs, the most conclusive evidence that could be adduced against that very doctrine which he attempted to establish by means of two thick octavo volumes of misrepresentations and special pleadings. Dr. WILSON would have deserved the thanks of all candid minds for the publication of a report which entirely destroys the most vicious doctrine—the most destructive in its consequences to the community—that has blinded the understandings of weak men, had he not at the same time attempted to rear a structure equally injurious, and even more unstable and absurd than the one which he has so completely overturned. But let me advert more particularly to the case of the unfortunate ships of war which called forth the reports of the above great West India authorities.

129. It should be premised that the infection of this pestilence had lurked for several years, or even longer, in the most frequented seaports of the West Indies, as Port Royal, the Havana, Vera Cruz, &c.; and as the inhabitants, especially those who have resided long in these places, have been once attacked, and are no longer liable to be attacked again, it follows that comparatively few are predisposed to the affection, excepting strangers or young persons; the arrival of a number of the former, particularly of persons from Europe, being followed, while the infection remains in the place, by an increased prevalence of the distemper. Hence the arrival of ships from Europe—whether ships of war, transports, or traders—and of troops from a different climate, is often very soon followed by an outbreak of this pestilence among them, more especially if no

measures are taken, as too generally has been the case, to prevent the introduction of the infection, or to sequestrate those first attacked. The Iphigenia ship of war, while in Port Royal harbour, became infected with this pestilence. At the desire of the admiral, Drs. BANCROFT, ADOLPHUS, and MACNAMARA proceeded to examine her, and reported her clean, dry, and sound in every respect. They admit that the malady prevailing in this ship was this pestilence; and that it could "only be produced by an external cause," as no cause could be detected by them in the vessel herself; but what this external cause might have been they appear to have been at a loss to imagine, for they summarily dismiss the idea of infection, without, however, adducing any evidence or argument against either the introduction or diffusion of the distemper by this cause. While thus drivelling respecting the existence of "*an external cause*"—this suspected entity or non-entity—the following statement is made by this sage commission: "We abstain, at this time, from offering any opinion as to the probable cause of the disorder [and this pestilence is only a *disorder* in Dr. BANCROFT's estimation, the reporter of the commission] in the Iphigenia; though we think it right to state that we have not hitherto found evidence sufficient to authorize the belief that her anchorages in the harbours of Curaçoa, off Puerto Cabello, or Port-au-Prince, within the last five months, at all contributed to produce the fever." Now what is here aimed at? They assert there was no internal cause or source of mischief; that hence there must have been an external one; but that this external one was not derived from the harbours just mentioned: they, therefore, would seem to infer that it existed, or was derived, from the port where this ship was now lying. But Dr. ADOLPHUS comes to this conclusion, in a separate document. "I consider the fever (in the Iphigenia) to have been produced by increased temperature and other atmospheric causes;" and here he stops without a single word being added. This, therefore, we must consider as his "external cause." Dr. MACNAMARA next enlightens us with his "external cause," also in a separate document of most palpable absurdity. Here it is: "It is difficult to account for the generation of disease in a ship so well regulated, and in such a state of high discipline as the Iphigenia; and I am most positively and decidedly of opinion that the disease, which has already committed such ravages on board that ship, is to be solely attributed to a particularly vitiated state of the atmosphere, the influence of which has been experienced along the whole of the American coast, from the northern bank of the Orinoco to Boston in New-England, and in the adjacent islands." How precisely this vitiation of the air, this arch assumption, is limited! What countless crews of ships must have suffered, what interminable wretchedness on shipboard, and on coast-board also, must have been produced by a "particularly vitiated" air, extending from the Orinoco to Boston, inclusive of the West Indies, &c. How few could possibly have escaped destruction, seeing that the air which all within these extended bounds must have breathed was, in the "positive and decided opinion" of Dr. MACNAMARA, in "a particularly



vitiated state!" What a loss science has sustained in having had the particular vitiation in question, so decidedly and yet so precisely extended, left entirely unexplained, and its nature unascertained! But this deficiency may have been subsequently supplied, and the document supplying it may be buried in the rich repositories of the Medical Board and Somerset House. The reader has now got the opinion of the majority of the commission as to the mysterious "external cause" of this fever. What Dr. BANCROFT's opinion is does not appear. Probably his experience as to his former opinions make him more reserved on this occasion, and he comes into the field fortified by the caution of an old soldier.

130. The crews of ships of war, transports or traders, are rarely the subjects of fever in the West Indies, unless they are exposed to the infection of this pestilence in the ports where it is prevailing at the time, or have the infection introduced among them from these ports or from infected vessels. They are rarely in that country exposed to the malaria proceeding from marshes or lagoons, unless when watering, or when allowed to remain on shore, and then they readily are attacked by remittent fever, especially if they have slept within the sphere of these sources of disease. The pestilential fever now under consideration has appeared on board many vessels whose crews have not been exposed to these sources, and not a few of these have been ships of war which were certainly not so exposed. Nevertheless, attempts have been made, although most fruitlessly, to show that the causes of the distemper have existed in the ships themselves; either the ballast, or the bilge-water, or the wood itself of which these vessels were built, having been imputed as the cause, without the least endeavour to prove any thing actually noxious proceeding from any one of these sources, or to demonstrate the generation of any gas from them, whereby the air could be vitiated. Ships of war are now, and have long been, provided with iron ballast and tanks, so that the chief source to which the non-infectionists imputed the distemper did not exist in them; and yet we find that many ships of war have had their crews nearly altogether carried off by it; and although the introduction of infection might have been presumed, owing to the remarkable probability of such an occurrence, these vessels either being at the very time in infected ports, or very recently having left such ports, or having communicated with infected vessels, yet no satisfactory inquiry was ever instituted by the surgeons of these vessels to determine the question as to the propagation of the malady from these sources; the only inquiry that was made being that respecting the conditions of these vessels as to cleanliness and discipline. The probability, or even the possibility, of infection was not dreamed of; indeed, many of those to whom the matter more especially appertained, would neither see nor admit infection under any circumstances, neither the word nor the meaning attached to it being comprised within the limits of their belief. Take, for instance, the following:

131. The distemper existed at Port Royal, in Jamaica, both previously and subsequently to

the arrival of the Rattlesnake ship of war there, in July, 1824; this vessel being clean, sweet, well ventilated. Dr. WILSON, the surgeon of her, admits that he was himself the first who was attacked; and that he, as well as the purser, was seized "*from exposure to the cause on shore.*" Indeed, there can be no doubt of both of them having contracted the disease on shore, for Dr. WILSON admits this in no less than two places at p. 159 of his book, written to prove the "ligneous origin of the distemper." And there is as little doubt of their having introduced the infection on board this vessel, although he argues against the existence of infection, but without furnishing any proofs of his position; the efforts to infer the non-existence of this property obviously originating either in a desire to establish his own hypothesis, or in the consciousness of having neglected measures to prevent the diffusion of infection—a diffusion fatal to a large proportion of the crew. The following are facts which cannot be refuted.

132. First: this pestilence prevailed at Port Royal, more or less, for several years, about this epoch, namely, from 1819 to 1826; but the doctrines of BANCROFT and other non-infectionists were exerting a most noxious influence over the minds of medical officers in the public services in the West Indies. Owing to this circumstance, no measures were taken, with few or no exceptions, among either the military or the naval forces, to prevent, to limit, or even to restrain the spread of infection. The only restraints which were attempted, and these but few, were owing to the good sense of commanding officers. During this period the crews of many ships became infected with this pestilence at Port Royal; but the surgeons of these ships, with the exception of the surgeon of the Scout sloop of war, were blinded against infection, and had some favourite hypothesis to support.

133. Secondly: the Rattlesnake having thus arrived at Port Royal, where the distemper existed, communicated with that port; the officers who first went on shore were the first attacked by it; and nearly the whole of the crew were afterward seized, at first gradually, but subsequently much more rapidly; for the ship having put to sea under a false impression as to the cause of the malady, and bad weather having come on, and occasioned the shutting of the gun-ports, &c., thereby preventing due ventilation, the distemper spread with greatly increased rapidity and fatality. These are the facts respecting this ship of war, and they cannot be gainsayed by any special pleader.

134. Thirdly: but in these fatal years, other ships of war arrived during the years 1824 and 1825 at Port Royal, and suffered in a similar manner to the Rattlesnake. The Isis ship of war arrived at this port in 1824, and this distemper appeared on board of her in October. She was ordered to the Gulf of Mexico, where the prevalence of north winds at this season reduces the temperature to about 65°, or even lower, and the disease subsided. This ship returned to Port Royal in the following autumn, and the malady reappeared in her, and was very destructive. In this year the Lively, Py-lades, and Ferret were half unmanned while lying in this port; and other ships were simi-

larly infected. But the calamitous consequences of a general indisposition on the part of medical officers to admit the existence of infection were not limited to the naval service. The military medical officers, with the *CORYPHÆUS* of non-infection then at their head, were equally blinded to every perception of the property to the non-admission of which the lives of thousands were sacrificed. Stoney Hill, in Jamaica, is situated 1300 feet above the level of the sea, and would be healthy for troops if precautions against the introduction of infectious fever were duly instituted. The seventy-seventh regiment arrived in Jamaica in 1825, and was stationed here. This pestilence appeared among them, and, no satisfactory means of preventing its spread having been taken, it attacked nearly all, and carried off a very large proportion. It should be, moreover, recollected that the greatest prevalence of the distemper on shore among the military, and among the inhabitants of Port Royal who were not protected by a previous attack (for this protection and its influence should not be lost sight of in the argument), was in the very year and season of its most destructive prevalence also in ships arriving at this port.

135. The surgeon of the Scout sloop-of-war sent home documents proving the contagious nature of this distemper on board of this ship; and Dr. J. Jounson, whose belief in this property appears to have been very limited, or contingent, as he terms it, states that he "had seen these documents, and can vouch for the highly contagious character of the fever." (*Med. and Chirurg. Rev.*, vol. ii., p. 12.) Now, if admitted to have been contagious in the case of this ship, and likewise in the case of the Bann, as demonstrated by Sir W. BURNETT, the able and zealous head of the naval medical service, how comes the same identical malady to be non-contagious on board of other vessels placed in similar circumstances to these, in which others it has been even more general and more fatal? Surely, if in about a dozen ships of war the same distemper appears after arriving at a certain seaport where that distemper exists, and if it be admitted by one from whom the admission is almost extorted, that it was actually contagious in one of these ships, it could not be less contagious on board of the other ships which had arrived at the same port, which had been infected from the same source, and in which it was even more fatal than in the one to which the contagion is conceded. This is a matter which concerns the lives, not only of the crews of ships, but also of regiments, of armies, and of the inhabitants of populous cities and towns; and yet it has been allowed, up to the present day, to be disposed of, and measures, or rather worse than no measures, have been permitted to be taken respecting it, in our numerous colonies and dependencies—in our fleets and in our armies—according to the visionary notions of the totally inexperienced, and of those altogether unacquainted with the nature and cause of the pestilence in question; or, what is still worse, to those who have formed erroneous notions respecting its source and properties. What can be the use of accumulated facts and of countless observations to prove that which requires no farther proof, if they are not to furnish data from which cor-

rect inferences are to be drawn for the benefit of the inexperienced, for the direction of the wrong-headed, and for the advantage of the general community, by those competent persons it is to be presumed to whom these facts and observations have been officially furnished? And possessing these data, should it not be required that such inferences shall be drawn by minds capable of weighing evidence and of devising rational expedients of protection, that these inferences might be made the basis of instructions for the institution of salutary measures for the guidance of the uninformed and the unthinking, and for the strict observance of the reckless and the vain theorizer, in order that hundreds of thousands of human lives may not be sacrificed to the Moloch of false doctrine, as they have been during a long series of years.

136. *g.* Let the occurrences at *Sierra Leone* in 1823 and 1829 be taken as a specimen of the mode of medical protection from pestilence in a colony most liable to outbreaks of it, although provided with a colonial surgeon, a deputy inspector of hospitals, and with other medical officers. This distemper has appeared at this place also in other years; but the colonial surgeons and deputy inspectors have written on the occurrences of these years, and books and reports have been the results of their Sisyphean toils. The governor of the colony, however, has thrown light upon a subject which they have confused and mystified; and has shown, as respects the epidemic of 1829, that it was imported into the colony, and that it was highly contagious both there and among the shipping. (*Narrat. of the Ashantee War, and Present State of Sierra Leone, &c.* By Major RICKETTS, Governor. 8vo, Lond., 1830.) The medical writers on those epidemics—for they cannot be called authorities as regards this malady, unless they be viewed as such against the doctrine which they toil so ineffectually to support—found that a distemper which they recognized, after a time, as altogether different from the endemic of the country, had come among them; but they were quite unprepared for the occurrence, notwithstanding the records and recollections of former visitations. They appear at first to have mistaken the malady for the endemic of the country, and when their eyes were opened they were amazed and alarmed, and they acted as they have written, in a state of imbecile confusion and bewilderment. Their accounts are full of contradictions. While they argue against infection, they, in the unconsciousness of helpless ignorance, furnish the most conclusive evidence of the existence of this property. They admit that the persons attacked first in the colony had visited a place in the vicinity, two or three days previously, where the pestilence was then raging, yet they deny the existence of infection, and issue notices to prevent the adoption of precautions against the spread of the distemper, at the very time when such precautions ought to have been taken under their directions. They admit the identity of the malady on shore with that on board of several ships in the roadstead, and of both with the pestilential yellow fever, and yet they contend that it was altogether non-infectious in the former, and infectious in the latter! Their admission of this property in the ships was evidently extorted from them by undenia-



ble facts, and the firm belief of every rational and unprejudiced mind; but no measures of protection were proposed by them.

137. The source of the distemper might have been readily ascertained in both these epidemics, if the inquiry had been instituted by competent, candid, and unprejudiced persons. Indeed, in their unfortunate endeavours to mystify the matter they sufficiently indicate the source, although without the precision and force which might have been imparted to it by positive evidence. Still, the admissions of infection which escape their powers of concealment are, perhaps, the strongest proofs of the fact that could have been adduced. The infection having been introduced without having been recognised or suspected, until its mischievous effects had proceeded far, by those whose duty it was to watch for, to detect, and to guard against it, their secret yet manifest desire was to deny its existence, and to suppress, misrepresent, and distort occurrences and circumstances accordingly. Although persons belonging to the colony had visited places adjoining where the pestilence was raging at the time, had returned to the colony, and were immediately afterward attacked and died, other cases of the disease following upon these admitted to have been the first; and although ships, more especially slave-ships with sickly cargoes of human beings, arrived at the colony just before and at the time of the outbreak of these epidemics, some of the writers on the subject contended that the distemper had arisen from malaria brought from a distance by the winds, and others concluded that it had travelled from the interior of Africa to the coast—a sufficient admission of infection; while the more observant of the residents believed in its introduction through one or other of the channels just indicated, or through both. There can be no doubt, however, that the distemper was conveyed in 1823 on board of the Bann ship of war, then at Sierra Leone, where it was prevailing both on shore and in the shipping, either from one of the slave-ships detained at Sierra Leone, or from a trading vessel at that place; that the crews of the Bann and of the San Raphael, a tender to and accompanying the former ship, were generally attacked, a very large proportion having been carried off on the voyage to the Island of Ascension, from Sierra Leone; that the pestilence was introduced by these ships into that island, where every one was seized, and many died of it; that the Driver sloop of war arrived in perfect health at this island, where a very restricted communication took place between her and the Bann; and that three persons “were taken ill with the prevailing fever, two of whom were sent on shore, and one died on board; and the captain very properly put to sea and used every precaution; and with these three cases the disease ceased.” (Sir W. BURNETT's *Official Report of Sickness, &c., in the Bann.*)

138. While the pestilence was prevailing at Sierra Leone in 1829, the Eden and Champion ships of war left that colony for Fernando Po, and immediately upon their departure it appeared and ravaged these vessels, all the medical officers, five in number, having been attacked, three having died. When the ships reached Fernando Po they had lost about half their

crews. At this latter place communication took place between the crews of these ships and of the Sybille, the Heela, and Black Joke; and the distemper appeared also in these ships, and became most destructive. These facts cannot be disputed, and whatever attempts may be made to explain them away by self-sufficient cavillers, they will still remain remarkable indications to all common-sense persons of that very important property of the distemper upon which every means of preventing and of restricting its propagation should be based; and to the neglect of which so much misery has been inflicted upon extensive communities, both civil and military, up even to the present day. During the continuance of this epidemic the crews of several trading vessels were nearly altogether swept away. Every person on board of two ships was attacked, and only two survived. This frightful mortality appears to have been mainly attributable to erroneous notions entertained by the medical officers of the colony as to the cause of the distemper, and to the neglect of every precaution against it, and of all means calculated to prevent its extension. Their minds were preoccupied with one idea, and were incapable of conceiving another. This single article of their faith and belief was malaria; it was their evil genius which distorted their vision, disordered their understanding, perverted their judgment, and rendered them altogether incapable of meeting the crisis which their incapacities had tended to develop. Malaria, according to them, was in the winds, in the waters, in the earth, and in the regions under the earth; and yet it did not, they believed, originate where it was so mischievous, but was brought from a distance on the winds, and even over the extensive bay into which the Sierra Leone River empties itself. To this absurdity they joined a second, namely, the belief that a distemper of a continued and rapid course, such as they observed and described, could proceed only from a cause always producing effects of a very different character.\*

\* While the foregoing pages were passing through the press, the author received the official returns to Parliament respecting the disease which prevailed, in September, 1845, on board the “*Eclair*,” steamship of war, on her return to this country from the coast of Africa. The conveyance of this pestilence to the very shores of Great Britain—almost to the portals of the metropolis—and the alarm of the public mind consequent upon the circumstance, gave rise to the correspondence and documents on the subject which have been printed, and from these the following particulars are derived:

The “*Eclair*” steamship left Plymouth on the 2d of November, 1844, with a crew of 146 officers and men. On the 20th of December she was at the River Gaboon, on the west coast of Africa, and passed thence westward and northward along the coast until she arrived at Sierra Leone on the 23d. She there took in 40 Kroomen and liberated Africans, allowed to assist the crew. She departed from Sierra Leone on the 28th of January, and continued off Sheerboro, watching slave-traders, until the 4th of February. During this time the vessel could not have safely approached nearer than three miles to the shore, owing to the shelving nature of the coast; but the boats were sent in, and the men landed frequently, and slept on shore on two or three occasions. Most of the men who had slept on shore were attacked with fever, which appeared to have been of a malignant kind, as nine or ten of those attacked died; but two of the men who were severally seized had not been out of the ship. These cases occurred during the months of April, May, and June, and were said to have been the endemic remittent of the climate; but no details of symptoms are given. When the vessel returned to Sierra Leone, on the 4th of July, the crew was healthy; but, from that time until her departure on the 23d, the men were engaged in cleaning out the hold

139. *h.* From what has been advanced above it may be admitted without any assumption,

of the "Albert" iron steamship, and were allowed to go on shore; and several of them slept on shore. Of these, four were attacked with fever on the 19th, 21st, 22d, and 23d; one was landed, but the other three were treated on board and died. No account of the symptoms are given. But Sir WILLIAM PYM, who went on board on the arrival of the "Eclair" in England, and examined the officers, states that the first man who died after leaving Sierra Leone on the 23d had black vomit, and that the cases which occurred there and subsequently, as well as those which were still remaining, were actually this pestilence. On this point it is impossible for Sir William to have been mistaken; seeing that his experience of this distemper in the West Indies and in the south of Spain has been greater than that of any other physician whatever; and, although no description or details are given in the official papers now before the author, yet quite sufficient is stated to show the nature of the distemper.

The "Albert" was taken in tow by the "Eclair," and brought into the Gambia on the 10th of August. After leaving Sierra Leone, three other men were attacked in the end of July, and died; these men had also slept on shore; and a merchant who embarked on board the "Albert" at Sierra Leone was also taken ill in that vessel, and died on the 27th of July. The first three of those attacked in August were on board of the "Albert" when taken ill. "Afterward the fever became indiscriminate in its attacks." The "Eclair" touched at Goree to take in coals, but was not allowed pratique. She went on to Bona Vista, one of the Cape de Verd Islands, where she arrived on the 21st of August, having had, from leaving Sierra Leone, eighteen men attacked by the distemper, and of these thirteen died, most of them with the black vomit.

At Bona Vista the disease continued to spread rapidly among the crew, when, permission having been obtained from the Portuguese governor, it was determined to land the crew, sick and well, and purify the vessel. A fort was appropriated for the accommodation of the seamen and sick, and the officers obtained lodgings in the town. Every means were taken to purify the ship by washing and white-washing, fumigation, &c.; all the Kroomen remaining on board, with the exception of six employed in attendance upon the sick. The disease, however, continued to prevail among the officers and men on shore, thirty-one men having died between the 21st of August and the 13th of September. Under these circumstances a consultation was held by three naval surgeons, and upon their report and recommendation it was determined that the steamer and crew should proceed to England. The ship's company were in consequence re-embarked, and sailed on the 13th of September; Captain ESTCOURT having been taken ill the day before leaving Bona Vista, and died on the 16th. At Bona Vista the Assistant Surgeon HARTE, of the "Eclair," died, when Dr. MCCLURE, a naval surgeon, passenger in the "Growler," and Mr. COPPEY, assistant surgeon of the "Growler," volunteered their services on board; here, also, seven seamen volunteered from the "Growler." Dr. MCCLURE died on the voyage to Madeira, and one of the volunteer seamen was taken ill of the fever and recovered. Upon the arrival of the steamer at Madeira the authorities refused permission to communicate with shore, as had been previously done by the French at Goree; but at this island Mr. BARNARD, a naval surgeon, volunteered his services, and was received on board with two seamen. From the day of her sailing from Madeira, the 21st of September, up to the 30th, seven deaths had taken place from the fever, and eight new cases had occurred.

On the passage from Bona Vista to England forty-one were attacked, and twelve died. In the short time of the vessel's remaining at the Motherbank two men were seized and died. From the time of her being put in quarantine on her arrival until the 31st of October, nine new cases occurred, five of which were fatal. The pilot, who was taken on board on the 1st of October to take her to Standgate Creek, was taken ill on the 7th. An officer was also seized on the same day, and both officer and pilot died in three or four days. The surgeon was taken ill on the 4th of October, and the assistant surgeon on the 5th; the former died. The illness of the two surgeons occasioned the sending two other medical officers, on the 5th, on board the "Eclair," and one of them was attacked on the 11th. After this period but slight illnesses occurred, and the disease entirely ceased soon afterward, owing to the arrangements made under the directions of the quarantine establishment, aided, most probably, by the low range of temperature at this season, and in this climate.

There appears to have existed in the minds of the medical officers attached to this vessel a strong belief that the distemper, which was so fatal, was merely the endemic remittent of the African coast. As such they reported the disease, and hence were allowed, with great hospitality and kindness, all the advantages which could accrue from visit-

1st. *That this pestilence is altogether different, in its causes, progress, and nature, from every form*

ing Bona Vista; and yet, when they drew up their report advising the return of the vessel to England, the three medical officers concur in characterizing the distemper as "a malignant fever," causing "great mortality;" and in stating that "many fresh cases were daily occurring;" and they farther add, that "the extremely malignant character of the fever, which has resisted the treatment usually found successful in the common endemic fever of the coast, its continuance since the removal of the 'Eclair' from the coast, &c., induce them to recommend the return of the vessel to England;" a resolution most proper in the circumstances; but the very terms in which the recommendation is worded show a tacit consciousness that they had not the endemic remittent of the climate to deal with. That the distemper was genuine hæmagastic pestilence, is shown by the very few particulars furnished by the printed papers as to the appearances and symptoms of the distemper. I state this from my experience of this pestilence and of the endemic remittent of the coast of Africa. Dr. STEWART, in his medical report of the few cases which came before him after the 7th of October, when he joined the "Eclair," mentions "black vomit and slight yellowness of the skin, which became of a deeper shade after death. In the second case there was hiccough during the last fifteen hours of life, and with the hiccough a plugging, gurgling sound, which conveyed an assurance, that had it been possible to examine the stomach after death, coffee-ground fluid would have been found in it. There was a slight tinge of yellowness in that case, also, during the last hours of life; and after death the body became very yellow, while the neck was as dark as if the patient had been strangled." (P. 90.)

That an infectious fever had been introduced into this vessel, and that it spread by infection to all who were attacked, are proved by the history of its progress; by the extension of it to all but one of the medical officers who attended the sick, and the death of most of them; by the introduction and spread of the pestilence to the inhabitants of Bona Vista; by the infection of five of the Kroomen, or native Africans, who are exempt from remittent fever, but not from this pestilence, although they are little subject to it; and of the persons who went on board the vessel after her arrival in England; and by the "fact of the sick attendants on the 'Worcester' getting fever after returning to the 'Eclair.'" (P. 90.)

In further proof of the above, it may be added, that of four officers of the "Growler" steamer sent to survey the purser's stores on board the "Eclair," three of them—the lieutenant, purser, and clerk—were attacked in consequence, and several of the crew; "in all thirteen cases; and two of the three last cases died at Woolwich with all the symptoms of the disease." (P. 77.)

It now remains to notice what occurred at Bona Vista after the departure of the "Eclair;" and, in doing this, it is necessary merely to furnish abstracts from the official reports of the British consul and of H. M.'s commissary judge to Lord ABERDEEN. Consul RENDALL states, that the "Eclair" was allowed pratique, and permitted to land her crew at Bona Vista on the representation of the medical officers that the cases of fever which had occurred on board were the endemic remittent; that black vomit had not been mentioned; that, seven days after the steamer had left, one of the white Portuguese soldiers who had been housed with the crew of the "Eclair" died in the fort (which had been given up to the crew); that on the following day another also died, and the remaining soldier in the fort (a coloured man) was reported sick; that another coloured soldier, sent to assist his comrade, was also taken ill; and that the authorities therefore abandoned the fort and island, and caused the two sick men to be brought into the town. The distemper then began to spread, and the first fatal case in the town occurred in the house where the two coloured soldiers from the fort had been brought and recovered from their sickness. "Up to the first week of December the fever continued to rage, and at that period it had found its way into almost all the country villages, the deaths averaging seven or eight daily." "The English have suffered considerably, having lost one third of their number," and among them the resident English surgeon, Mr. KENNY. The symptoms were black vomit, pains in the head, back, and thighs, with suppression of urine, and sometimes hæmorrhage. The consul adds that the fever had proved contagious to those who acted as nurses to the sick; this was observed to be the case without exception.

The commissary judge, MACAULAY, in his letter to Lord ABERDEEN, after remarking the usual healthy state of Bona Vista, and the introduction of a malignant fever into it by the "Eclair," notices the improper conduct of the medical officers who had reported the disease to be merely the endemic remittent of the coast, while it was obviously a malignant and fatal pestilence; and remarks that these officers, not having "previously served on the African station, had mistaken the malady," declaring from first to last that



or grade of remittent fever; 2d. That it is infectious in its nature among the predisposed, and more especially in a warm, humid, and close atmosphere; and, 3d. That it attacks the human frame only once, the exceptions to this being even fewer than in respect of any other infectious malady.

[Professor DICKSON lays down the following propositions, as containing all that is clearly known in relation to the generation of yellow fever:

"1st. This malady is the effect of a specific and peculiar cause.

"2d. In certain localities, this obscure cause is permanent, and always active; in others it exhibits only an occasional activity, by which alone its presence can be inferred. In Vera Cruz, Havana, and Kingston it is perennially endemic; it is occasionally so in New-Orleans, Mobile, Savannah, and Charleston, which last city seems to be placed upon its extreme northern limit of spontaneous production.

"3d. Its relation to season and temperature is equally well made out, being efficient only during the hot months of summer and autumn.

"4th. Yellow fever is contagious; in other words, a case of yellow fever having been generated in a favourable season and locality, by its unknown and undetected cause, becomes itself a generating centre productive of other cases, or of a morbid agent capable of producing them.

"5th. It is transmissible from any one centre to another, or from any one of its generating centres to a healthy locality; and this communication or extension may take place in two modes: either by conveyance of a portion of atmosphere, in which is diffused its undefined specific cause, as in the hold of a foul vessel, from any place where it prevails epi-

demically; or by the introduction of a sick body or any fomites imbued with its own contagion.

demically; or by the introduction of a sick body or any fomites imbued with its own contagion. "6th. As a general rule, the contagiousness of yellow fever is limited by certain contingencies. This is HOSACK's doctrine of contingent contagion; but the same circumstances limit the efficiency, also, of the generating cause, as, indeed, of all the alleged causes of yellow fever. Thus, high temperature is necessary to its production, existence, and extension. A depraved atmosphere, whether koino or idio-miasmatic, is generally, but not always, essential to the spread of the disease. The chief contingency on which its extension prevails, besides heat, is density of population. Originating in any one spot, it spreads thence not only by conveyance, but by infected atmosphere, widening its sphere of influence gradually on all sides, until it takes in the whole limit of a dense or concentrated population, but losing its force as soon as it reaches an atmosphere free from concentrated animal effluvia." (*Essays on Pathology, &c.*, vol. i., p. 340.)

It was nothing but the common coast fever. He farther adds, that Mr. MANTELL, the queen's advocate, who had come from the Gambia to Bona Vista in the "Eclair," first mentioned the occurrence of black vomit in one of those who had died on the passage from the Gambia; but that the medical officers would not admit that any importance should be attached to this circumstance; and he concludes his letter with the same account as the consul has given, of the infection of the soldiers from the crew of the "Eclair," and of the population of Bona Vista from the former (see above). The latest published accounts state the number of deaths in this island to be upward of 400, and the distemper still prevailing.

I cannot refrain from directing attention to the evils which have resulted on numerous occasions, and even more flagrantly and flagitiously than on this, from the confident tone so often assumed by very young and quite inexperienced medical officers of the non-infectious nature of the distemper under consideration, and from the circumstance of their confounding it with the endemic remittent. These false notions are mischievous enough even when entertained by theorists and speculators after popularity with money-getting traders, who view restrictions requisite to the protection of public health as invasions of and abstractions from the amount of their private interests and gains; but they become ten-fold more destructive when they are made at the caprice or upon the hasty suggestion of an inexperienced and reckless young surgeon, the basis of measures involving the lives of thousands. Why, in the name of all that is honourable and humane, among the regular members of our profession—and we believe, as yet, none but such can gain admission into our public services, although such limitations may not be observed in palaces or courts—are not definitive instructions furnished by the heads and boards of the medical departments of the public services, which may guide the inexperienced in devising precautions against the extension of malignant and pestilential distempers when they first appear in ships, garrisons, and armies. The votaries of medical science would, in their simplicity, believe that such ought to be one of the chief functions of those boards; but, alas! this at least does not appear to have hitherto been one of their offices.

The apparent anomalies observed in connexion with the mysterious spread of yellow fever may, as Professor WOOD remarks, be explained by one of two theories. According to one of them, a peculiar product is generated, under certain circumstances, which is capable of acting as a ferment, when it finds the proper materials to act upon, and of reproducing itself, or a substance identical with it, out of these materials, as yeast is generated during the vinous fermentation which it has set in motion. The other theory supposes the cause to be a living, organized, microscopic being, either animal or vegetable, which, produced out of pre-existing germs, under favourable circumstances, is capable of propagating itself indefinitely when these circumstances exist. According to either of these views, the ferment or the developed germ may be conveyed in ships, or even in the clothing of individuals, from one spot to another; and, if it find the proper material to act upon, or the proper food to support it, with the temperature essential to its activity, may spread itself indefinitely, and, though perhaps originally little more than a mere point, may poison the atmosphere of a whole city. Thus is explained the conveyance of the disease from place to place, without the necessity of appealing to the medium of contagion. That it is not more frequently propagated to interior cities, may be owing to the less likelihood of the conveyance of the poison in the clothing of an individual than in the confined air of ships, where it may possibly be kept in existence by the same power of propagation. In favour of the theory which ascribes the disease to organic germs, is the fact that it is endemic or original only in a comparatively small portion of those regions of the world where all the exterior circumstances would appear equally to favour its production. Organic germs have been planted by the Creator in certain parts of the earth; and that of the cause of yellow fever, supposing it to be organic, may have been originally limited, by the same fiat which produced it, to the warm latitudes of America. That it has reached Philadelphia and New-York, upon this continent, and Gibraltar and Barcelona upon the old, rath-

er than the more distant parts of the Mediterranean or the East Indies, may be owing to the less mercantile communication of the latter with the places of its production, or simply to their greater distance. (*Treat. on Pract. of Med.*, vol. i., p. 306.) We believe that the spread of yellow fever may be more satisfactorily explained on either of these theories than on that of abstract contagion, as held by our author.]

#### VII. OF THE ORIGIN OF THIS PESTILENCE.—

The next topics which may require a brief consideration are those involved in the following questions: *a.* Can remittent fever, or fever proceeding from malaria under circumstances of crowding, insufficient ventilation, and a high range of temperature, change its character, and become this distemper?—*b.* Can the accumulation of the sick of other diseases in a close, hot, and humid air, give rise to this pestilence, or generate its seminum?—*c.* Can the accumulation of a number of persons in similar circumstances, and more especially of a large number of negroes in the close hold of a slave-ship within the tropics, so contaminate the air as to occasion, or otherwise generate, the distemper, the pestilence being thus produced *de novo*, whenever any of the foregoing circumstances exist in a marked or decided manner?—*d.* Does this malady ever arise *de novo* from the decomposition of accumulated animal excretions or exuviae, or of dead animals in a warm, humid, and still atmosphere; or from exhalations from foul or obstructed drains and sewers during states of the air favourable to their concentration?—*e.* And, lastly, is this pestilence propagated only by a specific cause, like to smallpox or scarlet fever, that may be preserved for a considerable time in *fomites*, during circumstances unfavourable to its outbreak, but may occasion it as soon as those circumstances supervene which favour its operation, viz., a high temperature and a humid and still atmosphere?

140. *A. Can remittent or periodic fevers proceeding from malaria so change their characters and properties under circumstances of crowding, of insufficient ventilation, and a high range of temperature, as to become this distemper, and to assume infectious properties?*—The solution of this question is by no means easy. The evidence bearing upon it is probably insufficient to prove the negative; but most certainly we have no satisfactory proof of the affirmative. The occasions certainly have not been few on which a large number of persons affected with remittent or other periodic fevers produced by malaria, have been confined in close apartments, or otherwise placed in circumstances favourable either to the evolution of a new character in these cases, or to the production of a distemper with different properties from those attending the pre-existent malady; and yet I can find no satisfactory evidence of such conversion of disease having occurred within the tropics, or in more temperate climates, during hot seasons. I cannot deny the possibility of this conversion; but I have not met with it on two or three occasions of this description which have fallen under my observation; and, although it has been contended for by several very respectable authorities, still the evidence in favour of it is not conclusive. In order that the necessary elements of sound con-

clusions should be furnished respecting it, the proofs of malaria and of its consequences, periodic fevers, should be adduced; and evidence of persons holding communication with others affected with those fevers in a warm, humid, and close air, becoming infected with this distemper, no other source of infection existing, ought to be furnished. The existence of remittent fever and its origin in malaria, the actual conversion of the remittent fever into the true hæmagastric infectious pestilence, and the circumstances connected with this conversion, should be fully and unequivocally shown; or, in other words, the assumption of the properties of the latter by the former, under the circumstances just specified, and the propagation of the assumed properties and converted malady, thus originating *de novo*, in a similar way to other manifestations of this pestilence in an epidemic form, ought to be satisfactorily demonstrated. I cannot, however, satisfy myself, after the diligent attention I have devoted to this topic, that these premises are so established as not to admit of doubt. We do not find in the eastern hemisphere, where remittent and other periodic fevers are prevalent, and where the occasions favourable to the conversion of them into this pestilence are as likely to occur as elsewhere, that such conversion has ever taken place, for there this pestilence is unknown. During the late Niger expedition, the occasions favourable to the conversion of the remittent fever into this pestilence must be admitted, and yet I know that this conversion—that this pestilence, did not result. Similar facts have fallen under my own observation.

141. This doctrine of *contingent infection* owes its origin chiefly to the fact of remittent fever in its worst forms having been so frequently confounded with this pestilence, and to the circumstance of the infectious nature of the latter having been so fully demonstrated as to preclude skepticism, while the belief in malaria as the original cause was still adhered to. But the undoubted and now generally admitted fact, that this pestilence attacks the same individual only once, strongly militates against the conversion in question, and against the *contingent origin* of infection, while it strongly supports the doctrine of a specific cause of the malady, different from, and independent of the causes productive of periodic fevers. That the conversion of these non-infectious fevers, under the favourable circumstances mentioned above (§ 140), into the hæmagastric pestilence, which is afterward propagated by infection, may be possible, I will not attempt to deny. I, however, believe it to be very improbable. I know that my own observation and research have not furnished me with any evidence of its occurrence that can be implicitly relied upon; and hence that conclusive proofs of the fact are still required. Besides, most of the outbreaks of this pestilence have commenced by solitary cases, without any instances of remittent fever having then existed in the locality or vicinity, and without any communication having been known between those first attacked and persons labouring under remittent fevers.

[It is doubtless true that the yellow fever attacks an individual but once in any of its endemic seats, provided he remain there a constant resident; but let him remove to a colder



climate and spend but a single winter, he will again be liable to a re-attack on visiting a tropical climate. "There is much dispute," says Dr. Dickson, "whether a Gibraltar or New-York attack will save a man from a second in Havana or Vera Cruz, or even in a subsequent epidemic visitation after a long interval. I believe the security in these latter cases less perfect, but I cannot help regarding it as still very notable, and fully proved." This protection is evidently, then, owing to the influence of acclimation, and therefore does not have an exact analogy to that observed in smallpox and measles. It is very doubtful whether one attack of yellow fever in New-York or Boston would render a person insusceptible to another attack in the same locality. All, then, that can be affirmed, in the existing state of our knowledge on this subject, is, that long residence in a warm and tropical climate, and a previous attack of yellow fever, secure the constitution for the future.]

142. *B. Can the accumulation of the sick of other diseases in a close, hot, and humid air give rise to this pestilence, or generate its seminum?*—What I have stated in answer to the former question also applies to this, and even with still greater force. Without, however, denying the possibility of such an occurrence as that involved in this question, I cannot find sufficient proof of the fact. Moreover, as this distemper possesses certain specific properties analogous to those of other infectious fevers, arising also from a specific cause—as it, like scarlet fever, measles, and smallpox, presents regular stages and periods; attacks the same person only once, and spreads among the unprotected by means of an effluvium from the bodies of those already affected by it under circumstances favourable to the concentration and operation of that effluvium—so it may be inferred to be no more the contingent result of the accumulation of the sick in a close, humid, and hot air, than any one of the maladies just mentioned as analogous to it; and we know that there is no proof of any one of them having so originated, or having been caused by emanations from the sick of diseases different from itself.

143. *C. Can the crowding together of a number of persons in a close, hot, and humid atmosphere, and more especially in the close hold of a slave-ship within the tropics, so contaminate the air as to occasion, or rather generate, this distemper, and thus produce it, de novo, whenever the foregoing circumstances coexist in a marked degree?*—That the contamination of the air, especially when it is humid, warm, and close, either by other fevers or by other maladies, or by a number of persons previously in health confined in it, will take place, so as to produce fevers of a malignant character, more especially that fever which I have called PUTRO-ADYNAMIC (see FEVER, § 484-496), I have shown when treating of that malady (§ 496); but satisfactory proofs are wanting of this pestilence ever having originated in this way. Since my visit, however, to several places in Africa, and knowing the very limited space in which a large number of slaves are often confined, both on shore and in slave-vessels, I entertained the idea that this pestilence or its seminum, or specific infection, had been generated originally by the congregation of negroes in a close

atmosphere, or is generated *de novo* by this race when placed in the circumstances now stated; and that, although it affects them in a comparatively slight manner, it is most particularly baneful to the natives of cold countries; as smallpox is comparatively mild in the white races, while it is most pestilential and fatal among the negroes. This opinion, entertained since 1817, I have endeavoured to ascertain the truth of whenever I have had an opportunity of making any inquiry respecting it; but the evidence is not sufficient to establish this as the source of the infection. The following, however, may favour the truth of this idea. A small vessel in which I was a passenger was anchored, in May of 1817, a short distance from Sierra Leone; and the ship's boat, with four of the crew, was bringing me on board, when a tornado suddenly overtaking us, we took shelter on board of a ship recently brought into the harbour full of slaves, and near which we were at the time. The men belonging to the boat took shelter down between decks. I remained under a small poop on the quarter-deck. All these men in two or three days were seized with this distemper, the vessel having just put to sea, and I escaped. The sick men were constantly kept on deck, free ventilation was enforced, and every possible precaution under the circumstances was used, and no more were attacked.

144. The organization of the negro, and the more extensive functions of the skin of this race as an excreting organ, give rise to a most offensive and foul state of the atmosphere, when numbers of this race are confined in a limited space, and particularly in a humid and warm atmosphere. Indeed, nothing can be imagined more nauseous and depressing than the respiration of air so contaminated; and it cannot be disputed that the concentrated and virulent effluvium generated from this source poisons the surrounding and sometimes stagnant atmosphere; and it may farther be admitted that it so affects the organic nervous system and the blood as to develop this pestilence, when all the circumstances requisite to the production of this effect exist in due force. The above fact, these considerations, and various occurrences or outbreaks of this distemper, after communications with slave-ships, that have come to my knowledge, induce me to attach some importance to this source of the evil, and to suggest that some endeavour should be made to ascertain the amount of credit it may deserve. At the same time, I must admit that some of the arguments I have used against the doctrines involved in the foregoing questions may be urged against this.

145. *D. Does this pestilence ever arise, de novo, from the decomposition of animal excretions or exuvia, or of other animal substances, in a warm, humid, and still atmosphere; or from exhalations from foul or obstructed drains and sewers during states of the air favourable to their concentration?*—The remarks already made also apply, in some respects, to the present topic. If the distemper ever arises from negroes crowded in a confined space, as suggested above, this question should be answered in the affirmative, inasmuch as the accumulated cutaneous excretions in these cases are mainly concerned in causing it. That the putrefaction of animal substances

in a warm, humid, and stagnant atmosphere will cause malignant fever, cannot be doubted; the only question being, whether this pestilence, or a form of fever such as I have described under the name of *putro-adyynamic* (FEVER, § 484-496), will be the result. Circumstances have proved to me the production of this latter fever in these circumstances, and in forms more or less malignant and rapidly fatal; but I have no proof of the pestilence now being considered as having originated in this latter source. The same remark applies to the concentrated exhalations from foul drains and sewers. I believe that these are quite sufficient, especially before they are much diluted by the atmosphere, to occasion the putro-adyynamic fever just referred to; but, after examining into the attempts which have been made to connect this pestilence with that cause, I believe them to have been quite futile, and by no means supported by even the slightest evidence. In many warm regions and climates, more especially in eastern countries, as shown in several parts of this work, emanations from the excretions, the exuvix, and the dead bodies of animals, combine, with the exhalations from a humid or marshy soil, to give rise to a low or putro-adyynamic fever, which may present, with more or less malignancy, evident remissions, more particularly when the terrestrial exhalations are the most influential in causing it, as shown in the article FEVER (§ 435, 484), still this fever will not acquire an infectious character with a moderate attention to ventilation and the avoidance of crowding of the sick. When, however, emanations from the decomposition of animal matters, and from drains and sewers, are concentrated in a warm and humid air, and predominate over those from vegetable matter or from a marshy soil, the resulting fever will assume more or less of the continued type and putro-adydynamic characters, and become infectious in circumstances favourable to the manifestation of this property. Still the fever hereby produced (and fully described in the article FEVER, § 434, *et seq.*), is not the pestilence now under consideration; and I cannot find any evidence that this pestilence has ever really originated in this source.

146. In thus disputing the origination of the true pestilential yellow or hæmagastic fever in several sources to which it has been very loosely imputed, it may be stated that my skepticism is caused by the entire want of evidence of the truth of such occurrences, and by the very general assumption, without any proof, of these as the sources of the distemper. I have no favourite doctrine or cause of my own to support, and no theory to subvert, merely because it is different from the one in which I believe. I am most anxious to know the truth wherever the truth is obscured or difficult of access; but I lean the most to that doctrine which is most truthful, which rests on the most convincing evidence, and which, as being itself truth, is the safest to follow, and is, moreover, the most advantageous to adopt as regards the welfare of the general community.

147. *E. Is this pestilence, like to smallpox and scarlet fever, propagated only by a specific cause that may be preserved in fomites for a considerable time, without causing it, during circumstances unfavourable to its outbreak, but may occasion it as*

*soon as those circumstances supervene which favour its operation, viz., a high temperature and a humid and still atmosphere?—That the cause is specific cannot be doubted, inasmuch as the effect—the distemper—is also specific or determinate, as the other specific maladies just alluded to.\* It has been repeatedly observed that this cause has been preserved in the bed and body clothes of those who have been affected by the disease for a considerable time, either when these clothes have been shut up from the air, or when they have remained during the cold months unexposed or unused; and that, when these fomites have been exposed among susceptible persons, and during states of the atmosphere favourable to infection, the disease has been reproduced. Thus, in several towns in the south of Spain, as shown by most of the authorities already quoted, the distemper has gradually ceased with the accession of cold weather; but it has appeared again in the summer, or as soon as the atmospheric temperature and humidity reached those grades which are requisite to the production of infection. If, therefore, it be admitted that the distemper is specific—is so determinate in character as neither to lapse into remittent fever, on the one hand, nor to pass into plague or putro-adydynamic fever on the other; and that the cause is also specific, and, like other specific causes, capable of being preserved for a considerable period without losing its poisonous properties and capability of germinating and reproducing itself and the distemper, we may farther infer, whatever may have been its remote origin, that it is not a frequent contingent production or result of the circumstances to which it has been imputed, and which have just been passed in review. If it were a contingency merely of one or more of these circumstances, it must have occurred in other warm countries besides those in which it has been so frequently observed. It must, in this case, have appeared both in the eastern hemisphere and on the shores of the Pacific, where it has never been met with. It may, however, be stated that, while this consideration militates against the contingent production of the specific poison causing this pestilence in the circumstances against which I have argued above, it in some degree supports the opinion which I have suggested, as to the not improbable origin of the distemper in the concentrated emanations from the bodies of a great number of negroes confined in the close, humid, and hot holds of slave-ships (§ 143). If this opinion as to the probable origin of the infectious poison be not admitted, there is certainly none other deserving greater confidence, and we are left entirely in the dark as to the earliest origination of the mischief, although the fact of the communicability and diffusion of that mischief cannot now be disputed, nor the circumstances which favour its communicability on the one hand, and those which prevent or retard it on the other. The cause being obviously specific, from the very determinate and specific character of its effects, we have no greater reason to believe, in the absence of conclusive proof of the fact,*

[\* The intermittent fever may be called a specific or determinate disease, and its cause is also specific. It is not necessary that the cause should be a specific animal virus in order to make the disease a specific one.]



that this specific cause is contingently produced in the course of other maladies, or in the circumstances above considered, than that the specific causes of smallpox, scarlet fever, and of other pestilences, are also contingently produced in similar circumstances.

[These facts do not certainly demonstrate the doctrine of the contagiousness of the disease, in the ordinary acception of the term; on the contrary, they are among those which led our countryman, Dr. RUSH, to abandon the belief in its contagious character, which he had held during the greater portion of his life. In his last writings on this subject (*Med. Inquiries*, vol. iv., p. 144) he remarks, "That the yellow fever is not contagious in its simple state, and that it spreads exclusively by means of exhalations from putrid matters diffused in the air, is evident from the following considerations: 1st. It does not spread by contagion in the West Indies. This has been proved in the most satisfactory manner by Drs. HILLARY, HUCK, HUNTER, HECTOR, McLEAN, CLARK, JACKSON, BORLAND, PINCHARD, and SCOTT. Dr. CHISHOLM stands alone in maintaining a contrary opinion. 2. The yellow fever does not spread in the country when carried thither from the cities of the United States. 3. It does not spread in yellow fever hospitals when they are situated beyond the influence of the impure air in which it is generated. 4. It does not spread in cities from any specific matter emitted from the bodies of sick people. 5. It generally requires the co-operation of an exciting cause, with miasmata, to produce it. This is never the case with diseases which are universally acknowledged to be contagious. 6. It is not propagated by the artificial means which propagate contagious diseases, as inoculation, swallowing the matter of black vomit, &c. To the first four of these assertions there are some seeming exceptions in favour of the propagation of this fever by contagion. I shall briefly mention them, and endeavour to explain them upon other principles. The circumstances which seem to favour the communication of the yellow fever from one person to another by means of what have been supposed to be contagions, are as follows: 1. A patient being attended in a small, filthy, and close room. The excretions of the body, when thus accumulated, undergo an additional putrefactive process, and acquire the same properties as those putrid animal matters which are known to produce malignant fevers. I have heard of two or three instances in which a fever was produced by these means in the country, remote from the place where it originated, as well as from every external source of putrid exhalation." (In what respect does this differ from Dr. CORLAND's doctrine of contagion?) "2. A person sleeping in the streets, or upon a bed impregnated with the sweats or other excretions, or being exposed to the smell of the foul linen or other clothing of persons who had the yellow fever. The disease here, as in the former case, is communicated in the same way as from any other putrid animal matters." (Dr. RUSH gives several cases in illustration of this fact.) "3. The protraction of a yellow fever to such a period as to dispose it to assume the symptoms, and to generate the peculiar and highly volatilized exhalation from the pores of the skin

which takes place in the jail fever." (This disease, Dr. RUSH maintained, was decidedly contagious, and he speaks of time, *i. e.*, protracted duration, 'rendering fevers of all kinds now and then contagious, by excretion,' &c. In ordinary cases he supposed the yellow fever was too transient to admit of the formation of this contagious excretion, but might become so in rare instances.) "4. Miasmata, whether from marshes or other external sources, acting upon a system previously impregnated with the excreted matters which produce the jail or ship fever. 5. A fifth instance in which contagion has been supposed to take place in yellow fever is, where the exhalation from the excretions of a patient in that disease acts as an exciting cause in persons previously impregnated with the marsh or other external miasmata which produce it. The activity of this exhalation, even when it is attended with no smell, is so great as to induce sickness, headache, vertigo, and fainting." (Cases in point are given.) "In the months of July and August," says Dr. R., "when miasmata are generally local, and float chiefly near to their hot-beds, the docks and holds of ships, persons who are affected by these miasmata, and sicken in other parts of the city, never communicate the disease; but after the less prepared and heterogeneous filth of our whole city has been acted upon by an autumnal as well as summer sun, so as to emit pestilential exhalations in all our streets and alleys, the fever is now and then excited in the manner that has been mentioned by a single person in a whole family. The common intermittents of the Southern States are often excited in the same way, without being suspected of spreading by contagion. Even the jail or hospital fever is vindicated by Dr. HUNTER from the highly contagious nature which has been ascribed to it upon the same principle. He remarks, in relation to this fever (typhus), 'In considering the extent and power of the contagion, I am not inclined to believe that this causes the fevers of all those who are taken ill in one family after the first, as they are all along exposed to the same vitiated air which occasions the first fever. In like manner, when a poor woman visits some of her sick neighbours, and is taken ill herself, and afterward some of her children, I would not impute the disease to infection alone, she and her family having previously lived in the same kind of vitiated air which originally produced the fever. If the cases in which the infection meets with the poison already half formed be excepted, the disease in itself will be found to be much less infectious than has commonly been supposed.' By the modes of communicating the yellow fever which have been admitted, the dysentery, and all the milder forms of autumnal fevers, have been occasionally propagated, and, perhaps, oftener than the first-named disease, from their being more apt to run on to the typhus or chronic state. 6. The last instance of supposed contagiousness of the yellow fever is said to arise from the effluvia of a putrid body that has died of that disease. The effluvia in this case act either as the putrid excretions just mentioned—under the first head, or as an exciting cause upon miasmata previously received into the system. A dead body, in a state of putrefaction from any other disease,

would produce, under the same circumstances of season and predisposition, the same kind and degrees of fever. The similarity of the fever induced by the means that have been enumerated, with the fever from which it was derived, has been supposed to favour the opinion of its being communicated by a specific contagion. But let it be recollected that the yellow fever is, at the time of its being supposed to be thus received, the reigning epidemic, and that irritants of all kinds necessarily produce that disease. The morbid sweats which now and then produce an intermitting fever, and the alvine excretions which occasionally produce a dysentery, act only by exciting morbid actions in the system, which conform in their symptoms to an immutable and universal law of epidemics." Dr. RUSH then assigns his reasons for believing that yellow fever is propagated by means of an impure atmosphere, at all times and in all places, which are chiefly the following: "1. It appears only in those climates and seasons of the year in which heat, acting upon moist animal and vegetable matters, fills the air with their putrid exhalations. 2. It is unknown in places where a connexion is not perceptible between it and marshes, mill-ponds, docks, gutters, sinks, unventilated ships, and other sources of noxious air. 3. It is destroyed by means of long-continued and heavy rains; also by frost, intense heat, and high winds." Dr. R. then proceeds to point out the advantages which are to result from a belief in the non-contagiousness of yellow fever (*Med. Inq.*, vol. ii., p. 166), to which we beg to refer the reader.

We have thus, in accordance with a sense of duty toward our distinguished countryman, whose writings on this subject have been strangely neglected by our author, given a synopsis of his leading views in relation to the nature and mode of propagation of this fatal malady. The reader will perceive that, notwithstanding the apparent difference of opinion between him and Dr. COPLAND, there is not, after all, that discrepancy which can justify the severity of language indulged in towards those who seem to hold different views on this important subject, and that, if their terms were duly defined, and exceptions and explanations regarded, there would really, after all, be little cause for disputation.

Prof. J. B. BECK, of New-York, has written as ably against the contagiousness of yellow fever as any other American author. (See *New-York Med. and Phys. Jour.*) We present but a single quotation. "There are some persons," says Dr. B., "who have contended that yellow fever may be contagious in one kind of air, and not so in another. All the testimony adduced from the fever of 1822 is directly adverse to this position. If we suppose the cause of yellow fever to enter into chemical combination with the surrounding foul atmosphere, then it would no longer be the same disease. If, on the other hand, the air serves merely as a medium for transmitting the poison to a greater distance, then no reason can be assigned why, if you approach near enough to the sick body, contagion should not display itself as well in a pure as in an impure atmosphere. It has been already shown that not merely in the pure air of the country, but even in the most impure and unhealthy parts of our city, patients sick

of the yellow fever in 1822 were uniformly approached with perfect impunity. The air, therefore, in the infected district must have been more venomous than the contagious poison itself coming off directly from diseased bodies; that is, poison diluted in atmospheric air must have been more powerful than pure, unmixed poison itself—a proposition absurd in itself. We infer, then, as the air of the infected district was more deleterious than actual contact with the sick, the poison existing in the air must have been some other than effluvia from the bodies of the sick" (*loc. cit.*).

We deem it unnecessary to enter at length upon the discussion of the contagiousness or non-contagiousness of this disease. Dr. COPLAND has exhausted the arguments in favor of the former doctrine, and it would require equal space to set forth those connected with the latter. 1. We hold it to be a specific disease, and not a high or malignant grade of bilious remittent, as held by RUSH and others. 2. It is propagated by an infected atmosphere; but in what this infection consists is entirely unknown. 3. It is not communicated from one individual to another in a pure air, in which respect it differs from all other admitted contagious diseases. 4. It does not owe its origin to those miasms which cause remittent and intermitting fevers. 5. The cause, whatever it may be, is often aided by a kind of epidemic influence, the nature of which is unknown, but which gives efficiency to the specific cause, although it does not originate the disease when that cause does not exist. 6. There are certain conditions and circumstances which act as predispositions to the disease, and there are others which act as exciting causes; but in all cases the individual must be exposed to the peculiar specific cause.]

148. VIII. NATURE OF THIS DISTEMPER.—It has been supposed that the plague of Athens, described by THUCYDIDES and noticed by PLUTARCH, was identical with this malady; and certainly the resemblance between them is strong in many points. THUCYDIDES states that it prevailed in Lemnus and other places, although not so extensively and fatally as in Athens, where it afterward appeared; that it suddenly broke out in the port, the Piræus, and extended over the city; that when it had reached the upper parts of the city it had become most fatal; and that, having ravaged Athens, it was conveyed to other places which were most populous. These are the specific statements of THUCYDIDES, and indicate a similar importation of an infectious malady and its extension from the port over the city, and to places with which the intercourse was greatest, to that demonstrated on several occasions in the south of Spain during the last fifty years. The infectious nature of the Athenian plague is still more distinctly stated by PLUTARCH, who remarks that the distemper appeared in the army with which PERICLES besieged the sacred city of Epidaurus, and affected not only it, but all those also who had intercourse with it. (PLUTARCH, *Vita*, &c. 8vo, Lond., 1729, vol. i., p. 378.)

149. Not only in their propagation, but also in their symptoms, may the resemblance between the Athenian and the hæmagastrie pestilences be traced. THUCYDIDES notices the



peculiar febrile heat, and the pale greenish yellow (*χλωρόν*) and livid colour of the surface of the body; the singular affection of the parts of generation; the excessive sense of internal heat; and the peculiar amentia, insanity, or apathy attending the distemper. The abundant bilious evacuations mentioned by him may have been the black or dark-brown matters characterizing the modern distemper, for it cannot be doubted that the black stools produced by altered blood were ascribed to black bile by the ancients. He farther notices the very rare occurrence of relapses; the fact of the disease never having seized the same person a second time; and the greater liability of strangers, and of persons from the country visiting the city, to be attacked.

150. Whatever may have been the original source of this distemper, in whatever way the cause of it may have been at first generated, and however this cause may have been afterward preserved and propagated, there can be no doubt of the appearance of it in many places and on many occasions, where it can be accounted for in no other mode than by referring it to the operation of an infectious emanation proceeding from a recently affected person, or from clothes imbued with this emanation. The difficulty of obtaining information as to the first persons attacked is always great, and sometimes impossible, as respects not only this distemper, but all other infectious diseases; and hence the early proofs of infection can rarely be obtained even as regards any of them. In respect of the outbreak of this pestilence in America, Africa, and Europe, we know that it has occurred both after and during states of season and weather of the most different and even opposite kinds; the only atmospheric requisites to its appearance being high ranges of temperature and of humidity. It has occurred in the driest and in the most marshy situations; in dry as well as in rainy seasons; after prolonged droughts, and after excessive rains; on the surface of all soils, whether rocky, sandy, gravelly, or clayey; and in ports, towns, garrisons, forts, and ships of all descriptions, both foul, clean, unhealthy, and healthy, and placed in every possible circumstance that may be conceived in respect of them. It has appeared in one or two isolated persons who had not previously breathed the foul air of sick wards or apartments; nor visited the places in which either the sick or the healthy had been confined; nor inhaled the effluvium from decomposing exuvie and animal substances; and thus, by the exclusive process of reasoning, we have left only that cause to which I have imputed it; and by means of which it is as undoubtedly propagated and perpetuated as any other malady whose infectious properties are admitted.

151. The terrestrial exhalations believed by Dr. FERGUSSON and others to be emitted from the fissures of the soil, caused by prolonged drought, or from the dried-up beds of rivulets, &c.; the wooden theory propounded by Dr. WILSON, and its combination with a limestone influence; the malaria carried by winds from great distances, or issuing forth in currents of only a few feet in diameter; the emanations from bilge-water and ballast; and the vegetative principle imagined to be thrown out from rich absorbent and alluvial soils, are the sever-

al sources which have been assigned; but are merely illusions which have played before the minds of medical theorists, and which are dissipated by a more comprehensive glance of the very different circumstances attending each outbreak of the pestilence. The chief circumstances which remain without very material alteration, in all the most destructive visitations of the distemper, are certain ranges of heat and humidity, a still atmosphere, or an imperfect renewal of the air, and a more or less dense population; all which especially favour the propagation of infection of every kind, and which are indispensable to the extensive prevalence of this distemper.

152. *The pathological inferences* which may be drawn from what has been advanced respecting the *causes*, the *symptoms*, and *course*, and the *consequences* of the distemper, may be stated as follows: 1st. Of the numerous *causes* and *sources* which have been assigned to this pestilence, there is not one which has been ascertained to have existed in all, or even in the majority of, the occurrences of it since it became in modern times the subject of medical interest, with the exception of a *specific infection*, or poisonous animal emanation proceeding from the sick, and directly, or by fomes, affecting those among the healthy who have not previously been attacked, and who are otherwise predisposed. It should not be overlooked that the majority of those who have reasoned against the operation of this cause have either wittingly or ignorantly overlooked the now well-established fact of the immunity from a second attack, produced by the first, and have attributed much importance to the escape of many of those among whom an infected person has been placed, without admitting the great probability of the majority of those having been protected by their having had the disease. This particularly applies to the intertropical parts of America, and to many of those who have written upon the disease as it has there appeared, and who have even never inquired into the manner in which this exemption affects the diffusion and prevalence of the distemper, nor in any way concerned themselves with this very important fact, although it so very materially affects the results, and although they present themselves before the profession with the dogmatism of an infallible inspiration.

153. Secondly, that the effluvium proceeding from the bodies of the affected being so remarkably offensive as to attract the notice of every observer, is itself a proof of the infectious nature of this distemper; for when it is admitted even in single and isolated cases, how much more remarkable must this fetor become when numbers are affected in a humid, warm, and still atmosphere, and in a limited space, in which circumstances even the birds in the air and the lower animals are also infected. Dr. LEMAY, who has given a remarkably correct description of this pestilence as it appeared in the island of Dominica in 1838, where it could not be expected to have been very prevalent among old residents, owing to the exemption arising from a previous attack, and where, indeed, he states the number attacked to have been small, with the exception of the military, remarks that the "odour of the cutaneous exhalations was often extremely disagreeable, as well to the patient

himself as to his attendants," and that "*the fœtor became more intolerable towards the last stage of the distemper.*" Now I believe that every one whose experience of diseases attended by much fœtor of the exhalations from the skin and lungs [is extensive], will admit that these diseases are more or less contagious or infectious, especially in the circumstances so frequently alluded to above, and where numbers are exposed to this cause, or inhale an atmosphere contaminated by these exhalations. There can be no doubt, however, that, where those exhalations are much diluted by the atmosphere in an open situation, they will generally fail in producing those effects which undoubtedly result from them in a close, crowded, and humid air, and where numbers of predisposed persons are congregated. The dissipation of these exhalations by a rapid renewal of the air is the chief cause of the limited extension of the distemper to high and open situations, and to places thinly inhabited, and is one of the chief means of arresting the progress of an epidemic, facts proving what reason asserts, namely, that on those occasions of the outbreak of the distemper in close streets and barracks, the removal of the inhabitants to open and airy grounds and encampments, so that a free perfusion is allowed under the tent-cloths, is always followed by a rapid subsidence and total disappearance of the malady. A person from the country visits a town in which the malady is prevalent, and another from a ship lands in the same town, and both persons probably visit the same place or house in which the disease exists. Both persons, if unprotected by any circumstances, and equally predisposed, are infected, but the infection will not become manifest until two or three days subsequently. The one returns into the country and is attacked, but, owing to the circumstances favouring the communication of the malady being wanting there—owing to free ventilation, a high and airy situation, and a sparse population, with numerous other favourable circumstances—the distemper either extends no farther, or extends merely to a few, even in the absence of any other sanitary measures; while the sailor returns to his ship, and in the ill-ventilated, and perhaps over-crowded fore-castle, or between decks, where he is confined, he communicates the malady to every one who is not protected by a previous attack. Now these occurrences have actually taken place, as now stated, times out of number; and, moreover, the additional fact has been often observed of a third person having come from a distant town and city, been infected at the same place as the two others, and carried the infection to such town where he has sickened, and, owing to crowding, ill-ventilation, and other circumstances favouring infection, the malady spreads rapidly, although it has proceeded no farther as respects the first person here instanced.

154. Thirdly, if we connect the circumstances attending the impression made by the exciting cause of the distemper—by the effluvium from the affected—if we consider the phenomena which immediately result, those which are subsequently developed, and the lesions which are ultimately produced, we shall have every reason to conclude that this cause produces a specific morbid impression upon the organic ner-

vous system through the medium of the lungs; that it changes the vital manifestations of this system, and contaminates the blood; and that this contamination farther affects the organic and cerebro-spinal nervous systems, which again, in their turn, react upon the vascular system and blood, until the vital tone and cohesion of the tissues and capillaries are remarkably impaired, and the vital crisis of the blood more or less dissipated.

155. Fourthly, it cannot be doubted, by any person who has seen both maladies, and who is uninfluenced by partisan views, that this pestilence is altogether distinct in its causes, its progress and course, and in the lesions found on dissection, from more malignant states of remittent fever. The admission is made by many of the non-infectionists themselves; and sufficient has been adduced above (§ 37, 122) to prove this difference. In those cases of the pestilence which proceed more rapidly to the extinction of life, the poisonous emanation which has infected the body produces but little structural lesion in its fatal course, excepting the changes in the digestive mucous surface and in the vascular system, especially in the blood. The viscera present no remarkable alteration beyond the defect of vital cohesion just mentioned, and the tendency to rapid decomposition. The pale yellow appearance of the liver, first accurately observed by the French physicians, who described the distemper as it appeared in Spain, and subsequently noticed in the West Indies by Dr. IMRAY and others, is obviously occasioned by the loss of blood from the digestive mucous surface. The loss of the vital cohesion of this surface and of the capillaries supplying it, and the more or less extensive detachment of the epithelium, with the other changes described above (§ 26, *et seq.*), are consequences of the remarkable depression of the organic nervous or vital energy, and of the changes produced in the blood by the poisonous emanation causing the infection.

156. Fifthly, that the changes produced on the blood are not merely the ultimate effects of the disease, but supervene, to a certain extent, at a more or less early stage, in consequence either of the morbid impression made on the organic nervous system by the exciting cause, or of the absorption of the cause into the blood itself during the respiratory process, or of a combination of the two modes of operation, is sufficiently evident from the appearances of the blood during the earlier periods of the malady. In the cases where the vital depression and changes in the blood are the greatest at these periods, blood-letting would be improperly, and has been rarely, resorted to; but in those cases where vascular tone and action have been less impaired, and where the blood has consequently presented the least amount of change observed in this distemper, this fluid, even at the time of its escape from the vein, has been more or less altered. It has generally been much darker than natural, and it has separated very imperfectly into serum and crassamentum. This change in the blood, remarked and described by me many years ago, is farther noticed by Dr. IMRAY in the epidemic observed by him in the West Indies. He states that "the blood, as it flowed from the arm, presented a singularly mixed appearance, as if the



vein had contained two differently coloured fluids, the one bright red, the other almost black ; and on examining the blood an hour or two after being withdrawn, the separation into serum and crassamentum had taken place very imperfectly. In the centre was observed a loose coagulum, easily broken down, the surface of which was streaked green and yellow, the serum being in large quantity, and intimately mixed with the colouring matter of the blood. These changes in the vital fluid were invariably noticed to a greater or less extent in every instance where blood-letting was had recourse to, which was always at the very outset of the attack ; and as the disease advanced to the last stage, the blood was so altered and broken down as to escape from the capillary vessels of all the mucous surfaces." (P. 92.)

157. Sixthly, the changes in the digestive mucous surface more especially, and in the crasis and constitution of the blood, favour the escape of this fluid from this surface, and these are necessarily followed, near the close of the attack, and when the black vomit and anal evacuations are very abundant, by an anæmic state of the liver, giving rise to the pale yellow hue of it so generally observed after death. At an advanced stage of the malady, more especially, and even from a very early period, the organic nervous or vital power, by which the portal circulation is chiefly carried on, is more or less impaired ; and, consequently, the abdominal organs and digestive mucous surface become congested. As vital power and the crasis of the blood are farther impaired with the progress of the disease, the congestion increases, and ultimately the digestive mucous surface allows the altered blood to exude from the weakened and overloaded capillaries ; and the discharge from these capillaries into the digestive canal proceeds with an increased rapidity as the portal circulation becomes more and more impaired. The loss of blood from this surface at last leaves the vessels of the liver comparatively empty, and the organ pale, notwithstanding the dark appearance of the blood at this period. The changes which are thus early and extensively produced in the vascular system and gastric organs, and the prominence of the symptoms referable to them during the progress of the distemper, have suggested the name *hæmagastic*, which I have used to designate the distemper, and to distinguish it from those states of remittent fever which are often attended by yellowishness of the skin.

158. Seventhly, although the digestive organs and vascular system betray the most prominent affection during the progress of the distemper, still the nervous system, and more particularly the organic nervous system, with the organs chiefly supplied by it, are very remarkably, and most probably primarily affected. The morbid impression made upon this system, and the contamination of the blood, whether they be produced in succession or contemporaneously, ultimately, at least, react on each other, until the functions of vital and of excreting organs, and the vital cohesion of the several tissues, are impaired to an extent incompatible with the continuance of life. The consequences necessarily flowing from the morbid impression made by the cause of dis-

temper upon the nervous systems are impairment of the functions of the lungs—the channel through which this impression is made—diminished secreting and assimilating actions of the liver ; and, consecutively, an almost total suspension of the functions of this organ and of the kidneys. A marked diminution, also, of the cutaneous and intestinal exhalations and secretions is present from an early period of the attack. The results of these changes, as respects the blood, are the accumulation of effete and injurious elements in this fluid, and the combination of them, as they are partially eliminated from secreting surfaces, into those specific infectious emanations which propagate the pestilence. When the alterations in the nervous and vascular systems, in the blood, and in the several tissues are approaching an acme, the altered blood exudes from the relaxed capillaries and tissues, especially from the digestive mucous surface ; and when the passive hæmorrhages which thus supervene are considerable, previous congestions are removed, and the portal vessels and larger veins are either left comparatively empty, or contain a small quantity of black fluid or semi-dissolved blood. With the failure of organic nervous power, the due adaptation of vascular tone to the states of vascular fulness on the one hand, or of vascular deficiency on the other, is lost, and the progress to a fatal issue is greatly accelerated, without the conservative influence of life being able to arrest the advance. But when the passive hæmorrhages in the last stage are considerable, the fatal result is rapidly accelerated, owing to the powers of life being inadequate to the adaptation of vascular tone and action to the amount of circulating fluid, and to the quality of this fluid being such as further depresses the already depressed state of the nervous systems.

159. Eighthly, whether the progressive alterations in the blood actually arise as stated above (§ 154), or are owing to the introduction into the circulation of the infectious molecules given off from the affected, and inspired with the air in which these molecules float, is a question which does not admit of a positive answer in the present state of our knowledge. If we adopt the latter alternative, it follows that the absorbed molecules, which infect the system, multiply themselves either in the blood or during the processes of excretion ; and that the morbid leaven thus introduced gives rise to the progressive phenomena of the disease in the process of reproducing their kind, and in the course of vital deterioration and vascular contamination.

160. The inferences which I have now attempted to draw from what appears established as to the *causes* and *nature* of this pestilence must, at least in the present state of our knowledge, be made the basis of those measures which should be adopted, 1st. *For the protection of the general community ; 2d. For the prevention of individual attacks in circumstances of imperfect general protection ; and, 3d. For the recovery of the affected.* As the measures for the attainment of the first and second of these objects are nearly the same as regards the three kinds of pestilence discussed in this article, I shall consider this important topic in a separate chapter, and with reference to each of

these pestilences. (*See PESTILENCES, GENERAL AND INDIVIDUAL PROTECTION FROM.*)

161. IX. TREATMENT.—There are very few distempers which are less under the control of treatment than that now under consideration, or in which the protective influence of life is less manifestly exerted. Persons who are the most robust, the previously healthy, the young, and those in the vigour of life, are generally the most susceptible of infection, the most violently attacked, and often the most rapidly carried off. Something, however, may be attributed to the dose of the infectious emanation, or poison, which has impressed and contaminated the frame; and something, also, may be owing to the violence of reaction in persons of a plethoric habit of body and strong constitution. In the first case, the concentration and intensity of the cause may be so great as to overwhelm even the most powerful, and to annihilate altogether that vital resistance which is always opposed, in various grades in different persons, to the influence of injurious agents; in the latter case, excessive action, while vital power is depressed, rapidly exhausts itself, and accelerates, with remarkable rapidity, those changes in the blood which so generally supervene upon high vascular action in warm climates or in hot seasons, and more especially in robust and plethoric persons who have recently migrated from a cold to a warm country. From this it is manifest that the treatment which is advantageous to persons circumstanced as these latter are, cannot be equally, or even at all, beneficial to others who are otherwise circumstanced, or to those who have resided long in a warm, or in an unhealthy climate; and it is equally obvious that medical means will be of service, or even detrimental to the person requiring them, according to the judgment regulating the exhibition of them appropriately to the morbid conditions existing in each case individually, and in the same case at the several stages of its course.

162. The treatment, also, should be modified, or even very different, according to the circumstances in which the patient is placed during his employment, for the patient who is removed into an open, well-aired, and healthy locality before he is attacked, will bear, and indeed require, very different measures from those required by persons who remain in the close, low, and infectious air of a crowded hospital, or in the sick bay of a ship-of-war. Hence the necessity of removing those who are attacked as much as possible from under the influence of the contaminated air in situations where numbers are affected, and of preventing the air surrounding them from being contaminated by as rapid a renewal of it as possible. Thus, in cases of infection in low and ill-ventilated houses and streets, removal to a well-ventilated hospital, or even tents having a continued current of air passing under the tent cloths, is most beneficial, not merely as respects the chances of recovery, but also in arresting the progress of infection, for the contamination of the air surrounding the patient is thereby prevented, at least to that degree which is hurtful to himself and infectious to others. In the instance observed by myself, of several sailors becoming infected by communicating with a slave-ship, the sick were

constantly kept on deck, sheltered only from the sun by means of an awning, open all around, and the result was most favourable as regarded the infected, the distemper not extending farther than to those men who had gone on board the slave-ship.

163. Impressed with the necessity of applying the means of cure with strict reference to the peculiarities of individual cases, and of each stage of these cases, I shall not attempt to describe the treatment which is more especially applicable to the disease as it occurs in different *constitutions* and *temperaments*, because I should thereby be led into irksome repetitions, and very imperfectly accomplish the end in view. Besides, different constitutions and temperaments are not so readily recognised, nor are they so precisely marked out, as to enable practitioners of even admitted discernment to detect them during the tumultuous disorders of function characterizing this distemper. The means which are particularly suitable to *grades of intensity*, and to the *several stages of the disease*, may be stated with more reasonable hopes of advantage to the inexperienced; still it should not be overlooked that the malady is very mutable in its character, and that an attack which may appear very slight, and by no means dangerous, during the second, third, or even the fourth day, may suddenly change its state, and become remarkably severe, or even rapidly fatal. Having particularized the several grades (§ 6, *et seq.*) and stages (§ 21, *et seq.*) of this distemper, I shall first give a rapid sketch of the treatment which appears to me the most appropriate to each *grade* and *stage*, and afterward notice those means individually which have been or may be employed, and endeavour to estimate the true value of each.

164. i. TREATMENT AS TO GRADE OR FORM.—*A. IN THE MILDEST FORM* (§ 6), our chief reliance should be placed on free ventilation, and due promotion of the several secretions and excretions; measures equally applicable to all forms of the distemper. The bowels ought to be early evacuated by means of calomel with jalap or rhubarb, or any other purgative, and afterward kept open by olive-oil taken by the mouth, and administered freely in enemata. A tepid bath or the cold affusion may be resorted to, if there be much heat of skin; and, after the surface has been carefully dried, frictions of the trunk and all the limbs with olive-oil will prove extremely beneficial, and favour a free perspiration. This object will be farther promoted, after the bowels have been freely evacuated, by the exhibition of the liquor ammoniæ acetatis and the spiritus ætheris nitrici, in bland diluents or demulcents. In the majority of cases of this grade, nothing more than the above may be required; light farinaceous articles of food and simple emollient diluents being allowed as the febrile action subsides. If, however, the abdominal excretions are not duly evacuated by these means, they should be repeated in increased doses; the oil should be more freely administered, and the oleum terebinthinæ, or common salt, may be added to the enemata, which may be repeated according to circumstances. If the malady should suddenly assume a severer form, the treatment hereafter to be described may



be resorted to. The physician should endeavour throughout to inspire confidence in the mind of the patient, and to dissipate desponding ideas.

165. *B. THE TREATMENT OF THE MORE SEVERE FORM* (§ 7) of this pestilence is generally beset with more or less difficulty. In many instances a recourse to the foregoing means may be the most judicious, at least until the more serious symptoms characterizing this form supervene; and they are the more likely to be of service if the bowels are freely acted upon by them, and if the perspiration is copious and general. In these circumstances, a recourse to the more heroic and perturbing means may be productive of more mischief than benefit. Where vascular action appears high, blood-letting has been advised by many, and many have been induced to employ it, and to repeat it even oftener than once; the seductive calm produced by it for a few hours often alluring the reckless and the inexperienced to carry it to an injurious amount. But the calm is only momentary, and is generally followed by reaction still more violent than that preceding it, although vital power and resistance are materially depressed. Unless in the circumstances hereafter to be noticed (§ 167), and regulated as will be mentioned, this measure is of doubtful efficacy, and in most instances should not be resorted to.

166. If the means now mentioned be followed by a subsidence of the disease, attention to the several secretions and excretions, and to diet and regimen, will insure recovery; but if the morbid actions assume an onward course—if the pulse become weak, compressible, unequal, irregular, or slow; and more especially if discoloration of the skin about the neck, chest, &c., appear, either alone or with increased irritability of stomach, a most dangerous exhaustion of vital power has now taken place, and powerful stimulants, or other restoratives, as about to be advised for the *third stage* of the malady, are urgently required. To these symptoms black vomit and hiccough are soon added, if they be not removed by energetic means; and in many instances such means will fail in producing the desired effect. Nevertheless, they should be employed perseveringly, and be variously associated, according to the changing features of the case. Sulphate of quinine, with camphor and capsicum, or with the addition of opium, each dose being immediately followed by a glass of Champagne; friction of the general surface with olive-oil and spirits of turpentine, or embrocations of these kept constantly applied over the epigastrium and abdomen, by means of flannel frequently imbued with them; enemata with olive-oil, turpentine, and asafoetida; and even more powerful stimulants than the above, as brandy with an equal proportion of water, ammonia, or others hereafter to be mentioned, are the chief means on which any reliance can now be placed. If black vomit be imminent, or commence, an occasional dose of spirits of turpentine with olive-oil, and two or three grains of capsicum; sulphate of quinine, with sulphate of zinc and opium; or the acetate of lead, with camphor and opium; the acetate of lead, with creasote, acetic acid, and tincture of opium, brandy in small quantity, but given frequently

with arrow-root, sago, &c., and the enemata already advised, may, even in this almost hopeless state, be followed by recovery in some instances. In all cases a careful watching for the successive changes taking place in the advanced course of the malady, and a recourse to means which are appropriate to them, with good nursing, are among the most essential requisites.

167. *C. THE TREATMENT OF THE THIRD FORM* (§ 9) is not very different from that just considered. Blood-letting, if at all resorted to, should be employed only at the commencement of vascular reaction, and be confined to the young, plethoric, and robust. It ought not to be carried so far as to produce at any time full syncope, for excessive reaction is the more likely to return when this effect is produced by it. Even in this form, and in this class of patients, it is doubtful whether or no general blood-letting is of service. I believe that it will rarely prove beneficial in those cases which remain during the treatment within the range of the contaminated atmosphere surrounding numbers of persons affected by the pestilence, or in low, humid, and ill-ventilated places. An early recourse to the tepid bath, followed by frictions of the surface with olive-oil; to purgatives and cathartics with calomel, in full doses, and promoted by enemata containing olive-oil and turpentine; and to the diaphoretics already mentioned (§ 164), ought not to be neglected. When the vascular excitement is about to lapse into exhaustion, the means already advised, as well as those about to be noticed (§ 173), are the most deserving of confidence.

168. *D. IN THE FOURTH FORM* (§ 11) of this malady, blood-letting in any mode is most injurious; and the means required for the third stage (§ 172) are early required. The early exhibition of cholagogue purgatives in full doses, and the promotion of their action by means of the enemata already mentioned, and by olive oil taken internally, in frequent doses; the warm bath, followed by assiduous frictions of the surface with olive-oil and turpentine; and an occasional dose of spirits of turpentine (from one to four drachms) with one or two drops of creasote, and two or three grains of capsicum, taken on the surface of milk, coffee, or any aromatic water, aided by the more powerful stimulants noticed above (§ 166), as the symptoms may indicate the necessity of having recourse to them, are the means most likely to make that impression upon the system which is required to subvert the morbid action, to support the conservative influence of life, and to restore the secreting and excreting functions. When yellowness of the skin, black vomit, or passive hæmorrhage supervene, the measures already mentioned, and others to be noticed in the sequel, may be adopted, although with faint hopes of deriving advantage from them.

169. *ii. TREATMENT OF THE STAGES.*—It is unnecessary to remark at any length upon the means which the pathological states characterizing these stages may suggest.—*A. THE FIRST PERIOD, or that of invasion* (§ 21), is generally so sudden in its accession, and passes off so rapidly, as often to elude the observation of the physician. In some cases, also, it is extremely slight, or the chills, rigours, or horrors characterizing it are either so little complained

of by the patient, or so imperfectly manifested, or even so entirely wanting, the disease approaching most insidiously with most of the symptoms of the second stage in a slight degree, as almost to warrant a total disregard of it in many instances. When it is present, measures should be taken to counteract the injurious impression produced on the frame by its continuance, to restore the equilibrium of the circulation, and to procure freedom of secretion and excretion. The immediate removal of the patient into an uncontaminated atmosphere; a warm bath with frictions of the surface both in the bath, and when removed from it; or warm baths medicated with aromatic and stimulating substances, and followed by frictions of the surface with olive oil; warm and cholagogue purgatives; and warm diaphoretics and diluents, are the most appropriate to this period. But we cannot expect these to cut short the disease, or prevent the accession of the other stages. All that we can hope for, seeing that this stage indicates the actual infection of the frame, is to render the periods succeeding it more mild, and more amenable to treatment, than they might prove if it had been left to the unaided efforts of nature; and possibly to prevent that contamination of the circulation which takes place, and advances with the progress of the distemper.

170. *B. IN THE SECOND STAGE* (§ 22) the treatment should always be conducted with a perfect conviction of the important truth that, however high arterial action or nervous excitement may appear, and however robust and plethoric the patient may be, both the action and the excitement are unattended by vital power or organic nervous energy or tone. Vitality is overpowered or poisoned by the infection contaminating not merely the nervous and vascular systems, but the whole frame. Hence the very general failure of blood-letting even in those cases which seemed most urgently to require it. For, owing to the relaxation of the tissues, the want of tone throughout the vascular system, and the early contamination of the blood, the vessels soon lose the power of accommodating themselves to any marked diminution of the usual amount of their contents. With this pathological state, the use of tonics and restoratives is by no means incompatible; and, as I have proved on numerous occasions, the only way of subduing excessive action, when thus associated with deficient and sinking power, is to administer the more permanent stimulants, or such tonics as are most efficacious in counteracting the loss of vital cohesion of the soft solids and of the crasis of the blood, a loss more or less rapidly advancing during the unfavourable progress of the distemper. Instead, therefore, of endeavouring, as many have advised, to overcome the vascular excitement characterizing this stage by means of blood-letting and depressing agents, I would recommend the exhibition of camphor, sulphate of quinine, ammonia, capsicum, decoction of cinchona, chlorate of potash, spirits of turpentine, wine, brandy, &c., either singly or in such combinations as the states of the case may require. During this stage the blood is not only deficient in fibrin, but also in those healthy requisites resulting from complete assimilation and free excretion of effete elements;

and the deficiency of fibrin, of healthy crasis, as well as of normal purity, increases progressively through this and the succeeding stage, until these several morbid conditions reach their acme. Now, by what means are these changes most surely counteracted or arrested in their course? If not by the above means, we shall have much difficulty in finding others more efficacious than they. It will be in vain to attempt the cure of the malady, even in this comparatively early stage, by any other means than such as are capable of producing these effects—of counteracting or arresting these changes. Can blood-letting possibly accomplish these ends? It may possibly indirectly aid other measures to this effect; but this is the utmost amount of its agency as respects the blood; and it may save, in a few instances, some important organ from injury during the height of reaction. With this latter view it is most frequently practiced; but I much doubt its capability of producing this effect in this distemper, and am inclined to believe that this solitary advantage is more than counterbalanced by several unfavourable contingencies; for the increased loss of power, consequent upon blood-letting during morbid states of the blood, is as frequently followed by hæmorrhagic or serous effusions or exudations as the pre-existent state of vascular fullness; for, after blood-letting, the accommodation of vascular tone to the amount of the vascular contents is deranged, and various consecutive changes take place that might not otherwise have occurred. In some of the less violent states of vascular excitement, when the pulse is less rapid, and less expansive or tumultuous, where it is less open, and presents more of tone than is observed in the more violent and rapid states of vascular excitement, the liquor ammoniæ acetatis, with potassæ nitras, and spiritus ætheris nitrici, taken either in camphor mixture, or in the decoction or infusion of cinchona, will often prove of manifest service, especially after the bowels have been freely evacuated, and the functions of the skin restored by the tepid bath, and frictions with olive oil.

171. In this period the urgent thirst usually present should be alleviated by spruce beer, soda water, or by water rendered pleasantly acid with vinegar, raspberry vinegar, lime-juice, &c. Of these I prefer either of the kinds of spruce; but the selection should partly be guided by the nature of the medicines prescribed, and the quantity taken at each time should be small, as large draughts, especially of cold fluids, are very soon afterward followed by vomiting. Even at this stage of the more severe cases, and especially of the 3d and 4th forms (§ 9-11) of the malady, restorative and stimulating beverages, taken often, but in a moderate quantity at a time, are frequently of service, and are the only drinks which should be allowed. Of these, Champagne or hock, with soda water or Seltzer water, or with milk; small quantities of brandy in spruce beer; and, in other circumstances, Seltzer water with milk, or milk with lime water, are to be preferred. In general, it is preferable to allow a considerable portion of the fixed air to escape before the fluids containing them are taken, as this air distends the stomach, occasioning a reaction of its coats, followed by the rejection of the distend-



ing body, in the form either of painful eructations or of vomiting.

172. *C. THE TREATMENT OF THE THIRD STAGE* (§ 23) has been partly anticipated (§ 168, 171). In the favourable cases of the distemper, the vascular excitement glides into a calm, attended by a return of the secretions, and by a general and genial warm perspiration; and the third stage, or that of vital depression or exhaustion, can hardly be said to have appeared. But, unfortunately, in the more violent attacks, and when the vascular excitement of the second stage has been excessive or violent, vital power is so depressed or overwhelmed as to be unable to make the usual resistance, or it sinks in the struggle. When such sinking or exhaustion appears, whether suddenly or more gradually, the energies of life require to be supported by means which may be rationally inferred to be commensurate with the existing depression. It will be seen, from what I have stated above (§ 170, 171), that I would advise the depression characterizing this stage to be anticipated by a somewhat earlier recourse to stimulants than has been advised by some writers; for I am confident, from my limited experience in this distemper, and from a more familiar acquaintance with the vascular excitement attending the earlier stages of other malignant fevers, that a judicious recourse to those remedies may be had much earlier in these diseases than has usually been advised. This fear of stimulants and restoratives has arisen from the rapid, tumultuous, and expansive state of the pulse; the restlessness, nervous excitement, and harsh heat of skin, so generally present, so frequently misinterpreted, and so injuriously treated by evacuants and other lowering remedies; the remarkable loss of power accompanying this state, and the morbid condition of the blood—circumstances strongly militating against such treatment—being entirely overlooked, or, if taken into account, being inaccurately estimated.

173. Anticipating, therefore, with more or less decision or activity the accession of vital depression in this stage, by commencing the exhibition of stimulants before the stage of excitement or reaction has altogether ceased, these medicines should be still more strenuously prescribed after this stage has actually supervened. In the fourth form of the malady, where vital reaction or excitement is very imperfectly developed, the treatment appropriate to this period should be employed without hesitation or delay. In several instances of the distemper which came under my care in Africa, I had exhausted the various combinations of camphor with nitrate of potass; of ammonia, ether, and aromatic spirits; and of cinchona, serpentaria, and capsicum, in the treatment of this stage, without deriving that benefit from them which I had expected. I then had recourse to the following: to warm clothes imbued with spirits of turpentine and kept constantly applied to the epigastrium, abdomen, and insides of the thighs; to brandy with an equal quantity of warm water, or in sago, arrow-root, or in spruce or ginger beer, &c.; to enemata with oil, spirits of turpentine, and camphor, or asafetida; to camphor with capsicum, either in the form of pills or bolus with opium, or rubbed up with olive oil and taken on

the surface of some aromatic water, or spirits and water; to Madeira and other wines, either alone or with soda water and ammonia; and, when hæmorrhages and black vomit either were threatened or had appeared, to spirits of turpentine in various forms and combinations and the results were certainly most beneficial, several cases having recovered that presented some of the worst symptoms of this stage of the malady. The quantity of wine or of spirits taken in some of these cases was most remarkable, and generally with no other effect than that of allaying the sickness and vomiting, and calming the restlessness, tremour, and delirium. It was often found necessary to the securing of a successful issue, in these cases, to repeat the stimulus frequently, and to continue the treatment for several days. It was remarked that thirst, heat at stomach, and anxiety were more certainly removed by these stimulants than by milder fluids, or by simple diluents. I have mentioned these means, having experienced their good effect; but it is very probable that the addition of *creosote* to some of them, as to the camphor, capsicum, and opium, and that the farther addition of the acetate of lead to the *creosote* and to these would have increased the benefit derived from them.

[As yellow fever assumes different types in different years and different latitudes, so, also, it requires modifications in the modes of treatment. Dr. IMRAY has alluded to this circumstance with respect to the disease as it prevails in the islands of Martinique and Dominica, which are both mountainous, and have a similar climate and temperature, and yet in the one, while blood-letting proved a most efficient and successful remedy, in the other it proved equally destructive, and had to be entirely abandoned. The same remarkable circumstance has been alluded to by Dr. NOTT, of Mobile, who witnessed five epidemics of yellow fever in that city in different years (1837, 1839, 1842, 1843, 1845), each of which presented some predominant peculiarity of type, and all demanded some modification of treatment. As a general rule, it is now admitted by American practitioners that yellow fever is not a disease which demands active depletion, and that the lancet is to be used with great prudence and caution, and only in the first stage of the disease. "If you determine to resort to it," says Dr. DRICKSON, "place your patient half erect, make a large orifice, and draw from the vein at once a sufficient amount to make a forcible impression on the system. You will thus fulfil your purpose of the reduction of vascular excitement with the least absolute diminution of the original powers of action and resistance of the constitution." Dr. D., however, admits that, in the treatment of the ordinary inflammatory form of the disease, the first and principal indication is, to reduce vascular excitement, which is to be done by the most prompt and efficient means compatible with the well-being of the patient. "A few hours," says this experienced observer, "at the very commencement of the attack, comprises all the time allowed us for the hopeful application of our remedies, as we have to contend with scarcely any disease in which the vital powers are so soon crushed and overwhelmed beyond the capacity for resistance. The force of morbid

determination, too, is chiefly directed upon an organ at once of the utmost importance and of the greatest delicacy—the stomach—whose sympathies involve peculiarly the tone and energy of the whole system.” And yet Dr. D. thinks that the lancet is by no means an essential or even general remedy in yellow fever. As a substitute, he prefers the cold bath, which, he states, is equally effectual in subduing morbid excitement and controlling irritation, without any positive expenditure of, or subtraction from, the vital forces. Cold water is to be freely poured over the patient—seated in a convenient vessel—in a large stream, until the heat of skin, thirst, headache, pain and irritability of stomach, &c., are abated; and this process is to be repeated as often as these morbid symptoms return. It is very probable that the cold, wet sheet would answer the same indications. Emetics are to be wholly proscribed. Mild purgatives, as of calomel, followed by oil or sulphate of magnesia, are considered indispensable by many, as the bowels are for the most part torpid. All bulky or nauseating formulæ will be instantly rejected. Dr. DICKSON relies, in a majority of cases, upon the mercurial treatment, without the use of diaphoretics, persisting in free doses of calomel, until the patient has become better, or ptyalism brought on. “It is a matter of great importance,” he observes, “that this shall be accomplished speedily, in order to arrest the destructive and rapid progress of this terribly malignant disease. Many and various are the measures proposed, with a view to hasten the excitement of the mercurial action in the system. Some rely on opium, as checking its purgative effect; some regard alkalies as specifically adjuvant. I am convinced that we shall succeed best by a judicious attention to the general symptoms. By the cold bath and the cathartic, affusions upon the vertex, and cups or mustard poultices upon the epigastrium, we relieve morbid local determination, and diminish diffused excitement; relaxing cutaneous constriction, deriving to the extensive surface of the intestines, whose vessels, congested and engorged, are unloaded by soliciting free mucous discharges.” The prostration and collapse are to be met by quinine, or the infusion of cinchona with an aromatic, and a little alkali, as soda or potash; also by camphor and opium in properly regulated doses. Hæmorrhage from the bowels is said to be best controlled by nitrate of silver given in doses of one fourth to half a grain; also by enemata. Where there is an oozing of blood from the gums, pledgets, dipped in a strong solution of it, should be held in the mouth. Stimulants, as recommended by Dr. COPLAND, have generally proved entirely inert in this stage of the malady. *Capsicum*, in combination with opium, is undoubtedly one of the best. The *spt. terebinth.* will irritate the stomach, increasing the gastric distress, without accomplishing any useful object. In the last stage, most writers agree in the propriety of giving alcoholic stimulants freely, especially rum, or brandy in combination with milk, arrow-root, sago, rice gruel, &c.

Much attention has been recently paid to the effect of large doses of *quinine* in the treatment of yellow fever, not administered during

a remission, but in the very incipient stage of the disease, before any local lesions have occurred. Our army surgeons at Vera Cruz, we understand, have recently employed this remedy with great success in this disease, in large doses, as thirty, forty, and even sixty grains, with the effect of producing a rapid subsidence of the violent symptoms, and speedy convalescence.]

174. iii. REMARKS ON VARIOUS METHODS AND MEANS OF CURE.—*A. Blood-letting.*—It is generally found that the usual mode of treating fevers, occurring to persons who have recently migrated to places within the tropics, sanguineous depletions—a mode generally found beneficial, and even necessary in young and robust Europeans—is not only inefficacious, but often highly injurious, even in those persons when attacked by this pestilence. The experience of Dr. IMRAY as to this very important topic is so accordant with my own, and with that of the most discriminating and judicious physicians, that I shall adduce it here in almost his own words. Although a few instances, he remarks, of recovery take place after blood-letting, yet the effect seems rather an acceleration of the fatal event. Where, from the onset, the pulse is feeble, and the prostration of strength extreme, the abstraction of blood is clearly contra-indicated; “but, on the other hand, when the patient is young and robust, the pulse strong, the skin burning hot, and gastric irritation constant, it at first sight seems evident that a prompt and decisive use of the lancet is urgently demanded; and yet, when depletion is carried to its fullest extent, the only good effects produced are but a temporary alleviation of the symptoms.” When the blood is allowed to flow until faintness or actual syncope take place, the patient afterward expresses himself greatly relieved; the violent headache, pains in the back and lower extremities are removed, and the skin becomes cool and moist. This respite, unhappily, lasts but a very short time, giving place, after one or two hours, to a renewal of all the symptoms, perhaps in an aggravated form. If blood-letting be again practiced, the same result follows as from the first bleeding, “and to whatever extent it may be carried or however often repeated, no permanent impression is made upon the disease; but the stage of collapse is hastened, and the strength becomes much impaired by the loss of blood, rapid sinking being the consequence” (p. 85). It will generally be found more beneficial in cases of local congestion or prominent affection of an important organ, especially where moderate blood-letting is indicated, to have recourse to local depletions, by cupping below the shoulder-blades, or by leeches behind the ears, or in other situations, and to an amount which will be indicated by the circumstances of the case, than to resort to large bleedings from a vein.

175. *B. Mercurials*, more particularly *calomel*, have been much employed in this distemper since they were so strenuously recommended for it by Dr. CHRISHOLM; but in this, as well as in all other malignant diseases, confidence in them, either alone or chiefly, will be followed by disappointment. In the West Indies and America, in the south of Spain, and in Africa, *calomel* has been given by many physicians for



the cure of this pestilence, in large and frequently-repeated doses, with the view of bringing the system under its influence as speedily as possible; but the difficulty of effecting this object was generally in the ratio of the severity of the malady. It is stated by Dr. IMRAY, that "the more malignant the symptoms the less probability there was of the calomel exerting its specific action; but even where this object was attained, the patient could never be pronounced absolutely safe, inasmuch as cases terminated fatally when calomel had been given in large quantities, and the system was decidedly under its influence;" and that, when the desired object of salivation was produced by enormous doses of calomel, "recovery, if it did take place, was much protracted, and intolerable sufferings inflicted on the patient. In the more malignant cases, the only approach to salivation was swelling and soreness of the gums, tongue, and throat, with a decided increase of the tendency to hæmorrhage from the mucous surfaces." There can be no doubt of the accuracy of these remarks as regards a recourse to frequent and large doses of calomel when given alone; but when full doses of this medicine are prescribed early in the disease with purgatives or cathartics, or when they are continued after free evacuations of the bowels, in conjunction with large doses of camphor, capsicum, and opium, a much more beneficial result is produced by them. I have had many opportunities of testing the effect of large quantities of calomel given alone in several malignant distempers, and have observed the general failure of the practice; but when the calomel was conjoined with equally large doses of camphor, capsicum, and opium, and employed, thus combined, early in the disease, the result has been very different, more especially when these remedies have been aided by the application of the warm epithems and frictions of the surface, and by the enemata already recommended (§ 166); recovery having very frequently taken place in most unfavourable cases and circumstances, and often without salivation having been produced. Much, certainly, was to be ascribed to the medicines conjoined with the calomel and to the rest of the treatment; but something certainly was also owing to this latter substance. I believe, however, that the effects of these conjoined means are much more beneficial than may be inferred from their individual operation, not only in removing the irritability of the stomach and internal congestions, but also in restoring the secretions and excretions, and in calming the perturbation of the nervous and vascular systems. The quantities of those substances which I have prescribed, and the intervals between the doses, have varied much with the character and nature of the attack; but I have given from 5 to 20 grains of calomel, with 3 to 15 of camphor, 2 to 5 of capsicum, and from one third of a grain to one grain of pure opium every four or six hours; and in some instances, where it was not necessary to give the former of these substances so frequently, I have prescribed even a larger dose of the opium.

176. *C. Purgatives* are required in all the forms of this pestilence, and more especially early in the attack, not merely for the evacu-

ation of accumulated morbid secretions and excretions, but also for the promotion of the functions of the liver and intestines, and the selection of them is generally a matter of some moment. A full dose of calomel may be given with jalap or the compound extract of colocynth, and half a drop or drop of croton oil, and be followed by the infusion of senna, with a neutral salt and an aromatic tincture, and shortly afterward by the oleaginous enemata already advised (§ 164, 166). These will be less apt to offend the stomach if one or two drops of creasote be added to each dose. The quantity of calomel may vary from 5 to 20 grains, and may be taken with the other ingredients in the form of bolus or of pills. After the free action of these, the frequent recourse to sweet oil, in the earlier stages, and of this oil with spirits of turpentine in the last stage, as noted above (§ 166, 173), aided by enemata, will generally procure a sufficient evacuation of the bowels, more especially if calomel be given with camphor, capsicum, and opium, as already mentioned (§ 175).

177. *D. The irritability of stomach*, so constantly attending the disease, is not only a distressing symptom of itself, but is one interfering remarkably with the exhibition of medicines, and preventing their retention by the stomach and passage into the intestines. In order to allay this state, various means have been devised. Blisters, bleeding, opium, effervescing medicines, &c., were those most commonly had recourse to when I visited intertropical countries in 1817 and 1818; but I soon perceived their general inefficacy. Bleeding often aggravated, although it frequently mitigated for an hour or two, this symptom. Blisters produced only a very temporary effect. Effervescing draughts occasioned a more rapid and complete evacuation of the stomach, and often a painful reaction of this organ upon the distention produced by the fixed air. Opium often produced no sensible effect when given alone, or with fluids, it being generally thrown off; I therefore gave it with full doses of calomel and capsicum, and found great benefit derived from it. The beneficial influence of these upon the state of the stomach was much promoted by the application of turpentine epithems over the epigastrium and abdomen. In the first and second stages of the distemper these means will often prove most serviceable; and very probably the addition of *creasote* will farther promote their efficacy, not merely in these stages, but also in the third stage, when the antiseptic and anti-emetic properties of this substance are so remarkably required. In this last stage, it is remarkable that the vomitings are more completely allayed by a most nauseous medicine, viz., by the spirits of turpentine, than by any sedative or narcotic, especially when taken on the surface of milk or some aromatic water, &c. The irritability of stomach in the slighter cases is often removed by means of almond emulsion, or of sweet oil with calcined magnesia and small doses of tincture of opium, taken after short intervals, especially when these are aided by the turpentine epithems on the abdomen and purgative enemata (§ 166).

178. *E. Tonics, stimulants, and antiseptics* are severally more or less serviceable in this dis-

temper, but I believe that they are rarely prescribed in sufficient quantity to make a due impression on the system in its existing state of vital depression.—*a.* Formerly cinchona, in various forms, was employed, but was either inert, or not retained on the stomach unless conjoined with camphor, or ammonia, or capsicum. I have given it in substance, in large doses, and in these combinations in as much as half a pint of Madeira, in malignant remittent fever, with great benefit; but in this distemper it is neither so frequently retained by the stomach, nor so beneficial when retained. The sulphate of quinine is now substituted with great advantage in the former disease; but it has been found much less serviceable in the pestilential distemper. Dr. IMRAY states that, while the stage of excitement lasted, no opportunity was afforded of exhibiting quinine, and when this stage subsided, and that of collapse came on, it was completely inert, even in the largest doses; and he adds that it was also equally inefficacious in arresting the malady if given at the commencement of those cases which were accompanied with extreme vital depression. There can be no doubt of its general inefficacy in the last stage, and even early in the fourth form (§ 11) of the distemper; for, in these states of vital exhaustion, it is either imperfectly, or not at all, dissolved in the stomach, even when retained; and even granting that it is dissolved, the degree of depression is so great as not to be roused by it alone. Hence the bark in substance, taken in wine, with ammonia, capsicum, &c., as mentioned above, would be preferable, if it were retained by the stomach. I would advise that quinine should be given earlier in the disease than it usually has been, if given at all. The existence of vascular reaction ought not to delay its exhibition, which should be directed in full doses, and generally conjoined with camphor, capsicum, and opium or creasote, or both, according to circumstances; for it should be recollected that, however tumultuous and excessive vascular action may seem, vital power is so deficient as to render tonics and stimulants indispensable to the reduction of such excess.

179. *b.* Mention has been made (§ 173) of those *stimulants* which I have employed in this distemper. In one case, to the notes of which I have referred, I find that somewhat more than two bottles of brandy were taken within twenty-four hours in the treatment of the period of exhaustion, besides some Madeira, the patient having rallied and ultimately recovered. Dr. IMRAY states that few stimulants were found to answer so well as Champagne. "If any irritability of stomach remained, a greater or less quantity of this wine, sometimes as much as half a tumblerful, was given every hour or half hour, alternated with farinaceous food containing brandy; and in some instances the quantity of stimuli taken, with merely the effect of warding off impending fatal sinking, was truly surprising." The circumstance most to be dreaded, and, indeed, to be prevented by an earlier recourse to stimuli than is usually advised, is exhaustion of the vital power of the stomach, so as to be past being influenced by this class of medicines. If, however, the cold, clammy feel of the body and the sinking of the pulse have come on before stimulants are ad-

ministered; and if the pulse rise in strength, and if a glow of returning warmth be diffused over the surface, the best hope may be entertained of the patient's recovery, notwithstanding the late period at which they have been exhibited; but the strictest care will be required for several days to prevent symptoms of sinking from supervening. *Brandy, Madeira, hock, &c.*, taken in soda water, generally with the addition of the sub-carbonate of soda, or carbonate of ammonia, or in spruce beer, Seltzer water, &c., or the former in arrow-root, sago, &c., are generally of service in the more severe states of the malady, and when the stage of excitement is about to pass into exhaustion.

180. *c.* Of medicinal stimulants, *camphor, ammonia, capsicum, &c.*, are most deserving confidence in this malady, especially when conjoined with *opium and aromatics*, or with the preparations of cinchona. *Spirit of turpentine* is, however, the most generally applicable, as respects both the state and stage of the distemper and the modes of administering it; and it is even more certainly beneficial when given during the stage of excitement, especially conjoined with other oils, so as to act freely on the bowels, and administered in enemata, as noticed above (§ 166, 173). When the stage of exhaustion is approaching, or has supervened, and indications of passive hæmorrhages or black vomit appear, it then should be prescribed in smaller and more frequently repeated doses, with small quantities of tinctura opii, capsicum, or other aromatics, and administered largely in enemata, with camphor, asafoetida, &c., or with tinctura camphoræ composita. Much of the advantages derived from this substance result in this as well as in other malignant diseases from the mode of prescribing it, according to the varying states of morbid action; and the modes most appropriate to these states are to be learned only from attentive observation of its effects in various circumstances. It will be more easily retained by the stomach when vital depression is very remarkable, if a drop or two of creasote, or of cajepout oil, or of tinctura capsica, be added to each dose.

181. *d.* The use of *antiseptics* in this and other malignant diseases was more generally adopted by the older than by recent writers. The humoral pathologists recognised the virtues of those substances which possessed antiseptic properties; but with the adoption of the doctrine of HOFFMAN and CULLEN, the possibility of antiseptics proving serviceable was disputed and even denied, because they believed that benefit from these substances was inconsistent with their doctrine. Thus an important class of medicines for the most dangerous states of disease was sacrificed to a theory, and the results of sound and close observation were despised, because they could not reconcile them with their limited views. Many of the substances which act as stimulants act also as antiseptics, and serve to prevent the tendency to a dissolution of the vital cohesion of the tissues, and of the crisis of the blood, characterizing the malady, and manifesting itself even before life is extinct. The preparations of *cinchona, camphor, the chlorides, the chlorate of potass, the terbinthinate substances, creasote, aromatics, &c.*, severally exert not only a stimulating influence on the vitality of the frame, but



also an antiseptic effect not merely on the digestive mucous surface, but also upon the whole body, by imbibition and absorption into the circulating fluids, if the exhibition of them has not been delayed until the powers of life are sunk too low to be impressed by physical agents. The cause of the failure of most of these agents in pestilential and malignant distempers is often to be attributed either to the late period of the malady in which they are prescribed, or the inadequate doses in which they are given.

182. *F.* With the *chemical pathology* of West Indian fevers, Dr. STEVENS introduced a different practice in their treatment from what had hitherto been adopted; but, as might have been expected by those who have studied the laws of living bodies, in connexion with those displayed by inert matter, the practice has not justified the praise lavished on it by its author. The chemical doctrines of LIEBIG, with reference to physiology and pathology, have tended to impart much greater importance to a purely chemical treatment of disease than might otherwise belong to it; still, chemical agents, as aids to the due development of the controlling influence of life, ought not to be overlooked, but should be rationally employed, under the guidance of observation and experience. The important truths, that the chemistry of living bodies is not the chemistry of inert matter; that the vitality of the body develops a vital chemistry of its own, and controls the chemical actions of material elements to its own ends; that it is only the deficiency or loss of vitality that allows purely chemical actions to be manifested, while the due ascendancy of this principle converts them from their natural and purely chemical tendencies, and directs them to its own purposes; and that due energy should be imparted to this principle when we wish to develop those chemical changes which are strictly vital, and which are indispensable to the continuance of animal existence—ought never to be lost sight of in our speculations on the treatment of malignant and pestilential distempers, and should be made the basis of our indications of cure.

183. Dr. STEVENS justly stated that the colour of the blood was changed in the more malignant cases of fever; but he was not equally correct as to the loss of the saline ingredients of the blood, nor even as to the cause of the loss of the colour of this fluid. The still more important loss of the fibrin of the blood had not its proper place assigned to it in his appreciation of the changes evinced by the circulation. Believing that the alteration of the blood arose from the loss of the saline ingredients, he prescribed the neutral non-purgative salts, viz., the *chlorate* and *nitrate* of potass and the *carbonate* of soda, at short intervals and in moderate doses, and confided in them entirely. There can be no doubt of changes in the blood occurring in the course of the disease; but these changes are not of a purely chemical nature; for, even admitting that a partial deficiency of the saline ingredients of the blood is actually present, it is evident that this deficiency arises rather from a want of an accustomed supply of these ingredients during the course of the disease than from any increased loss or waste of them, as shown in another place. They are

strictly a part only of those changes which depend upon the state of vital influence, or of organic nervous power in the several viscera; the deficiency of fibrin being even greater and more remarkable than that of the saline ingredients. The treatment of Dr. STEVENS, as well as his pathology, was too exclusively chemical to be consistent with actual morbid conditions. He saw a portion, and that but a small portion, of the mischief; yet that little was large enough, in his eyes, to intercept the view of much more important truths. The puny progeny of his mind was rapidly nurtured by his imagination into premature and gigantic growth, but like all objects attaining large dimensions prematurely, it wanted the vitality necessary to endurance. While he unwarrantably magnified changes which he considered to be chemical, he mistook their origin, and entirely overlooked those which are vital, which depend upon the state of vital endowment. He did not even appear to recognise any alteration that was vital. What was most prominent and unmistakable was altogether hid from him. The highly diseased condition of the blood was sufficiently obvious; but it was also equally obvious that the alteration was much more vital than chemical. Dr. STEVENS's theory, failing in support from observations and experience, has fallen "like an inverted cone." Dr. IMRAY thus states the results of the treatment which was based upon it: "Unhappily, the salutary change said to be effected by the action of the neutral non-purgative salts did not take place, as may be inferred from the malignant symptoms continuing unabated. Notwithstanding the exhibition of these salts in large doses, and the administration of the carbonate of soda, muriate of soda, chloride of soda, nitrate of potass, &c., variously combined, yet in no instance in which they were prescribed could it be said that they produced any marked effects, either in preventing malignant symptoms, or in removing them after they had made their appearance."

184. The inefficiency of this treatment has partly been owing to the erroneous views entertained by its author respecting it, and to the circumstance of its being confided in solely, to the neglect of other and more important remedies. If certain of these salts had been employed as adjuvants of other means in states and combinations appropriate to existing morbid conditions, I believe, from my experience of them in other malignant distempers, that more benefit would have been derived, especially if they had been prescribed before the vital powers were too far reduced, and before the consequent changes had proceeded too far to be influenced by them. The *chlorate* of potass was recommended many years ago by Dr. GARNETT and others; and for more than thirty years I have employed it in the low adynamic states of fever, more especially in malignant scarlet fever, with carbonate of soda and *hydrochloric ether*, in the decoction of cinchona or the infusion of valerian; combinations which, with some modifications or additions, might be prescribed with advantage in this pestilence, if not delayed until a too advanced period.

185. *G.* The *external means* which offer the most advantages are, during the first or cold stage, or that of horror and invasion, the warm

bath, followed by frictions of the surface with warm olive oil, and sinapisms or turpentine embrocations over the epigastrium. When the period of excitement and vascular reaction has supervened, the hair should be removed from the head, and cold applications, or the cold affusion, be prescribed, and repeated or continued according to circumstances. The tepid bath, or cold sponging of the whole surface, is generally as beneficial as it is grateful to the patient in this stage; and when either the one or the other is followed by frictions of sweet oil, a copious and general perspiration usually supervenes, and proves critical, especially when aided by the warm sudorifics, particularly the liquor ammoniæ acetatis, spiritus ammoniæ aromaticus, and the æther hydrochloricus, or spiritus ætheris nitrici, as advised above (§ 164). In the last stage, and even early in the fourth form of the distemper, the external applications should be of a different kind from those required in the second stage. Warm and rubefacient substances are now required, the same means as are advised in another part of this article being also the most appropriate in these states of the distemper. (*See* PESTILENCE, CHOLERIC, § 179, 180.)

186. *H. During convalescence* the utmost care is requisite to prevent a relapse, especially into that state of dangerous exhaustion or depression marking the third stage and the fourth form of the malady; a relapse being the more to be dreaded the earlier the period of convalescence, and the more liable to occur when the patient has been rescued from sinking by recourse to powerful stimulants and restoratives; for in these cases the too early suspension of these remedies allows the distemper to resume that course which had been arrested only for a short time by their aid; for if they be altogether or even partially relinquished before the secretions and excretions are restored, and the condition of the blood very materially improved, the disease returns, the morbid actions characterizing it being only suspended for a while under the influence of the agents which had been administered. When convalescence is farther advanced, the distemper having altogether ceased, recovery generally takes place more or less rapidly without any disposition to relapse, unless errors of diet, excesses, or most injurious exposure to noxious influences have occurred; and even in these cases it is doubtful whether or not the consecutive disease is the same as that from which the patient had recovered; for it must be obvious that a patient convalescent from this distemper cannot be exempt from the operation of malaria, or of other causes of disease, but, on the contrary, more likely to be affected when exposed to them, owing to existing debility and impaired resistance of vital power to injurious agents. During convalescence from this as well as from other pestilential maladies, very nearly the same measures may be adopted as have been advised in another place, with such modifications as the circumstances of particular cases may suggest. (*See* PESTILENCE, CHOLERIC, § 215-217.)

#### [APPENDIX.]

For the following valuable notes on the yellow fever at Vera Cruz, &c., we are indebted

to the kindness of P. S. TOWNSEND, M.D., the able author of the work on this disease, so often quoted, and the well-known translator of VELPEAU's Operative Surgery.—(Ed.)

YELLOW FEVER AND OTHER DISEASES OF THE AMERICAN TROOPS, SAILORS, AND MARINES AT VERA CRUZ, NEW-ORLEANS, LAFAYETTE, MOBILE, TAMPICO (!), &c., 1847.—PREVAILING DISEASES OF THE AMERICAN ARMY ON THE TABLE-LANDS OF MEXICO, AS AT JALAPA, PEROTE, PUEBLA, MATAMORAS, CAMARGO, MONTEREY, &c.

During this present summer of 1847 there have rapidly occurred in the Gulf of Mexico some of the most instructive lessons on the subject of the origin and communicable, transportable or importable, and contagious and infectious nature, and specific *sui generis* character of yellow fever (as contrasted with other diseases), that are to be met with in the history of this disease. These facts have resulted from the present war of the United States with Mexico, and the extensive and sudden accumulation, within the tropics, of bodies of troops, and sailors, and marines, almost exclusively, or at least *two thirds* of them, unacclimated, robust northern men, and employed on various expeditions against the Mexican seaports and interior towns. During the past spring some 15,000 to 20,000 volunteer troops and regulars, mostly from our northern and western States (Illinois, Indiana, Ohio, Mississippi, Kentucky, Tennessee, Pennsylvania, and New-York), together with a naval fleet of one 74, several frigates and steam-frigates, sloops of war, brigs, gun-boats, and small steamers, manned by four thousand seamen and marines, assembled before Vera Cruz. The volunteers and regulars were brought thither chiefly by the way of New-Orleans, in a short run of a few days, in United States steam-transport and other craft, as ships, brigs, &c., and some from ports in the middle and northern states. The *transports alone* that carried the troops, first to Tampico, but chiefly to the island of Lobos, near Vera Cruz, and soon after to the anchorage of Anton Lizardo, within five to ten miles of Vera Cruz, where our naval armament were moored, amounted to near 150 or 200 vessels, chiefly of large dimension, and a considerable number of which were steamers. The entire coast of the Gulf of Mexico, from the mouth of the Mississippi River to Vera Cruz (lat. N. 19°), was, for the first time in history, alive with *crowded* expeditions, chiefly of *northern men*, and all natives of high latitudes or extra-tropical countries.\* All this occurred for the most part in the beginning of March, and about the middle of that month Major Gen. SCOTT landed from our squadron, in the space of a few hours, some 15,000 of these raw northern troops, including a large battalion of marines, upon the strip or margin of *gravel, sand, and sand hills*, which here, for miles and miles, forms the coast of Mexico, in the midst of which arid spot, *perfectly destitute of all marshes, lagoons, or malaria*, Vera Cruz is situated. During all these embarkations, transportations, and debarcations, whether at Tampico, just

\* Though *four fifths* of the soldiers and sailors were Americans from latitudes north of 34° N., the other fifth were almost exclusively Irish, with a few Germans.



without the tropics, or at Lobos or Vera Cruz, both in about 19° N. lat., scarcely a single soldier, or sailor, or officer died of any disease or fever whatever, though all were of robust constitutions, well fed and well clad, many of them (as the volunteers) *wealthy* farmers, and all un-habituated to a tropical climate, and most of them thus brought, by the aid of steam chiefly, *suddenly* into the neighbourhood of Vera Cruz, within a month after leaving their northern homes. In all this time *not one died of yellow fever*, although the temperature during March and April was, for the greater part of the time, ranging above 80° F. More than this, the troops before and during the bombardment of Vera Cruz, and at the time of the surrender of that town and of the Castle of San Juan de Ulloa, and afterward, lay for a month in their encampments of tents on the sand-beach without the city, a few only being quartered within the walls of the city and castle for garrison duty. After this, the army proceeded on its march on the great public road, through dense forests and shrubbery, called chaparrals, constantly ascending rapidly above the level of the sea, capturing on their route Cerro Gordo, the city of Jalapa, Castle of Perote, and, finally, the city of Puebla, on the vast table-land or plain of the Valley of Mexico, which plain is itself 100 to 200 miles in diameter, and upon an average of 7000 to 8000 feet above the level of the sea, besides being surrounded by an amphitheatre of mountains which, many of them, are 8000 feet still higher above that plateau.

The army have here since (*i. e.*, up to our writing, September, 1847) enjoyed almost uninterrupted health, finding themselves in a pure, brilliant, elastic atmosphere of diminished density, and which, though it may be said in that rarefied condition to be tropical, and is geographically within the tropics, possesses, however, a uniform mildness of temperature which belongs to extra-tropical regions, but of much more salubrity than upon extra-tropical parallels of similar temperature. The only diseases that have prevailed here have been incidental to exposure to the rank vegetation on the march, irregularities, and excesses in diet and liquor, exposure to night air, and indulgence in the mixed tropical and northern fruits, always accessible in these places; and hence the diarrhœas, dysenteries, and intermittents, and some remittents; but *no* yellow fever or vomito.

Previous to the army leaving the coast, and while being concentrated during February and March at Vera Cruz and the neighbourhood, the entire Gulf of Mexico in this portion of it was almost daily swept by those refreshing, and even in this season often unpleasantly cool and fierce breezes called "northers," or heavy blows from the north, often, as occurred this summer, augmenting to destructive tornadoes to the shipping at anchor or near the coast, but serving as most thorough purifiers and ventilators against the possibility of any lurking contagion or infection.

Hence, while these continued, *viz.*, up to the beginning of May, the full-blooded, sanguineous northerner, with his rich animal blood, wholly escaped the *de novo* production of vomito in his system; for the other element, inter-tropical heat, was nullified in its operation by the cold winds named. The city of Vera Cruz, though

naturally a dry, clean, well-laid-out place of some 7000 inhabitants, is surrounded with high walls which completely exclude all ventilation. The reflected and reduplicated irradiations of heat, untempered by the northern blasts, placing Vera Cruz in a condition similar to the shut-up harbour of Havana, with its immense battlement of the Moro Castle and Cavana opposite (200 feet high and a mile long), making it a perfect oven, now made the Mexican seaport also begin to feel the force of this suffocating atmosphere. The disease, of course, began to appear sporadically, or in isolated spontaneous cases, successively among the combustible materials there fresh for its reception, *viz.*, among the few northern troops left (after the departure of the great body of the army) to garrison the city, in which garrison duty were included the various northerners employed in the quartermaster's department, or as teamsters or sutlers, &c. To this concentration of *heated human effluvia* was doubtless superadded the offensive putrid exhalations from bodies crushed beneath the falling buildings, walls, &c., and which must have amounted to a considerable number, as several hundred of the Mexicans were killed in this way through the bursting of the vast number of heavy, destructive shells sent by our artillery and naval batteries in the intrenchments during the bombardment which resulted so gloriously to our arms. A greater portion of these smouldering ruins and decaying bodies, however, were speedily removed by the vigilance of our commanding officers in garrison (Gen. WORTH, Col. WILSON, &c.).

Meanwhile, though the disease, after being once generated, as I have mentioned, within the heated atmosphere of Vera Cruz, naturally reproduced itself in others by its infectious or contagious germs, it was, by a vigilant police, ventilation, disinfection, and therapeutics, instituted under Dr. BARTON (President of the Board of Health of Vera Cruz), prevented from becoming epidemic. And in the famous Castle of San Juan de Ulloa, only a mile distant, and where there was only a small garrison, and spacious shaded apartments, and cleanliness, and thorough ventilation and dilution with the sea-breeze, not a solitary case, we believe, of the vomito occurred. The fever soon declined also even in the city. The reason why we shall see.

To exhibit, however, this most important point of *atmospheric dilution* in all prophylactic or preventive and purifying measures, take such facts as these: In consequence of Gen. SCOTT finding himself at Puebla, in the interior, greatly embarrassed by his communication being cut off with Vera Cruz, on the coast, owing to the large bodies of guerillas or rancheros that infested the road, it became necessary to keep this route open or cleared by correspondingly adequate forces of American troops. Bodies of American soldiery, therefore—almost every one raw recruits from the north—have been constantly arriving at Vera Cruz all the months of *May, June, July, and August*, and have successively encamped outside the city, on the extensive beach before mentioned. Here they have, almost all of them, remained encamped in their tents for near a month, as force after force was successively marched up

to Jalapa and the interior. Thus the forces of Generals PILLow, CADWALLADER, PEARCE, &c., each from 1500 to 3000 men, with large trains of ammunition and provisions. And yet, while encamped in their tents on the beach at this hottest season, where the "northers" had ceased to blow, scarcely a solitary soldier of the whole of these troops has perished of vomito! The under parts of the tents being open to free currents of air constantly, and the tents themselves being judiciously separated, and so located as to favour this thorough ventilation and dilution with the external atmosphere, during the alternate land and sea breezes, night and day, and also the *now* (in the summer months) constant range of the thermometer, night and day, at a very small distance from 90° Fahr. either way, are wholly sufficient causes for the solution of this problem. It is, on the other hand, and in corroboration of what is here asserted, to be remarked, that the yellow fever (from what has yet been disclosed) began now, in the month of July, to make its appearance also on board of the squadron under Commodore PERRY, lying, as before, more or less of their time constantly at the anchorage of Anton Lizardo, some five to ten miles south of Vera Cruz. These cases occurred successively, and chiefly on board the Mississippi steam-frigate; and we explain its special occurrence here in one or some, or all of the following modes: 1. Her ship's crew consists of three to four hundred, and hence below decks, ventilate as we may, there must be far more crowding, and also, therefore, far greater concentration and accumulation of human effluvia than in the smaller craft which have only small crews. 2. Sailors generally (especially when off duty) are more dissipated, and more ready to indulge than soldiers in excesses of drink, fruits, &c., exposure to the hot sun on shore, fatigue, &c. 3. Though the temperature of the atmosphere on shore was *now* at this season too high (as during the "northers" it was too low) to co-operate with the rich blood of the newly-arrived northern man in the *de novo* production of yellow fever, it was in the *shipping* less elevated, viz., probably ranging below decks from 85 to 88°, and at the same time converted into a most combustible medium or nidus both for the germination and for the re-propagation of yellow fever. 4. Doubtless some of the disease on board was introduced by communication of the crew with the garrison and city of Vera Cruz.

A curious episode, however, occurred in the midst of this exposure, and during the gallant services of our naval armaments; and it proved for them doubtless a most fortunate one. For, by the activity of the commodore and his officers, constant expeditions during these hot months have been planned and executed to bring to submission the various other seaport towns, mostly small cities, on the small rivers that open on this part of the coast.

Among these, and by far the most important undertaken by Commodore PERRY (Tampico and Tuspan having fallen early in the campaign), was Tobasco, in July. Marines and sailors were detached in large draughts from all the vessels of the squadron, both from those left at Anton Lizardo and from those that constituted the expedition to the mouth of the Tobasco

River. These forces, nearly 1200 in number, were, on account of the current and shoals, two days nearly in ascending some 150 to 200 miles, to the small town of Tobasco, though towed up in a masterly manner by the small steamers of the squadron. All the accounts represent this winding stream and its tributaries to be margined with the very heaviest growth of rank vegetation, which at the time was in its highest state of luxuriance, and masses of it macerating and decaying in the humid places along the banks. The sailors, in capturing the town of Tobasco, had first to land and make fatiguing, rapid marches in the hot and broiling sun, in the midst of exuberant masses of chaparral, and vines, and trees, and underbrush, literally cutting their way through these entanglements. They then returned to Anton Lizardo, leaving only an inconsiderable garrison, which in a few days being re-enforced to nearly one third the original expedition, thence proceeded on foot farther up the river, encountering in their tedious and difficult march the same kind of obstacles as before, and captured another small town, to which also a force of small steamers afterward went up for the same purpose.

Together with such expeditions and exposure to the most intense malaria and a hot sun, among streams of fresh water clothed in submerged vegetation, we should remember that our sailors and marines also had, a few weeks previously, executed similar expeditions up similar rivers, as to Alvarado, Tuspan, Laguna, &c., under TATNALL, MAYO, HUNTER, &c., directed mostly in person by Commodore PERRY. It is sufficient to know that the *naval forces* left on the Mexican coast, and thus operating in the midst of the spring and summer months, were thus constantly on the move, and fearlessly breasting, on this tropical shore, every kind of hardship and danger; the greatest of which was that of having been compelled, as already remarked, to encounter the deadly *paludal malaria* of the mouths of the rivers.

What was the consequence? About the same time that the rigid police and cleanliness of the squadron, while remaining at anchor at Anton Lizardo, in every respect the same dry, healthy, and sandy shore and beach as at Vera Cruz, was, so to speak, "*staving off*" the vomito, or having only an occasional sporadic case among the crews not on the expeditions named, these last began, at the places they had captured, to yield to the influence of morbid causes, which, though naturally less fatal, were far more virulent than any element of the vomito, so far as regards, at least, their *epidemic* or atmospheric extension. This was the *malaria* or paludal exhalations mentioned, of which more than *two hundred and fifty* became sick almost simultaneously, or in large numbers successively. That they should have thus fallen sick together was to be expected as a matter of course, where all were alike exposed to a general and wide-spread vegetable poison. The 60 to 70 marines finally *left in garrison* on the Tobasco river were, it is asserted, every one of them taken down. This was to be anticipated, from their remaining several weeks constantly in a situation where they were compelled to breathe in the paludal poison diffused so abundantly through the atmosphere. All these invalids



were now successively brought down to the anchorage at Anton Lizardo; and the utmost astonishment was manifested by those unaccustomed to tropical climates and to vomito, in perceiving that nearly every one of the above cases of *paludal remittents* recovered, while those at Vera Cruz, and the very few on board the squadron that had been seized with *vomito*, almost invariably died. Such facts afforded but poor consolation to the blind theorists who had luxuriated in the scholastic absurdities of Rushian dogmas, that the *vomito* is not a specific idiopathic disease, but identical with *paludal* or *hepatic* disease, in other words, with *bilious remittents*. What is more, some of these very returned men of the expeditions, enervated by these remittents, now caught (by infection, doubtless) the vomito on board the Mississippi (little of it as there was), and died of it! Out of the company of marines just named, and who, from their continued exposure at Tobasco for weeks, naturally had the severest grade of remittent, only six or seven, nevertheless, perished of it, and of these probably two or three, or more, may have been cases of vomito caught on her arrival at the anchorage. In the forepart of August, in consequence of the great numbers sick on board the Mississippi of *remittents* among those who had been on the expeditions named, Commodore PERRY, who had previously shifted his flag to the sloop-of-war Germantown, despatched the frigate with the invalids, some 150 in number, to our naval station at Pensacola, in Florida. There they arrived in a few days, and almost every one of them became rapidly convalescent as soon as the frigate had put to sea, and proceeded north before she reached her destination. So much for the *puer*, *cooler sea air* in the tropics in its salutary influence on the *remittent type* of disease. Not so with the vomito: the cases of this last almost invariably multiply at sea on leaving a hot port, as Vera Cruz or Havana, at this season; for there is necessarily more or less crowding below decks, and the cooler oceanic temperature, by its constricting effects on the surface [see my various works on yellow fever], favours the retention and more energetic action of yellow fever poison. The truth of this is seen every year.

While the masses of troops, sailors, and marines have been assembling and operating, as above described, on the tropical portions of the coast of Mexico, at Tampico, where we have also constantly had a garrison since early in the spring, and where, also, a similar expedition to that of Tobasco (*viz.*, under Colonel DE RUSSEY) were similarly exposed to the malaria of the River Panuco, remittents, it is true, and diarrhœas and dysenteries, as among all our troops and garrisons, have been prevailing (not, however, mortally), while scarcely a case of the *vomito* occurred! Tampico is considerably *without the tropics*, and located in a healthy position, though far less so in respect to paludal exposure than Vera Cruz.

Also the other great arm of our service, *viz.*, that under General TAYLOR, on the Rio Grande, has been, during the above period of the present spring and summer, receiving very considerable re-enforcements, also chiefly of northern men (volunteers or regulars), and mostly by the way of New-Orleans. These re-enforce-

ments landed all at or near the mouth of the Rio Grande, at Brasos, Matamoras, &c., all of which are in about latitude 26° north. Here, also, and at Camargo and Monterey, higher up, more or less paludal fevers, diarrhœas, and dysenteries occurred, and some, from neglect or imprudence, proved fatal; but there was no mortality, and, least of all, no *vomito whatever*. The higher up the Rio Grande the more intermittents apparently occurred, and fewer cases of remittent type. So, in general, the juxta and intra-tropical positions, from the greater heat and greater intensity of malarious poison, and the greater activity of the liver and secretion of bile, furnish the most severe grades of remittent or bilious remittent. The malaria, as we see above at Tobasco, acts then so powerfully in its deadly poison, as to *occlude* the reaction of those elements that generate yellow fever, which elements, however, where the paludal poison is wanting, as at Vera Cruz, &c., then obtain the ascendancy. The whole subject, we repeat, is most instructive, and most emphatically significant of the type of the two diseases, and of their causes, symptoms, &c.

Finally, the vomito having now been fairly established at Vera Cruz from, as it were, imperious necessity, by forcing it into existence, by the large numbers from the north landed there, and latterly remaining under the most favourable circumstances, the disease thus obtained a new and more powerful auxiliary generating focus than it has at that city for many years.

New-Orleans, whose authorities have generally seemed to conclude that it would be more disastrous for her great commerce with the tropics to be sacrificed than to incur the risk of imported yellow fever by a lax code of quarantine, has thus acquired this year, through her patriotic co-operation in the Mexican war, not only active and direct means of introducing the foreign tropical pestilence by a return from Vera Cruz of the transports that carried troops and provisions, but also her customary supply of yellow fever infection in the short transit of her trading vessels from Havana, by which last-named market she is usually furnished with this pestilence.

The consequence has been that, through these prolific sources, the disease manifested itself at New-Orleans a few weeks subsequently to the first cases of our countrymen that were announced as its victims at Vera Cruz in June and July, or on the passage thence to New-Orleans. Meanwhile it was, as a matter of yearly and familiar occurrence, being introduced as usual at the wharves or levee at New-Orleans by daily vessels from Havana, &c. In the beginning of July it was no longer possible to *blink* the question, and since then its march has been one of longer and longer strides, and of a most frightful desolation, insomuch so that, in the beginning of September, even the *official* annunciation of deaths was acknowledged over one hundred victims daily! Gentlemen just from thence declare it never was so fatal, and they assert that the deaths daily are probably much nearer 150 than 100. This, too, it must be borne in mind, is in a population which at this season, by the customary migration of the richer classes to the north, is reduced to some 40,000 or 50,000 souls! At this rate our pres-

ent population in New-York, of 450,000 to 500,000 inhabitants, should lose by the vomito about 500 to 600 souls in every twenty-four hours!

We learn from credible sources that, as usual, the vomito has fallen with most severity on the poor emigrants (Irish and German chiefly) recently arrived within a few weeks from northern Europe, and who die, many of them, from pure neglect, and from having no means of escape to the country. It is inconceivable that the New-Orleans authorities should have culpably neglected to disperse their population bodily into the country. Even thinning out these emigrants in this manner would have done much; but the concentration of human effluvia has given a wild ferocity to the epidemic character of the pestilence. Finally, the intensity of the accumulated virus has reached the native Creole inhabitants, who will still, however, indulge the delusion that, in their latitude of  $29^{\circ} 30'$  north, they can acquire a tropical immunity to yellow fever! They, too, have fallen victims. And, to wind up the tragedy, for which, for the sake of the country and the war in which we are engaged, New-Orleans must, this year at least, be forgiven, the vomito has, after the disease had raged for some weeks at New-Orleans, been, as might have been anticipated, carried across the Mississippi River, from that capital to the town or village of Lafayette opposite, and there proved alarmingly fatal; while, at the same time, the disease has been fairly and clearly introduced also to a greater distance from the same focus, viz., into Mobile. So successively other towns on the Mississippi, in communication with New-Orleans, will successively become entangled in the chain of infection.

Surely no one at this day will ever be so inattentive as to say that there has been anything in the atmosphere at New-Orleans, or in any part of the United States, of an endemic or indigenous character, either as to river or wharf mud, or alluvium, that could have possibly warranted the suspicion that so fatal a pestilence would this year have afflicted that devoted city. It would be folly, after looking back at the natural links that connect the whole of this subject together in the Gulf of Mexico, to argue with persons of this description.

We will make one or two concluding remarks: 1. Its very fatality clearly demonstrates the truth of all our positions; for it is the subdued character of the temperature by day, and the interregnum of cool nights that succeed, which furnish precisely that condition of things which, with the crowding together of northern and ever-unacclimated subjects at hand to feed upon, makes the disease imported into New-Orleans, outside the tropics, so fatal there at this moment, as compared with its apparent suspension (both *de novo* and epidemic) at Vera Cruz, within the tropics, by excessive continued heat. 2. While this note has been going through the press, we have had a striking additional fact in support of the infectious or contagious and transportable character of the yellow fever, in the *actual importation* of the disease into Brasos, only three degrees outside of the tropics, in one or more infected transport vessels from New-Orleans, in lat.  $29^{\circ} 20' N.$ ; together with the information that our military authorities at Brasos interdicted the admission

of such infected shipping. 3. *One solitary case* only of the vomito, and proving fatal, has occurred in the Castle of San Juan de Ulloa, in Major Clarke of the army, who doubtless took the infection at Vera Cruz. 4. The prevailing diarrhœas and dysenteries in the army, especially the former, though infinitely less fatal than the yellow fever, have been attended with an unusual number of deaths.

P. S. TOWNSEND, M.D.

New-York, September, 1847.]

BIBLIOG. AND REFER.—H. Warren, Treatise concerning the Malignant Fever of Barbadoes, 8vo. Lond., 1740.—J. J. de Gastelbondo, Tratado del Motodo Curat. del Vomito Negro, 12mo. Madr., 1755.—J. P. Schottle, A Treatise on the Synochus Atra Biliosa; a Contagious Fever, which raged at Senegal in 1778, &c., 8vo. Lond., 1782.—J. Mac-kil-trick, in *Baldinger's Syllog. Select. Opusc.* vol. i., p. 87; et J. Moultrie, in *Ibid.*, vol. i., p. 163.—T. Romay, Dissertation sobre la Fiebre Amarilla, 4to. Habana, 1791.—J. Devèze, Recherches sur la Maladie Epidémique qui a ravagé Philadelphie en 1793, 8vo. Phil., 1794. (*Non-infectious*.)—W. Currie, A Treatise on the Synochus Ictericoides, or Yellow Fever, as it lately appeared at Philadelphia, 8vo. Philad., 1794.—M. Carey, A short Account of the Malignant Fever lately prevalent in Philadelphia, 8vo. Philad., 1794.—B. Rush, Inquiry into the late Epidemic Fever at Philadelphia, 8vo. Phil., 1793; and An Account of the Bilious Remittent Fever as it appeared in the City of Philadelphia in the year 1793, 8vo. Phil., 1794. (*In this and his other works he confounds Bilious, Remittent, and Pestilential Fever with each other, and illogically contends that what is true of the first and second is also true of the third.*)—J. Cathall, A Medical Sketch of the Synochus Maligna, 8vo. Phil., 1794.—Anderson, in *Duncan's Annals of Medicine*, &c., vol. v., p. 38; Drennan, in *Ibid.*, vol. v., p. 349.—Paterson, in *Ibid.*, vol. v., p. 356.—J. Holliday, Tratado sobre la Fiebre Amarilla, 8vo. Habana, 1794.—J. Patterson, Remarks on the Opinions of Dr. Rush on the Yellow Fever, 8vo. Lond., 1795. (*Infectious*.)—J. Bryce, Account of the Yellow Fever, with a successful Method of Cure. Edin., 1796.—J. Clarke, A Treatise on the Yellow Fever in Dominica in 1793-6, 8vo. Lond., 1797.—J. Masdevall, Relacion de las Epidemias de Calenturas Putridas y Malignas en Catalana, 4to. Madr., 1797.—S. Anderson, A Few Facts and Observations on the Yellow Fever, 8vo. Lond., 1798.—C. F. Ameller, Description de la Enfermedad Epidemica en Cadix, 4to. Cadiz, 1800.—R. Armeto, Reflexiones sobre la Epidemia en Cadiz, 8vo. Cadiz, 1800.—W. Fowle, A Treatise on the different Fevers of the West Indies, 8vo. Lond., 1800.—C. Chisholm, An Essay on the Malignant Pestilential Fever introduced into the West Indian Islands from Bulam, in 1793 and 1794, 2 vols., 8vo. Lond., 1793, and 3d edit., 1801.—P. M. Gonzales, Dissertation Medica sobre la Calentura que Regno en Cadiz, 8vo. Madr., 1801.—D. Grant, An Essay on the Yellow Fever, 8vo. Lond., 1801.—J. N. Berthé, Précis Historique de la Maladie dans l'Andalousie, 8vo. Paris, 1802. (*Imported and infectious*.)—J. Dancer, Strictures on Dr. Grant's Essay on Yellow Fever, 8vo. Lond., 1802.—N. P. Gilbert, Mémoire sur la Fiebre Jaune, 8vo. Paris, 1803.—R. Bayley, An Account of the Epidemic Fever in the City of New-York during the Summer and Autumn of 1795, 8vo. New-York, 1796.—T. Mifflin, Proofs of the Origin of Yellow Fever in Philadelphia, 8vo. 1797.—Facts and Observ. relating to the Nature and Origin of the Pestilential Fever which prevailed in this City in 1793, 1797, and 1798, by the College of Phys. of Philadelphia, 8vo. Philad., 1798.—W. Currie, Memoirs of the Yellow Fever which prevailed in Philadelphia and other parts of the United States in the Summer and Autumn of 1798, with Facts respecting the Origin of the Fever, &c., 8vo. Philad., 1798. (*Imported and infectious*.)—B. Rush, Observat. on the Origin of the Malig., Bilious, or Yellow Fever in Philad., &c., 8vo. Philad., 1799; et A Second Address, &c., containing additional Proofs of the Domestic Origin of the Malignant, Bilious, or Yellow Fever, &c., &c., 8vo. Philad., 1799.—C. Caldwell, Medical and Physical Memoirs, containing a Particular Inquiry into the Origin and Nature of the Pestilential Epidemics of the United States, 8vo. Philad., 1801.—Address to Philadelphia Medical Society on the Analogies between Yellow Fever and true Plague, 8vo. Philad., 1801.—J. Hardie, An Account of the malignant Fever lately prevalent in New-York, 8vo. N. Y., 1799; and Account of the Malig. Fever which prevailed in the City of New-York during the Autumn of 1805. New-York, 1805.—J. B. Leblond, Observat. sur la Fiebre Jaune, et sur les Maladies des Tropiques, 8vo. Paris, 1805. (*Infectious*.)—S. H. Jackson, Observations, &c., on the Epidemic Disease which lately prevailed at Gibraltar, intended to illustrate the Nature of Contagious Fevers in general, 8vo. Lond., 1806. (*Infectious*.)—B. Progetto, Sull' Origine, Natura, e Caratteri



della Peste dei Contagie, e della Fièvre Gialla, Svo. Luca, 1804. (*Imported and infectious*.)—*Dalmaz*, Recherches Historiques et Medicales sur la Fièvre Jaune, Svo. Paris, 1805. (*Imported and infectious*.)—*Palloni*, Observat. Medicales sur la Fièvre Jaune regnante en Livorno, Svo. Paris, 1800. (*Infectious*.)—*Puget*, Mém. sur les Fièvres de Mauvais Caractère, &c., Svo. Lyons, 1804. (*Infectious and imported*.)—*T. Lafuente*, De la Preservation, &c., de la Fièvre Amarilla, Svo. Madr., 1803.—*L. Valentini*, Traité de la Fièvre Jaune, Svo. Paris, 1803.—*J. M. Arcujala*, Suceintea Exposicion de la Enfermedad en Malaga, 4to. Mal., 1804; et Breve Descripcion de la Fièvre Anarilla de Cadiz, Svo. Madr., 1806. (*Introduced and infectious*.)—*W. Batt*, Alenni ditagli sulla Febbre Gialla, Svo. Genoa, 1804. (*Imported and infectious*.)—*D'Oyarvide*, Delo Vomito Negro, Svo. Habana, 1801. (*Imported and infectious*.)—*S. Henderson*, On the Means of Preventing the Yellow Fever, Svo. Birn., 1808.—*A. M. T. Saveres*, De Fièvre Jaune en Général et Particulièrement de celle qui a regné à la Martinique en 1803 et 1804, &c., Svo. Nap., 1809.—*C. Chisholm*, A Letter to Dr. Haygarth, exhibiting farther Evidence of the Infectious Nature of the fatal Pestilential Fever in Grenada in 1793-1796; and in the United States of America from 1793 to 1805, Svo. Lond., 1809.—*E. N. Bancroft*, An Essay on the Disease called Yellow Fever, with Observat. on Febrile Contagion, &c., Svo. London, 1811. (*Non-infectious*.)—*B. Mellado*, Historia de la Epidemia en Cadiz, el Año de 1810, Svo. Cad., 1811.—*A. Vilascca*, Noticia acerca de la Calentura Americana, Svo. Palma, 1811.—*F. Flores*, Sobray el Tifus Icterodes, Svo. Cadiz, 1813. (*Infectious and imported*.)—*F. Moreno Flores*, Ensayo sobre el Tifus Icterodes o Fiebre Amarilla, 4to. Cadiz, 1813. (*Infectious and imported*.)—*C. Powell*, A Treatise on the Endemic or Yellow Fever of Tropical Climates, Svo. Lond., 1814. (*Confounds endemic remittents with this pestilence*.)—*E. Doughty*, Observations and Inquiries on the Yellow or Bulam Fever, Svo. Lond., 1816.—*A. Mor. de Jonnés*, Précis Historique sur l'Irruption de la Fièvre Jaune à la Martinique en 1801, 1802, Svo. Paris, 1816. (*Infectious*.)—*E. N. Bancroft*, Sequel to an Essay on Yellow Fever, &c., Svo. Lond., 1817.—*J. Veitch*, On the Nature and Treatment of the Yellow Fever, Svo. Lond., 1818.—*V. Bally*, Du Typhus d'Amerique, ou Fièvre Jaune, Svo. Paris, 1814; et l'Histoire Medicale de la Fièvre Jaune en Espagne, 4to. Paris, 1821.—*W. Pym*, Observat. on the Bulam Fever which has of late Years prevailed in the West Indies, on the Coast of America, at Gibraltar, Cadiz, &c., with Facts proving it a highly contagious disease, Svo. Lond., 1815.—*J. Fellowes*, Reports of the Pestilential Disorder of Andalusia, which appeared at Cadiz in the Years 1800, 1804, 1810, and 1813; of that fatal Epidemic which prevailed at Gibraltar in 1804, &c., Svo. Lond., 1815. (*Infectious*.)—*F. C. Caizergues*, Mémoire sur la Contagion de la Fièvre Jaune, Svo. Paris, 1817. (*Contagious*.)—*E. P. Prisset* et *Mazet*, Observations sur la Fièvre Jaune, faites à Cadiz in 1819, folio. Paris, 1820. (*Contagious*.)—*G. Burnie*, Practical Remarks on Yellow Fever, Svo. Belf., 1819.—*N. Dickenson*, Observat. on the Inflammat. Epidemic incidental to Strangers in the West Indies, commonly called Yellow Fever, Svo. Lond., 1819.—*M. Pariset*, Rap. lu à l'Acad. Roy. de Méd. au nom de la Commission Chargée d'Examiner les Documents de *M. Chervin*, 4to. Paris, 1819.—Report of the Committee of the Medical Society of New-York on the Epidemic Fever which prevailed in Bunkerstreet, in the Summer and Autumn of 1820, Svo. N. Y., 1828.—*M. Cavanilles*, Memoria sobre la Epidemia de Andalusia de 1800, 1814, 1819, 4to. Cadiz, 1820.—*M. Hurtado de Mendoza*, Nueva Monografia de la Calentura Anarilla, 4to. Huesca, 1820.—*J. Devèze*, Traité de la Fièvre Jaune, Svo. Paris, 1820.—*A. de Maria*, Memoria sobre la Epidemia de Andalusia de 1800, 1814, 1819, 4to. Cadiz, 1820.—*A. Moreau de Jonnés*, Monographie Historique et Médicale de la Fièvre Jaune des Antilles et Recherches sur les Loix du Développement et de la Propagation de cette Maladie, Svo. Paris, 1820.—*N. Gerardin*, Mémoires sur la Fièvre Jaune considérée dans sa Rapports avec les Gouvernemens, Svo. Paris, 1820.—*J. Sedillot*, Notice sur la Fièvre Jaune, la Peste, et le Typhus considérés comme non-contagieux, Svo. Paris, 1820.—*F. M. Audouard*, Lettre sur la Contagion de la Fièvre Jaune; reponse à *J. Sedillot*, Svo. Paris, 1820.—*P. F. Keraudren*, De la Fièvre Jaune, Observat. sur les Vaisseaux du Roi considérés princip. sous le Rapport de sa Transmission, Svo. Paris, 1823. (*Contagious*.)—*W. Fergusson*, in Transac. of Med. and Chirurg. Soc. of London, vol. ii, p. 180; vol. viii, p. 108.—*J. D. A. Gilpin*, in *Ibid.*, vol. v, p. 303.—*A. Musgrave*, in *Ibid.*, vol. ix, p. 93.—*J. Fernandez*, Ensayo Analytico sobre la Natur. las Causas, &c., de las Calenturas Anarillas, 4to. Habana, 1821.—*R. Jackson*, Remarks on the Yellow Fever of the South Coast of Spain, since the year 1800, Svo. Lond., 1821. (*Non-infectious*.)—*T. O'Halloran*, A brief View of the Yellow Fever of Andalusia in 1820, Svo. Lond., 1821. (*Non-infectious*.)—*J. M. Salamaica*, Observaciones sobre el Contagio de la Fièvre Amarilla, Svo. Malaga, 1821. (*Imported and infectious*.)—*M. F. M. Audouard*, Relat. Hist. et Médicale de la Fièvre Jaune de Bar-

celona, Svo. Paris, 1822. (*Import. and infect.*)—*J. A. Rochouz*, Recherches sur la Fièvre Jaune, Svo. Paris.—*Larry*, Consid. sur la Fièvre Jaune, Svo. Paris, 1822.—*P. S. Townsend*, An Account of the Yellow Fever, as it prevailed in the City of New-York in 1822, Svo, 1823. (*Imported and infectious*.)—*G. Blane*, in *Edin. Med. and Surg. Journ.*, vol. iii, p. 385.—*Nagle and Wilson*, in *Ibid.*, vol. vii, p. 280.—*Chisholm*, *Ibid.*, vol. ix, p. 412.—*W. Pym*, in *Ibid.*, xi, p. 393; et vol. xii, p. 183.—*Doughty*, in *Ibid.*, vol. xiii, p. 238.—*Gilpin*, in *Ibid.*, vol. x, p. 41.—*Fergusson*, in *Ibid.*, vol. xv, p. 427.—*Smith*, in *Ibid.*, vol. xxv, p. 12.—*J. Imray*, in *Ibid.*, vol. lxiii, p. 78.—*C. Chisholm*, A Manual of the Climate and Dis. of Tropical Countries, &c., Svo. Lond., 1822, p. 167.—*J. R. Ferrari*, On the Yellow Fever of Xeres in 1821, in *Edin. Med. and Surg. Journ.*, vol. xix, p. 368. (*Imported and infectious*.)—*Ozanom*, Hist. Med. de Epidemies, t. iv, p. 335.—*E. Bally*, Rapport, &c., sur la F. J. regnant au Port de Passages in 1823, Svo. Paris, 1824.—*V. Bally*, Rapport, &c., sur la F. J. qui a regné au Port du Passage en 1823, Svo. Paris, 1824.—*D. Hosack*, Essays on various Subjects of Medical Science, 2 vols., Svo. New-York, 1824, vol. i, p. 253. (*Imported and infectious*.)—*F. E. Fodéré*, Leçons sur les Epidemies et l'Hygiène Publique, &c., t. iv, p. 228. (*Imported and infectious*.)—*Bally François et Pariset*, Histoire Médicale de la Fièvre Jaune observée en Espagne et Particulièrement en Catalogne dans l'Année 1821, Svo. Paris, 1823. (*The French Commission. Most irrefragable proofs of importation and infection*.)—*T. O'Halloran*, Remarks on the Yellow Fever of the South and East Coasts of Spain, Svo. Lond., 1823. (*Non-infect.*)—*Baldissone*, Manifesto sulla Febbre di Barcelona dell' Anno 1821, Svo. Gen., 1824.—*W. Burnett*, Official Report on the Fever of H. M. S. Bann, on the Coast of Africa, Svo. Lond., 1824. (*Infectious*.)—*C. C. Matthæi*, Untersuchung über das Gelbe Fieber, Svo. Hainov., 1827.—*J. Wilson*, Memoirs of West Indian Fever, Svo. Lond., 1827. (*Non-infectious*.)—*A. J. Ralph*, in Transac. of Med. and Chirurg. Society of Edin., vol. ii, p. 49.—*W. W. Fraser*, A Letter to the Earl of Clatham, Governor of Gibraltar, relative to the Feverish Distempers of that Garrison, Svo. Lond., 1826. (*Imported and infectious*.)—*J. N. E. von Reider*, Abhandlung über das Gelbe Fieber, Svo. Wien., 1828.—*V. N. ab Hildenbrand*, Institutiones Practico-Medicæ, &c., t. iv, p. 480. (*Infectious*;) *classes this pestilence with the exanthematous fevers*.)—*A. Heastie*, Treatise on the Nature and Causes of the Yellow Fever, Svo. Lond., 1830.—*J. Hennen*, Sketches of the Med. Topography of the Mediterranean, &c., Svo. Lond., 1830; et the Gibraltar Epidemics, p. 91.—*Gilcrest*, Cyclop. of Pract. Med., vol. ii.—*J. A. Rochouz*, Recherches sur les Differentes Maladies qu'on appelle Fièvre Jaune, Svo. Paris, 1828.—*M. D. Emery*, Reflexion sur la Fièvre Jaune, Svo. Paris, 1828.—*J. C. de Ferman*, Révuc Critique de quelques Ecrits Publics sur la Fièvre Jaune, Svo. Paris, 1829.—*Chervin*, Examen des Nouvelles Opinions de M. Lassis concern. la Fièvre Jaune, Paris, 1829; et Examen Critique des Prétendues preuves de Contagion de la F. J. observée en Espagne, &c., Svo. Paris, 1828. See, also, his various papers reviewed in *Edin. Medical and Surg. Journ.*, vol. xxxv, p. 365. (*This zealous apostle of non-infection confounds remittent fever with this pestilence, and either suppresses or does not admit the established fact of protection caused by a former attack; where most of his pleadings are baseless and irrelevant*.)—*Chervin, Louis*, et *Trousseau*, Documents recueillis par M. M. envoyés à Gibraltar pour observer l'Epidemie de 1828, et par *M. Barry*, &c., Svo. 2 tomes. Paris, 1830.—*J. Boyle*, The Epidemic Yellow Fever in Sierra Leone in 1823 and 1829, in a Pract. Medico-Hist. Account of the Western Coast of Africa, and of the Fevers of Western Africa, &c., Svo. Lond., 1831. (*Furnishes proofs of the differences between this pestilence and the endemic remittent of the climate; and while the author argues against infection, he actually furnishes proofs against his own doctrine*.)—*D. Barry*, On the Gibraltar Epidemic; in *London Med. and Physical Journal*, vol. lxxv, p. 380 and 476; vol. lxxvi, p. 91 and 475; vol. lxxvii, p. 1-96.—*P. Wilson*, On Gibraltar Epidemic, *Lancet*, June, 1830, p. 425.—*M. Guyon*, On the Origin of the Gibraltar Epidemic, *Journ. complém. des Sc. Méd.*, Sept., 1830; and *Lond. Med. and Phys. Journ.*, vol. lvi, p. 286. (*Imported and infectious*.)—*H. Fraser*, in *Ibid.*, vol. lvi, p. 213, 314; and *Johnson's Med. and Chirurg. Review*, Sept., 1830.—*M. E. A. Naumann*, Handbuch der Medicinischen Klinik, b. iiii. Abth. i., p. 321. (*Classes this pestilence, the plague, choleric pestilence, and exanthematic typhus as species of the genus—contagious typhus*.)—*P. C. A. Louis*, Anatomical, Pathological, and Therapeutic Researches on the Yellow Fever of Gibraltar, &c., transl. by *G. C. Shattuck*, Svo. Boston, 1839.—Report of a Special Committee of the House of Assembly of the State of New-York on the present Quarantine Laws, Svo. Albany, 1846. This able report, kindly forwarded by Dr. P. S. TOWNSEND, of New-York, reached me as this was passing through the press. It contains the evidence of the most eminent physicians in that city, and numerous facts fully confirming the views entertained in the preceding article. It is most satisfactory to have so

important and convincing a body of evidence as this report contains, so opportunely furnished, although too late to aid in my labours.

[AM. BIB. AND REFER.—*P. S. Townsend*, Account of the Introduction of the Yellow Fever into Pensacola and New-Orleans in 1822, New-York Med. and Phys. Jour., vol. ii., p. 315; et An Account of the Yellow Fever as it prevailed in the City of New-York in the Summer and Autumn of 1822, 8vo, p. 383.—A History of the Proceedings of the Board of Health of the City of New-York in the Summer and Fall of 1822, &c. New-York, 1823, p. 270.—*James Speed*, On Yellow Fever of North America, in Med. Repository, vol. ix., p. 259.—*William Baker*, On the Origin and Cause of Yellow Fever, and Means of Prevention, in Med. Repository, vol. ix., p. 268.—*J. Comstock*, On Bilious or Yellow Fever, in New-York Med. Rep., vol. x., p. 21.—*H. Hill*, On Yellow Fever in Havana, Med. Rep., vol. x., p. 113.—*Chatard*, On Yellow Fever in Baltimore in 1800, Med. Repository, vol. iv., p. 253.—*Selden and Whitehead*, On the Yellow Fever of Norfolk, Va., 1800, Med. Rep., vol. iv., p. 329.—*Daniel Moore*, On Yellow Fever of Baltimore, 1800, in Med. Rep., vol. iv., p. 351.—*Charles Caldwell*, An Address to the Phil. Med. Society, on the Analogies between Yellow Fever and true Plague, in Med. Rep., vol. iv., p. 400; vol. i., N. S., p. 143.—*M. McDowell*, in Med. Repos., vol. ix., p. 366.—*J. G. Scott*, Examples of the Origin of Yellow and Noncontagious Fevers in various parts of the State of New York, Med. Repository, vol. x., p. 240.—*N. Webster*, Address to the Citizens of the United States on the Malignant Fevers of their Country, N. S. Med. Repository, vol. i., p. 316.—*R. M. Collins*, A Dissertation on the Remote Cause of Fever, Transylvania Jour. of Med. for 1828, p. 465.—*Alex. Hosack, Jr.*, An Inaugural Essay on Yellow Fever of 1795 in New-York, New-York, 1797, 8vo, p. 40.—*Valentine Seaman*, On Yellow Fever in New-York, New-York Med. Repository, vol. ix., p. 391; vol. i., p. 303; et vol. iv., p. 248.—*B. Ticknor*, An Account of the Yellow Fever which prevailed at Thompson's Island, North Am. Med. and Surgical Journal, Nos. VI. and VII., 1827.—*Charles Coffin*, An Account of the Pestilential Fever which prevailed in Newburyport, State of Mass., 1796, Med. Repository, vol. i., p. 493.—*Joseph Browne*, Treatise on the Yellow Fever, New-York, 8vo, p. 31, 1798.—*Miffin's* Letters on Yellow Fever, Med. Rep., vol. i., p. 391, 398.—*John B. Doudge*, A Treatise on the Yellow Fever, Balt., 8vo, p. 65, 1798.—*Phil. Acad. of Med.*, On Origin of Yellow Fever of 1797, Phil., 8vo, p. 49, 1798.—*A. J. De Rosset*, Account of Pestilential Fever of Wilmington, 1796, Med. Repository, vol. xi., p. 143.—*W. Currie*, Memoirs of Yellow Fever which appeared in Philadelphia and other parts of the United States in 1793, Philadelphia, 8vo, p. 145.—*P. S. Physic*, Letter on Yellow Fever, Med. Repository, vol. xi., p. 327.—*Ed. Miller*, On Yellow Fever, Med. Rep., vol. xi., p. 379.—*Isaac Rand*, On Yellow Fever in Boston, Med. Repository, vol. xi., p. 442.—*Samuel Brown*, A Treatise on Yellow Fever, Boston, 8vo, p. 42, 1800.—*W. Harris*, Fever, with Black Vomit, in the middle part of Penn., Med. Rep., vol. iv., p. 75.—*L. Hallock*, An Account of a Malignant Disease which appeared on board of the United States Frigate Gen. Greene, Med. Repository, vol. iv., p. 1.—*E. T. Waring*, Account of Same, Med. Repos., vol. iv., p. 234.—*David Ramsay*, Facts concerning Yellow Fever in Charleston, S. C., Med. Repository, vol. iv., p. 217; vol. xi., p. 233.—*John Vaughan*, in Med. Repository, vol. iv., p. 233.—*Joseph Bayley*, Facts and Observations relating to the Yellow Fever which prevailed at the Quarantine Establishment at Staten Island, New-York, during the Autumn of 1821, New-York Med. and Phys. Jour., vol. i., p. 12.—Report on the Yellow Fever which prevailed in New-York in 1822, New-York Med. and Phys. Jour., vol. i., p. 422.—*Daniel D. Walters*, Diary of the Occurrences of the first Month of the Yellow Fever which prevailed in the City of New-York in 1822, with Facts and Observations relative to the Nature and Character of the Disease, New-York Med. and Phys. Jour., vol. i., p. 469.—*John B. Beck*, A Report to the New-York Board of Health concerning the Nature and Origin of the Malignant Fever in Middletown, Conn., 1820, New-York Med. and Phys. Jour., vol. i., p. 158.—Fevers: their Diagnosis, Pathology, and Treatment; Prepared and Edited, with large Additions from the Essays on Fever in Tueddie's Library of Practical Medicine, by *Meredith Clymer*, M.D., &c. Phil., 1846, 8vo, p. 605.—*George B. Wood*, A Treatise on the Practice of Medicine, in 2 vols., 8vo, p. 798.—*Robley Dunglison*, The Practice of Medicine, a Treatise on Special Pathology and Therapeutics, 2d Ed. Philad., 2 vols., 8vo, 1844.—*Samuel Henry Dickson*, Essays on Pathology and Therapeutics, &c., in 2 vols., 8vo, Charleston, S. C., 1845.—*John W. Monette*, Observations on the Yellow Fever of Natchez and of the Southwest, Louisville, Ky., 8vo, p. 155; et Western Med. and Phys. Journal, 1825.—*S. Barrington*, Account of Yellow Fever as it appeared on board the United States sloop-of-war Hornet in 1823, United States schooner Granpus in 1829, and United States sloop-of-war Peacock in 1830, Am. Journal Med. Sci., vol. xii., p. 307.—*E. B. Harris*, On Yellow Fever at New-Orleans in 1833, in Am. Jour. Med. Sci., vol.

xiv., p. 41.—*E. H. Barton*, Account of Yellow Fever at New Orleans in 1833, in Am. Journ. Med. Sci., vol. xv., p. 30.—*John Harrison*, On Cadaveric Lesions in Yellow Fever, in New-Orleans Med. and Surgical Journal, 1845-6.—*C. C. Dupré*, On the Yellow Fever at Key West, East Florida, in Am. Journal Med. Sci., vol. ii., N. S., p. 380.—*Thomas Stewardson*, in Amer. Journal Med. Sci., vol. iii., p. 91.—*Richard D. Arnold*, Two Cases of Black Vomit, with Observations, in Am. Journ. Med. Sci., vol. iv., p. 316. (Dr. A. makes the peculiar distinctive characteristic of Yellow Fever to be a total absence of biliary secretion and excretion.)—Account of Yellow Fever in Charleston, 1838, Am. Journal Med. Sci., vol. xxiii., p. 263.—*Thomas Y. Simons*, A Report on the History and Causes of the Stranger's or Yellow Fever of Charleston, Charleston, 8vo, p. 23.—*Robertson, Garvin, and Eve*, Report on Yellow Fever in Augusta, 1839, 8vo, p. 30.—*Ashbel Smith*, An Account of the Yellow Fever at Galveston in 1839, with Cases, &c., 12mo, p. 78. Galveston, 1839.—*B. B. Strobel*, An Essay on the Subject of Yellow Fever, intended to prove its transmissibility, Charleston, 1840, 8vo, p. 224.—*John D. Gillespie*, Report on Yellow Fever at Brooklyn in 1809, in Am. Med. and Phil. Register, vol. i., p. 106.—*William Currie*, Facts and Arguments in favour of the foreign Origin and contagious Nature of the Pestilential or Malignant Yellow Fever, in a Letter to Dr. Hosack, in Am. Med. and Phil. Register, vol. i., p. 181.—*John R. B. Rodgers*, Account of Yellow Fever in Brooklyn in 1809, in New-York Med. and Phil. Jour. and Rev., et New-York Med. and Phil. Reg., vol. i., p. 255.—*Richard Channing Moore*, Facts relative to the contagious Nature of Yellow Fever in Brooklyn in 1809, in New-York Med. and Phil. Reg., vol. xi., p. 22.—*D. Hosack*, Review of *Ed. Miller* on Yellow Fever in Brooklyn in 1809, in New-York Med. and Phil. Reg., vol. ii., p. 91-164, 270.—History of the Yellow Fever at Perth Amboy in 1811, Am. Med. and Phil. Reg., vol. iii., p. 102. (Drawn up by Drs. Hosack, Bayley, and Douglass.)—*John Stewart*, An Account of Yellow Fever at Granada, West Indies, in 1793-4-5, in Am. Med. and Phil. Reg., vol. iii., p. 183.—*D. Hosack*, On the Yellow Fever of Huntington, L. I., in Am. Med. and Phil. Reg., vol. iii., p. 191.—*John McKnight*, On Yellow Fever of New-York of 1798, in Am. Med. and Phil. Reg., vol. iii., p. 293.—*James Seagrave*, On Yellow Fever of St. Mary's, Georgia, 1808, in Am. Med. and Phil. Reg., vol. iii., p. 417.—*John Mitchell*, An Account of the Yellow Fever in Virginia in 1737, 1741, 1742, in Amer. Med. and Phil. Reg., vol. iv., p. 181, 353.—*P. Bowen*, Account of Yellow Fever in Providence, R. I., 1805, in Am. Med. and Phil. Reg., vol. iv., p. 331, 341.—*C. Cadden*, On Yellow Fever of Virginia, in Amer. Med. and Phil. Reg., vol. iv., p. 378.—*J. C. Warrin*, On Yellow Fever in Boston, in Amer. Med. and Phil. Reg., vol. iv., p. 557.—*B. Dowler*, Researches, Historical, Topographical, and Critical, on Yellow Fever, New-Orleans Med. and Surg. Jour., vol. iii., p. 165.—*E. D. Fenner*, Account of Yellow Fever in New-Orleans in 1846, New-Orleans Med. and Surg. Journal, vol. iii., p. 445.—*W. P. Hort*, Report of Board of Health of New-Orleans for 1846, New-Orleans Med. and Surg. Jour., vol. iii., p. 467.—*John W. Francis*, Report of a Special Committee of the House of Assembly of the State of New-York on the Quarantine Laws, 1846, p. 148.—*A. V. Vache*, in *Ibid.*, p. 68.—*T. Harris*, in *Ibid.*, p. 111.—*P. S. Townsend*, in *Ibid.*, p. 115.—*W. Sweetser*, in *Ibid.*, p. 153.—*J. R. Manley*, in *Ibid.*, p. 163.—*Hort*, in *Ibid.*, p. 167.—*D. M. Reese*, in *Ibid.*, p. 211.—*W. S. W. Ruschenberger*, in *Ibid.*, p. 215.—*W. C. Wallace*, in *Ibid.*, p. 207.—See, also, *Bost. Med. and Surg. Journal*, *passim*.—*W. P. Dewees*, Practice of Medicine.—*Hosack*, Lectures, and Ed. of *Thomas's Practice*, &c.]

#### PESTILENCE, SEPTIC.—SYNON. *Pestilentia*

*Septica*, Author. *Pestis* (from *pasco*, *pastum*, quod depascatur artus; or from *pessum*, quod pessum det). *Pestis Septica*, *Pestis glandulosa*, *P. Adeno septica* (from *Σηπτα*, *putrefacio*; *Σηπτός*, *σηπτικός*, *septic*, *putrid*, *liquescent*, &c.), *Λοιμός*, Hipp., Galen. *Λοιμωδης πυρετος*, Auct. Græc. *Λοιμός σηπτικός*, *Pestilentia*, Celsus, Pliny, Cicero *Pestis*, Auct. Var. *Pestis Orientalis*, Auct. *Typhus Pestilentialis*, *T. Gravissimus*, *T. Anthracicus*, *T. Bubonicus*, *Febris Pestilentialis* &c., Auct. Var. *Typhus Pestis*, Young *Anthraxia Pestis*, Good. *Exanthema Pestis*, Parr. *Loimopyra*, Swediaur. *Pestis Acutissima*, *P. Inguinaria*, *Pestilenta*, *Ephemera Pestilentialis*, *E. Mortifera*, *Febris Adeno-Nervosa*, Pinel. *Peste*, *Pestilence*, *Fievre pestilentielle*, Fr. *Pest*, *Plage*, *Pestfieber*, *Pestilenz*, Germ. *Pest*, *Pestilents*, Dan. Swed. *Peste*, *Pestilenza*, Ital. *Plague*, *Pest*, *Pesti-*



lence, *Levant Plague, Septic or Glandular Pestilence, &c*

CLASSIF.—Same as CHOLERIC and HÆMAGASTRIC PESTILENCES.

1. DEFIN.—i. NOSOLOGICAL.—*After chills, rigours, or horrors, nausea and vomiting, with vertigo, headache, or stupefaction, and fever; sense of heat or burning at the præcordia; rapid, weak, irregular, or intermitting pulse; and carbuncles, buboes, spots, pustules, or petechiæ of various colours distributed in different parts of the body.*

2. ii. PATHOLOGICAL.—*An animal poison or miasm specifically affecting the nervous and vascular systems, the circulating fluids, vessels, and glands, and remarkably impairing, and very frequently entirely subverting, vital resistance and the cohesion of the tissues.*

3. Annihilation of vital resistance and of the cohesion of the tissues characterizes more or less all severe cases of pestilence, and all malignant febrile diseases. The causes which occasion them—specific animal poisons—exert a manifest septic influence; manifest, at least, in their results, however the powers of life, in their resistance to the noxious causes which have invaded them, may give rise to various modes of reaction, or attempts at reaction, and ultimately either throw off the destructive agencies, or sink beneath them. But the virulence of the poison occasioning the plague, and the septic or life-dissolving influence it exerts, as evinced by the spots, by the carbuncles, by the sphacelations of portions of the cutaneous, adipose, and cellular tissues, by the softening of the internal viscera, and by the diffused or softened state of the lymphatic glands and surrounding structures found immediately after death, are so remarkable, especially where this pestilence is epidemic, that I have thought that these malignant properties, as being the most characteristic and the most generally present, should furnish the specific designation of the distemper. I have, therefore, used the word *septic* in the sense usually attached to it, to mark this tendency to vital dissolution and its actual consequences in this pestilence, as being, perhaps, the most appropriate, as marking the chief disposition and pathological conditions—the remarkable malignancy of the fully-developed distemper. It may not be approved by many, as not indicating the states of nervous power and vascular action characterizing the attempts made by the nervous and vascular systems under the influence of life, to resist the exterminating influence of the poison which has infected them; and I cannot say that it quite pleases myself; but I am anxious to avoid, on this occasion, as I have hitherto avoided, the introduction of new and foreign terms into this work. I shall, however, adopt any one that is unquestionably better, if the objectors will furnish it; but the topic will be discussed more fully hereafter.

4. There can be no doubt of this pestilence having appeared at various epochs as remote as history has furnished the records, in several countries bordering on the Mediterranean, and especially in Egypt. The sacred books of the Old Testament, and the writings of HIPPOCRATES, ARETÆUS, and GALEN, furnish notices of pestilences, which may be considered as more applicable to this than to any other species. Still they give no description sufficient to ena-

ble us to decide positively as to their identity with that now under consideration. The earliest notice strictly applicable to this distemper to be found in the writings of the ancients is that by RUFUS, preserved in an inedited book of ORIBASIVS, and to which reference is made by M. LITRE, in his edition of *Hippocrates*, and in his article on the plague in the *Dictionnaire de Medicinc*. RUFUS describes buboes as appearing in the neck, armpits, and thighs, and as being either with or without fever. But the buboes called *pestilential*, he states, are the most acute and the most dangerous. Such as are seen especially in Libya, Egypt, and Syria; and of which DENYS, surnamed KYRTUS, has made mention. DIOSCORIDES and POSIDONIUS, he adds, have concerned themselves chiefly with the pestilence which prevailed in Libya. They state that in this plague there were acute fever, pain, and tension of the whole body, delirium, and the formation of buboes, which were hard and large, and which did not go on to suppuration. These buboes appeared not only in the usual places, but also in the hams and bends of the arms. (*Classicor. Auct. e Vaticanis Codicibus Edit. curante A. MAIO, 8vo. Romæ, 1831, t. iv., p. 11.*)

5. No farther account need be taken of the brief notices of plague which are scattered through the works of the ancients, until we come to the description of the fatal epidemic by PROCOPIUS that depopulated the Roman empire in the reign of JUSTINIAN. An abstract of these notices will be found in Mr. ADAMS's translation of PAULUS ÆGINETA (vol. i., p. 279). The pestilence which prevailed in the reign of JUSTINIAN is also described by EVAGRIVS and AGATHIAS. It resembles the plague of Avignon, described by GUY DE CHAULIAC. According to PROCOPIUS, the usual precursors of an attack were disturbed dreams and various delirious fantasies; but the early symptoms were not well marked; for there was neither increased heat nor discoloration of the skin, nor did the patient apprehend danger. Generally on the first or second day, but in a few instances somewhat later, buboes appeared not only in the groins, but also in the armpits and below the ears. Some were affected with deep coma, and others with wild delirium. Some died from sphacelus of the buboes, which, when inspected by the physicians after death, presented the appearance of an anthrax, or carbuncle. Some died at the commencement, and others after the lapse of several days. In certain cases the skin was covered with black phlyctenæ, of the size of a lentil, which were usually succeeded by sudden death. Others were unexpectedly cut off by a discharge of blood. To women in the puerperal state it proved particularly fatal. When the buboes came to a proper suppuration, they generally proved a favourable crisis; but when they did not suppurate, they were commonly followed by a wasting of the thigh. One of the consequences of the distemper was an affection of the organs of speech. All the usual prognostics proved fallacious; and the effects of the common remedies were uncertain. In some cases the bath proved beneficial, and in others it had a contrary effect. The amount of deaths in Constantinople, at one time, was said, but probably with great exaggeration, to have

ranged from five to ten thousand each day. (*De Bello Pers.*, 22, 23, and *ADAMS's Comment. on PAULUS AEGINETA*, vol. i., p. 281.) This plague appears to have very closely resembled the plague of London in 1665, as described by Dr. HODGES. My limits will not permit any notice of the descriptions of the septic or glandular pestilence contained in the writings of the Arabian physicians. The reader, however, will find a brief abstract of these descriptions, and of the treatment recommended by these writers, in the volume by Mr. ADAMS just referred to.

6. This pestilence has presented various grades of severity, malignancy, and prevalence, according to the several accounts which have been furnished by contemporary historians and physicians, since the days of AVICENNA and other Arabian writers; and even within our own memories, since the commencement of the present century, it has evinced different degrees of severity and prevalence, according as it has appeared in a sporadic or endemic, or in an epidemic form. In the countries of the Levant, and particularly in Egypt, the distemper occurs sporadically or endemically, or rather appears in isolated cases, without becoming epidemic, unless after periods or epochs of indefinite but of considerable duration. In more northerly climates it has occurred only as a destructive epidemic, and then often without any manifest dependence upon season, time of the year, or weather, although a temperate or warm season has appeared to favour its malignancy and prevalence. During the Middle Ages numerous epidemical visitations of this pestilence occurred in Europe, Africa, and Asia, not merely in the countries surrounding the Mediterranean, but also in others more or less remote from this sea. The most destructive outbreak, however, of this pestilence upon record is that which occurred near the middle of the fourteenth century.

7. This pestilence, usually denominated the *black death* or *black plague*, first appeared in China in 1333, when it was said to have destroyed more than one fourth of the population; and it thence proceeded gradually to the western countries of Asia, to those surrounding the Caspian Sea; to Arabia, Syria, and Egypt; and to the eastern and southern kingdoms of Europe. It reached Avignon in 1348, gradually extending northward to France, Germany, England, Denmark, Russia, &c. It invaded Russia in 1350; and there, as well as in other northern countries, it proved nearly as destructive as in southern climates. It appeared first in the southern counties of England, and gradually proceeded northward; and in this, as well as in other countries, was most remarkably destructive in the large, close, and crowded cities and towns. It did not altogether cease in some places, or it continued to recur after intervals, until 1360 or 1361, when it seems to have entirely disappeared. Dr. HECKER has collected from numerous sources much information concerning this pestilence. He states that it was an Oriental plague, marked by boils and tumours of the glands, such as break out in no other febrile disease. From these boils or buboes, and from the black spots and carbuncles indicative of a putrid decomposition which appeared in the surface, it was

called, in the northern countries of Europe, the *black death*; and in Italy and other southern countries, the great mortality, or great plague.

8. According to GUY DE CHAULIAC, the victims of this plague were frequently attacked with an ardent fever attended by discharges of blood, which proved fatal in three days. Buboes and boils did not come out at first, but a carbuncular affection of the lungs often occasioned the destruction of life before the external symptoms were developed. He adds, that "the plague thus raged in Avignon for six or eight weeks, and the pestilential breath of the sick, who expectorated blood, caused a terrible contagion far and near; for even the vicinity of those who were affected was certain death; so that parents abandoned their infected children, and all the ties of kindred were dissolved. After this period, buboes, in the axilla and in the groin, and boils over the body, made their appearance; but it was not until seven months afterward that some patients recovered with buboes, as in the ordinary milder form of plague." (*Tract.*, ii., c. 5, p. 113.) This pestilence appeared in a similar manner in Egypt, destroying quickly with burning heat and expectoration of blood.

9. Boccaccio makes no mention of the first appearance of this pestilence in China, and of its progress westward, but remarks that "this most terrible plague happened in Florence in 1348; that it had broken out some years before in the Levant, and that after passing from place to place, and making incredible havoc all the way, it had now reached the west." It began to show itself in the spring of the year, "in a sad and wonderful manner; and different from what it had been in the east, where bleeding at the nose was the fatal prognostic; here there appeared certain tumours in the groin or in the armpits, some as big as a small apple, others as an egg; and afterward purple spots in most parts of the body; in some cases large and but few in number, in others less and more numerous; both sorts the usual messengers of death." (*Decameron*, Giorn. i., *Introd.*)

10. The same phenomena were remarked in this pestilence as it occurred in Germany, France, Norway, and Russia, and the most prominent among these were the infallible signs of the Oriental or glandular plague. But in different countries certain symptoms appeared more prominently than others, or perhaps were more particularly noted by contemporary or subsequent chroniclers. In France many were struck as if by lightning, and died on the spot, and this more frequently among the young and strong than the old; and the patients with buboes scarcely survived two or three days. In England the distemper was attended, as at Avignon, with spitting of blood, buboes, and carbuncles. In Norway and Poland spitting and vomiting of blood are stated to have occurred in addition to the characteristic signs. In Russia the distemper was said to have commenced with rigours, heat, and darting pains, to have been attended by spitting of blood, and to have terminated fatally in two, or, at most, three days. It was chiefly when the spitting of blood had continued for some time that buboes and carbuncles appeared.

11. Dr. HECKER remarks, that all the descriptions of this most remarkable pestilence



which have come down to us contain, with a few important exceptions, all the symptoms of the true plague as observed in modern times. No doubt can obtain on this point. The facts are placed clearly before our eyes. We must, however, bear in mind that this distemper does not always appear in the same form; and that while the essence of the poison which it produces, and which is separated so abundantly from the body of the patient, remains unchanged, it is proteiform in its varieties, from the almost imperceptible vesicle, unaccompanied by fever, which exists for some time before it extends its poison inwardly, and then excites fever and buboes, to the fatal form, in which carbuncular or gangrenous inflammations affect the most important viscera, as appeared to have been the case in a large proportion of cases of this pestilence.

12. The hæmorrhages which were so frequently remarked, in various countries where this pestilence prevailed, and soon occasioned death, were obviously the result of the vital dissolution of the structures and of the crisis of the blood; the inflammations said to have existed being a state of asthenic vascular congestion with sanguineous exudations, or inflammation of a gangrenous nature, owing to the rapid loss of the vital power of the capillaries. That such was the case in a remarkable degree, as respected the capillaries, the tissues, and the blood itself, was evinced by the rapid discoloration, the purplish hue, and the loss of sensibility of the affected parts. There was a loss of vital cohesion throughout the whole frame, those tissues and structures, as the mucous, the cellular, the glandular, and the parenchymatous, that possess the least density, and the capillaries supplying them, most rapidly and most completely undergoing this septic alteration.

13. The plague, which devastated the Empire of Morocco in 1799 and 1800, appears to have been equally virulent with the above, but much more circumscribed in its spread. Mr. JACKSON, who resided in that country during its continuance, has described it as it came under his own observation. He states that Tederodant, the metropolis of a province, lost above eight hundred each day during the height of the pestilence; the city of Morocco lost upward of one thousand daily; and that old and new Fez, about fifteen hundred daily. Young, healthy, and robust persons were for the most part attacked first, then women and children, and lastly thin, sickly, emaciated, and old people. The symptoms of this plague varied in different persons with age, constitution, and habit of body. "It attacked some with a sudden and violent shivering, others with a sudden delirium, succeeded by unquenchable thirst. Cold water was eagerly resorted to by the unwary, and proved fatal to those who indulged in its momentary relief. Some had one, two, or more buboes, which formed and became as large as a walnut in the course of a day; others had a similar number of carbuncles; others had both buboes and carbuncles, which generally appeared in the groin, under the arm, or near the breast. Those who were affected with shivering, having no bubo, carbuncle, spots, or any other external disfiguration, were invariably carried off in less than twenty-four

hours, and the body became quickly putrefied, so that it was indispensably necessary to bury it a few hours after dissolution."\* (P. 273.)

14. The plague of London in 1665, or the Great Plague, of which, according to Dr. HODGES, upward of 100,000 persons died, presented the phenomena already noticed variously grouped. This writer remarks that this pestilence puts on various or even different appearances, according to the constitution and age of the patient, the season of the year, the modes of living, the preceding and present distempers, and the virulence or degree of infection. Dr. HODGES practiced in London during the continuance of this plague; and, notwithstanding the admixture of the prevailing pathological notions of the day with his description of the symptoms, has given a very instructive account of them. He first states "*the manifest signs of infection*," and afterward describes "*the appearances after infection*." The manifest signs of infection he states to be horror, vomiting, dizziness, delirium, headache, and stupefaction. The appearances after infection are fever, watching, palpitation of the heart, bleeding at the nose, and great heat above the præcordia, all which may occur in other pestilences, but in this they are conjoined with those which are peculiar to it, as pustules, commonly called blains, buboes, carbuncles, spots, marks, or tokens. (*Loimologia*, p. 86, et seq.)

15. Septic pestilence, which had become much less prevalent for several generations after the black plague of the fourteenth cen-

\* The following brief notices of cases will illustrate the characters and nature of the pestilence: 1. M. A. fell suddenly down in the street, and was conveyed home. Three carbuncles and five buboes appeared the same day, in the groin, under the joint of the knee, in the armpits, and inside of the elbow, and he died three hours afterward.

2. L. R. was suddenly smitten when following his avocations, and fell down. He described a sensation similar to that produced by running needles into the parts; and in the situations where this was felt carbuncles afterward appeared. He died the same day.

3. Mr. JACKSON'S cook appeared in good health and spirits; but in half an hour afterward he came to the room door with his eyes starting from his head, and his bedclothes in his hands, saying, "Open the gate for me, for I am smitten." The next morning he came to the gate half dressed, saying that he was quite recovered. He was not admitted; and accordingly returned to his apartments, and expired the same evening, about twenty-four hours after his seizure; and before daybreak his body was in such a deplorable state that his feet were quite putrefied. His wife was afterward seized, but recovered.

4. H. ben A. was smitten suddenly, and felt at the time as if two musket-balls had passed through his groins. A giddiness and delirium followed, and immediately afterward a green vomiting, and he fell senseless to the ground. A short time subsequently, buboes formed in the places where he felt as if shot; and, on suppurating, discharged a fetid black pus. A carbuncle in the bend of the arm was full of a thin ichor contained in an elevated vesicle, and surrounded by a burning red areola. He ultimately recovered.

Mr. JACKSON remarks, that those who had vomitings of green or yellow bile, generally recovered after suffering in various degrees; but that those who were affected with giddiness or delirium, followed by vomiting of black bile, invariably died after lingering one, two, or three days, their bodies being covered with small black spots similar to grains of gunpowder. In this state, however, they possessed their intellects until their dissolution. He adds, that when the constitution was unable to throw the poison to the surface in the form of buboes, carbuncles, boils, or blackish spots, "the virulence seemed to have acted inwardly, or on vital parts, and the patient usually died in less than twenty-four hours;" and that, when the carbuncles or buboes had a blackish circle round their basis, the case was invariably fatal. "Sometimes the whole body was covered with black spots like partridge-shot. Such patients always fell victims; and those who felt the blow internally did not survive more than a few hours." (P. 238, 4.)

ture, again devastated many countries in the sixteenth century, as shown in the writings of LANGIUS, VALLERIOLE, SCHENCK, JOUBERT, PALMARIUS, INGRASSIAS, and others. In the following century, also, it prevailed in various countries of Western Europe; and, although limited chiefly to large and commercial cities, it was most destructive in those places; as fully shown by the writings of DIEMERBROECK, HODGES, DE FOE, and many others. During the last century this plague became even more generally epidemic than in the 17th, and invaded most of the countries of Europe, some of them far remote from those to which it was commonly confined. Of these pestilences, full details are to be found in the works of CHENOT, SCHRAUD, DE MÆRTENS, MINDERER, SAMOLOWICZ, RUSSEL, and others.

16. I. SYMPTOMS.—There are few distempers in which the symptoms are so diversified as in the pestilence now being considered. The severity of the attack, resulting from the intensity of the cause, or dose of the poison, relatively to the susceptibility of the patient; the age, habit of body, and temperament of the person attacked; the severity or character of the prevailing epidemic; and the various circumstances influencing the patient at the time of seizure or during the continuance of the malady, tend to modify the phenomena in a more or less remarkable manner. DIEMERBROECK has given a very succinct view of the symptoms of this pestilence, and of the diversities they present, and which I shall here exhibit with but little alteration. Fever, jactitation, extreme anxiety, frequently a remarkable internal heat, dull or gravative pains in the head, rarely acute; terror, horror, or delirium, convulsive startings of the tendons, or slight contractions of the limbs; in some continual watchfulness, in others an overwhelming somnolency; a restless expression of countenance, noises in the ears, and in some deafness; a dry, but rarely a black tongue; great fetor of the breath and of the perspiration; leipothymia or syncope; the pulse sometimes almost natural or full, but most frequently rapid, feeble, unequal, or even intermittent, in many very small, rapid, equal, or irregular; a short or dry cough, sometimes hæmoptysis; thirst, loss of appetite, pain at the epigastrium and cardiac orifice of the stomach, nausea, vomitings, hiccup; crude alvine evacuations, remarkably offensive, sometimes containing worms; occasionally an exhausting diarrhoea; the urine often almost natural, and depositing a settlement, in many high-coloured and scanty, in others crude and turbid, in some sanguineolent, and generally very different in the course of the distemper, or even in the course of the day; sudden prostration of strength, and incapability of motion from the commencement in some, in others but little impairment of power until the moment of dissolution; the heat of skin sometimes acrid and increased, sometimes natural or even reduced; the colour of the countenance either pale or reddened, or somewhat livid, or even natural; purple, violet-coloured, black, or red spots on different parts of the body, sometimes in small numbers, in others in great numbers, and either large or small, but always round, occasionally seen chiefly in certain parts of the body, but confined to no

one part in particular, and often scattered over the whole surface; tumours or buboes in the groins, armpits, neck, &c.; carbuncles in different parts of the body, &c. These symptoms are generally not all present in one case; but many of them occur in one, and the rest in others. During the epidemic prevalence of plague in various countries, the symptoms have presented several grades or states, most probably owing to the causes just assigned. These grades or states have been described by several writers of the last century, and their descriptions have been confirmed by those of the present day. I shall first notice these grades, and afterward the several stages into which the progress of the distemper may be divided.

17. I. GRADES OR STATES.—CHICOYNEAU, VERUG, SOULIER, and others have noticed five grades or states of this pestilence, and which they have described nearly as follows: *First Grade*.—This, the most *intense form* of plague, is observed chiefly at the commencement and during the early course of an epidemic, and consists of all those cases in which the symptoms are most severe, and are most promptly followed by death. The patient is attacked by irregular chills or rigours, or a feeling of general cold, a very small, soft, slow, or frequent, unequal or irregular pulse; by a heavy pain in the head, with a stunning, vertiginous feeling; and by a stupid, muddled, or drunken appearance. The countenance seems fixed, or vacant and apathetic, or presents a look of alarm or despair. The speech is slow, hesitating, plaintive, or interrupted; the tongue is white and afterward dry, red, black, and rough; the face is pale, or of a leaden hue, or cadaverous; the contractions of the heart are very frequent; the spirits are remarkably depressed; faintness or syncope, vomitings, retchings, great restlessness, distressing anxiety, &c., are frequent, and terminate existence. Persons thus attacked often sink in the course of a few hours, sometimes almost suddenly, or in the course of a night; frequently within twenty-four hours; and seldom survive longer than thirty-six or forty-eight hours; the powers of life sinking lower and lower, without being able, to make any resistance. Frequently tremours, or slight convulsive movements, occur at intervals; but none of the external signs, tumours, or eruptions, characteristic of the pestilence appear, the powers of life being insufficient to throw them out on the surface.

18. *B. Second Grade*.—This grade generally commences, as the foregoing, with chills or rigors, and with a similar affection of the head; but these symptoms are followed by some evidence of vascular reaction. The pulse becomes frequent, open, quick, expansive, but remarkably soft and compressible. The patient complains of burning heat internally, while the external temperature is either natural or but little augmented. Thirst is unquenchable; the tongue is white, or reddish brown, or dusky red; speech is hurried, or impetuous, or stammering; the eyes are suffused, fixed, or wild, and bright; the countenance is reddish or slightly livid; respiration is frequent, laboured, or large and slow, but without cough or pain; nausea is common, with vomitings of bilious, greenish, black, or bloody matters, similar matters being passed by the bowels, without ten-



sion or pain the urine is sometimes natural, sometimes turbid, or pale, at other times black or sanguineous; and the perspirations are offensive, and instead of relieving, merely enfeeble the patient. In some cases hæmorrhages from mucous canals take place, and produce fatal depression. Wandering or phrenitic delirium is common; and when the patient is rational, there are great depression and apprehension of immediate dissolution; nothing tending to rally his spirits, or to re-assure his confidence. In this grade the characteristic signs always appear from the commencement, or in the course of the distemper. Painful tumours or buboes occur in the groins or a little below them, in the armpits, or beneath the ears or lower maxilla, or neck; as well as carbuncles chiefly in the arms and thighs, but sometimes also in other parts; and frequently pustules of a whitish, pale, or livid, black, and carbuncular appearance, or purple spots spread over the surface of the body. Recovery rarely takes place from this state of the pestilence, although death does not occur so quickly as in the foregoing. Nearly all those attacked seem to be carried off by a rapid sphacelation of the parts chiefly affected, extending even to the thoracic and abdominal viscera. It is singular that this form of the disease is met with principally in the fat, robust, and plethoric; and the more these conditions are remarkable, the less is the chance of recovery.

19. *C. The third form* or class of cases comprises the two former; for the writers on the plague of Marseilles observed, during the whole course of the pestilence, numerous cases which presented in succession several symptoms referable to both the foregoing grades; so that most of the signs characterizing the second were the precursors of those attending the first form, which always indicated the rapid extinction of life. In these the buboes receded; and if carbuncles had advanced, they rapidly assumed a more extended and gangrenous form.

20. *D. The fourth state* or class of cases consists of those attacked with the same symptoms as are noticed in the second grade (§ 18), but these symptoms abate more or less on the second or third day, either spontaneously or from the effects of treatment, and almost always owing to a considerable eruption of buboes and carbuncles which seem to have concentrated the morbid leaven, and which, proceeding on towards suppuration, in this way procure the recovery of the patient.

21. *E. The fifth grade* or class of cases comprises all those in which there is no febrile or other disorder, or but very slight disturbance, but which present buboes or carbuncles, or both, that either go on to suppuration, or become hard or chronic, or are more rarely resolved without occasioning any unfavourable result. Thus there were seen at Marseilles a number of persons of both sexes who went abroad, lived as usual, and experienced but little or no impairment of strength, and yet were affected with buboes and carbuncles, or with one or other.

22. *a. M. Gosse*, one of the most recent writers on the plague, and who saw the disease during its prevalence in Greece in 1827 and 1828, furnishes some interesting particulars as to its history. He remarks that the contagion

produces a form of the distemper which, as respects the primary local symptoms, very closely resembles *malignant pustule*, or anthrax: this is the *carbuncle*. First, there appears in some part of the skin, but especially on the limbs, the arms or neck, a small brownish spot, like a flea bite, attended by an itching and smarting, and afterward by a burning heat. This spot increases to the diameter of three or four lines, assumes a violet hue, and is covered by a flattened vesicle or phlyctena formed of the detached epidermis. The base is hard, and swollen like that of a boil. In a short time the central part assumes a bluish black appearance, and the margins, as they diverge from the centre, form concentric circles of a violet tinge, then a dark purple, a bright purple, &c., or they assume an erysipelatous appearance. The black centre extends rapidly, as well as the surrounding areola. When this *carbuncular pustule* has reached the extent of an inch and a half in diameter, it generally about the third day continues for a short time stationary. In some rare instances vascular reaction is developed around the gangrenous centre, an inflammatory circle is formed between the living and dead parts, suppuration takes place with symptomatic fever, and detaches the central slough, and the disease terminates. But much more frequently inflammatory action is either not established around the gangrened part, or, if it exist, it is insufficient to separate or throw off the slough; absorption takes place, and the poisonous fluid of the part is absorbed, contaminating and inflaming the lymphatic vessels and glands, so that red lines may be traced from the carbuncles to the glands through which these vessels pass, these glands rapidly becoming most painful and swollen. When the patient is robust, and the case proceeds favourably, the glandular enlargement increases rapidly, and the pains in the glands are acute and lancinating. The *buboes* thus formed tend rapidly to suppuration, with moderate symptomatic fever; and if the patient is guilty of no imprudence in diet or otherwise, and if his vitality is sustained, the suppuration proceeds favourably. While the buboes are developed the carbuncles extend, the gangrenous portion or central slough tends to separate from the surrounding inflamed tissue, suppuration is established, and the central slough is detached, leaving a deep wound, which is often slowly healed. In some cases the slough thus detached is very large. When suppuration takes place in the buboes recovery generally follows; but if the patient be weakened by any cause, or be depressed by cold, by mental anxiety, or disordered by indigestible food; if a temporary swelling of the glands merely occurs, the tumour disappearing without passing on to inflammation or suppuration; if, especially, no buhœ follows a carbuncle which has not supplicated, the constitutional symptoms assume the worst form, and soon pass into dissolution.

23. *b. The other form* of plague, according to M. Gosse, instead of presenting the local or external phenomena, manifests intense affection of the whole system from the commencement. Chills or rigours, with acute frontal headache, noises in the ears, vertigo, or a stunning sensation or confusion in the head, are first com-

plained of. A sensation resembling sea-sickness is often felt, and these are generally followed by all the worst symptoms mentioned when describing the first and second grades of the distemper (§ 17, 18).

24. *c.* DE MÆRTENS describes the *carbuncle* of the plague to be a gangrenous spot in the skin, resembling that caused by a burn. It consists of a reddish spot covered by small vesicles, which are pale, livid, or black, and surrounded by an inflamed circle; and passing quickly into a black, hard eschar. The term *anthrax*, he states, is usually applied to a sore resembling the carbuncle, but is larger and more elevated. It penetrates deeper, and is surrounded by pain and inflammation. Carbuncles are found on the neck, on the cheeks, the chest, the back, and the extremities, sometimes even on the buboes. The anthrax is seen chiefly on the neck and back. Carbuncles sometimes appear without buboes; frequently they accompany these swellings of the glands, or even occur later than they. M. AUBERT remarks that carbuncles rarely appear alone, but are generally followed or preceded by buboes; and that the plague, termed carbuncular, is not the more dangerous, especially if the carbuncle is solitary. He adds that the largest carbuncle which he has seen was on the middle of the back, and was four inches in diameter; the cicatrization of it was very slow. He has met with as many as eleven carbuncles in the same case; and with an instance of a pregnant female, who died of the plague, having a carbuncle on the breast. She was delivered of an infant of seven months during her illness, and it had a carbuncle on its forehead.

25. *d.* The *petechiæ*, which are seen in plague, are stated by DE MÆRTENS, AUBERT, and others to be a most unfavourable symptom, and to occur chiefly at an advanced period, or shortly before dissolution. M. AUBERT, however, remarks that he has seen recoveries after the appearance of petechiæ. They are always in this pestilence round, purplish, or black, varying from an almost imperceptibly small point to the diameter of two lines; and are found on all parts of the external surface of the body as well as on the internal surfaces. *Ecchymoses* more immediately precede death; and proceed from effusions of blood of greater or less extent in the cellular tissue and membranes, owing to loss of the vital cohesion of the capillaries and tissues, and of the crasis of the blood. HODGES, MOREA, and others mention certain eruptions, *marks*, or *tokens*, which are very different from petechiæ or the furuncular pustules now described. They are small tubercles, somewhat resembling warts, callous, and more or less deficient in sensibility; varying in size from that of a millet seed to that of a bean. They are probably merely a modification of the early stage of carbuncles in the more unfavourable cases.

26. *e.* Various modifications of the symptoms are observed during the prevalence of this pestilence. HODGES mentions cases of persons who walked about, or presented the appearance of health, and partook of their usual meals, and yet had the most unfavourable signs of the distemper in various parts of the surface, death taking place in a few hours. Some became delirious immediately after being seized, and

wandered about until they fell down exhausted and dying. In the plague of Noja, it was observed by MOREA that when buboes appeared in the neck, especially near the carotids, the eye on the same side as that presenting the buboes became inflamed, and ultimately destroyed. RËNSA states that he has seen persons so little affected by the disease as to walk about, to eat and drink as usual, and to dress their own buboes. Those who have been already affected by the pestilence generally escape during subsequent epidemics, or experience in rare instances a modified attack, or merely pains in the cicatrices of old sores and buboes.

27. *f.* A secondary and modified attack of plague is occasionally met with, although a person who has been once infected is generally secure against a second seizure. M. GOSSE states that in Turkey and Greece, those who had been already attacked, and who presented the cicatrices of buboes or carbuncles, were employed in preference to others as attendants on the sick; and that, although they took no precautions in waiting upon the infected, slept and ate near to them, handled their clothes and persons, and interred them after death—although exposed to the influence of infection in its full intensity, they generally escaped a second attack of the distemper. Many of them, however, experienced pains in the cicatrices of the old buboes without any other ailment. A few complained during a subsequent epidemic of headache or vertigo, or disorder of the stomach and general debility. Others had slight enlargement of the glands in addition to these symptoms, and but very rarely new carbuncles or sores appeared. M. GOSSE mentions only one case in which the second attack was so severe as to terminate fatally. This person had been much exposed to the effluvium proceeding from the fetid evacuations of the sick, upon whom he was an attendant. He was soon after infected, and died on the sixth day of the disease.

28. *ii.* STAGES or PERIODS.—Although this distemper may consist of only *one stage* in its most aggravated cases, that one being characterized by rapid sinking of the powers of life, as manifested by the nervous and vascular systems and internal organs, still it much more frequently exhibits the several periods into which febrile, exanthematous, or other diseases, attended by vascular reaction, have been usually divided. These periods have been variously divided; but they may be described as follows, and as they appear in the majority of cases.

29. *A.* The *period* which elapses between the first impression of the exciting cause and the actual manifestation or irruption of the symptoms of plague has been differently estimated by different writers. The *duration* of this period obviously depends upon the intensity of the cause, relatively to the susceptibility of the patient—upon the dose of the poison infecting the individual. During devastating epidemics, when it may be presumed that the infectious agent or poison exists in its greatest intensity, and when its activity is augmented by an increased susceptibility of infection among the great majority of the community, this agent produces its effects with more or less rapidity. In some instances where it may be presumed that the morbid effluvia from the bodies of the



dead, or evacuations of the diseased, have been more than usually abundant, the effect upon those very nearly exposed to them has been most depressing, and almost instantly overwhelming to the powers of life. Many writers have mentioned the seizure of persons thus circumstanced as suddenly as if they had been struck by lightning, vital exhaustion proceeding most rapidly, with a feeling of the utmost internal anxiety and distress, and terminating in fatal sinking in an hour or two. In these cases, and even in many of much longer duration, the malady admits not of any division into *stages* or *periods*, these having, in fact, consisted of only one stage, namely, that of progressive exhaustion of the powers of life, following immediately after the impression of the exciting cause, and terminating fatally with great yet variable rapidity. In these, as there is no variation in the course of the distemper, so there can be no division of it into stages; and there is also no *latent period* between the impression made by the poisonous agent and the manifestation of its effects—no period for the incubation of the morbid seminum, the fatal results of which are rendered instantly apparent in such cases.

30. In different circumstances, however, and in the large majority of instances, the distemper requires a longer or shorter period from the time at which its cause has infected the system before its effects are apparent. This period, which has been denominated that of *incubation*, or the latest stage of the malady, cannot be said to exist in the circumstances just mentioned; and even in some of those which are now about to be considered, it is often of so short duration as either to be entirely overlooked, or to attract but slight attention. In these, as well as in other cases, when the period between infection and the irruption of the distemper is much longer, the patient is not generally in sound health during the interval. Although no complaint may be made and but little ailment is felt, still more or less of malaise, or lassitude, or slight disorder may be detected; at last, after a period varying from a few hours to several days, the *actual manifestation* of the distemper, inaccurately called the *period of invasion* by many writers, takes place, and the malady proceeds in its usual course. It is fully ascertained that the morbid phenomena may instantaneously follow the impression made by the poisonous effluvium upon the susceptible, when it is intense, relatively to the grade of susceptibility; and that they may follow at periods more remote from such impression; but the extreme duration of this period has not been precisely ascertained. Seven, eight, or nine days have been viewed by many as the longest period during which the infectious emanation operates its effects, in a silent or latent manner, in the frame of the recipient before it explodes in open disease. It is even possible that a longer period may sometimes be required, especially when the distemper is merely endemic or sporadic, when the dose of the infecting poison is weak relatively to the susceptibility of the recipient, or when the action of the poison is resisted by the constitution and circumstances of the patient. It is also obvious that in this, as well as in all other infectious distempers, as will be shown more fully hereafter, persons whose suscepti-

bility is by no means great may altogether escape, although very much exposed to infection, until some depressing agent or influence comes in aid and determines the operation of the exciting or infecting cause, as I have more particularly explained in the article *DISEASE* (§ 61).

31. *B. The period of irruption or invasion* usually appears with a short chill or rigour, nausea, lassitude, vomiting, severe pain of the head and præcordia; continued anxiety; a sense of internal heat referred to the stomach and bowels; vertigo, with a staggering walk and appearance of drunkenness. The spirits are depressed to a state of apathy; the features are pale, collapsed, sometimes turgid or bloated; the tongue is coated with a white mucous crust; thirst is urgent and constant; the skin dry and hot; and the pulse most variable, usually quick, but at one time weak, small, and irregular, at another more full and equal. The vertigo, headache, and drunken appearance of the countenance soon pass into delirium, with jactitation, restlessness, and tremour of the limbs and tendons, often passing into profound lethargy. Sometimes difficulty of breathing, pain, and oppression at the chest; hoarseness and cough; a sense of burning heat at the præcordia, and occasionally throughout the thorax; and, in some cases, slight expectoration of blood, or more copious hæmoptysis, are present from the commencement. These symptoms are often increased by the accession of vomiting, or of borborygmi, or meteorismus, or diarrhœa.

32. *C. The eruptive period* may occur after a few hours, or in the course of the second or third, or even the fourth day. After the rapid aggravation of the foregoing symptoms, stinging and lancinating pains are felt in parts of the surface, followed by the appearance of *carbuncles*, in the manner already described (§ 22), and generally, either subsequently or contemporaneously, by tumours of the lymphatic glands, or *buboes* (§ 22). These are developed with greater or less rapidity, and with an increase of all the constitutional symptoms, which present a more marked malignancy as they continue. The nervous systems of organic and animal life evince extreme depression and disturbance, and the vascular system remarkable loss of vital tone. The delirium is either furious, or resembles violent intoxication, or it sinks into a stupid muttering or typhomania, or into complete sopor. The face is lurid, or of an earthy or leaden hue; the eyes are watery, suffused, and the lachrymal caruncle red and congested; the tongue is dark, contracted, dry, and tremulous, sometimes almost black; the voice is hoarse or altered; the speech rapid, hesitating, interrupted, or stammering; vomiting is constant, irrepressible, attended by hicough, and the matters ejected have a putrid odour; the perspiration is cold, viscid, and most offensive, and the surrounding air is sickening and fetid. The carbuncles sphacelate; the buboes either subside or pass into an ichorous ulceration; petechiæ, vibices, or ecchymoses appear; subsultus tendinum and convulsive movements supervene; and the pulse becomes soft, weak, small, irregular, or intermittent, with faintness, sinking, deafness, and loss of sensibility. These symptoms, which are often variously grouped, differ but little from those

of putro-dynamic and true typhus fevers, excepting in the appearance of carbuncles and buboes.

33. *D. The period of crisis* supervenes; but the distemper may terminate fatally with the symptoms of vital depression, and of dissolution of the vital cohesion of the tissues just mentioned, at any period from the second to the seventh day. When it proceeds so rapidly as to terminate in death on the second or third day, the stages of its course are generally but imperfectly marked, at least according to the division of them adopted by HILDENBRAND, and followed by NAUMANN. But when the attack is less severe, and when it is prolonged to the sixth or seventh day, a favourable change frequently occurs on the latter day. The pulse is fuller, more equal, and stronger; a general, warm, and copious perspiration breaks out; the sloughs of the carbuncles begin to separate, and the buboes assume a healthy suppuration. The alvine and urinary evacuations are also improved, although a crisis is more rarely indicated by them than by the external surface and sores.

34. *E. The decrement* or cessation of the distemper is generally gradual and slow when the attack has been severe, and when the carbuncles and buboes have been large, open, and foul. When the disease has been milder the symptoms disappear more rapidly, a resolution of the buboes taking place without suppuration occurring; but in all cases where the buboes go on to the production of a morbid matter, either infiltrating the cellular tissue surrounding the diseased glands, or breaking externally, a healthy suppuration is requisite to returning health. Hence *convalescence* is more or less prolonged by the severity and extent of the external sores, as well as by the violence of the preceding constitutional affection, by the profound alteration and depression of the powers of life in all the vital organs, and by the conditions of the circulating fluids.

35. *F. The duration* of an attack of plague varies from an hour or two to six or seven days in fatal cases. According to M. MOREL, death generally occurs before seven days. When recovery takes place, the suppuration and healing of the carbuncles and buboes greatly protract the distemper, at least the early period of convalescence from it. In slighter attacks, when no foul and open sores are formed, recovery is much more rapid, and the duration of the distemper is much shorter, but of an indefinite duration, under nine or eleven days, no precise period having been remarked.

3. II. APPEARANCES ON DISSECTION.—M. RIGAUD, lately physician to the European Hospital at Alexandria, states the following to have been the results of his examination of the bodies of sixty-eight subjects of the plague. The exterior of the body, when death has ensued rapidly and without any medical aid, is bluish and dark-violet, in large, irregular patches, especially about the head, the neck, and upper extremities, the surface appearing as if rubbed over with mulberries. This discoloration, which is often absent when death has taken place slowly, is accompanied with petechiæ, varying in size from a flea-bite to that of a vetch. One or more carbuncles and buboes are found in the situations already specified (§

22). The usual cadaveric stiffness is present.

—*a.* The membranes of the *brain* are injected with black blood. The vessels beneath the arachnoid are greatly distended. This membrane is, however, rarely thickened; it is mostly adherent, by a buffy and granular transudation, to the upper and inner parts of the hemispheres of the brain. Sanguineous effusions are observed in some cases; but more frequently the cellular sub-arachnoid tissue is infiltrated with a serous fluid, sometimes yellow, or even purulent-looking. The cineritious substance of the brain is of a deeper colour than natural; and the white substance, when sliced, shows very numerous bloody points. A little limpid serum is found in the ventricles. The choroid plexuses are of a reddish violet colour, like the lees of wine. The brain is seldom softened. The membranes and substance of the spinal chord are generally in the same state as those of the brain. The cephalo-spinal fluid is in excessive quantity.

37. *b.* The *lungs* are generally found more or less altered, but the lesions are often consequences of antecedent maladies. They are often rose-coloured on their exterior and anterior surface, but sometimes pale yellow, marbled with blue; these appearances are, however, seen only when they are bloodless. Posteriorly they are always of a deep violet, their vessels being gorged with black and thick blood. The *pleura* is always of a dark red, with numerous adhesions. Effusions of a yellowish serum in considerable quantity are frequently met with in the pleural cavities. The *pericardium* usually contains from half a pint to a pint and upward of serum. The *heart* seems increased in volume, and its superficial vessels are congested and well defined. Spots like petechiæ are observed over the left cavities. The right cavities, the auricles especially, are distended by black blood, sometimes clotted, but always gluey. On the left side the cavities are empty, with the exception of a very little blood in the ventricle. The substance of the heart and its inner membrane are unaltered. The *arteries* are always empty; the *veins* are, on the contrary, distended, and full of black clotted blood, the jugulars more particularly. While the inner coat of the arterics presents no alteration, that of the veins is spotted largely and irregularly, as if with ink.

38. *c.* The *pharynx* and *œsophagus* are commonly natural; and this has been the case even with the latter, when appearances of intense inflammation have existed in the cardiac orifice of the stomach. The *peritoneum* is always of a pink or bright red tinge, and the vessels are seen beneath it largely gorged with black blood. The adipose tissue is injected and reddened, sometimes darkish, like lees of wine. The *stomach* is often distended by gas. It frequently contains a quantity of a dark viscid fluid, like a mixture of bile and putrid blood. The mucous membrane varies in colour from pink and bright red to a brown, bluish, or leaden tinge, and often to a bronze green. Large ecchymosed patches and petechial spots are also observed in the internal surface. The internal coats are remarkably softened, and sometimes ulcerated. The *intestines* present the same changes as the stomach, excepting the colon, which is somewhat contracted. Lumbrici,



and less frequently tæniæ, are found in many cases. The *mesenteric glands* are engorged and blackish, and the whole *glandular system* is more or less altered. The *liver* is almost always enlarged, especially its large lobe, which presses up the diaphragm very much on the right lung. Its vessels are engorged; its substance somewhat softened, but not otherwise altered. The *gall-bladder* is double, or nearly triple its usual size, containing a thick, greenish-black bile. Petechial spots are seen beneath its peritoneal covering. The *spleen* is much augmented in volume, softened, friable, and pulpy. The *kidneys* are engorged with blood; the ureters are arborescent, with a red hue along their entire course, or covered with black spots, or even wholly blackened, as if with charcoal or ink. The *urinary bladder* is commonly half contracted, and its inner membrane presents the same appearances as those of the stomach and intestines.

39. *d.* These changes were observed in Europeans who had died in the hospital in Alexandria, and who had been addicted to every kind of excess; but they differ but little from those found by other physicians who have observed the disease in various countries and epidemics. Petechiæ have been remarked in all the viscera, especially in the mucous surface, where, also, ecchymoses and large dark spots have been very common. The carbuncles said to have been found by the older writers on this pestilence in the abdominal and thoracic organs have manifestly been those large ecchymoses or exudations of blood in the tissues, more accurately observed by recent writers. M. LACHAISE, in his description of the changes in the bodies of those who died of the Egyptian plague of 1835, states that the whole lymphatic glandular system was diseased, internal as well as external. These glands were more or less engorged, enlarged, often softened and discoloured. The spleen was always very much enlarged, and so remarkably softened as not to admit of being handled. In all cases when black vomiting had occurred, the mucous surface of the stomach was not only ecchymosed and softened, but also ulcerated, the ulcers being very small and often numerous, and apparently the consequences of the ecchymoses, or small effusions of blood in and under the mucous or villous membrane. Red petechiæ and small rounded ecchymoses were also frequent under the serous surfaces. He adds, that all the parenchymatous organs were engorged with fluid black blood, which had frequently gone on to decomposition, causing the presence of gas, which was often remarked. M. AUBERT states that he observed the ganglia of the great sympathetic engorged with blood, and presenting numerous red points externally, and internally the colour of wine lees. M. LACHAISE mentions the frequency of red points in the nerves arising from extravasations of blood in their neurilema.

40. *e.* All recent writers concur in remarking the very sensible *alteration of the blood* in this pestilence even during the life of the patient. Blood drawn from a vein, even early in the distemper, does not separate into a coagulum and serum, and there is no fibrinous portion or buffy coat. These elements remain mixed together, presenting the consistence of cream.

During venesection the blood presents, as it flows, the same dark colour at the close as it did at the commencement of its abstraction; and it often emits a peculiar odour. After standing, drops of oil often appear on the surface, and the whole mass speedily undergoes putrefaction. M. BULARD states that M. ROCHET analyzed the blood in three cases. The blood was taken from three young and plethoric men, and from the third to the fifth day of the distemper. In 100 parts there were only six tenths of fibrin, and it contained sulphuretted hydrogen gas. It was always more dense than in health. The venous trunks contained blood, presenting the same appearances and chemical constituents as that taken away by venesection. The blood in these vessels was fluid and black; it appeared as dissolved, and often contained small oily drops.

41. III. DIAGNOSIS.—Plague is often distinguished with great difficulty from other malignant or low fevers on the first breaking out of an epidemic, so that physicians who have been in the habit of seeing plague patients have been deceived in some instances. The difficulty, however, is only felt at the commencement of an epidemic, and when neither carbuncles nor buboes appear. When these are present, or even either the one or the other, then the nature of the distemper is made manifest. During the prevalence of an epidemic plague, a white chalky tongue, a quick and rapid pulse, and headache, are sufficient proofs of an attack, although neither carbuncles nor buboes, nor even petechiæ are present. The septic or putrescent disposition, although greater in this pestilence than in others, is not sufficient to distinguish it in many cases, and especially early in the attack; but, when the affection of the glandular system becomes apparent either alone or conjointly with the other symptoms of malignancy, or signs of a septic tendency, then no doubt of the nature of the distemper need be entertained.

42. IV. PROGNOSIS.—The prognosis in this distemper has been more fully stated by DIEMERBROECK than by any other writer. He remarks that no dependence, in general, could be placed upon critical changes occurring even in the critical days; when, however, they take place on the sixth day, the disease is always fatal; and he adds, that those who are seized at new and full moon rarely recover. A seizure after a fit of anger, after terror, dread, or anxiety, and after sensual excesses, is especially to be dreaded. The commencement of the distemper during warm, humid weather, and a still or calm state of the air, in warm countries, or during the summer or autumn in colder climates, and in low, close, foul, and crowded localities, among a population insufficiently nourished, prone to excesses, and neglectful of cleanliness, is generally followed by a rapidly diffused and fatal epidemic. I shall treat of the prognosis with reference, in succession, to the chief functions of the economy, according to the information furnished by the most experienced writers.

43. *a.* The *circulating organs* sometimes fail of furnishing those indications of the result which might be expected from them; but this may be owing as much to deficiencies in the observer as to the conditions of these organs.

Paintings, syncope, or marked impairment of the *heart's action*, or palpitation at the time of seizure, or soon afterward, are generally unfavourable. An irregular, unequal, small, weak, and very soft pulse during the course of the distemper, and an intermittent, small, weak, and creeping pulse at an advanced period, are generally fatal. A rapid, quick, open, and expansive pulse at the commencement, or early in the attack, is also unfavourable. An even, not very frequent, or even an almost natural pulse, cannot be relied upon as indicating a favourable result unless accompanied by other favourable symptoms. DIEMERBROECK remarks that a pulse nearly approaching the natural state is deceitful, and that an intermittent pulse is always fatal. The state of the *blood*, as shown after venesection, or by the appearances of the mucous and cutaneous surfaces, and considered in connexion with the heart's action and pulse, also indicates the amount of danger, evidence of serious change in this fluid leaving but slight hopes of recovery.

44. *b. The nervous systems*, especially the *organic nervous system*, often furnish evidence of the ultimate result from the beginning of the attack. In some cases the *cerebro-spinal system* is not remarkably affected even during the whole course of the malady; the intellects are not disordered, and muscular power and action are often so far retained as that the patient is enabled to walk about until shortly before dissolution; and although the pulse may have disappeared from the extremities, he can, in some instances, change from one part of the chamber to another. When, however, the powers of the mind are impaired, depressed, or otherwise disordered at the commencement, or when violent or low delirium occur early, and when apathy, lethargy, stupor, or complete coma appear, the distemper generally terminates fatally. Tremour of the tongue and hands; convulsive movements of the extremities or other parts; contractions or startings of the tendons, generally indicate dissolution, especially when associated with delirium, stupor, or coma.

45. If all the functions which are actuated by the *organic nervous system* be remarkably depressed or otherwise disordered; if the digestive, the assimilative, the excreting, and the circulating functions are either arrested or remarkably impaired; if the vital or chemical conditions of the blood be visibly altered; and if the vital cohesion or tone of the capillaries and of the several tissues be manifestly diminished, occasioning passive hæmorrhages and discolorations of the surface, recovery rarely takes place, especially if these changes are very apparent. DIEMERBROECK remarks that epistaxis is dangerous on a critical day, and fatal on a non-critical day. Other hæmorrhages are even still more dangerous.

46. *c. The tongue* often indicates the result with much certainty. When it becomes black, or very dry and contracted at the commencement, an unfavourable issue may be expected; but when it preserves a natural appearance and continues moist, or when it regains these appearances, recovery may be anticipated. Severe affections of the *throat*, or pain in this situation, even although there may be neither dryness, nor aphthæ, nor tumours, or other manifest cause, often announces a fatal term-

ination. Exudations of blood from the gums, tongue, mouth, or throat, are equally unfavourable.

47. *d. If the symptoms referable to the stomach and bowels* are severe at the commencement, and especially if *vomiting* be exhausting, frequent, or continued; if the matters ejected be black or unnatural; and particularly if it be attended by singultus, death will ensue. When, however, vomiting is moderate, and when it ceases after the evacuation of green, or greenish-yellow, or bilious fluids, a favourable result often takes place. The occurrence of *diarrhæa*, and even of looseness, especially if the motions are black, or sanguinolent, or give out a very offensive, putrid, or unnatural odour, is generally fatal. On the contrary, *costiveness*, or a natural state of the bowels, at the commencement and during the increase and decrement of the distemper, is a very favourable circumstance.

48. *e. A free, tranquil, and easy state of respiration* furnishes just grounds of hope; but the more serious disorders of the respiratory organs are most unfavourable. A short cough, short and difficult respiration; a burning heat or pungent pain, or tightness in the thorax; bloody expectoration or hæmoptysis; and signs of pneumonia or of pleurisy, are several indications of a fatal issue. Frequent sneezings and remarkable fetor of the breath, or an odour of putrefied flesh furnished by the expired air, are indications of approaching dissolution. Alterations of the voice, a rapid or interrupted, or very slow or stammering enunciation, inarticulate or confused speech, are all unfavourable signs.

49. *f. The urine* generally fails to furnish any certain indications of the result; and I can find no exact information respecting its chemical conditions in this pestilence. DIEMERBROECK observes that a turbid urine was unfavourable; nevertheless, some escaped who passed this urine, while many died suddenly or rapidly, although the urine was natural, and that in some of these the symptoms did not appear dangerous. He adds, that a thick, oleaginous, brown, or blackish urine, or that furnishing a brown or black sediment, was generally a very unfavourable symptom. Those who discharged blood from the urinary organs, either mixed with the urine or distinct from it, he states, died in a short time. HOGES remarks that very offensive urine is a fatal symptom.

50. *g. The appearance of the catamenia* during this pestilence is dangerous, even upon a critical day; and most writers view this occurrence as fatal when it takes place on a non-critical day. HOGES says that every hæmorrhage is bad, but a flux of the menses is fatal. Women who are pregnant, or lying-in, or threatened by abortion, rarely recover when seized by this distemper; and they are in great danger of being attacked when it is epidemic, unless excluded from all possible medium of infection. Infants born either prematurely or at the full time, after the mother has been seized by the plague, have sometimes presented proofs of the disease having affected them *in utero*, and the distinctive characters of the distemper.

51. *h. The external surface* furnishes by its appearances the most certain evidence of the issue of the distemper. When a warm, genial,



and general perspiration breaks out, no symptom assuming a worse character, a favourable result may be expected. But when the perspiration is clammy, viscid, very offensive, or cold, or even although it be general, when the symptoms are aggravated, or the patient becomes weaker, or feels a sense of sinking, then the distemper terminates fatally. HODGES remarks that "the most certain fatality of all is from such sweats as have a cadaverous smell, although there was sometimes a disagreeable scented sweat, with which they recovered, as with it exhaled the pestilential venom." (P. 144.)

52. *i.* The *glandular tumours*, or buboes, characterizing this pestilence often furnish the best evidence of the issue. The early appearance of these tumours, especially before or without febrile symptoms, is a favourable circumstance; but it is very different if they follow the fever, or if the febrile symptoms are very severe or intense. The occurrence of these tumours below the ears or in the neck, and especially if they increase rapidly, or in the course of ten or twenty hours, or if they be soft, fluctuating, or boggy, either with or without inflammation, is always fatal; and although some patients with tumours thus situated and characterized may not appear otherwise very ill, they die nevertheless. If, on the other hand, the tumours are hard at the commencement, tense and oblong, and increase gradually or slowly, with a moderate degree of pain, and if they continue hard during their increase, a favourable result may be anticipated; and with more certainty if they pass on to suppuration; or when the fever has ceased, they gradually disappear without suppuration. But if hard buboes are surrounded by a circle resembling an iris, or if they assume a dark or fiery red, or a livid or black hue, or if the buboes disappear suddenly, the fever still continuing, death generally takes place. HODGES remarks that "the more buboes there are, so that they suppurate, the better. Carbuncles are always more dangerous than buboes." (P. 140.) Dr. MOREA observes that buboes in the armpits are always attended by danger, and an inflammatory affection of the eyes, with difficulty or other disorders of respiration, generally accompanies them, these and other symptoms becoming worse unless they enlarge and suppurate, when an amelioration takes place; but if they remain stationary, or subside, death always results. (*Op. Cit.*, p. 427.)

53. *k.* *Carbuncles* appearing in fleshy parts, from the commencement of the distemper or soon afterward, are favourable; but if they are seated over or very near the buboes or enlarged glands, over the spine, or on the fingers or toes, they indicate great danger. If they break out slowly there is much risk, and if they are numerous there is still greater risk. If, in the course of two or three days, they are surrounded by a red circle, they generally heal easily and soon; but if they continue to extend, without a disposition to become limited, or if they reach a great size, there is danger, or at least there will be great difficulty in healing them. The prognosis should be still more unfavourable if they are seated on the spine, or over large blood-vessels or nerves. When they disappear suddenly, or when they dry up, the feb-

rile or other symptoms still continuing, a fatal termination soon follows. HODGES says that "the smaller the carbuncles, and the more remote their situation from the viscera, greater vessels, tendons, and nerves, and the fewer they are in number, by so much it is the better; and, on the contrary, when they spread like a gangrene, and are near the principal parts, as the breast or belly, and also are numerous or livid, the fate of the patient may be pronounced desperate." (P. 147.)

54. *l.* *Petechiæ, ecchymoses, or spots* of a violet, purple, black, or greenish hue, whenever they may appear, always indicate a fatal issue. A few escape when the petechiæ are red, but even this is an unfavourable symptom.

55. *m.* Dr. CASTRO remarks that evacuations occurring spontaneously in the course of febrile diseases, especially on critical days, are favourable circumstances; that they are quite otherwise than favourable in plague. DIEMERBROECK observes that he has always considered *issues* and *setons*, made with a view of protecting the individual from an attack of plague, as most serviceable, even although he may be seized nevertheless; for if these continue to discharge fully during an attack, the pestilential venom seems to discharge itself by these channels; but if they dry up, or cannot discharge, during an early or more advanced period of the distemper, death will certainly take place. Of the protecting and favourable influence of *issues* on this malady, he quotes the opinions of MERCURIALI, HERCULES SAXONIA, GARNIER, HILDANUS, JOANNES HERCULANUS, and others in support of his opinion.

56. V. THE CAUSES OF PLAGUE.—This subject, in some of its most important relations, has long engaged the minds of eminent medical writers. It has occupied a portion of the attention of the legislature in this country in modern times; and very recently it has been inquired into and discussed in the Royal Academy of Medicine in Paris. I have, in preceding sections of this article, fully examined the *causes* of the *choleric* and *hamagastic pestilences*, and have demonstrated the existence of *infection* as their chief and efficient cause. However this may be disputed by the interested, by the prejudiced, and by the insufficiently informed, I am confident of its truth. I have written with a full conviction of the soundness of the opinions I have entertained, and with a firm belief that time will not only test, but also prove their accuracy. The inquiry upon which I am about to enter will be prosecuted as follows: 1st. Is plague caused and propagated by infection? 2d. Infection having been demonstrated, in what does the infectious agent consist, and by what media is it conveyed or preserved? 3d. What are the circumstances, influences, and agents favouring or determining the action of the infectious or pestilential miasm? And, 4th. For what period may infection remain latent in the system until its irruption in a specific form; and how long may the infectious poison retain its powers when preserved in animal or other productions?

57. *A.* *Is plague caused and propagated by infection?* Conformably with the meaning attached to the word *infection*, in the use which I have made of it in the two preceding parts of this article, and agreeably to what I have sta-

ted in the article *INFECTION*, there can be no doubt of the proofs of the infectious nature of this pestilence being most complete, and convincing to all candid minds. In that article I have classed plague in the *third class* of infectious maladies, and have stated the *tests* and *circumstances* proving the infectious nature of this distemper, and of others belonging to the same category. (*See INFECTION*, § 4, 15.) Lest I may be viewed as having espoused a particular doctrine without sufficient evidence of its truth, I shall *first* adduce a sufficient number of the innumerable facts upon record proving the infectious nature of this pestilence, and *next* inquire into the objections which have been urged against a most important doctrine as respects the best interests of the community.

58. *α.* Plague has been generally considered as both an *endemic* and *epidemic* distemper; it has been viewed as endemic in Egypt and Syria, where, also, it is frequently epidemic, and only epidemic after various prolonged and indeterminate intervals, in most of the countries bordering on or approaching to the Mediterranean shores, and less frequently, or much more rarely, in those which are farther distant from them. It has been said to be non-infectious or non-contagious when appearing endemically, sporadically, or primarily; and to be contagious by some, infectious by others, and both contagious and infectious by many, only when it appears in an epidemic form. These views have been often hastily taken, and the terms in which they are expressed have been as loosely as inaccurately employed. The meaning which the numerous writers on the subject have attached to the words contagion and infection has been vague in most instances; different writers employing them with a different import, or with a different range of meaning; and even the same writer using them without either precision or distinction. From what I have stated in another article (*see INFECTION*), it will be seen that I have used *infection* as the generic term, and *contagion* as a form of infection, or as that infection of a healthy but predisposed body produced by immediate or mediate contact of a diseased body, or of the secretions of a diseased body, the contagious agent propagating a specific malady and perpetuating its kind. I have applied the term infectious to those maladies which are propagated and perpetuated without contact, and by means of an animal miasm or emanation, proceeding from the bodies of the diseased, and affecting predisposed or susceptible persons with a distemper identical with that which produced the infecting miasm or emanation.

59. Taking the most extended view of *infection*, and considering it a result of whatever may contaminate the fluids and solids of a healthy body, as I have done in that article, we shall find that *contagion* is a mode only of *specific infection*; and that while all specific infections proceed from more or less diffusive, or more or less consistent animal emanations or secretions, which affect the system through the medium of either the respiratory or the cutaneous or mucous surfaces, contagion is infection by those secretions which act chiefly by contact with, and through the medium of, the external surface of the body. It is obvious

from this that, as the major includes the minor, so all contagions are also infectious; that infection has a wider range of acceptation than contagion; and that, among the several infectious agents, some act through the medium of the lungs, others through the medium of the external surfaces, and many through either channel, or through both, according to the circumstances or modes in which the infectious agent may be presented to the healthy frame. Thus infectious emanations or secretions from specifically infectious maladies may affect healthy predisposed persons: 1st. When diffused in the air either directly from the diseased body, or mediately from woollen, or body or bed-clothes, which had retained these emanations for a longer or shorter period, the air thus contaminated affecting the healthy through the medium of the lungs; 2d. When applied in a more or less consistent or tangible form to the cutaneous surface, or to the outlets of mucous canals; and, 3d. When presented to the healthy economy in either of, or in both these modes. Hence some distempers, as the two pestilences already treated of, are propagated and perpetuated in the *first* of those modes only; while others are communicated in the *second* of those modes, as itch, syphilis, rabies, &c.; and some are transmitted in *both modes*, as plague, smallpox, &c. The *first* order is simply *infectious*, the *second* is *contagious*, and the *third* is both *infectious* and *contagious*. (*See Art. INFECTION*, § 4.)

60. Much difference has existed among writers as to the country or countries in which the plague is *endemic*, or in which it is generated or its germs preserved; and as to whether or not it is always present in few or rare instances, although not commonly observed, when it is not generally prevalent—whether or not it is generated *de novo* in those countries, after intervals of entire extinction, or is the infectious poison always preserved by means of few or occasional cases, thereby imparting to it an appearance in those places of a sporadic or endemic distemper. Many of the ancients, as well as writers of later epochs, as MEAD, ADOLPHUS, ARBUTHNOT, FODÉRÉ, and others, have considered Egypt to be the most productive source of this pestilence; while PROSPER, ALPINUS, TARGIONI, and OLIVIER have believed that, although frequently observed in this country, it is generally introduced from Ethiopia, where it is generated by a hot sun from a deep and rich soil, kept almost constantly humid by the rains, a malignant miasm being produced from this source, that constantly gives origin to a malady, whose effluvia propagates and perpetuates itself. Whether originating or not in these or other countries bordering on the Levant, and whether it arises from this or other sources, there can be no doubt of the rapid spread of this pestilence from person to person, especially in certain circumstances which evidently favour this diffusion, although the exact nature of these circumstances are often not very manifest, or altogether unascertained. That this malady is propagated in one or other of the three modes to which I have just now endeavoured to assign some degree of precision, cannot be denied by any one who has perused a portion of the annals of pestilential diseases with an un-



prejudiced mind ; but the chief difficulty is to determine the particular mode in which it is transmitted ; and it is by no means a matter of small importance that the exact mode or channel of transmission observed by this pestilence should be ascertained, inasmuch as upon it all protective and prophylactic measures should be based. After perusing the evidence which I shall have to furnish respecting the transmission of this distemper from person to person—and this evidence can only be, owing to my confined limits, a very small portion of that which might be adduced—the reader will readily come to a conclusion as to the channels by which this transmission takes place, even without that assistance which it is my duty to afford.

61. Dr. HENNEN, who took great pains to investigate the origin and propagation of the plague in Malta in 1813, and who has confirmed the accounts of this epidemic furnished by Drs. CALVERT, FAULKNER, and TULLY, remarks that "it has been among medical men, I am sorry to say, that doubts have principally arisen as to the contagious nature of plague. This gross and dangerous error, in point of fact, has sprung from that most fruitful source of deception—preconceived theory ; and it has been aggravated by neglecting to define the terms employed, which is altogether inexcusable, and which has exposed us to no small portion of ridicule among the better-informed non-professional men who have interested themselves on the subject."

62. The signs or tests by which a disease may, with the utmost certainty, be proved to be infectious or contagious, or both the one and the other, have been fully stated in the article INFECTION (§ 15). Now whoever will examine the accounts of the plague furnished by those who have witnessed its ravages, will find most convincing evidence of the following truths : 1st. That it is most liable to attack those who approach patients affected with it, and that in proportion to the nearness of the approach ; 2d. That those who avoid all intercourse with persons affected with the plague, generally escape the distemper. These are facts recognised and acted upon by all persons who have had opportunities of observing the progress of this pestilence ; and there are few facts in medical history so well supported by evidence as these are, and as to which the experience of past and present times is so uniform and conclusive. A recent writer has remarked, that the most remarkable examples of the communicability of this distemper are afforded by the introduction of it into countries which had long been free from it, in consequence of intercourse with places in which it was then raging. The clearness with which this intercourse has been often traced is truly wonderful, considering the many temptations which travellers, traders, mariners, and commercial men, coming from countries where the plague is prevailing, have to clandestine intercourse, and the frequency of deception practiced by illicit dealers, smugglers, and others. Of such histories, there are so many on record that the difficulty is which to select ; although it must appear very difficult, if the subject be viewed in a proper light, to trace the origin of an infectious malady, especially when such malady may be propagated by the poison re-

tained, even for a very considerable period, in articles of clothing and bedding. Indeed, in many cases of the importation of plague into places remote from or even approximating the Levant, several circumstances and occurrences have taken place, proving the introduction of the infection not by one channel, article, or person merely, but by several in the course of a few days ; and thus the accounts given of the origin of the distemper have varied in some instances, and have thereby apparently weakened, although actually strengthening, the evidence of imported infection. Besides, the difficulty is greatly increased as respects this pestilence, as well as others, by the circumstance of a very large number, and sometimes all, the very earliest cases being either concealed or denied, or mistaken for some other fever : a fact of more importance than generally acknowledged in tracing the early history of an epidemic. Owing to the difficulties now adverted to, and to the fact of the plague appearing in places holding frequent intercourse with countries where it was raging at the time, the infection having been conveyed in more ways than one, several of the outbreaks of it in various parts of Europe during the 15th, 16th, and 17th centuries have been either imperfectly described or unsatisfactorily accounted for ; but such is by no means the case with others, and especially the more recent. The plague appeared at Marseilles in 1720, after an immunity of seventy years. A vessel from Seyde, in Syria, arrived in that port on the 25th of May, after having lost several of the crew and of the passengers during the voyage by this distemper, and among these the surgeon of the ship. On the arrival of the vessel, the crew and cargo were landed at the lazaretto. Soon afterward the disease attacked, in succession, another of the crew, an officer put on board to superintend the quarantine, a boy belonging to the ship, two porters employed in unloading her, then four other porters, the priest who had administered the last sacrament to the sick, the surgeon of the lazaretto, and his whole family. Notwithstanding these events, the passengers, having performed a short quarantine of less than twenty days, were allowed to take up their quarters in the town, and to carry with them their clothes and packages, conformably with the advice of the anti-contagionists of that place and time. As Dr. Gooch has very justly remarked, when passengers, after a voyage of nearly four months and a quarantine of nearly three weeks, are at length let loose in a large city, their first employment is to roam about the streets ; they have things to sell, and to buy, and to see. They come in contact, in the streets and in the shops, with persons whom they think no more about, and who think and know no more about them.

63. It is not surprising, therefore, that the exact traces of the distemper should be lost in all such circumstances, and that it should be often difficult, and even impossible, to follow the progress of it in its various courses towards the general infection of a community. Dr. BERTRAND, a resident physician at Marseilles at the time, states that it is most certain that the plague was on board Captain CHATAUB's ship ; that it was communicated to the infirmary by the merchandise with which it was

freighted ; that one of the first who fell sick in the city had been passenger in the ship, and had only quitted the infirmary a few days with his clothes and merchandise ; that among the very early victims of the distemper were the family of a famous contraband trader near the convent of the Carmes, and those of contraband traders residing in the Rue de l'Escale and vicinity ; and that the suburb adjoining the infirmary was attacked nearly at the same time as the Rue de l'Escale. I leave my readers to make the reflections naturally suggested by these facts.

64. Numerous incidents occurred, during the early prevalence of the pestilence in this city, proving the channels or modes of its extension ; but it is sufficient to notice one or two of them only. The Hôtel Dieu contained between three and four hundred foundlings of both sexes, besides the officers and attendants. A woman from the Rue de l'Escale presented herself at this hospital, stating that she was ill with a common fever ; for in this pestilence, as in many others, the first cases were not admitted to have been the plague, and numerous misrepresentations were made respecting them ; and hence the unrestrained progress of the mischief, and the loss of much valuable time, or, rather, the entire loss of that time, in which alone it could have been limited. She was taken in and conducted to her bed by two maid-servants. The next day the two maid-servants fell ill and died in a few hours. The day after, the matron, who had visited the patient, fell ill, and died almost as suddenly. The disease spread with amazing rapidity, and destroyed all the children, with every person belonging to the house, excepting about thirty, and these took the infection, but recovered.

65. An official report transmitted to Paris stated that the physicians and surgeons of Marseilles unanimously declared, "that when one person in a family was attacked and died, the rest soon underwent the same fate, inasmuch that there were instances of families entirely destroyed in that manner ; and if any one of an infected family fled to another house, the contagion accompanied him, and proved fatal to the family where he had taken refuge."

66. The removal and interment of the dead, as the pestilence extended, were among the greatest difficulties experienced by the authorities of this city. At first, beggars and vagabonds were employed in casting away the dead bodies ; but these soon were seized by the distemper, "and those who followed them in their offices soon followed them in their fate." Convicts were then supplied from the galleys to carry away the dead, and promised their liberty if they survived. The first supply amounted to 133, but these perished to a man in less than a week. A hundred were next granted, and in six days they were reduced to twelve. The population of Marseilles was calculated, at the outbreak of the pestilence, at about 90,000 souls ; but many left the city when the distemper began to spread. Upward of 40,000 persons died ; so that, comprising those who recovered and who left the city, very few escaped an attack. But this pestilence was carried to Aix, Toulon, and various other places in Provence, in which upward of 80,000 persons died of it.

67. While the horrors attendant upon this

pestilence were going on, intercourse was almost unrestrained, excepting in some places in which precautions were used to prevent communication with the infected, and which either escaped altogether, or in a great degree, according to the strictness with which the precautions were observed. When the distemper was admitted to be the plague, the galleys were detached from the shore, anchored in the middle of the port, and separated from other vessels. Three hospitals were appointed ; one for the crews, the others for the convicts. In the former, those infected with the plague were placed ; in the latter, those labouring under other diseases were kept. To the third, all doubtful cases were sent. The population of the galleys amounted to 10,000, yet 1300 persons only were attacked, and about half recovered. There are various ways in which precautions against intercourse with infected persons, and against the introduction of infected substances, may have been evaded without detection ; but there is a very remarkable difference between the numbers attacked where no precautions were taken and where precautions were adopted, although they were most probably partially evaded. A certificate given by the Bishop of Marseilles states that "the plague has not penetrated into the religious communities who have had no communications with persons abroad, and who have used the precautions necessary to protect them ;" and another, given by the first sheriff of this city, states that "the families which were shut up and had not communicated abroad, particularly the nunneries, had been protected against this scourge, which was introduced into some of them by communications with strange persons."

68. DE MÆRTENS, a physician of eminence practicing in Moscow, has given a full account of the plague which visited that city in 1771, after an absence of a century and a half. War commenced in 1769 between Russia and Turkey ; the next year the plague appeared in Wallachia and Moldavia ; and many Russians died of it in the city of Yassy. The following summer it entered Poland, and was conveyed to Kiow, where it carried off 4000 persons. At first, all communication was cut off between Kiow and Moscow ; but a colonel and two soldiers left Choczyn, where the plague was raging, for Moscow. The colonel died on the road, but the two soldiers reached Moscow, were taken ill at the military hospital, and died there soon after their arrival. This occurred in November, 1770. Towards the end of this month the demonstrator of anatomy at this hospital was attacked by this distemper, and died on the third day. The male attendants lived with their families in two chambers separated from the others ; and in one of these eleven persons fell ill in a very short time with a putrid fever, attended by petechiæ in some, and by carbuncles or buboes in others, and most of them died from the third to the fifth day. The same distemper attacked the attendants residing in the other chamber. On the 22d of December eleven physicians assembled, and ten out of the eleven declared the disease to be the plague. The hospital was closed, and a military guard interrupted all communication. Those affected by the distemper, with their wives and children, were separated from the



rest, and the clothes and moveables of those who had died of the disease, and who were still ill with it, were burned. The weather became intensely cold, and the traces of infection were lost in the hospital and in the city. The communications with the hospital were opened in February, 1771, but on the 11th of March the physicians were again convoked, and Dr. YAGELSKY stated that eight persons had been attacked in a large manufactory of military clothing, containing 3000 persons, situated in the centre of the city, with symptoms similar to those observed in the patients in the hospital three months before. The work-people declared that in the beginning of January a woman who had a tumour in the cheek had gone to the home of one of them, and that the disease had afterward spread in the manufactory, and 117 persons had died of it. The manufactory was closed and guarded; nevertheless, several of the work-people escaped on the following night by the windows. Precautions were taken to prevent the spread of the distemper, and an abatement of it became manifest; but these precautions were relaxed, and the progress of the malady became rapid. "Towards the end of July the mortality amounted to about 200 daily; by the middle of August, to 400; towards the end of the same month, to 600; at the beginning of September, to 700; some days afterward, to 800; and at length to 1000 daily. On the evening of the 5th of September the populace rose, broke open the hospitals, put an end to the quarantine, and restored the religious ceremonies used for the sick; the images of saints were carried with great pomp to the sick, and kissed by every one successively. The people, according to ancient custom, embraced the dead, and buried them within the city, declaring that human precautions were odious to the Divinity; they hunted down the poor physicians, broke their furniture, and sacked their houses. This riot lasted only a few days, but it was followed by the addition of two or three hundred to the daily mortality. Almost all the priests perished." The pestilence began to decline in October, and at length ceased with the end of the year. The mortality was estimated at more than 80,000, exclusive of that in the towns and villages to which the distemper had extended. In these the deaths were upward of 20,000; but they suffered much less, because in most places the inhabitants, taught by the miserable example of Moscow, readily permitted precautions to be used. Criminals were employed to bury the dead, and when these perished, the poor were hired to do it, and provided with covering of oil-cloth to protect them; but these, and the advice given them, were neglected. Most of them were attacked about the fourth or fifth day, and most of them perished. The plague was most fatal to the poor; nobles, gentlemen, and merchants generally escaping, owing to the precautions they had taken. Dr. DE MERTENS states that the distemper was communicated only by the touch of infected persons or clothes, and that the physicians, who only inspected the patients, and who touched neither the bodies, nor the clothes, nor beds of the sick, generally escaped, but that a number died of the surgeons and assistant surgeons who touched the patients.

69. While the pestilence was ravaging the city, the Foundling Hospital afforded a remarkable proof of the salutary effects of seclusion. It contained 1000 children and 400 adults. All communication was cut off, and the plague never entered the building. One night four attendants and as many soldiers escaped from it, and on their return were attacked by the malady; but they were separated from the rest of the house, and no others were infected. The contrast between the fate of this hospital and that of the foundling hospital at Marseilles (§ 64) cannot fail to strike the reader.

70. The plague raged in Cyprus from April, 1759, until June, 1760. Dr. RUSSELL states that it was introduced by a large Turkish vessel from Alexandria that was wrecked on the island in the month of April; and of the crew who were saved a great part were infected with the plague; and that, while numerous cases were occurring in consequence at Limsol and the vicinity, where the vessel was wrecked, a ship from Damietta arrived at Larnica and landed, on the 22d of May, infected passengers and sailors, who lodged in the houses and communicated freely with the natives. Another vessel from the same place arrived some time afterward with infected persons on board. During the hot months of July, August, and September little was heard of the pestilence, "but it continued lurking in these parts, showing itself only by starts," until October, when it greatly increased in those places where it had been introduced, and in the adjoining villages. The plague soon afterward appeared at Nicosia, to which place the annual fair had drawn a great concourse of people from most parts of the island. But the nature of the distemper was concealed, and the bodies were buried during the night to prevent alarm. It increased rapidly from this time, and destroyed about a third of the population of the island. The convents and European merchants observed seclusion, and wherever this precaution was strictly observed the distemper did not appear.

71. Dr. RUSSELL, in his account of the plague, which raged in Syria during 1759, and three following years, states that it appeared first at Saffat in October, and had been brought there by some infected Jews, who came from Alexandria. It afterward spread to Sidon, Acre, Latakea, and Tripoli, and prevailed greatly in these places and the vicinity during the first six months of 1760. "Jerusalem received the contagion in January, and in the beginning of March it reached Damascus; in both which places, as well as in the smaller towns and villages of Palestine, it made dreadful havoc during the subsequent months." Dr. RUSSELL, who was residing at Aleppo, remarks that at this time an extensive commerce existed between this city and infected places, and a total inattention to the means of prevention opened many channels for the reception of the distemper. Accordingly, the introduction of it soon took place; and in the following way: Three Turkish merchants, who had come in the Damascus caravan, were lodged in a public khan, near the British consular house, and after a stay of a few days they set out from Aleppo on the 16th of May. Next day the porter of the khan, an Armenian, and his son were suddenly taken ill, and soon afterward the brother of

the porter. The son died on the 19th. These men had been in attendance on the Turkish strangers, and had assisted in moving and packing their baggage. Dr. RUSSELL visited these two men on the 21st, and ascertained the existence of the plague, of which they died on the 22d and 23d. Towards the end of this month caravans arrived from Jerusalem and Damascus, in which were infected persons. These were, under various pretexts, refused admission into the city, but they encamped without the walls, and buried several persons during their stay; but several individuals found private lodgings in the town. The pestilence began now to prevail both in the suburbs and within the city; and the cases were numerous early in June; but it did not become very prevalent, and soon afterward subsided, although it extended to the villages scattered between the neighbouring mountains, and to various Arab tribes, and to the Bedouins, among whom it was remarkably fatal. During 1761 and 1762 the distemper continued, with varying degrees of prevalence and fatality, throughout this country. It became epidemic in these years, during May, June, and July, in Aleppo, and was most fatal in the last year; during the three years of its prevalence in Syria, the infection appeared to spread with varying degrees of rapidity in different places. While only straggling cases were observed in Aleppo, it was rapid in its progress among the Arab tribes in the vicinity; and when less prevalent among these, it extended more generally among the Turkish inhabitants of Aleppo. The higher classes and the merchants, especially Europeans, used more or less strict precautions, or entirely shut themselves up, and escaped in every instance where the precautions were strictly observed.

72. Mr. JACKSON, in his account of the Empire of Morocco, states that the plague has visited this country about once in every twenty years; and that the visitation of 1799 was more fatal than any previously known. It first appeared in Old Fez, and was imputed to the importation of infected goods from the Levant, by some; and to the destruction of immense swarms of locusts, which had infested West Barbary during seven years, and been immediately followed by epidemic smallpox, which had preceded the plague. This pestilence pervaded the whole empire, and in many places did not leave persons living sufficient to bury the dead. Mr. JACKSON resided at Mogadore during its fatal prevalence in that city. He states that the European merchants shut themselves up in their respective houses, as is the practice in the Levant, and escaped the pestilence; but that he "did not take this precaution, but occasionally rode out to take exercise." He remarks that his daily observations convinced him that the distemper "was not caught by approach, unless that approach was accompanied by an inhaling of the breath, or by touching the infected person." (P. 278.) He farther adds that, during the epidemic, he took "no farther precaution than that of separation, carefully avoiding to touch the hand or inhale the breath;" and he is of opinion that the plague is not produced by the atmosphere, but is "caught solely by touching infected substances, or by inhaling the breath

of those who are diseased." It has been said, he observes, "that the cultivation of a country, the draining of the lands, and other agricultural improvements, tend to eradicate or diminish the plague; but we have seen countries depopulated where there was no morass or stagnant water for many days' journey, nor even a tree to impede the current of air, or a town, nor anything but encampments of Arabs, who procured water from wells of great depth, and inhabited plains so extensive and uniform as to resemble the sea." (P. 279.)

73. The plague of Malta, in 1813, is rendered memorable by the proofs of the introduction of the infection, and by the measures used to arrest it, founded on a belief of its infectious and contagious nature. The history of this plague has been recorded by CALVERT, FAULKNER, TULLY, and HENNEN, all of whom agree as to the fact of the introduction of the distemper. The pestilence had not appeared in Valletta for 137 years, and was now introduced by a vessel from Alexandria, where it was then prevailing. Two sailors had died of it on the passage, and after the arrival of this ship, the captain and his servant; soon afterward, a smuggler of the name of Borg, his wife, children, and father, were seized with it, and all died; then a midwife who attended the wife of Borg in the premature confinement caused by the plague, a young woman who slept in her house, a kinsman who entered her chamber and touched her body, the child of a master of a wine-house near the quarantine harbour, where, among others, the servants of the health-office who guarded the infected vessel in the harbour, and some of the guards of this vessel themselves, with whom Borg, the smuggler, had frequent dealings. While the distemper was attacking in succession the above-mentioned persons, it appears by the official statements that no other individuals were affected by it in any other part of Malta. It is admitted that there was no positive evidence beyond rumour of communications between this vessel and Borg and his family; but what evidence can he expected in this and similar cases of undetected smuggling? Rumour in such cases is often near the truth; and that it should be true in this, as to the secret conveyance of articles from the infected ship, is extremely probable. The facts of Malta having been free from plague for 137 years; the arrival of an infected vessel, from an infected port, at the principal city of the island; and the almost immediate appearance of this pestilence after the arrival of this vessel, are of themselves demonstrative of the introduction of it, without the particulars connected with the communications between the vessel and the city being proved—particulars, from their nature, and the circumstances of their occurrence, that cannot admit of proof, as being secret; and of a nature which, if detected, would have led to the severe punishment of those engaged in them. But it is not the mere introduction from a distance that proves the infectious nature of a distemper, but also the subsequent diffusion of it, and the means found to be successful in guarding against it.

74. At first the malady was confined to the crew of the vessel which came from Alexandria, and to Borg's family and those who had communicated with them; but it soon after-



ward appeared in the town of Valetta. At this time the medical men contended that the malady was not the plague; and those attacked concealed their sickness from fear of being removed to the lazaretto, clamoured against precautions, and did all they could to thwart them. Hence the distemper spread not only through Valetta, Floriana, and the adjoining towns, but also to many villages.

75. The efficacy of *strict seclusion* was demonstrated by some striking instances during the prevalence of the distemper in Malta. The Augustine Convent stands near the top of one of the main streets of Valetta. When the plague appeared, the strictest precautions were used to prevent all communications with the town; but a servant went into a part of the town where it prevailed, and purchased eloths supposed to be infected. Soon after his return he confessed what he had done; he was immediately shut up, with one of the brotherhood who volunteered to attend him. Both of them were seized and died of the distemper, but no other person in the convent suffered. "When the plague was in Malta in 1675, CAVALLINO, who described it, states that all public establishments which cautiously shunned intercourse with the community, enjoyed perfect exemption from the disease; as did the prisons and monasteries, besides all the vessels in the harbour. In the late plague it was the same; the hospital of St. John of Jerusalem, the prison, and several public offices, and private houses, which early adopted, and steadily kept up, a rigid system of insulation, were not less fortunate."

76. A large building in Valetta had its ground floor divided into seven separate apartments, occupied by as many Maltese families; and its upper stories used as a military hospital for patients affected with common diseases. During the plague of 1813 the ground floor was penetrated by it; the inhabitants of four of these apartments were destroyed by it, and two only of each family escaped in the other three. While this was going on below, the sick tenants of the upper stories were shut in, all communication was cut off, and every individual among them escaped the pestilence, although it was raging in the houses around, and penetrating from the lower to the upper stories. Dr. GREAVES, whose house was within a few feet of this hospital, related this fact to Dr. McLEAN, at Valetta, and led him over the hospital, but no mention is made of it by this uncandid writer and ignorant physician. I say this from personal knowledge.

77. The anti-infectionists contend that the plague of Malta was not introduced by the ship which arrived from Alexandria very shortly before its outbreak, but from "a noxious state of the air;" and it has been shown, at other places, that they attribute the choleric and hæmagastic pestilences also to noxious states of the air; but how is it that this noxious air, which plays so important a part in the production of plague according to them, did not produce one of the other pestilences? We have seen that these three several forms of pestilence have ravaged the same places at different times; and, taking it for granted that they all arise from "a noxious state of the air," as the anti-infectionists would have us to believe, in what does the noxious air producing the one

pestilence differ from that producing the others? It has now been shown by numerous proofs, and many more may be, and some will be, farther adduced, that, while the distemper was depopulating numerous houses and streets, other houses and institutions, completely surrounded by these houses and streets, remained entirely uninfected, by observing the strictest separation. If the mischief was solely in the air, how came these isolated places to escape, not only during the prevalence of plague, but also during the prevalence of the other two pestilences, as shown in the appropriate places? And, moreover, how came "the noxious state of the air," causing the plague of Malta, after 137 years, the plague of Moscow, after 150 years, and the plague of Marseilles, after 70 years, to occur at such distant periods, and no indications of its existence in the intervals to have appeared? And how can the anti-infectionists prove this "noxious state of the air," this undefined, this supposititious, this airy, this baseless entity or non-entity, and account for the wonderful reappearance of it, after so very many years, just at the moment most desired to serve as an argument against the introduction of the plague by an infected vessel? And, again, from whence came the "noxious state of the air," which, according to the anti-infectionists, produced the choleric pestilence, and which had never previously existed, inasmuch as its imputed effects, this particular distemper, was not known to have ever appeared before 1817?

78. Dr. MACKENZIE resided at Constantinople and Smyrna for about twenty years, in the middle of the last century; and during that period scarcely a year passed without some appearance of the plague in one or both of these cities. He communicated his observations on the distemper to Dr. MEAD and Dr. CLEPHANE, which were published in the forty-seventh volume of the "Philosophical Transactions." The plague raged with great violence at Constantinople in 1751, and destroyed about 150,000 persons; and Dr. MACKENZIE, who was then residing in this city, remarked respecting it, that "he could see no other apparent cause of the virulence of the disease this year, besides the occasion of greater communication. In the months of February, March, April, and May last, the distemper was so strong at Cairo, as appears by letters from the English consul there, that no doors were opened for three months. In the mean time there arrived here, in May last, four ships laden with Cairo goods, which goods and men being landed, spread the infection over all the city at once, after which one conveyed it to another by contact. In the village where we lived there died only sixty persons of the plague. The French ambassador's palace, next door to us in the village, was infected, because five of his people went at midnight to a bawdy-house, where the father Demetry, the mother, and daughter had the plague, and died of it afterward, all three; so that two of his excellency's servants were infected by them, one of whom died, and the other recovered and is still living, after taking a vomit, some doses of the bark mixed with snake-root and Venice treacle, by my advice. We found this last time, and upon all such occasions, that whoever kept their door shut ran

no risk, even if the plague were in the next house; and the contact was easily traced in all the accidents which happened among the Franks."

79. SAMOLOWITZ, who had extensive experience of the plague in Poland, Moldavia, Wallachia, and, lastly, in the epidemic of Moscow, states that it is certain that this distemper is propagated by contact; and ORRÆUS, who was sent by the Empress Catharine of Russia to advise during the plagues at Yassy and Moscow, remarks that the most common mode of contracting the disease was by contact. When Mr. HOWARD went, in 1785, to visit the chief lazarettoes in France and Italy, he carried with him a set of questions concerning the plague, drawn up by Dr. AIKEN and Dr. JEBB, which were to be submitted to the most experienced practitioners in the places which he visited. On his return, Dr. AIKEN methodized and abridged the answers, and the result is given in the celebrated work on the Lazarettoes of Europe. "They all," says Mr. HOWARD, "in the most explicit manner, concur in representing the plague as a contagious disease, communicated by near approach to, or actual contact with, infected persons or things."

80. During the war, at the end of the last and commencement of the present century, the medical officers of both the French and English armies had numerous occasions of observing the plague, and they almost unanimously concluded that it was a contagious disease. Even Dr. BANCROFT, who strenuously contended against the infectious nature of the hæmagastrie pestilence, and who was present with the English army during a part of the Egyptian campaign, states that "the facts which prove the necessity of actual contact with some infected person or thing to communicate the plague, are so numerous, and many of them so notorious, that it must be unnecessary for me to enter upon a detail of them, after what Dr. RUSSELL and others have published, and after the experience of the British army in Egypt, which invariably demonstrated this necessity, by showing that all those who avoided contact invariably escaped the disease, while those who did otherwise in suitable conditions, were very generally infected. Nor was there, so far as I have been able to discover, any instance, in the French-Egyptian army, of a communication of the disease without contact, though the physicians to that army who have written on the subject do not, I believe, positively assert the impossibility of such communication."

81. Sir JAMES McGRIGOR, physician to the Indian army in Egypt during the Egyptian campaign, in his medical sketches of that expedition, gives the following account of the arrangements at the pest-houses, and their results: "In the pest-houses of the army thirteen medical gentlemen did duty, who in the Indian army might be said to have had the post of honour. In order to take from our medical gentlemen, in the pest-houses, some of the most dangerous part of the duty, it was my wish to procure some of the Greek doctors of the country to reside in the pest-houses, to feel the pulses there, draw blood, open and dress buboes, &c. The most diligent search was made for those people, and very high pay was promised to them, but we could tempt none of them to live in our

pest-houses: a plain proof of the opinion which they entertain of the contagious nature of the disease. The thirteen gentlemen first mentioned were those only that were directly in the way of contagion, for it became their duty to come in contact with the infected, and seven of them caught the infection, and four died. To the atmosphere of the disease all the medical gentlemen of the army were exposed, as they saw and examined the cases in the first instance; but, except from actual contact, there never appeared to be any danger."

82. The medical officers of the French army came to similar conclusions. DESGENETTES, in his *Histoire Médicale de l'Armée d'Orient*, thus sums up his opinion on the subject of the plague: "The plague is evidently contagious, but the conditions of the transmission of this contagion are not more exactly known than its specific nature. The dead body has not appeared to transmit it—the animal body in a heated state, and still more in a state of febrile moisture, has appeared to communicate it more easily; the contagion has been known to cease in passing from one river to another of the Nile; a simple trench made before a camp has been known to stop its ravages; and on observations of this kind is founded the useful insulation of the Franks, the practice of which has been sufficiently detailed by different travellers."

83. Baron LARREY states a similar opinion: "But however strong may have been these affections (moral), their effects cannot be compared to those which resulted from the communication of the healthy with the sick, or to the effects of contact with contaminated objects. We may be convinced of this truth by the ravages which the plague made in the year 9 (1801) among the Fatalist Mussulmans. It were to be wished that, on the first days of the invasion of the plague, its true character had been presented to the army. This would have diminished the number of victims; instead of which the soldier, imbued with the opinion which was at first propagated, that this disease was not pestilential, did not hesitate to seize and wear the effects of his companions dead of the plague. The pestilential germ developed itself in these individuals, who often sunk under the same fate. It was only when they had gained a perfect knowledge of this disease, that many preserved themselves by the precautions which were indicated."

84. Dr. SOTIRA, another of the physicians of the French army in Egypt, relates the following striking circumstance: "In the seventh year of the French republic about eighty medical officers died of the plague. In consequence of this mortality, an order was issued to employ Turkish barbers in the pest-houses, to dress the patients, and to undertake all the medical treatment which required actual contact. The result was, that during the next two years only twelve of the medical officers died of the plague; but half the Turkish barbers caught it." I now arrive at

85. *B. The Opinions of contemporary Writers as to the Infectious Nature of the Plague.*—a. The French government, with the view of causing an alteration of the quarantine laws, lately referred the consideration of the communicability of this pestilence to the Royal Academy of



Paris; and this body appointed a commission to inquire into the matter. This commission has published its report, and with it numerous documents from medical men who have served in Egypt and Syria during the last twenty or twenty-five years. Certain of these documents are answers to questions which were sent to the British consul in Egypt by the foreign minister; and others are essays on the subjects in question by various medical men attached to the army and civil establishment of the government of that country. From these the Academy has drawn up its report; which, however, is of much less importance and interest than the papers on which it is founded. The opinions conveyed in all these papers agree as to the communicability of this distemper from person to person; they differ merely as to the modes of communication and the circumstances favouring and preventing infection.\* It is thus

\* It should be kept in recollection that French writers limit the term *contagion* to the communication of a disease from the sick to the healthy by immediate contact, and that they apply the term *infection* to the transmission of disease by miasms proceeding from the sick, and contaminating the air respired by the healthy. In many of the writings of French pathologists, "*Foyers Epidemiques*," epidemic foci, influences or centres, play a very prominent part; and, according to many, no infectious disease can extend without this epidemic centre or influence be present. Some even suppose that the epidemic influence is itself the infecting agent; and they, with many others, argue that this influence, as well as all emanations from the soil, from matters decaying or putrefying in or on the surface of the earth, and from the bodies of the sick, are severally *infectants*, without, however, distinguishing between each, and confining, as British pathologists have uniformly, the word *infection* to the spreading of a disease from the sick to the healthy by means of emanations proceeding from the former, and producing and perpetuating in the latter the same disease, possessing the same property of disseminating and perpetuating itself. In this report of the Academy, as well as in some of the papers on which it is based, the "*foyer epidémique*" has a most prominent place assigned to it. If a case of plague occurs without spreading to others—if the several circumstances preventing the extension of the distemper be present or are observed—if a free ventilation of the sick, or of their effects, &c., be enforced—if the sick be not approached, and other means of prevention be observed—if those communicating with the infected be protected by a previous attack of the distemper—if the air be pure, dry, very cold, or very hot—if, in short, the circumstances favouring the extension of the malady are not present, then the occasional appearance of it (as in the instance of smallpox occurring in solitary cases when it is not epidemic) is said to be sporadic or endemic; but when various filiations of the distemper are traced from the person or persons first infected, to various streets, or to distant parts of a town—when a person becomes infected in a particular house, and the attendants or friends from different parts have left him, and convey the distemper to their homes and to their attendants, and these latter to others, then, according to the reporters of the Academy and many of the French-Egyptian physicians, a "*foyer epidémique*" is kindled, and is breaking out in various places. A poor devil of the rational school of physic may have some idea of the manner in which a humid, still air, close apartments and streets, imperfect ventilation, &c., favour the concentration of an animal effluvia proceeding from the sick, and its operation on the healthy, as well as heighten the predisposition of the latter to be infected. He even admits that these conditions may so alter the electro-motive states not only of the air, but also of animal bodies, and of other objects placed on the earth's surface, at the particular places where they occur, as thereby to heighten the effects otherwise produced by them. But the "*foyer epidémique*" is beyond his comprehension, unless it means something resembling what I have now endeavoured to explain. If it is anything else, it is only a term employed to conceal an ignorance which would have been better candidly confessed. One thing cannot be disputed, and this is, that the "*foyer epidémique*" plays a very harlequin part; it is here, there, and everywhere, but not at the same time, at least at first. It exists in a given circumference, and not in the centre; or in certain radii, and neither at the centre nor at the circumference; and yet it admits not of recognition but by its effects. It is the supposed source of plague, of pestilential cholera, and of pestilential yellow fever—these three

stated by the reporters that nearly all the physicians in Egypt (there are considerably upward of a hundred French and Italian physicians in this country) believe in the transmission of the plague by means of the emanations proceeding from the bodies of plague patients; and that Dr. GRASSI, physician to the lazaretto at Alexandria, alone espouses the doctrine of the communication of the distemper by immediate or mediate contact only, and without the interposing medium of the air; and they add that the Egyptian physicians consider that a prolonged stay in the chambers of those affected is particularly dangerous, and the more so the more that ventilation is neglected.

86. Dr. GRASSI, who has written a long memoir on the dissemination of the plague, has had an experience of twenty-nine years in Egypt and Syria, during which time his opportunities of observing this pestilence, especially as physician to the lazaretto, have been great beyond all others. He adduces numerous proofs in support of his opinion; but Dr. CLORBER and some others contend, in opposition to him, that they would not have taken place, or, in other words, the same results would not have followed the circumstances adduced, if observed at other periods, or in other places, than those of epidemic influence. The facts are so numerous and so well authenticated of the communication of the distemper, that they cannot be denied; but those who espouse the doctrine of conditional infection, as many of the Egypto-European physicians appear to do, contend that the infectious property exists only in respect of the epidemic, and not of the sporadic or endemic malady; and that if the epidemic influence did not exist, no infection would take place. According to this view, the distemper cannot spread by infection without the epidemic circle; and when the infection is conveyed to a distance by persons or clothes, it cannot propagate itself unless there be existing at the time and place an epidemic influence

great pestilences being very generally attributed to this cause by our neighbours. Now, as there are three pestilences, there must necessarily be, according to this view, also three different "*foyers epidémiques*;" for each specific malady must have a specific "*foyer*" for its source. Without, however, inquiring into the origin and nature of these "*foyers*"—for such inquiry is never thought of by them, it being quite sufficient to assume their existence—it must be inferred that they are most unaccountable things, seeing that they possess neither length, breadth, nor thickness, nor other material characteristics, and yet produce material effects; that they are neither recognised nor recognisable, and yet they destroy large portions of the human race; that their existence is a hypothesis, a supposition, and yet they produce ruin and devastation; that their hypothetical presence is only for a few weeks or months, and then, after many hundreds of years, never again to return, or then after short intervals, according to the manner of their reception. How very odd is their occurrence! In one year there was a "*foyer epidémique*," viz., that of pestilential cholera, which visited the countries of the Levant, and, among very many other places, Paris in particular, where the doctrine of "*foyers*" is so much in vogue; yet, in the following two years another "*foyer epidémique*," namely, that of plague, followed the one of pestilential cholera, the latter emulating the former in its destructive powers, as if enraged at the usurpation of a "*foyer*" never before known. Believing that there are certain conditions of the atmosphere favouring more or less the spread of infectious diseases, on the one hand, and restraining it on the other, I cannot subscribe to the all-efficient and absorbing "*foyers epidémiques*" of our neighbours, nor attempt to shelter my ignorance by a constant recurrence to a term which either means something appreciable and determinate, as in the light in which I would view it; or which is anything or nothing as it may suit an hypothesis, subserve a purpose, conceal a sophism, or mask a design.

favourable to this effect. In what this influence consists is not shown. It is not admitted to be merely a humid, stagnant, or impure air, as this state of the atmosphere is frequently observed without the distemper becoming prevalent; 'it is, therefore, believed by the supporters of this doctrine, that there must be some other superadded property, constituting, with or without the other properties of humidity, stillness, and a certain range of temperature, the epidemic influence in question; and that it is developed generally after lengthened intervals, or after terms of ten, fifteen, or twenty years, the terms being of different durations in different countries. In tracing the filiations of this influence according to these writers, numerous and singular vagaries are usually observed, especially as respects its attachment to certain persons and places, and its aversion to others. These filiations proceed sometimes in a hop, step, and jump manner, and straight ahead; then zigzag; now circuitously, next centrically, afterward eccentrically; but in whatever way they shoot forth, they show a remarkable respect for certain places and persons, more particularly for those who shut them out or who keep out of their way. Now, instead of attributing, with the abettors of the all-sufficiency of epidemic influence, the oddities so remarkable in the spread of this pestilence, to this influence solely, I consider that, when viewed in a proper light, there are neither vagaries nor oddities to be recognised; but merely the communication of the infection from person to person, favoured by proximity, and a temperate, humid, and still condition of the atmosphere; and that places and persons are exempted from it, according as the former may shut it out, or be out of its way; as it is conveyed in the person or in the clothes worn by the infected, or as the latter may be protected by a former attack, or be but little susceptible of the infection.

87. Much of the skepticism which has recently appeared in the East as to the infectious nature of this pestilence is to be attributed to the preconceived ideas entertained by the young French and Italian surgeons and physicians who have entered into the service of the Pasha of Egypt, and who have thought it a most distinguished feat to brave the dangers, as well as to oppose the doctrine, of contagion and infection. The experienced Dr. GRASSI states, with reference to this fact, that the champions of non-contagion disseminated an error which soon brought destruction on themselves and on many who had communication with them; that, in 1843—a year in which the distemper does not appear to have been very prevalent, unless in Cairo—numerous instances of contagion were furnished in some of the provinces of Lower Egypt, of which he adduces a few, showing the consequences of a disbelief in this property, on the part of those who ought to have known the truth, and to have acted accordingly; that, owing to this cause, the plague was introduced into several regiments, the surgeons of which were anti-contagionists; and that those surgeons, and many of those committed to their care, were thereby sacrificed. Dr. MARESCI, he adds, physician to the 5th regiment, fell ill and died at Mansour. He was attended by Dr. CERTANI, of the

3d regiment, and the plague commenced in both regiments. The apothecary became infected, and died. Dr. CERTANI persisted in denying the infectious nature of the distemper, and purchased the carpet used by an officer in his regiment who had died of it. He slept on this carpet, but he never again arose from it. Dr. BOUTELLE, of the 4th cavalry, attended Dr. CERTANI, the apothecary, and his wife, who had all died of the plague, was congratulating himself on his escape, when he was attacked and died. Dr. VALENCOGNE, who had succeeded Dr. MARESCI at Mansour, and who was also a non-contagionist, having acquired some things which belonged to, and had been used by, Dr. BOUTELLE, would not attend to the recommendation of purifying them before using them, and he fell a victim to his incredulity. Dr. ROSSI, of the 7th regiment, was attacked by the distemper and recovered. This young physician, two years before, had written a memoir against the infectious nature of the plague; but he afterward changed his opinion. Four apothecaries, of whom three died, and most of their families, in all twenty-three Europeans, nearly all those living in the province, were thus sacrificed.

88. Numerous other instances of the communicability and importation of this pestilence have been adduced by Dr. GRASSI, from his own observations in Egypt, Syria, and Palestine. My limits admit not of a farther notice of them; but they may be found in the Report of the French Academy of Medicine. He concludes as follows: 1st. That the plague is a disease entirely *sui generis*, possessing characters which are proper to it, and which distinguish it from all other maladies. 2d. That it is transmissible and transportable, and consequently eminently contagious. 3d. That its origin, like that of some other contagious diseases, is unknown; that it is not reproduced *de novo*; but that its seminum is preserved in one or other province or provinces of Turkey—sometimes in one, at another time in another. 4th. That, like smallpox, it very rarely attacks those persons who have been previously infected by it; and if it does, the attack is slight. 5th. That it prevails chiefly in temperate climates. And, 6th. That if it were combated and restrained in all directions, it might be ultimately suppressed, if the ignorance and fanaticism of some people would not oppose the attempt.

89. M. LACHÈZE states (*Rapp. de l'Acad.*, &c., p. 567) that he arrived in Alexandria during the prevalence of the plague there in 1834, and that he proceeded soon afterward to Cairo, where the distemper broke out on the 2d of February, 1835, and became remarkably destructive. MÉHÉMET ALI shut himself up in the palace of Schoubra, with 300 persons composing his suite, and surrounded it with a double cordon of troops. Three persons only were seized with the early symptoms of plague, and they were instantly dismissed. Captain VARIN, who commanded the School of Cavalry, informed Dr. LACHÈZE that 515 persons composing it were subjected to strict seclusion under his orders; that during their seclusion they enjoyed the same diet, regimen, and exercises as before; and that in the four months during which the quarantine lasted no case of serious



disease, and none of plague, occurred among them. Captain VARIN adds, that the town of Gizeh, in the midst of which the School of Cavalry was placed in quarantine, experienced a greater mortality in proportion to its population than even Cairo, in which one third of the inhabitants died, and yet strict seclusion in that town was followed by the most complete protection. Surely, if the disease was so entirely dependant upon epidemic influence, as contended for by the anti-infectionists, it should have appeared among the persons secluded in this instance, seeing that they were surrounded by this, to their minds, all-powerful influence.

90. M. DE SEGUR DUPEYRON, secretary to the Superior Council of Health (*Rapp. de l'Acad.*, &c., p. 593), states that during his several missions he has visited nearly all the places in the East and in Africa where the plague has appeared, with the view of determining its origin in those places; that his researches have proved that this distemper has generally appeared in consequence of scarcity following too great or too low a rise of the Nile; that the occurrence of this pestilence in Europe, especially in Venice, Trieste, Livournia, Genoa, and Marseilles, before the formation of quarantines, was frequent, and always connected with the prevalence of it in the Levant, especially during peace, when communication was unrestricted and frequent; that from 1721 until 1830 the plague has been imported thirty-three times into these ports by means of vessels which have been detained in quarantine; and that of these thirty-three importations eighteen came from Egypt; that this distemper was not constant in Constantinople until after the conquest of it by the Turks, when it became frequent, and at last almost permanent, owing to the return of numerous pilgrims from Mecca in vessels which, with the pilgrims themselves, were often infected; that he has seen the pilgrims arrive in small, crowded vessels, in a frightful state of dirt and disease; but that the plague has scarcely appeared in Constantinople since 1837, when quarantine and sanitary establishments were formed in that city; and that the plague is endemic in Egypt; but that it is not endemic, although frequent, in Syria, Constantinople, and Barbary. M. SEGUR concludes with some apposite remarks on its contagious nature, in which he firmly believes, both from his own observation and the evidence of others. He considers that this pestilence will never be arrested in its progress unless it be rigorously treated as contagious, until it has destroyed all those susceptible of infection, or until the temperature and state of the atmosphere become unfavourable to its farther extension; and he refers to the very decided measures adopted by General MALTAND, who on four different occasions—in Malta, Gozzo, Corfu, and Cephalonia—put a stop to the distemper by a strict system of separation and seclusion. M. SEGUR adduces numerous instances of passengers and other persons detained in quarantine in various ports, who were seized with the plague on opening their trunks and exposing their clothes to the air, the distemper extending to one or more of the health-guards. One or two of these instances is sufficient for my argument. In July, 1832, some passengers from Constantinople and Scio, where

the plague was prevailing, were landed at the Lazaret of Syra. On the sixth day after their entrance they opened their baggage, and eight of them were soon afterward attacked, and six of them died.

91. A Greek vessel arrived at the lazaret at Venice, in 1793, from Syria and Napoli de Romania. This vessel received on board, in Syria, a supply of five sailors. Four of them left the ship in the Morea, where they brought the contagion. One only, named Apostoli, remained when she arrived in quarantine. After unloading the cargo, which was not considered capable of conveying contagion, the sailors opened their chests and changed their clothes. Apostoli was first attacked. Twenty-one were infected, and sixteen died in the lazaret. Of the health-guards, eight were attacked and three died. In 1818 the plague appeared in the same lazaret, on board of a ship which had only two days to complete the quarantine. A passenger, who had not opened his trunk until then, was soon afterward seized, and died in two days. His health-guard was next attacked, and also died.

92. Dr. MORPURGO (*Rapp. à l'Acad.*, p. 609) resided eight years in Egypt, Syria, and Turkey, and was charged, in 1829, to organize the central hospital in Cairo by the pacha. In April, 1831, he quitted Alexandria and went to Constantinople. On his arrival there were no cases of plague in the city; but cholera prevailed. Subsequently a Greek vessel arrived from Cyprus with the plague, and the distemper soon afterward appeared in the Greek quarter of the city. Dr. MORPURGO left Constantinople, and arrived at Smyrna in April, 1832. The plague had not appeared there for several years, but the pestilential cholera had made great ravages. Soon after his arrival in Smyrna he was charged by the European inhabitants to organize a house of refuge for the poor of all nations and of all religions, and was brought in constant communication with the poorer classes. But until the month of May, 1833, he did not meet with a single case of plague; proving that this malady is not endemic in this port. During the five years that he passed in Smyrna he observed four epidemics of the plague. The first appeared in May, 1833. The distemper was introduced by a vessel whose crew and passengers were landed and placed under tents while the process of purifying the vessel was proceeding. Dr. MORPURGO traces the several filiations of the infection until the cases became numerous. It would appear from his details that, during the winter months of 1834, 1835, and 1836, the distemper lurked in this city, appearing during the spring, and becoming more and more prevalent until the spring of 1837, when it became very fatal, and many of the wealthier inhabitants either fled from the city or placed themselves in strict seclusion. During this most severe epidemic the plague made the earliest and greatest ravages in the most airy and cleanest quarter, and the latest and the least in the closest, the most dirty, and the most miserable district. During these epidemics, or, rather, epidemic—for the disease was introduced and continued for four years, slumbering for certain periods, and breaking out and prevailing more or less during others, according to circumstances, which will be

explained in the sequel—several occurrences were remarked by Dr. MORPURGO deserving notice. A Dr. JUSTINIANI, of the Faculty of Paris, arrived at Smyrna, and saw neither contagion nor infection in the plague, or nothing else than a gastro-enterite. He was soon afterward attacked, and died in three days. The Prussian consul shut himself up with his family, and had recourse to the strictest precautions; nevertheless, a chambermaid was attacked, and confessed, when near her end, that she had received through a window linen from her lover to wash, who lived in an infected quarter, a circumstance proving the difficulty of preserving a strict seclusion in cases even of the most imminent risk. In the most unhealthy locality of the city, where several drains and sewers meander through margins of filth, a barrack is situated containing from 1200 to 1300 troops. The physician advised the colonel to adopt the most rigid quarantine, and it was strictly observed. Not an individual was attacked, although the distemper was raging around them; and during their seclusion they had the same food and rations as before and after. All the convents which observed seclusion were completely protected, as also was the college, although situated in an unhealthy locality. The Greek and Catholic sick, not infected by the plague, were received into the same hospital with plague cases, but in different wards; none of them caught the distemper, a circumstance which Dr. MORPURGO considers a strong proof of the spread of the malady by contagion, and not by infection. He concludes his communications to the Academy by stating his conviction that the plague is not peculiar to any particular locality; that it is propagated by a seminum or germ, distinct from any other, and resembling those of syphilis and smallpox; that it always proceeds from and perpetuates the same distemper; that the isolation of the sick is the only protection; and that three things are necessary to the spread of the pestilence; namely, its seminum or germ, a favourable state of the atmosphere, and susceptibility of infection.

93. Among the most experienced physicians who have communicated to the Academy the results of their observations, Dr. GAETANI may be adduced. He is first physician to the viceroy, and has resided many years in Egypt. He states (*Rapp. à l'Acad.*, p. 627) that from 1825 until 1834 he met with no case of plague in Egypt; but that since 1834 this pestilence has appeared in a great number of towns and villages of Lower Egypt, and has occurred in many of these places during the months of September, October, and November, generally sporadically or in isolated cases; that it becomes epidemic in January and February, and subsides in June; and that he has not met with the distemper in Upper Egypt, but that during the epidemic of 1835 several cases arrived at Syouth, Fayoum, Cosseir, and other towns in Upper Egypt, without propagating the malady. During the epidemic of 1835, he states that more than fifty of the principal families of Cairo put themselves in quarantine, either at the desire of the viceroy, or from their own conviction of its necessity, and that not a case of the plague occurred in more than three or four of these families. When a case appeared in a house

placed in quarantine, it was always found that some suspicious circumstance or communication had taken place. In the palace of SCHE-RIB-PACHA two compartments existed, one for the men, the other for the women. In that for the men, who communicated with the city, many cases occurred, but in that of the women, which was strictly secluded, not a case was seen. At the commencement of the epidemic in Cairo, this city had a garrison of 22,000 troops, independently of 2000 invalids. These last alone were left to guard the city, and the troops were placed under tents, in an intrenched camp; and, although this camp was only a quarter of a league from the city, the plague did not appear among them; while it carried off one half of the invalids who remained in the city.

94. Dr. GAETANI adduces, in proof of the transmission of the pestilence by clothes, the fact that there existed at Rosetta a magazine of effects belonging to plague patients. This magazine was opened after two years, and three persons were seized with the distemper, although the town was in a most salubrious state, but they did not communicate the malady to others. He believes that the effects of plague patients will convey to a distance the malady, when the circumstances favouring infection are present; that the beds, bed-clothes, and body-clothes of the infected are most to be dreaded; and that merchandise never or very rarely transmits the disease. He also thinks that the pestilential miasms, during the prevalence of the malady, in a close, low, wet, and thickly populated locality, may accumulate in the humid and still air to such an extent as to transmit the distemper without any nearer or personal communication; and that it is to this contamination of the air, by the effluvia of the sick, that the extension of the pestilence to houses in which strict seclusion had been observed is to be attributed; for the state of the locality, the narrowness of the streets, and the circumstances just stated, in all such instances, could sufficiently account for the occurrence, without referring it to clandestine intercourse.

95. I believe that I have now adduced sufficient evidence of the infectious nature of the plague—infectious by direct or mediate contact, or by a humid air, conveying the pestilential miasms. I might have adduced ten times more evidence of the matter; but my limits will not permit me to do that which will appear to all candid minds as altogether unnecessary. There are, however, certain topics connected with the subject that yet require farther notice, in order to complete the full consideration due to it.

96. *C. The propagation of this distemper by inoculation* has been believed by some to be an important and necessary part of the evidence of the contagious nature imputed to it. But this proof is neither necessary to the completeness of the evidence required, nor is it of importance in this or in any other respect. There is almost no other febrile disease, besides smallpox and cowpox, that admits of certain communication by inoculation. All other infectious maladies have presented only a few contingent and doubtful instances of infection by this method. As respects smallpox, cowpox,



and some chronic contagious maladies, we observe a specific contagious virus or secretion formed at an advanced stage of the malady, capable of propagating it, unless in those very dry states of the air which is unfavourable to the propagation of all infectious and contagious maladies, when it frequently, also, fails of imparting the disease. If other secretions, or the blood itself, of a smallpox patient be used for inoculation, no more certain results would follow than those which have been observed to follow the employment of these fluids in attempting to inoculate the plague, scarlet fever, or typhus fever, or the measles. In the case of the plague, there is no consistent or specific virus or secretion proper to and characteristic of the distemper, that may be employed in this way with any rational hopes of its perpetuating the disease. The ichor or discharge from a carbuncle is merely contingent upon a local accident of the malady; the purulent matter from a bubo is equally such, and is chiefly met with during an early period of amendment; the blood of the infected can no more be expected to transmit the distemper than the blood in any other infectious disease, which has repeatedly been found to fail. Even granting it possible to procure the pestilential miasm, seminum, or matter of the plague, the difficulty would still exist as to the application of it to the frame of the healthy in that state, and to that particular organ and tissue by which its effects would be most certainly developed. I shall have in the sequel to infer, from the great mass of evidence I have perused, a part only of which I have here adduced, that it is chiefly owing to the pestilential miasms or effluvia proceeding either directly from the diseased, or preserved in their bed or body clothes, and given off upon their first exposure to the air, and inspired by susceptible persons, that the distemper is propagated and perpetuated. A near approach, amounting almost to contact, sometimes accompanied with contact, is often necessary to this effect; contact merely will often fail, or, rather, it will succeed in communicating the malady only when it is attended by the inhalation of the effluvia or pestilential miasm, whether proceeding from the diseased body or from fomites. Now how can the same effect be produced by the inoculation of fluids which have not been proved to possess the property of perpetuating the distemper, which, reasoning *à priori*, cannot be supposed to possess this property, and which, even granting them the possession of it, cannot be conveyed to that channel through which the observing mind must admit the infection to be principally, if not solely, admitted and transmitted through the economy?

97. From this it may be admitted that attempts at inoculation must be nugatory in respect of this pestilence, as well as of the two pestilences already considered; or if any attempts to inoculate succeed, their success is liable to be imputed, as it actually has been by the anti-infectionists, to the operation of the epidemic influence, and in no way to the inoculation, the persons infected being attacked altogether in consequence of this constitution of the air, and independently of any pestilential miasm, seminum or effluvia, proceeding from the diseased and inhaled with the air by the healthy, for the existence of which semin-

ium I, in common with other infectionists, contend. If attempts at inoculation should frequently prove futile, it must be obvious, from our knowledge of the operations of the digestive organs, that the experiments made by certain nasty fellows, in the excess of their scientific enthusiasm, in order to show the non-contagious nature of this and the other two pestilences, by swallowing the secretions and discharges of persons labouring under these distempers, must necessarily prove still more futile, inasmuch as no effects beyond nausea or vomiting could be expected from these experiments. Indeed, it is most probable that the extent of the probable or possible mischief was clearly seen, and safely, as well as most courageously, attempted by these experimenters.

98. However, the attempts at inoculation which have been made require a still more particular notice. M. DESGENETTES, finding the French troops in Egypt much depressed by their dread of the plague, attempted to inoculate himself with the distemper; but, to secure himself from risk, he afterward washed the part with soap and water; and, according to his own statement, he not only used this precaution, but he employed "the pus of a bubo of a convalescent patient"—using, in fact, the matter of what had become a healthy suppurating sore. Soon afterward, Dr. WHYTE, an anti-contagionist, in the English army, hearing of this feat, but not of the precautions which had been taken, repeated the experiment in a much more efficient and dangerous manner. "He rubbed some matter, from the bubo of a woman, on the insides of his thighs. The next morning he inoculated himself in the wrists with matter taken from a running bubo of a sepy." This was done on the 2d and 3d of January, 1802, and on the 6th he was attacked with rigours and other febrile symptoms, succeeded by heat and perspiration, much affection of the head, tremour of the limbs, a dry, black tongue, great thirst, a full, hard, irregular pulse, great debility and anxiety. He still persisted that the disease was not the plague, and would not allow his groins and armpits to be examined. He became delirious on the 8th, and died on the 9th.

99. Dr. GOOCH, in his paper on the contagion of the plague, has stated that Dr. VALLI, an Italian physician who resided some time in Turkey, made some experiments on the inoculation of the plague. He diluted the pestilential matter with smallpox matter, with oil, &c. This compound he called his pommade. If a Mussulman came to consult him for an ophthalmia, he ordered him some of his pommade to rub on his eyelids; if another came, complaining of pain in the bowels, he ordered it to be rubbed on his belly. In this murderous way he gave, it is said, the distemper to thirty persons. The Turkish government at last arrested the pharmacoplist who vended the pommade, and cut off his head, but Dr. VALLI escaped.

100. Dr. L. DELAPORTE states, in a memoir addressed to the Royal Academy of Medicine in Paris (*Rapp à l'Acad.*, &c., p. 321), that Dr. GAETANI-BEY communicated to him the fact that a person in Cairo, having persuaded several of his acquaintances that he would protect them from any future attack of the plague by

inoculating them with the sanies taken from a person recently dead of the distemper, found no less than eleven who, with himself, submitted to the experiment. They, however, were all attacked, and died, the experimenter himself only escaping; but he was not altogether recovered when Dr. GAETANI saw him.

101. It might be supposed that these experiments are tolerably decisive, not only of the contagious nature of the distemper, but also of the great probability of the communication of it, in its most deadly form, by inoculation. Yet the anti-contagionists will, nevertheless, contend that the individuals thus inoculated and killed by the experiment were actually not inoculated with the distemper, but were all attacked by the epidemic influence, which alone produced the disease of which they died! This mode of accounting for the result in no less than twelve instances, although admitted to have occurred at a time when the distemper was prevalent, shows the shifts to which the supporters of this doctrine resort to evade a most conclusive piece of evidence, happily furnished by a most respectable physician, although the experiments were as happily not performed by a medical practitioner. Now, the supporters of the all-powerful epidemic influence in the propagation of this distemper allow, that in Egypt the plague is epidemic only from February to the end of June; and as Dr. WHYTE'S inoculation of himself (§ 98) was performed on the 2d of January, his infection in consequence, therefore, could not be imputed to this influence—for it had not then commenced—but to its right cause, the inoculation. Now, seeing the disease actually follows inoculation in some instances (of which I have adduced only a very few out of the many which I have seen recorded), although it fails in others, and may be expected to fail for the reasons stated when commencing the consideration of the topic, there is nothing that can be reasonably desired farther to prove the contagious, as well as the infectious nature of this pestilence, according to the meaning which I have fully and explicitly applied to these terms at the setting out (§ 58, 59).

102. The immense importance of the various topics connected with the contagious nature of plague will not admit of my relinquishing the consideration of this part of the subject without noticing certain of the conclusions at which the commission of the French Academy of Medicine has arrived. The necessity of making some alterations in the quarantine laws, without endangering the safety of the community, especially during the now more frequent and more rapid communications between the several ports in the Levant and the south of France, induced the French government to refer the subject to the Academy, who appointed a commission, whose report is now before me. It is most likely that much of this report will be used by the anti-infectionists in support of their arguments, not so much for the facts and evidence which may appear to favour their views, but for the use of terms to which this commission has attached a different meaning to that which is applied to these terms in this country. In noticing, therefore, somewhat farther certain topics connected with the origin and propagation of the plague, I shall

make some remarks upon this laboured, but not very perfect performance.

103. *D. Of the origin of plague*, nothing can be asserted with any degree of certainty. The earliest indications of its existence have been already noticed, and its antiquity shown (§ 4); but whether or not it has always been, from the remotest period of its existence, propagated by a certain germ or seminum, *sui generis*, conveyed from one part to others, more or less distant, by persons or clothes, preserved in some one or other of the countries of the Levant, prevailing in some places, then subsiding, sometimes smouldering on with few or scattered cases, at other times breaking out into more open combustion as circumstances fanned the fire; or whether it has been produced, *de novo*, on several or many occasions, and whenever various local circumstances have arisen to generate it, are questions which have not hitherto been solved, although severally entertained by numerous observing and experienced physicians. The proposition involved in the first alternative has received considerable support from the investigations of Dr. RUSSELL in Syria, who completely established the fact that a second attack of plague, among the thousands of cases comprised by his researches, is of much rarer occurrence than a second attack of smallpox. Having established this most important fact, which subsequent researches have fully confirmed, but which the commission has entirely disregarded and never mentioned, a very convincing proof is thereby furnished of the contagious nature of the distemper, as well as a strong presumption of the truth of that proposition; the plague thus appearing in the same category with smallpox, hæmagastic pestilence, &c., and the same arguments which were employed when discussing this question in respect to that pestilence being equally applicable to this. (*See PESTILENCE—HÆMAGASTIC*, § 125, *et seq.*)

104. *a. The protection furnished by a first attack* being thus established, with but very few exceptions, it must be obvious to the candid inquirer that numerous occasions will occur, in the countries of the Levant, in which a very large proportion of the inhabitants is protected by a previous attack; and that the spread of the distemper will often be limited by this cause, aided by others connected with the temperature and states of the atmosphere. This fact will also explain the occasional failure of the very imperfectly-informed and inexperienced experimenters among Egypto-European physicians to communicate the distemper by contact and inoculation. Thus it will be found, in the report to the Academy, that a felon, having been made the subject of inoculation in Egypt, caught the distemper and recovered. Having thus earned his life, he was nevertheless experimented upon subsequently, and not being reinfected, the circumstance was adduced as a proof of non-contagion, although actually being, to the mental vision of all who can see, and duly estimate the most prominent and important truths in medicine, the strongest evidence which could be brought in aid of the opposite and orthodox doctrine. But there is every reason to believe that, as in the cases of smallpox and the hæmagastic pestilence, the infection of plague may be so mild, the febrile



disturbance so slight, the pains in the glands so evanescent, and the swelling so small, as to almost escape notice, or to pass away without recollection of the disorder, and knowledge, or even suspicion, of its nature. Indeed, a very mild grade of the distemper has been described above (§ 21), and is frequently remarked, when this pestilence has been introduced into a crowded city or place. Protection from second attacks may thus become much more numerous than actually apparent from this cause.

105. *B.* The second proposition involved in the alternative stated above (§ 103), namely, *is the plague generated, de novo, whenever circumstances favourable to its generation arise?* is answered in the affirmative by the Academy. It would have been instructive, probably most beneficial, if the French commission, during the long period they have taken to consider the matter, had ascertained the several circumstances which combine to generate this pestilence, *de novo*, and distinctly stated them, before they took the proposition for granted, and proceeded to reason upon it as an established fact; the more especially as it has been controverted by the ablest writers on the distemper, and doubted by many. But the commission adopts an easier course, and without any such preliminary and fundamental inquiry, asks themselves the question, *What is the place or places where the plague has arisen spontaneously?* And, after taking a very roundabout way of answering it, they state, without any doubt or reservation, "that the plague has been generated spontaneously not only in Egypt, in Syria, and in Turkey, but also in a great many other countries of Africa, Asia, and Europe." The spontaneity of plague, according to the commission, is thus tolerably latitudinarian, but many will doubt, notwithstanding the greatness of the authority, the wideness of the range, even if they do not dispute the accuracy of the principle adopted. Certainly the question of the origin of this pestilence cannot be readily or easily answered, especially by one who is cognizant of the difficulties which beset it, and of what may be said for and against the doctrine of spontaneity. I confess that I cannot arrive at a positive conclusion as to the matter. There are many circumstances which favour the opinion, and many which militate against it: first of the former.

106. Of all cities or places, Cairo furnishes the most numerous circumstances conducive to the production of this pestilence *de novo*; a crowded population in dirty, close, and ill-ventilated chambers, especially in the Coptic quarter; narrow streets, with open sewers in many places, and abounding with filth; the accumulation of decomposing animal excretions and exuvæ; a rich, deep soil, saturated with animal matter; low, close, dirty, and ill-ventilated habitations; the burial of the dead within the walls of most of the Coptic habitations; contaminated and unwholesome water; adjoining inundations; great humidity of the air during part of the year, and a temperature from 50° to 75° FAHRENHEIT, are a combination of conditions sufficient to generate a pestilential malady, or, at least, a putro-adynamic form of fever, especially when they exist in marked grades, or, are aided by scarcity of food, by great humidity and stillness of the air, and probably, also, by a neg-

ative state of the electro-motive agency in the atmosphere and on the earth's surface. If these do not actually give rise to the pestilence, without any pre-existing germ or seminum, they may be inferred, at least, to be most influential in developing, propagating, and even in perpetuating such a germ; and in giving rise to a susceptibility or predisposition of the population to be infected by it, as far as these favourable circumstances extend, and among all who are not protected by a previous attack or by other causes.

107. Dr. LEGASQUE, the member of a commission which visited Egypt in 1828, 1829, and 1830, to investigate the causes of plague, and to try the action of the chlorides on the pestilential miasm or virus, believes that, although the plague existed before the sixth century, it became more frequent in Egypt in consequence of the practice of embalming the dead having been relinquished after the introduction of sepulture by the early Christians, and that it is endemic in Lower Egypt. He considers that the practice adopted for so many ages in the Coptic quarter, which is situated in the centre of Cairo, of burying the dead within the houses, exerts a powerful influence upon the health of the whole city. There can be no doubt of this, especially aided as it is by numerous other circumstances of an injurious tendency, the chief of which have been already enumerated (§ 106), and he imputes the origin of the plague to animal decomposition; want of cleanliness, scarcity, poverty, the inundations of the Nile, ruinous state of the canals, and insufficient ventilation being only accessory causes. (*Rapp. à l'Acad.*, p. 590.) The same opinion is entertained, also, by several of those who have communicated on the subject with the French Academy. M. DELAPORTE, in a very able memoir, attributes the development of the pestilence to the same causes; but admits that, when thus produced, it perpetuates and reproduces itself, 1st. By pure contagion, or immediate cutaneous contact; 2d. By infection or internal pneumogastric contagion. It cannot be doubted that, if we admit the spontaneous generation of the pestilence on occasions when all the circumstances concur most efficiently to this effect, that the towns and villages of Lower Egypt furnish them in the most marked degree; but it cannot be also admitted that they stand alone in this respect, for many towns situated near the shores of the Mediterranean present conditions almost as favourable to the production of this effect as those of Egypt.

108. In opposition to the doctrine of spontaneity it may be contended, seeing that the circumstances that combine to generate it, according to this view, must necessarily exist in many places and towns in other countries enjoying the same range of temperature as those of the Levant, and in many cities in Western Europe during the warmer seasons, that this pestilence ought also to be generated in countries eastward of Arabia, as well as in some parts of America. Those who believe that it is propagated by a seminum analogous to smallpox, but not capable of being so long preserved as that of smallpox, are of opinion that the circumstances favourable to, as well as the occasions of, the conveyance of this seminum to the eastward of some parts of Arabia, and to

the westward of Europe and Africa, have not existed; and that when this distemper has appeared, as it has on rare occasions, in some of the northern cities of Europe, on the one hand, and in some of the hot countries of Africa and Syria on the other, it has always spread by the contagion and infection conveyed by persons and the clothes of the sick; but that the low winter ranges of temperature in the former, and the high ranges of the summers of the latter, have always destroyed the poisonous seminum, either by the influence of the extremes of temperature upon it, or by the loss of the power of perpetuation after a certain period.

109. That those very circumstances and occasions which would appear the most favourable to the production of this pestilence *de novo* have often not produced it, even in countries where the pestilence is met with sporadically, and is considered as being endemic by many writers, is a fact which has been demonstrated, and which militates strongly against the doctrine of spontaneity, but which supports that of a specific seminum; for, on these occasions, the absence of this specific contagious or infectious agent accounts for the non-appearance of this pestilence; other maladies, which these occasions generally produce, being the only results. Thus it is stated by Dr. Rossi, that when the Egyptian army were in Syria they were exposed to many of the circumstances supposed to originate the plague, and, especially when obliged to evacuate the country, they were crowded into ill-ventilated transports. Malignant typhus and dysentery, hospital gangrene, &c., then became most prevalent and fatal, but no case of plague occurred. This appeared to be the case especially with the regiment to which Dr. Rossi was attached, and which was not attacked by this pestilence until after its return into Egypt, when it became exposed to the infection during his absence, and, no measures of precaution or prevention having been taken, the distemper had become general throughout the corps. He sent all the infected (about 400) into the hospital, and caused those who appeared in health to bathe in the Nile, to put on clean and purified clothes, and to encamp on a dry and arid soil. As soon as one was attacked he was sent to the hospital, and thus the camp was preserved healthy, and the distemper ceased. Although the occasion of generating the pestilence *de novo* was most favourable in this instance, still it did not appear until the return of the troops to a place where cases of the plague existed; the neglecting of precautions against infection having diffused the distemper, and the adoption of precautions having arrested it. When the pestilence was introduced into Smyrna, as shown by the authority referred to above, it appeared first in the most open and healthy quarter, and advanced the latest, and prevailed the least, in the lowest, most crowded, and unhealthiest quarter; and this in a city supposed by some to reproduce the distemper *de novo*. Besides, it is fully shown by recent researches, and by the recent adoption of sanitary measures by Turkish and Egyptian governments, that the more or less continued presence of cases of this pestilence was not owing so much to the existence of the local causes supposed to generate it *de novo*, as to the want of all precautions and

quarantine regulations, and to the neglect of separating the infected from the healthy, whereby the specific infectious seminum was preserved and propagated.

110. Without, therefore, denying the frequent reproduction of the plague in Lower Egypt, by the causes stated above, still the doctrine of an original specific germ or seminum presents many considerations in its favour, and of the same nature as I have adduced when considering the origin of the hæmagastric pestilence. According to the former view, the circumstances above stated (§ 105, *et seq.*) give rise to the sporadic or endemic cases, as they have been called, but they are insufficient of themselves to spread or to diffuse the distemper in an epidemic form, until the epidemic influence or constitution, for which certain modern writers contend—the “*foyer epidémique*”—is actually developed. According to the latter view, the specific contagious agent produces but few, scattered, and isolated cases, in certain localities and towns, as long as the circumstances unfavourable to its propagation exist, as observed in respect of smallpox; while the extremes of temperature, a dry atmosphere, free ventilation, absence of susceptibility in many, and cautious avoidance of crowding, and of intimate or close communication, afford protection; these straggling instances being sufficient, especially when re-enforced by importations from other places furnishing occasional cases of the distemper, to perpetuate the specific agent of contagion. But when the circumstances favourable to the diffusion and operation of this agent appear, as moderate atmospheric warmth, conjoined with humidity and stillness of the air, and probably, also, with a negative state of the electro-motive influence, and with noxious exhalations from the soil, with crowding, and close or frequent communication with the affected, then the distemper becomes more or less prevalent with the grade and combination of these and other favourable circumstances; and these alone, or chiefly, constitute the epidemic influence or “foyer,” to which so much is imputed by some recent writers.

111. Now we find that the plague becomes epidemic at one year, or even during two or three successive years, in some countries of the Levant, successively appearing to a most destructive extent in one country, then subsiding, and breaking out in one or several countries; but much more rarely, or not for ages, appearing in more distant countries where precautions against its ingress are taken, and never where these precautions are strictly observed. If we admit, with the anti-infectionists, that this pestilence arises from an epidemic influence alone, such epidemic influence must be of a specific kind, since it produces specific and determinate effects, and occasions neither adynamic fever nor adynamic dysentery, nor either of the two other specific pestilences considered above; and, seeing that this pestilence migrates from one place and country to another, and is actually as eccentric in its migrations and courses as I have described it (§ 86), the epidemic constitution to which it has been thus absolutely imputed must necessarily be equally migratory. Moreover, as it has been most satisfactorily shown, and as sufficient evidence to demonstrate the fact has been adduced, that



this pestilence may be shut out for ages from places where it was almost a yearly visitant, by strict measures of separation and seclusion ; and that it may even be shut out and excluded from a house or houses, while all the surrounding houses are infected, how are the persons taking these precautions, I ask, enabled thus to prevent the epidemic influence to which it is imputed from occurring in the town, country, or place from which it is excluded? And if the town or place be invaded by this aerial influence, how are they able to shut it out from any house, or part, in which neither infected persons nor infected clothes are allowed to enter? The persons taking these wise precautions are admitted to be quite incapable of keeping off a single shower of rain, by all the scientific means they can use ; how comes it, then, that they can prevent a most destructive epidemic constitution of the atmosphere from visiting a country, although they profess their ignorance of the nature of that constitution, excepting from its effects ; and that, when they have carelessly or ignorantly admitted it, they can, as we have seen, ward it off, and prevent its ingress into any house they please? Can anything more completely show the absurdities of the doctrine of epidemic constitution and non-infection, than a knowledge of the facts connected with the development and spread of this pestilence?

112. The truth is, that infection is introduced, however it may originate, by persons or clothes, or by both, in a town or place ; and if the conditions favourable to its communication to susceptible persons are present—if the temperature be in neither extreme, or be moderately warm ; if the air be humid and still ; if the houses are crowded, low, damp, and ill-ventilated, the streets narrow and abounding in filth ; and if the communications be frequent and a large number of the population are susceptible, owing to their not having been previously attacked, or to some other cause, constitutional or otherwise, the pestilence soon spreads and becomes epidemic. These circumstances conjoin to constitute the epidemic constitution—the “*foyer epidémique*” of our neighbours, to which they impute the pestilence. But I contend that they are merely the conditions—the circumstances which favour the operation, spread, and reproduction of a poisonous agent—of the pestilential miasm or infectious emanation produced by the infected. As soon as these conditions and occasions disappear—as soon as the temperature sinks to freezing, or rises above 75 degrees of FAHRENEIT, and more especially if the air becomes at the same time dry, if high winds occur, and free ventilation in houses or tents is adopted, the infectious poison ceases to be concentrated, is more diffused in the air, and is less capable of reproducing itself, by infecting others, from its being weakened or otherwise changed, and from its ceasing to affect persons who have become, owing to these atmospheric conditions, much less susceptible of its operation, then as soon does the pestilence subside and entirely disappear ; unless it be allowed to smoulder on in low, dirty, close, damp, and crowded places, furnishing a few of the circumstances favouring its occurrence, and some persons still susceptible of its action. Thus in Levantine countries, the distemper is said to

be endemic or sporadic, occurs in isolated cases, and is ready to become epidemic as soon as the circumstances combine to favour its diffusion. The dose of the infecting poison in the former or favourable circumstances is large, strong, and efficient, and the recipient susceptible of its influence ; in the latter, or unfavourable conditions, it is small, weak, and inoperative, and the recipient insusceptible of its impaired power. What has now been stated of the infection of this pestilence does not pertain to it only, or to two or more pestilences merely, but is true of all other maladies of a malignant and epidemic nature, especially of the two other pestilences, of smallpox, and of the other exanthemata.

113. iii. *The arguments which have been used by the anti-infectionists to support their doctrine* hardly deserve any notice, after the ample evidence—after the undeniable facts I have adduced, completely proving that the three pestilences here considered are infectious in a most remarkable manner, under circumstances which are fully described. As the arguments which have been used by the objectors are the same as respects these three distempers individually, I have deferred the consideration of them until all the three have been brought fully before the reader. I even hesitated to consider these arguments at all ; because, when a matter is fully and irrefragably established on facts, any argument which can be brought against it—all special pleadings, however ingenious, argue either the fractious spirit of the objector, or some motive actuating him to prevent a belief in the truth. On this account, therefore, the arguments, or, rather, the sophistical puerilities which have been adduced by ignorant, interested, or captious and splenetic persons, hardly deserve a notice, and only when they seem to possess an air of importance—an importance derived only from unwarranted assumptions, confident assertions, and ill-founded pretension ; and, in some instances, also from the official or professional position of some of those who have ventured into the field of controversy—and not from any solid array of facts or of inferences logically drawn from facts. But, irrespective of the want of every element of sound argument, a very large proportion of the anti-infectionists betray, as shown above, an utter ignorance of the distempers respecting the nature of which they speak with confidence, and even with disgusting pretension—and not only of these distempers, but even of others, either allied or analogous to them, of which they have incidentally taken notice. This assertion may be conceived by some, who have not had opportunities of judging for themselves in the matter, as severe or ill-founded ; but it could be very easily proved if it deserved the space which would be wasted in proving it. Whoever has perused some of the writings to which I allude, and which I have referred to, or others which I have considered undeserving of notice, with that amount of knowledge which enables him to form a tolerably correct estimate of medical writings, will readily admit the accuracy of the assertion ; and the attentive reader of what has preceded, and of what has yet to be adduced, will find sufficient reason to arrive at the same conclusion.

114. A. It has been argued by the anti-infec-

tionists that the three pestilences now considered are not governed by the laws of contagious, but of epidemic diseases. Now this assertion shows, even of itself, that those who make it know nothing of these laws, and still less, if less be possible, of the matters respecting which they attempt to argue. What is there known of the laws of infectious disease which these pestilences do not actually possess and present? The chief law, admitted even by the objectors, is, that contagious or infectious diseases present precise, specific, and distinctive characters. Has not the whole history of the three pestilences now considered demonstrated the possession of these very characters by them in a most remarkable manner? Is even smallpox more distinctive or specific than they are all? Is there any one at the present day, who has had the smallest amount of experience, who will not admit the special character of these distempers, unless he be blinded by ignorance or prejudice, or by both, for they are both often combined? But the anti-infectionists say that other maladies, admitted by them to be infectious, affect a person only once in his life, but that this is not the case with the pestilences now described. Here, again, their ignorance, or their dishonesty, is most barefaced and egregious; for they should know, if they really do not know, that a second infection is even more rare, as shown by facts out of number, as regards two out of these three distempers, than even the exanthematous fevers, whose infectious nature they admit; and that opportunities have not yet been afforded, at least in Europe, to test a similar property in the third of these distempers. In truth, there should be an end of all argument with such persons, as being unworthy of the distinction conferred by fair argument; for they will neither see, nor acknowledge, nor appreciate fairly, any fact which may be construed unfavourably to their views; but will endeavour to controvert it by misstatements and drivelling doubts, when they find it to be otherwise unavailing.

115. Oh! exclaim these pseudo-philosophers, who wish to make infection appear a prejudice, a vulgar error, and who, in the fulness of their vanity, desire to seem altogether above every thing that can be accounted a vulgar or general belief—these pestilences are merely epidemics, observing the laws of epidemics, and are hence not infectious. Yet what do they know more of the laws of epidemics than their opponents, who admit that these pestilences are very frequently epidemic, and are mostly known as such in Europe; but who also contend that they are likewise met with in solitary or scattered cases, in the countries which present the climate and circumstances favourable to their preservation during all seasons; and that their occurring in an epidemic form—their more general prevalence—is only the result of the existence of the several conditions and circumstances which admit of the concentration or accumulation of the infectious miasm which favour the development and operation of it, and which thereby promote the diffusion of infection, especially among susceptible persons, and those who have not passed through the distemper; and still more remarkably when these are collected in numbers, or are crowded

in towns and cities, or are otherwise placed in circumstances predisposing them to the invasion of the pestilential emanations from those already infected. According to the non-infectionists, the pestilential cholera was considered an epidemic depending upon aerial conditions, and was hence termed epidemic cholera. The calamitous consequences of opposing a supposititious aerial or tellurial influence, or a combination of both—for suppositions were varied, and even numerous as to the matter—to a manifest property of the distemper to spread from the sick to the predisposed among the healthy, like all other infectious maladies, and the confident assertions and assumptions employed to conceal ignorance, have been already beyond the power of human calculation to estimate as respects this single pestilence merely; they are still frightful and extensive, and they may even become much more so, and be indefinitely perpetuated.

116. Still, the non-infectionists exclaim, these pestilences, choleric, hæmagastic, and glandular or septic, are merely epidemics, prevail only as far as the epidemic influence extends, and are the results of the "epidemic foyers." Has, however, the choleric pestilence, which has continued to prevail, more or less, for nearly thirty years in India, been an epidemic during all that time? Or has it not rather been, as I have shown, an infectious distemper preserved in that country, by the absence of all attempts to prevent infection, or to limit the spread of it, and by the circumstances of the climate, but prevailing more or less, or becoming more epidemic at one place than another, as occasions arose favouring its diffusion, and predisposing those exposed to it? The truth is that, when the various occasions and circumstances concur to develop lurking cases of either of these pestilences into an epidemic form, it prevails to an extent influenced and limited by these occasions and by the numbers of the predisposed within the boundaries to which infection has extended, and then subsides; sometimes having exhausted itself for want of susceptible subjects, when the circumstances favourable to its diffusion have continued without mitigation; at other times subsiding without occasioning great fatality, when these circumstances have either been but slightly favourable to its propagation, or when others have tended to arrest or limit its extension. In most countries where these pestilences prevail without attempts having been made to limit or destroy the infectious agents, they are perpetuated, by communication with the sick, and by the clothes of the infected, in solitary or scattered cases—scattered more or less profusely in some localities, and in certain seasons, than in others—until the favourable occasions of temperature, humidity, and stillness of the air, conjoined with susceptibility and crowding of the population, have developed them into an epidemic prevalence. In other countries or climates, where the infectious agent is destroyed, or is allowed to extinguish itself by removing it from the reach of susceptible subjects, or where it dies away from the occasions requisite to its propagation being absent, the pestilence is no longer heard of for a time, until an infected person or infected clothes again introduce the distemper, which



becomes more or less prevalent according as circumstances favour its spread; and thus it may prevail, then subside, extend to another place, disappear, return, and become epidemic in succession in various situations, as usually observed in respect of the plague in the Levant. The opposers of infection—the supporters of the doctrine which attributes all the effects observed in the course of epidemic maladies to epidemic constitutions or influences merely—to “*foyers epidemiques*”—cannot produce a single epidemic of any pestilence, the several phenomena of which can be fully accounted for by the agency or influence which they invoke, but of which they can neither demonstrate the existence, nor assign any indications of its presence, beyond the mere circumstance of the spread of the distemper from the sick to the healthy, with more or less unusual or remarkable frequency. Now the infectionists contend that this propagation of the disease is the result of a morbid effluvium proceeding from the sick and infecting the susceptible among the healthy, all other occasions and circumstances existing at the time being only aids of this efficient cause; and they challenge their opponents to an examination of both doctrines with an honest regard to facts, more especially to those facts which are open to the scrutiny of all candid minds, and from which alone, and not from argument, the truth is to be elicited.

117. The non-infectionists contend, as a proof that pestilences are not infectious, that “they break out at a certain season, last for a certain time, and then subside and remain dormant until a favourable season returns;” while, on the other hand, they assert that “contagious diseases can be propagated at any time and among any number of persons;” and that “a disease depending upon a specific contagion must prevail alike in all seasons, in a pure as well as in an impure atmosphere, among the rich as readily as among the poor; and that the only influence of these adventitious circumstances would be to render the disease more or less severe.” Now I have, on more than one occasion, accused the non-infectionists of ignorance of that science with which, unfortunately for the causes of humanity, they have meddled; and some may have supposed the accusation harsh, or even ill-founded; but, can a more convincing proof of the fact be adduced than the very arguments they have employed to support their doctrine—the very weapons which they have wielded in a conflict involving the interests of the community? Is there one medical man—one who has the smallest right to a title, which should claim respect from all well-constituted minds—who could make the assertion contained in the latter part of the above quotation, with the least shadow of truth as regards any one disease which is either contagious or infectious? On the contrary, it is known to all who have either observed for themselves, or read the observations of others, that all contagious or infectious maladies, propagated in the natural way, spread readily at one time, and scarcely at all at another; that hooping-cough, scarlet fever, measles, smallpox, and even rabies, are more prevalent at certain seasons than in others; that either of these maladies may for some time be

rarely or never seen, then break out, and be more or less prevalent. There is no disease more demonstratively both contagious and infectious than smallpox, or in many respects more analogous to plague. Now let us see what was the usual mode of its appearance before it was controlled by inoculation and vaccination. Before smallpox was thus interfered with, it is well known that it used to lie dormant, then appear, rage for a time, and then subside, like those pestilences now considered, and which have been imputed by the non-infectionists to epidemic influences. There can be no greater authorities adduced respecting smallpox, before the introduction of inoculation, than SYDENHAM, BOERHAAVE, and VAN SWIETEN; and they describe it as appearing and running its course like epidemic diseases. SYDENHAM remarks that “one and the same disease kills an infinite number at some certain seasons, and at another time seizes only here and there one, and goes no farther; and this is very apparent in the smallpox, and especially in the plague.” BOERHAAVE observes that “this disease is generally epidemical, beginning in the spring, increasing in summer, abating in autumn, ceasing almost entirely in the following winter, to return again in the spring;” and VAN SWIETEN states, “I have seen many variolous epidemics, and they agreed in most things with the observations of SYDENHAM.”

118. B. So much for the medical knowledge of the non-infectionists as evinced by their arguments, and on occasions when exact knowledge, and not ignorance, should have been put prominently forward. I shall next furnish an example of the “*suppressio veri*”—of the honesty of their arguments. “People are attacked,” states a pillar of the non-infectious faith, “not in proportion as the inhabitants of the affected mix with those of the unaffected places, but in proportion as the inhabitants of unaffected expose themselves to the air of affected places. The visits of the sick to unaffected places is [are] followed by no increase of disease; the visits of the inhabitants of an unaffected to an affected place is [are] attended with a certain increase of sickness. On their removal from a noxious to a pure air, the sick often rapidly recover; but they do not communicate the disease to the inhabitants of a pure atmosphere.” Now I can affirm that, amid the numerous worthless statements which I have been doomed to peruse—of the multitude of medical facts or medical lies which have come before me—none has been more impertinently false than the above. The short passage now quoted conveys, with its unmitigated falsehoods and bad grammar, two distinct propositions, in several ill-expressed forms: 1st. *That when the people of healthy districts visit the affected districts, they take the disease not from the sick, but from the air;* 2dly. *That when the sick move from an affected to a healthy district, they speedily recover, and do not give the disease to others.* These propositions are the basis upon which the non-infection faith reposes, and are extended by the apostles of this faith to the three pestilences which I have been considering. I shall, therefore, bestow somewhat more notice on them than they deserve, and show—what, indeed, most of what I have

adduced in any way connected with the subject must have already shown—that they are as baseless as the visions which haunt the imaginations of the trembling and sickly drunkard when deprived of his accustomed stimulus. Having demonstrated the non-existence of the grounds upon which a belief in non-infection is based, this most dangerous doctrine—a doctrine pregnant with the worst consequences to the community—is consequently swept away, and entirely removed from rational minds, a belief in it being merely a matter of history, and an illustration of the progressive advancement of the human mind.

119. *a.* If, according to the *first proposition* of the non-infectionists, *those who come out of a healthy into an infected district take the distemper, not from the sick, but from the atmosphere of the district*, then it follows that those who avoid the sick, or the clothes of the sick, shall be as liable to the distemper as those who approach or touch them. Now is this the case with the plague, or with any of the other pestilences I have discussed? The contrary is so notorious as to require no farther demonstration than it has received in the preceding articles; and if farther demonstration be required, let a mere reference to the numerous instances of the protection afforded by seclusion in the midst of an infected population, on occasions of the prevalence of either of these pestilences, be sufficient; and a sufficient number of these instances has been adduced, in the course of the preceding pages, to satisfy the candid mind. Let the reader peruse the facts I have adduced, proving, as respects each of these distempers, that the healthy will remain protected amid a dense infected population—while surrounded by the sick and the dead—as long as seclusion and avoidance of all communication with infected persons or infected clothes are observed. These facts are undeniable, and are not to be assailed by the loose statements of ignorant men, expressed in the bad grammar, and worse English, indicative of minds insufficiently informed for those investigations which are necessary to elicit the truth, and to trace its relations to matters held in dispute.

120. *b.* The *second proposition*, that *when the sick move from an affected to a healthy district, they speedily recover, and do not give the disease to others*, has been sufficiently characterized by me above (§ 118), and is entirely false, as may have already appeared from what I have adduced in various places. That the infected should be less severely attacked when removed from crowded, close, low, or ill-ventilated places, to dry, elevated, and well-ventilated situations, may be inferred. It is one of the circumstances most strongly insisted upon by the infectionists, with reference to the three grand pestilences of modern times; and it has been more efficiently acted upon by them than by their opponents, as demonstrated at Gibraltar and other places. But, unfortunately, numerous exceptions to the generally good effects of removal occur; for, once the infection has taken place—once exposure to infection of a manifest or concentrated kind has occurred—a severe and fatal grade of distemper will often be developed notwithstanding that the removal to a pure atmosphere has immediately followed the infection. Instances proving this fact are

numerous, and too familiar to every experienced observer, as respects the three pestilences under consideration, to require a more particular notice than that which has been already taken of the subject. It has, moreover, been shown that a more or less elevated temperature and stillness of the air are necessary elements in the development of the epidemic prevalence, of at least two of the pestilences in question, if not of all three; and, consequently, it follows that a reduction of that temperature and free ventilation will be favourable to the infected, and will be more certainly secured by removal. Hence removals, with advantages as to temperature and ventilation, will prove more especially beneficial. But it may be inferred that a removal, even to a purer air, when the reduction of the temperature of that air is slight, will not be so manifestly advantageous as when it is much more considerable. Thus it was shown, on a very recent occasion, that when the crew of the “Eclair” steam-ship, the infected and the healthy, were removed from this vessel, which, according to the non-infectionists, was the cause of the disease to all those who were not exposed to malaria in Africa, and were landed at Bona Vista, the distemper was not thereby mitigated in any degree, but continued to spread among the crew, and subsequently to the inhabitants of the island.

121. The assertion made by the writer quoted above (§ 119), that the visits of the sick to unaffected places are not followed by the propagation of disease, is the most outrageous and unblushing falsehood which has ever desecrated medical doctrine or disgraced medical writings—a falsehood, moreover, which, if believed in and acted upon, would on numerous occasions endanger the lives of the majority of the community in every civilized, or even partially civilized, country. Can such an assertion deserve the least notice, after the numerous proofs to the contrary adduced in the preceding pages?—after the instances I have referred to—and thousands more might have been mentioned if my limits could have admitted them. I shall, however, notice two which I have just seen in the course of my reading. Mr. HOWARD, in his celebrated work, states that “when the plague raged in London in 1665, the infection was conveyed by means of a parcel of clothes to the remote village of Eyam, near Tidewell, in the Peak of Derbyshire. In this place it broke out in September, 1665, and continued its ravages upward of a year, when 260 of the inhabitants had died of it.” “In the surrounding fields are many remains denoting the places where tents were pitched; and tombs are still existing of large families entirely swept away by this devouring pestilence.” (P. 24.) The plague is very rarely introduced into Arabia, the passage across the desert, and the state of the climate in many parts of the country, being unfavourable to the development and spread of its infection; and it is generally admitted that the pestilence has never appeared there unless when imported, as was the case in 1815, by the army of MOHAMMED ALI, which crossed the desert into Arabia on an expedition against the Wahabees. Dr. BABINGTON, the eminent physician to Guy’s Hospital, who came over land from India at this time, remarks, in a communication to Dr. Gooch,



that the plague had then visited Yambo and Jedda, and crept down the coast as far as Gamfada, and that each of these towns had lost nearly half the population. He, moreover, adds, that when he was at Milo, in the end of 1815, a vessel came into the port having one person on board ill with the plague. This vessel was ordered by the Greek authorities to quit the harbour. She put into Mitylene, where those in command, being less cautious, allowed the sailors to land, several of whom had by this time become infected. The distemper immediately afterward broke out among the islanders, and many fell victims to it. It is unnecessary to adduce farther proofs not only of the utter worthlessness, but of the insane recklessness of the assertion, which I have now sufficiently noticed. Indeed, the full evidence I have brought forward of the infectious nature of each of the pestilences considered under this head, completely overthrows the position so rashly assumed by the non-infectionists.

122. But, as shown above, and admitted by the contagionists or infectionists themselves, the plague is not always propagated; when those sick of it, or the clothes of the infected, are removed to a place or places which is altogether healthy, or free from the pestilence. This circumstance has been fully explained; but because, like all other infectious maladies, this requires certain conditions for its epidemic prevalence, and because it is not universally diffused; because it is not widely and generally propagated on all occasions and circumstances whatever, the non-infectionists raise an argument against its infectious nature. The occasions and circumstances favouring the spread of this distemper are hereafter shown (§ 124, 127, *et seq.*), and those preventing the propagation of it also stated (§ 126). That there should exist such occasions, is only in accordance with the laws of nature, and with the phenomena characterizing all acute infectious maladies. The same takes place in respect of the smallpox and the rest of the exanthematic, and it is notoriously the case as regards the other pestilences. Before the introduction of inoculation, smallpox, as respects its epidemic prevalence, presented the same laws as the plague and other infectious maladies which frequently appeared in an epidemic form. VAN SWIETEN, who saw the smallpox when it was propagated only in the natural way, remarks as follows: "I have sometimes observed large towns to be free from the smallpox, while it raged epidemically in the neighbouring villages; and, on the contrary, some large towns universally visited by the complaint, while the villages in the neighbourhood remained in health, though the inhabitants of both mixed daily with each other. I also perfectly remember that I once removed two patients of mine from a place where the smallpox raged to a large town, without propagating the contagion there; and many excellent physicians, with whom I have cultivated a friendly commerce with respect to medical knowledge, testify that they have observed the same thing." A similar fact is mentioned by Sir JOHN PRINGLE. He states that "the smallpox, being carried into a camp by some new-raised recruits, quickly disappeared without becoming general, although it is notorious that other camp diseases are but too apt quickly to

spread themselves." Dr. ODIER, in a letter from Geneva to Dr. HAYGARTH, says: "We have frequently inoculated, at Geneva, a great number of children in the years during which the smallpox was not epidemic; these children have gone out every day, even after the eruption had broken out; they have been in the streets, and in the public walks; they have communicated freely with other children susceptible of the infection, and not only the smallpox did not spread, but there did not occur, to my knowledge, any distinct instance of the communication of the disease from one individual to another in the streets or promenades."

123. I have now taken as much notice of the chief arguments of the non-infectionists as they deserve. Who will not be convinced by what has been adduced above, are not likely to be convinced of the infectious nature of the pestilences here considered, by anything whatever that may be advanced. I can only add, for the consideration of the inexperienced and incautious, that, after what I have stated on the subject, with a perfect conviction of its truth, and after the fullest and most extended research it was in my power to bestow upon the subject, if they neglect those measures which are calculated to prevent infection, in the several circumstances in which it may be likely to appear and extend; if they act recklessly, as the numerous occurrences of these pestilences have presented many examples, and despise the doctrine of infection and all protective measures, they will open the flood-gates of an overwhelming calamity, in which they themselves, among many others, may be swept away; or, if they should survive, they will have an account to settle with their own consciences of no small amount. At the present day, persons are endeavouring to overturn belief in a doctrine most essential to the safety of the community, and are attempting to oppose their opinions to the views and doctrines inculcated by the master minds in our science—inculcated for the promotion of the best interests of humanity, and inculcated, moreover, with a perfect conviction of their truth.

124. iii. *There are some circumstances which predispose to, and others which appear to counteract, the infection of plague, besides those just referred to.* My limits will only admit of a brief notice of them.—*a.* It has already been remarked that extremes of temperature arrest the spread of this pestilence. It has long since been stated by VOLNEY and others that the winter temperature of Constantinople puts out, but that spring and summer heats rekindle, the distemper. But it is very questionable whether or not the infectious miasm is destroyed by the cold, or is merely rendered inoperative or dormant; and, although the spring and summer heats resuscitate the pestilence, it is very doubtful whether this effect is produced by the generation of the distemper *de novo*, by the influence of a higher range of temperature upon the decomposing animal exuvie and other materials; or whether the dormant infection is thereby rendered operative and called into activity, or even whether the infection is introduced on several occasions, and at several points, by infected vessels and travellers, and especially by the numerous pilgrims returning to or passing through this city, and that the

infection spreads as soon as the occasions favourable to its extension supervene. That this last is the true reason of the prevalence of the distemper during summer in this city is shown by the almost total disappearance of it since quarantine regulations were adopted in 1839. In Cairo and other towns in Lower Egypt, as well as in some parts of Syria, where the winter temperature is much higher, the distemper becomes epidemic, or, at least, more or less prevalent, usually at a much earlier period of the year, generally in March, April, and May, and subsides when the temperature rises above 75 or 80°.

125. *b.* It is, however, not so much the temperature as the *humidity* of the air which favours the extension of this pestilence, and the former may be said to be operative only when it is conjoined with great humidity. This is evinced at Constantinople, where the air is very humid in spring and summer, owing to the influence of the adjoining seas, the extensive forests, and high ranges of mountains. In Lower Egypt and Syria, especially in places near the coast, the winter and spring are humid and rainy, and the atmosphere close and still; and although the range of temperature is not high, still the close and moist air favours the accumulation of the emanations proceeding from sporadic cases of the pestilence, or from clothes retaining these emanations, and renders those exposed to them more susceptible of their influence. When, however, the atmosphere becomes dry, whatever may be the range of temperature, the pestilential miasin loses much of its power, and the population, or those exposed to it, much of their susceptibility. It is, therefore, chiefly owing to the combination of heat with humidity that the former is influential in the diffusion of this pestilence.

126. *c.* The *winds* have no mean influence in the development and spread of plague, especially in the East. At Constantinople, the north wind, called the Tramontana, which is dry and cool, prevents or arrests the progress of the distemper; while the Sirocco, or south wind, which is both warm and moist, favours the development and spread of the malady. High winds, especially when they are dry, remarkably diminish the infectious disposition, and restrain and arrest the propagation of the disease, chiefly by dissipating and diluting the miasms proceeding from the infected, and giving rise to freer ventilation in crowded streets and houses. The salutary effects generally derived from placing infected troops or communities in tents, upon a dry, arid, or healthy soil, proceed chiefly from the readiness with which the winds pass under the tents and dissipate morbid emanations, or dilute them so as to render them inoperative. Dry winds, also, render the human constitution less susceptible of contagion. Thus it has repeatedly been observed that the Harmattan, a remarkably dry north-east wind, occasionally blowing for several days on the west coast of Africa, suspends the infection of smallpox, and that even inoculation of that disease is generally inoperative while it blows.

127. *d.* The *electrical conditions* of the atmosphere have been supposed to be more or less influential in producing epidemics of plague and

of the other two pestilences; but the particular electrical conditions have not been shown, the negative state being most frequently accused. Very probably electricity, as it circulates through the animal economy and other objects on the earth's surface, and passes off into the atmosphere, by its varying states and its influence upon the nervous system, impairs in some cases, and increases in others, the nervous power and vital resistance of the frame, thereby rendering them more or less disposed to the invasion of infectious agents, and, as observed in respect of its influence on dead animal matter, imparting more or less of a septic tendency to the fluids and soft solids. Still, the actual amount of influence of this agent on the living body is unascertained, and probably much exaggerated by many, especially by those who impute epidemics to atmospheric conditions, without admitting the efficient agency of specific infection.

128. *e.* *Local or endemic conditions* have been much insisted upon by some writers, and by several of those who have communicated with the French Academy on the subject of plague; these conditions, especially the accumulation of animal exuviae, the decomposition of dead animals, incomplete modes of human sepulture, and burying the dead in vaults and crowded churchyards situated within or nearly contiguous to towns and cities; imperfect drainage, and the passage of decomposing animal fluids and excretions into cess-pools, into a low, wet, and rich soil, or into canals, open drains, &c.; collections of animal and vegetable matters left to decompose in the air surrounding low, damp, and ill-ventilated dwellings, or in narrow and crowded streets; living in cellars or in close apartments on the ground, and having merely the soil impregnated with animal secretions and the fluids from animal decomposition, for a floor; adjoining marshes, estuaries, low grounds subject to inundations, ruinous and obstructed canals, stagnant waters, &c.; a deep, rich, and humid soil, accumulated for ages from the decay of animal and vegetable matter, and from the mud and slime produced by repeated inundations and evaporation by a warm sun; scarcity and unwholesome food, and the use of water contaminated by animal matter, by the decomposition of organized bodies, or by the infusoria, severally exert no mean influence in the development and spread of plague and other pestilences. It is seldom, however, that one or two merely of these conditions are found existing in a locality or town in the East without being associated with others, or even with nearly all those now enumerated; and if they be singly injurious, as they must be admitted to be, how much more so must they prove when associated, and the emanations from them are elicited by heat, and accumulated in a humid and stagnant atmosphere. It is to the combination of a number of these, aided by moderate warmth and humidity, that many recent writers impute, as I have shown above (§ 106, *et seq.*), the generation of this pestilence *de novo*, and its endemic and sporadic existence; while others have maintained, in opposition to this view, that, so far from these circumstances having generated the plague, or given rise to sporadic cases, or to an endemic form of the pestilence, they have



actually been unfavourable to the prevalence of it when it has been epidemic, and that quarters of cities where they have been most remarkable have suffered the least from it on these epidemic occasions. It has been stated, even by the supporters of the origination of this distemper in these causes, that the Jews' quarters, and others the most filthy, and combining most of the conditions just specified, have suffered the least in various epidemics which ravaged Cairo, Smyrna, and other towns in the East; and an argument against the accuracy of their own views, as to the origin of the pestilence, has thus been furnished by themselves.

129. There can be no doubt of the injurious influence of these causes, acting either singly or in combination, upon human health; and of the fact of putro-adyamic fevers, typhus, adynamic dysentery, and other maladies having originated in a combination of two or more of these circumstances, more especially when aided by warmth, humidity, crowding, and imperfect ventilation; but that they generate *de novo* this pestilence, may be disputed, as shown above (§ 41), or even that they constitute the sole source or centre of epidemic influence during fatal prevalences of this distemper. Indeed, the precise part which these circumstances perform, the amount of influence which they severally or conjointly exert in the generation or in the diffusion of this pestilence, has not been clearly ascertained. Their noxious influence has been more a matter of inference than of demonstration; and numerous facts seem to show that other circumstances, often associated with these, although not necessarily connected with them, are more concerned than they in the spread of the distemper; that crowding, and the close and frequent communications with infected persons, and pestilential emanations from the clothes and bedding of the affected, and from their persons, and the concentration of these in a stagnant and humid atmosphere, are the principal and efficient agents of general infection; and that the several local or endemic states above enumerated (§ 128) are operative chiefly in as far as they concentrate or accumulate these emanations, and prevent their dilution or dissipation in the surrounding air, [and displace pure air.—*T.*]

130. *f. Modes of sepulture* have not received due attention, especially with reference to the generation and diffusion of pestilential diseases. In many places in Africa, especially among the pagan and negro tribes, and even among the Copts, the dead are generally buried in the houses or huts of the living; and as many of the dwellings have no other floors than the earth itself, it must follow that, in the more populous and older towns, a most fruitful source of disease exists in the very dwellings of every family. This practice may be concerned in the origination or propagation of the hæmagastric and septic pestilences, especially the former; but how far it is actually so concerned cannot easily be determined. That it is injurious to health, cannot be disputed. I believe that it is more influential in the generation and spread of pestilence than the other local causes above specified (§ 128), especially in humid and stagnant conditions of the atmosphere, and when aided by several of these causes. It was observed, during the French Revolution, that the

trenchings, &c., made in many burying-grounds in order to obtain nitre, occasioned malignant fevers. And M. BORRINI, secretary to the sanatory establishment at Alexandria, states that a cemetery near the city, in which more than 500 bodies were interred, during the plague of 1834 and 1835, was opened in 1837 for the foundation of an edifice, and the plague appeared in the following spring. But it is difficult to determine, in this instance, how far this circumstance was concerned in originating or in propagating the distemper of the following spring. Although facts have been adduced having some reference to this matter, they have been superficially observed and loosely described. That these occurrences are productive of malignant fevers and adynamic dysentery, cannot be doubted. I have met with instances of adynamic and putro-adyamic or malignant fever, which have proved fatal as early as the sixth day, caused by the foul air emitted from burying-grounds and vaults in this city, and that foul air from similar sources in warm climates, and even in colder countries in warm seasons, and in a more concentrated form, should occasion plague, is not improbable, although not so fully demonstrated. The evidence as to the origin, *de novo*, of the specific form of pestilence now under consideration from this source, is too deficient to admit of my connecting them as cause and effect. The subject requires farther investigation before either the affirmative or the negative can be admitted. There is one circumstance which may be mentioned, that, although in the great plague of London about 100,000 dead bodies were put in the ground very near densely-inhabited places in London, and although they were thrown into pits, each containing many thousands, and were covered only by a shallow layer of earth, still this pestilence was not continued during the years immediately following; but a malignant typhoid, or putro-adyamic fever, caused by the effluvia proceeding from the burying-places, and an adynamic or putrid dysentery, occasioned by the water contaminated by these sources, were remarkably prevalent in London during several years immediately consequent upon the plague. Similar occurrences are recorded to have followed very fatal epidemics of plague in other cities, but their causes have rarely been recognised or even inquired into.

131. It is, indeed, a matter of surprise that a chief source of the most malignant diseases—a source rendered manifest to the senses in the most disagreeable manner, and so easily connected with its effects—should be allowed so long to exist in civilized countries, and more especially in this, without the least interference; but this is only one of numerous instances of the disregard of health and life by governments in which particular classes obtain the power of legislating for their own interests, and in favour of property, with a total disregard of the public health, and of the protection of human life. The loaf of bread exposed to the tempted gaze of the starving is protected from his grasp, and the miserable wretch who cannot withstand the temptation placed in his way is made the subject of the severest punishment, contrary to the Mosaic law, so conveniently adopted in other matters; while the interests involved in the traffic of

burial vaults and grounds in the midst of crowded localities, prosper by the increasing amount of mortality they produce; and, while the proprietors are fed and made rich by the very deaths they occasion, their interests are respected by the law and by the legislature, and the murderous traffic is allowed to proceed. But this is not the only way in which the public health and human life are made the wholesale objects of commercial speculation and private gain, protected by the glorious stringency of the laws in behalf of property. The vendor of poisons, whether with the intention of destroying, or with the avowed object of restoring health, is allowed to pursue his murderous vocation not only without hinderance, but is actually more efficiently protected in the exercise of it than the educated and scientific physician, who has devoted his whole energies to the honest and salutary performance of what he professes. Both kinds of depredators on human life have obtained, by the favours of the laws and of the expositors of these laws, by the forbearance of the legislature, by the ignorance of the aristocracy, by the devotions paid to wealth to the neglect of worth, and by the state of society generally in this country, vested rights in their vocations; and at the present day they are encouraged by church and state, and even applauded by numbers in the community, during the unblushing exercise of their hideous iniquities—

"Murders most foul, as in the best they are;  
But these most foul, strange, and unnatural."

132. *g.* There are few causes more accessory to the prevalence of plague than *scarcity, and unwholesome articles of food*. Insufficient and unhealthy nutriment increases the septic tendency so remarkable in this pestilence, and favours glandular enlargements. The use of tainted animal food, of half-putrid meats and fish, of unripe or injured grain, and of numerous other unwholesome articles, often partaken of during periods of scarcity or want, although not originating the pestilence, certainly increases the susceptibility to, and the spread of, infection. Hence the remarkable prevalence of the distemper on several occasions when the infection has been introduced into a place subject to scarcity or famine. Fatigue, all exhausting causes, especially sexual indulgence, mental depression, dread of infection, and want of sleep, dispose the system to an attack.

133. *h.* There is much difficulty in determining the *influence of sex, age, and occupation* in favouring the infection of this pestilence. Much depends upon the exposure to which each is liable during an epidemic; and this will necessarily vary in different countries and epidemics. There is no doubt of medical men and hospital attendants, and next to them the ministers of religion, having been more frequently attacked than any other class—a circumstance altogether arising from their greater exposure to infection. All those who were employed in burying the dead, in removing and attending upon the sick, or whose avocations brought them in contact with the affected, or with their clothes, or even near to them, have rarely escaped in any epidemic of which particular accounts have been furnished, unless they were protected by previous attacks of the pestilence. It is said that the water-carriers, and the oil-

pressers and preparers in Cairo and other Mohammedan cities, generally have escaped, and that the immunity of these classes was very evident in the epidemic of 1835. Tanners, curriers, and skin dressers have been found more exempt from plague than other artisans, as shown in numerous epidemics in both Europe and the East.

134. *i.* The plague, like smallpox, spreads more rapidly, generally, and fatally among the negro and other dark-skinned races than among the Caucasian race. In this respect it is opposed to the hæmagastic pestilence, which attacks more especially the latter. It was observed in the Egyptian epidemic of 1835, that the negro inhabitants were attacked and died in much larger proportion than others. The natives of countries, also, approaching the tropics, and even of those of the south of Europe, have been considered more liable to the plague than those of the north; and persons having weak and susceptible nervous systems, and feeble or disordered digestive organs, also have been said to be more predisposed than others; while those who are labouring under diseases attended by purulent or other discharges generally escape. LARREY remarked that the soldiers who had been wounded, or had sores or ulcers, were not attacked so long as their wounds or sores yielded a puriform discharge, but that they were not unfrequently seized as soon as the discharge ceased. During periods of the plague in Europe, numbers of persons have had recourse to artificial purulent discharges as a prophylactic measure, and frequently with success.

135. *iv.* The hypothesis of insect life as a cause of disease has been applied to plague and other pestilences. Dr. HOLLAND has discussed this hypothesis, in connection with the choleric pestilence, with great ability and eloquence (*Medical Notes and Reflections, &c.*, 8vo, Lond., 1839, p. 560), and adduced every consideration that can be entertained in its favour. Much of what may be said regarding the origin of that pestilence in this cause is equally applicable to the plague. Admitting that swarms of insects sufficient to cloud or to obscure the atmosphere may exist in it, and yet be so minute individually as to elude the unassisted vision; that the numerous infusoria, &c., detected in fluids by powerful instruments is a strong argument, from analogy, in favour of this opinion; that these swarms of insects may be generated from the decomposition of dead animal matter, and that the circumstances which favour such decomposition may also favour other modes of existence too minute to be detected by our grosser senses; and admitting, moreover, that these insect swarms may be inhaled into the lungs, or be absorbed, they or their ova, from these and other surfaces, and occasion the most noxious and fatal effects, and that they may so travel as to explain certain courses taken by this and the choleric pestilence, still there are many facts and considerations which weigh strongly against this hypothesis. Indeed, all that has been adduced against the opinion of the atmospheric origin of these pestilences apply equally to this doctrine. If swarms of insects passing through, or floating in the air, too minute to be perceived, and hence capable of passing into the circulating vessels, and there produ-



cing fatal distempers, were actually capable of occasioning what has been imputed to them in respect of either of the pestilences in question, we should expect a more or less simultaneous affection of the population of the district through which they passed; and seclusion or separation could not be viewed as being more likely to protect from this cause than from the atmospheric constitution contended for by others. It would be difficult, also, to connect what can be believed possible of such insect swarms with the several epidemic manifestations, and sporadic or endemic appearances of this and the other pestilences.

136. But these insect swarms have not been proved to exist in connexion with individual cases, or with the epidemic prevalence of plague or other pestilence. Those manifest and palpable swarms which have been occasionally observed in most countries, to such an extent as to darken the air, and to colour the objects on which they rested, and which furnish the chief argument for the existence of those supposed to be productive of plague or other pestilence, have not been found destructive of human life, although productive of more or less disorder. The transmission, also, of these distempers from one place to another, the transport of plague from the east to places in the west or north of Europe, and the various circumstances connected with the transport or appearance of pestilence in various distant, or even adjoining places, are not consistent with insect swarms existing in the atmosphere.

137. It is more probable that the material emanating from the infected, whether denominated the pestilential miasm, emanation, or effluvium, and infecting the susceptible among the healthy, either by direct or mediate contact, or by the respiration of the air more immediately surrounding the sick, actually consists of innumerable, impalpable, and invisible but living and organized existences, generated during the distemper, and thrown off as the distemper proceeds, in so minute but specific forms as not to be visible to the eye, although often admitting of recognition by the sense of smell. It is no very extravagant notion to conceive, what has the support of numerous circumstances and analogies, that during the more or less rapid effluxion of the vitality endowing the frame in this and other pestilences, the effluent vitality may associate itself with certain materials or molecules furnished by the diseased body, and thus may assume the state of organized existences, of specific form, but invisible and impalpable size, capable of infecting the healthy, and, by means of the malady they produce, giving rise to similar specific existences, thereby propagating, spreading, and perpetuating their kind. These innumerable and invisible existences, or organized swarms, whether thus equivocally generated by changes in the states of vitality and organization in the highest of animals, or capable of perpetuating themselves by ova, may be supposed to assume certain determinate forms in each specific pestilence, the specific characters of which may depend upon the determinate forms thus assumed, and upon the manner these forms invade and affect the organs of our frames. It might be futile to add more in favour of infection by means of organized existences or para-

sites generated by the diseased, although much more might be added in support of the doctrine; but we well know that in proportion as the vital energies of the frame languish or are impaired, so are the parasitical animals peculiar to each of the higher animals more numerous, swarming, and fully developed; and it is not unreasonable to infer, that as vitality, apparently, changes its form, its conditions, and material alliances in these cases, probably without even the intervention of ova, and merely from the effluence of the vitality of the parent, and the combination of that effluent portion of vitality with molecules of matter which it fashions into certain specific forms, and which, moreover, although thus equivocally generated, it may even endow with the power and with the organs of reproduction. Rejecting, therefore, on the one hand, the doctrine of insect swarms floating in the air and producing pestilence, as being deficient in the evidences of their existence, and of their operation on the economy consistently with the phenomena presented by pestilence, and believing, on the other hand, that the opinion as to the material or emanation infecting the healthy is a living and organized material, consisting of innumerable and invisible forms or existences given off from the diseased body, has sufficient analogies and other evidences in its favour, I would recommend the future investigation of this subject by means of those aids which are now so much employed in physiological and pathological researches.

138. *v.* *There are certain conclusions respecting the causes and propagation of plague at which I am disposed to arrive, after the best consideration I could devote to these matters. I believe that they are consistent with the best evidence I can obtain, and with the actual state of our knowledge. If any of them be found inaccurate, the disposition to correct them shall not be wanting.*

139. *a.* The amount of evidence (as I do most firmly believe the proofs of the last century equally valid with those of the present) favours a belief in the communication of the plague by contact of infected persons or clothes. Although the contact of these will very frequently fail of producing this effect, and although the evidence on some occasions may appear equivocal, and admit of other special explanations, still the frequent infection after the contact of these, the sequence of occurrences, and the connexion of sensations, conspire to the formation of a well-founded belief that the result is produced in the way usually accredited.

140. *b.* From what I have stated above, I infer that the inoculation of the plague may be effected. That while its accomplishment proves the contagious nature of the pestilence, its failure, for the reasons I have given (§ 96), cannot be justly considered as disproving the contagious property; and that, although the evidence of the communicability of plague by inoculation is not quite complete, it is sufficiently so, viewing it in connexion with other modes of propagation, to warrant the belief that the plague may be communicated in this way also.

141. *c.* That in addition to, and even more frequently than, the infection by contact of persons and clothes, infection is produced by the emanations or effluvia given off from the

sick, and inhaled by the susceptible upon near approach, remaining near or long with the infected, especially in humid and still conditions of the air, and in ill-ventilated apartments.

142. *d.* That the pestilential emanation, or effluvium, is absorbed and retained by bedding, bed, and body clothes, more especially when these consist of animal products; and that, if these articles are shut up immediately, or soon after they have been used by the sick, and excluded from the atmosphere, they may retain this effluvium, and by giving it off upon exposure to the air, they contaminate the surrounding air, and infect the susceptible who may respire the air thus contaminated.

143. *e.* That numerous occasions may occur in which it cannot be determined in which way or through what channel the infection is conveyed, although no rational doubt as to the actual communication of the distemper from one person to another can be entertained, and that in many cases where the distemper appears to be communicated by contact, the proximity necessary to this act brings the susceptible person within the sphere of infection produced by a pestilential effluvium, or emanation from persons or clothes. Hence the experiment made in 1835, in the Hospital Esbeki, at Cairo, on two criminals, who, after having put on the body-clothes of two persons who had recently died of the plague, lay down on their beds, prove infection either by contact, or by the air contaminated by the clothes, which were used and respired by the subjects of the experiments, or by both modes. In these two instances infection was manifested on the fourth and sixth days.

144. *f.* That the period during which either the bodies of the dead or the contaminated clothes may retain the power of infecting the living has not been ascertained, and most probably no particular period can be assigned, as it may rationally be supposed to vary with the physical and other circumstances by which either source of infection is surrounded. There can, however, be no doubt that the dead body retains the power of infection during a period of considerable duration, and that the same may be said of the clothes and bedding of the infected, when these have been excluded from the influence of air and light.

145. *g.* That, however we may speculate as to the nature of the specific miasm, effluvium, or emanation propagating plague or either of the other pestilences, we only know actually that it is specific, or of a determinate kind, in each distemper; and that it is so, is an inference the truth of which is demonstrated by its effects, and especially by the fact of its propagating and perpetuating its kind. The effects, as well as other considerations, suggest the belief of a certain grade of vitality and organization in the material given off by the diseased, and affecting the susceptible among the healthy, and consequently of a specific conformation or constitution of the infecting material in each distemper, and they favour, but by no means prove, the idea of infection by the generation of invisible living existences by the diseased, that, either directly or by contact, or mediately, or by the air contaminated by these existences floating in it, affect the healthy in a similar and determinate manner.

146. *h.* That the chief and most frequent channels of infection are the respiratory passages and organs; the air inhaled conveying with it the contaminating or infecting agent, whatever this may be, and thereby infecting the healthy, whenever this agent is sufficient in quantity or concentration relatively to the susceptibility of the person exposed; but that infection may take place in some instances and circumstances from the cutaneous and digestive mucous surfaces, although much more rarely, and merely contingently.

147. *i.* That we have no valid evidence, in respect of plague, more than as regards the other pestilences and the exanthemata, that this distemper may be generated *de novo* by certain sources, namely, by the emanations from dead animal matter, or from the exuviae and dead bodies of our own species, although numerous circumstances favour this doctrine, while others militate against it, and support the opinion that the pestilence is perpetuated by contagion and infection, during circumstances favourable to the communication of it; and that it is prevented from being extinguished by the transport of it from one place to another, its existence and prevalence in one or more places, when it has disappeared from others, furnishing the means of its return to those places from which it had entirely disappeared for a time.

148. *k.* That many of the circumstances which suggest the doctrine of spontaneity, or the generation *de novo* of the plague, on occasions of its appearance and prevalence in places where these circumstances exist in the most evident manner, remarkably favour the propagation and perpetuation of the pestilence, and, in fact, constitute the condition which has been denominated epidemic constitution, influence, source, centre, or *foyer*; but they require the presence of the pestilential germ or infection, whether already existing sporadically or endemically, as incorrectly termed, or being latent in certain fomites, or imported from more or less distant places, before the malady can be developed and disseminated.

149. *l.* The period of incubation, or the time elapsing from the moment of exposure to the infecting agent to that at which the effects become manifest, has been variously estimated. It evidently varies in duration with the concentration or amount of the dose of infection relatively to the susceptibility of the recipient. It may be so short as not to admit of recognition, as in the occasion of a cart conveying a number of bodies to the pit dug to receive them, when, upon the jolting of the cart, a most overpowering gush of foul air proceeded from the bodies which it contained, and almost instantly struck down a person who was near it, and who died in an hour or two afterward; and the period may extend to ten or eleven days. The period has not been supposed to be longer than this by most of those who have communicated with the French Academy of Medicine on this subject.

150. *m.* That an attack of plague protects from a future seizure as certainly as an attack of smallpox, or of any other of the exanthemata, protects from a second infection. That this fact, fully proved by Dr. RUSSELL and others, has not been sufficiently recognised by several



recent experimenters ; although it is of great importance in selecting attendants on the diseased, and in our speculations as to the propagation, prevalence, and sporadic or endemic existence, of the pestilence, and as to the escape or insusceptibility of many of those exposed to it.

151. *n.* That the occurrence of infection from merchandise or goods, of any other description than clothes and bedding used by the sick, must be very rare, as the circumstances in which these can be infected by plague must necessarily be rare ; and even when clothes and bedding are contaminated, exposure for no very long period to due ventilation, especially when the air is dry and the wind is high, will be sufficient to deprive them of any infectious property.

152. *o.* That the various predisposing and accessory or determining causes of plague have not been fully ascertained, and their influence determined farther than may be inferred from what I have stated above (§ 124, 127, *et seq.*) ; and extremes of temperature, dry states of the air, and free perfilation and ventilation always either arrest or restrain the spread of this pestilence.

153. VI. MORTALITY FROM PLAGUE.—This pestilence is probably the most fatal of any to which the human frame is liable. At Marseilles, it was believed that above one half of those seized died of it ; and in certain places and institutions, the proportion of fatal cases was even higher. Thus, in the “Hôpital de la Charité,” 1013 cases were received, and 585 died. In the “Hôpital du Jeu de Meril,” 1512 persons were received, and 820 died ; and in the lowest classes the proportion of deaths was still greater. As respects the plague of London in 1665, and all the more recent outbreaks of the distemper in other cities and districts, there is no evidence that the mortality has been much less, but we have no statistical information upon which any reliance can be placed. It is very generally remarked that, at the beginning of an epidemic, although the malady is least diffused, it is the most fatal ; that, during the increase and height of the pestilence, a larger proportion recover ; and that, during the decline, the numbers attacked are much diminished, and the comparative mortality is much less. These facts may be explained on the supposition that, in the early progress of the distemper, the most predisposed to infection are first attacked, and being the most susceptible, are the most liable to sink under it ; that, as the sources of infection multiply, the less susceptible are also attacked, but are the least severely affected, and recover in greater numbers ; and that, after a certain number of weeks or months, when the distemper has been introduced among a dense population in a town or city, the least susceptible only remain to be infected ; and, if these are attacked, they are the most likely to recover, unless they are exposed to a more concentrated infectious effluvia, or have become more predisposed to a severe infection. Hence it often occurs, as noticed by Dr. RUSSELL and others, that some persons, who have been in close communication with the sick, have resisted infection until the decline of the epidemic, when they have been attacked, and even died.

154. The prevalence and mortality of plague depend much upon the numbers of those, in a district where it has been introduced, predisposed to infection. If the distemper has been frequently epidemic there, or has been lately remarkably prevalent, a considerable number of persons protected from a second attack will necessarily exist. The most susceptible of plague, as in the hæmagastic pestilence, has been said to be the young, robust, and plethoric ; but this is not fully established, especially as regards the rate of mortality among them, which has also been considered as high. The greater prevalence of the distemper among these persons is probably owing to the greater exposure to infection to which they are liable. The fact of the mortality being the greatest among the negro and dark-skinned races, whose frames are much less powerful than the Caucasian, would indicate a comparatively less mortality among those which are young and strong. The recent observations of the European physicians who have practiced in the East do not appear to confirm the opinions as to the greater liability of, and greater mortality among, robust and young persons ; indeed, there is every reason to believe that, however susceptible such persons may be of infection, at least the proportion of recoveries is greatest among them.

155. There is no datum from which any inference can be drawn as to the influence of different modes of treatment upon the mortality of the distemper, more especially during the epidemic prevalence of it among a dense population. The varying characters, severity, and complications of the disease must render any particular method of cure altogether unsuitable to some cases, although most appropriate to others ; and thus all exclusive plans or measures must be equally successful, or, rather, abortive, if universally employed. It is in this distemper, as, indeed, in all others, most manifest that the careful adaptation of the means of cure, and the varying and suitable combination of them to existing grades, states, and associations of morbid action, can alone have the effect of so controlling or arresting such action as to influence the comparative rate of mortality.

156. VII. THE NATURE OF PLAGUE.—My views of the nature of this pestilence may be inferred from what has been advanced above respecting the *occasions* and *causes* of its outbreaks, and the phenomena presented by the infected. My remarks, therefore, on this topic are merely a summary of what appears to be, as well as not to be, fully established respecting it.

157. *a.* Plague is a contagious and infectious distemper, according to the meaning attached to these words, both above (§ 58, 59), and in the article INFECTION, and in the favourable circumstances and states of susceptibility already fully insisted upon (§ 124, *et seq.*) ; and a person who has been once attacked by it is protected from a second attack, as proved by RUSSELL, WHITE, and others.

158. *b.* The infection of plague may be preserved in, and propagated by, the bedding, bed, and body clothes of those who have been attacked ; and the pestilence has been propagated by these means, in the circumstances and states of susceptibility above shown (§ 124, *et seq.*), as well as by personal communication or contact.

159. *c.* Goods, or articles of trade or merchandise, not having been used by the sick, cannot be expected to propagate the distemper in any circumstances, especially if they have been exposed to the air.

160. *d.* The infectious emanation or poison, when received into the lungs during respiration, may so depress the organic nervous energy and vital power of the frame, and so contaminate the circulating fluids, as instantly to produce manifest effects, or even to destroy life in two or three hours, when this emanation is very powerful or concentrated, relatively to the state of vital resistance. When, however, this poison is less powerful, or the infection of the frame differently produced, and when the vital resistance to its morbid impression and contaminating influence is energetic, then a more considerable period is required to develop its operation and noxious effects in a manifest and specific form; but the extreme duration of that period is not precisely ascertained, although it is generally believed not to extend to above eleven or twelve days.

161. *e.* The changes produced upon the healthy by the infecting miasm evolved from the sick are of an asthenic and septic character; and however high the vascular reaction may be, owing to the powers of the constitution—to the vital resistance opposing the poison invading and contaminating the body—there is a tendency to a dissolution of the crasis of the blood, and of the vital cohesion of the soft solids: the capillaries, the lymphatic glands, and the cellular and mucous tissues, early experiencing and manifesting the effects of these changes.

162. *f.* As the phenomena and characteristics of this distemper have been uniform during ages, and in all countries, however far apart, and wherever they have been observed, so it may be presumed that the efficient cause is also uniform and specific, reproducing its kind on all occasions, and with the power of perpetuation *ad finitum*. The distemper being specifically the same in all ages, the cause may be also considered to be of a specific kind, and to be preserved and propagated by the successive infections produced by it, as shown above (§ 103, 104); and although numerous circumstances favour a belief in the generation of this infection *de novo*, or in its spontaneity, still the evidence is not conclusive on this point, and still more numerous circumstances and considerations oppose it (§ 108, *et seq.*).

163. *g.* The characteristic changes of this malady are accompanied by various accidental or adventitious phenomena, arising out of the concentration of the exciting cause or morbid poison occasioning it, of the state of susceptibility of the recipient, and of peculiarity of temperament, constitution, and habit of body; and probably, also, out of the conditions of the digestive, assimilating, and excreting viscera at the time of infection. Hence sometimes appear, in the course of the malady, certain prominent affections, or complications, which may more or less characterize it, in addition to those which are specific and are constant. Owing to this circumstance, J. FRANK and others have divided the distemper into certain *states* or *forms*, namely, the *Simple*, the *Inflammatory*, the *Gastric*, and the *Nervous*, according to the predominance of the affections corresponding

with these designations. But this division is defective, inasmuch as the most severe and most rapidly fatal cases of the distemper are not comprised in any of the above states, the patient sinking rapidly, owing to extreme and rapidly increasing depression or annihilation of the powers of life, without vascular reaction, or prominent affection of the gastric or cerebro-spinal organs.

164. *h.* It is probable that the circumstances of locality may also modify the type or character of the febrile phenomena of plague—that on occasions of the extension of infection to places productive of emanations from marshes, &c., and at seasons when the malaria from these sources are most abundant, the infection of plague may be attended by either an intermittent or a remittent type of fever. It has been contended, when plague has appeared in such localities, and has presented more or less of a periodic fever, that the distemper has actually originated in the increased concentration or intensity of the malaria generated in these places. But there is no proof of this actually having been the case; but every reason to believe that the distemper had been introduced, and that the existing malaria had imparted to it more or less of a periodic character.

165. *i.* Although it is admitted that the foul air generated by the decomposition of animal substances, and of animal exuvie, will produce continued fevers of a malignant or putro-ady-namic character, especially when decomposition takes place in a warm, humid, and stagnant air; and although it is probable that plague may be thus generated *de novo*, still the evidence of this actually being the case is not conclusive; and we are, therefore, led to infer that, as the distemper is specific or *sui generis*, so is the infectious agent or poison which perpetuates it, however it may have originated (§ 103, 104).

166. *k.* Although the plague presents most of the characters of a malignant or putrid fever in the highest degree, it cannot, therefore, be inferred to be identical with that fever, as some writers have contended, inasmuch as it possesses certain specific signs and lesions which are not present in the latter, and which do not appear in those cases of malignant or putrid, or putro-ady-namic fever, which arise from infection.

167. VIII. TREATMENT OF PLAGUE. — The treatment of this pestilence may be said to have been hitherto altogether empirical. The great number of medical men who have, since the commencement of this century, visited the East, and practiced for many years in countries where the plague is most prevalent, have thrown no light upon the cure of it. The introduction of quinine and of the chlorides into practice, during this period, has added somewhat to the means of cure available for the distemper; but the former is merely a preparation of a substance previously in general and even beneficial use in most cases of this pestilence, and the latter has not always been employed in such modes and combinations as are calculated to show the full amount of their virtues. Even popular remedies, such as olive oil, have not received that attention from European physicians which their reputation among the Arabian doctors might have excited. Indeed, the perusal of accounts



of the numerous means resorted to against this distemper, from the beginning of the sixteenth century down to the present day, leaves the humiliating and lasting impression on the mind, of the very inefficient and contemptible nature of most of them, when we compare what is known of the operation of these means upon the economy, with the obvious nature and remarkable severity of the changes characterizing the distemper. It must be most manifest to all who endeavour to combat the changes and morbid conditions constituting a malignant disease, and who attempt to employ agents appropriately to pathological states inferred to exist, that those agents should neither be doubtful as to their operation, nor be of a trifling kind as to their effects—that they should possess energetic and determinate properties, and be employed so as to produce a decided operation; and that the activity and the combinations of the means should be directed with strict reference to the remarkable depression of vital power throughout the frame, and to the poisoned condition of both fluids and soft solids characterizing this malady. But have the means employed against this pestilence possessed these attributes, or been prescribed with due reference to morbid conditions, or in those modes and combinations which could rationally admit of any hopes of a beneficial result from their exhibition? I can safely answer that, in 99 cases out of 100, where the means resorted to have been described in connexion with the states of the case for which they were prescribed, that no such hopes could be rationally entertained, and that, if any advantage actually did accrue, it was due to the efforts of nature, to the innate vital resistance to morbid changes, and not to the agents employed. Of the treatment of plague, the most important part is that which relates to the *protection of the community from its introduction, and of individuals from its infection, after it has been introduced.* This will, however, be discussed in the sequel, when considering the means of protection applicable to this and the other pestilences (*see PESTILENCES, GENERAL AND INDIVIDUAL MEANS OF PROTECTION FROM*); and I now proceed to discuss the *curative treatment of this distemper.*

168. *i. CURATIVE TREATMENT OF PLAGUE.*—I have sufficiently insisted, in the foregoing pages, on the necessity of removing all affected by malignant diseases into a pure air, and into a large, well-ventilated apartment, whenever this can be accomplished; and it is the more especially required for cases of this pestilence, and more particularly for those attacked in close, crowded, and low situations. But this removal should be effected with a due regard to the protection of the healthy, and to the limitation of the pestilence. Persons who have already had the disease should be employed about the sick in preference to others, and personal cleanliness should be strictly enforced. There is nothing which tends more, as regards not only this, but also the other pestilences, to increase the infectious property, than the use of soft beds, especially those stuffed with wool or feathers, of woollen bed-clothes, and the neglecting frequently to change the night and inner body-clothes. There is every reason to believe that the entire disuse of bedding and coverings, consisting chiefly of woollen or other animal ma-

terials, in countries liable to outbreaks of pestilential distempers, would tend much to prevent the diffusion of infection.

169. *A.* At the commencement of an attack, *emetics* have been much recommended both by the older and more recent writers. M. AUBERT states that, in the more benign cases, they were always followed by an abatement of the symptoms, and generally by recovery, which would take place without farther treatment, but then convalescence was prolonged; that he never observed any unpleasant effects from them in any circumstances; and that, in the more dangerous cases, the progress of the distemper was often arrested for a time by them, thereby giving time to act, and the patient was not weakened by them, as by bleeding. He, therefore, regards emetics as most beneficial early in the disease, in all cases. M. AUBERT, however, offers no remarks as to the emetics which should be preferred. But it is obvious, from the nature of the malady, that a preference ought to be given to those which are least likely to lower the powers of life, and that these should be conjoined with stimulants, or warm aromatics. Thus, *sulphate of zinc* may be prescribed with capsicum, camphor, ginger, cinnamon, &c., and *ipccacuanha* either with these, or with ammonia and aromatics. Dr. HODGES very justly remarks, that the dose of the emetic should be large enough to operate soon, and to evacuate the stomach completely; that it ought to be given only in the infancy of the distemper, and not when the stomach has been freely evacuated by the retchings which often accompany the more full development of the malady, and that antimonial preparations are not advisable.

170. *B. Blood-letting* has been considered injurious in the plague by the great majority of both old and modern writers. SYDENHAM, DOVER, and a few others have, however, advised large blood-letting; but the former possessed not the experience of his contemporary HODGES, who strongly opposes this practice; and the disease for which DOVER employed copious bleedings was not the true plague. HODGES observes, with much justice, that "if the authority of the ancients, as well as the experience of the moderns, have any weight, and, indeed, if my own practice may be regarded, it is highly to be feared, from many instances, that bleeding in a genuine pestilence is not only to be suspected, but charged as pernicious." MM. AUBERT and RIGAUD had recourse to blood-letting in Europeans, for whom they believed it to be sometimes of use; but they considered it as generally injurious in the Arab constitution. M. DULONG states, that the violence of the fever, and the imminent congestion of some important organ, induced him to have early recourse to venesection, and sometimes even to repeat it. Generally an amendment immediately followed the operation, but it was of short duration, and he rarely obtained any signal advantage from the practice. He, however, found the application of *leeches* behind the ears, when the head was prominently affected, or upon the epigastric region, when the digestive organs were remarkably disordered, to be of considerable service.

171. MASSARIA believed that blood-letting was beneficial in the plague of Vicenza in

1576; and he was considered by his contemporaries as a great authority. Opinions, however, greatly preponderate against this practice; yet, in some cases, especially among the nations of northern and temperate climates, in young, robust, and plethoric persons, and in the sanguine temperament, a moderate vascular depletion, early in the distemper, may be of service, and may dispose the system to be more readily influenced by diaphoretic and restorative remedies. In cases such as these, SYDENHAM recommended venesection to a large amount, and even to be repeated; but, when he found the practice opposed by the patients and their friends, he confined chiefly in a moderate blood-letting, and followed it immediately by full and frequent doses of warm diaphoretics.

172. *C. Sudorifics* appear to have received the favourable testimony of almost all writers on this pestilence. DIEMERBROECK, VAN DER HOYDE, SYDENHAM, ORRÆUS, RUSSELL, CHENOT, PUGNET, DESGÉNNETTES, and many others, trusted chiefly in them, selecting those of a warm and stimulating kind.—*a.* Dr. HODGES remarks, that all authors and practical physicians agree in this, namely, to throw out the pestilential poison as soon as possible by warm sudorifics, or *Alexipharmics*, according to the nomenclature of the day. It would be of little advantage to notice the numerous and very diversified substances which he recommends for this purpose; but among these are to be found some of the most energetic substances which are employed at the present day. He adds, "that recourse should be speedily had to these remedies as to a sacred refuge; and there is such plenty of them, that nature seems to have had more than an ordinary indulgence and forecast in providing them against this destructive enemy of mankind." Of these remedies, he considered the *Virginian Snakeroot*, with much justice, "the most efficacious diaphoretic and Alexipharmic for expelling the pestilential poison." And the next place he believed to be due to the *Contrayerva-root*, which, as well as the snakeroot, he combined with a number of other vegetables of a stimulating and aromatic nature, in every conceivable form—in powder, electuary, infusion, decoction, &c.

173. *b.* Of *mineral sudorifics*, there is none so safe and efficacious as the one first introduced into practice by MINDERER, and so long known by his name—the Spirit of Minderer, or *liquor ammoniæ acetatis*; and, when given with the ammonia very considerably in excess, it is more to be depended upon—more febrifuge and diaphoretic, especially in all low, pestilential, and exanthematous fevers, than any other medicine with which I am acquainted. In all these maladies, and especially in plague, it may be conjoined with the infusion of *serpentaria*, or with the decoction of bark, or with camphor, or with all these, when the powers of life are much depressed, and unable to resist the poisonous tendency of the infection on the frame: but in such cases the ammonia should be also greatly in excess, unless the urine indicates an ammoniacal tendency, when the aromatic acetic acid may be substituted, and it be allowed to be in excess.

174. *c.* Many years ago, frictions of the surface with warm olive oil was much recommend-

ed by BALDWIN and others in the treatment of plague, with the view of promoting a copious sweat, which seldom failed of supervening. The practice was common in the East from the earliest times; and the oil was also taken internally with the belief of its possessing both prophylactic and curative properties. Several experienced writers are much in favour of it, and the evidence is very conclusive as to its diaphoretic operation when employed externally; but it is by no means so as to its curative influence, yet even in this way it appears sometimes to have been of use. Mr. JACKSON, in his account of the very destructive plague which was introduced into Morocco in 1799, recommended it to many, both as a preventive and as a cure; and he states in both characters it was eminently successful.

175. *D. Purgatives* have been found generally injurious by most writers on this pestilence. BOCKEL states that they were remarkably so in the plague of Hamburg in 1565; and PALMARIUS, DIEMERBROECK, and RUSSELL, as well as most recent authors, have been equally decided in the reprobation of them. It is evident, however, that the moderate evacuation of the morbid secretions and excretions is not so much dreaded by them as the disposition existing in most cases of the distemper to diarrhœa, and the difficulty of limiting the operation of purgatives to a moderate evacuation, and of preventing inordinate and exhausting discharges from the exhibition of them. It must be obvious that the evacuation of accumulated secretions and excretions from the bowels, and the prevention of any collection of these, are most important objects in the treatment; but they should be attempted by such mild agents as are most readily controlled, and the least liable to excite irritation, in the weakened and already irritable intestinal mucous surface. It is extremely probable, that olive oil, when used internally as well as externally, produces a mild demulcent, or soothing, as well as laxative effect on the bowels, without occasioning an operation of an exhausting kind, or one which is not readily restrained by the other remedies usually employed against the malady. Although much employed as a popular remedy, it has not received that attention from the regular members of the profession which I think that it deserves, from my knowledge of its effects in several other diseases. Judging by analogy, and guided by other considerations, I would advise the occasional combination of the *oleum terebinthinæ* with this oil, and the exhibition of it both by the mouth and in enemata, according to the circumstances of the case; guarding, at the same time, their action by means of aromatics, spices, and small doses of opium, or of camphor with opium.

176. *E. Stimulants, tonics, and antiseptics* have been generally employed against plague, and are more applicable to it than to any other malady. Indeed, I much doubt the propriety of withholding them in any state or stage of the distemper whatever, even where vascular excitement appears the most violent. The vascular reaction often occurring at an early period of the malady is of that open and expansive kind which indicates greatly reduced vital power in connection with morbid action; and it will certainly be found that no more in



this distemper than in other malignant diseases similarly characterized, can this action be subdued without restoring, as far as may be, vital power, and enabling it to resist those changes by which this action is excited and perpetuated. In fact, the same principles, upon which I insisted when discussing the treatment of the *hamagastric pestilence* (§ 178, *et seq.*), should also be adopted in this. Even in cases of the most violent vascular action, and when it may be prudent to have recourse to a moderate or full blood-letting, the stimulating diaphoretics already noticed, with full or even large doses of the *sesquicarbonate of ammonia*, or of *camphor*, or of the *sulphate of quinine and camphor*, should be prescribed as frequently as the urgency of the case may require. Sir A. BROOKE FAULKNER states that in two instances a large quantity of *spirits of turpentine* and of *camphor* were taken by mistake, and that both recovered.

177. *a.* The remarkable loss of tone throughout the vascular system, in this as well as in the preceding distemper, prevents the vessels from accommodating themselves to the quantity of blood in the system, and creates a demand upon the heart to support the circulation by means of greatly increased action; hence, in the great majority of such cases, even a moderate blood-letting is often detrimental, inasmuch as it still further increases the loss of that due correspondence which should exist between the state of the blood-vessels and the amount of blood circulating in them, unless, indeed, the depletion be immediately followed by the exhibition of stimulants or tonics; and of those, the most to be depended upon are *camphor*, *quinine*, *ammonia*, with or without the *liquor ammonia acetatis*, the preparations of *serpentaria*, or of *arnica*, the *hydrochloric ether*, &c. Of all these, *camphor* and *ammonia* are the most generally of service; and the former is congruous with any other remedy which may be employed; but it should be prescribed in full or in frequent doses. The *sulphate of quinine* has been very favourably mentioned by most recent writers; but it has only taken the place of the *cinchona bark*, which was formerly much used in this distemper, with *serpentaria*, *ammonia*, and other stimulants. It will be found that the combination of the *quinine* with *camphor* and *capsicum*, and the exhibition of all three in full doses, will prove most decidedly beneficial, especially during the earlier stages of the malady.

178. *b.* When *irritability of stomach* prevents the due exhibition of stimulants or tonics, or the retention of them, an *epithem* of warm spirits of turpentine should be applied over the epigastrium; and this will generally allay the retchings, if it be properly applied, and remarkably aid in bringing out and promoting a most copious perspiration. In this state of the distemper, which J. FRANK denominates the *gastric form*, effervescing draughts are generally grateful. Dr. RUSSELL is in favour of the use of these, but those of the carbonate of ammonia, with either the citric or the acetic acid, the ammonia being considerably in excess, should be preferred; and such restoratives and antiseptics as the circumstances of the case may suggest be prescribed, from time to time, and chiefly in enemata when the stomach still

continues irritable. About a drop of *creasote* may be given with each dose of the medicines; and several drops of this substance may be added to the enemata, especially when diarrhoea is present.

179. *c.* At an *advanced stage* of the distemper, or from the commencement of the attack in cases presenting much depression and other signs of inalignancy, the more energetic stimulants and tonics recommended for similar states of the *hamagastric pestilence* (§ 179, *et seq.*) may be resorted to, as being quite appropriate to these cases. Indeed, whenever vital depression is very remarkable, the stimulants prescribed ought to be such in kind and quantity as will produce an immediate effect; and the selection of them should be guided by the previous habits and circumstances of the patient. Several of the stimulants in more general use are also *antiseptics*, and these should be given in full, and even large doses, especially those mentioned above (§ 176, *et seq.*). But they ought not to be deferred until a too far advanced period of the disease, but should be prescribed early, especially in the more malignant or septic cases, and given in decided doses and in efficient combinations. It does not appear, from the recent works on plague, that the *chlorides* have been employed in it in such a manner as fully to test their efficacy, and in such combinations as are most likely to prove beneficial. The most appropriate of these is probably the *chloride of lime*, conjoined with *camphor*, aromatics, and opiates. The *chlorate of potash* also promises to be of service, especially when prescribed in stimulating or tonic infusions or decoctions, particularly the infusion of *cusparia*, or of *serpentaria*, or of *cloves*, or of *valerian*, or the decoction of *cinchona*, or of *scnega*, or *tormentilla*, and with various other restoratives and aromatics. The *hydrochlorate of ammonia* was formerly much employed in low fevers; it is equally suitable for this malady, and it may be taken with any of the substances just mentioned, in as large doses as the stomach will tolerate, or from ten to twenty grains. Its good effects will generally be promoted by the addition to each dose of from half a drachm to a drachm of the *hydrochloric ether*. Various formulæ for the medicines recommended at this place will be found in the APPENDIX, more especially *Form.* 385, 387, 388, 409, 416, 431, 437, 439, and 848, which may be prescribed in quantity and frequency of dose according to the severity of the disease.

180. M. AUBERT states that he gave *phosphorus* in many cases of this distemper; but it does not appear that any decided benefit was derived from it. The formula for it in the *Appendix* (428) is a suitable mode of employing it in this disease. This physician mentions a new medicine, called *hachisch*, which he considers of great efficacy in this malady. He furnishes no information as to the nature of this substance, but states that several cases recovered by its aid, which he considered altogether hopeless before it was administered. He gave it in doses of one, two, or three drachms in coffee; and it appears to have had a stimulating and exhilarating effect.

181. *F.* At the commencement of the present century, the *affusion of cold water over the surface* was considered the most successful and

most generally appropriate remedy in all fevers, especially those of a severe or malignant form. Experience has shown the very exaggerated estimate then formed of this practice. It was at that time recommended for plague as well as for other pestilential maladies; but observation and reflection have shown that, unless where the vascular reaction was high, and the heat of the surface was much increased, and at the early period of reaction, the practice was sometimes injurious, and often of doubtful advantage. I can find no evidence of its having proved of service in this distemper; although it is probable that it may, in those cases which are characterized by more violent vascular reaction, and which have, from this circumstance, been by some viewed as presenting an inflammatory character, advantageously precede the frictions of the surface with olive oil (§ 174) that have generally been found so beneficial in bringing out a copious perspiration.

182. *G.* The very general recourse which was formerly had to *mercurials* in the cure of fevers by British physicians, more especially to *calomel*, was extended also to the plague; but the diarrhœa, which is so apt to come on in the course of the malady, restricted their use; and their effects, in any form, appear to have been equivocal. The trials, however, made of them by Mr. STAFFORD, as related by Sir B. FAULKNER, seem to indicate that they deserve a farther and a more satisfactory trial. Calomel and mercurial inunction were the means employed, with the view of producing their specific effects. They have been, also, recommended by SCHREIBER, FORMAY, SCHRAUD, and others; but, as OLIVIER has observed, the system resists the specific effects of all mercurials in the severe cases, and the slight cases do not require a recourse to them. If calomel should be employed, it ought to be conjoined with opium and aromatics, to prevent it from disordering the bowels; and even when thus combined, this effect may nevertheless ensue.

183. *H. Diarrhœa* is one of the worst symptoms which occur in the course of the distemper, and is generally controlled with great difficulty, especially when it appears at an advanced stage. At an early period, *opium*, conjoined with camphor, creasote, and aromatics, will frequently restrain it; but the more active *astringents*, conjoined with *antiseptics*, will often be required, more especially the *chloride of lime*, the *sulphate of zinc*, conjoined with *catechu* or *kino*, &c., and with opiates. These substances should also be administered in enemata.

184. *I.* The treatment which has been fully described as most beneficial in the hæmagastrie pestilence is in most respects suitable to this, the several means of cure being varied according to the form which the malady assumes. Many of the distinctions, however, which have been pointed out by writers will hardly be made out in practice; and, though they may be prominent in some cases, they will hardly appear in others. It will be sufficient for the physician to bear them in mind, to adapt his measures to the features of each case which may come before him, whether *inflammatory*, *nervous*, *gastric*, *putrid*, or *septic*, according to the views of various writers; to act upon pathological principles; and to employ his remedies conformably with their ascertained effects.

185. *K.* As to the *local treatment* of the *booes* and *carbuncles*, little farther is required than the application of poultices, fomentations, or emollients, as their states may require. When matter or other fluid accumulates, an exit should be given to it, in order to prevent the contamination of the adjoining tissues, and a healthy suppuration ought to be promoted. Subsequently the healing process may be encouraged by means of such digestive and gently stimulating applications as the cases will suggest. The condition, however, of these sores will be much more efficaciously controlled by the internal or constitutional treatment than by local applications; and in most cases it will be necessary to support the powers of life, when the external lesions are considerable, in order that the process of restoration may go on satisfactorily.

186. *L.* The *diet* and *regimen* of the patient should be the same in this as in other fevers. Indeed, the diet and regimen which are suited to this pestilence are also suitable for the others, especially the *hæmagastrie*. At an early period of the attack, especially when febrile reaction is considerable, and the disease assumes that form which has improperly been denominated the inflammatory, owing to the vital resistance and vascular disturbance, simple diluents, and refrigerant and diaphoretic drinks, are the most serviceable; but in a more advanced stage, or in more protracted cases, and where the vital powers are depressed, a more restorative diet may be allowed, as chicken, veal, or mutton broths, beef tea, &c., which may be taken with sufficient salt and spices to render them palatable; and as the distemper advances, and vital depression increases, wine, brandy, or liqueurs may also be taken, diluted in various ways, or in arrow-root or sago. In this distemper, as well as in the hæmagastrie, hock or sherry, with Seltzer-water, Champagne, brandy in the warm infusion of black or green tea; the bitter Hungarian and Austrian wines; milk or green tea punch; the yolk of an egg beat up in brandy and water or sherry; various kinds of jelly, &c., may be severally given, according as the circumstances of the case will suggest to the physician a guarded recourse to them. There is every reason to believe that in this malady, as well as in other low fevers, the use of these and similar dietetic restoratives is often too long deferred, and that the cravings of the patient for them are very improperly unheeded. In the diet and regimen, as well as in the medical treatment, of patients in low or malignant fevers, the physician has been too often guided by prevailing theories and doctrines, instead of proceeding warily in the path of close observation and sound common sense. With these as his guides, while he endeavours to fulfil the intentions rationally inferred from recognised states of morbid action or of altered structure, the physician will generally act safely and efficiently; and will produce as successful results in this as in other distempers, as can possibly be produced by the limited amount of human means and of human intellect.

187. *M.* The *management of convalescence* should depend upon the circumstances in which the patient is placed, and be ordered accordingly. The chief points which require attention



are the enjoyment of a pure air and due ventilation; suitable diet; and the due promotion of the several digestive and excreting functions. During this period, care should be taken that the extent of the external sores, or the amount of the discharges from them, should not exhaust the patient, or cause a too protracted recovery. The constitutional powers, in such circumstances, often require the aid of both medical and dietetical restoratives; and these should not be timidly withheld, or too profusely allowed. At this time a healthy atmosphere is remarkably beneficial; and as soon as the patient can bear removal to a different air, the change will prove the greater restorative; but this must be done with due precautions and regard to the health of the uninfected.

BIBLIOG. AND REFER.—*H. Stainhovel*, Regiment der Pestilenz, 4to. Ulm, 1482.—*A. Benedetti*, Liber de Observatione in Pestilentia, 4to. Venia, 1493, and folio, Bologna, 1516.—*P. de Bayrus*, Questio nova de Peste, 12mo. Taur., 1507.—*J. Vochs*, De Pestilentia Anni Presentis ejusque Cura, 8vo. Magd., 1507.—*F. Bernardus*, Tract. de Origine et Causis Morbi Pestilentis, 4to. Colon., 1518.—*J. Schillerus*, De Peste Britannica Comment., 12mo. Basil, 1580.—*J. B. Gemma*, De Vera Ratione Curandi Bubonis Carbunculisque Pestilentis, 4to. Dant., 1549.—*T. Gibson*, A Treatise behovefull to preserve the People from Pestilence, 4to. Lond., 1536.—*N. Massa*, De Febri Pestilentiali, ac Peteehiis, Variolis, et Apostematibus Pestilentialibus, ac eorumdem Curatione, &c., 4to. Venia, 1536, 1556.—*G. Gratarolo*, Pests Discriptio, 8vo. Lyon., 1555, 12mo. Paris, 1561.—*J. Dalechamps*, De Peste, libri tres; et *R. Chahin De Vinario*, Liber de Peste, 12mo. Lyon., 1553.—*G. Agricola*, De Peste, Libri quinque, 8vo. Bâle, 1554.—*B. Landi*, De Origine et Causa Pests Patavinae, Ann. 1555, 8vo. Ven., 1555.—*V. de Boungente*, Decem Problemata de Peste, 8vo. Ven., 1556.—*A. Gallus*, Fase, de Peste et Peripneumonia cum Sputo Sang. Febri Pestilentiali, &c., fol. Brescia, 1565, et 12mo. Francf., 1608.—*J. Houllier*, De Morb. Curatione, de Febribus, de Peste, &c., 8vo. Paris, 1565.—*T. Beza*, Tract. de Peste, 12mo. Ludg., 1565. Translated into English by *J. Stockwood*, 8vo. Lond., 1580.—*L. Joubert*, De Peste Liber, &c., 12mo. Lyon., 1566.—*O. de Oddis*, De Peste, et Pestiferorum Adfectuum omnium Causis, Signis, Precautione et Curatione, Libri iv., 4to. Venet., 1570.—*B. Patinus*, De Venenis, Sive Morbis Pestilentialibus, 8vo. Brix., 1572.—*B. Pisanelli*, Discorso Sopra la Peste, 4to. Roma, 1572.—*J. P. Ingrassias*, Informazione del Pestifero e Contagioso Morbo, il quale affligge ed ha afflittito la Città de Palermo, e molte altre Città e terre del Regno di Sicilia, nell'Anni 1575 et 76, 4to. Palermo, 1576.—*J. Bokelius*, De Peste Hamburgensi, 12mo. Hurricop., 1577.—*C. Johnson*, Counsell against the Plague, 8vo. Lond., 1577.—*T. Brasbridge*, The poor Man's Jewel, a Treatise on the Pestilence, 8vo. Lond., 1578.—*A. Perez*, Tratado de la Peste y sus Causas, 8vo. Madr., 1598.—*J. Bamford*, A short Dialogue concerning the Plague's Infection, 8vo. Lond., 1600.—*J. Mercurialis*, De Pestilentia in Universum, præsertim de Veneta et Patavina, 4to. Venet., 1577, et 4to. Leyd., 1601.—*G. Potel*, Discours des Mal. épidémiques ou Contagieuses Advenues à Paris en 1596, 1597., 1606, et 1607; comme aussi en 1619, 8vo. Paris, 1623.—*J. Palmarius*, De Morbis Contagiosis, Libri vij. Paris, 1577.—*A. Massaria*, De Peste, Libri ij., 4to. Venet., 1579.—*J. Camerarius*, Synopsis quorundam brevium, sed perutilium Comment. de Peste Clariss. Vir. *Donzellini*, *Ingrassia*, *C. Rincii*, et post hoc sui ipsius eadem de fide Scripta in lucem retulit, &c., 8vo. Nurem., 1583.—*F. Alesandri*, Trattado della Peste e Febbri Pestilenti, 4to. Torino, 1586.—*P. Alpinus*, De Medicina Ægyptiorum, Libri iv. Veneta, 4to, 1591; lib. i., cap. xiv-xlvij.—*R. de Castro*, Tract. brevis de Natura et Causa Pests quæ, Anno 1596, Hamburgensem Civitatem afflixit, 4to. Hamb., 1596.—*T. Lodge*, A Treatise of the Plague, 4to. Lond., 1603.—*J. Godskall*, King's Medicine for the Plague, 8vo. Lond., 1604.—*A. Gallus*, Fascis Aureus de Peste, 12mo. Francf., 1606.—*G. Garnevus*, *Entrop*, &c., De Peste quæ Grassata est Venetiis, Anno 1576, &c., 12mo. Brunt., 1610.—*F. Rondinelli*, Relazione nel Contagio Stato in Firenze l'Anno 1630 et 1633, 4to. Florence, 1634.—*D. Senner*, De Peste, Pestilentialibusque ac Malignis febribus. In Opp. Omnia. T. V. Lib. iv., 4to. Francf., 1634.—*M. A. Rota*, De Peste Veneta, Anno, 1630, 4to. Veneta, 1634.—*J. Ripamonti*, Libri v. de Peste quæ fuit Anno 1630, in Urbi Mediolanensi, 4to. Milan, 1631.—*J. De Lemprière*, Traité de la Peste, de ses Causes, &c., 8vo. Rouen, 1620.—*Th. Thayne*, An excellent and best-approved Treatise of the Plague, 4to. Lond., 1625.—*W. Roraston*, A Treatise of the Pestilence, 8vo. Lond., 1630.—*R. Lygonet*, Loimo-

graphia seu Reconditarum Pests Cnusrum Curiosa Disquisitio, 8vo. Lion., 1639.—*J. Woodfall*, The whole Works of, containing a Treatise on the Plague, fol. Lond., 1639.—*S. Bradwell*, Physik for the Sicknesses called the Plague, 4to. Lond., 1636.—*J. de Diemerbroeck*, De Peste, Libri iv., 4to. Arnh., 1646, et Amsterd., 1665.—*Van Helmont*, Tomulus Pests, 4to. Amsterd., 1648.—*P. de Castro*, Pests Neapolitana, Romana, et Genuensis, Ann. 1656 et 1657. Fidei Narratione delineata, &c., 12mo. Verona, 1657.—*L. Giesseler*, Observat. Medicæ de Peste Brunsvicensi, Ann. 1657, 4to. Brunsw., 1665.—*J. B. Bindl*, Loimographia see Hist. Pests Contagiosa, 4to. Roma, 1658.—*Anon.*, Certain necessary Directions concerning the Plague, 4to. Oxf., 1665.—*Anon.*, Golgoth, or a Looking-glass for London, showing the Causes, &c., of the Plague, 4to. Lond., 1665.—*J. Gadbury*, London's Deliverance predicted, showing the Causes of the Plague, &c., 4to. Lond., 1665.—*T. Garencieres*, A Discourse concerning the Nature of the Plague, 4to. Lond., 1665.—*T. Sydenham*, Febr. Pestilent. et Hodie, Ann. 1665, 1666; Opera Medica, sect. ii., cap. 2.—*N. Hodges*, *Λοιμολογία*, sive Pests nuperæ apud Populum Londinensem grassantis, Narratio Historica, 8vo. Lond., 1672; transl. by Quincey, with additions, 8vo. Lond., 1720.—*G. Harvey*, A Discourse of the Plague, 4to. London, 1665.—*W. Kemp*, A Treatise of the Nature, Cause, Signs, and Cure of the Pestilence, 4to. Lond., 1665.—*W. Austin*, The Anatomy of the Pestilence, a Poem, 8vo. Lond., 1666.—*G. Thomson*, *Λοιμογραφία*, or the Pest Anatomized, 12mo. Lond., 1666.—*P. Barbette*, Tract. de Peste, cum Notis, *F. Dickeri*, 12mo. Lond., 1667.—*E. Gockel*, Enchiridion de Peste, &c., Aug. Vin., 8vo. 1669.—*L. J. Bimus*, Pests ad Vivum delineata et Curata, Leod. Eb., 12mo. 1671.—*J. J. Quattrou*, Traité de la Peste, de la Difference de la Pourpre, la Petite Verole, et la Peste, 8vo. Paris, 1671.—*C. La Font*, Dissert. duæ de Veneno Pestilenti, 12mo. Amst., 1671.—*H. Brunswick*, Liber Pestilentialis, Buch der Vergift der Pestilenz, fol. Strasb., 1700.—*L. Pereira de Beinterna*, Loimologia, sive Historia Constitut. Pestil. Ann. 1708, 9, 10, 11, et 13, per Thraciam, Sarmatiam, Poloniam, Silesiam, Daciam, Hungariam, Livoniam, Danim, Sueciam, Saxoniam, Austriam, varique loca grassante, &c. Viena, 1714.—*J. B. Werlosching*, a *Parenberg*, Loimologia, seu Hist. Pests quæ ab Anno 1708 ad 1713 inclusive, Transylvaniam, Hungariam, Austriam, &c., aliasque Continentum Provincias et Urbes, prægradiendo depopulabatur per Epistolas ex Autopsia et Experientia propria medica exarata. Styria, 1716.—*J. C. Gottwald*, Memoriale Loimicum de Peste Dantiscana, Ann. 1709; Dantziak, 1710.—*M. Stoeckel*, Anmerkungen bey der Pest, die Ann. 1709, in Dantziak Grassante. Hamb., 1710.—*J. Browne*, Practical Trent. of the Plague and all Pestil. Affect. that have happened in this Island for the last Century, 8vo. Lond., 1720.—*Anon.*, The Causes of the Discontents in relation to Plague, 4to. London, 1721.—*R. Mead*, A short Discourse concerning Pestilential Contagion, 8vo. London, 1720.—*Anon.*, Some Observat. on the Plague, occasioned by Dr. Mead's Discourse, 8vo. Dubl., 1721.—*Anon.*, Collection of valuable and scarce Pieces relating to the Plague of 1665, 2d ed., 8vo. Lond., 1721.—*J. Browne*, Antidotaria, a Collection of Antidotes against the Plague and other Malig. Diseases, 8vo. London, 1721; Considerations on the Nature, Causes, and Cure of Pestilences, by a Freethinker, 8vo. London, 1721.—*R. Blackmore*, A Discourse on the Plague, with an Account of Malignant Fevers, 8vo. Lond., 1721.—*Anon.*, A Succinct Account of the Plague at Marseilles, 8vo, 1721.—*Anon.*, A brief Journal of what passed in Marseilles, afflicted by the Plague in 1720, 8vo. Lond., 1721.—Peste de Marseilles et Provence; Pièces Historiques sur la, en 1720, 21, et 22, 8vo. 2 tomes; repub. Paris, 1820.—*J. Astruc*, Sui l'Origine des Maladies épidémiques, principalement de la Peste, 8vo. Montp., 1721.—*J. B. Bertrand*, Relat. Histor. de la Peste de Marseilles, en 1720, 12mo. Col., 1721.—*R. Boulton*, A Treatise on the Plague, 8vo. Lond., 1721.—*R. Bradley*, The Plague at Marseilles considered, 8vo. London, 1721.—*R. Brookes*, A History of the most remarkable Pestilential Distempers that have appeared in Europe for Three Hundred Years past, 8vo. London, 1721.—*Chicoynneau*, Observat. et Reflex. touchant la Nature, les Evenemens et le Traitement de la Peste de Marseilles, 12mo. Lyons and Paris, 1721.—*W. Henley*, Loimologia Sacra; A Discourse on the Plague, 8vo. Lond., 1721.—*B. Ramazzini*, De Peste Viennensi, vide Opera.—*T. X. Benza*, Relatio Historica Pests Austriam niquando Vastantis, 8vo. Vien., 1717.—*E. Timon*, De Peste Constantinopoli grassanti. In Philosop. Trans. Anno 1720, p. 14.—*Chicoynneau*, *Verney*, and *Soulier*, A Succinct Account of the Plague at Marseilles, translated by a Physician, 8vo. Lond., 1721.—*G. Pye*, Two Discourses of the Plague, 8vo. Lond., 1721.—*Anon.*, A new Discovery of the Nature of the Plague, and the true Causes of its raging in European Cities, with the Remedy, 8vo. London, N. D. (about 1721). Generated and propagated by minute insects).—*J. Pringle*, Rational Inquiry into the Nature of the Plag., 8vo. Lond., 1722.—*C. Scarborough*, Practical Method for the Cure of the Plague in 1665, 8vo. London, 1722.—*R. Mead*, De Peste Liber, 8vo. Lond., 1723.—*J. Astruc*, Dis-

sert. sur la Contagion de la Peste; ou l'on prouve que cette Maladie est véritablement Contagieuse, &c., 8vo. Toulon, 1724.—*J. Boecier*, Recueil des Observat. qui ont été faites sur la Maladie de Marseilles, 4to. Strasb., 1726.—*D. W. Triller*, De Carbone Pestilenti Epistolæ, 4to. Uratisl., 1736.—*J. F. Schreiber*, De Peste quæ Annis 1738 et 9 in Ukraina Grassata est, 4to. Petr., 1741.—*W. U. Waldschmidt*, De Peste Ilosatica. In *Halleri Disput. Med.*, vol. v., p. 547.—*R. Goodwin*, An Historical Account of the Pl., &c., 12mo. Lond., 1743.—*Anon.*, The Plague no Contagious Disease, 8vo. Lond., 1744.—*T. Lobb*, Letters concerning the Plague, 8vo. Lond., 1745.—*O. Turriano*, Memoria Historica del Contagio della Città di Messina dell' Anno 1743, 12mo. Naples, 1744.—*D'Autrechaux*, Relation de la Peste de la Ville de Toulon. Toulon, 1721, 12mo. Paris, 1756.—*M. Mackenzie*, Several Letters concerning the Plague at Constantinople; in the Philosophical Transactions for the Year 1752, p. 354-514, 1764, p. 69.—*W. Hird*, Remarks on Pestilence and Pestilential Diseases, 8vo. London, 1753.—*D. Ingram*, An Historical Account of the several Plagues since 1346, 8vo. London, 1755.—*R. Manningham*, A Discourse concerning the Plague and Pestilential Fevers, 8vo. Lond., 1758.—*A. Bruce*, Inquiry into the Cause of Pestilence, &c., 8vo. Edinb., 1759.—*F. L. Meltzer*, Beschreibung der Pest., 1770-72, in Moscau, 8vo. Moscov., 1776.—*A. Chenot*, Tract. de Peste, 8vo. Vienna, 1766; et Historia Pestis Transylvania, &c., Annis 1770, 71, opus posth. edict. *F. de Schraud*, 8vo. Bude, 1799.—*De Hacu*, In Rut. Med., Part. xiv., sect. 2, 1770.—*Samoilowicz*, Memoire sur la Peste qui, en 1771, ravagea l'Empire de Russie, surtout Moscou, &c. Paris, 1783.—*C. de Martens*, Observat. Medicæ de Febribus Putridis, de Peste, Nonnullis aliis Morbis, 8vo. Vienna, 1778; Translated by *G. Pearson*, 8vo. London, 1799.—*G. Orvius*, Descriptio Pestis quæ Anno 1778 in Jassia, et 1771 in Moscu grassata est, 8vo. Petersb., 1784.—*G. Bajamonti*, Storia della Peste che regno in Dalmazia, 1763-4, 8vo. Venez., 1785.—*W. Henderson*, A few Observ. relative to the Things which are probable respecting the Plague, 8vo. Lond., 1789.—*J. M. Minderer*, Comment. de Peste, eique medendi Methodo in ratione et Experimenta fundata, 4to. Riga, 1789.—*P. Russell*, A Treatise on the Plague, containing an Account of the Plague of Aleppo, 4to. Lond., 1791.—*J. Antes*, Observat. on the Manners, &c., of the Egyptians, and on the Plague, 4to. Lond., 1800.—*J. Tytler*, A Treatise on the Plague and Yellow Fever, 8vo, 1799.—*J. V. von Hildenbrand*, Ueber die Pest, &c., 8vo. Wien., 1799.—*J. P. Pagon*, De la Peste, ou Epouques mémorables de ce Fléau, 2 tomes, 8vo. Paris, 1800.—*N. Webster*, A brief History of Epidemical and Pestilential Diseases, 2 vols., 8vo. Lond., 1800.—*W. Falconer*, An Essay on the Plague, 8vo. Bath, 1800.—*G. Sotira*, Mémoire sur la Peste Observée en Egypte, 8vo. Paris, 1802.—*Savarez*, Mémoire sur la Peste, &c. Dans son Recueil de Mémoires Physiques et Médicaux sur l'Egypte, 8vo. Paris, 1802.—*J. Larrey*, Mém. sur la Peste, &c.; dans Mém. de Chirurg. Milit., t. i., p. 316.—*R. Wilson*, Hist. of the Brit. Exped. to Egypt, 4to, 1803.—*J. Mac-Grigor*, Medical Sketches of the Expedition to Egypt from India, 8vo. Lond., 1804, p. 100.—*R. Desgenettes*, Histoire Médicale de l'Armée d'Orient, 8vo. Paris, 1802.—*P. Assalini*, Observat. on the Plague, &c., of Egypt, &c., 18mo. Lond., 1804.—*R. Pearson*, A Brief Description of the Pl., 8vo. Lond., 1813.—*J. F. X. Pugnet*, Mém. sur les Fièvres de Mauvais Caractère du Levant et des Antilles, 8vo. Paris, 1804.—*C. Maclean*, The Plague not Contagious, or a Dissertation on the Source of Epidemic and Pestilential Diseases, 2d ed., 8vo. Lond., 1800; and Results of an Investigation respecting Epidemic and Pestilential Diseases, including Researches in the Levant concerning the Plague, 2 vols., 8vo. Lond. 1817.—*V. Morea*, Storia della Peste di Noja, 8vo. Naples, 1817.—*G. M. de Richter*, Geschichte der Medicin in Russland, &c., 8vo. Moscov., 1813, t. i.—*R. Grohman*, Ueber die in Jahre 1813, in Bucharest herrschende Pest., 8vo. Leipsic, 1816.—Report from the Select Committee of the House of Commons appointed to consider the Doctrine of Contagion in the Plague, fol. Lond., 1819.—*A. B. Granville*, A Letter, &c., on the Plague and Contagion, &c., 8vo. Lond., 1819.—*J. B. Faulkner*, Treatise on the Plague, 8vo. London, 1820.—*R. Calvert*, Of the Plague of Malta in 1813, in Trans. of Med. and Chirurg. Society of London, vol. vi., p. 1.—*J. D. Tully*, The History of the Plague as it lately appeared in the Islands of Malta, Gozzo, Corfu, &c., 8vo. London, 1821.—*J. Hancock*, Researches into the Laws and Phenomena of Pestilence, including a Medical Sketch and Review of the Plague of London in 1603, 8vo. London, 1821.—*C. Balme*, Observat. et Reflex. sur les Causes, les Symptoms, et le Traitement de la Contagion dans différentes Maladies, et spécialement dans la Peste d'Orient, et la Fièvre Jaune, 8vo. Paris, 1822.—*J. Frank*, Doctrina Pestis, in Prælexe Med. Univers. Præcepta, pars i., vol. ii., sect. 1.—*Vaidy*, Dict. de Sciences Médicales, Art. Peste, t. 41.—*Lachaise*, Sur la Peste en Egypte, dans Bullet. de l'Acad. Roy. de Méd., t. i., p. 354.—*Ozanam*, Histoire Médicale de Mal. épidémiques, vol. v.—*F. E. Fodéré*, Leçons sur les Epidémies, et l'Hygiène

Publique, 5 tomes, 8vo. Paris, 1824, t. iv., p. 167.—*J. Henzen*, Sketches of the Medical Topography of the Mediterranean, &c., 8vo. London, 1830, p. 501.—*Brown*, Cyclop. of Pract. Med., vol. iii., p. 352.—*D. Barry*, On the Gibraltar Epidemic, in Med. and Phys. Journ. of Lond., vol. lxiv., p. 383; and vol. lxvi., p. 476.—*Chollet*, Mém. sur la P. qui a regné épidémiquement à Constantinople en 1834, et sur sa Non-contagion, 8vo. Paris, 1836.—*A. Brayer*, Neuf Années à Constantinople, Observat. sur la Topogr. de cette Capitale; la Peste, les Causes, &c.; et la Non-contagion de cette Maladie, &c., 2 tomes, 8vo. Paris.—*Estiennes*, Journ. des Connaissances Medico-Chirurg., Feb., 1837.—*Pariset*, Mém. sur les Causes de la Peste, et sur les Moyens de la détruire, 12mo. Paris, 1837.—*J. F. C. Hecker*, The Epidemics of the Middle Ages. Trans. by *B. G. Babington*. (Published by the Sydenham Society.) 8vo. London, 1844.—*L. A. Gosse*, Relation de la Peste qui a régné en Grèce en 1827 et 8, 8vo. Paris, 1838.—*A. F. Bulard*, de la Peste Orientale, d'après les Matériaux recueillis à Alexandria, au Caire, à Smyrne, et à Constantinople, pendant des Années 1833 à 1838, 8vo. Paris, 1839.—*L. Aubert*, De la Peste ou Typhus d'Orient. Documens et Observations recueillies pendant les Années 1834 à 1838, en Egypte, en Arabie, sur la Mer Rouge, en Abyssinie, à Smyrna et à Constantinople, 8vo. Paris, 1840.—*E. Littré*, Art. Peste, dans Dict. de Médecine, 2d edit. Paris, 1841.—*A. B. Clot-Bey*, De la Peste Observée en Egypte; Recherches et Considerations sur cette Maladie, 8vo. Paris, 1840.—*Prus*, Rapport à l'Acad. Roy. de Médecine sur la Peste et les Quarantaines, fait au nom d'une Commission, &c., 8vo. Paris, 1846.—*A. White*, A Treatise on the Plague, &c.; and on Quarantine, 8vo. London, 1846. *This important work, the result of much experience, appeared as this sheet was going to press. It contains numerous additional proofs of the truth of the doctrines for which I have contended.*

PESTILENCES—PROTECTION FROM.—Having considered the three destructive pestilences of modern times, in respect of their causes, propagation, nature, and treatment, as fully as my limits have permitted me, I now proceed to notice the measures which should be taken to protect the community from them, and the prophylactic means which may be used by individuals against them. In order that the subject may receive due attention, I shall discuss it according to the following arrangement :

## I. PROTECTION OF THE GENERAL COMMUNITY FROM PESTILENCE.

### i. PREVENTION OR WARDING OFF PESTILENCE.

- A. By sanatory measures having reference to the state of the locality, and to the community.—Prevention of domestic causes.
- B. By measures intended to prevent the introduction of pestilence from abroad.—Prevention of foreign causes.

### ii. THE ARREST OF THE SPREAD OF PESTILENCE WHEN INTRODUCED OR PREVAILING.

- A. When introduced or prevailing in towns, cities, &c.
- B. When introduced among troops, armies, or garrisons.
- C. When introduced into ships.

## II. PROTECTION OF INDIVIDUALS, FAMILIES, OR CLASSES.

### i. PROTECTION BY SECLUSION, OR STRICT QUARANTINE, &c.—DEPARTURE FROM THE SOURCES OF INFECTION.

- A. Estimate of the means answering this protection.—The avoidance of infection.
- B. Restrictions which should be imposed on those departing from an infected locality, and when they should be imposed.

### ii. PROTECTION BY SUCH MEANS AS MAY ENABLE THE CONSTITUTION TO RESIST INFECTION.

- A. Medicinal Prophylactics.
- B. Dietetic, Regimenal, and Moral Prophylactics.

## 2. I. THE PROTECTION OF THE GENERAL COMMUNITY FROM PESTILENCE.—The objects of gov-



ernment, in all civilized countries, are the protection of the lives and properties of the inhabitants, the observance and advancement of religion and morals, and protection from foreign aggression. For the attainment of these objects, laws are enacted and enforced. In most of the countries of Europe, however, the last of these objects have received the greatest attention, and to it the wealth and resources of countries have been more especially devoted. The lives of the inhabitants have always attracted the smallest amount of regard from governments, legislators, and political economists; and even from those who administer the laws, unless under circumstances of peculiar atrocity. The numerous circumstances which influence the health and longevity of the community; the palpable causes which produce disease and pestilence; the acts of individuals or of companies, affecting the health or lives of hundreds or thousands of those with whom they have intercourse or concerns, or who surround them; and the multifarious modes in which avarice and the love of over-reaching directly and indirectly sap the springs of life, have never engaged the attention of most governments, and least of all, those of this country, until the magnitude of these evils, the fears of a widely-spread pestilence, and the pressure from without, diverted a very small portion of that attention to them which had heretofore been entirely absorbed by the interests of parties and the advantages of a class. Formerly, and even now, although much less remarkably, literature, in attempting to live upon the crumbs which fell from the tables of placemen and aristocratic partisans, like the parasite gull, so well known to the naturalist, fed only on the offal and filth ejected by those whom she worshipped. The sufferings of the poor, the squalor consequent on want and misfortune, and the garbs necessary to the satisfactory performance of important and requisite occupations, were made the themes of poetic derision and prosaic sarcasm by the statesmen and the popular writers of the day! Yet, however foul and degraded the Georgian era of literature may have appeared in several of its epochs, science continued to advance with due majesty, and with a gracious care of the health and lives of those who had become the least cared-for parts of the machinery, invented for the acquisition of wealth, and who were looked upon by statesmen as the common herd, among which pestilence and death might freely revel, as "cheeks to an overgrown population." Philanthropy went abroad; but, in neglecting his home, most signally destroyed or enslaved the objects of his foreign care. His very enthusiasm blinded him to the effects of his actions, and diverted him from his domestic duties; but hopes of his return are to be entertained from certain measures which public opinion has enforced, and he may still promote some of the numerous reforms of our social condition that are urgently required, and remove many of the most influential causes of disease and of premature dissolution that degrade while they afflict the community.

3. **I. THE PREVENTION OF, OR WARDING OFF, PESTILENCE.**—It is obviously the duty of governments, however much they may neglect it, to prevent pestilence from springing up in

the countries they profess to protect, and to ward off the invasion of pestilence from abroad. These are two grand sanitary intentions, the fulfilment of which the community has a right to demand from those who govern and enormously tax it. The second of these has been as efficiently and satisfactorily accomplished as circumstances allowed; but the first has been altogether neglected; and not merely neglected, but sacrificed to class interests. No efforts have been made by those who had the power, but neglected the duties which that power involved, to prevent the habitations of the living, the depositories of the dead, and the aggregations and conditions of the lower animals, from becoming the sources of disease or pestilence. The ignorant builder, who, in many instances, could hardly write his name was in no way discouraged from building houses and streets calculated to endanger not only the health of their inmates, but that also of the whole neighbourhood. He might erect houses and streets in any form and position, at the shortest possible distance, with the utmost disregard of ventilation, and without either drains, cess-pools, or sewers. He might favour the accumulation of animal exuvæ as much as he pleased, and in as detrimental a mode as possible to the health of all within many hundreds of yards, and no one could interfere. He might introduce disease and death among the whole population of his district, and, instead of meeting with reprehension from the authorities, obtain the reputation of being a spirited proprietor, and accordingly receive a portion of the mammon-worship so generally and so assiduously performed in almost every street, mansion, and house in the kingdom. The capitalist economizes his means by the neglect of sanitary measures, which would necessarily involve expense, and the law protects him in doing what he pleases with his own; but it does not deign to protect the lives of those around him from the certain consequences of his ignorance and avarice. Thus London, and most other cities and towns in the kingdom, have increased in size without the least control, or the smallest endeavour to protect the public health; but, on the contrary, with every facility to accomplish the deterioration of it, and with the strongest inducements, in the acquisition of wealth, and hence of consideration, to generate disease. These remarks may be considered overstrained; but let the reader refer to the evidence brought before the "*Health of Towns' Commission*," and published in its reports, and he will find them inadequate to convey the opinions which the numerous circumstances and occasions there described must suggest.

4. A very able and enlightened member of that commission, Mr. J. R. MARTIN, observes with great justice in reference to this subject, that, "if it be the business of government to prevent and to punish crime—to secure the public peace—to enforce industry instead of rapine—and the settlement of disputes by appeal to reason instead of by fraud or violence; if the well-being of the subject be, in short, the main object of legislation, then would it appear the special duty of the ruling power to secure the health and the lives of those who, of all others, stand most in need of its protec-

tion against the invasions of individual or corporate caprice, ignorance, or stolid avarice. Here we perceive a moral and political duty of necessity. On this subject it should ever be borne in mind that, where there is disease, there also will be found the seat of poverty and crime. Disease, poverty, and crime in their worst forms are constantly and everywhere found together. The truth then is, that misery and crime produce disease, and disease produces misery and crime, in a circle which revolves in the same calamitous monotony from year to year, of the brief existence of the masses crowded in the worst quarters of our manufacturing cities. While men are in the lowest state of physical destitution, surrounded by filth, vermin, privation, and squalor of every conceivable kind—familiar with sickness and death, and strangers to every comfort—with the mind continually on the rack, or absorbed in striving against physical necessity—or with the animal spirits broken down by its pressure, how is it to be expected that obedience to the laws, and that morals, education, or religion should find a place? How can a man whose mind is ruined even more effectually than his body—the man to whom moral degradation and physical suffering have done their worst—how can such a man be expected to give a passing thought even to such matters? The thing is impossible."

5. But, not to speak of these higher considerations, the benefits of surrounding civilization, cleanliness and health, are not for the occupants only of lanes, courts, cellars, and houses, teeming with exhalations from the excretions and other exuvix of the inhabitants, but extend in various ways to the inmates of mansions, and even palaces—to the houses of the rich and the proud—to the dwellings, and even to the persons, of those who consider poverty and wretchedness the worst of crimes, and who cannot approach even the one or the other, even in the temples of the Almighty, even in the houses of that God whom they profess to worship, without dreading contamination, and derogation from their high positions.

6. *A. The prevention of the generation of pestilence or disease in a country* has been already insisted upon as a duty which the government owes the community. The neglect of it is sure to become the source of calamity, and the extent of that calamity will neither be readily controlled nor soon arrested, at least on all occasions of its occurrence. In this climate the calamities arising out of the sources to which attention is now to be directed are generally not so prominent as in warmer countries and places, where the progression of the seasons is more regular; but if, owing to the nature of our seasons, they are less remarkably violent, they are more numerous and varied, and they can be shown to be equally destructive in their silent, constant, and unobtrusive course.

7. It must not be supposed that, because the causes of disease to which particular reference is about to be made, and has been made, in various parts of this work, and particularly in connection with the pestilences just considered, have not been proved to be the originators of any of these pestilences in this country, they are, therefore, entirely without influence as respects either the propagation of these

pestilences when introduced, or the production of other not less fatal, although more prolonged, maladies. They are, in truth, among the most efficient causes of the diffusion and propagation of all infectious maladies; while they are the principal agents in the generation of chronic and constitutional diseases, in contaminating the springs of life at their very sources, and in producing decrepitude and mental weakness in the offspring, if, indeed, the blighting influence of these agents during infancy and childhood be survived.

8. *The prevention of domestic causes of pestilence is also the prevention of epidemic maladies, and of numerous chronic and constitutional diseases.* The prevention of those causes has no farther relation to the three pestilences above considered than as respects the removal of some of the chief circumstances which favour and give activity to the infection of these pestilences, on the occasions of the introduction of the infection from abroad; but it has a much more certain, continued, and manifest effect upon the prevalence of the numerous other maladies, which, in our climate, depend upon their domestic causes, especially as they exist in large towns and cities. These causes are so evident to the senses, so disgusting to the sight, so sickening and sensibly injurious to all who come within their spheres, and so very prominently connected with their baneful effects, that it is a matter of the utmost surprise that a more enlightened attention to them, and attempts at their removal, have not long since been enforced by the legislature.

9. *All sanitary measures which should be enforced in a locality* should have for their objects, 1st. The removal of the excretions, as speedily as possible, from the habitations of the people, and the prevention of their accumulation; 2d. The means or method of their removal should be such as should, as efficiently as possible, prevent the escape of the gaseous and putrid emanations they emit into the atmosphere; 3d. That a sufficient supply of water should be provided for the rapid removal of putrid exuvix and excretions, and for other purposes of cleanliness and ablution; 4th. That animal remains and excretions should as quickly as possible be conveyed to their natural and intended destination, namely, to cultivated fields and soils, with the intention of fertilizing them; 5th. That the bodies of the dead should not become, from the mode of sepulture, and the situation and crowded state of the places of burial, with reference to the habitations, especially in cities and towns, a source of disease to the living; 6th. That ditches and marshes should be removed, especially in the vicinity of animal and human habitations, by under-draining, &c.; 7th. That while the supply of water should be abundant, it should in no way be contaminated by the vicinity of burial-grounds, ditches, or marshes; 8th. The supply of pure air, and the requisite renewal of it in all circumstances, with as little risk of contamination as possible from animal excretions or remains—from drains, sewers, cess-pools, church-yards, ditches, marshes, &c. In proportion as attention is paid to these topics, so will the health of cities and towns be improved. But I cannot dismiss the consideration of them without further and more particular notice.



10. *a. The prevention of animal excretions and remains from accumulating*, especially in large towns, has always been attended with some difficulty, but it is a difficulty which has rarely, until very recently, been attempted to be removed. Indeed, much more frequently, if not almost universally, actual provision has been made in large cities and towns for the accumulation of these excretions to a most astonishing amount, and without any intention of their removal for many years. It was proved before the "Health of Towns" Commission," that these accumulating sources of disease exist in respect of most of the houses of all cities and towns, in the forms of privies attached to houses unconnected with drains, and of cess-pools, into which the soil from water-closets and privies, and the foul water used for domestic purposes, flow; and that these cess-pools, privies, and drains exist under and around most of the best residences, and in all the worst, in and about London, and in other cities and towns, and that they have generally no communication with the common sewers and drains, but actually are allowed to accumulate until their overflowing contents compel a recourse to nightmen.

[This remark will apply particularly to the city of New-York, which has, undoubtedly, better natural advantages, and is more favourably located for health, than almost any city on the globe. Though abundantly supplied with the purest water—the *Croton*—yet it has no extensive system of sewerage; and, indeed, it is but very recently that sewers have begun to be constructed at all, and that only in our principal streets; while privies and cess-pools have no communication with those already made, their contents being discharged by nightmen, with the effect of contaminating whole neighbourhoods with the most horrible stench. When to this we add, that filth of every kind is allowed to accumulate in our streets and gutters, which are rarely washed, although there is ample water to accomplish it; that slaughter-houses and manufactories of various kinds, deleterious to health, abound in every part of our city, it will be seen that reform is loudly called for, if we mean to keep pace with other cities in guarding the lives and health of our citizens.]

11. The inhabitants who have for so many years calmly submitted to a heavy sewer-rate, from the notion that the sewers formed by their contributions actually carried away the soil and foul water from their houses, now find that they have been deluded, legally swindled; and that, notwithstanding the vaunted drains and sewers of the metropolis, there is no necessary connection between them and the houses, close to which they pass, even where they do pass; that the sewers are few compared with the number of streets, and that comparatively few houses have any communication with them. Thus the contents of privies or necessities, water-closets, cess-pools, and drains, are allowed to sink into the soil upon which the houses are built, to poison it, and to contaminate the air within and around the dwelling, the more consistent remains being pent up, and allowed to accumulate without any outlet whatever. As these contents collect and increase, the more fluid parts filtrate

through the upper layers of earth or clay, and contaminate the water supplying pumps and springs. The gaseous parts, and those which are carried off during evaporation by the air, more or less infect the air, and destroy the health in various ways, of those especially who live in the lower apartments, and particularly if they sleep in them. During warm seasons the emanations proceeding from these accumulations of animal excretions, and from the ground thus imbued with animal matters, upon and around which the dwelling stands, become almost as injurious as those generated in warmer climates and countries, to which reference has been made above, in respect of the generation of the pestilences just now considered; and would, equally with them, promote the diffusion of the infection of those pestilences as soon as the infection should be imported. Indeed, the accumulated emanations thus arising from the aggregation of individual sources, furnished by thousands of residences, constitute that contaminated state of atmosphere which favours the propagation of the infection of these pestilences; and the absence of these emanations, or at least the comparative absence of them in country places, partly accounts for the much slighter prevalence of pestilence in these localities.

12. It is supposed that the circumstance of cess-pools and drains, containing animal matters in a state of decay, being covered over, is a sufficient protection from their injurious influence. But they are not hermetically sealed. There is a constant generation and extrication of foul gases from them; and these gases, and the air contaminated by them, are continually passing off between the boards and crevices of the stones which cover them. In many places of this metropolis, as well as in manufacturing towns, large privies exist, used by the numerous workmen in large and crowded factories; and cess-pools of immense extent, which receive the contributions of many houses and work-shops. It is well known that the former are often not emptied for many years, but are allowed to diffuse their odours, and their baneful influence, for many hundreds of yards, in all directions; and it is stated of the latter, that an attempt was made to empty one of them, situated in a central and crowded neighbourhood; but after some scores of cart-loads of soil were removed, the rods which were employed to reach the bottom of the depository were not sufficiently long for the purpose, and the Herculean task of emptying it—cleansing was out of the question—was relinquished. It was stated, also, before this commission, that one of these immense reservoirs of filth and putrid animal matter existed immediately under a school, so that, in addition to the contamination of the air by the congregation of a great number of children in a confined and insufficiently ventilated space, there was the additional evil of foul air constantly rising up from the poisonous sources beneath them.

13. Much has been said of the collections of filth, of the superficial uncovered drains, and other disgusting states of things in former times; and in numerous continental and eastern cities and towns in modern times; and of their influence in originating and perpetuating pestilence. But these sources of mischief are

readily swept away by rains; the emanations from them are soon dissipated by the winds; and the grosser materials are carried off and devoured by birds of prey and the lower animals; so that they are actually less injurious than those accumulations of filth and faecal matters furnished by almost every house in the towns of this country. These faecal collections are so carefully preserved from these natural means of purification, that the emanations from them continue to be generated at all seasons, and to be extricated within the very walls of the dwelling, in their areas, and under the very windows which are intended to admit fresh air and light. No cold in this climate is so great as to prevent the generation of noisome vapours and gases from these sources; while the warmth of summer and autumn increases the extrication of them, and concentrates them in a more humid atmosphere. But it may be asked by utilitarians and political economists, where is the mischief which these admitted nuisances and offences against the senses occasion? Do they produce pestilence? We see no sign of pestilence. To these every well-informed physician will answer, that there has been no pestilence—no plague—because the seminum or infection of plague has not been allowed to be imported. But if it had been imported, or were even now to be imported, especially during summer or autumn, all the conditions requisite to its devastating spread exist in the sources now pointed out. Although protected from this foreign scourge by quarantine laws, the existence of which is now threatened by persons ignorant of the subjects to which they relate, let it not be supposed that these nuisances, these sources of contamination, are unproductive of the most serious effects. To the question, therefore, as to the mischief they occasion, another may be put, as to what mischief, evil, or disease afflicting the human frame may not be imputed more or less to these very remarkable domestic sources. I find it much more difficult to point out a single disorder or malady which cannot be imputed partly or altogether to these causes, than to enumerate the many which acknowledge them as their principal sources. Even where they are not the efficient agents, as in the pestilences above considered, they are predisposing, aiding, and determining causes. They more especially occasion sickness and death during infancy and childhood; and even when these epochs of human existence are struggled through, and the various affections of the digestive organs and nervous system, and the febrile diseases, and the varied forms of debility which these causes produce, are either partially or altogether removed, there frequently succeed a sickly period of puberty, impaired manhood and premature decay, scrofula, and tubercles in their numerous forms and seats, visceral diseases in countless variety, and mental weakness in endless forms and grades.

14. During the present warm summer (1846), I have had numerous occasions of remarking the very injurious consequences of frequenting those privies in which the faecal matters are allowed to accumulate. Of three families, every person was attacked with adynamic dysentery, with a low or putrid form of tenesmus, and an erysipelatous state of the anus, extending to the vulva and vagina of the females. In one

family, nine persons were thus attacked; and in several other families, and on other occasions, I have traced these affections, which have often been attended by great danger, to this particular cause—to the influence of the foul and concentrated effluvia, from long-accumulated faecal matters, upon the mucous surface of the anus and vagina.

15. It is obvious from this that no such accumulations of noxious agents should be allowed to exist; that drains and sewers should be so constructed as to convey from the dwellings, as rapidly as possible, and without sinking into the soil, or evaporating into and contaminating the atmosphere, the foul materials and animal exuvia into the main sewers; that the supply of water should be sufficient to aid this object, and that the main sewers should be so constructed, as respects their terminations, as to allow their contents to be removed by safe and suitable modes of conveyance, to cultivated grounds for the purposes of manure.

[This is a very important measure, which we trust will not be disregarded in the future sewerage of our cities. Wherever a proper system of house-drainage prevails, the valuable excreta of the human frame, containing the debris of all the food consumed by the inhabitants, find their way into the sewers. Experience has proved that these excreta, but especially the urine, are among the most effective of our manures; and that they far exceed in value the products of the farm-yard and all solid manures, not even excepting *guano*. In China, and those parts of continental Europe where agriculture is most skilfully practiced, this fertilizing liquid is highly valued.]

To this, the most important constituent of sewer water, may be added, as derived also from house-drainage, the alkalies, potash, and soda, which are so largely used for household purposes in the form of pearlash, soap, and common salt. These alkalies form, as is well known, very important elements of the food and structure of plants. Besides all these, we have the refuse of slaughter-houses, markets, and manufactories, large quantities of soot, rich in ammonia and sulphurous acid. So valuable are these debris of towns, that it is calculated that a population of 100,000 in number would furnish sufficient nitrogen, phosphoric acid, and other substances to manure no less than 93,440 acres of wheat; and in Flanders, we are informed that the excreta of an adult are valued at ten dollars per annum. Lands in England which were formerly a barren waste have been known to yield as much as £11 4s. per acre annually.]

16. *b. The burying of the dead within, under, and around chapels or churches, or in large burying-grounds, situated within, or close to cities or towns,* is among the most serious evils of the present state of society, and of existing legislation. The emanations from these places are equally injurious with those proceeding from the sources just noticed, and are, on some occasions, as I have often witnessed, even more strikingly injurious, owing to the greater concentration of the noxious vapours and gases, especially as they emanate from the remarkably crowded burying-grounds and vaults around and under chapels in the metropolis. And, although numerous states of ill-health and forms



of acute disease actually proceed from this cause, as well as from that above exposed, the most malignant putrid or putro-adyamic fever, as described under that article, have come before me, and been referred to this source by the more intelligent of those who have been thus attacked. I have, moreover, had demonstrative evidence that cases of this fever, caused by the emanations from the vaults of chapels in this city, and terminating fatally in eight days from the period of exposure, these emanations at the moment of their impression producing most marked effects, have infected other persons, in the same house with them, with a similar and equally dangerous and fatal fever.

17. The congregation of many hundred persons in a building, opened only once in the week, warmed and ventilated but partially and imperfectly on that occasion, and containing immediately beneath its floors, and surrounded by, thousands of human bodies undergoing putrefaction and decay, must necessarily prove more or less injurious to health; and still more remarkably to the health of those who may happen to inspire a portion of those irruptions of foul air which break forth at intervals from the burying-places, or which flow from the grated openings communicating with the vaults and other places of sepulture constructed under the pews of these chapels.

18. *c.* It is almost unnecessary for me to insist upon the *impropriety of allowing ditches, swamps, or marshes to contaminate the air* in the vicinity of towns, or any human habitation whatever; or to bring supplies of water from places near to these sources of disease, or to burying-grounds. Water loaded with animal matters in a state of decay, or abounding with animalculæ, and the infusoria, is most remarkably productive of diarrhœa, dysentery, mucous and adynamic fevers, or of those typhoid forms of fever which are attended by ulceration of PEYER'S and BRUNNER'S glands. The means of removing these causes are too obvious to require notice at this place, and ought never to be neglected, although no very remarkable mischief may result from them, or no very remarkable outbreak of disease may occur. They, nevertheless, impair the constitutional powers of all within the sphere of their influence; induce, gradually and slowly, visceral obstruction, and numerous chronic maladies, and favour the prevalence by promoting the infection of malignant and pestilential distempers.

19. *d.* *Crowded apartments and assemblies, and neglect of due ventilation of these, and of the dwellings of the poorer classes,* are among the most productive causes of disease, and of the diffusion of pestilence, wherever pestilential infection is introduced. The residences of the poor are not merely overcrowded, but also ill-ventilated, owing both to the prejudices of many of this class, and to the situation of them in courts, lanes, narrow streets, and cellars. A free and thorough ventilation is often impossible in these situations; and, in addition to this cause of disease, and to the evils resulting from large numbers residing and sleeping in each of the several apartments into which the house may be divided, there are often superadded the foul air proceeding from privies, cess-pools, and drains, and the other sources above described

(§ 9, *et seq.*). Thus the air which is respired by persons thus circumstanced is contaminated both by those who breathe it and by the several causes just alluded to; and in this state of contamination it is allowed, moreover, to stagnate, to become still more foul, and to concentrate more fully the emanations from the bodies of those who respire it, and from the several sources above indicated. Among persons thus placed, it must be expected that all infectious maladies will not only make rapid progress, and prevail extensively, if not generally, but assume a more malignant character than in other and more favourable circumstances.

20. It is not, however, merely by favouring the extension and malignancy of infectious and pestilential maladies that these causes act injuriously on the classes of the community more especially subjected to them, but also by actually generating infectious diseases, and even by imparting an infectious character to several affections which would not otherwise present it. In this way fevers are generated, and are spread from these original sources to the abodes of wealth and rank—to the very families and persons of those by whom the wants of the lower classes were neglected, for they could not have been unknown, and to whom they were an abomination; for, if they had been objects of compassion, they would have been long since considered with the intention of devising a remedy for such of them as admitted of remedy.

21. The want of due attention to ventilation in the construction of work-houses and other places for the reception and medical treatment of the poor, aided by insufficient and unwholesome food, has been no mean cause of the production of low fevers, diarrhœa, and dysentery among the inmates of these places, but also of the prevalence of these diseases in the vicinity. The crowded states of these abodes of poverty and disease, and the several other sources of disorder connected with them, certainly do not limit their baneful effects to the places in which they exist, but extend their malign influence on many occasions by various modes of infection, in several directions, and to more than one class of the community. If a rigid inquiry were made by competent persons into the states of work-houses, lunatic asylums, charitable institutions, chartered and endowed schools, penitentiaries, and other places where a constant residence or daily congregation of a number of persons or of children is required, how few would appear unexceptionable in every respect. In many, ventilation is imperfect or only partial; in others, the sleeping as well as the sitting apartments are most disgustingly overcrowded; in most of them imperfect ventilation is associated with over-crowding, and not infrequently, also, with foul emanations from privies, cess-pools, and drains; in some, one or more of these evils are conjoined with insufficient and unwholesome food, and with want of due exercise in the open air; and in not a few, all these evils are combined in various states, according as one or several of them assume more or less prominent characters, or are, moreover, associated with neglect of cleanliness of person and of residence, &c. In what condition could the inmates of a lunatic asylum

have been in, as respects all the circumstances which contribute to health, and especially those to which attention has been directed above, when 112 out of 450 died in twelve months, as proved by Mr. WAKLEY in the House of Commons?

22. *c.* There is nothing which tends more to injure health, and to develop scrofulous and tuberculous and other chronic diseases among children and young persons *than numbers sleeping in the same apartment.* The evil is great in proportion to the number relatively to the size and imperfect ventilation of the chamber; but when this is conjoined with others, as it often is, more particularly with foul emanations from privies, cess-pools, and drains, with insufficient or unsuitable food, and with insufficient exercise in the open air and in sunshine, the injuries thereby inflicted upon the constitution in various forms of acute as well as chronic disease, and the malignancy and danger imparted to infectious and febrile distempers, when they break out in these circumstances or places, become the most alarming, and often the most hopeless, to which medical aid can be called. The circumstance of numbers being compelled to sleep in the same chamber has been fraught with mischief, not only to the physical powers and the bodily health, but also, and not less remarkably, to the moral feelings and dispositions through life; and although most especially detrimental to children and young persons, it is also very seriously injurious to grown-up people. What is the state of health in children in large schools and institutions, where from five or six to fifty or sixty children sleep in the same apartment; the smaller numbers in boarding-schools, and the large number in public institutions, as Christ's Hospital School at Hertford? The data necessary to a correct answer to this question are not before me; but I will assert, from no small experience of the bad effects of this and other conditions of these schools and institutions, as favouring the development and spread of disease, that the extent of the mischief thus produced is not even suspected by those who are most actively concerned in their management. The evils which result from causes connected with the arrangements of these institutions are even not seen, and when they are seen, from their prominence or extent, they are not referred to their actual sources.

23. Nor are some of the evils which may be traced to the congregation of great numbers of children during the day in small school-rooms much less remarkable than those above adverted to; but when it is known, as indeed it has been proved before the "Health of Towns' Commission," that these assemblages, of several hours' duration, actually take place in rooms immediately over immense cess-pools, or in chapels streaming with emanations from the dead bodies in their vaults, or from those putrefying around the walls, or from both productive sources, it may, without great impropriety, be assumed, that the wisdom of man, even of him who thinks himself the most divinely inspired, is but blindness, foolishness, and presumption; and that, in his attempts to accomplish what is laudable in itself, he is actually occasioning acute disease, or contaminating the constitution during life, and occasioning,

moreover, that state of contamination which will be imparted to the offspring during many generations. The collection of numbers of persons in factorics, the imperfect ventilation of many of them, and the modes of warming and lighting them, are not among the least of the evils to which the health of the working classes is exposed. Science could not render a greater service to the community than in rendering her aid to the reformation of these and similar ills, which weigh upon the physical and moral powers of the productive classes; and affect equally their health, happiness, and offspring.

24. *B. The Prevention of foreign Pestilence.*—The duty of government to prevent the introduction of pestilence from abroad is as obvious as that to prevent both the existing and predisposing causes of pestilence, and of distempers almost as fatal as pestilence, from being generated and allowed to exist at home. While the former has been entirely neglected in this country, the latter has received a very proper attention. Yet, although the neglect of all domestic sanitary measures has met with little reprobation, the enforcement of the quarantine laws has experienced much opposition; and restrictions of every kind, calculated to hamper commercial speculations, have been condemned by those who consider a small pecuniary loss of greater importance to them than the contingent occurrence of a great public calamity. But, as Mr. McCulloch justly remarks, "quarantine is not a matter in which innovations should be rashly introduced; whenever there is doubt, it is proper to incline to the side of security." In this country we have to guard against the introduction of the three great pestilences above considered, and the risk from each, although remote, is probably almost equal. The frequent importation of plague into this and other European and northern countries, before the institution of sanitary measures; the increased risk occasioned by the very rapid communication between all parts of Europe and those places in the Levant and within the tropics, where plague and hæmagastic fever prevail, and our recent experience of the pestilential cholera, are circumstances which should not be overlooked in our estimate of the probabilities of a visitation from either of these distempers, and which ought to influence those who are bound to protect the public, while they give every facility in their power to trade, in their deliberations and enactments.

25. In the United States, more especially in some of them, and in many of their large commercial cities, quarantine has been either imperfectly enforced, or not instituted at all, until recently. The great distance between them and the Levant, and the nature of their climate, gave them little cause of alarm as to the introduction of plague; and, until lately, the hæmagastic pestilence, so generally and destructively prevalent in the West Indies and on the coast of Mexico, and so frequently epidemic in some of their chief cities, was viewed entirely as a domestic evil, against which quarantine and other sanitary measures could not possibly prove of any avail. From 1751 until 1791, this pestilence made its appearance in New York on several occasions; but after the latter period it appeared more frequently and more destructively, as might have been expected from



the increased size of and population of the city and the more frequent intercourse with places where it prevailed. It even occurred during two or three successive years, and was seldom absent for a longer period than this, until 1822, when it prevailed most fatally. Since that year quarantine regulations have been strictly enforced, and the distemper has not appeared again in that city—now a period of nearly a quarter of a century—although it has scarcely been a year absent from vessels detained in quarantine, and in the quarantine hospital. (See the *Report of a Committee of the House of Assembly of the State of New-York on the present Quarantine Laws*. 8vo. Albany, 1846.)

[It seems no more than proper to state that the yellow fever did not prevail in New-York between the years 1805 and 1822, when, whatever quarantine regulations may have existed, were by no means strictly enforced, a fact which may serve to shake the soundness of the conclusion arrived at by our author. It seems to us, moreover, that in accounting for the exemption of the city from this disease since 1822, it is hardly proper to attribute it entirely to the observance of strict quarantine; for, during the same period, vessels have been freely allowed to come to the wharves at Brooklyn, after two days' quarantine, and discharge their cargoes, and yet no yellow fever has been propagated in that city from this source, nor has infection spread from vessels unladen at the quarantine station, nor from yellow fever patients received into the hospital at Staten Island from sickly ports. It should be borne in mind that the general sanatory condition of this city has materially improved within the last twenty years, by prohibiting the burial of the dead in the crowded parts of the city; widening and cleaning streets; and the introduction of the Croton water, &c., so that it is now the opinion of our most enlightened physicians that, even were the yellow fever to be introduced, it would not spread, owing to the absence of those atmospheric conditions on which its extension seems to depend.]

26. Can any stronger proof of the propriety of enforcing these regulations be adduced than that to which I have now referred, and which may be perused with numerous other valuable documents in the official report just named? It is well known to most physicians that Dr. RUSH, celebrated not only as a medical writer, but as a statesman, at an early period of the rising greatness of the United States of America, laboured with great zeal to prove that the pestilential yellow fever was of domestic origin. But the authors of the report just referred to state that "this opinion was nevertheless somewhat modified before he ceased exerting a prodigious personal influence upon the mind of man; for he says, 'that it was even produced in Philadelphia from the effluvia from a chest of unwashed clothes which belonged to one of our citizens who had died of it in Barbadoes.\*' This influence, says Dr. MONETTE, has

doubtless been the destruction of thousands; and had it not been so great in the medical community of the United States, our northern seaports would not have been so long subject to the pestilential visitations of yellow fever. The southern ports, still acknowledging a vassalage to his authority, and to his arbitrary dictation, through his disciples, to this day immolate hundreds and thousands of victims annually upon the altar of a blind credulity." (*Report*, &c., p. 21.)

27. Can it be possible to adduce a stronger instance than that to which this quotation refers, of the baneful influence of authority upon the minds of medical men? Or is there more satisfactory evidence required, not merely of the importation of the distemper to which it refers, but also of the necessity of enforcing quarantine regulations for the protection of the public? But the instance thus adduced by Dr. RUSH is one, not only proving the importation of this pestilence, but also showing the facility of such importation; and, when the nature of the means is considered, the great difficulty, however strict quarantine regulations may be, of preventing it through the medium here indicated. Dr. LIND states that a trunk of clothes was brought from the West Indies into Philadelphia, in 1741, containing the clothing of a young man who died of the yellow fever; and he says that all the persons present when the trunk was opened contracted the disease, which was afterward propagated to other persons in the city. The reporters to the House of Assembly of New-York state that a vessel, which had arrived at New-Haven from Martinico, "had brought home a chest of clothes which belonged to a sailor who died of the yellow fever at Martinico;" that it was opened in the presence of four persons named in the report; that three of these four, in a short time afterward, died of this fever; and that the pestilence was propagated from these to the town of New-Haven. (*See Report*, &c., p. 17.)

28. Now I have adduced these facts, not because they are strong proofs of the importation and infectious nature of the pestilence to which they refer, for, after what I have stated in the preceding articles, no additional facts are required, but because they furnish the strongest evidence of the necessity of quarantine restrictions, and at the same time show the great dif-

[\* This statement is altogether erroneous. Dr. RUSH, during the latter years of his life, consistently and ably defended the doctrine of the domestic origin of yellow fever. In a letter addressed to Dr. MILLER, of New-York, he says: "You will perceive, from the facts and reasonings contained in this letter, that I have relinquished the opinion published in my account of the yellow fever, in the years 1793, 1794, and 1797, respecting its contagious nature. I was

misled by LINN and several West India writers. I am aware of the influence which such changes in medical opinions as I have acknowledged have upon a physician's reputation; but small, indeed, should I consider the total sacrifice of mine could it avert the evils which are connected with a belief in the importation of pestilential diseases." In the fourth volume of his "Medical Inquiries" he says, "I beg the forgiveness of the friends of science and humanity, if the publication of that opinion" (alluding to contagion) "has had any influence in increasing the misery and mortality attendant upon that disease. Indeed, such is the pain I feel in recollecting that I ever entertained or propagated it, that it will long, and perhaps always, deprive me of the pleasure I might otherwise have derived from a review of the attempts to fulfil the public duties of my situation." In connexion with Dr. RUSH, we may state, that Dr. DAVID RAMSAY, in a letter to Dr. MILLER, of New-York, in 1800, remarks, "The disputes about the origin of yellow fever, which have agitated the Northern States, have never existed in Charleston. There is but one opinion among the physicians and inhabitants, and that is, that the disease was neither imported nor contagious. This was the unanimous opinion of the Medical Society, who, in pursuance of it, gave their opinion to the government last summer, that the rigid enforcement of the quarantine laws was by no means necessary on account of yellow fever."]

faculty of so enforcing them as to prevent the introduction of those articles and effects which are most likely to propagate not only this, but also the other pestilences. I have not the least hesitation in maintaining, and I do so from personal observation and knowledge of the fact as respects two out of the three pestilences here considered, that there is more risk of the importation of them from body and bed-clothes, and foul linen of those who have been affected with them, than from the persons of the infected, or from any other source whatever. Every person who has seen much of the communications between distant places by means of trading vessels, who has travelled much, or who has voyaged frequently in those vessels, will admit the difficulty of preventing clothes and linen from being landed, and the frequent neglect of exposing infected articles of this description to due ventilation and cleansing before they are landed. Vessels are even not infrequently, especially in countries where the restrictions are loosely observed, allowed to continue in quarantine until the period is elapsed without the clothes or other personal effects of individuals having been opened up or aired; and not rarely are these articles, more especially dirty linen, sent on shore or smuggled away, without the guards either knowing the occurrence or being able to prevent it.

29. My limits will not permit me to notice the several regulations requisite to the due enforcement of quarantine. These regulations should be based upon the numerous ascertained facts mentioned in the course of the preceding inquiries; and they should be enforced with a full knowledge of the deceptions so frequently practiced or attempted, in order to avoid the detentions requisite to the observance of the law. With highly qualified and duly remunerated health-officers, there can be little reason to dread, either too great severity on the one hand, or too great laxity on the other, even should much be left to their discretion. My object at this place is merely to show the importance of, and necessity for, such restrictions, and to insist upon the strictest attention being given to the bed and body-clothes of all persons who may have been infected, or suspected of being infected, with these pestilences; for, when the numerous ways by which these and other personal articles and effects may pass, from infected places and vessels, to persons at a great distance, even before they are opened up or exposed, are duly considered, it cannot any longer be a matter of surprise that the distempers which they propagate are so often traced with difficulty, or even not traced at all, to their several sources, and through their several channels.\*

30. The propriety of enforcing quarantine regulations does not rest upon a few authorities merely. An outcry has been raised, by persons interested in their abolition, that they are supported only by those who are appointed to enforce them. What possible interest can I have in contending for them? What other interest had most of the ablest writers who have advocated them in this and in other civilized countries, than the cause of truth and the interests of humanity? Dr. J. BAYLEY, in his correspondence with the Mayor of New-York, af-

ter adducing numerous proofs of the importation of pestilential yellow fever into that city previously to 1822, concludes as follows: "I cannot suffer this opportunity to pass without expressing my firm conviction that rigid quarantine regulations are essentially necessary to guard the inhabitants of our commercial cities against the introduction of pestilential and infectious diseases." (*Report, &c.*, p. 79.) What, also, say other eminent physicians of that city on this important topic? Dr. TOWNSEND, whose experience of the hæmagastric pestilence has been obtained in New-York, in the Havana, in the Bahama Islands, in Charleston in South Carolina, and in the West Indies, thus remarks on the crude speculations and productions of some of those who have recently written on the subject now under consideration. "The true character of the pestilential yellow fever, commencing with the monographs of the earliest writers, as TOWNE, HILLARY, WARREN, ROUPPE, &c., and the not less masterly descriptions of those who succeeded them, as CHRISTOLM, BLANE, LINING (of Charleston, S. C.), HOSACK, and a crowd of others, together with the more recent productions of STROEBEL of Charleston, and MONETTE of Washington (Mississippi), &c., have been entirely lost sight of to give place to the more congenial and crude speculations and misrepresentations of empirical adventurers, many of whom, with mercenary motives, designed to flatter the authorities of different governments with the delusive hope that commerce might be disburdened of every such restriction, as a relic of barbarism, have not hesitated to assert, and to disseminate on the subject of yellow fever, a tissue of heresies and errors which every practical physician, and every common citizen acquainted with this disease, as it has prevailed in our seaports and in the West Indies, know to be without the shadow of a foundation."

31. Dr. VACHE, of New-York, observes, "that yellow fever has not appeared in that city for nearly a quarter of a century, and not since the present health laws have been rigidly enforced; therefore, let us not forget, in our zeal for innovation and improvement, the good old maxim, 'Let well enough alone.' Admit they are, in a measure, restrictive to commerce and burdensome to the merchant, will any calm observer deny they are alike protective of his life and conducive to his interest? The pecuniary loss of a hundred years by the quarantine establishment cannot equal the ruin and desolation of a single season of the pestilence. Who does not shudder at the memory of closed dwellings, the suspension of business, the shunned city, the quarantine abroad, and the sepulchres of hundreds during the summer of 1822?" (*Report, &c.*, p. 97.)

32. Similar opinions to these have been given by Dr. FRANCIS, and other eminent physicians in the United States, and furnish the basis on which the Report is founded, to which I have referred, and which reached me after the chief part of the above article was put to press. These fully confirm the views which I have entertained, as well as furnish most conclusive evidence of the necessity of enforcing quarantine regulations. Dr. FRANCIS, as well as many other eminent physicians, has shown that the hæmagastric pestilence has been imported into

[\* See Appendix to this article.]



many places, and into the quarantine districts of the United States, when the thermometer ranged above 75°. Now if the Eclair steamship had arrived in this country when the temperature was at this elevation, or at any period during the summer of 1846, and quarantine regulations had either been neglected or imperfectly enforced, what might have been the consequences? and what may still be the consequences if these regulations should be so far relaxed as to allow of the admission of the foul bed or body-clothes of persons who have died of any of the pestilences just considered, especially during states of temperature and of the air favouring the infection of these pestilences? I fully believe that pestilential cholera was introduced into various places, both in this and in other countries, by foul clothes, and that there is more risk in either of these distempers being imported in this way than by personal communication—than by the infection having been imparted in some place where the distemper prevailed, and remaining latent in the infected person for a number of days, so as to break out only shortly before, or soon after, arrival at the place of his destination. Certainly, all the contingencies of the malady—infection by close communication, by opening up the clothes of infected persons, and such articles of traffic as are calculated to imbibe infectious emanations, or are likely to have been exposed to them; the period which has elapsed from the occasions of such infection and of such exposures, and the several circumstances favouring or counteracting infection, even admitting its presence, as temperature, humidity, or dryness of the air, cleanliness, ventilation, &c., ought severally to be considered when framing regulations for warding off pestilence, and when carrying these regulations into effective operation.

33. How far it may be prudent to relax these laws in respect of merchandisc, even still farther than they have been in this country, cannot be stated absolutely and with confidence of perfect safety; for several articles of traffic belong to the same category as apparel and bed and body-clothes, and retain and convey the poison long and far; but caution should be used in such relaxations; and the facts should not be overlooked, that the most obvious and important advantages have already accrued from the recent institution of quarantine laws in Constantinople and other places in the East, and from a more strict enforcement of them in the cities of the United States.

34. To the entire neglect of *government measures of prevention*, and to insufficiently strict quarantine regulations, the extension of the choleric pestilence throughout the countries of the east, and through Europe and America, are entirely to be imputed. The difficulty, however, of completely enforcing these measures, and the liability of evading them in all countries, particularly those which are continental, and have an extended boundary, which are thickly inhabited, particularly on their frontiers, have large and populous frontier towns and seaports, and enjoy a rapid and extensive commerce, either by sea or land, are so great that numerous instances of their infraction must occur, and the chances of the introduction of the pestilence be thereby increased.

These circumstances fully account for the importation of the malady into the principal towns and seaports of Russia and Prussia; its appearance in Moldavia, Hungary, Austria, Vienna, Dantzic, Hamburg, &c.; and the negligence with which quarantine regulations are usually resorted to, fully explains the introduction of this pestilence into Egypt, into this country at various ports, as well as into numerous places in other countries, where stricter precautions might have reasonably been supposed to prove successful.

35. As intimately connected with all regulations of quarantine, the period which elapses from the impression of the morbid cause upon the frame, and the full development of the disease, requires some notice; but, unfortunately, sufficient facts have not been obtained, and those which have been observed are not sufficiently precise to furnish us with exact data on this topic. In respect of plague, eleven or twelve days have been assigned as the extreme period, while other observers have stated fourteen days to be the longest time. Various circumstances, however, serve to show that the full development of the morbid actions constituting these diseases may take place very soon, even a few hours, after exposure to an intense degree of the exciting causes, or when the state of predisposition to become affected has been great; while, on the other hand, several, perhaps many, days often elapse before a marked effect is produced. As to the exact length of time which may, in extreme cases of this kind, thus elapse, I have no means of stating, especially as respects pestilential cholera and hæmagastic fever; but even taking it for granted that a few days merely will often form this period of latent or smouldering action, it becomes obvious that a person may have been exposed to a source of infection, previous to leaving an infected place; that he may travel a long distance, especially in these days of rapid locomotion, and yet not experience the disease until some time after his arrival in a healthy situation, when he may be attacked, and thus he will introduce the pestilence.

36. The unknown duration of the interval which may elapse between the infection of the malady and its full development must render it doubtful what should be the prescribed period of quarantine; but there can be no doubt of the propriety of regulating it according to the length of time during which persons or vessels have been on their passage from an infected place, provided that no source of infection existed in their course. I believe that nothing can be objected to the measures which have been resorted to in this country respecting ships; but it remains a question in what point of view articles of merchandisc are to be considered.

37. That the chances of infection by articles of this description are much less than by persons, may, I think, be safely taken for granted; but I still consider those articles which are most likely to have imbibed a portion of the effluvia of the affected, as made clothes, articles of bedding, furs, cotton, woollen, silken, and linen furniture, and rags, to be calculated to transmit the infection. In all cases, therefore, these should be subjected to precautionary measures, and particularly to a full expo-

sure to the open air. It is astonishing how very long woollen and silken bed and body-clothes, especially, will often retain animal effluvia, when closely packed together, or excluded from ventilation. This must be familiar to every medical man who has been in the habit of continuing for a considerable time, or to be frequently in dissecting-rooms; for the animal miasm which his clothes have there imbibed will be sensibly felt months afterward if they have been put in a close place immediately after they were saturated with the foul air.

33. That sanitary measures will succeed in averting a visitation of this pestilence, will much depend upon the nature of the frontier of a country, upon its extent, the number of populous places in its vicinity, and the nature of the intercourse between it and the infected parts. In respect of this last-named source of infection, illicit intercourse, or smuggling, is one of the most probable channels through which the disease will be communicated; and when the population is thick, and the towns large and numerous, the chances of pestilence being introduced in this way are much greater than by regular commercial intercourse, inasmuch as the latter is more or less under the control of sanitary regulations, whereas the former avoids them altogether. Besides, bed and body-clothes, foul linen, and similar infected articles, are more likely to be conveyed clandestinely than by ordinary commercial channels.

39. ii. OF THE ARREST OF PESTILENCE WHEN INTRODUCED OR PREVAILING.—When pestilence is introduced, the measures which should be taken to arrest its progress must necessarily depend upon the extent of its diffusion, upon the number and situation of the places in which it has appeared, and upon the nature of the pestilence itself. As regards the last of these, it may be premised, 1st. That the *hæmagastric pestilence* can be introduced into a country only where the temperature is above  $70^{\circ}$ ; and when the air is close and humid, and the elevation not greatly above the level of the sea; that it is rarely disseminated when the situation is well ventilated, and not thickly inhabited; that frost destroys its infection, and that it attacks the human frame only once. 2d. That the *septic or glandular pestilence* may be introduced into a country at all ranges of temperature, from  $35^{\circ}$  to  $75^{\circ}$ ; that it may remain dormant in favourable circumstances at a temperature either below  $35^{\circ}$  or above  $75^{\circ}$ , although these more extreme ranges are more likely to destroy its infectious power; that a close, humid atmosphere, with the other circumstances already noticed (§ 9-23), favour its spread; and that a previous attack generally protects the system from a second, although not so fully as observed in respect of the *hæmagastric distemper*. 3d. That the *choleric pestilence* may be introduced and prevail in any range of temperature observed in temperate countries, although it is most rapidly and generally diffused in warm, humid, still, and sultry states of the air; in crowded situations, or where intercourse is most frequent, as in camps, barracks, transports, and ships of war; where, also, the other pestilences are more rapidly and universally propagated.

40. It has always been observed that, when either of the pestilences has appeared in a coun-

try, the places nearest the frontier or coast, or in most intimate and frequent communication with a previously infected part, are the first attacked. It is obvious that, when once introduced into a populous and commercial town, surrounded either by other towns or by a dense population, the difficulty of preventing its extension is greatly increased beyond what obtains when it appears in a walled city or in an isolated locality. For in all places depending chiefly upon manufactures, and upon commerce with distant or foreign parts, measures sufficiently restrictive to confine the malady there until it shall have subsided or exhausted itself, will be productive of so much distress, by throwing many persons out of employment, and by abridging the means of subsistence, and so injure the health of the community, and predispose to the extension of the distemper, as to induce all classes to combine to evade them, until the pestilence will spread, notwithstanding these restrictions. The failure, however, of such measures is not to be viewed, as it has been by the anti-infectionists, as a proof of the justice of their cause, but of the impossibility of preventing communications, indirect or direct, between the sick and the healthy, in these circumstances.

41. A. When pestilence first appears in a populous city or town thus circumstanced, the chief measures of prevention ought to be directed to the infected habitations, as will be pointed out hereafter, and to the infected persons and things which introduced the distemper. Those attacked should be immediately removed, in conveyances constructed for the purpose, to an isolated hospital, devoted to them only; and suspected persons, or those in close communication with the infected, but not yet attacked, ought to be removed to another hospital or place of observation near to, but not connected with the former, to which all should be conveyed as soon as they are seized. All intercourse between the inmates of infected houses and of those adjoining should be prevented, or placed under rigorous restrictions; and thus the pestilence may be strangled at its birth. In all outbreaks of pestilence, the attendants, and those employed in removing the infected, ought to be selected from those who have been attacked on some former occasion; and they should be provided with linen, canvas, or other suitable dresses; and the medical attendants ought not to leave persons infected by either of these pestilences and proceed abroad, or to visit other persons, without changing the clothes, in which patients in pestilence were seen, for other garments.

42. If pestilence spread notwithstanding these restrictions and precautions, more especially in large towns, and a thickly inhabited surrounding country, more advantage will accrue from the individual means of prevention hereafter to be noticed than from measures which aim at that which cannot be enforced or accomplished, namely, the maintaining a strict non-intercourse with the vicinity. Where, however, this object may be attained with reasonable hopes of success, it should not be neglected. But in a place where, besides a frequent intercourse with other parts by shipping, an hourly communication by means of stage-coaches, wagons, canals, and railroads is



kept up with other towns in all directions, I cannot see that quarantine or sanatory cordons can be strictly maintained, or regulations be enforced in such a manner as to prevent the extension of the malady. How can various effects and articles, even those most likely to transmit the pestilence, be sequestered for the purpose of purification, and yet avoid all chances of conveying it? And how, especially, are the hundreds, or even thousands of persons whom their avocations daily call to adjoining parts, many of whom may have been exposed to infection previous to their departure, to be placed in quarantine, or in observation, for a sufficient time to avoid all chances of their conveying the disease to the places of their destination?

43. I conclude, therefore, that where a strict quarantine, or sanatory measures calculated to confine the pestilence to the place of its introduction, cannot be maintained, the mischief resulting from the attempt will be greater than the benefits which will arise to the community. But that, where they may be enforced, owing to the nature of the locality, the employments of the population, the distance from other towns or populous places, and the thinly inhabited state of the surrounding country, they should be adopted, notwithstanding the temporary losses, or even distresses, of the place thus sequestered, for the good of the few should give place to the safety of the many.

44. *B. When pestilence is introduced among troops in armies or in garrisons*, the very best results will be generally obtained if decided measures be early resorted to, as shown by those devised by Sir W. Pym at Gibraltar. Notwithstanding the existence of medical boards in this country and in each of the presidencies in the East Indies, there does not appear to exist any code of regulations by which either the young and inexperienced medical officer, or the more responsible and experienced army physician may be guided wholly or in part, or which he may mould to circumstances. In 1831 Sir DAVID BARRY, whose talents were great, and sphere of observation extensive, published several suggestions on this subject, with reference especially to the hæmagastic pestilence of Gibraltar, but applicable to all outbreaks of pestilence in armies or garrisons. How far they have been adopted in garrisons or among troops liable to be infected by either pestilence, I am unable to state; but there was formerly, and I believe that there still is, in all departments of the army, more especially in the East Indies, a most remarkable neglect of sanatory or precautionary measures. Those which I have now to offer are in several respects the same as were recommended by Sir D. BARRY.

45. *a.* When pestilence shall have been proved to exist within a fortress, garrison, or encampment, let the sick and the suspected be immediately removed without the walls, or placed in tents in dry, airy, and open places, or in hospitals, or places fitted up as hospitals, when these are more favourably situated or circumstanced, and there kept effectually separated from the healthy, unsuspected, susceptible part of the inhabitants.

46. *b.* Let the infected houses and goods be kept in strict quarantine, and purified by water, air, fumigations, and every other means

that may be thought advisable; great care being taken that these expurgatory measures be executed by non-susceptible persons, or those who have been attacked by the pestilence on former occasions of its prevalence.

47. Let no time nor labour be thrown away, at this most important crisis, on cleansing drains or privies. Experience has already proved, most fully, both in Cadiz, in the great epidemic of 1800, and in Gibraltar in 1828, the perfect inutility, nay, the absolute mischievous tendency of this measure, when adopted after the pestilence has commenced, with the view of arresting its propagation.

48. *c.* Should the infection appear to spread within the territory or fortress, notwithstanding the removal of the first sick, all theories must be abandoned, and one established fact must alone guide all our measures, viz., *that the disease will stop as soon as the susceptible are separated from contaminated places, persons, and things.*

49. *d.* Since, however, it would be obviously impracticable to remove all the susceptible from a fortified town, or garrison, at once, when an epidemic breaks out after a long interval of public health, and when, besides a large portion of the civil population, the whole garrison may belong to this class, as was the case in Gibraltar in 1828, all the moveable sources of infection and fomites should be sent beyond the walls, and as many as possible of those capable of being affected by such sources as cannot be removed. The civil hospital of a fortified town should also be transferred, with its whole establishment, to the open ground or any situation as above (*a*) directed, to serve as a nucleus of a civil lazaretto, on the very first breaking out of pestilence. The regimental hospital, also, should be sent out, as the corps to which they belong happen to be attacked. No family or person, after having been once contaminated, should be allowed to remain an hour in a fortress or fortified town, particularly at the commencement of an epidemic, but should be removed to the places above indicated, where they should be strictly secluded or placed in rigorous quarantine.

50. *e.* Temporary emigration should be encouraged among the healthy, uncontaminated, and unsuspected civilians; and the whole susceptible population, civil and military, should be scattered over the open ground and adjoining country, as widely as circumstances will admit, due care being taken that the places or ground occupied by the sick, suspected, and the hospitals should not be too nearly approached (*a*). Whenever a regiment becomes infected, it should be immediately encamped outside the town, city, or fortress, if it can be spared; but if it cannot, it should be removed to as open and as well-ventilated a place as can be obtained, and the infected instantly carried to the hospital.

51. *f.* The sanatory division of the healthy into the susceptible, and the non-susceptible or those previously attacked, naturally dictates the classification of the sick into the decidedly infected, the suspected, and the unsuspected. There should, therefore, be three distinct hospital establishments, viz.: 1. The foul lazaretto for pronounced cases. 2. The lazaretto of observation, for those cases which may, or may

not, turn out to be infected. 3. The free or clean hospital, for accidents or non-susceptible sick. All the attendants of the first and second establishments, medical, clerical, and others, should be kept, if possible, in quarantine.

52. *g.* The bed, bedding, and every thing personal to the sick soldier, sent to either of the two first hospitals, should follow the fortunes of their owner. If the sick man should happen to die, his effects will thus remain where they can do no further mischief, viz., in the foul hospital; should he survive, they accompany him to the convalescent dépôt, and thence, after having undergone the most careful ablutions, fumigations, &c., to the suspected quarter within the fortress, on his return to duty.

53. Hospital bedding, properly so called, should be used, as in time of public health, in the clean hospital only. This, of course, implies that the bed and bedding of the unsuspected sick need not be removed from the tents or quarters of the healthy.

54. *h.* There should be three descriptions of camps and quarters, corresponding to the hospital establishments; the foul, the suspected, and the clean, or free. These should be kept distinct during the epidemic.

55. Convalescents from the foul and suspected hospitals should be returned to the fortress, after their recovery, placed in suspected quarters, and appointed to the lightest duties at first, distinct from the uninfected, until the return of public health.

56. *i.* The guards, and all other duties within the town and in the sheltered situations, should be reduced to the minimum consistent with the safety of the fortress; and, as soon as the original and convalescent non-susceptible soldiers are sufficiently numerous to perform these duties, the susceptible should no longer be permitted to participate in them.

57. *k.* The epidemic sick should, as far as practicable, be treated in detached tents, huts, or sheds, so placed and constructed as to admit of the most perfect ventilation. It will not be enough for the protection of the susceptible, nor for the benefit of the sick, that the latter be sent outside the gates. They must be so placed as not to be sheltered by the out-works from currents of cool air.

58. *l.* Should it so happen that troops in garrison, or otherwise in service, cannot furnish a sufficient number of non-susceptible (formerly attacked) orderlies for attending upon the infected, civil attendants of that class should be employed from the commencement.

59. *m.* In the pitching of tents, and particularly in the erection of boarded sheds, as temporary hospitals, places of seclusion, observation, &c., care ought to be taken that they be not huddled too closely together, and that they be so placed in regard to each other as to allow a free passage for currents of air; for nothing tends more effectually to prevent and to destroy the propagation of infection than open space and perfect ventilation.

60. *n.* The first and most important steps towards the saving of human life, on the breaking out of pestilence, being the early detection of it, and the firm, unhesitating announcement of its existence to the proper authorities, the chief medical officers, or those best acquainted

with its characters, should carefully observe and report upon all cases of sudden attacks and of malignant features.

61. *o.* When corps, detachments, re-enforcements, or armies are marching or changing quarters, care ought to be taken by commanding officers to cause all quarters, barracks, and encampments to be inspected by trustworthy and experienced medical officers, in order to ascertain their cleanliness, salubrity, &c.; and, as far as possible, the state of health of the previous occupants, and the existence or non-existence among them of any malignant, infectious, or febrile disease. The three pestilences above considered have severally been often propagated in this way to both troops and civilians; those departing carrying with them and imparting on their route the infection to others; while healthy troops have rapidly been infected upon arriving in the contaminated quarters which had been relinquished to them. This shows the necessity of using the most efficacious disinfecting means to all quarters and barracks that are in the least suspected, before healthy troops approach them.

62. *p.* When troops or detachments are upon march, care should be taken not to allow any of the men, or even of the officers, to enter towns or villages before the state of health of such town or village is inquired after by the principal and most experienced medical officer; and this inquiry should be made at the chief authorities and medical practitioners of the place. Want of attention to this, and to the immediately preceding precaution, has been the cause of the infection of healthy corps, on numerous occasions in the East and West Indies, with the pestilential cholera and yellow fever.

63. *C.* When pestilence is introduced into ships, especially transports, ships of war, and emigrant vessels, it will be most difficult, if not impossible, to prevent its extension to all susceptible persons in such vessel. Hence the necessity of the utmost precaution in preventing communication with ports in which even the suspicion of the existence of pestilence may be entertained. Trading vessels are, however, often bound to ports where one or other of the pestilences above considered is more or less prevalent, or where it sometimes breaks out during the continuance of the vessel in the port; and in such circumstances the infection of one or more of the crew generally occurs; for sailors usually frequent those places in which a pestilential malady generally makes its first appearance, or most commonly lurks, awaiting susceptible subjects, especially in regard to plague and hæmagastic pestilence, for its outbreak. Besides the infection introduced in the persons of sailors infected on shore, infection may be introduced in clothes, especially such as may have been previously worn, purchased by them and brought on board. Vessels, also, may be infected by incautious communication with other vessels, especially in the Mediterranean, and on the coasts of Africa and America, and more particularly with slave-ships.

64. When a pestilential malady thus appears in a vessel in port, the circumstance should be dealt with as follows: If the vessel have been infected in the port, the distemper existing at the time in the port or its vicinity, the person or persons attacked ought to be instantly land-



ed and taken, with all the precautions against the diffusion of the infection, to the hospital or place provided for pestilential cases, unsusceptible or formerly attacked individuals being employed for the removal, if they can be obtained. The vessel should be removed to some distance from others, and ventilation and purification resorted to. If the vessel have conveyed the disease from an infected place to a healthy port, especially during seasons and temperature which favour the propagation of the distemper, communications of all kinds ought to be strictly prevented with the infected vessel. She should be instantly placed in quarantine, in a suitable place, and health guards sent on board. The persons already infected ought to be sent to the quarantine hospital, and the susceptible non-infected removed to an observation hospital, ship, or place, and their clothes be carefully ventilated, cleansed, or fumigated. The vessel and articles in her capable of imbibing infectious emanations should be purified by non-susceptible persons.

65. The greatest risk of the introduction of pestilence, and of the diffusion of it among the crew, arises from the concealment, on the part of the captain of a trading vessel, of the illness or death of any of his passengers and crew, and from the preservation of the bedding and clothes of the infected, which are often concealed and smuggled on shore, or even openly preserved and sent home to the relatives of the deceased. It has been frequently found, in the quarantine ground at New-York, that the hæmagastic pestilence has reappeared in vessels after purification had been, as was supposed, sufficiently resorted to. This failure of the usual means of disinfection, in respect of these vessels, may have arisen from some articles of clothing or bedding having escaped notice or sufficient purification, or from the return of such articles to the vessel without due ventilation and cleansing; or from the circumstance of the infection having remained longer latent in the system before it developed its effects than is generally believed to be possible.

66. When the hæmagastic pestilence breaks out in a vessel within the tropics, it has usually been recommended, and practiced, to proceed forthwith to a colder climate, or to latitudes in which the range of temperature is below 60°; all the usual means of ventilation and disinfection being at the same time employed. In some circumstances this measure may be judicious. But it should not be depended upon when the vessel, especially a ship of war or transport, is so circumstanced as to admit of the instant removal of the infected into a quarantine or other appropriate hospital, and of the susceptible non-infected into an observation hospital or ship, and of the immediate disinfection of the ship. The great errors, in many instances of the outbreak of this pestilence in war-ships within the tropics, have been, 1st. The non-recognition of the distemper by the medical officers; 2d. The too frequent denial of its infectious character, and the proceeding upon that supposition; and, 3d. The neglect of measures based upon its infectious character, and especially of the immediate separation of the infected, and the removal of them to the pestilential hospital, even when such removal could have been carried into effect.

67. The sending of a vessel to sea ought never to be enforced where the means of immediate separation of the sick and suspected, and of purification, can be carried out in the place or port where the vessel lies; for, by doing so, the infection of the whole susceptible persons in the crew, or among the passengers, is thereby ensured before she can possibly reach a temperature so low as to put a stop to its extension. In cases of ships of war or transports, the captain should be advised to proceed to the nearest port where these measures can be enforced with all the precautions of quarantine, and without endangering the inhabitants of the port; and a recourse to a colder climate should not be entertained unless it may be certainly reached in a much shorter time. But the distemper may appear in vessels in such places and circumstances as preclude the possibility of reaching either a suitable port or a colder climate, within a period likely to save the crew, or at least a large proportion of them. In this dilemma, and even while the attempt to reach either of these destinations is being made, the resources of the medical officer, as well as of the captain, become of the greatest importance, and, if wisely directed, are always most advantageous.

68. In the circumstances now adverted to, every means of ventilation consistent with the safety of the ship should be enforced. The hatches and gun-ports ought to be constantly open, and wind sails carried down to the lower decks and hold. The infected should be removed instantly upon being attacked from among the crew to a well-ventilated place upon the upper or gun-deck, and be excluded as much as possible from all persons but the unsusceptible or those who have been formerly attacked, and these latter should be made attendants on the sick. The sick-berth should be separated by a bulkhead or partition, and be in the best ventilated part of the ship. A number of the crew of a ship in which I was a passenger many years ago, had been exposed to the infection of pestilential yellow fever; and as they were attacked I advised them to remain on deck under an awning, a free perfusion of air existing around them. The accumulation of infectious emanations was thus prevented, and the distemper extended no farther than to one only of the crew who was not exposed to infection in the first instance. The seclusion of the infected and ventilation should be rendered as perfect as possible; and all the evacuations ought to be instantly removed in covered vessels and immersed in the sea, without uncovering them until actually immersed. Various disinfecting agents, especially the solutions of the chlorides, the vapour of creosote, &c., may be employed, but they should never interfere with a recourse to every possible means of ventilation, to which they should always be subordinate in importance, as they are in efficacy.

69. II. PROTECTION OF INDIVIDUALS, FAMILIES, OR CLASSES FROM A PREVAILING PESTILENCE.—When pestilence exists in a city or place, or when measures have not prevented the introduction of it, much may be accomplished by cautiously devised means either of avoiding it, or of enabling the frame to resist it. The most certain way of escape is,

70. 1. DEPARTURE FROM THE SPHERE OF INFECTION, OR STRICT SECLUSION OR QUARANTINE.—Departure from the infected city or place is protective to all such as have not been exposed to the emanations from the sick, and from fomites, previously to their departure. In the Levant, European consuls and merchants generally observe strict seclusion during the prevalence of plague, but the seclusion is enforced with great difficulty in respect both of persons and effects, more especially body-clothes, &c. Moreover, when seclusion is attempted in a house or mansion forming part of a street, or within the walls or limits of a town, the atmosphere around the place of seclusion may be so contaminated by the numbers of sick and dead as to become more or less infectious to the inmates of the secluded residence; and the winds or currents of air may convey the infection into the very apartments of such residence. This circumstance fully explains the failure of seclusion in affording protection in the comparatively few instances in which seclusion has failed.

71. A. *In order, therefore, that protection may be with great certainty procured*, departure from an infected town or place should be immediate upon the ascertainment of the existence of pestilence, and before the pestilence has extended itself to many of the inhabitants; for, if it have spread far, or if cases of it have occurred in most of the quarters of a city, it is impossible to determine who is, or who is not, already infected, although not yet attacked, and the distemper may be conveyed to healthy localities in the persons or effects of those who may then depart. Indeed, this contingency has been often observed as regards each of the three pestilences in question. The same remark equally applies to seclusion or quarantine within or near an infected city or place; for, if the seclusion be too long delayed, some one of the persons about to be secluded may have been exposed to the infectious effluvia, and be attacked several days after this precaution has been adopted, and thus introduce the distemper among the secluded party. In this case, the farther extension of the malady may be prevented by the immediate removal of the person attacked, with his personal effects, from the place of quarantine; but the removal should be effected, if possible, by non-susceptible persons.

72. Those who may be unable to depart from an infected place, or to seclude themselves, should carefully avoid a too near approach to any person either in a street or in a house, and more especially to those who are strangers. Above all, they ought to avoid the breath or the expired air from another person; and they should not enter the houses or apartments of any one unless there is the fullest evidence of immunity from infection. But even when no risk may be anticipated, persons or articles may be in these houses at the time which may endanger those who approach them. If any danger exist as regards the reception-rooms of a house, the danger is greater in respect of the sleeping apartments. Great caution should, also, be exercised as respects articles of clothing, beds, and bed-clothes. During seasons of pestilence, the linen of a family ought not to be sent out of the house; it should be cleaned at home; and care ought to be taken that this precaution extends to the servants more espe-

cially; and no beds, bedding, or clothes, more especially such as may have been previously used, ought to be admitted. Strangers, and particularly those with effects, ought to be excluded as much as possible, unless they come direct from healthy and uninfected places.

73. B. *Restrictions should be imposed on those departing from an infected locality*, in order that they may not convey the pestilence to the places of their destination, and that they may be received in these places in such a way as may least endanger the safety of the inhabitants.—a. Persons who appear to be already attacked, or those who have members of their families attacked, or who have recently lost any of their family, either should not depart for a healthy locality, unless the departure be to a country residence or house, secluded from other houses, or should be subjected to strict quarantine before being admitted into towns, cities, or ports.

74. b. All persons leaving infected places ought to obtain from the Medical Board, or Board of Health, which should exist in all cities and large towns, certificates of the probable degree of immunity from infection existing in their individual cases, to be produced to the authorities of the places to which they are about to proceed. The information supplied by persons requiring these certificates may be verified by the messengers of the board.

75. c. Persons already infected, and suspected cases, instead of being allowed to depart for healthy towns, should be removed to quarantine, infected, or observation hospitals, according to the circumstances of each case, and not be permitted to endanger the inhabitants of an uninfected place until due precautions have been strictly enforced.

76. d. It is obvious that, if certain restrictions are requisite on persons departing from an infected place, they are still more necessary for those who arrive at an uninfected city or port; and more especially for those who come from an infected part. On these latter, a due period of observation and quarantine should be imposed, when the circumstances of the locality or town are such as admit of the restriction being duly enforced. The chief difficulty is the determination of the period of observation or quarantine in each of the pestilences in question. When persons have already passed some time from leaving an infected place before arriving at their destinations, a proportionate abridgment of the period of quarantine may be allowed, especially if no sources of infection existed at any place in their routes. In the case of a person arriving directly from an infected place not far distant, there is every reason to believe that a quarantine of fourteen days would afford sufficient protection, in respect of any of the pestilences now considered. But the clothes and personal effects of this person should be immediately opened up and ventilated.

77. e. In all cases, where the clothes, linen, and bedding are infected, or even suspected, disinfecting agents should be applied to them. Of all disinfectants, high ranges of temperature are the most efficacious; and the best method of employing a high temperature, with the view of decomposing the morbid effluvia retained by the bedding or clothes of persons who have



laboured under pestilential and infectious maladies, is that invented by Mr. DAVISON and Mr. SYMINGTON, who recommend the transmission of heated air through a chamber in which these articles are suspended, the temperature of the air being raised to grades varying from 200° to 250° of FAHRENHEIT. The great advantage of this method is its easy applicability to all kinds, and to any number, of objects and articles,\* without injury to their textures or fabrics.

78. ii. PROTECTION BY SUCH MEANS AS MAY ENABLE THE CONSTITUTION TO RESIST INFECTION.

—A. There are four facts which should be kept in recollection, as being intimately connected with the adoption of preservative measures against pestilence: 1st. That a specific principle or effluvium, probably of a parasitic or organic nature (PESTILENCE, SEPTIC, § 137), proceeding from the diseased, is necessary to the communication of the malady. 2d. That this specific effluvium is inhaled with the air into the lungs when a person sick of either pestilence is too nearly approached; and that the infecting effluvium invades the susceptible frame chiefly through the respiratory passages and organs. 3d. That a predisposition to become affected by this effluvium is requisite to infection by it, or a susceptibility of infection. In what this susceptibility consists can hardly be determined with precision in many cases, and as respects each of the kinds of pestilence, although there is sufficient reason to believe that the causes of predisposition described above, with reference to each of these distempers, are more especially concerned in producing it; and, 4th. As regards two of these maladies, at least, a previous attack destroys this susceptibility. Upon these facts all prophylactic measures should chiefly be based.

\* MESSRS. DAVISON and SYMINGTON, civil engineers, have employed heated air, in various modes, both in currents and otherwise, and in various grades from 60° to 600°, and for numerous purposes—for the drying and seasoning of timber, for the prevention of dry-rot, for the drying and preserving of animal and vegetable substances, for cleansing casks, and for preventing mouldiness, and the formation of fungi, and other parasitic productions; for disinfecting foul clothing, feather and wool beds, mattresses, &c.; and have obtained patents for the application of heated air to all these, and various other purposes. Their experiments prove that currents of heated air, of 250° and upward, may be passed through linen and cotton articles, for the purpose of disinfection, without injury to their textures, and that woollen and other animal productions, as feathers, feather beds, wool beds, hair mattresses, cloths, flannels, &c., will not be injured by a temperature of 240°. It is obvious that the application of this method to the purification or disinfection of all kinds of bedding, and bed and body-clothes, used in hospitals, ships, prisons, &c., will be of the utmost advantage. Even to private families it will often prove most beneficial, especially in arresting the progress of infectious diseases, to transmit the contaminated beds, bed-clothes, &c., to a place where this mode of purification and disinfection is employed. On the occasion of smallpox, scarlet fever, typhus, or measles having infected one or more members of a family, the infection being, possibly, limited to one chamber or floor of the house, and due precaution being taken so to limit it, the properly-constructed and carefully-closed cart of the establishment might remove the contaminated articles to the place of disinfection, and return them in a very short time, thereby preventing the extension of the malady to the rest of the family, or to other persons by that medium which is most likely to transmit the infection. In these maladies, and still more remarkably in pestilential distempers, this method of disinfection deserves a general adoption, in respect both of its great efficiency and of its universal applicability. When feather beds, or woollen and hair mattresses, have become foul or impure, as they must necessarily become when in long use, especially in hospitals, prisons, ships, &c., this method of purification is particularly necessary. The beds used in lying-in-hospitals ought frequently to be subjected to this process, in order to prevent puerperal fevers and diseases.

79. As respects the first and second of these, the measures above recommended, in order to prevent exposure to infection, are the most efficient, the great object being to avoid intercourse with such persons as are most likely to have been among the infected, and a near approach to contaminated articles. The predisposing and concurring causes of the distemper, as far as they are known, ought to be avoided. There is much reason to believe that whatever tends, directly or indirectly, to exhaust the vital energy, especially excesses of every kind, low and unwholesome diet; exposure to cold chills, wet, night-dew, &c.; the use of cold fluids, of cold, flatulent, and unripe fruits, will favour the invasion of pestilential infection. On the other hand, whatever supports the energy and preserves, in their due regularity, the several functions of the frame, will render the body less susceptible of infection.

80. If at any time exposure to the night air, or to cold and moisture, is inevitable, the system should be fortified against them, but not, unless when better means are not within reach, by wines or spirits; for these should be used in very moderate quantity, otherwise they will leave the system, as soon as their stimulating effects have passed off, more predisposed than before to the invasion of the infectious effluvium. Medicinal tonics, however, and those more especially which determine the circulation to the surface of the body, at the same time that they improve the tone of the digestive organs, and promote the regular functions of the bowels and biliary system, may be resorted to on such occasions. For this purpose, the infusions or decoctions of bark, of cascarilla, of columba, &c., with the spirits of MINDERER, or any warm stomachic medicine; or the powdered bark, or the sulphate of quinine, or the balsams, may be taken either alone or with camphor, or with the aloes and myrrh pill, and any one of the spicy aromatics.

81. *B. Olive oil* has been much employed, both in Spanish America and in the Levant, not merely for the cure, but as a prophylactic, of pestilential distempers: in the former countries, with lime-juice, in the hæmagastic pestilence; in the latter, both internally and externally, for the plague. It is usually given in full and frequent doses in both distempers; and, from the information I have derived from various quarters, it appears to be deserving of a much more extensive trial in these pestilences than it has hitherto received from European physicians. As a prophylactic, it has usually been employed externally with slight friction, after coming out of the warm bath. It is much employed in both hemispheres by the native practitioners of medicine.

82. *C. The diet* should be regular, moderate, nutritious, and easy of digestion. While every approach to low living should be shunned, its opposite ought never to be indulged in. The stomach should have no more to do than what it can perfectly accomplish, without fatigue to itself, but to the promotion of its own energies. It must never be roused to a state of injurious excitement by means of palatable excitants, nor weakened by over-distention, or too copious draughts of cold, relaxing diluents.

83. Care should be taken never to be exposed to the morning or night air with an empty

tomach. A cup of coffee previous to such exposures will be serviceable. The state of the bowels should be always attended to, and their functions regulated and carefully assisted; but in no case should this be attempted by cold, debilitating medicines, such as salts. The warm stomachic laxatives, or those combined with tonics, may be adopted with advantage as occasion may require.\*

84. Particular attention ought to be paid to personal and domestic cleanliness. The surface of the body should be kept in its natural and perspirable state. The constant use of flannel nearest the skin will be serviceable for this purpose. Excessive perspirations ought to be avoided.

85. During the existence of either of the pestilential diseases in our vicinity, or family, these precautions are still more imperatively required. A free ventilation of every apartment ought to be constantly observed; in conjunction with fumigations, by means of aromatic substances kept slowly burning, or by the vapour of the chloride of soda or of lime. If a quantity of a very weak solution of the chloride of lime be put in a vessel, and some muriatic acid poured on it, and placed in the hall, or the very lowest parts in a house, the disengaged gas will soon find its way in sufficient quantity to the higher apartments.† The attend-

\* Any of the following recipes may be employed for the purposes here recommended:

No. 319. R Decocti cinchonæ, ℥ivss.; liq. ammon. acetat., ℥ss.; spirit. ammon. arom., ʒij.; tinct. capsici annui, ℥xx.; spirit. pimentæ, ʒij. Misce. Fiat mist. cujus capiat coch. j. vel ij. vel iij. pro re nata.

No. 320. R Infusi Cascariæ, ℥vjss.; potassæ subcarbon., ʒj.; tinct. auranti comp., ʒiij.; spirit. lavandul. comp., ʒjss. M. Fiat mist. cujus capiat cochlear., ij. vel iij. larga, mane nocteque.

No. 321. R Quinina sulphatis, ʒj.; massæ pilulæ aloës et myrrhæ, ʒss.; Extr. Anthemidis, ʒj. M. Fiat pilulæ xx. quarum sumatur una mane nocteque.

No. 322. R Camphoræ rasæ, ʒj.; extr. gentianæ; pilul. aloës cum myrrhâ, ʒâ, ʒss.; pulv. capsici, gr. xv., sirupi simp., q. s. M. Fiat pilulæ xxiv. quarum capiat binas mane nocteque.

No. 323. R Camphoræ rasæ, ʒj.; pilulæ galbani comp., ʒss.; quinina sulphatis, gr. xii.; pulv. capsici annui, gr. xx.; balsami Peruvienis, ʒj. Fiat pilulæ xxx. secundum artem, quarum capiat binas primo mane ac nocte.

Shortly before the sailing of the Niger Expedition, sent out by government, a physician, one of the naturalists to the expedition, called upon me, he having heard that I had been in or near that part of Africa to which he was about to proceed. During our interview, I advised him to take three grains each of camphor, sulphate of quinine, and capicum, night and morning, during the period of his exposure to the malaria proceeding from the low grounds near the banks of the river, and to increase the dose to five grains of each when the exposure was greater than usual, or the malaria more concentrated. This gentleman called upon me, upon the return of the expedition, to thank me for my advice, which he had followed, and he informed me that he had not experienced a single day's illness.

† Dilute one part of the concentrated solution of the chloride of lime with fifteen parts of cold water, and stir the mixture for a few minutes.

Place an open earthen vessel, containing a quart of the diluted solution, in the current of air entering the room or place to be disinfected, and pour into it a wineglassful of the hydrochloric acid: perfect purification will very speedily take place. In about an hour fresh air should be admitted as freely as possible. If clothes supposed to be infected are suspended in the room during this process, they will be readily purified.

To disinfect rooms in which sick persons are confined (who would be incommoded by the above rapid mode of purification), wet a linen cloth with the diluted solution, and suspend it in the place to be disinfected: it will require renewal two or three times a day. Night-chairs, or any vessels in which putrid animal or vegetable matter has been kept, will be immediately disinfected by rinsing them with the diluted solution; a small quantity of which may afterward be allowed to remain in them while in use.

ants on the sick should particularly observe the measures now prescribed, and ought never to bestow their attentions on the affected so near their persons as to inhale the effluvia emanating from them, without at least fortifying the vital energies in the way pointed out; and they should carefully avoid entering upon those duties with an empty stomach, or when fatigued.

86. Besides burning warm aromatic substances, and odoriferous gum-resins, in the apartments, and in those adjoining them, in which affected persons are or have been confined, a saturated solution of camphor in aromatic vinegar, or in the pyroligneous acid, should be occasionally sprinkled on the floors, furniture, and bed-clothes. These means, with a thorough ventilation, and a due attention to cleanliness, will not only counteract the influence of the effluvia proceeding from the affected, and ward off its action even on the predisposed, but will also prevent the clothes, bedding, or furniture of the apartments of the sick from becoming imbued with it so as to communicate the malady. They are within the reach nearly of all; and, in the event of the extension of pestilence to any considerable town or city, if care were taken to see them put in practice, under the direction of medical councils of health, one of which should be formed in each district, or quarter, much good would result from them. Keeping in recollection the principle with which I set out, namely, that the exciting cause of the disease undoubtedly makes its first impression on the lungs, the advantages of those measures, from the circumstances of their being applied especially to this organ, must be obvious.

87. *D. The state of the mind* also requires judicious regulation. It ought never to be excited much above, nor lowered beneath its usual tenor. The imagination must not be allowed for a moment to dwell upon the painful considerations which pestilence is calculated to bring before the mind; and least of all ought the dread of it to be encouraged. There is a moral courage sometimes possessed by individuals who are the weakest, perhaps, as respects physical powers, enabling them to resist more efficiently the causes of infectious and epidemic diseases, than the bodily powers of the strongest, who are not endowed with this mental energy. Those who dread not attacks of diseases, and who yet exercise sufficient prudence in avoiding unnecessary exposure to their predisposing and exciting causes, may justly be considered as subject to comparatively little risk from them. This, I am persuaded, is particularly the case as respects the pestilential cholera, and I wish to impress it upon the minds of those whom the observation concerns. On all occasions a fool-hardy contempt or neglect of ailments, especially those affecting the stomach and bowels, ought to be guarded against, and the best medical advice be immediately procured upon the first manifestation of disorder.

#### [APPENDIX.]

Professor CHARLES CALDWELL, of Louisville, Ky., has written a very able treatise on the

To disinfect drains, sewers, and water-closets, a quantity of clean water should first be thrown down them, and afterward one or two gallons of the above diluted solution.



contagiousness of plague, yellow fever, and cholera, which was crowned with the Boylston medical prize of Harvard University for 1834. To this essay the reader is referred for a vast amount of information in opposition to the contagiousness of these diseases. Dr. C. is, accordingly, opposed to all quarantines, regarding them as founded in error and superstition, and a relic of barbarous times. "Nothing," he remarks, "in the history of despotism can surpass them. Though professedly intended for the benefit of man, they are strangers, within their sphere, to human right and human sympathy. To say they make sport and food of the sufferings and misfortunes of man, would scarcely be extravagant. They may, and often do, prohibit at pleasure, during indefinite periods, and under heavy penalties, all forms of business, and, as far as they can, of social intercourse, whether public or private; invade personal freedom, by confining those who become obnoxious to them to their own dwellings, or in places worse than common prisons; assume the right to destroy property, to the ruin of its owners, on mere supposititious grounds, and have been frequently carried to the taking away of life. The modifications that have been made in them have been far from keeping pace with the progress of that branch of science by which they should be regulated. They manifest, therefore, no practical wisdom, and have done no appreciable good. I speak of the evil they constitute, as it prevails throughout the world. In the United States, and a few other places, it is somewhat mitigated, but is still sufficiently annoying in its operations and grievous in its effects. Quarantine establishments, then, are still the product of the fourteenth, with but little affinity to any of the institutions of the nineteenth century. That consideration alone renders them objects of well-founded suspicion, the date of their origin being, in so high a degree, unfriendly to truth and usefulness in all that depends on physical science."

With respect to the contagiousness of plague, we are not so particularly interested, perhaps; but it is nevertheless well to reflect, that the British government has long maintained quarantines in London, Liverpool, Bristol, Portsmouth, Falmouth, Milford, and all other ports between which and the whole country of the Levant, and, indeed, every Oriental place of business visited by plague, an extensive intercourse by commerce has been constantly maintained; and yet, although suspected cargoes that have entered them have been opened, examined, and familiarly handled in innumerable cases, for nearly two hundred years, no opener, inspector, or cleanser of reputedly infected goods in them has ever sickened of plague; nor has a single patient affected with that disease been received into their lazarettoes. The same remark will apply to vessels from the Levant arriving in this country. With respect to the yellow fever, there can be no doubt, as stated by Dr. CALDWELL, that when the disease first broke out in Philadelphia, in 1793, the views of the physicians of our country respecting it were directly the reverse of what they are now. The belief in its contagiousness was universal; hence the wide-spread panic produced, and the nu-

merous barriers that were erected to prevent it from overrunning the land. From that time to this, quarantines, more or less rigid, have existed in nearly all our Atlantic ports, but with a gradual relaxation, until, at the present time, when some of them, as New-Orleans and Mobile, have no quarantine whatever. There can be no doubt whatever that the port regulations of this city, for example, have been needlessly oppressive and vexatious, previous to their recent modification (1846), and that they are still unnecessarily stringent. We have seen, that although vessels have been allowed to come to, and unload at the wharves of Brooklyn for the last thirty years, where the population is as compact as in New-York, there has not been a single case of yellow fever communicated to the inhabitants, nor has there been the slightest fear of such a result. Quarantine regulations should form a part of a general code of sanitary discipline, and the quarantine board should be but a branch of a general board of health.

We are not aware that there is a particle of evidence to show that the yellow has ever been imported by the *sound* cargoes of vessels coming from infected ports; and, even with respect to the bed or body clothes of passengers, the risk of its introduction in this way is very small indeed; though it will always be prudent to avoid this risk, especially as it can be done with so little trouble and expense. More attention ought to be paid to the condition of ships' holds than is usually the case. It is universally agreed that a foul hold is a not unfrequent cause of bad fever on board—a fever that may eventually acquire an infectious character. If the duration of quarantine was made to depend on the state of the vessel, rather than the port from which it came, or the time of year it may arrive, much expense and delay might be saved, and the public health be equally protected.

The great object of sanitary establishments should be to keep the atmosphere in a pure condition, for even infectious diseases cannot spread under such circumstances; foul ships and damaged cargoes should, therefore, be excluded until rendered innocent by purification, because they tend powerfully to vitiate the air of the place. The mode of effecting this must be adapted to the nature of the articles to be purified, and the depth of their contamination. "In all cases and kinds of cleansing," says Dr. CALDWELL, "the only means to be confidently relied on are pure air, pure water, soap, sand, brushes and sponges, or cloths, to wipe with. These agents, skilfully applied, are competent to the cleansing of all articles worth preserving; and fire alone can purify the rest." We believe, however, that fumigation with the acids and chlorides, perhaps sulphur, is important, where *fomites* are suspected. But the process of purification should depend on the circumstances of the case, as well as the period of detention. For this reason, they cannot be specified, but should, in all cases, be left to the judgment of the health officer. "Vessels may accomplish all that is required," says Dr. SMITH, the quarantine physician of Boston, "in three hours as well as three days, unless the circumstances are of a very marked character, requiring time for some anticipated develop-

ment of disease supposed to exist on board." In Baltimore no vessel has been detained over four days, for the last twenty years, except in cases of smallpox. In the port of Boston no vessel is required to stop at the quarantine ground at all, but is piloted directly before the city, where it is inspected. If the crew are well, and have been so during the voyage, and the bill of health speaks favourably of the public health at the port of departure, the vessel is allowed to approach the wharf and discharge, without any reference to the kind of cargo on board, although the inspectors are not allowed to permit any thing to leave the ship in a damaged condition. The sick are sent to the different hospitals, according to the nature of their complaints, if they have neither friends nor homes; if they have either, they are permitted at once to leave the vessel and go to them. Infectious cases only are subject to quarantine detention, as smallpox, ship fever, &c. Damaged goods are sent to the quarantine to be aired, dried, washed, cleansed, &c., as circumstances require. Vessels are sent there when there is a prospective danger from them, if permitted to remain in the city, but not without. Hides, skins, hair, wool, rags, carpets, feathers, &c., are landed freely at all times of the year, and with perfect immunity. Under this system, which is based on common sense principles, there has not been a case of yellow fever in Boston in the last twenty years. We regret that the quarantine regulations of our own port (New-York) are not equally judicious. For example, according to the recent revision of our health laws, "Vessels arriving at the port of New-York shall be subject to quarantine as follows: All vessels direct from any place where yellow, bilious malignant, or other pestilential or infectious fever existed at the time of their departure, or which shall have existed at any place, and proceeded thence to New-York, or on board of which, during the voyage, any case of such fever shall have occurred, arriving between the first day of May and the first day of October, shall remain at quarantine for at least thirty days after their arrival, and at least twenty days after their cargo shall have been discharged, and shall perform such farther quarantine as the health officer shall prescribe." We doubt whether a physician can be found in the United States who will say that such a regulation as this is necessary.

In all our other Atlantic ports detentions of more than four days are rarely required. We have yet to learn what evils have arisen from the practice. The Board of Health of Philadelphia have power to detain a vessel at the lazaretto not exceeding twenty days, if it appear that it has come from a port at which a malignant disease prevailed; but this is rarely done. In Baltimore the whole subject is left to the discretion of the health officer, and so, also, in Charleston and Savannah. Our limits do not allow us to go into greater detail. In conclusion, we say, with Prof. CALDWELL, "in every sanatory establishment a hospital should be included, as well as suitable buildings, grounds, and apparatus for cleansing and storing goods and merchandise. Into the former should be received all sick persons arriving on board of ships, and sailors who may sicken in

port; not because they would endanger the health of the city by being lodged and attended elsewhere, but because their accommodations and chance of recovery might not be so good. The healthy portions of the crews and passengers of sickly ships may go on shore immediately, free from all restraint, care being taken that their persons and clothes are clean. No filth, however small in quantity, should be conveyed into the city from without. Under the best-regulated police, every crowded place of commerce has filth enough of its own. Let ships, cargoes, bedding, persons, and wearing apparel be thus purified, and all other necessary measures be pursued to enforce domestic cleanliness and prevent the formation of malaria, AND THE DREAD OF IMPORTED PESTILENCE MAY BE SAFELY DISMISSED."]

BIBLIOG. AND REFER.—*T. Gibson*, A Treatise befove-  
 full to preserve the People from Pestilence, &c., 4to.  
 Lond., 1536.—*L. Fioravanti*, Regimento della Peste, 8vo.  
 Ven., 1565.—*F. Hering*, Certain Rules, &c., for the Pre-  
 vention of the Plague, 4to. Lond., 1625.—*J. du Chesne*,  
 La Peste reconnue et combatue; ensemble la Reformation  
 des Theriaques et Antidotés opiatiques, &c., 12mo. Paris,  
 1631.—*Anon.*, Certain necessary Directions as well for the  
 Cure of the Plague as for preventing the Infection, 4to.  
 Lond., 1636.—*J. Guastaldi*, Tractat. de Avertenda et Profi-  
 ganda Peste urbem invadente, &c., fol. Bologna, 1634.—  
*L. A. Muratori*, Del Governo della Peste, e della Maniera  
 di guardarsene, trattato Politico, Medico, ed Ecclesiastico,  
 8vo. Milan, 1721.—*J. Broune*, Antidotaria, or a Collection  
 of Antidotes against the Plague, 8vo. Lond., 1721.—*M.*  
*Pestalossi*, Avis de Précaution contre la Maladie Conta-  
 gieuse de Marsilles, &c., 12mo. Lyons, 1721.—*J. Col-  
 batch*, A Scheme for proper Methods to be taken, should it  
 please God to visit us with the Plague, 8vo. Lond., 1721.  
 —*T. Lobb*, Letters relating to the Plague and other Conta-  
 gious Diseases, containing Rules for a suitable Manage-  
 ment when that Sickness shall be brought into a City,  
 Army, or Navy, and proper Preservatives from it, &c., 8vo.  
 Lond., 1765. (*A singular, somewhat curious, and yet a good  
 book*).—*E. Langner*, L'Art de faire cesser la Peste, &c.,  
 8vo. Paris, 1784.—*J. P. Papon*, De la Peste; ou Epoque  
 mémorable de ce Fleau, et des Moyens de s'en préserver,  
 2 tomes, 8vo. Paris, 1797.—*A. B. Granville*, A Letter,  
 &c., on the Plague and Contagion, with reference to the  
 Quarantine Laws, 8vo. Lond., 1819.—*L. J. M. Thomas*,  
 Guide Sanitaire des Gouvernemens Européens, ou Nouvelles  
 Recherches sur la Fièvre Jaune et le Cholera Morbus, &c.,  
 2 tomes, 8vo. Paris, 1826.—*F. E. Fodéré*, Leçons sur les  
 Epidémies et l'Hygiène Publique, t. iv., p. 167.—*Pariset*,  
 Annales d'Hygiène Publiq., t. vi., p. 243, Paris, 1831.—*D.*  
*Barry*, in Lond. Med. and Phys. Journ., vol. lxiv., p. 476.—  
*J. Copland*, Of Pestilential Cholera, its Nature, Prevention,  
 and Curative Treatment, 8vo. Lond., 1832, p. 95.—*Lagas-  
 quie*, Recherches sur l'Origine de la Peste, et les Moyens  
 d'en prévenir la Développement, 8vo. Paris, 1833.—*Segur*—  
*Dupeyron*, Recherches Historiques et Statistiques sur les  
 Causes de la Peste, 8vo. Paris, 1837.—*J. Bowring*, Ob-  
 servat. on the Oriental Plague, and on Quarantines as a  
 Means of arresting them, 8vo. Edin., 1838.—*A. Holroyd*,  
 The Quarantine Laws, their Abuses and Inconsistencies,  
 8vo. Lond., 1839.—*E. Lefèvre*, Essai Critique contre les  
 Adversaires de la Contagion par Infection appliqué à la  
 Peste, Alexandria, 8vo, 1838; et Propositions sur la Cause  
 et la Contagion de la Peste, 8vo. Alexand., 1839.—Reports  
 of the Commissioners for inquiring into the State of large  
 Towns, &c., 4 vols., 8vo. London, 1845.—*G. Milroy*, Quar-  
 antine and the Plague, &c., 8vo. Lond., 1846; and Med.  
 and Chirurg. Review, No. 90, p. 256.—*A. Waite*, On Plague  
 and Quarantine, &c., 8vo. Lond., 1846. See, also, the  
 BIBLIOGRAPHY to the several Articles on Pestilence.

PHARYNGITIS. See THROAT, DISEASES OF.  
 PHLEBITIS. See VEINS, INFLAMMATION OF.  
 PHLEGMASIA ALBA DOLENS.—SYNON.—  
*Phlegmasia Dolens*, Hull. *Phlegmasia Lactea*,  
 Levret. *Echymoma Lymphatica*, Parr. *Ana-  
 sarca Serosa*, Cullen. *Echyma Edemati-  
 cum*, Young. *Sparganosis Puerperarum*, Good.  
*Phlebitis Cruralis*, Davis, Lee. *Cruritis*, Ho-  
 sack. *Edema Lacteam, Metastasis Lactis*,  
 Auct. Var. *Edème des Nouvelles Accouchées*,  
*Dépôt lacteux*, French. *Milchstreichen*, Germ.  
*Crural Phlebitis, swelled leg of Lying-in Wom-  
 en; Puerperal tumid leg.*



CLASSIF.—III. CLASS, I. ORDER (*Author*).

DEFIN.—i. NOSOLOG. DEFIN.—*Painful and tense swelling of one or both legs, attended by fever, and running an acute and definite course, occurring most frequently after delivery.*

2. ii. PATHOLOG. DEFIN.—*Inflammation or obstruction, or both, of the veins, lymphatics, and lymphatic glands, sometimes attended by inflammation of the adjoining nerves, most frequently occurring after delivery; but sometimes appearing independently of the puerperal states, and consecutively of other diseases, mechanically or otherwise implicating the veins, absorbents, and nerves of a limb.*

3. Having sometimes met with this disease in various circumstances as the sequela of other maladies, independently of the puerperal states, I have not considered it under the head of PUERPERAL DISEASES. Whether occurring after delivery, or in other circumstances, it evidently does not present the same appearances and symptoms in all instances; and in fatal cases the morbid changes are also not always the same. Owing to these causes, opinions have lately differed widely as to its nature, and to these opinions I shall more particularly refer.

4. I. HISTORY.—This affection was first noticed by RODERIC A CASTRO and WISEMAN; but MAURICEAU first described its symptoms, and referred them to pathological states. He appears to refer many of the symptoms to the femoral nerve; but Dr. LEE supposes him to have mistaken the femoral vein for the nerve. PUZOS and LEVRET subsequently described the disease, and considered it to proceed from metastasis of the secretion of milk. The former states that it is a painful and sometimes fatal malady, occurring frequently about the twelfth day after delivery, although sometimes as late as the sixth week. The description of LEVRET coincides with that of PUZOS, and both refer the disease to the crural vessels; especially in their accounts of the symptoms, although they view it as proceeding from a "*dépôt de lait*." According to Mr. CRUICKSHANKS, Dr. WILLIAM HUNTER did not subscribe to the opinion of PUZOS, and did not view it either as a metastasis of the milk, or as a cold of the limb, as it was considered by some. Mr. TRYE published, in 1782, an essay on the disease, in which he referred the symptoms to rupture of the lymphatics as they cross the brim of the pelvis under POUPART'S ligament. Mr. WHITE soon afterward published on this affection, and suggested the opinion that it depends on obstruction, detention, and accumulation of lymph in the limb, or some other morbid condition of the lymphatic glands and vessels of the part. Mr. WHITE saw fourteen cases, but they all recovered. Dr. FERRIAR next maintained that the disease proceeded from inflammation of the absorbents. In 1800, Dr. HULL published an essay on phlegmasia dolens, in which he showed that all the phenomena could not be explained by referring them to inflammation of the lymphatics only; he therefore viewed them as the results of an inflammatory state of all the textures of the limb—of blood-vessels, lymphatics, glands, nerves, cellular and muscular tissues, causing an effusion of serum and coagulating lymph; but he furnished no case in which the appearances observed on dissection supported this view.

5. It is a remarkable circumstance, as Dr.

R. LEE has remarked, that nearly a century and a half should have elapsed since the time when this disease was pointed out by MAURICEAU, before the precise nature of it was attempted to be ascertained by dissection. There had been opportunities to determine the accuracy of the different opinions advanced as to its nature and origin, but these were neglected until 1817, when Dr. DAVIS examined the body of a patient who died of it; and the appearances were described by Mr. LAWRENCE. The left lower extremity was œdematous, without external discoloration from the hip to the foot, owing to effusion into the cellular tissue. The inguinal glands were a little enlarged, but pale-coloured. The femoral vein, from the ham upward, the external iliac, and the common iliac veins, as far as the junction of the latter with the corresponding trunk of the right side, were distended and firmly plugged with what appeared externally a coagulum of blood. The femoral portion of the vein, slightly thickened, and of a deep-red colour, was filled with a firm bloody coagulum, adhering to the sides of the tube, so that it could not be drawn out. As the red colour of the vein might have been caused by the red clot everywhere in contact with the vein, it cannot be deemed a proof of inflammation. The trunk of the vena profunda was distended in the same way as the femoral vein; but the saphæna and its branches were empty and healthy. The substance filling the external iliac and common iliac portions of the vein was like the laminated coagulum of an aneurismal sac. The tube was completely obstructed by this matter, more intimately connected to its surface than in the femoral vein; adhering, indeed, as firmly as the coagulum does to any part of an old aneurismal sac; but in its centre there was a cavity containing about a teaspoonful of a thick fluid of the consistence of pus, of a lightish-brown tint, and pultaceous appearance. "The uterus, which had contracted to the usual degree, at such a distance of time from delivery, its appendages and blood-vessels, and the vagina, were in a perfectly natural state. There was not the least appearance of vascular congestion about the organ, nor the slightest distention of any of its vessels. Its whole substance was pale, and the vessels everywhere contracted and empty." (*Transact. of Med. and Chirurg. Society*, vol. xii., p. 427.)

6. An essay was read by Dr. DAVIS, on the 6th of May, 1823, to the Medical and Chirurgical Society, with the object of proving that the proximate cause of the disease, called phlegmasia dolens, is an inflammation of one or more of the principal veins within, and in the immediate vicinity of the pelvis, producing an increased thickness of their coats, the formation of false membranes on their internal surface, a gradual coagulation of their contents, and occasionally a destructive suppuration of their whole texture; in consequence of which the canals of these vessels are so much diminished, or so totally obstructed, as to be incompetent to the circulation of blood through them. He first notices a case by J. G. ZINN (*Comment. Soc. Reg. Götting.*, t. ii., p. 364, 1753), in which dissection disclosed an enlarged and indurated state of the inguinal glands of the affected limb, surrounding the crural vein, and diminishing

the diameter of this vessel; and next adduces the case, the post-mortem appearances of which I have noticed as described by Mr. LAWRENCE; and, in addition to the cases which he had himself observed, he mentions a case communicated to him by Mr. OLDFIELD, in which inflammation of the iliac veins was present; and "the absorbent vessels and glands were slightly enlarged as high as the lumbar regions, but not otherwise affected." (P. 436.)

7. During the commencement of 1823, M. BOUILLAUD published several cases and dissections, in which the crural veins were obliterated in women who had been affected with swelling of the lower extremities after delivery; but Dr. DAVIS had been promulgating his views since the occurrence of his first case in 1817. Dr. BOUILLAUD distinctly states, in his instructive memoir on this subject, that he considers obstruction of the crural veins to be the cause not only of the oedema of lying-in women, but of many partial dropsies; and he adduces instances of this obstruction being caused both by disease of the vessel itself, and by tumours pressing upon the vessel. (*Archives Générales de Médecine*, t. ii., 1823.)

8. Soon afterward, M. VELPEAU published some observations on this disease, and concluded as follows: 1st. The acute swelling of abdominal extremities of women after delivery has for its cause, at least in some cases, inflammation of the pelvic articulations, or of the veins. 2d. On the other hand, the symptoms observed in the living patients are referable as much to severe lesion of the deep-seated veins, as to that of the lymphatics. 3d. At present it remains to be shown whether or not these latter parts are really the cause of the phlegmasia alba dolens. 4th. Affections altogether different are ranged under the same name, causing confusion, and giving rise to obscurity in the writings of several physicians on the subject. Those cases adduced by M. VELPEAU, and which occurred in the Parisian hospitals, are very interesting. In all of them there were marks of inflammation, with collections of pus, in the pelvic articulations or symphyses, in the uterine canals and veins (see case 2d), in the iliac and femoral veins, and in the lymphatics and glands. The whole of the memoir, and the observations appended to it by M. ANDRAL, have not received, from more recent writers on the subject, the attention which they deserve. It should be added, that M. VELPEAU considers the inflammatory appearances, and the purulent matters found in the veins and lymphatics, to be the consequences of the inflammation commenced in the pelvic articulations and uterine organs. (*Archives Génér. de Méd.*, t. vi., p. 220.)

9. MM. GARDIEN and CAPURON, somewhat earlier writers than those now referred to, regarded the disease as an inflammation of the lymphatic vessels and glands; and Dr. DEWEES considered it to be inflammation occupying "exclusively the white lymphatic vessels (!) of the cellular membrane of the several textures of the limb." (*Dis. of Women*, p. 489.)

10. Dr. BURNS believed, and with much justice, judging from some cases which I have seen, "the nerves to be implicated in the disease as much as the veins; and that while both may contribute, we shall find, in different cases,

one or other predominate." (*Midwifery*, page 611.)

11. In April, 1824, I attended a case, with my friend Dr. DAVIES, now of Hertford, in which the symptoms indicated at the commencement considerable affection of the nerves of the limb; but those of vascular obstruction afterward predominated. (*Lond. Med. Repository*, vol. xxiii., p. 452.)

12. Dr. DAVIS, to whom the honour of originating the phlebotic pathology of phlegmasia dolens belongs, considered the inflammation to commence in the iliac veins. But Dr. LEE remarks, that Mr. GUTHRIE suggested to him the idea of tracing the affected veins to their origin in the uterus; and that, acting upon this suggestion, he ascertained that crural phlebitis is but an extension of uterine phlebitis. That the disease thus originates, in many cases, cannot be doubted. I have myself seen such cases, and Dr. LEE has observed many others. One of my cases, not, however, occurring in the puerperal state, was seen also by him. But, judging from the few I have seen, and from the descriptions of cases which have been published, I cannot come to the conclusions, either that the affection is a pure and uncomplicated phlebitis in all cases, although it may be in some, or that it always originates in the uterus, although it often does so originate. My views as to the pathology of this affection will appear more precisely in the sequel.

13. II. DESCRIPTION.—This disease attacks much more frequently the left lower extremity than the right. It very rarely commences in both limbs at the same time; but it sometimes passes over to the other limb, when it leaves the one first attacked. It generally appears within six weeks from delivery—most frequently between the fourth and fifteenth day; but it is not confined to the puerperal state. Dr. LEE states, that in eight of twenty-three cases of puerperal crural phlebitis seen by him, the disease commenced between the fourth and twelfth day after delivery, and in the remaining fifteen it appeared subsequently to the latter of these days.

14. i. SYMPTOMS.—The pathognomonic symptoms of phlegmasia dolens are preceded, in some cases, by general febrile disturbance, and in others the local symptoms are the first to appear. In the former case the patient complains, from the period of delivery, of fever, which continues without a manifest cause; and in the course of a few days the swelling of the limb appears. In other instances, the swelling is preceded by severe rigours, which recur several times. In many cases, signs of peritonitis, or of inflammatory action of the pelvic viscera or parietes, are present before the symptoms of this affection are remarked, especially in the same side of the pelvis with the affected limb; and there is often a severe pain complained of in the iliac fossa of that side. In a few cases, however, the symptoms of phlegmasia alba dolens occur suddenly in one of the limbs, without pain or any other symptom in the abdomen or correspondent iliac region. In addition to uneasiness and pain in the lower part of the abdomen, or extending along the brim of the pelvis, the patient is weak, irritable, and depressed.

15. a. When the disease begins in the pelvis,



the pain soon extends below POUPART'S ligament along the thigh to the ham, calf of the leg, and instep of the foot. Shortly afterward the inguinal region is tumefied and tense, and, in a day or two, the thigh becomes swollen, tense, white, and shining. When the pain commences in the calf of the leg, the swelling is first observed there, or at the ankles, gradually extending itself up the leg and thigh. In some cases, the pain ascends from the leg along the thigh to the groin, or even to the iliac region. In rarer instances, a considerable space intervenes between the situation of the pain, which, in this case, is usually felt in the inguinal region and in the leg, the thigh being exempt from pain.

16. The character of the pain varies greatly. In some it is merely a sense of numbness or stiffness, or a sort of cramp, or a painful feeling of tension. In others the pain is severe, burning, or shooting; and in several it is darting or lancing, and so violent as to cause the patient to scream aloud. The slighter or duller pains are usually constant, but the violent shooting pains are remitting. The pains follow exactly the course of the femoral vessels, the darting violent pain being especially referable to the femoral nerve. In some cases the pain extends all the way from the iliac fossa along the thigh to the ham and calf of the leg. The whole surface of the limb is tender. Pressure at any part, but especially on the femoral vessels and nerves, remarkably aggravates the pain. The least motion of the extremity, more especially extension, greatly increases the pain; the easiest position is that of partial flexion. Aggravation of the pain on pressure is sometimes only felt in a limited portion or spot, as in the groin, or popliteal spot, or calf of the leg.

17. *b.* The swelling generally occurs after the pain has existed a short time—usually after a period varying from twelve to thirty-six hours. In some instances the swelling appears nearly contemporaneously with the pain, and it usually commences in the same situation as that in which the pain is at first felt. In the majority of cases it proceeds from above downward, implicating successively the hip, nates, and labium pudendæ; the thigh and leg. CASPER, CALLISEN, FRASER, and RAIGE-DELORME mention instances in which the swelling extended also upward to the flank and trunk, so as to reach the upper extremity of the same side. In some cases it begins in the foot, and rises more or less rapidly until it invades the whole extremity, the nates, vulva, and iliac region; but PUZOS, LEVRET, WHITE, GARDIEN, and other writers consider the descending character of the swelling as pathognomonic of the disease. The swelling is sometimes so great that the affected limb is double the healthy size. When it is advanced it is generally uniform, but it is sometimes more remarkable on the inside of the thigh, and near the knee. In the early stage of the disease, and while the acute symptoms continue, the swelling is tense, and does not pit after pressure; it is generally at a later period that pitting from pressure is observed.

18. *c.* The colour of the limb is commonly a pearly white. In some, reddish lines are observed chiefly in the course of the vessels; and in others only small red spots or points. In cases observed by Dr. LEE and M. SALGUES,

dark vesicles and phlyctenæ were observed; and in a case terminating in gangrene, under the care of Dr. DAVIES, and also seen by me, the usual discoloration of the skin in such circumstances was observed. In most instances the temperature of the affected limb is increased, especially on the inner aspect, and at the earlier periods; but sometimes, as Dr. BURNS has remarked, it is diminished, particularly at an advanced stage. Gangrene, in the case just adverted to, was preceded for several days by great coldness of the limb. Most writers have remarked the existence of a *nodulated chord*, very painful on pressure, descending from the crural arch more or less down the thigh. This chord may be only barely perceptible, or very remarkable, from the thickening and infiltration of the cellular tissue surrounding the vessels. In some cases it descends considerably down the thigh, and may even be detected in the popliteal space. It is not easily detected when the swelling and pain are great, and it is chiefly when the more violent symptoms have subsided that it can be best ascertained. The pain and tenderness are always greatest in the course of this chord, or in its immediate vicinity.

19. *d.* Enlargement of the glands in the groin, and even of those of the ham, is often observed during life, and found after death. In some cases, as observed by CASPER, red lines are traced along the surface in the direction of the tumefied and tender glands. The nodosities frequently found in the course of the vessels are attributable, in some situations and cases, to enlargement of the glands; and, in other places and instances, to the induration and inflammation of portions of the cellular tissue surrounding the inflamed vessels; or to thickening of the coats of the vessels, and to coagulation of the blood below the seat of obstruction. As observed, also, in the first case, in which a dissection was made after death, the tumours may arise both from enlarged lymphatic glands, and from the distention of the vein below the seat either of compression by these glands, or of obstruction by disease of the vessel itself.

20. *e.* The constitutional symptoms are often very remarkable, even before the local mischief is much complained of. In most cases, weakness, depression, irritability of the pulse, diminished or disordered lochia, diminution of the secretion of milk, want of sleep, and disorder of the digestive and excreting functions immediately precede and accompany the accession of the local disease. As this becomes developed, the pulse, hitherto weak, quick, or sharp, becomes rapid, often 130 or 140 in a minute, and small and feeble; the appetite is lost, the tongue is white or loaded, the thirst is increased; the bowels are confined, and the stools unhealthy, but they are sometimes loose, fetid, or bilious; the urine is turbid, and the lochia is often diminished or suppressed, or offensive. The patient is restless, sleepless, and irritable, or morbidly sensible. The countenance is generally pale, and sometimes evincing marked anæmia. There are frequently indications of disorder of the uterine organs, or of disease of the pelvic viscera or parietes. The vulva and vagina are tender; and pressure above the pubis is seldom made without pain. The os uteri is sometimes partially open and

soft. At the commencement of the disease, the skin is generally hot and dry; but it sometimes becomes moist, or perspirations break out. The secretion of milk is often altogether suppressed or much diminished. In very severe cases, the febrile disturbance is not only attended by sleeplessness, but followed by delirium. In some instances, in which the disease supervened in the other limb, as it subsided in the first affected, the cerebral symptoms were very urgent. In two cases which were under my care, one of which was attended also by Dr. LEE, constant low delirium, followed by coma, came on; but the patient ultimately recovered.

21. ii. TERMINATIONS.—The disease may terminate variously: 1st, by *resolution*. When it terminates in this way, the *acute symptoms* subside in the course of from twelve to twenty days, generally in the order of their appearance; the pain ceases, the swelling disappears, and the use of the limb returns. As the swelling begins to subside, it pits more readily on pressure; and, in many cases, the tumours and chord, in the situations already mentioned, are more distinctly felt, and in some the superficial veins are dilated, or irregularly enlarged, not only in the limb, but also, as stated by M. RAIGE-DELORE, in the flank and parts adjoining. As the resolution proceeds, the constitutional symptoms subside. Resolution takes place much more gradually and slowly when obstruction of the femoral is present. The swelling then continues sometimes for months, in a less degree, and thus becomes *chronic*, the patient being hardly able to use the limb. In these cases, thickening of the cellular tissue surrounding the vessel often exists, and a varicose state of the veins takes place and remains. 2d. *Suppuration*, according to PETIT, CAPURON, and CHURCHILL, takes place in rare instances, generally in the tract of the large vessels, or situation of the lymphatic glands. This result obviously proceeds from the inflammation of those vessels having extended to the surrounding cellular tissue and passed on to abscess. 3d. The disease still more rarely terminates in *gangrene*. M. GERHARD has adduced a case in which this occurred; and Dr. DAVIES has published the details of another, which was also seen by me on several occasions. In this case gangrene of the leg and foot was followed by sloughing, and the parts were amputated by Dr. DAVIES above the knee, the thigh being at the time about double the thickness of the opposite one. As soon as the vessels were divided, the blood in the veins was observed quite coagulated. A considerable quantity of serum was discharged from the surface of the stump as soon as the leg was removed. (*London Med. Repos.*, vol. xxiii., p. 454.)

22. 4th. *Death* sometimes takes place, generally owing to the severity of the several changes which supervene in the course of the disease. It may occur suddenly, as remarked by DENMAN, BURNS, and BLUNDELL, owing chiefly to exhaustion consequent upon previous losses of blood, and upon the violence of the constitutional and nervous symptoms, especially if the patient makes any exertion in this state, or raises herself up too quickly in bed. It most commonly, however, takes place consequently upon the organic lesions found in the

pelvic viscera and parietes; such as inflammation and purulent formations in the uterus, ovaria, and pelvic articulations, with similar changes and coagulations of blood in the iliac veins. In these cases, death is the result of contamination of the circulating fluids, and is generally preceded by a very rapid, small, and feeble pulse, by distressing feelings of sinking, by delirium, sometimes coma, and various nervous phenomena.

23. iii. APPEARANCES AFTER DEATH.—On dissection, the limb is seen infiltrated with serum and lymph. Several small abscesses are disseminated through the cellular tissue, between the muscles, or one or two considerable abscesses are formed in the vicinity of the large vessels, especially in the iliac, inguinal, and popliteal regions. The sub-peritoneal cellular tissue, particularly that of the meso-rectum and iliac fossæ, is sometimes infiltrated with a sero-purulent matter. The articulations of the affected limb, and even the joints at a distance from the seat of the affection, although much more rarely, are occasionally the seats of suppuration. Purulent collections have also been found in the liver and lungs. A sero-puriform effusion has sometimes taken place in the pelvic cavity,\* and in the cavity of the pleura. These lesions are secondary, and the consequences of the phlebitis, constituting the chief pathological condition of the malady.

24. A. The researches of Dr. DAVIS, Dr. R. LEE, Dr. DAVIES, and others, have fully shown the great extent to which the *veins* of the limb, and very frequently also those of the uterus, are affected in this malady. The femoral vein is always more or less diseased. It is inflamed, its parietes are thickened, and its canal is obstructed by fibrinous coagula, in the centres of which puriform, or a brownish grumous, matter is often found. In rarer cases a fibrinous false membrane is observed adhering to the interior of the vessel. The same changes may be traced along the profunda and popliteal vein, to most of the veins of the extremity. The phlebitis may be so general in the limb, that a puriform matter escapes from all the small veins upon dividing them. In many cases, however, the saphena remains unaffected. The same lesions as exist in the femoral vein are also generally observed in the external iliac of the same side, and often extend to the hypogastric or internal iliac. In this latter case the veins of the vagina, of the neck and body of the uterus, and of the ovaria and tubes, and, indeed, most of the branches which contribute to the hypogastric, present the usual appearances of inflammation, on the same side with that affected. In many cases the same lesions are found in the veins of both sides of the uterine organs, but they extend not so far as the internal iliac of the unaffected side. In some instances the inflammation extends not only to the common iliac, but also to the vena cava, and in rare instances as far as the emulgent veins. M. RAIGE-DELORE remarks, that the alteration may even be traced to the right side of the heart; but this can be possible only in rare instances.

25. When the disease has existed in both extremities, the phlebitis in the pelvic and uterine organs extends along both hypogastric veins to the external iliacs and femoral veins,



&c. ; it has even been observed in the lower portion of the vena cava. It has been supposed that the supervention of the disease in the other limb, as that in the first attacked subsides, is produced by the extension of the inflammation from the common iliac of the one side to the vena cava, and to the common iliac of the other side ; but the inflammation of the uterine veins may extend to both limbs, although not at the same time, without passing to and from the vena cava. M. RAIGE-DELMORE refers to two cases in which phlebitis supervened in the brachial, cephalic, and cubital veins in the course of this disease.

26. *B. The lymphatic glands and vessels* are frequently also found inflamed ; but where this lesion coexists with phlebitis, it is difficult to determine which of the two is primary. They are probably contemporaneous in their development and course. In the account of the first *post-mortem* examination of the disease on record, ZINN states, that the *inguinal glands* were greatly enlarged and indurated, and that they surrounded and very much diminished the diameter of the crural vein. The glands of the groin and ham are often enlarged, injected, and sometimes in a state of suppuration ; but purulent matter is more frequently found in the cellular tissue surrounding them than in the glands themselves. RAIGE-DELMORE states that the glands in the iliac fossæ sometimes present various degrees of inflammation, which has also extended to the mesenteric glands.

27. *C. The lymphatic vessels* have been frequently overlooked in dissections of the affected limb. BOUILLAUD states that inflammation of these vessels has been ascertained in a considerable number of cases of this disease. MM. TONNELLÉ, DUPLAY, and NONAT have also confirmed this view. M. ALBONNEAU (*Journ. Comp. du Dict. des Scien. Méd.*, t. xxxviii, p. 10) has recorded a case in which "the superficial lymphatics of the thigh presented a deep red colour, were enlarged and tortuous, the veins being also inflamed on the same side as high as the vena cava." Dr. CHURCHILL remarks, that pus and evidences of inflammation are sometimes met with in the absorbents.

28. *D. The nerves* are probably also more frequently implicated than they have lately been supposed to be, particularly since attention was more especially directed to the veins. In the interesting case published by Dr. DAVIES, the symptoms, which were very violent in their accession, were referable to the femoral nerve ; and M. DUGÈS has adduced several cases showing that neuritis actually forms a part of the lesions observed in this disease.

29. *E. Alterations of the uterus*, and especially of the *veins of the organ*, have been much insisted upon by Dr. LEE as the points of departure in the succession of morbid phenomena constituting this complex malady. Although M. VELPEAU appears to have been among the first to describe lesions of the uterus and its veins, in examinations of this disease after death, still Dr. LEE first insisted upon the connection, and upon the circumstance of the phlebitis being propagated from the uterus or its appendages to the hypogastric, iliac, and femoral veins. Inflammation of the veins and canals of the uterus, puriform matter in them, or in the walls of the uterus ; softening of the

organ ; membranous exudations on its internal surface ; softening, dark discoloration, and marks of inflammatory action, more especially at the part where the placenta was attached ; puriform collections in the ovaria, &c., have been very frequently observed. Dr. BURNS, however, remarks that the uterus is sometimes found quite healthy. Besides these lesions, M. VELPEAU has shown that the adjoining pelvic viscera may be also more or less implicated, especially the sacro-iliac and pubic symphyses, the cartilages and ligaments of which are loosened, softened, and bathed in pus ; but these lesions are not so frequent as those of the uterus and its appendages.

30. II. CAUSES.—*A.* This disease has not been observed with due precision in respect of its remote causes, and particularly as to those which *predispose* to the origination and extension of the several lesions recognisable during life and found after death. The much more frequent occurrence of the affection during the six weeks immediately following parturition evidently proves that the changes more especially connected with that period are more or less concerned in producing it. The pressure which the gravid uterus exerts upon the nerves, blood-vessels, and other parts within the pelvis during the latter months of pregnancy, the violence which these parts often sustain during parturition, the sudden removal of the pressure, and the changes in the state of nervous function and of circulation consequent on the removal, altogether remarkably predispose to the supervention of the affection, especially when aided by other circumstances. But the disease may occur during pregnancy. PUZOS treated three cases before the period of parturition ; and in these, as well as in others met with at this period, it is reasonable to infer that the pressure was chiefly concerned in producing it in these instances, and that uterine phlebitis was not its point of departure.

31. As far as my own observation enables me to judge, aided by the histories of many recorded cases, constitutional debility and delicacy of frame ; the exhaustion consequent upon protracted, difficult, or instrumental labours ; hæmorrhage during or after parturition ; and anæmia and cachectic states of the system, are among the most influential predisposing causes of this affection. Females subject to leucorrhœa, especially during pregnancy, appear also to be more liable than others to an attack.

32. *B. The exciting causes* are, in the great majority of instances, those of uterine phlebitis. The use of instruments during labour, injury of the organ, the retention of portions of the placenta, the means taken to remove it ; the retention of coagula, or of the lochial discharge in the uterine cavity or vagina, owing to deficient contractile power ; imperfect contraction of the uterine canals and veins admitting of the retention, and consequent alteration, of their contents ; the passage of the retained and altered lochia from the cavity of the uterus into the uterine veins ; inflammation of, and purulent collections in, the parietes of the uterus or in the ovaria, giving rise to inflammation of the veins of these organs ; inflammation of the vagina, or of any of the pelvic articulations, are the most frequent exciting

causes of phlegmasia dolens. These local conditions and changes, in the great majority of cases in which they take place, either proceed no farther, or give rise to other secondary maladies than this; but, when the predisposition is marked, and when other causes re-enforce these, the affection will be induced, and may occur, although in rare cases, even when the uterine lesions are not present.

33. There can be no doubt that, when the lochial discharge is not freely thrown off, in weak or exhausted females, or after copious losses of blood, and when morbid secretions form in the uterus or ovaria, in these states of the system absorption of these matters, either by the lymphatics or veins, or by both, will then take place more readily and abundantly than in other circumstances, the matters thus absorbed inflaming the vessels and contaminating the fluids. Causes producing a suppression of the lochia, or of the secretion of milk, may also occasion the supervention of crural phlebitis, and even of inflammation of the absorbents, by favouring the absorption of excrementitious matters; and thus the old doctrine of the metastasis of these secretions, although not strictly applicable to these cases, is not, in some respects, very wide of the truth.

34. Exposures to cold, wet, and to currents of air, insufficient clothing, and unwholesome, heating food and beverages, especially spirituous liquors, are evidently concurring, if not exciting causes. Probably more importance has sometimes been attached to the influence of cold than it deserves; but where the cold is applied directly to the limb—where the lower extremities are not sufficiently protected from it, or where the patient wears damp shoes, &c., particularly upon getting about soon after parturition, the injurious influence may not be local only, but extended to several of the exerting functions; and, although it may not be sufficient of itself to produce the disease, it may powerfully aid the operation of other causes, or favour the extension of morbid changes existing in the uterine organs, or parts in the vicinity, to the iliac and femoral veins, or also to the nerves and absorbent vessels.

35. iii. PHLEGMASIA ALBA DOLENS, UNCONNECTED WITH THE PUERPERAL STATES.—An affection, or rather a complex disease, in every respect similar to that now described in connexion with the puerperal states, may occur in *women independently of these states*, and even in the *male sex*; but in every instance which I have seen of this description, amounting in all to nine, of which I have taken notes, it has been contingent upon some other dangerous disease, and has presented the same changes of structure in the limb as those which I have described above (§ 24, *et seq.*). The diseases upon which it has supervened in my practice are the following: Inflammation of the uterus; hysteritis complicated with dysentery; cancer of the mamma (two cases); tubercular consumption; typhoid fever; iliac abscess (two cases); malignant ulceration of the mouth and neck of the uterus, and injury of one of the upper extremities. The injury in this last instance of the affection was soon followed by inflammation of the lymphatics and veins; the patient, however, recovered.

36. The case of the disease following hys-

teritis occurred in 1831, in a lady who had not been pregnant in three or four years. The affection commenced in the right thigh, and extended to the left as it began to subside in the right. The patient had shortly before experienced a smart dysenteric attack, which was followed by inflammation of the uterus, and for each of these she had been moderately bled. The disease of the extremities was most severe, and was attended by dangerous constitutional symptoms. As the case well illustrated Dr. R. LEE's views of the pathology of the disease, I requested him to see her. Delirium, sopor, and great nervous exhaustion supervened, but followed the very rapid subsidence of the swelling of both extremities, which had reached as high as the flanks. She was very remarkably benefited by nervous and restorative remedies, and recovered very rapidly. I have seen her very frequently since, and as recently as the day of my writing this; but there was never any evidence of enlarged veins or swelling about the ankles subsequent to the attack; the appearances of the limbs, up to this time, now fifteen years, being in every respect the same as before.

37. In the other case there were both hysteritis and dysentery; indeed, the whole pelvic viscera appeared simultaneously attacked. This person, the wife of a publican, had never been pregnant; only one extremity was affected; but low fever, with muttering delirium, coma, and destructive inflammation of one eye, supervened, and she died, the other eye also becoming affected shortly before death.

38. In both the cases of carcinoma mammae, the arm on the affected side was enormously swollen, painful, and tender, but not discoloured. One of the cases was that of a lady attended by Dr. YOUNG and myself. She was only thirty-five years of age, had borne several children, and was then pregnant. Great enlargement of the lymphatic glands had taken place, and obstruction both of the lymphatic and of the venous circulation obviously existed. This lady, who was far advanced in pregnancy when the affection of the arm supervened, was delivered nearly at her full time of a child about one fourth the usual weight; she died, as was expected, shortly afterward. The other case occurred in a person advanced in age, and was in all respects similar as regarded the local disease. In neither instance was an examination after death allowed.

39. The case contingent upon tubercular consumption, of which I have notes, and which was a remarkable instance of the affection, presented, upon dissection, tubercular deposits in the inguinal glands, with great enlargement; obstruction of, and coagulation of blood in the femoral and iliac veins, the centres of the coagula consisting of a grumous, soft, or pulsataceous brown matter. There had been, also, diarrhoea and ulceration of the bowels; but the veins were not traced from the iliac to the ramifications to the pelvic viscera; and it was hence not manifest whether or not the disease of the veins was caused by ulceration in the lower bowels, or by the morbid state of the blood consequent upon the absorption of purulent and tubercular matters. I have seen other cases of great swelling of one or both lower extremities, consequent upon phthisis; but I



have had an opportunity of examining after death only the one now mentioned. My recollections of the others are such as to lead me to infer that the obstruction in the veins of the lower extremities was the consequence chiefly of the morbid states of the blood, aided by the physical conditions of the limb—the sitting posture, and the remora of the blood in the veins, owing to this posture, and to the influence of gravitation; and that these states favoured coagulation of blood in the veins, or inflammation of their internal surface.

40. Instances of phlebitis, in the course of low or typhoid fevers, are not rare. I have, however, met with only one in my own practice. In this case there was certainly no evidence of ulceration of the lower bowels. The disease of the veins is to be referred chiefly to the state of the blood, and to some local physical conditions, or causes acting locally. Drs. GRAVES and STOKES have related instances of this contingent form of the affection. They remarked that the œdema was unattended by redness, but accompanied with pain, tenderness, increased heat, and impaired motion of the limb.

41. The first case of the disease contingent upon iliac abscess occurred to me in 1821, in a groom, a patient of the South London Dispensary, when physician to that institution, and was attributed to the pressure of the collected matter upon the iliac nerves and veins, and probably, also, upon the lymphatics. A more recent case was entirely similar, and both terminated fatally soon afterward, but inspections were not permitted. There can be no doubt of the occasional occurrence of this malady during organic changes in the uterus and ovaria, occurring independently of parturition, and more especially if these changes are attended by the absorption of morbid secretions from these organs. Dr. R. LEE has adduced several instances of this source of the disease. Sir H. HALFORD has recorded two cases, which consisted chiefly of inflammation of the veins arising apparently from exposure to currents of cold air; and, in one case, from such exposure being in the standing posture. Many years ago I met with a case which originated in this cause; but the patient was of a cachectic habit of body; recovery, however, took place without any unfavourable occurrence. It is not improbable that, during an impure or morbid state of the blood, connected with debility and a languid state of the circulation, the remora of the blood in the veins of the lower extremities, favoured by position or other physical causes, will occasion either partial spontaneous coagulation, or an inflammatory state of the coats of the vessel, more especially if pressure have existed on the trunk of the veins. Hence the occasional appearance of this affection in the advanced progress of many other diseases, especially of those in the course of which morbid secretions are apt to pass into the circulation, or to be absorbed by the lymphatics, and when pressure has existed upon, or has been suddenly removed from, large veins. (*Veins, Disease of.*)

42. IV. NATURE OF THE DISEASE.—A. I have already noticed (§ 4, *et seq.*) some of the opinions formerly entertained respecting the nature of this complex affection, and stated enough to show that most of these were more or less er-

roneous, but chiefly in their limitation to one only of the several morbid conditions generally present in the fully-developed cases of the disease. Since the days of WHITE, who attributed the malady to rupture of the lymphatics, most writers up to the end of the last century believed it to be an inflammation of the lymphatics. BOYER, TRYE, DENMAN, FERRIAR, and GARDIEN adopted this opinion, with certain shades of difference. Thus TRYE considered that the inflammation of these vessels proceeded sometimes from pressure of the gravid uterus, sometimes from an acrid matter secreted by this organ; while DENMAN supposed that it originated in the lymphatic glands of the groin; and FERRIAR that it commenced in the lymphatics of the thigh. Many of the symptoms observed during life, and even part of the changes detected after death, evince that these views were not entirely without foundation. They wanted the support derived from post-mortem research; and they constituted only a part of the morbid changes; they were merely a substitution of a part, and often only a small part, of the malady for the whole.

43. Much more recently, certain symptoms, attracting the notice of pathologists, and more than ordinary attention being directed to these symptoms, and to their origins, a different opinion of the nature of phlegmasia dolens was suggested, and former views were thrown in the shade. Thus ALBERS (HUFELAND'S *Journal*, &c., Feb., 1807, p. 16) considered the disease as merely a form of neuralgia. He believed that it commenced in the nerves of the limb, and that the swelling was a consecutive lesion. That this is actually the case, at least in some cases, as in that recorded by Dr. DAVIES, in two or three cases seen by myself, and in others recorded by DUGÈS, KRUGER, and other physicians, cannot be doubted. DUGÈS (*Revue Médicale*, t. iii., 1824); SIEBOLD, LOEWENHARD (in SIEBOLD'S *Journal*, t. x., p. 352), HANKEL (RUST'S *Magazin*, t. xxiv.), and KRUGER (HORN'S *Archiv.*, t. iv., 1831) attributed the malady to inflammation of the nerves of the pelvis and thigh, or, at least, to a morbid state of the sensibility of these nerves, admitting, however, consecutive changes in the veins, lymphatics, and arteries of the limb.

44. NEWMANN and TREVIRANUS (SIEBOLD'S *Journal*, t. xi., p. 253), on the other hand, considered this affection as an inflammation of the aponeurosis, or fascia lata, giving rise to an effusion of serum and lymph; while others even supposed it to be a form of rheumatism occurring in the puerperal state, and modified by the circumstances of this state. This opinion, supported by HIMLY and REUTER, is equally visionary with that of NEWMANN.

45. The researches of Dr. DAVIS first established inflammation and obstruction of the veins as the principal lesion of severe cases of this malady; and the investigations of BOULLAUD, VELPEAU, J. DAVIES, BOUDAUT, and R. LEE farther illustrated this doctrine. \* Dr. LEE first demonstrated the origination, of at least many of the cases of the disease, in lesions of the uterus and the veins of this organ, in uterine phlebitis. So that the prevailing opinion in the present day is, that *phlegmasia alba dolens* is inflammation of the iliac and femoral veins, originating in the veins of the uterus,

and often extending, on the one hand, to the common iliac veins, or even to the vena cava; and, on the other, to most of the veins in the extremity.

46. I believe, however, from considerable experience of the disease in different circumstances, that phlegmasia dolens is a more complex affection than it is generally now considered to be; that it is not always, at least, a simple crural phlebitis; that it does not always, although very frequently it does, originate in uterine phlebitis; that it is not uniform in character, phenomena, and progress; and that it is a much more complex disease than it is generally viewed to be.

47. *B. Pathological Inferences.*—*a.* The disease certainly consists chiefly of inflammation or obstruction, or of both lesions, of the femoral and iliac veins; but these, although the chief, or occasionally almost the only lesions, are not always such.—*b.* The crural phlebitis, even when manifestly existing, cannot always be referred to the uterus for its origin, although it very frequently does so originate, especially in cases occurring after delivery.—*c.* The lesions observed in the veins appear, in some instances, as consequences of prolonged pressure, or of this cause and the sudden removal of that pressure, the disease originating in the iliac and femoral veins.—*d.* The affection appears to commence, in some cases, in the nerves, owing to the causes just assigned, the veins becoming consecutively affected, or being contemporaneously attacked.—*e.* Cases occur in which it is difficult to determine whether the veins or the lymphatic vessels and glands are primarily or mainly implicated, the symptoms and the lesions observed after death being referable to both systems of vessels.—*f.* The disease may originate in lesion of any of the pelvic viscera, or of the articulations or parietes of the pelvis; and in such cases it may not be limited to either the veins or absorbents, but may affect the one or the other, and extend to both.—*g.* The disease may be unconnected with lesion of the pelvic viscera, and may commence in the veins, or in the lymphatics or veins, or even in the nerves, and extend more or less to these vessels, especially when the patient has had the extremity exposed to pressure or injury, or to cold or currents of cold air, or to other injurious physical agents.—*h.* The precursory, early, and advanced symptoms, the constitutional phenomena, and the terminations or consequences of the affection, vary according as either of the parts just pointed out as being implicated more or less, or any two or more of them, are prominently affected; the pain and nervous symptoms are more severe, the more the nerves are affected; the swelling, the general oedema of the limb, and the pitting on pressure, and the low or typhoid character of the accompanying fever, are more remarkable the more the disease is confined to the veins; and especially when it is preceded or attended by disease of the uterus, or of any other pelvic viscus or part; the hardness, tenseness, and heat of the limb; the tenderness of the surface, and its indisposition to pit on pressure, are more manifest the more the lymphatics and glands are concerned in the malady.—*i.* I have never met with a case of the disease in which the arteries were implicated.

48. *V. PROGNOSIS.*—Although a small proportion only of those who are attacked with phlegmasia dolens terminates unfavourably, especially when the affection appears after parturition, still it should be viewed as a serious disease, and more particularly when it occurs in the course of other maladies which contaminate the circulating fluids. But the amount of danger should be inferred chiefly from the severity of the symptoms, from what is made apparent as to the cause and origin of the attack, and from the pathological condition manifested at the commencement and progress of the case. Pre-existing disease of the pelvic viscera or parietes; evidence of inflammation of the iliac and femoral veins; the extension of the malady to both extremities; low fever and delirium; a very rapid, soft, and small pulse, are severally indications of great danger.

49. The nature and amount of disease of the pelvic viscera, preceding and attending the attack, should always be duly estimated, as well as the nature and relations of it. When disease of the veins is detected, the extension of it to the common iliac and vena cava, and consequent contamination of the blood, are to be dreaded—changes which may be often prevented by judicious practice, but which, when once induced, can rarely be removed. The passage of the affection to the other limb indicates, at least, a severe lesion of the uterine or pelvic viscera, possibly even the extension of the venous disease to the vena cava. Low fever, delirium, sopor, and a rapid, soft pulse, evince contamination of the blood, and the injurious influence of this change upon the brain and nervous system, and constitution. The contingent occurrence of the affection in the course of other maladies is always a very grave, or even most dangerous circumstance; but the amount of that danger depends upon the nature of the primary disease. In malignant or cancerous maladies, in tubercular consumption, and even in some other constitutional diseases, the hopeless state of the patient depends more upon these than upon this super-induced affection, which, however, hastens the unfavourable issue.

50. *VI. TREATMENT.*—It is of the utmost importance to ascertain the predisposing and exciting causes of this affection; and the pre-existing pathological conditions, especially those so frequently implicating the pelvic viscera and parietes, before the indications and means of cure are adopted. Of the considerable number of cases in which I have been consulted, I have not met with one which did not occur consequently either upon large losses of blood from the uterus, or upon blood-letting, large in relation to the state and constitution of the patient. There have frequently been marked disorders of the secreting and excreting functions, and sometimes, also, a cachectic habit of body. In no instance have the previous health and existing state of the patient been such as to admit of venesection, or even of local depletions to a great amount. I have never prescribed the former for the complaint, and I have ordered the latter only in a moderate degree. The uterine or other lesions in which the disease often originates, the pre-existing state of the parts which are the seats of this disease, the antecedent and existing state of the patient, and the character of the pulse and other symp-



toms, not merely forbid the employment of general or large local blood-lettings, but warrant the adoption of restorative, and often even of tonic remedies. But the facts, *first*, that the disease generally originates in states of rapidly-induced anæmia, of vital exhaustion, or of vascular contamination; and, *secondly*, that both the morbid changes in which it originates, and the pathological conditions of which it consists, become more extended, and more rapidly contaminate the circulation, after vascular depletions and depressing agents, have been either altogether unknown to, or very remarkably overlooked by, the numerous writers on this complaint.

51. The chief *indications* are, therefore, *first*, to enable the powers of life to resist the extension of the changes constituting the malady, and, *secondly*, to palliate, reduce, and ultimately remove, the symptoms and lesions which already exist. These intentions should not be carried out altogether in succession, but in great measure simultaneously; and they are most appropriate in the cases of the disease occurring after parturition. My observation warrants me in stating that the most dangerous symptoms have occurred in those who had been most exhausted, or lost the largest quantities of blood either before or during the disease; while those cases proceeded most favourably for which the above indications were prescribed. I have certainly seen cases proceed favourably after the application of leeches in the course of the crural vessels; but I doubt any actual advantage having been derived from them. Dr. CHURCHILL remarks that, "generally speaking, venesection will not be required; but if the patient be of a plethoric habit—if she have in some degree recovered her confinement, and if the disease set in with great violence, it may be advisable." (P. 426.) Now, without denying the occurrence of the complaint in these circumstances, it certainly takes place very rarely; but most commonly in opposite conditions of the patient. Dr. R. LEE states that, in all the cases he has witnessed, "there has been so much feebleness of pulse and prostration of strength," that he has not ventured to draw blood from the arm; yet he trusts for the relief of the inflammation "to the repeated application of leeches above and below POUPART'S ligament;" and recommends "from two to three dozen of leeches to be applied immediately after the commencement of the disease, and the bleeding to be encouraged by warm fomentations." "Should the relief of the local pain not be complete, it is requisite soon to re-apply the leeches in numbers proportioned to the severity of the attack, and to repeat them a third, or even a fourth, time at no very distant intervals, should the disease not yield." (*Cyclop. of Pract. Med.*, vol. iii., p. 349.)

52. Now I believe that "the feebleness of pulse and prostration of strength," so very justly insisted upon by Dr. R. LEE, as forbidding a recourse to venesection, equally forbid the application of leeches in the numbers, at least, here recommended by him. He considers the disease exclusively to consist of inflammation of the veins, and, according to his own showing, it should be treated as such. But I am confident that neither bleeding from the arm, nor applications of large numbers of leech-

es are beneficial either in phlebitis, or in lymphangitis, or even in the association of both. I state this from a very sufficient experience; and I am supported in this by JOHN HUNTER, who has insisted upon the necessity of having recourse to such remedies as will prevent the extension of the disease along the vessels, and the contamination of the blood; neither of which objects can be accomplished by venesection, nor by the application of numbers of leeches. If, therefore, leeches be applied at all in the vicinity of the pain, or near the groin, they should be few.

53. I have shown, when treating of inflammations of the lymphatics, of the nerves, and of the veins, that blood-letting aggravates them, and that even moderate local depletions produce but little benefit; and, granting that inflammation of these vessels exists in phlegmasia dolens, and even that it originates in the pelvic viscera or parts, it is to be presumed, irrespective of the results of experience, that vascular depletions cannot be more serviceable in this malady than in the uncomplicated states of either of these inflammations. The very circumstance of the inflammation having commenced in some one of these viscera, especially in the uterus, and extended to the internal iliac veins, is a sufficient proof of the impropriety of having recourse to depletions of every kind; for, whether the complaint originates in the absorption of morbid matter from the uterus, or whether it arises in the lymphatics or veins themselves, extending along their internal surfaces, both the absorption and the disposition of the disease to extend itself will be very remarkably increased by depletions and other depressing agents. Indeed, I have no doubt of the extension of the disease to the opposite limb being caused chiefly by blood-letting and a lowering treatment. Instead, therefore, of approving the treatment usually mentioned in the works of writers upon midwifery and the diseases of women, I would advise that which my experience, since 1820, has shown to be most efficacious, not only in this disease, but also in several maladies occurring after parturition, as well as in others implicating the circulating vessels and fluids; and which, moreover, fulfils the intentions of cure above specified (§ 54, 55, *et seq.*).

54. Instead, moreover, of having recourse to the more decided antiphlogistic, or rather depressing, measures recommended by most of the English and French writers on the disease, I would advise the bowels to be moderately evacuated by means of a stomachic aperient (see Form., No. 266), or of castor oil and spirits of turpentine (from three to five drachms of each), taken on milk or some aromatic water; and of an enema containing these latter substances. The same remedies should be repeated, daily or occasionally, or as circumstances require; but I have not found it necessary to have recourse to them oftener than three or four times, although I have prescribed the enema more frequently. After evacuating the bowels by these means, a pill, containing from two to five grains of camphor, and one grain of opium, should be given, and repeated after three hours; and a third, or even a fourth, dose may be given after six or eight hours, according to the state of the patient. If there be irritability of

stomach, a grain of capsicum, or a drop of creasote, or both, may be added to each dose; and these will also diminish or prevent the headache usually complained of after taking opium.

55. Immediately upon first seeing the patient, and the more especially if pain is detected in the pelvic regions, either the warm *terebinthinate fomentation* should be applied, in the way so frequently advised in this work, over the hypogastric region and upper part of the affected thigh, or flannels moistened with this *embrocation* should be kept in the same situation as long as possible, covered with a warm napkin, and renewed from time to time, as circumstances may require.

No. 324. R. Linimenti Camphoræ co.: Linimenti Terebinthinae, ʒʒ, ʒiss.; Olei Olivæ; Tinct. Opii, ʒʒ, ʒss.; Olei Cajuputi, ʒss. Misce bene, et fiat Embrocatio, more dicto utenda.

56. This treatment will often arrest the disease in a very short time, if it be resorted to at an early period; and, even at a more advanced stage, it will generally prevent the more dangerous symptoms, and the passage of the affection to the sound limb. If the disease be preceded or attended by an offensive discharge from the uterus or vagina, a frequent injection of a warm infusion of chamomile flowers and camphor water, with or without a drop or two of creasote, will be of service; and enemata containing spirits of turpentine, camphor, and asafetida, may be thrown up occasionally. If the pulse be very frequent and weak, or continue in this state, after a recourse to the above means, the decoction of bark should be given, either with the hydrochloric, or nitro-hydrochloric acid, hydrochloric ether, and aromatic tinctures; or with the liquor ammoniæ acetatis, and full doses of the sesqui-carbonate of ammonia; or with the chlorate of potass and ether; and these remedies may be repeated as frequently as the case may require, and whether the swelling be abated or not, the camphor and opium being also taken as the severity of the pain and other symptoms may indicate.

57. If low fever, delirium, and other indications of extension of the disease to the common iliac veins, and of contamination of the blood be present, the decoction of bark, with the chlorate of potass and hydrochloric ether, or the alkaline carbonates and serpentaria; camphor, with aromatics and opium; the injections into the rectum and vagina above recommended; the cautious exhibition of wine, and even of brandy, with nutritious substances, as with arrow-root, the yolk of egg, &c.; and suitable articles of diet, are indispensable. It sometimes happens, as I observed in a severe case, in which both extremities were affected, that the very rapid subsidence of the swelling, and consequently the rapid conveyance of the matters which had been effused into the circulation by absorption, so contaminates the blood as to occasion the most dangerous as well as alarming symptoms; the patient labouring under low muttering delirium, with sopor or coma, and a very rapid, weak, or small pulse. In this case these symptoms did not appear until the swelling of both extremities had subsided with remarkable rapidity; they were treated as just recommended, and terminated favourably, without the least change existing in either of the

limbs, shortly or long after the attack, as fully ascertained on several occasions.

58. The above treatment has been uniformly successful in the cases to which I have been called, although some of them have been very far advanced before I saw them. As I have never met with an instance of the malady that has been attended by sthenic inflammatory action, or that has occurred in a plethoric habit, or even moderately robust constitutions, but in opposite states of the system, so I have not had recourse to vascular depletions. If, however, the disease should occur in the former circumstances, vascular depletions may precede the means now advised, although I believe that they are not even in such cases so indispensable as many writers have supposed and who have most erroneously believed that inflammatory affections are to be removed only by depletions, without duly considering that *inflammations* are various in character and diathesis, as I have shown in that article, and that they are often aggravated by a lowering treatment, and are then to be cured only by diametrically opposite means. It will be seen that I have recommended measures altogether consistent with my views as to the treatment of lymphangitis, neuritis, and phlebitis, and in accordance with the sound principle laid down by JOHN HUNTER, but now so generally overlooked, namely, that in all spreading inflammations, and more especially in the inflammations of circulating vessels, the chief intention of cure should be to enable the constitutional powers to form coagulable lymph, whereby the disease may be limited, and the extension of the mischief and contamination of the system prevented; an intention to be fulfilled only by tonics and other restorative means.

59. Upon referring to the writings of the more recent writers, especially those upon midwifery, much difference of opinion as to the treatment of this disease presents itself. While DENMAN, DEWEES, BLUNDELL, LEE, CHURCHILL, RAIGE-DELOIR, DAVIS, and others advise vascular depletions, chiefly, however, by leeches, and only conditionally by venesection, a small minority, among whom Dr. BURNS is most conspicuous, recommend tonic and restorative remedies. Dr. BURNS remarks, that "at first we may use saline draughts; but these are not to be often repeated, and must not be given so as to produce much perspiration. In a short time they should be exchanged for bark, sulphuric acid, and opiates, which tend to diminish the irritability. In the last stage we may give a moderate quantity of wine. When the pain shifts like rheumatism, bark and small doses of calomel are useful. In every stage the bowels should be kept regular." (*Midwifery*, p. 612.) It is evident from this that Dr. BURNS and myself adopt the same principle or indication of treatment, and that his remedies, as far as they are stated, are the same as those I have advised.

60. Much difference of opinion also exists as to the *local treatment* of the affection. I have already noticed (§ 55) what appears to me the most important part of that treatment. *Blisters* were recommended to be applied to the limb, immediately upon discovering the complaint, by Mr. SANKEY, and were considered by him as a specific. He advises "the first to be ap



plied to the calf of the leg, as the pain is generally most severe in that part, and there is less fear of its not healing than if applied lower. If required, he repeats the blister every two or three days, not at the same place, but higher or lower, according to the seat of the pain." (*Edin. Med. and Surg. Journ.*, vol. x., p. 402.) Some difference of opinion has been expressed respecting this practice. Dr. DEWEES disapproves of it, and Dr. CHURCHILL expresses himself favourably as to it. I have seen blisters employed only in one case, and I was led to believe them to have acted favourably, by procuring copious discharges of serum and of a sero-puriform matter, and thereby preventing or diminishing absorption and the extension of the disease along the vessels.

61. When the more acute symptoms have been subdued, and when the accompanying fever is either abated, or does not assume a severe or adynamic form, gentle support may be afforded to the limb by a slight flannel bandage drawn gradually tighter; and the *embrocation* prescribed above (§ 55) may be employed as a liniment, with gentle friction of the surface, if no abrasion of the cuticle have followed the application of it in the mode previously advised. As the disease subsides, a tonic, or at least a restorative, treatment is still generally required, with due attention to the state of the bowels; and a light nutritious diet—chiefly, however, of farinaceous articles. The best aperient in this state of the disease is that consisting of equal parts of the compound infusions of gentian and senna, with some neutral salt and an aromatic tincture (*see Form.*, 266). If the swelling of the limb continue, the supertartrate of potash may be given with the bi-borate of soda, or the latter may be taken in any aromatic or tonic infusion in *small* doses, so as not to disorder the stomach.

62. As convalescence advances, change of air, warm salt-water bathing, and subsequently sea bathing, may be recommended. But in this, as well as in the early periods of ailment, due attention should be directed to the uterine functions and discharges; and the treatment ought to be varied accordingly, and after due examination of the state of the uterus. At an advanced period of convalescence the preparations of iron, especially the compound steel mixture (*mist. ferri comp.*), or the muriated tincture of iron, with the compound tincture of camphor, are generally most serviceable; but much of the management of the patient should depend upon the circumstance of each case, upon the contingencies which may arise, and upon the complications observed in the course of the complaint.

63. *The local states of disease, described above (§ 35) as either closely resembling, or being identical with, the affection now treated of, should be viewed closely in connexion with those upon which they occasionally supervene. They can hardly be treated apart from the original maladies, and in some instances they will be but little benefited by any treatment whatever, especially when they occur in the course of malignant and consumptive diseases. In other circumstances, the treatment must depend upon the nature of their exciting causes and existing pathological conditions; the indications being to remove them, and to enable the system to*

oppose their progress, or entirely to overcome them; intentions which will be best fulfilled by the means already recommended.

[Dr. JAMES FOUNTAIN, of Peekskill, N. Y., divides this disease into three distinct stages, each requiring widely different modes of treatment. These are, 1st. The *forming*, or *neuralgic stage*; 2d. The *albuminous*; and, 3d. The *serous stage*.

The neuralgic stage commences at the invasion of the disease, and continues till the violence of the pain has greatly subsided or nearly ceased, when the limb is at rest, and the swelling has reached its acme, or nearly so. This stage varies in duration, occupying from twelve to eighteen hours. The indication in this stage of the disease, according to Dr. F., is to tranquilize or allay nervous irritation at once, and thus arrest the disease by breaking up the first link in the chain of morbid catenation. This is to be accomplished by a full anodyne, as four to eight grains of opium, with as much gum camphor, and repeat the dose, if necessary, every two hours, till all pain ceases. Dr. F. states that he has prescribed this in six consecutive cases, and always with complete success. The anodyne has generally been prescribed at bedtime, in full dose, and the next morning every symptom has been found removed except a little stiffness. He accompanies the opiate with some warm vegetable infusion, which induces copious perspiration; and this is followed by a gentle laxative, with proper cautions against cold, to guard against a relapse. The second, or *albuminous* stage, is that in which the limb is swollen, of a pearly whiteness, uniformly smooth, tense, and elastic, very sore and painful when flexed, but not painful when at rest, nor pitting on pressure. When the swelling commences at the onset of the disease, Dr. F. states that it pits, because the effusion is serous; that it ceases to do so in a short time, because it has become too albuminous or jelly-like, and, in ordinary cases, continues so till the disease is changed. When, however, the affection continues to increase in intensity, by maltreatment or otherwise, coagulable lymph is poured out, or pus is formed; hence sometimes the limb remains permanently enlarged, or suppuration ensues. The indication in this stage is, to change the *albuminous* into a *serous state*, which is readily done by *emetics* alone. "No class of medicines," says Dr. F., "so soon and so effectually reduce nervous erethism, break up morbid associations, and consequent disordered movement of the capillary system, and set them right, as *emetics*." These considerations first induced me to resort to them in this stage of phlegmasia dolens, and I have uniformly found their operation to be decidedly and strikingly beneficial." Dr. F. prefers the *tart. antimony*, as being more decisive in its action on the nervous, and especially on the capillary systems. "Often one emetic alone," he observes, "will change the character of the tumefaction in twenty-four hours, freeing it from soreness, and causing the swelling to pit freely and deeply, being purely serous. When one emetic fails, a second may be given, or even a third, at intervals of twenty-four hours. I do not hesitate to say that three emetics at most, and very often one alone, will change any acutely

sensitive and swelled phlegmasia dolens into a passive serous state in as many days. Cathartics are of no avail in any stage of this disease, any more than to keep the bowels regular. In conjunction with emetics, the most advantageous local applications are, soothing fomentations of hops or poppy-heads, especially the latter, applied warm; over these a flannel should be placed, to retain the warmth and moisture. All kinds of stimulating liniments or embrocations are injurious, as is every degree of opiation, during this period. As soon as this course has succeeded in procuring a freedom from soreness, and a doughy, pitting feel, with coolness of the limb, the third, or serous stage, is fully established."

The third, or serous stage of the disease, which, according to Dr. F., consists almost entirely of a distention of the cellular tissue by a serous or watery fluid, except in those truly inflammatory cases which pour out fibrin, and are nearly incurable, is to be treated as one of uncomplicated anasarca. Our main dependence here is on the roller or bandage, extending from the toe to the hip. At first it is to be applied moderately firm, but drawn with more force daily. The bandage should be removed every twenty-four hours, and the whole limb rubbed with brandy, saturated with common salt, or with any stimulating liniment. Frictions with the hand or flesh-brush may now be resorted to with advantage, to give tone to the relaxed vessels. In this stage diuretics and tonics are indicated, as calomel and squills, some bitter alkaline infusion, and generous diet. Among other things, Dr. F. recommends especially an infusion of the *pyrola umbellata* and the *apocynum cannabinum*. Several successful cases are detailed, illustrative of the above pathology and treatment, which we would strongly recommend to the attention of medical men. See *New York Journal of Medicine and the Collat. Sciences*, vol. v., p. 151.]

BIBLIOG. AND REFER.—*Mauriceau*, Malad. des Femmes Grosses, &c., t. i., p. 446.—*Puzos*, Traité des Accouchemens, &c., p. 350.—*Levet*, L'Art des Accouchemens, &c., p. 932.—*C. White*, An Inquiry into the Nature of that Swelling in one or both the Lower Extremities which sometimes happens to Lying-in Women, 8vo. Warrington, 1784.—*C. B. Frye*, An Essay on the Swelling of the Lower Extremities, &c., 8vo. Lond., 1792.—*J. Ferriar*, On an Affection of the Lymphatic Vessels hitherto misunderstood: in Medical Histories and Reflections, vol. iii., p. 112. Lond., 1798.—*J. Hull*, An Essay on Phlegmasia Dolens, 8vo. Manchester, 1800.—*T. Chevalier*, in Trans. of Med. and Chirurg. Society of London, vol. ii., 1811.—*Sankey*, in *ibid.*, vol. xv., p. 156.—*J. J. Westberg et Albers*, in *Hufeland's Journ. der Prakt. Heilkunde*, Feb., 1817, p. 3.—*J. L. Casper*, Commentaires de Phleg. Alba Dolente, 8vo. Halle, 1819.—*D. D. Davis*, An Essay on the Proximate Cause of the discaled Phlegmasia Dolens: in Trans. of Med. and Chirurg. Society, vol. xii., p. 419. Lond., 1823.—*W. Lawrence*, in *ibid.*, vol. xvi., p. 58.—*Dugès*, Révue Médicale, t. iii., 1824.—*J. W. Francis*, in New-York Med. and Phys. Journ., No. i., 1824.—*D. Hosack*, Observations on Cruritis or Phlegmasia Dolens: in *ibid.*, and in Med. and Chirurg. Review, vol. iii., p. 432.—*M. Ryan*, in London Med. and Surg. Journ., vol. iv., p. 325.—*J. Davies*, A Case of Phlegmasia Dolens, which terminated in Sphacelus of the Leg and Foot: in London Med. Repository, vol. xxiii., p. 451.—*A. Velpeau*, Recherches et Observat. sur la Phlegmasia Alba Dolens: in Archives Générales de Médecine, t. vi., p. 220.—*Meissner*, in Siebold's Journ., &c., t. iv., p. 73.—*Fraser*, in *ibid.*, t. vii., p. 647.—*Hermann*, in *ibid.*, t. xi.—*Loewenhard*, in *ibid.*, t. x., p. 352.—*Kruger*, in Horn's Archiv., t. iv., 1831.—*G. R. Trevisan*, in Annales Chir. Heidelberg, t. v., p. 492.—*J. L. Struve*, Comment. de Phlegmatia Alba Dolente, Observations, xv. practicas continens, 8vo. Tubing., 1825.—*R. Lee*, A Contribution to the Pathology of Phleg. Dolens, in Trans. of Med. and Chirurg. Soc. of Lond., vol. xv., p. 132, 369, and Cyclop. of Pract.

Medicine, vol. iii., p. 339, and Diseases of Women, &c., p. 117.—*J. Bouillaud*, Dict. de Med. et Chir. Pratiques, art. Phleg. Alba Dolens, t. xii.—*L. Pfeiffer*, Versuch über die Phlegmasia Alba Dolens, 8vo. Leips., 1837.—*Raige-Deforme*, in Dict. de Médecine, 2d edit., art. Phleg. Alba Dolens.—*F. Churchill*, Observations on the Diseases of Pregnancy and Childbed, 8vo. Dublin, 1840, p. 414. See, also, the Works on Midwifery and the Diseases of Women by *Denman*, *Burns*, *Capuron*, *Gardien*, *Davis*, *Dewees*, *Campbell*, *Blundell*, and others.

PHRENITIS. See BRAIN AND ITS MEMBRANES—INFLAMMATION OF.

PHTHISIS. See TUBERCULAR CONSUMPTION.

PICA. See APPETITE—MORBID STATES OF.

PILES. See HÆMORRHOIDS.

PITYRIASIS.—SYNON. Πιτυρίασις, from πιτυρον, bran.—Πιτυράδες, furfurosi, quibus assidue furfures in capite gignuntur, Galen. *Alvarati*, Avicenna. *Porrigio*, Celsus, Lorry, J. Frank. *Tinea furfuracea*, Sennert. *Tinea porriginosa*, Astruc. *Furfurisia*, Gilbert. *Pityriasis*, Vogel, Willan, Bateman, &c. *Lepidosis pityriasis*, Young and Good. *Teigne*, darte, darte furfuracee, Fr. *Haukleic*, *Schuppen*, *kleiengrind*, Ger. *Dandriff*, *Scurf*.

CLASSIF.—II. ORDER, II. GENUS (Willan).

III. CLASS, I. ORDER (Author).

1. DEFIN.—A chronic, non-contagious, superficial affection of the skin, attended by the production of minute white scales in great abundance, frequently on patches of irregular form, variable dimensions, and of a very light or dull red colour.

2. I. DESCRIPTION.—Pityriasis may occur in any part of the cutaneous surface, sometimes on several parts in succession, and most frequently in certain parts in preference to others, but very rarely over the general surface. The patches are often attended by slight heat, pruritus, and tingling. The scales are thrown off soon after they are formed, and are reproduced with great rapidity. They are generally small and micaceous; in some situations, and in the more inflammatory states, they are large and lamellar; and in others, especially in the non-inflammatory, or at least when inflammatory action is least manifest, they are minute, pulverulent, or measily.

3. THE VARIETIES OF PITYRIASIS, according to WILLAN, are the *rubra*, *visicolor*, and *nigra*. But RAYER and WILSON divide the complaint into *general* and *local*, subdividing the latter according to its situations, and consider the varieties *versicolor* and *nigra* of WILLAN as not properly belonging to this affection, but to those affections which consist chiefly of alterations of colour. Pityriasis, however, may be simple or non-inflammatory, and associated or consequent upon an erythematous or superficial inflammation of the skin. I shall, therefore, view it in these phases, the former of which has been overlooked by the writers just named; retaining, also, the varieties rejected by RAYER. As the local forms of this eruption are the most commonly observed, I shall consider them before I notice the more general affection, the occurrence of which is comparatively rare.

4. i. LOCAL PITYRIASIS.—This complaint, according to the situation and grade of the inflammatory action attending it, has been variously denominated and described by writers since the days of GALEN and CELSUS down to those of WILLAN and J. FRANK. Hence different meanings have been attached to the term pityriasis, and have occasioned no small amount of confusion. The more precise descriptions of CAZE-



NAVE, WILSON, RAYER, and others have, in great measure, removed this evil; but there still remain a few omissions to supply and imperfections to remove, even in the accounts which they have furnished. *Local pityriasis* may be non-inflammatory or *simple*, and inflammatory or *complicated*; and in either form it may present, in some cases, shades of colour different from those usually observed, even independently of any decided evidence of inflammatory action in the part—facts not sufficiently adverted to by some writers on the complaint. The *varieties* which I shall notice are the following: *Pityriasis capitis, simplex et associata*; *P. palpebrarum*; *P. labiorum et oris*; *P. palmaris et plantaris*; *P. præputialis et pudendalis*; *P. versicolor*; *P. nigra*.

5. *A. Pityriasis capitis* has been too generally viewed as an inflammatory affection, and described as such. That it most frequently possesses this character, especially in adults, cannot be disputed; but it is occasionally, even in this class of patients, devoid of every inflammatory appearance.—*a. Pityriasis capitis simplex* is frequent in infants and old people, and rarely observed in the middle-aged and young. Its presence is indicated by innumerable minute white scales, which are rapidly produced and thrown off. They are thin, white, and dry, and at first adherent at one side and free at the others, but are very readily detached. Upon removing them the surface presents no inflammatory sign, but, on the contrary, has a dull, indolent appearance, and is without any visible capillary vessels. The exfoliation and reproduction of the cuticle proceed with various degrees of rapidity, and furnish, accordingly, quantities of these scales, which collect near the roots of the hair, and fall out upon scratching the part, or combing the hair. This form of the complaint is not attended by any, or but a slight, itching, which is chiefly owing to the presence of the accumulated scurf. It is observed chiefly in those of a dark complexion, or with black or dark-brown hair, and of a delicate constitution, or disposed to disorder of the digestive organs.

6. *b. Pityriasis capitis rubra et complicata* is most common, especially in the young and middle-aged. Its occurrence is indicated by a number of minute scales, appearing in some part of the scalp; usually of a white, whitish gray, or yellowish gray colour; very thin, especially at their edges, and perfectly dry. They are often imbricated in children, but in old persons they are scattered irregularly. Their formation is often so rapid that, although they may be all detached by the comb, they will collect in nearly equal quantity in a day or two. When they thus accumulate the patient cannot scratch his head, or even arrange his hair, without detaching numbers, which fall upon his clothes in the form of a white mealy powder. When the scales are small, they are generally of a pure silvery white; but when they are larger they assume a duller, or even a darker hue. Upon separating the hairs and removing the scales the scalp is found to be dry, rough, reddened, and shining in spots or patches. In very chronic cases the surface is often of an opaque, grayish white; the cuticle appears to be thicker and coarser than natural. The scales are generally larger and thicker in this

variety than in the former, and sometimes they attain a diameter of five or six lines. They occasionally form by their union a thin layer, especially in children, extending over a considerable portion of the scalp, being thickest at points where they are most abundantly evolved.

7. The most frequent seat of pityriasis is the scalp; and when partial, or in patches, it is most commonly seen about the coronal and squamous sutures, whence it may extend to the temples, forehead, and to the eyebrows. The itching attending the eruption is often annoying, causing the patient to scratch the part and to loosen showers of scurf. When the affection is of long standing, and is attended by much superficial inflammation, or where it is much irritated by scratching, it is often followed by the evolution of eczematous vesicles, and eczema auriantacea is developed from the admixture of the scales of pityriasis with the eczematous discharge.

8. This complaint may continue for many months, or even for many years, especially in the aged, and may appear, also, in various parts of the face and body. When it is approaching a favourable termination, the scales are not formed so rapidly, and at last they cease to be produced; the skin, however, remains for some time of a light or dull red, or yellowish red, and slightly shining. But it often appears in a different part, or extends or is aggravated after errors in diet, especially after overloading the stomach, or after taking spirituous liquors or fish, more especially shell-fish; and it may thus ultimately abate and be exasperated for a long and indefinite time.

9. *B. Pityriasis palpebrarum* may exist alone; but it most frequently commences in the eyebrows, or is an extension of the eruption in the scalp. It is apt to occasion the loss of some of the eyelashes, and to give rise to chronic irritation or inflammation of the conjunctiva. It is to be distinguished from psoriasis in this situation by the smallness and thinness of the scales, and the erythematous appearance of the patches when the scales are removed.

10. *C. Pityriasis labiorum et oris* differs in nothing from the red variety of the complaint, excepting the situation. When affecting the lips, it is apt to be confounded with psoriasis; but it differs from this latter in appearing as red stains, and not as papular elevations, followed by thick squamæ. To the red stains succeed a general redness and continual desquamation of the epithelium of the lips, and occasionally of the cuticle of the adjoining skin. Desquamation of their transparent laminae, resembling the dried healthy epidermis, proceeds along the lips, the laminae becoming detached first at the edges, and adhering longest in the centres. The lips are tender, heated, and tumid; the epithelium is yellow and thickened, and then cracks and is detached as just stated, a new epithelium being formed under that which is about to fall off. This new cuticle in its turn becomes yellowish and cracked, and ultimately is detached, and thus the affection is perpetuated. It is different from the slighter and more transient affection much resembling it for a short time, that follows exposure to cold and various acute diseases, and is a most obstinate complaint, at one time nearly disappearing and again return-

ing even in a worse form than before, and with considerable swelling of the lips. M. RAYER remarks, that he met with this variety in two great talkers who were frequently biting their lips. The epidermis of the external surface in the immediate vicinity often undergoes a similar redness and desquamation, although the affection is sometimes limited to the epithelium.

11. An affection of the *internal surface of the mouth*, closely resembling that of the lips, has been described by M. RAYER, and a few instances of it have been seen by myself. It consists chiefly of redness, tenderness, heat, and protracted desquamation of the epithelium of portions of the surface of the tongue and gums, and the internal surface of the cheeks, and in rare cases of the whole surface of these parts. In all the cases I have seen there has been more or less serious chronic disorder of the digestive organs.

12. *C. Pityriasis præputialis* and *P. pudendarum*. The *prepuce* of the male and the *labia majora* of the female are sometimes the seats of a superficial chronic inflammation, giving rise to exfoliations of the epithelium, and to an increased secretion of the follicular fluids of these parts, especially in persons who are subjects of pityriasis capitis; and occasionally even the external surfaces of the parts now named are also similarly affected; generally, however, to a limited extent. These affections are usually ameliorated or aggravated by the states of the digestive organs; and sometimes they entirely disappear for a time, and again return. They are always obstinate.

13. *D. Pityriasis palmaris* and *P. plantaris* are varieties which were confounded with psoriasis affecting the palms and soles, until distinguished from it by M. RAYER. This eruption commences in these situations as small red spots or stains of irregular outline, which spread and soon acquire a yellowish hue. The epidermis thickens, dries, and cracks, and is constantly peeling off in foliaceous lamellæ, the exfoliation sometimes extending to the fingers and nails. Attention to this state of the eruption at the commencement will readily determine its nature; for psoriasis begins with papular elevations, the summits of which are soon afterward covered with dry, thick squamæ of a dull whitish colour. Pityriasis of the palms or soles is attended by painful tingling and tenderness, and increased heat, which become so much increased when the patient is warm in bed as often to break his repose.

14. *E. Pityriasis versicolor* appears in the form of continuous patches of various size, covered by a furfuraceous desquamation. It is characterized by a varied yellowish or yellowish-brown discoloration of the cuticle, which even continues for some time after the cure of the complaint. It occurs chiefly on the neck, chest, shoulders, and abdomen, and rarely on the face. It is distinguished from the ephelides by the furfuraceous desquamation, and from other cutaneous affections by the peculiar pale yellow or yellowish-brown hue of the cuticle. It is as obstinate to remove as the other varieties already mentioned. In the instances of brownish discoloration, the scurfiness of the surface is often but slight; the discoloration being more deeply seated than the cuticle, and evidently existing in the rete mucosum, as re-

marked by WILLAN. In some cases, however, the discoloured cuticle is exfoliated, leaving the new cuticle of a red hue, as in the more common states of the affection. Mr. PLUMBE mentions instances in which no sensible elevation was perceptible to the finger when passed over the discoloration, although a dry cloth forcibly rubbed over it detached films of delicate cuticle, leaving the surface underneath tender and inflamed.

15. *F. Pityriasis nigra* is of rare occurrence. Dr. BATEMAN describes it as commencing in a partially papulated state of the skin, and terminating in a black discoloration, with slight furfuraceous exfoliations. It appeared chiefly in the extremities, and in the fingers and toes. MM. CAZENAVE and SCHEDEL state that numerous instances of this variety were observed in Paris in 1828 and 1829. The furfuraceous desquamation appeared on a deep black surface. The affection occurred in two distinct forms. In the one the epidermis was the seat of discoloration, and, if detached, a red surface appeared beneath. In the other the epidermis was transparent, and the cutis vera was the part discoloured. Dr. A. T. THOMSON remarks, that the affection which prevails in Mexico, termed the *pinta*, or *blue stain*, appears to be a variety of pityriasis nigra. "It commences with slight febrile symptoms, which last a few days only, and, on subsiding, leave the face, breast, and limbs covered with yellowish areolæ, which change to a blue, and, in advanced stages, to a black colour. The skin assumes a rough and scaly appearance, and exhales an offensive perspiration." (*Bateman's Synop. of Cut. Dis.* by A. T. THOMSON, p. 77.)

16. ii. GENERAL PITYRIASIS.—a. This is a rare state of the complaint, and is much more rarely met with in a *simple or non-inflammatory form*. Yet I have seen a very few instances in persons of a dark complexion, with the limbs much covered with hair, of a furfuraceous exfoliation of the cuticle, proceeding with remarkable rapidity, and followed by as quick a removal of it in several parts of the body, but especially on the outsides of the thighs and near the joints, appearing in one part as it subsides in another, without any apparent redness of the surface either before or after the exfoliations. The scurf which is detached consists of very minute silvery white scales, which the slightest friction detaches in great numbers. These evidently proceed from exfoliation and rapid production of the epidermoid scales, either independently of inflammatory action or in consequence of so slight a grade of it as hardly to be observed; and depend more upon the production and nutrition of the epidermis than upon increased vascular action. In the very few instances I have seen, the scalp, lower parts of the face, arms, and lower extremities were chiefly affected.

17. b. The *inflammatory state* of general pityriasis is oftener seen than the foregoing, although very much less frequently than the local varieties. It is a most obstinate affection, and is generally complicated with disorder of one or more of the abdominal viscera. The eruption is preceded by itching, tingling, or pricking in the surface about to be its seat. When closely examined, superficial erythematous spots or patches may be detected. The heat of the



surface is increased, and the part is slightly tumid. The inflammatory blush diminishes, and even shortly afterward entirely disappears within a few days, so that this variety of the affection, if not seen early, may be mistaken for the non-inflammatory form. The epidermis then cracks, becomes less adherent, and desquamation commences. The scales thrown off vary in their appearances with the seat of the eruption, and the grade and duration of the inflammation. On the insides of the limbs they are usually small, micaceous, and pulverulent. On the outer surfaces of the extremities they are much larger, and often vary from three to six or seven lines in diameter. They consist of foliaceous lamellæ, which continue to adhere by their centres or extremities for a considerable time after they are partially detached; and thus they appear as loosely floating on the surface. When removed, especially by friction, the parts affected are of a rose colour, and slightly tumid. When the accompanying pruritus impels the patient to scratch the part, the surface exudes a yellowish serous fluid, similar to that observed in moist eczema; and when this takes place to a considerable extent, the diagnosis is thereby rendered obscure. Behind the ears, about the axillæ, bends of the arms, groins, wrists, and insteps, the inflamed surface assumes much of the appearance of intertrigo—is rough, moist, and clapped in the direction of the natural folds of the skin. On the breast and abdomen the desquamation occurs in much larger lamellæ than on the back. On the olecranon and patellæ, and especially on the palms and soles, where the cuticle is much thicker than on other parts, exfoliation takes place in larger and thicker laminae than elsewhere. On the face and scalp the scales are much more minute and powdery.

18. Pityriasis, particularly the more general states of it, is attended by much pruritus; but this sensation is most annoying when the eruption is recent and the inflammation considerable; and the enjoyment, if not the relief, experienced from scratching is the greatest; but it is generally followed, when indulged in, by painful smarting, so as to disturb the rest. It is very rare that the more general states of the eruption are seen without the scalp being affected also. In all cases where this part is implicated, the hair is not affected or changed for a considerable time, or until the disease has continued long. It then gradually changes to gray, and becomes finer, softer, and weaker; ultimately it gradually falls out; but baldness is rarely the result, unless in aged persons, although it is generally thinner in protracted cases.

19. *c.* The course of general pityriasis varies in individual cases. It often appears in one place as it subsides or disappears from another, and is always a most protracted complaint. The scales become small and pulverulent when it is subsiding or is still lingering, and large and foliaceous when it is recent or has been irritated, and the inflammation considerable. The surface is red and moist in this latter case, and pale white, or slightly yellowish, in the former. When the eruption is most acute, or is exasperated, especially on the lower extremities, and in these even when the redness under the scales is hardly perceptible, tumefac-

tion of the affected parts is very common, owing more, probably, to the thickening consequent upon the irritation than to the state of the subjacent cellular tissue. The hair covering the limbs is much more readily lost during the eruption than that of the scalp.

20. *d. Associations.*—I have rarely, or perhaps never, met with an instance of this eruption, whether *local* or *general*, without being associated with disorder of the digestive functions. In most instances there is chronic dyspepsia, often with torpor of the liver, and sometimes with indications of chronic inflammation of the mucous surface of the stomach or bowels, or of both. Flatulence is often, also, complained of; and in females, dysmenorrhœa, in some amenorrhœa, is not infrequently, also, associated with it. Fever seldom attends the local or partial states of the eruption, but it sometimes appears during the more general and severe forms, or when exasperated by external irritation or a stimulating diet.

21. *II. DIAGNOSIS.*—The seurf seen on the foreheads of very young infants, and that on the scalp of aged persons, are not always exfoliations of the epidermis, but rather the incrustations consequent upon the state of the cutaneous secretion and neglect of cleanliness. Very slight attention, however, will enable the physician to distinguish these cases. M. RAY-ER remarks, "that the scalp and extremities of some adults, and especially aged persons, are occasionally affected with an habitual exfoliation of the epidermis, which differs essentially from pityriasis by being attended by neither redness, heat, nor any other morbid sensation." Now this is the condition which I have denominated *simple*, or *non-inflammatory*, pityriasis, and stated to consist of a morbid or excessive exfoliation of the epidermis. It is often attended by slight itching, and slight friction will readily induce an inflammatory blush of the surface, indicating increased irritability of the vessels of the rete mucosum, and generally, also, by disorder of the digestive organs.

22. The exfoliation of the cuticle in pityriasis differs from that which takes place in all the varieties of *psoriasis*. For in this latter eruption the cuticle is thickened, rough, dry, and of a dull white colour; and the red patches always rise above the level of the surface, while those of pityriasis are not at all prominent. In *psoriasis*, also, the inflamed surface, even when deprived of the squamæ, remains dry, while that of pityriasis exudes a serous fluid. In the former the integuments are not swollen and painful, excepting in *psoriasis inveterata*, and in it only to a limited extent; while in the more acute or inflammatory states of the latter they are often painful and swollen over a large extent of surface. The heat and pruritus in pityriasis, also, are much more troublesome than in *psoriasis*. The same circumstances also distinguish pityriasis from the *leprous form* of *psoriasis*, with this distinction in addition, that the leprous variety generally assumes a circular form, and heals from the centre to the circumference. The detachment of the cuticle in *ichthyosis* is not preceded by redness or morbid sensation of the skin, and the desquamation following chronic *lichen* and *eczema* is preceded by papule and vesicles.

23. *III. PROGNOSIS.*—Pityriasis is one of the

most obstinate affections of the skin, more especially the more general forms of it. Even the local varieties are difficult to remove, and often return again and again, especially after errors in diet, and during disorder of the digestive organs. Of these latter varieties, that affecting the lips and mouth is the most rebellious. The duration and extent of the affection, and the association of it with internal disorder, as well as the nature of that disorder, should all be duly considered before an opinion as to the probable effect of treatment is given, and before the means of cure adopted. In all severe and complicated cases, more especially where the eruption is more or less general, and the digestive and respiratory mucous surfaces affected, the removal of the complaint is a work of time, and is not to be accomplished without effecting a change in the constitution by diet and regimen.

24. IV. CAUSES AND COMPLICATIONS.—The causes of this eruption are often obscure, and are more rarely local than constitutional, or such as affect the digestive organs, and through them the state of the constitution. Local irritants, the use of combs, or hard hair-brushes, the kind of soap used, and the operation of shaving, have been usually considered as exciting causes; but I believe that they are much less concerned in producing this affection than the following, namely, too full or rich living; improper or unwholesome diet; the frequent use of pork, bacon, and dried, smoked, or preserved meats, or of shell-fish; prolonged and repeated irritation of the gastro-intestinal surface, by these or by other articles of an indigestible kind; drinking cold fluids when perspiring; a morbid condition of the gastro-intestinal secretions; torpor of the liver, and a disordered state of the biliary and pancreatic secretions; exhausting discharges, and anxiety and exertion of mind. There can be no doubt of either or several of these causes being the most efficient in causing a return of this eruption in those who have been before attacked, and in aggravating all the symptoms in those who are already affected. The more general forms of the eruption are often associated with dyspepsia, flatulence, and chronic inflammatory action of either the pulmonary or the gastro-intestinal mucous surface, or even of both.

25. V. TREATMENT.—A. The local varieties of pityriasis generally require the utmost attention to cleanliness, and soothing and emollient applications.—a. When the *hairy scalp* is affected with the more severe forms of this eruption, the hair should be cut as short as possible, and the dried exudations and squamæ softened by means of poultices and the vapour douche, the latter of which should be continued for some time, and alternated with alkaline or emollient lotions. If there be much redness and heat of the surface with serous exudation, leeches ought to be applied behind the ears, and the calomel ointment (one drachm of calomel to one ounce of ointment) rubbed over the inflamed surface once in the twenty-four hours, after carefully washing the surface with an emollient soap, such as camphor or palm-oil soap. At the same time the bowels should be freely evacuated, the abdominal secretions and excretions duly promoted, and the cutaneous

exhalations increased by means of purgatives, alternatives, and cooling diaphoretics.

26. Due attention ought also to be paid to *diet*. The stomach ought never to be overloaded, and the quantity of animal food should be very much diminished, if it be partaken of largely, or even more than very moderately. Pork, bacon, veal, fish, particularly shell-fish; dried and smoked meats, and all other articles of food which are apt to occasion or to aggravate indigestion and gastro-intestinal irritation, ought to be avoided, and farinaceous articles of food and fresh vegetables substituted for the meat dishes which are relinquished, avoiding, however, all pickled, acid, acerb, and acrid articles whatever.

27. b. These means will generally remove the more recent cases of the eruption; but the more *chronic states* are often but partially relieved by them. I have considered that this and other cutaneous eruptions, which are attended by the exposure of a considerable portion of the inflamed surface to the action of the atmosphere, especially of the oxygenous portion of it, are aggravated by whatever tends to increase that exposure, either by removing the exudation and scales formed upon this surface, or by preventing their formation, and the protection they afford until a healthy epidermis is formed beneath them; and, therefore, instead of advising various deterging lotions, usually recommended, I have directed the surface to be covered, when the accumulated scurf and scales have been removed, with some albuminous or gummy application which may completely exclude the air from the affected part. The albuminous portion of egg, the solution of isinglass, or of gum acacia, or of tragacanth, will answer this purpose sufficiently.

28. c. In those cases which are attended with flatulence, acidity, and a predominance of the uric acid or urates in the urine, and, indeed, in most of the forms of this complaint, a sufficient quantity of magnesia and precipitated sulphur may be taken every night to procure a free evacuation of the bowels in the morning; and be continued for a considerable time, observing due precautions as to diet and regimen, and attending to cleanliness. The variety of pityriasis capitis which attacks adults, and especially the aged, and is attended with little or no inflammatory action, requires chiefly attention to cleanliness, diet, and regimen, and the removal of those symptoms of indigestion and gastro-intestinal irritation which are so frequently observed to attend this eruption. In these cases, the alkaline carbonates, taken in gently tonic infusions; the nitrate of potash, or the hydrochlorate of ammonia, in small doses, with emollients and vegetable bitters; or these with the hydrocyanic acid, will often be of service. The bowels should also be regulated by means of magnesia and sulphur, as just advised. In these cases, dyspepsia and gastro-intestinal irritation are generally associated with debility; and we shall in vain endeavour to remove the former if we neglect the latter, or to remove the eruption if we overlook these complications.

29. d. Mr. E. WILSON advises, after the inflammatory action is removed, some weakly-stimulating application to the surface, such as alkaline lotion, consisting of a drachm of liquor



potassæ to half a pint of emulsion of bitter almonds, or camphor spirit, or a weak solution of the bichlorate of mercury. A solution of two or three grains of bichloride of mercury, in half a pint of emulsion of bitter almonds, he considers best suited for patches on the face; and the zinc ointment for pityriasis palpebrarum, præputialis, and pudendalis. The vapour bath or douche, with the white precipitate ointment, are recommended by RAYER for pityriasis, palmaris, and plantaris. In these varieties, I believe that the recently-prepared calomel ointment, and due protection of the surface affected in the way just advised (§ 27), will be found preferable to the means directed by these writers.

30. *B. The more general states of pityriasis* are very frequently complicated with an inflammatory or congested state of the digestive or respiratory mucous surfaces, or with disorder of the abdominal organs; and hence the necessity of having a strict reference to these associations of disorder during the treatment.—

*a.* If the patient be young, robust, or plethoric, venesection to a moderate amount, and even the repetition of it, will be necessary, especially in recent and acute cases. Sometimes these complications appear not until the pityriasis has been of some duration; but in these blood-letting may not the less be required. Still, the circumstances of the case ought to be taken into account; for this form of the eruption occasionally appears in persons exhausted by mental exertion and anxiety; and for these relaxation and a complete change of habits and modes of living are required. Temperate mucilaginous baths, due regulation of the bowels, cooling diaphoretics, especially the liquor ammoniæ acetatis, spiritus ætheris nitrici, potassæ nitras, or the ammoniæ hydrochloras, taken in emollients or demulcents; the nitro-hydrochloric acids, taken internally, or applied externally, and a farinaceous, demulcent, and vegetable diet, are the means which deserve the greatest confidence.

31. *b.* If the bowels require assistance, the repeated use of the magnesia and sulphur, as above advised (§ 28), will be found most serviceable in this and in other forms of the eruption. If they become relaxed, ipecacuanha with any of the preparations of opium, or with the tinctura camphoræ composita, and a frequent recourse to mucilaginous baths, and to applications of albumen, or of solutions of gum, &c., over the more inflamed and denuded surfaces, will prove most beneficial. In this as well as in most other forms of the eruption, the preparations of arsenic, or even of iodine, are not so serviceable as in some other scaly affections, particularly when dyspeptic symptoms or gastro-intestinal disorders are present. But cases occasionally occur in which they are very advantageously taken immediately after a meal; and when thus administered they will not induce or aggravate these symptoms.

32. Mr. WILSON remarks that the local affection "is to be treated by emollient baths, fomentations, alkaline baths, and opium to lull the pruritus." Dr. A. T. THOMSON advises a lotion, consisting of one drachm of the solution of potash; one drachm of the dilute hydrocyanic acid, and seven ounces of the mixture of bitter almonds to be applied to the af-

fected surface, in order to quell the pruritus. I cannot quite approve of these means of cure, for the reasons already assigned (§ 27), especially of the more detergent substances employed, and am not surprised at their frequent failure. The treatment recommended by BATEMAN will be found more successful than that now noticed, namely, a combination of antimonials with decoction of woods, and warm baths. And when the irritability of the skin is not very great the application to the parts of an astringent lotion containing alum, or the di-acetate of lead, or a lotion containing borax. Emollient lotions and baths, containing also the sulphuret of potassium, are often useful. Mr. ERICSEN advises them to be aided by an ointment of white precipitate of calamine, or of the oxide of zinc.

33. *c. The Harrowgate and other sulphurous waters* are often of use in all the varieties of pityriasis. In a remarkably severe case of the general form of the eruptions in a married lady, about the period of the cessation of the menses, which was under my care, a prolonged course of these waters, following an active course of medicine, effected a complete and permanent cure. The discoloured varieties of the eruption, described by WILLAN and BATEMAN, and but rarely met with, require the same treatment as that advised above.

34. In most instances, especially the more chronic and general states of this eruption, comparatively little benefit will accrue from any method of cure, if the state of the digestive organs, and the diet and regimen of the patient, be neglected. For in this, as well as in all other chronic diseases of the skin, a complete and enduring cure can be obtained only by a change in the constitution, brought about by a suitable diet and regimen, and habits of life. What the diet, regimen, and habits ought to be cannot be stated with precision, as they should be partially accommodated to the circumstances of individual cases; but, in general, those in which the patient has indulged before and during the commencement of the affection require change. Abstemious and regular habits should be adopted, avoiding rich, indigestible, and heating articles of food, and stimulating beverages, and substituting farinaceous and vegetable substances, as far as may be prudent. Mental exertion and anxiety should also be avoided as much as possible; exercise in the open air ought to be regularly enjoyed; and sexual indulgences restrained within due bounds.\*

BIBLIOG. AND REFER.—Galen, De Composit. Medicament. secundum Locum, lib. i.—Celsus, lib. vi., 2.—Oribasius, Synopsis, lib. vi., cap. 25.—Aëtius, lib. vi., cap. 66.—Alexander Tral., lib. i., cap. 5.—Paulus Ægineta, lib. iii., cap. 3.—Avicenna, lib. iv., Fen. vii., tr. 2, cap. 24.—Forsters, lib. viii., Observ., 13.—Mercuriali, De Morbis

\* I have at present under my care a case of general pityriasis in a man, of great extent and severity. He has tried courses of the solution of the iodide of mercury and arsenic, of the sulphur and vapour baths, and the Harrowgate and Leamington waters, without benefit. He is about fifty years of age, has lost an arm, is of a full habit of body, and has lived freely. A severe diet, chiefly of farinaceous and vegetable food, sponging the surface with cooling lotions, exercise in the open air, and a course of alterative medicines were prescribed for him, but as yet the benefit derived is only partial, the restricted diet and prescribed regimen not having been observed. The great difficulty in the treatment of this and other diseases of the skin, is to convince patients of the necessity of observing a strict regimen, or rather to secure their faithful and continued adoption of the diet and regimen prescribed.

Cutis, cap. vii.—*Sumertus*, Pract. Med., &c., lib. v., pars iii., sect. i., cap. 7.—*Alibert*, Précis Théorique et Pratique sur les Malad. de la Peau, 2 tomes, Paris, 1822, plate 11.—*Willan*, On Cutaneous Diseases, 4to, 1805.—*Bidouz*, Réflexions pratiques sur les Maladies de la Peau, 8vo. Paris, 1826.—*T. Bateman*, Pract. Synopsis of Cutaneous Diseases. Edit. by A. T. Thomson, 8vo. Lond., 1829, p. 71.—*M. Good*, The Study of Medicine, 4th edit., 8vo. Lond., 1834, vol. iv., p. 443.—*Plumbe*, Pract. Treatise on Dis. of the Skin, 2d edit., p. 202.—*P. Rayer*, Theor. and Pract. Treatise on Diseases of the Skin. Transl. by R. Willis, 8vo. Lond., 1835, p. 654.—*W. C. Dendy*, Pract. Remarks on Diseases of the Skin, 8vo. Lond., 1837.—*J. Green*, Pract. Compendium of the Dis. of the Skin, with Cases, 8vo. Lond., 1835, p. 233.—*J. E. Erichsen*, Pract. Treatise on the Dis. of the Scalp, 8vo. Lond., 1842, p. 164.—*E. Wilson*, Pract. and Theor. Treatise on the Diagnosis, Pathology, and Treatment of Dis. of the Skin, &c., 8vo. Lond., 1842, p. 231.—*Cazenave and Schedel*, Manual of Dis. of the Skin. Transl. by T. H. Burgess, 8vo. Lond., 1842, p. 217.—See, also, the Illustrations of *Willan*, *Rayer*, and *Willis*, &c. Medical literature furnishes little either truly satisfactory or practically useful respecting the pathology, the constitutional relations, the complications, and the treatment of this obstinate and generally symptomatic eruption.

PLAGUE. See PESTILENCE, SEPTIC OR GLANDULAR.

PLETHORA. See BLOOD, EXUBERANCE OF.

PLEURA, DISEASES OF.—*SYNON.* Πλευρά vel πλευρον, pleura, the membrane covering the internal surface of the ribs, according to the ancient meaning; now the membrane covering the internal parietes of the thorax, and reflected over both lungs.—*Pleurc*, Fr. *Brustfell*, *rippenfell*, Germ.

1. I shall consider at this place those diseases which commence and are seated chiefly in this membrane; but the consecutive changes to which the pleura is liable will also receive due attention. *Inflammations of the pleura* will be first discussed, and next the other organic lesions, which either commence in, or consecutively implicate this membrane, will be treated of, occasional reference being made to associated affections and diseases of the LUNGS (see that article) and of other connected and adjoining organs.

INFLAMMATION OF THE PLEURA.—*SYNON.* Pleuritis, πλευριτις, πλευριτις νοσος, morbus lateralis, the side disease. Morbus pleuriticus, Celsus. Passio pleuritica, Morbus costalis, Pleuresis, Auct. Var. Febris Pleuritica, Hoffmann. Pleuritis Pulmonis, Pleuroperipneumonia, Auct. Pleuritis, Vogel, Sagar, Boerhaave, &c. Pneumonia pleuritica, Cullen. Cauma pleuritica, Young. Empresma pleuritica, Good. Inflammatio pleura; Pleurisie, French. Brustfellentzündung, Scitenstich, Germ. Pleurite, plurisia, Ital. Plurisy.

CLASSIF.—I. Class, 2d Order (Cullen). II. Class, 3d Order (Good). III. CLASS, I. ORDER (Author in Preface).

2. DEFIN.—i. NOSOLOG.—*Acute pain in the chest, aggravated by inspiration, commencing with chills or rigours, followed by increased heat, a hard and accelerated pulse; short, dry cough; and by difficult, short, or disordered respiration.*

ii. PATHOLOG. DEFIN.—*Inflammation, commencing in or implicating one or more parts of the pleural expansions, attended either by more or less of a consistent albuminous exudation, false membrane or adhesion, and by a fluid effusion, varying in their characters with the varying states of different cases; causing pain, symptomatic fever, disordered respiration, dulness on percussion, and alteration of the respiratory sounds.*

3. Pleurisy has been mentioned by *Hippocrates* and *Celsus* in several places, and more

distinctly by *Galen*; but *Aretæus* was the first to describe it with precision, and with reference to the treatment. *Cælius Aurelianus*, *Alexander Trallianus*, and *Paulus Ægineta* have also treated of it at considerable length. All these writers have viewed the disease as seated in the pleura lining the ribs, or external parietes of the chest. Modern physicians, who agreed with ancients in limiting the malady to the pleura, did not also agree with them in believing that it was confined to this portion of the pleural surface, but that it was seated, with, probably, much greater frequency, in the pleura reflected over the lungs and other parts. While *Boerhaave*, his commentator *Van Swieten*, and others contended for the separate and distinct affection of the pleura, *Sydenham*, *Hoffmann*, *Triller*, and *Morgagni* believed that the pleura and the substance of the lungs were generally both implicated, and that the one could rarely or never be inflamed without the other being also attacked. Hence *pleuro-pneumonia*, or *pleuro-pneumony*, was used to designate inflammation of these distinct structures. This latter view was followed by *Cullen*, *Portal*, the *Franks*, and many others. Nevertheless, it is now fully demonstrated by *post-mortem* examinations, as well as by the physical and rational symptoms during life, that inflammation may commence in, and be limited to, the pleura in some cases, and may be equally confined to the substance of the lungs in others; although in perhaps a still more numerous class of cases, it may originate in the one and extend to the other, implicating either of them more or less, as I have fully shown when treating of *inflammations of the lungs* (see art. LUNGS, § 73-75), and as the researches of *Laennec*, *Andral*, *Louis*, *Cruveilhier*, *Williams*, *Forbes*, *Chomel*, and *Stokes* also have fully demonstrated.

4. It has been fully shown by *Dr. Stokes* that the superficial description of many anatomical writers has given rise to incorrect views as to the connexion between the pleura and the parts over which the pleura is reflected. Instead of this membrane being connected to these parts simply by means of a subjacent cellular tissue, it has interposed, between it and these parts, a thin but dense fibrous membrane, which entirely envelopes the lungs, and forms a strong capsule for these organs. *Dr. Stokes* remarks, that this capsule, in the healthy state, though possessing great strength, is transparent, a circumstance in which it differs from the fibrous capsule of the pericardium, and which has probably caused its being heretofore overlooked; and that it is always more perceptible in disease implicating the pleura and subjacent tissues when they are more or less hypertrophied and rendered opaque. "This fibrous tunic invests the whole of both lungs, covers a portion of the great vessels, and the pericardium seems to be but its continuation, endowed in that particular situation with a still greater degree of strength, for purposes sufficiently obvious. It covers the diaphragm, where it is more opaque, and, in connexion with the pleura, lines the ribs, and, turning, forms the mediastina, which thus are shown to consist of four layers, two serous and two fibrous." (P. 460.) This conformation of the investments of the lungs and adjoining parts is interesting in a



physiological and pathological as well as an anatomical point of view. It establishes an additional analogy between the lungs and the parenchymatous and glandular organs of the abdomen, which have their fibrous capsules; and illustrates the general law of the constant association of serous and fibrous membranes, as we see in the arachnoid, pericardium, peritoneum, tunica vaginalis testis, and the synovial capsules. Considered pathologically, Dr. Stokes adds, it may explain the pain of pleuritis and pleurodynia, and the rarity of perforations of the pleura, so remarkable when considered in connexion with the frequency of ulcerations of the lung, which constantly approach so close to the surface as to be bounded by the fibro-serous membrane alone. "In pleuritis, with effusion, its existence may assist in explaining the binding down of the lung, and its corrugated appearance after the removal of the effusion." It may also be the seat of ossifications of the pleura; indeed, there can be little doubt of this being the case.

5. Notwithstanding this structure of the thoracic linings, we find that the cavities are capable of considerable dilatation, and that the mediastinum yields much more than is generally supposed, before the pressure of intra-thoracic accumulations. Hence, in empyema, or in pneumo-thorax of the left side, displacement of the heart, as Dr. Stokes has shown, occurs long before the intercostal spaces are obliterated, or even the diaphragm depressed. It is not improbable, however, that the strength of this fibrous tissue varies in different persons; indeed, with respect to the pericardium, the greatest difference of strength exists, for in some subjects it is dense and opaque, while in others it is nearly transparent.

6. *The varieties or states of pleuritis* are numerous; and they have been variously denominated and arranged, according to the views of those who have described them, and to the various morbid relations they furnish.—(a) Considered with respect to the character of its progress and duration, pleurisy may be either *acute* or *chronic*; and (b), both the one and the other may also be either *attended by pain* or *without pain*—may be *open* or *latent*.—(c) In relation to its extent, pleurisy may be *partial*, or circumscribed to a portion only of the pleura of one side, or much more extended on one side, but still *single*, or it may exist on both sides, or be *double*.—(d) As regards the characters of the pathological changes attending it, pleurisy may be *dry*, *adhesive*, or *pseudo-membranous*, or it may be *effusive*, *serous*, *sero-puriform*, or *purulent*.—(e) In relation to the causes and circumstances of its occurrence, pleurisy may be *primary* or *consecutive*, or it may be *spontaneous* or *traumatic*. (f) In respect of antecedent disease, it may be consequent either upon other diseases of the chest, or upon constitutional maladies, more especially the eruptive fevers.—(g) Pleuritis may, moreover, be *simple* or *complicated*; and it may be *simple* from the commencement and continue so, or it may become complicated in its course, and it may be *complicated* from the beginning, or it may be consequent upon the malady associated with it; thus it may be associated with *catarrh*, *pneumonia*, *bronchitis*, *tubercles*, *pericarditis*, *diaphragmitis*, *hepatitis*, *rheumatism*, &c.—(h) Pleurisy may be even charac-

terized according to the *states of the system* and the *diathesis*, and the circumstances in which it occurs: thus it may be *sthenic*, or *asthenic*, or *bilious*, or *typhoid*, or *malignant*, or *cachectic*, or *puerperal*.—(i) It may, lastly, be *true* or *false*.

7. Having premised these remarks, I shall first notice the *causes of pleurisy*, and afterward describe the principal *forms and states* which this disease assumes, with their *terminations*, their *diagnosis*, and the *appearances on dissection*, concluding with the *treatment* which appears most appropriate to each of these states.

8. I. THE GENERAL CAUSES OF PLEURISY.—Pleurisy occurs in all *ages* and in both *sexes*—in infancy and childhood as well as in adult age; and in this latter somewhat more frequently than in old age. It is much more frequent in males than females, probably in the proportion of five to three, and owing to the greater exposure of the former to the exciting causes. It is most prevalent among persons much exposed to the vicissitudes of season and weather, and those actively engaged in outdoor occupations, more particularly such as require physical exertion. It is met with somewhat oftener in those of a sanguine temperament, and robust or plethoric habit of body, than in others; but this may admit of some doubt. It occurs more frequently in winter and spring than in the other seasons, and in this it accords with pneumonia, both these maladies occasionally becoming so prevalent in those two seasons as to be almost epidemic. Nevertheless, pleurisy may be more than usually prevalent, also, during summer and autumn, as it manifestly was during the spring and summer of 1846, during which seasons, however, there seemed to be a tendency to inflammatory affections of serous membranes, and these often of an asthenic character.

9. A. *The various circumstances which predispose pleurisy* are not determined with precision. There can be no doubt, however, that previous disease of the respiratory passages or substance of the lungs, or the actual presence of these and eruptive fevers, are the most frequent and influential. To these may be added the arrest of accustomed discharges, and the suppression of cutaneous eruptions and of painful affections, before the constitutional derangement of which they are the external manifestations is removed, for there are often predisposing causes, although they may not actually excite or determine this malady, other causes commonly following upon these, and determining the morbid action to the pleura or other serous membranes.

10. B. The most influential *exciting causes* are certainly exposure to cold in the numerous modes of its application, &c., and external injury.—a. The vicissitudes of season, of temperature, and of other atmospheric conditions, have a marked influence on the prevalence of this disease. It is generally supposed that cold and dry states of the air occasion pleurisies more frequently than cold and humid states. This is probably the case, but it is not demonstrated, nor is it easily demonstrable, as there are generally numerous other circumstances which should be taken into the account. There can be no doubt, however, that cold applied to the surface of the chest, or the cold generated by currents of air passing over this part of the

body, or even over other parts, and damp or wet clothes upon either the trunk or the extremities, more especially when the surface has been perspiring at the time, or shortly before, are frequent causes of pleurisy.

11. *b. Injuries or other mechanical causes* are frequent and sufficiently manifest, especially fractures of the ribs, penetrating wounds of the thorax, and contusions. I believe that the influence of the last of these has often been underrated, and that contusions and superficial injury even of a slight kind have occasioned pleurisy more frequently than has generally been supposed. In some states of the constitution, by no means recognizable previously, superficial and painful injuries, such as severe burns, scalds, and lacerations of the surface, are followed by inflammation of the pleura; and in some instances the injury may have been so severe as to have its effects propagated to the intercostal muscles, and thence to the costal pleura; but, in other instances, this explanation can hardly be entertained, although the frequency of pleurisy subsequently to such injuries fully justifies a belief in the sequence being that of cause and effect, while nervous communications, connexions, and influence sufficiently account for the phenomenon.

12. *c. The pathological causes, or antecedent diseases*, require some notice in relation to the occurrence of pleurisy, more especially as the most frequent appearances of this malady are of this description. The common supervention of pleurisy upon general and lobular pneumonia, upon tubercles in the lungs, the rupture of a tubercular cavity, or tubercular perforation of the lung, and upon other organic lesions of this organ, is well known. But it is not always sufficiently recollected, at least it has not been sufficiently noticed by authors, that pleurisy is often consequent upon inflammations of the liver, of the diaphragm, and of the pericardium, and still more frequently upon rheumatism. Pleurisy may either follow or coexist with these, and more frequently with inflammation of the liver and diaphragm than is generally supposed. It may also follow partial or general peritonitis, and become the most dangerous part of the complicated malady. It is well known that diseases of the mamma, more especially the malignant maladies of this organ, often extend to the pleura, and occasion one of the worst forms of pleuritis; and pleurisy, generally with effusion, is one of the most unfavourable consequences, and not the least unfrequent, of inflammations of the veins and of the lymphatics, of punctures or the inoculation of morbid fluids during dissections, and of organic diseases of the kidneys.

13. *Eruptive fevers* are among the most frequent pathological causes of pleurisy, this disease commencing either during the acme of the eruptive fever, or during the subsidence of the eruption, or even during the period of convalescence. When the pleurisy appears during the acme of eruptive fevers, it may be manifest, or be marked by the other phenomena, or be latent, and be detected only after death; and it may be similarly circumstanced when occurring at any period after the decline of the eruption. In the first instance, the concomitant pleurisy is to be imputed to the morbid poison in the circulating fluids that has affected the

pleura in addition to the external surface, and, indeed, other surfaces of the body. In the later appearances of pleurisy in connexion with, or subsequent to, an eruptive fever, it may be inferred that the morbid condition of the circulating fluids had not been removed by the changes which had taken place on the cutaneous surface, and by the other emunctories, but that it was still sufficient to implicate the pleura, especially if exposure of the surface, in its existing state of susceptibility, favoured determination of the circulation to internal parts. Moreover, the cutaneous function is often not restored for some time after eruptive fevers; hence the blood retains much uneliminated materials, which act injuriously upon serous exhalant surfaces, and often inflame them; and this evil and its consequences are always developed or aggravated by exposures to cold, even of the most evanescent and slightest kind, during the early periods of convalescence from these fevers. Besides, the sympathies existing between the skin and serous membranes, already insisted upon (§ 11), are also to be taken into the account when speculating on the connexions of inflammations of these surfaces.

14. The *puerperal state*, more especially the first month after delivery, is not an unfrequent cause of pleurisy; inflammation of the pleura occurring then either in a simple form, or associated with peritonitis, or with pneumonia, or with phlebitis, &c. In this particular state there can be no doubt of the disease being caused, in great measure, by the condition of the blood consequent upon the absorption of morbid matters from the uterus, and even in part from the digestive canal, aided probably, in some cases, by suppression or interruption of the eliminating or depurating functions of the skin, kidneys, and intestinal canal. In many instances, also, of puerperal fever, more especially of the adynamic and malignant states of that disease, pleuritis appears both as a complication or prominent local lesion, and as a consecutive malady; and thus pleurisy, appearing after parturition, may be viewed as resulting from analogous changes to those which occasion it in connexion with eruptive fevers, erysipelas, and some other diseases of the skin, namely, from the states of the circulating fluids, aided by interruption or suppression of the actions of the skin and other emunctories.

15. II. DESCRIPTION OF PLEURISY.—i. THE STRUCTURAL CHANGES CONSTITUTING PLEURISY.—It will be advantageous briefly to notice those changes in the pleura constituting this disease, in the earlier stages, and which exist in all cases in a greater or less degree, however early treatment may arrest their progress. These changes are identical with those characterizing inflammations of the *peritoneum*, and hence it will be unnecessary to do more than to notice them briefly. It is probable that, at the very commencement of the inflammation, there is a diminution of the serous exhalation that usually moistens or lubricates the pleura in the healthy state. This being the case, the friction between the opposing surfaces would be increased; but this condition would soon be followed by an exudation of lymph, or of an albuminous serum, which would assume various forms with the intensity and continuance of that inflammation, and the habit of body and



vital powers of the patient. The pleura, more especially in its subjacent or more fibrous layer, and the connecting cellular tissues, becomes more vascular, more opaque, and somewhat thickened, at least subsequently, and the lymph effused more copious. The liquid or lymph poured out consists of serum—an augmentation of the serous exhalation—and of a material of nutrition, the albuminous, the coagulable, or albumino-fibrinous portion. If the inflammation continue, even for a short time, the exudation of these materials, in variable proportions in different cases, proceeds rapidly, and gives rise to changes depending much upon the proportion of the latter material contained in the serous fluid. In its smallest proportion, the coagulable material is held in solution by the effused fluid; and, when withdrawn from the body, it gelatinizes upon cooling, the liquid mass assuming a jelly-like appearance. When the coagulable portion is more abundant, it forms films or coats of lymph upon the surface of the membrane; and this deposition is generally the more considerable, and the more disposed to speedy organization, the more acute the inflammation, the more plethoric and robust the patient. This coagulated lymph thus forms the false membranes, and the substance of the adhesions so frequently formed between the surfaces of the inflamed pleura. But the false membranes may exist with or without adhesions, the existence of adhesions depending much upon the quantity of the fluid effusion between the pleural surfaces. This effusion, especially when considerable, will generally gravitate to the most depending portions of the pleural cavity; and there, especially, it will tend to keep the pleuræ separate. But if the upper portions of the pleura be inflamed, they will more readily adhere, unless the fluid be very abundant. If the pleuræ be inflamed only in their lower expansions, a small quantity of fluid will be sufficient to keep them apart. When the lymph effused on the inflamed surfaces becomes organized it forms a false membrane; and if the lymph cover opposite surfaces, adhesions, through the medium of these membranes, often become firm or permanent. When the liquid effusion is small, or even considerable, various adhesions may be formed, and vary in number, appearances, and extent, in connexion with the effusion; or partial adhesions, coexisting with false membrane, may exist without any, or with very slight, effusion. In more prolonged cases, and in various other circumstances, which will appear in the sequel, various consecutive changes are observed in the pleura, and in the matters effused in its cavity; but these will be more fully noticed hereafter.

16. ii. THE SYMPTOMS AND SIGNS OF PLEURISY.—A. OF SIMPLE ACUTE PLEURISY—OR STHENIC ACUTE PLEURISY.—This, as well as other inflammations, generally commences with chills or rigours, the continuance and severity of which are generally in proportion to the severity of the attack. The rigours are either preceded, or accompanied, or followed—for no precise order of procession of their symptoms is observed—by pain or stitch in the side, aggravated by inspiration and cough. To the rigours succeed heat of surface and the usual phenomena of sympathetic inflammatory fever,

which vary with the constitution, idiosyncrasy, and vital power of the patient. The respiration is short, frequent, sometimes nearly forty in a minute, superficial, and anxious. Inspiration is interrupted, or, as it were, cut short by the lancinating pain. Cough is dry and suppressed. The chest, on percussion, furnishes a dull sound on the affected side; and, at the same time, there are diminished motion and sound of respiration, with other morbid signs, on that side. The accompanying fever is attended by nocturnal exacerbations, with more or less manifest remissions. From the fifth to the ninth day the fever subsides, either with or without critical changes. The pain of the side abates, and with it the feeling of oppression or tightness, and expectoration and respiration become more easy. Still the local changes, evinced by percussion and auscultation, remain, and often continue for a considerable period; and even, to a certain extent, during life. But more commonly they gradually disappear, and the patient recovers health and strength. Dulness on percussion is the sign which is the last observed, the breath-sound returning often long before the dulness entirely disappears. These phenomena result from the several products of inflammation collected in the cavity of the pleura, that are generally removed during the period of convalescence. This view of the symptoms of pleurisy requires, however, a more particular examination, in respect both of the diagnosis and of the treatment.

17. a. The pain or stitch in the side, characteristic of this state of the disease, indicates a more or less developed period of it. This pain is sharp or lancinating, often severe, recurs at each inspiration, and prevents the dilatation of the thorax, thus confining inspiration within certain limits. Its seat is most frequently under the nipple, at the margins of the lateral attachment of the diaphragm. It has been asked, to what is this pain owing? M. CRUVEILHIER answers this question by referring it to the friction of the costal pleura over the pulmonary pleura, which he believes to be greatest at this situation. But I doubt the existence of much friction between these surfaces, and believe that the pain is to be imputed chiefly to the stretching of the inflamed fibrous layer of the membrane during inspiration, and to the development of its morbid sensibility by this act. The pain may be felt in other situations besides that now mentioned. It may exist at any part of the affected side of the chest. It may even extend to the lumbar region, or to the lower margins of the ribs and down to the crest of the ilium; and it may exist in the mammary and sub-sternal regions, and rise as high as the margins of the third or second rib, extending even to the shoulder. The pain varies as to intensity and duration: it may be permanent or temporary, remittent or intermittent. It may be so intense as to threaten suffocation or asphyxia, either from attempting to move, or owing to the inability to dilate the chest. This, however, is most remarkable in extreme cases, and in those of *double pleurisy* (§ 61). In other instances the pain is comparatively slight, and is felt chiefly during a full inspiration, or upon coughing or sneezing, &c. In some cases the pain extends over nearly the whole of the side, and is increased upon pressure, especially on the

intercostal spaces, upon percussion, &c. I have seen, also, the pressure of the stethoscope endured with difficulty, and a certain degree of puffiness or œdema of the side or of the external parietes. In a case of pleurisy consequent upon hepatitis, very recently under my care, this external œdema and tenderness were very remarkable. I have imputed these phenomena to inflammation of the costal pleura, and to the external propagation of several of the local changes, especially excited vascular action, increased sensibility, and serous infiltration to the sub-cutaneous cellular tissue. Moreover, the pain may be entirely absent, or may exist in a situation which may not suggest the existence of pleurisy; and hence the disease has been called *latent pleurisy*, which will be considered hereafter (§ 49.)

18. *b. Respiration* is short, interrupted, superficial, and very frequent. It may even reach fifty in a minute. The frequency of respiration is generally in proportion to the severity of the pain, which checks the dilatations of the chest, and creates a necessity for an increased frequency of the act. In these cases a sudden attack of cough or sneezing almost threatens asphyxia; but I cannot agree with M. CRUVEILHIER, that asphyxia ever occurs under these circumstances, unless in double pleurisy, when much effusion has taken place. Great frequency of respiration may, however, exist independently of pain; but in this case there is generally considerable effusion. Hence this state of respiration, although no pain is complained of, should always induce a suspicion of the existence of pleurisy. When the remarkable acceleration of breathing is caused by the effusion, then attacks of cough, sneezing, &c., may be followed by fatal asphyxia, but this issue more frequently supervenes without either of these contingent causes having occasioned it.

19. *c. Cough* most frequently attends pleurisy; but it is short, dry, and suppressed, owing to the pain it causes. It sometimes, however, brings up some bronchial or tracheal mucus, and when pleurisy is complicated with catarrh, then the cough is much more severe and distressing, and often attended by a copious expectoration of the sero-mucous fluid of catarrh. Occasionally the catarrhal symptoms are not developed until the acute stage of pleurisy is subsiding, and when a free, abundant, and copious expectoration then takes place, it may be viewed as being critical; but when the sputum is viscous, adheres closely to the vessel, is rusty or streaked with blood, it may then be considered an indication of the extension of the inflammation to the substance of the lungs, and to the minute bronchi.

20. *d. Immobility of the thorax* on the affected side has been considered characteristic of pleurisy; but this is the case only to a certain extent, and is not to be depended upon, for in many severe cases it is difficult to see much difference in the degree of motion of both sides, or of different parts of the same side. Besides, immobility is often caused by pain, which may exist in the side independently of inflammation, as will appear hereafter.

21. *e. Decubitus* is most frequently on the back during the acute stage of pleurisy; sometimes it is upon the sound side, and rarely on

the affected side as long as pain is considerable; but when effusion has taken place, and the acute stage has passed away, the patient can lie only on the back or on the side in which the effusion exists. Indeed, in all chronic cases of pleurisy, or whenever effusion into the pleural cavity is great, the lung on the sound side only remains capable of performing the respiratory functions, and it necessarily requires to be unembarrassed during the discharge of these functions, either by position or any other circumstance.

22. *f. The fever* attending pleurisy may precede, for two or three days, the local symptoms, or accompany them. It generally subsides, before these symptoms disappear, for a longer or shorter period. The heat of surface varies considerably, but generally it is co-ordinate with the strength and hardness of the pulse, and is increased towards evening or night. The fever is seldom perfectly continued; it is generally slightly remittent; sometimes more manifestly so. It is much less frequently intermittent, although the latent form of the disease often presents complete morning or daily intermissions. The pulse is hard, concentrated, or constricted, and more or less accelerated, while in pneumonia it is full and developed. Hardness of the pulse was considered by BAGLIVI as the most distinctive symptom of pleurisy. The concentration and hardness of the pulse are generally remarkable in proportion to the acuteness of the pain. When effusion takes place, or is considerable, especially about the third or fourth day, or later, the febrile symptoms subside, or remit more decidedly, and sometimes the pulse intermits. These phenomena may be referred to the influence produced by the effusion upon the functions of the lungs and heart, and consequently upon the blood itself. The least mental or physical agitation, however, occasions great acceleration of the pulse in these cases, and a febrile exacerbation returns at night.

23. Although the sharp pain in the side, catching and restraining every inspiration, and rendering deep breathing or coughing almost intolerable; the short breath, and short dry cough thereby caused; the hard and quick pulse, heat of skin, &c., are often characteristic of pleurisy; yet acute inflammation, and its most important consequence, copious effusion, may have existed for many days in the pleura, without this array of symptoms. Even effusion may have taken place to a very great amount without either disturbing the respiration very sensibly, or even rousing the sensibility of the parts, if it have proceeded gradually or slowly. On the other hand, the *physical signs* are more to be depended upon than those symptoms which have been now considered. And, although they do not indicate the intensity of the inflammation, they seldom fail in announcing the presence, and most serious consequences of it. I shall therefore analyze these signs in the order in which they commonly appear.

24. *B. Physical Signs of Pleurisy.*—*a. Diminished motion* is usually observed as already stated, and is at first to be imputed to the pain; but, as pain may exist independently of inflammation, this sign cannot be depended on. The sound of respiration is also diminished in pro-



portion as the movements are restrained in the parts affected with pain.

25. *b. A sound of friction*, or a creaking sound, is sometimes heard during the movements of the chest. This is ascribed by Dr. STOKES, M. REYNAUD, and others to a defective lubrication of the opposite pleural surfaces during the early or incipient stage of inflammation—to a *dry pleurisy*. Dr. WILLIAMS ascribes this sound to the presence of lymph, and believes that its production is favoured by the lung being partially distended or pushed against the walls of the chest during respiration. It is most apt to occur where the lung is confined by adhesions or false membrane, or partially distended by tuberculous or other deposits. This sound is commonly heard about the middle parts of the chest. It generally ceases as soon as effusion into the pleural cavity is announced by percussion; but in the dry pleurisy it may continue for a long time. Dr. WILLIAMS remarks that, in three cases in which the sound was heard a few days before death, the pleura were thinly coated with a few small patches of soft granular lymph; and that, on gently rubbing the lung upon the costal pleura, a friction-sound was produced by the patches, but by no other part of the pleura. The pleural inflammation and effusion were very slight in these cases.

26. *c. Dulness on percussion*, at the most dependent parts of the affected side, is present when effusion has taken place; but there may also be some dulness on percussion of other parts, or where a considerable effusion of lymph, or false membrane, is interposed between the opposite surfaces. The effused fluid collects in the lowest part of the cavity, floating, to some extent, the lung upon it; and hence the dulness in that part. As, however, the vesicular and peripheral parts of the lung yield more readily to pressure than the tubular or more internal parts, the fluid mounts up, as it accumulates between the lung and ribs, and occasions more or less dulness, which is then distinctly heard if the percussion be gentle and abrupt. But in all cases the sound should be compared with that emitted by corresponding parts on the sound side.

27. *d. Diminished sound of respiration*, with diminution of the extent of the motions of respiration, necessarily result from the accumulation of fluid in the pleural cavity. The breath-sound is more and more weakened and shortened as effusion proceeds, and is ultimately abolished in most parts, excepting those about to be noticed. This sign, as well as that preceding and those following it, may be modified, or rendered less distinct, by adhesions previously existing between the pulmonary and costal pleura.

28. *e. Ægophony*, or the modification of the vocal resonance so denominated, occurs when the dulness on percussion and diminution of the respiratory sound reach the middle regions of the chest. The vocal resonance is heard more distinctly than usual in those regions, "and it is superficial, as if produced in the spot, separately from the oral voice; and it is changed to a small bleating, trembling note, which so much resembles the voice of a goat, that LAENNEC termed it ægophony. This modification of the voice is heard most distinctly

between the third and sixth ribs, which corresponds with the situation of the middle-sized bronchial tubes; about the spine it is generally mixed with more of a common bronchophony from the larger tubes at the root of the lung." The liquid interposed between the lung and the parietes of the chest renders the voice more audible in the above situation, by condensing the tissue of the lung, and thereby making it a better conductor of sound. The layer of fluid thus interposed, being thrown into vibration by the sound propagated from the bronchial tubes, transmits the voice to the ear of a tremulous and wiry character, or imparts to the voice, heard upon auscultation in this situation, this particular character. The high or sharp tones of the voice are best transmitted in this way. Hence ægophony is most evident in boys, women, and children with high voices. In persons with a bass voice it is more commonly limited to the inferior angle of the scapula, or near the spine; and it then approaches nearer to bronchophony from its being seated in larger tubes.

29. As the liquid increases, the ægophony becomes weaker, more distant, and loses much of its tremour, the sound much resembling a small, deep-seated voice, or a silvery echo of the original. This is owing to the amount of effused fluid, and to the compression of the lungs and tubes; and when these are much increased, the sound ceases altogether. It has not been ascertained what quantity of effusion is sufficient to produce this last effect. Dr. WILLIAMS thinks that much sound of the voice is not transmitted when the layer of serum exceeds an inch in thickness. If the ægophony continue stationary for several days, it may be inferred that the effusion is moderate, and increases very slowly, which is a favourable sign. But it is often very transient; and cases often do not come under treatment until the pleuritic effusion has become too great to give rise to ægophony. Former and existing adhesions, however, modify this as well as the other physical signs. When ægophony is most distinct it is often accompanied with bronchial respiration, especially between the scapulæ, where, also, there is a good deal of common bronchophony with it. Indeed, ægophony is merely the bronchial voice modified by transmission through a layer of fluid; and hence it may be changed into bronchophony by causing the patient to change his position so as to allow the fluid to gravitate to a different part of the cavity. Hence, also, ægophony and bronchophony often present mixed and doubtful states, which do not admit of easy distinction, although they differ sufficiently when their respective characters are well marked. The former may be stated to be a *tremulousness* of the voice when it is superficial, and an echo-like smallness when it is deep-seated; while the latter may present several other varieties.

30. *f. The diffused vibration of the voice*, which is usually felt by the hand applied to the chest, is generally intercepted and prevented by effusion into the pleural cavity. M. REYNAUD first pointed out this sign, and showed that the vibration caused by the voice pervading the common tissue of the lung, and transmitted to the parietes of the chest, is muffled and destroyed by a layer of fluid interposed between the lung

and the parietes, although ægophony may be heard at the same spot, the vibrations of the latter being too fine to be felt by the hand. When dulness on percussion is caused by solidification of a portion of the lung, the vocal vibrations are transmitted with unusual force from the tubes to the walls of the chest, and hence the opposite effect occasioned by the fluid interposed becomes an important diagnostic sign, in regard of these lesions. Partial adhesions, however, of the lungs to the costal pleura may very materially interfere with these phenomena; for there may be even more vibrations than usual felt at the adhering parts, or where the lung is pressed close to the walls of the chest; and, on the other hand, there may be solidification of the lung, and fluid or other obstruction in the bronchi may prevent the fremitus of the voice from being transmitted through them; or more or less fluid may be interposed between the solidified lung and the walls of the chest.

31. *g. Ægophony and all sounds of the voice cease* throughout the affected side as the liquid effusion increases, excepting within two or three inches of the spine; or where the lung may adhere to the walls, which frequently happens at the upper parts of the chest. The sound of respiration is not heard in all the parts of the affected side, except the interscapular region and under the clavicle; but it is much weaker in these parts.

32. *h. Enlargement and immobility of the affected side* may always be detected when the effusion is considerable. This side is first seen to be larger than the other at the end of expiration, it not diminishing equally with the sound side, especially at its lower region. The difference between the sides may be rendered more evident by encircling the chest by a piece of tape, and by fixing it at the spine and sternum; when the tape will slacken and tighten with expiration and inspiration, more evidently on the sound than on the diseased side, which latter remains more fixed in proportion to the amount of effusion and degree of distention. As the effusion augments, the enlargement of the side becomes the more obvious to the eye during the respiratory act, the want of symmetry being apparent in whatever position the side is viewed from; but the amount of difference should be ascertained by measuring the chest horizontally with a piece of tape. Having made the tape, or riband, to meet at the middle of the lower end of the sternum, it should be taken at the precise point of its crossing the spinous processes of the vertebræ, and the difference of length between the two sides will give the amount of enlargement; recollecting, however, that the right side of an adult is about one third of an inch larger than the left.

33. *i. Displacement of the parts and organs bounding the effusion* becomes more and more manifest as the amount of fluid increases. LARRENEC, and many after him, have remarked that the intercostal spaces on the side of the effusion do not present their usual depressions, and that they are sometimes, especially in chronic cases, equal with the surface of the ribs, or even more prominent than they are; but this sign is hardly perceptible in acute cases, unless in the more asthenic states, and when the patient is thin or emaciated. In such cases, Dr.

WILLIAMS has noticed an evident fluctuation, which, however, is a rare occurrence. The smoothness of the side, from the yielding of the intercostal muscles and consequent obliteration of the spaces, as well as the yielding of the diaphragm, and the pushing before it of the viscera of the upper regions of the abdomen, are remarkable when the effusion is great, and are ascribed by Dr. STOKES to paralysis of these muscular parts, consequent upon the inflammation of their serous linings. "The true explanation," he remarks, "of the protrusion of the intercostals and diaphragm will be found to be that they are affected by paralysis following inflammation of a contiguous structure—that their contractile powers are lost, and that hence they yield easily to a pressure, which in their healthy state (as in vesicular emphysema, in hydrothorax, and the first stage of pleurisy) they effectually resist." (P. 464.)

34. Displacement of the organs more immediately adjoining the effusion, especially that of the heart and of the liver, is one of the chief indications of the existence and of the amount of liquid effusion into the pleural cavity, and was first noticed by Dr. STOKES and TOWNSEND. When effusion is considerable in the left side, the consequent displacement of the heart renders its recognition easy. In this case the pulsations of the heart are felt and heard most distinctly under or to the right of the sternum, or as low as the epigastrium, instead of between the cartilages of the fourth and sixth left ribs. If the effusion be on the right side, the liver is pushed down much below the margins of the ribs, and its position is easily traced by percussion and by the touch. It may even be pushed so far as to form a tumour in the abdomen, and hence lead to a serious mistake in the diagnosis, if the symptoms and signs referrible to the thorax be not duly investigated. When effusion in the right cavity is very great, the heart may also be pushed farther than usual to the left, and it may be felt beating to the left of the nipple, or even below the axilla. The mediastinum may also be displaced by a copious effusion, so that a dull percussion sound will be given out over nearly the whole of the sternum, and even for half an inch beyond it upon the sound side, owing to the mediastinum being pushed to this side by the effusion, which thus occupies the space behind the sternum. The dulness on percussion in these cases is most evident below the juncture of the second rib with the sternum. The above displacements may also be caused by air in the pleural cavity, but in this case the tympanitic sound would be present instead of dulness.

35. *k. The motions and sounds of the healthy side*, especially when compared with those of the affected side, indicate either no sign of disease, or an increase of the signs of healthy action, owing to the increased work performed by the sound side. This side moves more fully and rapidly than usual, and the respiratory sound is so loud in it as to resemble the respiration of children.

36. *l. Old, or even recent, adhesions* very remarkably modify the physical signs of pleurisy. When the adhesions are loose, or are stretched by the effused fluid, so as to form bands traversing the effusion, or cells filled with fluid, the lung may be thereby kept at a moderate dis-



tance from the parietes of the chest, and ægophony would thus be continued as long as this state continued. Where the adhesion is extensive and close, fluid poured out in the vicinity will compress one part of the lung, and stretch and ultimately compress the part adjoining, in or near the place of adhesion. Thus, as not infrequently observed, adhesions may be found in the upper regions of the chest, and the fluid effusion in the lower parts may be so great as to press the lungs against the upper portion, and there occasion a loud bronchophony and bronchial respiration transmitted from the large tubes by the adhering dense column of lung; and thus the case may be mistaken for one in which cavities exist underneath this situation; but the prominence of the intercostal spaces, the dulness on percussion, the enlargement of the side, and the displacement of parts, as above described (§ 32, *et seq.*), will readily distinguish its real nature.

37. In rarer instances, the pleura of the upper and posterior parts of the lung may be affected, and that of the inferior portions may be adherent to either the diaphragm or lower walls of the chest. In these the lung will be pressed, by effusion into the upper and posterior parts, against the anterior or other portion of the walls of the thorax, according to the seat of effusion, and to the manner in which the fluid is bounded by the adhesions or false membranes; and the sounds will be tubular, loud, or clear, or otherwise vary, with the part of the lung thus pressed to the sides of the chest, and with the proximity of the larger bronchial tubes; and a more or less loud bronchophony will also be heard.

38. *C. Consecutive Changes in Acute Sthenic Pleurisy.*—If inflammatory action subsides in consequence either of the treatment or of the effusion which takes place, *absorption* of the fluid and of the lymph usually results, and the compressed lung expands under the efforts of respiration in proportion as absorption proceeds. The signs evincing the increased effusion gradually disappear; and ægophony and the sound of respiration return in the situations, generally the upper parts of the chest, where they were last heard. With the return of these, the side assumes its natural appearance, and a gradual improvement takes place of the sound on percussion. In modern cases, as Dr. WILLIAMS remarks, the fluid is absorbed before—indeed, long before—the lymph or albuminous matter is removed; and when the pleural surfaces covered with this matter come together, a rubbing or rustling sound is sometimes heard, which soon ends in the adhesion of these surfaces by bands, or by more continuous false membranes. If these false membranes are formed after the fluid has been removed, and the lung has recovered its full expansion, they are adapted to its free motions, which are not materially interfered with by them. Hence adhesions are often formed, which are lengthened in the lower parts of the chest, where the lungs descend somewhat as the ribs rise, and which are short in the upper parts, where the lungs more closely follow the movements of the parietes.

39. In severe cases, the inflammation continues after the effusion has become abundant; and not only increases or perpetuates the fluid

effusion, but also throws out “albuminous matter in various conditions, which by its present qualities or subsequent changes may produce a variety of prejudicial effects, all tending more or less to interfere with the restoration of the organs to a healthy state.” These consequences arise from the continued or unsubdued inflammation, whether it has been imperfectly treated, or entirely neglected; and they furnish strong proofs of the value of the physical signs, which are never absent, and which rarely fail to point out the existence of these consequences. They will come more appropriately under consideration under the heads of *Chronic Pleurisy* (§ 63, *et seq.*).

40. *D. Termination of Acute Sthenic Pleurisy.*—The most frequent terminations of this form of pleurisy are, 1st, by resolution; 2d, by passing into the chronic state; and, third, by fatal asphyxia.—*a. Resolution* may be complete, the effused fluid and the false membranes being absorbed, cellular adhesions being the only traces left of the disease, or it may be incomplete. In this latter case, the fluid effused is absorbed, but the false membranes remain, undergo changes, and occasion phenomena which will be noticed when the *second* of these terminations are considered.—*b. Death by asphyxia* may occur in the most severe cases, either in double pleurisy, or in the single state of the disease when the effusion is rapid and very great; but this termination is much more frequent in pleurisy than in pneumonia. It is, moreover, very rare in the acute stage and simple form of the disease: it occurs chiefly in the chronic stage, and in the more complicated states.

Before I proceed to describe the changes observed in the pleura and in the matters thrown out on the surface of this membrane after inflammation of it, I shall first notice the several states or forms of pleurisy which differ from that which has now been described, as being the more common type of the disease. Certain of these, indeed, differ from that just considered in very little farther than in the seat or limitation of the disease, or in the stage, period, or continuance of it; and hence the necessity of considering them all in close connexion.

41. ii. DRY PLEURISY—the *Pleurisie sèche* of ANDRAL.—*a.* This state of the disease deserves notice chiefly because it has been particularized by Dr. STOKES and M. ANDRAL; for it can hardly be considered a distinct form, but rather as being particular periods, of pleurisy modified, more or less, by peculiarity of constitution and by the grade of inflammatory action. Dr. STOKES remarks that this term may be applied to that form in which nothing is effused but lymph. The characters of this state, in general, are, that the constitutional and local distress is comparatively slight, that organization rapidly advances, that the sound is clear, or nearly so, on percussion, the phenomena of accumulated effusion being wanting, and that the friction signs are evident. Dry pleurisy occurs, according to these writers, as an original and uncomplicated disease, or as consecutive of fever, erysipelas, or diffuse inflammation. It may be associated with or succeed to any of the diseases of the lungs, or occur as a complication of cardiac or hepatic disease. The circumstances in which I have met with it, in the

least equivocal form, are either associated with, or consequent upon, acute rheumatism, acute hepatitis, and pneumonia.

42. *b. The physical conditions of dry pleurisy* Dr. STOKES believes to occur in two stages of the ordinary disease, namely, in the earliest periods, before effusion takes place; and in the latter stages, when the liquid effusion is absorbed. In the first case, the duration of the friction phenomena depends on the rapidity of effusion; in the second, on the vigour of the constitution which influences the process of organization. At the commencement, pain is often felt in or near the situation of the inflammation, but it soon subsides. The characters of the friction-sound, generally soon afterward heard in the situation of the pain, are various; but this sound always conveys the idea of two rough or dry surfaces moving uninterruptedly upon each other. It accompanies inspiration and expiration, but it may be absent during ordinary breathing, and yet become manifest on forced respiration. In some instances the rubbing sensation is felt by the patient for a long time, but the sound may often be heard long after he ceases himself to feel the obstruction. Dr. STOKES states, that the friction-sound in the early stages of the simple disease, or immediately after the absorption of an empyema, is often accompanied by a rubbing sensation, perceptible to the hand. Like the former sign, this may be absent during ordinary breathing, but become manifest when the patient inspires deeply. In the progress towards cure, this is the first of the physical signs to subside; it is apparently connected with the least organized state of the effused lymph.

43. The duration of the friction-sound, depending upon the absorption of the fluid and the rapidity of organization, varies remarkably in different persons; it is comparatively short in the young and robust; while in the feeble and cachectic it may continue without changing, especially when the disease is consecutive or complicated, longer than a month. It is rarely heard, or continues but a short time, at the commencement of pleurisy, attacking the cachectic, or complicating febrile maladies. When, however, it follows the absorption of an effusion, it may continue from several days to some weeks. It is heard most distinctly over the middle parts of the chest. The friction is rarely heard when the dry state of pleurisy is consequent upon pneumonia with hepatization of a considerable portion of the lung. It is more distinct when the pleurisy is consequent upon, or complicated with, acute hepatitis. When pleurisy is associated with pericarditis, the rubbing sounds seem double, but the combination of that caused by the action of the heart, with that following respiration, often causes a confusion, which requires attention and practice to distinguish and duly recognize.

44. *c. The causes of the friction-sounds* have been differently stated by pathologists. These sounds, variously modified with the nature of the case, have been heard in certain states of inflammation of the pleura, pericardium, and peritoneum; and as they have not been heard in those states which are attended by a copious liquid effusion, but in that in which an unorganized lymph is presumed to exist on the

surface of the inflamed membrane, so they have been viewed by M. RENAUD, Dr. CORRIGAN, and Dr. STOKES as being caused by the presence of this lymph in the situations where these sounds are heard. Still this cause admits of doubt; for the *creak*, or *leather-creak*, admitted to be one of these friction-sounds, is rather to be viewed as given out by the membrane itself in certain morbid states of it, than by the friction of the opposite surfaces when covered by unorganized lymph. The fact, however, of Dr. CORRIGAN having produced the sounds in question by rubbing two portions of the inflamed membrane one upon the other, may appear conclusive of this point; still, I believe the matter still to require farther examination.

45. *d. The existence of dry pleurisy*, it should be mentioned, even as a *stage* of pleurisy, has been doubted very recently by a no less distinguished pathologist than Professor HASSE. He remarks, that the attempt has been made to reckon the progress of pleurisy by defined stages; first, the period of dry inflammation, which is of shorter or longer duration, and comprehends all the changes observed in the pleura and sub-serous cellular tissue (see § 112), but without, as is supposed, any serous effusion. Now, he adds, that he has never encountered this dry stage as described, having always, even at the very outset, found the serous fluid somewhat, however slightly, augmented in quantity, and marked by its deep yellow tinge and its increased consistency. There were, likewise, present those grayish or yellowish points, the initial and quickly-expanding rudiments of membranaceous formations. "The so-called *dry pleurisies* of ANDRAL (*Clin. Med.*, 4mo edit., t. iv., p. 405)," he continues, "are, therefore, probably to be understood in a comparative sense only—effusion too scanty to be detected by physical signs during life. Such a ground of distinction is, however, obviously opposed to the strict principle of pathological anatomy." The second stage has been viewed as eminently that of effusion, which, although not confined to any one period, is not sufficiently copious and characteristic to constitute a secondary and distinctive stage until the original inflammation has become thoroughly developed. But to divide the period of effusion into two stages, and thus to attempt to discriminate between the development of liquid effusion on the one hand, and of coagulable lymph and adventitious membrane on the other, are discordant with the process which gives rise to these productions. The third period has been considered to be the organization of the plastic exudation. This, however, does not take place at any particular stage, nor is it a process to which every form of plastic effusion is necessarily subject. It would be difficult to reconcile, in this arrangement, those pleuritic exudations which exhibit traces of organization after the first twenty-four hours, with those in which the organizing powers have been ineffectually exerted for weeks or months. While, therefore, this division might seem justified in some instances by the procession of morbid phenomena, it would in others be quite inapplicable. It would probably be preferable to consider the secondary changes in pleurisy according to the degrees of intensity



of the primary inflammatory act, and to the rapidity with which they ensue upon this act.

46. *E. Pleurisy as above considered*—whether it be attended by little or no liquid effusion at an early stage, by a rapidly increasing and abundant effusion, or by more or less organization of the exuded lymph—generally presents a *sthenic character*, more especially when it occurs primarily, and in a previously healthy constitution. It then, particularly in the young, robust, plethoric, or sanguine temperament, is accompanied with highly inflammatory symptoms, local and constitutional; runs its course frequently with great rapidity, and evinces a greater tendency to the organizing or formative process, even although effusion, to a great extent, may rapidly supervene. The *sthenic character* may also exist, although in a much less marked degree, in more delicate or even in lymphatic subjects, especially when the disease is primary, but it is then attended by much less fever and less severity of local suffering, the symptoms more nearly approaching the state of the disease next to be noticed. The *sthenic character* may likewise be evinced in pleurisy consecutive of, or complicated with, pneumonia, hepatitis, pericarditis, or acute rheumatism, in all which, although it sometimes assumes more or less completely, or approaches to, the *asthenic character*, the *sthenic* is more frequently observed, unless in the aged, the debilitated, and cachectic.

47. iii. *ASTHENIC PLEURISY.—Pleuritis Nervosa*, RICHTER; *Cachectic Pleurisy*.—This form of pleurisy is generally met with in persons who have been debilitated by previous acute or chronic diseases; in the cachectic, or those subject to some constitutional vice; in persons whose constitutions are broken down by intemperance and dissipation, and more especially in the course of other maladies in which the circulating fluids are contaminated either by the absorption of morbid matters, or by interruption of any of the eliminating or depurating processes. It thus not infrequently supervenes in the course of, or during convalescence from, typhoid or adynamic fevers, exanthematous fevers, puerperal fevers, erysipelas, organic changes in the kidneys, phlebitis, diffuse inflammation, or spreading and diffuse suppuration, and consecutive abscesses. In all these, effusion is more or less rapid, the dry stage hardly or not at all exists, and albuminous exudations either are not formed into membranes and adhesions, or do not become organized unless a change is produced during the course of the disease in the states of vital power and of vascular action. Indeed, in the majority of cases of *asthenic pleurisy*, the albuminous portion of the exudation is more or less mixed with the serous fluid, the fibrinous or fibro-albuminous character not being present.

48. This form of the disease is seldom attended by acute or painful local symptoms. It is generally *latent*, and often effusion is far advanced, or has long existed before the disease is detected. It is rarely a primary affection, is most frequently associated with some other disorder or structural change. It is sometimes very sudden in its occurrence, and indicated at first by the shortness and frequency of respiration, by the position of the patient, and the sinking of the powers of life, rather than by

local distress or pain, or by febrile symptoms, which, if they be present, are usually of an adynamic character. This state of pleurisy, as may be expected from its nature and the circumstances in which it appears, is always removed with great difficulty, or not removed at all, especially if copious effusion has taken place before it was detected. It may supervene in the course of the maladies just mentioned (§ 47), and escape detection until dissection after death discloses its existence, although attention has been directed to its contingent appearance, especially when the effusion has been small, or when it has taken place shortly before death. I have thus met with it in the last stage of malignant or infectious puerperal fevers, in open cancer of the mamma, confluent smallpox, &c. I have seen albuminous exudations covering the pleura in some of these cases, but the serous effusion was abundant, and the membranes formed by these exudations evinced no indication of incipient organization.

49. iv. *LATENT PLEURISY.—Pleuritis Occulta*, RICHTER.—The term *latent* has been applied to pleurisy when it takes place without pain in a situation where it can be referred to the pleura. And this state of the disease is more frequently associated with the *asthenic* than with the *sthenic character*; or, in other words, *asthenic pleurisy* is much more frequently *latent* than *sthenic pleurisy*. M. CRUVEILHIER supposes that this state of the disease is more frequent than any other. The numerous instances of adhesions between the opposite surfaces of the pleura found on dissection of cases, in which no symptom of pleurisy had been complained of, appears to justify this opinion. Still we often hear of instances of pain in the side ascribed to pleurodynia, or to rheumatism of the intercostal muscles, where a more accurate examination may have detected pleurisy. Besides, pain is often present for a time, and either overlooked or forgotten, or ascribed to some other than the real cause.

50. *Latent pleurisy* may be either *acute* or *chronic*. In its latter state, it will be noticed hereafter. It may be either *primary* or *consecutive*, or associated with some other disease. Pleurisy may be *latent* in either of two ways, owing, 1st. To the absence of all pain whatever. 2d. To pain being felt in some part remote from the thorax, and suggesting the existence of disease in some other quarter. This *second form* of latent pleurisy has hitherto not been noticed by writers; but I have met with several instances of it, and recently with three cases which were primary and uncomplicated. In all these the pain was referred to the iliac region of the same side, no pain being felt in the chest, at any part, upon a full inspiration, or when coughing, although it was excited in that remote situation. In most cases of latent pleurisy there are chilliness, thirst, heat of skin, especially in the trunk, dryness of the general surface; and, as effusion becomes copious, shortness of breathing, with more or less difficulty or oppression, upon the least exertion. This form of pleurisy often affects children and old persons; and in both classes of persons it is frequently associated with catarrh or influenza. Indeed, so often is this complication met with in these subjects, that a careful examination of the chest should be made in

all cases of severe catarrh or influenza affecting them.

51. *V. PARTIAL PLEURISY.*—Circumscribed or partial pleurisy may occur *primarily* or *consecutively* of other diseases, but much more frequently in the latter than in the former state. Circumscribed or limited pleurisy may also be attended either with *adhesions* only, or with *effusion*, adhesions, however, of various extent also existing in the latter class of cases.—*A.* The *adhesive form of partial pleurisy* is very frequent, and is commonly consecutive of tubercular formations in the lung, of either of the forms of pneumonia, and of inflammatory irritation of any kind in the vicinity of the part of the pleura becoming thus affected. It is a very usual consequence of tubercular depositions, softened tubercles or cavities, when either approach to the surface of the lung, the pulmonary pleura then becoming inflamed, and throwing out lymph which agglutinates it to the opposite costal or diaphragmatic pleura, most frequently to the former at its upper regions. The pleuritic affection is in these cases often slight, but it is seldom latent to the close observer. It is generally indicated by more or less pain, uneasiness or tenderness in or over the part affected; by a feeling of constriction or tightness, by frequent superficial breathing, and by diminished motion of the ribs in that situation; somewhat increased dullness on percussion, increased pain or uneasiness upon stretching or exerting the adjoining muscles, and a greater intolerance of a strong percussion over the part than in any other place, are often, also, present. The pain is sometimes sharp, evanescent, and even so slight or brief in duration as hardly to be noticed or recollected. This form of partial pleurisy is often salutary in its effects, in respect of the tubercular malady, of which it is so generally a consequence, inasmuch as the adhesions between the opposite pleural surfaces prevent ulceration and perforation of the pulmonary pleura, and the escape of the tubercular matter into the pleural cavity. Although this state of the disease is sometimes latent, it is less frequently so than has been stated by some writers, it being rather overlooked, owing to the slightness or evanescence of the symptoms just mentioned.

52. *B. Partial pleurisy with effusion* is much less frequent than the foregoing.—(a) It is commonly a consequence of a more general state of the disease, in the course of which adhesions have taken place between the opposite surfaces in one part, and effusion or even supuration in another. In some instances, the pleurisy attacks a person who has previously been the subject of this disease, and in whom adhesions of greater or less extent already exist; and this subsequent attack affects merely that portion of the pleura which is non-adherent; the adhesions limiting the extension of the inflammation, and bounding the liquid effusion, or purulent formation. Partial pleurisy, accompanied with liquid or puriform effusion, may occur in any situation; but its nature can seldom be ascertained with any degree of certainty during life.

53. (b) The above observation applies to *interlobular pleurisy*, or inflammation, and its consequences affecting the opposite surfaces of

two corresponding lobes of the lungs. This particular form of partial pleurisy is rarely primary, but is generally consequent upon the more general state of the disease, or upon tubercles in the lungs or pneumonia. The *vomicæ*, so often said to have been found in the lungs, have very probably been puriform collections between the opposite pleural surfaces, circumscribed by adhesions, in this and the preceding states of partial pleurisy.

54. (c) The question has been put by M. CRUVEILHIER, whether or not a *costal pleurisy* can exist independently of a *pulmonary pleurisy*, or the latter exist without the former. BICHAT believed that it could not, and contended that the inflammation always extended from the one surface to the other continuously, or without any interruption at the non-adherent parts. I am convinced, however, that this is not the case, unless in the asthenic or spreading form of the disease; but that the inflammation originating in either surface is followed by an exudation of lymph which acts as an irritant, when brought in contact with the opposite surface, and inflames this latter; and thus inflammation, or adhesion, or even effusion, is often developed in the opposite surfaces without the continuous extension of the morbid action over the intervening, non-adherent, or unaltered part of the membrane.

55. It has been supposed by some writers that inflammation of the pulmonary pleura is not attended by pain, and that pain is felt only or chiefly when the costal pleura is implicated. This opinion has been considered to derive much support from the different anatomical connexions of the two portions of this membrane. This distinction, however, is by no means determined; farther and more precise observation is required before an opinion can be given respecting it.

56. (d) *Costo-pulmonary pleurisy* may be attended by liquid, or sero-albuminous, or puriform effusion or collection, limited by adhesions to a smaller or larger space, as shown above (§ 52). The circumscribed purulent collections—the *empyema necessitatis* of various writers—sometimes met with, and that point externally, are of this kind.

57. *C. Mediastinal Pleurisy.*—This form of circumscribed pleurisy has been considered, as far as the subject admits of consideration, in the article MEDIASTINUM. It is unnecessary, therefore, to add more at this place than to remark, that inflammation may originate in that portion of the pulmonary pleura in contact with the mediastinum, and extend to this latter, forming adhesions between them, and giving rise to liquid or puriform effusion, which may be bounded by these adhesions. In cases of considerable duration, the liquid collection may assume puriform and encysted appearances. The exact nature of these cases is seldom accurately ascertained during life; for they are most frequently secondary and complicated with pneumonia, or with tubercles in the lungs, or even with pericarditis. The symptoms of this state of the disease, as far as they are known, are the same as those stated in the article MEDIASTINUM (§ 3, *et seq.*).

58. *D. Diaphragmatic pleuritis* is of frequent occurrence, especially in the course of inflammations of the liver and peritoneum, and even,



although much more seldom, of the liver and of the spleen.—(a) This form of pleurisy may be consequent upon either acute or chronic disease of these parts, especially upon the former. I have at another place (*see* LIVER, § 41, *et seq.*) remarked upon the not unfrequent extension of inflammation from the liver to the diaphragm and diaphragmatic pleura, and even also to the costal and pulmonary pleura; and, although this occurrence is sometimes met with in connexion with abscess of the liver, it also not unfrequently takes place in the course of sero-hepatitis, or in cases of inflammation of the superior serous surface of the liver, and of partial peritonitis in the superior abdominal regions. I have met with several cases of acute sero-hepatitis in which the inflammation rapidly extended to the pleura, the disease consisting, during the greater part of its course, of hepatitis complicated with pleuritis.

59. It is very rare, however, unless in cases of this kind, that is, in those consequent upon inflammation of some one of the abdominal viscera, that pleurisy is limited to the diaphragmatic pleura; and even in those it soon extends, more or less, to the pulmonary or costal pleura of the same side as that on which the viscus first attacked is situated. This mode of extension is not, however, always observed; for, in a case at this moment attended by me, but which I did not see at its commencement, there are chronic hepatitis, with tenderness in the region of the liver, effusion into the peritoneal cavity, and pleuritic effusion into the left pleural cavity, the heart being pushed towards the right side of the chest.

60. (b) The symptoms of diaphragmatic pleuritis differ but little from those of the more usual states of pleurisy. Generally, however, when this portion of the pleura is more especially affected, there are acute pain, augmented by inspiration, by physical efforts, by vomiting, or even by the eructations of flatus, and seated at the base of the thorax on either side, or about the attachments of the diaphragm to the thoracic parietes; anxiety, difficulty of breathing, or orthopnoea, the patient being obliged to sit up, with the trunk of the body bent forward; an anxious and distressed expression of the features; sometimes nausea or vomiting, and singultus; and considerable symptomatic fever, occasionally with delirium. When effusion is considerable, or collections of sero-puriform or purulent matter are present between the base of the lungs and the diaphragm, this latter is pressed downward, and considerable fulness, with dulness on percussion, is observed in the hypochondrium of the affected side, and thus the semblance of an enlarged liver or spleen may be occasioned. When the liquid collection is completely circumscribed between the base of the lungs and the diaphragm, the diagnosis is usually difficult. The antecedent symptoms, especially pain or stitch in the side, with symptomatic fever, ushered in by rigours, will indicate the nature of the disease. Complicated cases, however, may occur in which the diaphragmatic pleura is affected on the one side, and the peritoneum, or some infra-diaphragmatic viscus, on the other, and be attended by great difficulty of ascertaining the exact seat and extent of mischief; but a careful examination of the physical signs and

the symptoms during the progress of the disease, and a due recollection of the fact that inflammations not unfrequently extend from one side of the diaphragm to the other, especially from the peritoneal to the pleural surface, will often aid the physician in his diagnosis. In some cases of diaphragmatic pleurisy of the right side, excessively acute pain along the margins of the right side; short, anxious respiration, jaundice, protrusion of the liver downward by the fluid effused between the diaphragm and lungs, and much symptomatic fever, were the most prominent symptoms.

61. vi. DOUBLE PLEURISY.—a. Pleurisy rarely attacks both sides of the chest at the same time and in a primary form; but instances of this double disease occasionally present themselves, especially in a secondary form, and consecutively of adynamic, or malignant, or of exanthematous fevers, of erysipelas, or of those states of constitution which have already been noticed as imparting an asthenic character to pleurisy, more particularly morbid states of the circulating fluids. In double pleurisy, both sides of the thorax are not always affected to an equal extent, nor are the inflammatory products always the same, in respect either of the effusion or of the more consistent exudation. One or other may be much more abundant in one side than in the other, and even be otherwise modified or different; and very generally the patient is carried off, either by asphyxia, or by the effect upon the powers of life occasioned by the extent of lesion, before effusion has taken place in both pleural cavities to a great amount, or before the false membranes which may have been exuded have presented any advancement towards organization.

62. b. The symptoms and signs of double pleurisy, in most instances, readily evince the extent of the disease. In some cases, however, there is difficulty in determining, 1st, the existence of pleurisy; and, 2d, its presence in both sides of the thorax. When effusion takes place, then the bronchial respiration, ægophony, and the obscurity of the sound, can leave no doubt as to the nature of the disease. The sound emitted on percussion is attended by greater difficulty, because the means of comparison are wanting. Pain is not always a certain symptom, as it may be wanting in either side, although the amount of disease may be even greatest in the side where it is not felt. Generally, however, the history of the case, the state of respiration, the positions of the patient, and the constitutional symptoms, viewed in connexion with the physical signs, will indicate the extent of the malady. This state of pleurisy is much more dangerous than the ordinary forms; indeed, the patient may be carried off by it, aided by some other associated complaint, before the more advanced lesions have supervened, and even before the amount of effusion or the character of the symptoms had admitted of the recognition of the full extent of the malady.

63. vii. CHRONIC PLEURISY.—EMPHYEMA.—Pleurisy assumes every grade of severity, of activity, and even of duration. It may be most acute, as respects the degree of suffering, and the rapidity of its progress; and it may be most latent in its character, and slow in its course, and in the progress of the suc-

cessive changes attending and consequent upon it. Between the extremes of these, the intermediate grades of morbid action and duration, and shades of character, are innumerable. *Chronicity*, therefore, in respect of pleurisy, is, perhaps, more of a conventional term than as regards almost any other malady. The *chronic state* of this disease is commonly consequent upon the acute, when this latter has been either neglected or improperly treated; but it is also sometimes primary, or rather the advanced or prolonged state of a pleurisy which has commenced in a latent and silent, perhaps also in a slight or sub-acute form, and has continued thus to advance until the amount of effusion has given rise to phenomena such as have been described above (§ 30, *et seq.*), and as could not be neglected any longer by the patient or overlooked by the physician. Chronic pleurisy may even be an *intercurrent* malady, or supervene secondarily in the course of some other disease, although not so frequent as acute pleurisy. Thus it may occur in the course of chronic disease of some contiguous viscus, as of the lungs, liver, spleen, peritoneum, stomach, &c., or of malignant affections of the mamma, or diseases of the skin, &c.; while the acute states of pleurisy most commonly occur in the course of malignant or adynamic, exanthematous, and other fevers, or of inflammation of adjoining organs. Chronic pleurisy may thus, as well as in other forms of succession, be *complicated* with some other disease; indeed, it frequently becomes thus associated from the very circumstances of its duration.

64. Chronic pleurisy, in the state of full development, is attended by great effusion of fluid; and to this condition, whether it be the consequence of a violent attack, or of a sub-acute, or of a latent state of the disease, the term *empyema* has been given, although the composition of the fluid effused is often very different from pus; it being more frequently serous, sero-albuminous, or sero-puriform, or sero-sanguineous, as will be more fully shown in the sequel.

65. Although I agree with Dr. WILLIAMS that the transition of the acute to the chronic state is so indefinite, and the symptoms of the recent disease sometimes have so little of an acute character, while that of a long duration occasionally manifests so much greater an intensity of irritation, that the terms acute and chronic would seem to be less applicable to pleurisy than to other inflammations, still I cannot consent that the distinction in question should be altogether set aside. I readily, however, subscribe to the circumstance that much of the difficulty connected with this distinction is to be ascribed to the anatomical relations of the pleura: this being a shut sac, it is liable to have its acute inflammations rendered chronic by the retention of the inflammatory products; and the chronic state is equally liable to be excited into an acute state by the irritating and distending influence of these products, more especially the fluid products. Still, differences in character or form, in connexion with duration, are very apparent in many cases; in the prevalence of high inflammatory fever, severe local suffering, and rapid progress in some; or in the absence of fever, or in the existence of hectic or remittent fever, with but little or

slight local suffering or discomfort, and slow progress or long duration in others; in the sthenic character of vascular action and vital power in many; in the asthenic condition of both action and power in some; and in the varying grades of pain, of irritation, and of sympathetic disturbance in all. These differences can hardly be described in all their phases of existence as they are presented to our view in practice; but they require to be pointed out in such a way as will most remarkably fix our attention, and render them safe guides in devising our indications and means of cure.

66. *Effusion* being the characteristic condition of *chronic pleurisy*, as well as of the advanced state of the most frequent form of *acute pleurisy*, it follows that all that has been stated above with reference to the latter (§ 24, *et seq.*) is equally applicable to the former. The disease, whether denominated acute pleurisy with effusion, or chronic pleurisy with effusion, or empyema—or whether or not the liquid be purulent, or sero-albuminous, or of any other description hereafter to be noticed—is attended by the same local and physical phenomena and signs, however much the states of vascular action, of vital power, and of constitutional disturbance may differ, in each case, with its duration and progress. *Chronic effusion*, even to the extent of compressing the lung and displacing the mediastinum, and even the diaphragm, may exist without distressing constitutional symptoms, which may either have subsided, or, in fewer cases, never existed. Dr. STOKES truly remarks that, if we separate the *physical signs*, we find nothing characteristic in the general symptoms alone. Hectic may or may not be present; and no characters of the cough, expectoration, respiration, decubitus, or, with a single exception, the appearance of the patient, are sufficient to distinguish this from other diseases of the lung. This exception is the dilatation of the side and intercostal spaces. But if, in addition to the symptoms of pulmonary irritation and obstruction, as shown by cough, shortness of breathing, dyspnoea, increased by exertion, or by lying on the affected side, and by a sense of fulness and oppression referred to one side, which is often oedematous, the physical signs of fluid accumulation, compression, displacement, &c., be also present, we may safely diagnosticate the disease.

67. In certain cases the general symptoms are nearly wanting. Instances are not rare of persons with copious effusion of considerable duration to be without fever, pain, or local distress; to look tolerably well, and to have good appetites; to lie nearly equally well on either side, and even to pursue their usual occupations, when these are not laborious. The physical signs are hence of the utmost importance in chronic pleurisy; indeed, of greater value in this than in any other thoracic disease. Most cases of bronchitis, of pneumonia, and of phthisis can be, at least, recognised, as Dr. STOKES remarks, without these aids; but such is not the case with pleurisy; and it is fortunate that its physical signs are more simple, numerous, and striking than those of any other of the complicated diseases of the lung.

68. When chronic pleurisy is not accompanied by much fever or pain, the patient may not be obliged to keep his bed. He complains only



of shortness of breathing on exertion; and he often pursues his usual occupations. He merely believes himself indisposed, and considers that he is not the subject of serious disease, until the pallor and emaciation of his features, the general loss of strength and flesh, the coldness of the extremities, the short, suppressed cough, the frequent and short respiration, increased on the least exertion or mental emotion; the loss of appetite, the rapidity of his pulse, especially during evening exacerbations, of hectic; and the inability of lying on any other than the same side, attract his notice, and direct the attention of the physician he consults to the nature of his complaint. These symptoms having suggested the seat of the mischief, an examination of the chest readily discloses its nature and extent.

69. *B. The physical signs of chronic pleurisy* are those already described (§ 26, *et seq.*) as evincing extensive fluid accumulation in the pleural cavity; but they become, with several of the general symptoms, much modified by the duration of the effusion, and by the changes in the pleura and lung. The state of the liquid effusion also modifies the course and phenomena of the disease; and hence it is necessary to notice briefly those changes which thus influence the character of the malady. When pleurisy has continued for some days, alterations take place not only in the more consistent exudation, but also in the fluid effused. These alterations depend much upon the diathesis of the patient, and the states of vital power and vascular action; and although some of them may be inferred to be present by the symptoms and signs during life, yet others are, owing to their nature, incapable of being indicated until disclosed after death.

70. (*a*) In healthy, young, and robust persons, lymph of a highly organizable quality is thrown out upon the inflamed surface, of greater or less thickness, with a serous effusion; and this lymph, forming a layer, or false membrane, over the surface, although diminished by absorption, becomes more dense as it is organized, and thus restrains the expansion of the lung, and impedes the absorption of the accumulated serum. In cases where the membrane is less dense or thick, the expansion of the lung and the absorption of the fluid may proceed, especially when vital power is not defective, until ultimately the fluid is removed, and the lung acquires very nearly or altogether its natural expansion. In this case adhesions, cellular, partial, or otherwise, may form, and the functions of the lung not be materially impeded (see § 115).

71. (*b*) In other cases, by no means different from the above, or varying only in the states of vital power and vascular action, and generally of a less active inflammation and more prolonged duration, organization proceeds slowly, and the false membrane is of a more dense and rigid nature. Consequently, the lung is prevented from expanding, even although the fluid effused be partly or nearly altogether absorbed. In many cases, especially in those of considerable duration, the false membrane covering the lung shrinks or contracts in its superficial extent, in the manner stated when describing the changes consequent upon peritonitis; or like cicatrices after burns

of the skin, and thus not merely prevents the expansion of the lung, but actually compresses this organ still more closely. In more chronic cases the membranes formed on the pleura assume a state of cartilaginous induration, or become more or less extensively ossified, or they may be cartilaginous in parts and ossified in others. These changes often coexist with the shrinking just noticed, and are to be ascribed in part, in some cases at least, to the irritation produced by the effused fluid on the surfaces enclosing it.

72. (*c*) In some cases, when the vital energy is insufficient to enable the inflamed surface to throw out a readily organizable lymph, the exuded matter assumes a curdy appearance, of greater or less thickness, almost solely albuminous, and presents much less of a fibrinous character than in the foregoing cases; and the fluid part of the exudation is turbid, or contains loose shreds or pieces of albumen (see § 116, 117). In some instances a false membrane of some density is found covering the inflamed surface, but it is imperfectly organized, or presents no traces of organization. In other cases, a coating of albumen, without adhesion or organization, covers the pleura, the fluid effusion being turbid, serous, or sero-albuminous, or otherwise changed or coloured, according as colouring particles of the blood may be exuded. This class of cases is more frequently of much shorter duration than the foregoing classes, are always asthenic, and are more closely allied to the acute asthenic form of the disease (§ 47), being more prolonged instances of that form.

73. (*d*) The albuminous or nutritive matter may be thrown out in a more diffused form with the serum; or the formative process, characterizing so frequently inflammations of serous surfaces, may be still less exerted, and a puriform, or sero-puriform fluid only be produced. It is probable that, in some instances, when the immediately preceding state (§ 72) of the disease is much prolonged, the sero-albuminous exudation may pass into a puriform or sero-puriform state. This purulent state of the effused fluid appears most frequently in the most chronic cases, but it also is sometimes observed in the most acute, and is that to which the term *empyema* is strictly applicable. It depends rather upon the state of vital power, or the diathesis of the patient, in connection, probably, with the condition of the blood, than upon the duration of the disease. Dr. WILLIAMS very justly remarks, respecting this state of the disease, that "the solid matter is thrown out in a disintegrated state, utterly insusceptible of organization, and diffused through the fluid in flakes or particles, forming a mixture more or less resembling pus, which is the fluid or empyema. Although in many instances this is the result of a more chronic form of pleurisy than that which forms lymph, and owes its persistence and tendency to increase to the want of vitality in its solid matter, yet we do meet with cases of empyema which arise from very acute forms of inflammation. In these instances the fluid is more strictly purulent, the solid matter being in the form of globules, like those of pus, and seems to be the result of what may be called a suppurating diathesis, in consequence of which all the albuminous products of

inflammation tend to assume a purulent character." It should be remarked, also, that the continued access of air will cause the inflamed pleura to secrete pus instead of coagulable lymph, this membrane being similarly influenced by this cause to other tissues. Whenever pleurisy is consequent upon perforation of the lung, the effused fluid is always purulent.

74. (c) The other lesions which are contingently associated with chronic pleurisy, especially the tuberculous, schirrous, encephaloid or fungoid, and melanotic, generally proceed from their respective constitutional taints: they will receive due consideration hereafter.

75. It is obvious that the above states, into which the lesions of chronic pleurisy may be divided, are not precisely defined in all cases; but that instances occur, owing to changes of vital power and vascular action in their course, in which intermediate conditions, or transitions from one state to another, may be found on close examination. The truth is, that in many instances, even after the acute action has subsided to the chronic state, the retained effusion, owing to the nature and combination of the several elements, may rekindle an acute or subacute state of action, or keep up a continued irritation, which cannot fail of producing a varied series of changes not only in the false membranes, but also in the pleura itself and the subjacent tissues; and that the effused fluid, as well as the surrounding structures, both natural and adventitious, will consequently undergo changes varied in numerous ways, although most frequently presenting the general features now pointed out, and those about to be more minutely described (§ 118, *et seq.*).

76. In some cases the condition of lesion, in respect both of the more consistent exudation and of the fluid accumulation, may be predicated during life from the indications of vital power and vascular action furnished by the patient. The *first* and *second* of these conditions (§ 70, 71) are generally attended by a more sthenic state or diathesis, by less failure of constitutional power, and a stronger grade of vital resistance. The *third* (§ 72) is accompanied with more marked asthenia; with greater depression of vital energy and resistance than the first and second; with more or less of a cachectic appearance, or of a morbid condition of the circulation. The *fourth* (§ 73) of these conditions, or that to which the term *empyema* is more strictly applicable, is generally attended by hectic of a marked character, by night perspirations, and often by various pulmonary symptoms in connexion with physical signs of accumulation of fluid in the plural cavity.

77. When we reflect upon the effects consequent upon the retention of the products of inflammation in the pleural sac; upon the constricting action of the organized false membranes on the lung; upon the irritation caused by the nature of the fluid effusion, and the consequent resuscitation of inflammatory action in acute or subacute states, extending more or less to the parenchyma of the lungs; upon the influence of constitutional diathesis and taint upon the states of vascular action and adventitious productions; and upon the numerous contingencies, intrinsic and extrinsic, moral and physical, to which the patient is exposed,

we may readily infer that chronic pleuritis, if not soon remedied, must necessarily be followed by farther alterations, not only of the adventitious formations, and of the consistent and fluid deposits in the pleural cavity, but also of the lungs, bronchi, pericardium, and parietes of the chest. These successive alterations all tend to impede absorption, and thereby to perpetuate the disease; and are the most important lesions which *complicate* the advanced course of the more unfavourable cases of chronic pleurisy. Nevertheless, absorption does take place in many instances—sometimes even in prolonged cases, especially when vital power and resistance are tolerably maintained, and when the consecutive lesions, or *complications*, about to be noticed are not developed.

78. C. *Signs of Absorption of the Effusion.*—

(a) Many of the cases of acute and subacute pleurisy recover without contraction of the side or depression of the shoulder, such as will be noticed hereafter; but in these cases the effusion is more or less readily absorbed. It is, however, comparatively rare for the fluid to be removed, in the more chronic cases, without these changes in the appearance of the affected side being observed. When the lung is bound down or constricted by the false membranes, as stated above (§ 71), or when it is so condensed by long-continued pressure, or by the extension of inflammation to its parenchyma, as no longer to be capable of expansion, the removal of the fluid accumulation by absorption necessarily occasions, owing to the atmospheric pressure, more or less contraction of the affected side, which, instead of being enlarged beyond the size of the healthy side, now gradually becomes smaller—sometimes very remarkably smaller, than that side. The contraction appears at first in the upper part of the chest; the shoulder being depressed, and, with the whole side, much more fixed than the sound side, which presents the full development and active motions of respiration. As the diseased side contracts, the ribs approach closer together, and sink lower; the scapula is more prominent, and nearer the spine; and the sternum and spinal column are somewhat curved, so as to be concave on this side. While the upper parietes of the diseased side are thus pressed inward, the lower walls are similarly affected; the diaphragm is carried upward, and with it the liver, or the stomach and spleen, according as either side is affected. In cases where the absorption has proceeded far, or has taken place long previously, more especially in children and young persons, the healthy lung becomes so expanded or developed from its augmented function as to press the mediastinum over into the affected side, and thus even to prevent a still greater contraction of the side from occurring. Cases are not very rarely seen in which the heart has been thus pushed either to the right side, or drawn upward to the left, owing to the two causes of absorption of the effusion in the side toward which the heart and mediastinum are drawn, and of expansion of the lung in the sound side. In cases of this kind, the displacement, instead of being the result of liquid effusion, or of a collection of air or gas pushing these parts to the sound side, is caused by the removal of fluid from the affected side, in the manner now pointed out



In a few instances, as remarked by Dr. STOKES, the contraction is confined chiefly to the lower portion of the side, the shoulder not being materially depressed. In those instances, occurring in young persons, in which the sound lung becomes much expanded, the deformity often is much diminished in process of time.

79. M. LAENNEC has insisted strongly on this termination being most frequent after what he terms the *hæmorrhagic pleurisy*, or that state of acute pleurisy in which the fluid effusion is very great, and more or less tinged with blood-globules, and which often becomes chronic owing to the slow removal of the fluid. Although contraction of the chest is most apt to accompany the cure of the most severe cases, or those in which the effusion has been the greatest or most prolonged, yet it is by no means confined, as LAENNEC supposed, to those cases which he denominated hæmorrhagic, or even most frequently consequent upon these; for, as Dr. FORBES has remarked, it is a common consequence of the removal of all fluid effusions of considerable duration, and of purulent collections in the pleural cavity; "and, if other evidence were wanting, we have it in the analogous contraction in chronic pneumonia and phthisis."

80. In some instances the contraction consists chiefly of a flattening of the anterior portion of the side, causing more deformity than diminution of size. In others, the affected side approaches somewhat to a triangular form, "the base of the triangle corresponding to the mesial line, and the apex to the centres of the ribs." One of the first signs of absorption with contraction is the increased prominence of the inferior angle of the scapula. Dr. STOKES thinks it likely that the paralysis of the intercostals and diaphragm, which he believes to accompany pleurisy, has an immediate effect in producing the subsequent contraction, by preventing the expansion of the side.

81. The condition of the side of the chest changing thus from that of dilatation, consequent upon the effusion, to that of contraction caused by the removal of the fluid, it may be supposed that the transition from the one to the other will not be indicated by the form of the chest; and this is really the case in some instances, although in the majority the transition is not uniform, but partial. More frequently the contraction commences at the upper part of the thorax before the dilatation and displacement have entirely disappeared at the lower. An irregularity of the shape of the affected side is hence often observed during the removal of the effusion by absorption, the upper parts being unusually contracted or depressed, while the lower are more or less bulged or dilated. This appearance assists in the diagnosis between consolidation of the lung and progressive absorption of a pleuritic effusion, for which this latter may be mistaken.

82. But the effusion into the pleural cavity may not be to the extent of filling this cavity; it may be partial only, or limited by adhesions and false membranes, as above described (§ 52). In these cases of partial adhesions, the walls of the chest cannot so contract as to accommodate themselves to the vacuities caused by the removal of the fluid. Sometimes slight or irregular contractions may take place; but the

spaces are chiefly occupied by a partial rising of the diaphragm, and expansion of the healthy lung on both sides; and most frequently a portion of the more consistent or albuminous contents of the effused fluid still remain, presenting a curdy or semi-solid state, which is probably ultimately removed when the patient permanently recovers.

83. *b. The auscultatory signs* furnished by a side contracting after chronic pleurisy are of importance, inasmuch as during the progress of the contraction the disease may be mistaken for chronic pneumonia, or consolidation of the lung, or for tubercular diseases of this organ, or even for enlargement of the liver. In many cases, especially when the effusion has been copious and of long duration, the sounds of respiration and percussion continue permanently imperfect, even although the fluid may be completely removed, and they are universally more or less impaired for months after the attack. They thus correspond with the diminished motion of the affected side, and are owing to the same lesions. Dr. WILLIAMS correctly states that an improvement is generally indicated first in the upper part of the chest, and near the spine. With the return of a weak respiratory murmur, and slight resonance on percussion, some degree of vocal resonance may also accompany the removal of the fluid in the upper parts of the chest, "amounting to loud bronchophony, often accompanied with a remarkable buzz; in other parts being merely the diffused vocal fremitus, according to the size of the bronchial tubes, and the degree and permanence of their compression." In some cases of this kind some of the physical signs may mislead, if attention be not paid to all these signs, and to the history of the case; for, as remarked by Dr. STOKES and Dr. WILLIAMS, if at the first time we see a patient with the above signs, and he happen to have bronchitis, we may be induced to believe that the resonance of the voice and the dullness are caused by consolidation from recent inflammation of the lung, or from tubercles; but this error will be prevented by attending to the history of the case and the appearances of contraction. The dullness on percussion of the contracting side is owing both to the falling inward of the thoracic parietes and to the absence of air in the compressed lung. The physical conditions of the lung and of the wall of the chest are much changed in this state of the disease; for both, especially the former, owing to the loss of their resiliency—the lung being constricted by false membranes, and compressed by the effusion, and thereby in great measure deprived of air; and the parietes of the thorax being insufficiently antagonized against the pressure from without by the much-diminished supply of air to the lung—are incapable of furnishing not only the usual sounds on percussion, but also the true indications of their existing states, unless by a strong pressure of the fingers, which are the media of percussion against the walls of the chest, and by varying the force, direction, &c., of the stroke.

84. Recovery from chronic pleurisy, with contraction of the chest, is more or less complete according to the reduction that has been made in the size and functions of the lung by the previous lesions. The recovery is rarely

so complete in persons advanced in life as in the young. In children, placed otherwise in favourable circumstances, and in young persons, recovery is often not only complete, but little or no inconvenience is caused by the contraction, which sometimes diminishes, especially in growing persons, owing to the increased development of the healthy lung. Some individuals, who have their sides contracted from the state of the disease, have continued to enjoy good health, and to pursue active occupations. LAENNEC has alluded to a distinguished surgeon in Paris who had his side remarkably contracted by pleurisy in his youth, and yet enjoyed excellent health, and was in the habit of lecturing twice a day without inconvenience. In most instances thus occurring in young subjects the contraction is not excessive, and the respiratory murmur is not altogether abolished. But in a greater number of cases, particularly those occurring in advanced life, contraction of the chest occasions such an habitual shortness of breath and tendency to palpitation as to incapacitate the subject of it from active exertion. Persons thus circumstanced also experience distressing dyspnoea, and otherwise suffer most severely from slight bronchial attacks, from catarrh, and febrile affections. Dr. WILLIAMS very justly remarks, that before the system becomes accommodated to the abridgment of respiration which this lesion produces, and even afterward, under unfavourable circumstances, there is an enfeebled or cachectic state of the whole frame, in which various trains of disorder may arise; and unless care be taken to counteract them by the means most favourable to the general health, scrofulous or dropsical disorders may be engendered, and develop new mischief in the respiratory organs or elsewhere. Although, therefore, contraction of the side of the chest may be viewed as a mode in which pleurisy may be cured, "it is one of the least favourable kind, and liable to many detracting circumstances."

85. *D. Empyema.*—In those cases in which the effusion is not removed by absorption, or in which the morbid secretion or effusion equals or preponderates over absorption, the accumulated fluid is productive of changes ultimately of a fatal tendency, if it be not evacuated either by a spontaneous perforation of the pleura, or by an operation. The persistence and character of the accumulated fluid are to be ascribed rather to the continued inflammation and change of structure of the pleura than to any other cause. The nature of the matter effused, its purulent character more especially, also favours the accumulation or impedes absorption. Something, also, may be imputed to a congested state of the lung, to tubercular infiltration, or to consolidation of its structure. When the circulation through the heart or blood-vessels is obstructed, the cause of increasing fluid accumulation is more manifest.

86. *a. The signs and symptoms of empyema* are nearly the same as those already described in connexion with very copious liquid effusion into the pleural cavity (§ 26, *et seq.*). In this, however, the more chronic state of disease, the accumulation of fluid, proceeding more slowly, generally is greater, and is attended by a more marked displacement of the walls of the chest, and of the viscera more immediately adjoining

them. Although the more urgent symptoms have in great measure subsided, particularly fever, dyspnoea, and pain, yet the enlargement of the side, and the displacement of the parietes, are often the more remarkable. The slow increase of the accumulation, the prolonged pressure, and, probably, as Dr. STOKES contends, the paralyzed state of the muscles bounding the effusion, favours the greater amount of fluid collection in this class of cases than in most others. The duration of the disease, the side which is affected (more frequently the left), the nature of the associations or complications, and the temperament and diathesis of the patient, modify both the extent and the phenomena of the accumulation, more especially the extent of enlargement of the side and visceral displacement. There is no certain indication usually furnished of the purulent nature of the fluid. When rigours or chills recur, with hectic, a soft, open pulse, perspirations, or even when these last are very prominent, there is great probability of the fluid being purulent; but these symptoms may be either but slight or nearly wanting. Protrusion of the intercostal muscles is considered by Dr. STOKES and Dr. H. ROE as more especially diagnostic of a purulent state of the secretion.

87. *b. When the fluid is purulent, ulceration and perforation* may ultimately attack the pleura at some point, and permit the fluid to be evacuated in a direction, according to the seat of the ulceration—either through the lungs, the walls of the chest, or the diaphragm; causing parts through which the evacuation takes place to be involved and more or less affected. Generally, the perforation of the pleura is consequent upon excavations in the layer of organized or semi-organized lymph coating this membrane; and sometimes death occurs before the perforation has become complete, or even proceeded farther than this false membrane. When, however, the pleura is perforated, the structures external to the ulcerated point in the pleura also become inflamed and ulcerated, and the accumulated matter makes its way in the direction of the ulceration, often burrowing between muscles or tendons, and even causing caries of the adjoining bones, as the vertebræ, ribs, or sternum.

88. LAENNEC and HASSE considered the perforation of the pulmonary pleura and discharge of the matter of empyema by the lungs and bronchi of more frequent occurrence than perforation of the walls of the chest. Dr. WILLIAMS doubts this, according to his own experience; and I think with good reason, as regards the whole parietes of the chest—costal and diaphragmatic. When the matter is discharged by ulceration through the lungs and bronchi, there is generally a violent fit of coughing, resembling or accompanied with vomiting, and attended by a copious expectoration or evacuation of it; the efforts, together with the quantity discharged, threatening suffocation; but remarkable alleviation of all the symptoms, and diminution of the evidence of dilatation and displacement, are the results. Dr. TOWNSEND describes the ulceration through the lungs and bronchi, in these cases, as being preceded by the formation of a gangrenous eschar, which is detached, the fistulous passage being lined with a false membrane, which prevents the matter



from infiltrating the substance of the lung, and conducts it to the air-tubes (*see* § 125).

89. When the ulceration of the pleura commences, and proceeds in a situation favouring the pointing of the matter externally, a soft fluctuating swelling is felt at some part of the chest; and it may generally be presumed to communicate with the pleural cavity by its becoming tender during expiration, and softer during inspiration, or by a sort of fluctuation caused by coughing. Dr. WILLIAMS remarks, what I have also seen in several instances, especially in children, that the matter not uncommonly burrows under and between the muscles and integuments of the chest, and points at several places, and at a distance from the perforation of the pleura. He has seen abscesses connected with empyema point in three cases under the pectoral muscle, once in the right hypochondriac region, and once close to the spine. That in the hypochondriac region had been mistaken for an abscess of the liver: in this case it was found, after death, that there were three perforations of both intercostal muscles and diaphragm; and between the layers of the latter the matter passed to the margins of the ribs, and there spread under the integuments, communicating with the other perforation between the ribs. In a case of empyema in the son of a medical friend, aged about six years, the matter was discharged near the margins of the right false ribs, and the boy recovered, and is now well, at the age of fifteen.

90. The superficial abscesses consequent upon perforation of the pleura are sometimes tender and painful; but they are occasionally also neither the one nor the other. They are generally slow in their progress to the formation of an external opening; usually spreading between the muscles and integuments, and causing a diffused or puffy tumour. When an opening is at last formed, there is a more or less copious discharge of matter, that recurs from time to time, especially during a forced expiration, or during coughing. "Sometimes air is drawn in through the orifice during full inspirations, and the next jets of matter issue with greater force, occasionally mixed with bubbles of air." After air is admitted into the diseased cavity, the pus, which was at first inodorous, generally becomes in a few days more and more fetid, and exhales the odour of sulphureted hydrogen. With this change in the discharge, or, rather, as a cause of this change, the constitutional symptoms assume an asthenic and irritative character. The pulse is much more accelerated; is quick and irritable; soft, open, and sharp; and the skin is alternately hot or burning, and bathed in a colluviate perspiration. The bowels become irritable; and general depression and asthenia, with irritative fever and rapid emaciation, soon carry off the patient.

91. The matter of empyema may be discharged by a fistulous opening, either uninterruptedly or at intervals, with more or less temporary relief. The recurring discharge may exist for weeks, often for months, and, in rarer instances, even for years; the patient occasionally recovering, but much more frequently sinking from the extent and nature of the disease. Recovery is oftener seen in the young than in persons even moderately far advanced in life and

when it is likely to take place, the discharge soon becomes less, and either does not present, or loses, its fetid character. The external opening closes, and the side becomes contracted, as already described (§ 78, *et seq.*), respiration partially returning in some portions of the chest.

92. *D. The terminations of chronic pleurisy* may be readily conceived from what has been already stated. The *duration* of this state of the disease varies from six weeks to a year, or even much more, when it terminates either in *recovery* or in *death*.—(a) *Recovery* often takes place after a gradual *absorption* of the effused fluid and of the albuminous exudations, or after the organization of the latter into false membranes. This mode of termination is evinced by the signs mentioned above, and by the depression and contraction of the affected side (§ 78).—(b) *Recovery* much more rarely occurs by the evacuation of the accumulated fluid through a *perforation of the pleura*, and a fistulous opening, either in the lungs and bronchi, or in the thoracic parietes (§ 88).—(c) *Death* is frequently caused, 1st. By the general exhaustion and hectic attending the disease, especially when the accumulated fluid is puriform, or when the substance of the lungs is consolidated or tuberculous; in these cases the patient sinks in the same manner as in tubercular consumption; 2d. By the sudden asphyxia of the patient: in these, sudden attacks of dyspnoea, almost amounting to suffocation, sometimes are complained of, at intervals, before the fatal seizure; these attacks often occur during the night, and may return almost nightly. Death may take place very nearly as suddenly as from disease of the heart, and may be thus mistaken for death from this cause, if the history of the disease be not known or ascertained.

93. III. COMPLICATIONS OF PLEURISY.—*Pleurisy*, in either of the states described above, is very frequently a *primary* and *simple* disease. But it is also often *associated* with inflammation of an adjoining tissue or organ, or with some other lesion or malady. In this *complicated state*, it may be either the *primary* or the *secondary* disease; the exact condition and succession being of importance in respect both of the prognosis and of the treatment. I will, therefore, notice some of the more frequent complications of it observed in practice; and, in some instances, a mere notice is all that is necessary, as the suggestion of the associations which the disease so often presents will put the physician on his guard, when he will not fail of detecting it.—a. *Pleurisy* in any form, but more especially in the acute, is often associated with *inflammation of the substance of the lung*, forming *pleuro-pneumonia*, described in the article LUNGS (§ 73-75), or *pleuro-pneumonitis*, *peripneumonia*, or *peripneumony*, of various writers. It is unnecessary for me to notice this complication farther at this place, than to add that the inflammation, in these cases, most commonly assumes a sthenic character, although the asthenic state is occasionally also met with; and that, although both diseases, or, rather, the inflammation of the two different structures, may be coetaneous as well as coexistent, yet the pleuritic is more frequently consecutive of the pulmonic affection than the pulmonic is of the pleuritic. This may be owing, in great part, to

the nature of the tissues, and of the connexion existing between them; but it is more probably owing to the general tendency of inflammations of parenchymatous organs to extend to the periphery.

94. *b.* Pleurisy, either in a simple form, or associated with pneumonia or with bronchitis, is one of the most important complications of *exanthematous* and *continued fevers*. When it is the complication or associated local affection in these constitutional maladies, it is always acute, unless when it appears in the course of convalescence from either of them; and it presents the same characters or diathesis, in respect of vascular action and vital power, as these possess; but the *asthenie*, in its various grades, is the most common, especially if it supervene at an advanced period of the fever, when the vital energy is depressed or exhausted, and when the circulating fluids are morbid or contaminated. Whenever the breathing is very short and frequent, with or without cough or pain in the side or chest, in these diseases, then this complication should be suspected, and a careful examination be immediately instituted, as the progress of the local mischief is generally rapid when it occurs in the course either of these or other constitutional maladies.

95. *c.* Pleurisy, generally of an adhesive form, and of chronic duration, very frequently accompanies *tubercular consumption* and chronic *tubercular pneumonia*. This pleurisy is generally the consequence of the irritation or chronic inflammatory action occasioned by the tubercular deposits in the lungs, especially when these exist near the surface, or when the tubercles soften in that situation, and are followed by cavities. In these cases the pulmonary pleura becomes implicated in the inflammatory action in the immediate vicinity, throws out lymph on its free surface, which excites a corresponding morbid action in the opposite part of the costal pleura, and forms close and firm adhesions between the lung and walls of the chest. This state of chronic or subacute pleurisy is most frequently observed near the summits of the lungs or upper regions of the thorax; is most commonly attended by adhesions, without fluid effusion; or, if such effusion occur, it is soon absorbed (*see* § 120). In some cases, however, tubercles soften and cavities form near the surface of the lung, and perforate the pulmonary pleura at the nearest point to them, without giving rise to adhesion to the opposite surface. In these, fluid effusion often takes place before the perforation is completed, and air passes into the pleural cavity, giving rise to the lesion denominated *pneumothorax*, which is fully considered in another place. The association of pleurisy with tubercular consumption is more fully considered in the article on this latter malady.

96. *d.* Pleurisy is sometimes complicated with *pericarditis*. Generally the pericarditis is of the dry form, in which it has been remarked in several instances by Dr. STOKES. In two cases, to which I was called shortly before death, the previous history of which was not precise, but which were considered and treated as very acute cases of pleuro-pneumonia, the *post-mortem* examination disclosed the association of pleurisy with pneumonia and pericarditis. In both these cases there were considerable effu-

sion, with shreds and pieces of lymph, into the left pleural cavity and pericardium, the diaphragmatic pleura being much affected. Dr. STOKES remarks, that where the pericarditis is of the dry form, the symptoms are not so violent as in that with effusion. He has observed this complication in cases of acute pleuritis, and in two instances of very chronic empyema. In the latter cases, the usual symptoms of pericarditis were altogether wanting, and no new suffering marked the invasion of the disease, which was discovered only by auscultation. The observations of M. BROUSSAIS apply chiefly to cases of this complication, with copious effusion into the pericardium, in which there are generally pains in the præcordia, with great anxiety and want of sleep. The patient sits bending forward, with his head resting on his knees; and yet, notwithstanding great concentration of the pulse, there is a tendency to fainting, and almost complete absence of fever. (*Traité des Phlegmasiæ Chroniques*, t. i.)

97. *e.* Although pleurisy is more frequently caused by, than associated with, acute rheumatism, still this complication is occasionally observed, the still farther complication with endocarditis or pericarditis being also met with in rare instances. This very complicated state of disease has been seen by me in children between eight and thirteen years of age, in three cases, in all of which it was recognised during life, and ascertained by inspection after death.

98. *f.* The complication of *hepatitis*, especially of inflammation of the convex surface of the liver, with pleurisy, is by no means infrequent, and supervenes chiefly in the course of the acute form of hepatitis. It occurs also in the chronic form, especially when an abscess of the liver is passing through the diaphragm, either into the pleural cavity, or into the lungs and bronchi, adhesions having been formed between the opposite surfaces of the pleura. This form of the complication is noticed in the article on the diseases of the LIVER (§ 141–145); but I have seen cases of chronic hepatitis, not connected with abscess, that have been associated with empyema of the left side, the heart being pushed over towards the right side. I am at this time attending a female in Brook-street, aged between thirty and forty, who, according to the history of the case furnished me, appears to have been attacked by subacute hepatitis, attended by suppression of the menses, and followed by ascites, and by chronic pleurisy of the left side, with effusion, displacement of the heart, and dilatation of the thoracic parietes. I was recently requested, by Mr. SIMS, a surgeon who had practiced in India during many years, to see a lady, aged about fifty, who was the subject of a most acute attack of hepatitis, to which rapidly succeeded dry pleuritis and pneumonia of the right side. In this very remarkable case, the symptoms and signs of hepatitis, of diaphragmitis, of diaphragmatic pleurisy, and of pneumonia with rusty expectorations, were distinctly recognised by Mr. SIMS and myself. The patient recovered, and is now quite well.

99. *g.* Pleurisy may also be consecutive of, and complicated with, *peritonitis*, especially partial peritonitis of either of the superior abdominal regions. I have seen several instances of acute asthenic pleurisy, with abundant



sero-albuminous or sero-sanguineous effusion, complicating the several varieties of puerperal fever, and puerperal peritonitis and phlebitis; but in these complications the pleurisy was generally latent, death having taken place before obvious dilatation of the side or displacement of organs occurred. Indeed, in most of these cases, the pleuritic complication was double, although the fluid effusion and other lesions were much greater in one side than in the other, the amount of effusion in either side not being so great as to compress the lung in a remarkable manner.

100. I was lately called to a gentleman who had just arrived from the Azores with ascites, consequent upon repeated attacks of *peritonitis*; pleurisy, with effusion, having also supervened, and proved the more immediate cause of death. Upon examination, the appearances described in the article *PERITONEUM* (§ 88, *et seq.*) were found, the adhesions being numerous, very long and thick, and the serous effusion very abundant. Some of these adhesions were round, as large as the first or second finger, with serous or polished surfaces, and formed cylinders, the external layers of which were organized and dense, and two or three lines in thickness, the interiors being loose and cellular, yet containing very much fatty matter, or, rather, consisting almost entirely of adipose tissue. A turbid serum was found in considerable quantity in the left thoracic cavity, in smaller quantity in the right, and adhesions, cylindrical or nearly so, stretched through the effused fluid, from the pulmonary to the diaphragmatic and costal pleura, in several places, and presented similar appearances to those in the peritoneal cavity; the thicker and the more cylindrical adhesions having organized serous surfaces, and cellulo-adipose centres; but the adipose matter was not so abundant in them as in the peritoneal adhesions.

101. *h.* In most of the complications above mentioned, the pleuritic inflammation is secondary, or consecutive of that with which it is complicated, unless in some cases of pericarditis. But in the course of many cases of chronic pleurisy, or empyema, complications may occur, and render still more dangerous, or even fatal, this already dangerous disease. This is more particularly the case when the fluid accumulation in the pleural cavity is of a purulent kind. In these, especially, various alterations take place in the surrounding structures, caused both by the nature of the accumulated fluid and by the mechanical influence of it. The substance of the lungs, the bronchi, the pericardium, and the mediastinum are either more or less implicated by the early stages of the pleuritic inflammation, or are consecutively irritated, inflamed, or otherwise changed by the nature and quantity of the effusion. Consolidation or atrophy of the lung often results; chronic pericarditis, with adhesions to the heart, sometimes takes place; the bronchi undergo various changes, and are often inflamed; the vessels of the lungs are altered, pulmonary phlebitis even occasionally supervening; and the vertebrae, or even the ribs, sometimes becoming carious. In addition to these effects, the actions of the heart and large vessels are impeded or disordered; while the blood becomes morbid, owing to the greatly impaired

function of the lungs, and all the vital actions consequently languish.

102. IV. *PLEURISY IN THE DARK RACES.*—Pleurisy is very often met with in the negro and other dark races, particularly when they pass into high latitudes and cold regions; and in these circumstances it is very frequently associated with pneumonia, tubercular consumption, bronchitis, &c. *Acute pleurisy* in these races is frequently latent, most commonly presents asthenic characters, and is generally attended by copious serous, sero-sanguineous, or puriform effusion. Hence, unless the shortness of breathing, acceleration of pulse, short cough, and debility, with rapid exhaustion after slight exertion, usually attending the early stages of the disease in these varieties of the species, attract due attention, acute pleurisy will rapidly pass to its ultimate period, or may terminate fatally before its existence is ascertained. *Chronic pleurisy* is also frequent in these races, especially when they migrate to colder than their native climates. It often then assumes the purulent form, and is generally complicated with pulmonary tubercles. Pleurisy, both in acute and chronic states, frequently with effusion in the former state, and often with adhesions in the latter, is not an unusual complication of pulmonary tubercles in the dark races, especially after change of climate and exposure to cold, and is very commonly either latent or masked by the symptoms caused by the bronchitic complication, which is also frequently present.

103. V. *PLEURISY IN INFANTS AND CHILDREN.*—Pleurisy is met with in children of all ages; but it is most frequently seen, especially in an uncomplicated form, in children upward of five years of age. Before that epoch, it is rarely unassociated with pneumonia, and even, also, with bronchitis, pleuro-pneumonia being the most common state of disease. In children, as well as in adults, pleurisy is much more frequent in male than in female children. In this class of subjects it is frequently consecutive of pneumonia, and of eruptive fevers, either as a complication of those fevers, or as a sequela of them during some period of convalescence. Indeed, there is a remarkable disposition to the supervention of pleurisy, or of pleuro-pneumonia, during the whole period of convalescence from these fevers, more especially until the healthy functions of the skin are entirely restored. In other respects the causes of the disease in children are the same as those of adults; but, as shown when remarking on the prevalence of pneumonia in children (*see LUNGS, Inflammations of*, § 122, *et seq.*), these causes act more injuriously, and their effects, whether in the form of pneumonia, of pleurisy, or of pleuro-pneumonia, are the more to be dreaded the younger the child which becomes the subject of them.

34. Pleurisy in children is most frequently single, as in adults. MM. RILLIET and BARTHEZ state that, in the uncomplicated state, pleurisy is somewhat more frequent in the right than in the left side, while the complicated states occur more frequently in the left. This, however, does not agree with my experience; as I have found, in children as well as in adults, pleurisy in every form more frequent in the left than in the right side of the chest. As to

the products of inflammation of the pleura, false membranes, and serum more or less turbid, are most commonly observed in this class of patients, and the false membranes are most extensive and most generally found in the pulmonary pleura, and least abundant and frequent on the diaphragmatic pleura.

105. The accession of pleurisy is not always attended by rigours or chills, especially in young children—never in infants; and the *decubitus* in them especially is not much different from the usual. Sometimes *decubitus* on the back, with the shoulders raised, is preferred. In young children and infants especially, when associated with pneumonia, as pleurisy usually is, little or no fluid accumulates in the pleural cavity, although lymph is thrown out. The infant is restless, cries constantly, especially when moved or held erect; the skin is hot and dry; and the rubbing or creaking sound is heard on auscultation, the respiratory movements of the affected side being diminished. During the acute or early stage of the disease, in older children effusion, although abundant, seldom causes dilatation of the side: this symptom is rarely observed until the disease has become chronic, and then it is often remarkable and attended by pallor, enervation, debility, night perspirations, and loss of appetite. If the fluid be not absorbed or evacuated by an operation, death ensues, after one, two, or more months, the patient being in a state of complete marasmus. In the case of a young relative of my own, pleurisy, followed by empyema of the right side, occurred at the age of eight years, and the matter was evacuated externally by a fistulous opening, as described above (§ 99). He perfectly recovered; and the functions of the lung and the size of the side are now natural.

106. The complications of pleurisy are most to be dreaded in children; more especially when pleurisy occurs in the course of eruptive fevers, or of pneumonia or hooping-cough. In very young children, and in infants, this disease, whether simple or complicated, and more particularly when associated with pneumonia or bronchitis, or when developed in the course of hooping-cough, is very frequently fatal; and in infants it may terminate fatally, by causing suffocation in twenty-four hours. In older children, especially when uncomplicated, pleurisy, even in the more acute forms, is much more disposed to assume a chronic form than in the very young, in whom the more prolonged states of the disease are rarely seen.

107. VI. THE STATE OF THE BLOOD IN PLEURISY has recently received attention, but more as regards its chemical constitution than as respects its sensible appearances. Formerly, and with much better reason, these appearances attracted the chief, and indeed no small attention; for they furnish very important information as to the states of vital power and of vascular action characterizing the disease at the time when the blood is abstracted; and they moreover aid the physician in forming his diagnosis—still more in giving his prognosis—but most of all in determining his indications of cure, and in selecting the means of fulfilling them. Yet this important source of information is neglected, and the particular mode of studying the conditions of the blood in disease that actually furnishes the smallest amount of

useful information to the practical physician is that which now attracts attention, although this very small amount cannot possibly be ascertained by the practitioner at the only time when it can prove in any way advantageous, while it causes the neglect of that knowledge which instantly furnishes the most important pathological and therapeutical indications.

108. A. The appearances of the blood, especially of the coagulum, vary remarkably in pleurisy, according to the states of vital power and vascular action.—a. In the *sthenic acute form* of the disease, the blood taken from a vein generally presents the buffy coat and a firm coagulum, the quantity of fibrin being generally about double the proportion observed in health. If the first bleeding has been early in the disease, the blood will generally present a firm and rather large coagulum, but frequently be neither cupped nor buffed, or but slightly so, although a second venesection, performed only a few hours afterward, will present these appearances in a high degree, a third depletion also presenting them, but in slighter grades. However, nothing can with certainty be affirmed as to the effects of a second or third depletion, as much will depend upon the quantity of blood taken away relatively to vascular fulness and action, and to the powers of the constitution; but commonly the proportion of the coagulum to the serum, or of blood-corpuscles becomes diminished, while the fibrin may be increased in the second blood-letting, but diminished in a third and fourth. In these cases, as well as in pneumonia and acute rheumatism, the quantity of fibrin is generally great in proportion to the degree of fever, pain, and sthenic action, while the blood-corpuscles, or hæmato-globulin, is diminished with the quantity of blood taken away. In fat persons, especially, the serum often assumes a whitish or milky hue after repeated venesection, owing to the fat absorbed and conveyed into the blood. (See art. Blood, § 84, 96–108.)

109. b. In the *asthenic, cachectic, and latent states*, as well as in most instances of chronic pleurisy, the appearances of the blood are still more various than in the sthenic form; but in many instances they furnish important indications of cure. When vital depression is very remarkable, and vascular tone impaired or exhausted, the coagulum is either soft or the blood coagulates imperfectly, although the quantity of fibrin may be greater than in health; and a large soft coagulum is often imperfectly separated from the serum. In many of these cases the blood presents much of the appearance described in the article BLOOD (§ 94); but I have so rarely seen blood taken from a vein in these states of the disease, that I am unable to add more from my own observation, as to the appearances of the blood in these circumstances.

110. B. *Analyses* of the blood in pleurisy have been made by ANDRAL and GAVARRET, who found that the quantity of fibrin was increased to very much more than double the natural quantity; and that the increase was greatest in the most acute and most febrile and painful cases, and was the least in the chronic and non-febrile. BEQUEREL and RODIER analyzed the blood of five men attacked with acute pleurisy, and found the fibrin much more than double the healthy proportion, while the albumen and



blood-corpuscles were somewhat diminished; but the results of the observations of the physicians above mentioned are in no way precise, nor are the changes very remarkable, excepting only as respects the quantity of fibrin; the proportions of the several constituents of the blood depending much upon habit of body, sex, and constitution of the patient; upon the state, grade, and form of the disease; upon the states of febrile action and vital power; upon the stage of the malady, and the quantity of blood previously abstracted. Let the candid and practical reader peruse the accounts of numerous analysis of the blood made by German and French chemists and pathologists, especially those made with a view of showing the composition of it in pneumonia, pleurisy, rheumatism, erysipelas, &c., and he will find, according to the summaries of these analyses given in SIMON'S Animal Chemistry applied to Physiology and Pathology, with the additions by Dr. DAY, the very slight differences, or even the sameness, of the results, as regards these and some other diseases. Having obtained the full amount of knowledge he possibly can derive from these sources, let him next endeavour to apply it to practical purposes; and if he can do so, with only one tenth of the advantage which may be derived from attention paid to, and an acquaintance with, the sensible appearances and properties of the blood, he will be much more fortunate than I can credit.

111. It is very justly remarked by VOGEL, that it is very difficult—indeed impossible—to draw any certain conclusions from the statements of the above-mentioned and other observers, respecting the changes of the several constituents of the blood, or the causes of these changes. In fact, our whole knowledge of the chemical constitution of the blood in both health and disease is most unsatisfactory, and the statements of different writers vary so widely, that it is impossible to deduce any general laws from them. And I may add to this opinion of this able pathologist, that writers on the chemical constitution of the blood in disease have shown only how very little information they were able to give upon the subject; and that little evinces its insufficiency even for the purposes of either a theory or a hypothesis, and its almost total inapplicability to any practical purpose. It is, therefore, to the old fashion of observing the sensible changes and states of the blood, and of connecting these changes with the states of vital power and of vascular action upon which they manifestly depend, that we must recur with any hopes, in the present state of our knowledge, of practical advantage.

112. VII. THE PATHOLOGICAL ANATOMY OF PLEURISY.—A. The earliest appearances of inflammation of the pleura are similar to those which I have described as being observed in inflammation of the PERITONEUM (§ 81, *et seq.*), and consist of a congested state of the capillaries, which are congregated, here and there, beneath the still transparent membrane. The red colour produced by these vessels at certain points, deepens and becomes more diffused. These points are somewhat prominent, and, although scattered and distinct at first, they soon enlarge and coalesce. Patches and streaks are also observed, either darker than the rest, resembling small ecchymoses, or of a pale red

hue, as if from imbibition. The pleura now becomes dull, and loses its polish and smoothness. The redness spreads and becomes more and more uniform. Soon afterward the rudiments of adventitious membrane may be perceived. The spots originally reddened by repletion of the capillaries present little, dull, whitish or yellowish points, which rise above the surface in the form of flat granules, and ultimately coalesce. The pleura, as HENLÉ has shown, consists of several layers of superimposed cellular tissue, more and more closely attached to each other, the free surface being a thin layer of epithelium cells. Blood-vessels penetrate all these layers, excepting the exceedingly delicate epithelium membrane formed by these cells. The inflammation, therefore, is not seated, or does not commence, in the epithelium membrane, but in the subjacent cellular layers, this epithelium being thrown off at an early period of the disease. While these changes are proceeding in the pleura, the layers of cellular tissue connecting the pleura to the subjacent parts are more than usually vascular, and are more or less infiltrated with a yellowish, semi-gelatinous fluid; but this implication of the external cellular tissue is only occasional, or exists chiefly at the commencement, and is removed as effusion or other advanced changes take place. In rare instances only are alterations of the pleura and of the subjacent cellular structure observed to proceed, *pari passu*, with each other, more particularly as regards the costal pleura.

113. Consequent upon the changes now described, especially upon the grayish or yellowish points mentioned above, which are the initial and expanding rudiments of the consistent or membranous effusion, a slight, sometimes a much more abundant exudation of serum is also observed. When the progress of the inflammation is soon arrested these products are inconsiderable; but more frequently, and when the disease proceeds but little farther, the pleura is found as far as the inflammatory injection extends, to be lined by a very thin layer of plastic exudation, forming a delicate membrane, mostly opaque, which veils the inflammatory redness underneath it. The liquid effusion contained in the pleural cavity consists of a small quantity of a yellowish limpid fluid, or of a more abundant collection of a turbid, or of a reddish or mahogany-coloured serum, containing delicate flocculi. HASSE supposes that upon the condition of the thin adventitious membrane covering the pleura depends the length of time requisite for the absorption of the fluid; and that the more heterogeneous the quality of the former, the greater will be the impediment to the absorbents acting upon the latter. However, there are other circumstances besides the state of this membrane, which will either impede or accelerate absorption of the contained fluid, and it can hardly oppose any great obstacle, as it either enters into organic union with the serous tissue, or else it is gradually dissolved in the fluid.

114. When the inflammation either continues unabated, or steadily, and gradually, or more or less rapidly increases, the morbid products accumulate in proportion, exhibiting at the same time the most manifold differences. These differences depend more or less upon

iathesis or peculiarity of constitution and emperament, upon the grade of inflammation, upon its character and the degree of tone or of vital power attending it, and upon the state of the blood itself. The German and French pathologists, more especially HASSE and ANDRAL, while they describe these differences with much precision, take insufficient note of the several pathogenic conditions upon which they certainly depend more or less; although it is very difficult to assign these differences or states of the inflammatory products in this disease to any one or more states of the system or of the circulating fluids, inasmuch as these products evidently undergo various changes after their accumulation and during their retention, and, moreover, the states of vital power, of inflammatory action, and of the blood attending their exudation and collection, soon change and become very different when they are retained for some time, these states being rather the consequences of the accumulation and retention of these products, and of the changes these products have undergone, than the causes of the differences or peculiarities they present when they become the objects of examination. To say, therefore, that variety of character in the products of inflammation of the pleura "is entirely founded on individuality," as some pathologists have contended, is to confess ignorance under the mask of a term. That the varieties observed are chiefly to be referred to the states just enumerated will be confirmed by more close and precise observation, although the difficulties of ascertaining the dependance of certain alterations upon determinate states of vital action, while the products of these states cannot be immediately examined, I am still disposed to believe. The exact appropriation of the several varieties of these products to the pathogenic states which produce them can hardly be expected, seeing that both the causes and the effects are the subjects of continual change; but an approach to it may be made sufficiently close for all practical and useful purposes.

115. *a.* The product of pleurisy, most simple, and most frequently observed, is a transparent yellowish jelly or lymph, and which is effused with great rapidity and in considerable quantity when the inflammation is intense. It is partly diffused in layers between the pulmonary and costal pleura, and partly subsides to the lowest part of the pleural sac in pellets or flakes surrounded by a small portion of fluid. This gelatinous exudation or lymph consists almost exclusively, and often in nearly equal proportion, of the fibrin and serum of the blood, the latter most frequently predominating, with a very little colouring matter, attracted here and there to the inflamed surface. It is *susceptible of organization throughout*, and blood-vessels form in it with surprising rapidity. HASSE met with a case in which pleuritic pains occurred twenty hours before death, and found, at the corresponding part, this gelatinous lymph, in which delicate vessels were observed shooting from the borders. This product soon adheres to the surfaces of the pleura where they approach each other, and a very few days suffice to produce an extensive cohesion between the two. The rapid growth of vessels gradually confirms the union, and the aqueous

portions of the effusion soon being absorbed, the formerly separate surfaces now adhere by means of a soft vascular and cellular layer or false membrane. The disease often terminates thus favourably, without the function of the affected part being materially or permanently disturbed. But the inflammation, having given rise to these changes, either partially or fully, and being nearly extinguished, may be rekindled, and the incipient adhesions may be stretched, or torn away, or even dissolved by the fluid poured out during the consecutive attack, and various other changes produced in the products previously formed, as well as other more novel deposits may take place.

116. *b.* The pleuritic exudation or lymph is not always of this organizable kind, or so german to the organism, owing to a depraved habit of body, to the state of vital power, and most probably, also, to the condition of the blood. Without, however, ascribing the difference to these states, Professor HASSE believes that ingredients very often enter into the composition of the pleuritic effusion which, either from too early consolidation, or, from some peculiarity of character, render it less susceptible of consolidation. These substances he considers as being far less easy of assimilation, and, acting as foreign bodies, serve to embarrass the surrounding parts. Adventitious membranes of this kind, and which are only *conditionally susceptible of organization*, appear not to form so rapidly as those just described. They generally consist of several either homogeneous, or else distinctly different layers, largely investing and firmly adhering to the pleura. Their consistence resembles that of a hard-boiled white of egg. They tear easily, and present, when torn, a fibrous-like texture. The colour of these plastic or albuminous masses is mostly of a yellowish or dull white; but they occasionally vary greatly, passing to a faint red, or into a violet or mahogany tint. The tinge is sometimes equable, but is also occasionally irregular, or patched, or streaked, or different in the layers or surfaces. These membranes are always opaque; their free surface is usually paler and softer than that adhering to the pleura, and is usually villous or reticulated. The cavity of the pleura contains, in addition to this false membrane, a considerable quantity of a slightly turbid or flocculent fluid, or a light-brown or reddish liquid, bearing some relation to the quantity and character of the false membrane. When there is a more complete development of blood-vessels in this membrane, there is also a smaller amount of fluid; and where, on the other hand, the organization of the membrane is imperfect or arrested, or when the consistent product is merely that of an unorganized coagulum, the fluid effusion is relatively more abundant, and, as HASSE supposes, with great probability, much less likely to be absorbed. It is not unlikely that exudations of the latter kind are liable to various changes during their retention, causing farther alterations in both the more consistent and more fluid parts, preventing or retarding the organization of the false membrane, and the absorption of the liquid. In these cases the disease is prolonged, and does not terminate favourably until the adventitious membrane has become organized and the fluid ab-



sorbed. But in those cases in which these results do not take place, the constitutional efforts caused by the morbid products, and the vital efforts made to resist the extension of the changes which these products occasion, produce a febrile or hectic state of the frame, which acts upon the local lesions, and these again react upon the constitutional disturbance until the vital functions are at last arrested. When the effused matters are much altered during retention, or assume a more morbid or irritating quality, even the partial absorption of them causes hectic of a more or less acute or rapid kind. Absorption of such matters is so constantly attended by hectic and emaciation, that Dr. HODGKIN, with much reason, regards the absence of these symptoms as evidence of its non-existence. It often does not proceed steadily, but remains stationary, until some intercurrent disease, in no way connected with the pleuritic malady, accelerates its progress.

117. c. When plastic matter or albuminous lymph is exuded in a very short period, by the intensity of the inflammation, *it does not enter into organic union* with this membrane, with which it is only loosely agglutinated, owing either to its rapid coagulation, or to the constitution of the exudation, or to the state of vascular action in the pleura. The coagulum then generally assumes the form of a honey-combed false membrane, or it presents imbricated layers; or it merely consists of irregular flocculent layers, whence scattered filaments run across the cavity of the pleura, while others shoot from the free surface, and give an irregular villous appearance to this surface. These plastic exudations are generally soft, opaque, and of a pale yellow hue. Along with the matter forming these depositions, a considerable quantity of liquid is also effused, which is sometimes tinged with the colouring matter of the blood, imparting in such cases its tinge to the whole morbid product. The more solid part of the exudation surrounds the more liquid portion, and forms an envelope for that portion; and being unorganized, and interposed between the fluid part and the pleura, prevents the absorption of that part. In these circumstances the disease becomes chronic, if death does not soon ensue, or assumes the form of *empyema*.

118. d. The *purulent* or *empyemic* form of effusion may be the result, as HASSE observes, either of a high degree of inflammation at the outset, or of the introduction of external air reacting on the inflamed serous surface and its product, during the progress of the disease. But may it not also arise from consecutive changes in the vascular action of the inflamed membrane, and in the effused fluid independently of the admission of the external air? I believe this to be the case in some instances. Suppuration of the pleura, however, is most marked where *pneumothorax*, with violent inflammation, follows the bursting of an abscess, or of a tubercular cavity into the pleural cavity. (See art. PNEUMOTHORAX.) In this case the pleura soon becomes dull and of a dingy gray, and secretes a thick tenacious, puriform fluid, covering the surface of the membrane, and collecting in the most depending portion of the cavity. In some instances a pure liquid pus is very abundantly formed, and

is often mingled in various proportions with coagulable substances, especially with a very soft, thin, puriform, false membrane, which are either deposited upon or slightly adhere to the pleura, or which are mingled with the purulent fluid, in the form of pellets or flakes. Unless the pus find a ready outlet, or become sequestered within false membranes, this state of the disease soon terminates fatally.

119. e. Owing to the circumstance of the pleura being inflamed in different degrees, in different portions, or to the occurrence of a succession of attacks, or to the recrudescence of a subsiding inflammation, *several of the kinds of morbid product* above described are often met with in the same case. The most various combinations both of consistent exudation, organized, organizable, and unorganizable, and of liquid effusion, are thus sometimes seen in the same subject. HASSE justly remarks that pus, at whatever period it may be generated, stamps all other substances effused with its own impress. Plastic organizable exudations are thus liquefied and converted into pus; that which is coagulated turns yellow, becomes putrescent and flocculent, and, in like manner, resolves itself, partially at least, into pus. This statement, in fact, confirms the view which I have entertained above (§ 73) of the not infrequent conversion of other and more chronic states of pleurisy into that of a purulent or empyemic form, independently of the admission of the external air.

120. f. The *tubercular form* presented by the pleuritic products is one of the most important, and occurs chiefly in the scrofulous diathesis, and when tubercles at some one period of their development exist in other organs, especially in the lungs. As the tubercular constitution changes the plastic products of nutrition in particular structures, even in the circumstances of ordinary health, or causes the cytoblastemata of tubercle to be secreted conjointly with normal elements in these structures, so does it exert the same influence in the formative processes consequent upon inflammatory action. When pleurisy occurs in this constitution, and gives rise to the organizable or first form of product described (§ 115), there are seen, either simultaneously with the incipient formation of vessels, or earlier, dull points as large as pins' heads, scattered through the gelatinous effusion; and these points ere long change into granules. In the second form of false membrane (§ 116), tubercles likewise often appear in the shape of white, flat granules, distinct both in colour and consistency from the rest of the mass. These granules are inaccessible to the vascularity which soon pervades the organizable product. Professor HASSE remarks the existence of these granules, even the plastic substances deposited from purulent effusion, but he has never met with them in the adventitious deposits which are not susceptible of organization (§ 117). In pleurisy, as well as in other diseases, the characteristic influence of tubercles is exerted; for, by acting as substances alien to the organization, they keep up irritation, and the continued secretion of fluid and consistent matters; and they impede or frustrate the function of absorption. A portion, also, of these effects may be imputed to this particular diathesis, and to the circum-

stance of tubercles in various stages of growth being generally also present in other organs, more particularly in the lungs.

121. *g.* The *sanguineous state* of the products of pleurisy was particularly noticed by LAENNEC. The various grades of reddish colour imparted to pleuritic exudations by the colouring matter of the blood have already been slightly mentioned. Sanguineous coloration of the fluid effused is most frequent in the tubercular states of pleurisy. It is only in rare instances that the blood itself exudes into the pleural cavity in this disease; and when this occurrence takes place, little clots are found at the bottom of the collected serum, or deposited between false membranes. Instances of the entire effusion, consisting of pure blood, are mentioned by ANDRAL and HASSE; but these should be referred rather to hemorrhage into the pleural cavity than to inflammation of the pleura. Even when blood is effused into this cavity it will necessarily produce inflammation; and hence, in cases where pure blood, or clots of blood, are found in this cavity in connexion with inflammatory products, it may be difficult to determine that these are not the products of an inflammation excited by a primary hemorrhage into the pleural sac, effused blood generally causing inflammatory action in the tissues surrounding it.

122. *h.* The spontaneous evolution of a *gaseous fluid* from the products of pleurisy has been believed in by some pathologists, and denied by others. The question at issue is, whether or not these products may become so decomposed during the life of the patient as to form a gaseous fluid. We know that this effect is not unfrequently observed after death. Dr. HODGKIN doubts the possibility of it during life, and ANDRAL and HASSE appear very nearly to agree with him; for, in instances which occurred to them, in which gas seemed to have been spontaneously evolved from these products, they admit the possibility of some perforation of the pleura to have existed, although they failed to detect it. Although the exuded matters, fluid as well as more consistent, may long remain either unchanged, or but slightly changed, as long as the vital energies are not very much impaired, yet when these energies are very far reduced, the products of inflammatory action are either insufficiently, or no longer controlled by them, and various changes must ensue. Some of those changes may be ascribed to endosmosis and exosmosis; others to the states of vascular action and of absorption; and a portion even to incipient putrefaction; but death usually occurs before this last proceeds far. The ulterior changes of the more fluid matters effused in pleurisy are as yet not fully ascertained, especially with reference to the different grades of vital power; and the question as to the spontaneous evolution of gas from these matters, in the most unfavourable circumstances of the disease, and when vital power is remarkably reduced, still remains undecided.

123. *i.* The most important change that takes place in the gelatinous and more consistent products of pleurisy is their *vascular organization*. This process has been explained in two ways. DÖLLINGER and others have supposed that the exudation, possessing a derived grade

of vitality from the surface producing it, has hence the power of producing a movement of its molecules, of transforming these into blood-globules, and of developing canals for their circulation independently of any connexion with the blood-vessels of the surrounding tissues, the circulation in the false membrane becoming connected with and subject to that in these tissues only subsequently, and by slow degrees. This theory has not been supported by accurate and direct observation, and it has only the remote and loose analogy of the incubation of the egg to support it: a process which possesses elements entirely wanting in the organization under consideration. The other explanation is more obvious, and admits of visual demonstration. It has been observed by HASSE, KIERNAN, HODGKIN, myself, and others, in various stages of its progress; and it may be briefly stated, that, wherever vessels had formed in adventitious membrane, they proved to be continuations of the branches ramifying in the serous coat, having penetrated the false membrane at numerous points, and then branched out in a stellate manner, or having formed into partly divergent, partly parallel, fascicular groups. In those false membranes which are less organizable, or only conditionally so (§ 116), the descriptions of LAENNEC, FORBES, and GENDRIN show that a multitude of little red elevations appear on the serous membrane, like clusters of protruding vessels. These elevations impress corresponding pits in the adhering surface of the false membrane, and upon the surfaces of these pits appear little arborescent or stellate extravasations of blood. By degrees these arborescent extravasations become more strongly marked, and assume the appearance of vascular ramifications. LAENNEC states that these ramifications present an outer and softer layer, formed by desiccated blood; and that this layer encloses a small whitish chord of coagulated fibrin, apparently hollow in the centre, and pervious to the blood stream. These thick-walled canals gradually change into the natural coats of the vessels, which, pursuing their course, thus seek to traverse all the organizable portions of the false membrane. Professor HASSE remarks, that some plastic substances are possessed of so little power of attraction over the capillary vessels of the inflamed pleura as neither to form these little vascular prominences, nor to occasion the little stellated extravasations on the new membrane. These heterogeneous formations go on irritating the pleura until another false membrane is thrown out, which, acting as an intermediate vascular link, establishes something approaching to vegetative reciprocity between the two; and, being itself devoid of nerves, obviates morbid irritation.

124. *k.* Whatever does not sooner or later become assimilated or organized; whatever is not converted into vascular cellular tissue, or is not removed by absorption, remains perfectly isolated and encysted, and may, in some instances, be retained for years without occasioning any serious symptoms. When the more fluid parts have been absorbed, the more solid constituents remain, forming a pap-like mass of the consistence and aspect of moist cheese, or of imperfectly-coagulated white of egg. “Previously to this, the effused product usually sinks



to the most dependent part of the cavity of the pleura, so that the above mass accumulates into a layer more or less thick, between the two firmly-adhering and thickened pleuræ, posterior to the inferior lobe of the lung." When tubercle enters into the combination, and the case does not prove rapidly fatal, it is occasionally met with as a residue of the aggregate morbid product in small scattered portions included between the pleuritic adhesions. In such cases, various consecutive changes sometimes take place, which will be noticed hereafter.

125. *l.* When the fluid, instead of being removed by absorption, makes its way out of the pleural cavity, the lung is the part most frequently perforated; and it is the superior anterior portion of the organ which is most commonly the seat of perforation. HASSE states that this does not take place where the lung has suffered compression, but where it has continued to expand—in the majority of cases, at the inferior surface of the upper and middle lobes. Such portions are commonly attached by old adhesions to the costal pleura, and form an arch over the effusion. The effusion presses against this arch, until some point of the substance of the lungs and of the pleura softens, gives way, and allows the fluid to escape through the bronchi. The perforation may, however, take place at the inferior lobe, or at the base of the lung, especially when protected from compression by old adhesions, and remaining partially pervious to air. These perforations are rounded or oval, are smooth at their edges, and seldom exceed two or three lines in diameter. They are generally single. The parenchyma in the vicinity of the perforation or fistula is generally in a state of gray hepatization, or of complete purulent softening. This change is usually fatal; but ANDRAL and HEYFELDER have met with instances of recovery.

126. The passage of empyema through the diaphragm is very rare. ANDRAL and MOHR have adduced instances of this occurrence. In these the fluid, after perforating the diaphragm, pushed down the peritoneum before it, thereby preventing effusion into the peritoneal sac. In one of MOHR's cases the diaphragm was perforated near to the spine, and the pus descended behind the peritoneum, along the psoas muscle, causing abscesses and fistulous openings in the thigh, extending as low as the knee. GENDRIN mentions a case in which the fluid made its way into the anterior of the mediastinum. Escape of the effusion through the thoracic parietes presents a better chance of escape for the patient than the foregoing. The chief cause of the spontaneous evacuation of the fluid of empyema through the bronchi and thoracic parietes being so often fatal, is the influence of the external air upon the diseased pleura and upon the walls of the fistula, especially upon the substance of the lungs. The purulent secretion soon becomes remarkably fetid, and the air which passes into the cavity is soon deprived of its oxygen. DAVY found the air in pneumothorax to consist of 0.92 of nitrogen, and 0.08 of carbonic acid. The fluid of empyema generally evolves the odour of phosphureted and sulphureted hydrogen.

127. *m.* The state of the lungs, in cases where the pleural cavity is surcharged with effusion, has been described by several modern writers.

The lung of the affected side suffers the most, as may be expected, its compression being commensurate with the increase and ascent of the fluid, until it can no longer expand, and the air can scarcely enter the partially compressed bronchial tubes. When the lung is free from adhesions, it is pressed upward and forward, and finally on all sides towards its roots, when the bronchi and blood-vessels penetrate. It then occupies the least possible space in front of the vertebral column; is flattened and shrivelled; its different lobes are mostly adherent; the parenchyma is inelastic, devoid of crepitation, and almost bloodless; and generally without tubercles. When, however, tubercles are developed in the course of chronic pleurisy, or are advanced, having previously existed—a thing by no means rare—they are not found in the most compressed portions of lung. The bronchial tubes are usually found loaded with a whitish, tough mucus. Where adhesions exist, these generally preserve a portion of lung more or less expanded, the bronchi then remaining partially pervious to the air, and tubercles are not unfrequently seen in the partially-expanded portions of lung.

128. The mode in which compression of the lung presents itself in those cases in which adhesion between the opposite surfaces of the pleura exist has been described by MOHR (*op. cit.*, p. 127). Out of forty-three cases, six of which were double, the compression and displacement of the lung were once in the direction from above, downward; four times from behind, forward; four times from before, backward; four times from within, outward; thirteen times from below, upward; and twenty-three times from without, inward.

129. *n.* The appearance and structure of the adhesions formed between the lung and costal pleura, and between the lobes, differ; but they may be referred to two kinds: *First*, the cellular, in which the opposite surfaces are equally united by means of a dense cellular tissue; and, *secondly*, the filamentous or band-like, separate bridles or bands, having a smooth, serous surface passing between the two pleural surfaces. These bands appear identical with the serous membrane, whose product they are, and into which they directly pass. They are often supplied with blood-vessels of considerable size; and they consist of densely stratified cellular tissue, with an investment of epithelium cells; and they sometimes contain, as remarked by LAENNEC, HASSE, and myself, a considerable portion of fat within this texture, more especially in their centres (see above, § 100.) As shown by BECLARD, DUPUYTREN, VILLERMÉ, and others, these adhesions may remain during life without occasioning any sign of disease; but I have met with cases in which their existence and situation have been inferred, and the inference has proved correct, as shown by dissection, years afterward. They may even disappear in the course of time. In the latter case the chords lengthen, become thinner in the middle, and ultimately rupture, nothing excepting a whitish, rugose thickening of the pleura remaining.

130. The adhesions following and complicating tubercular disease of the lungs are different from those observed in primary pleurisy. They commence at the apex and gradually de-

scend, closely following the course and extension of the tubercular disease. Professor HASSE considers these adhesions as being less the result of decided inflammation than of a chronic irritation, limited in degree, and kept up by the proximity of the heterologous product. The result is complete blending of the pulmonary with the costal pleura, with lardaceous thickening, and degeneration of the serous structure. Owing to this intimate fusion, the intercostal vessels push branches into the diseased substance of the lung. In favorable circumstances to the development of inflammation, the slight irritation, causing the insensible, or nearly insensible, adhesion of opposite portions of the pleura, may amount to actual inflammation, rapidly spreading over the pleura, and throwing out diverse products, generally with tubercular matter, and passing into chronic pleurisy. MOHR calculates the complication of pleurisy with tubercular diseases of the lungs to be fifteen cases out of twenty; and this appears to be near the truth.

131. o. It is comparatively rare to find pleuritic lesions simultaneously in both cavities. HASSE states, that of thirty-five fatal cases he found nine double cases; and in five of the nine one sac was implicated in a minor degree. He considers both sides of the chest to be almost equally prone to the disease, with this difference, that pleurisy of the left side is both more likely to prove fatal in the acute stage, and more apt to pass into a chronic state; but he adds, of the thirty-five cases just mentioned, sixteen were of the left side, and ten of the right, the other cases being double. Of fifty-six cases observed by MOHR, the left side was the seat thirty-seven times, and the right nineteen times. The experience of Dr. H. ROE and Dr. HUGHES, also, shows a much greater frequency of the disease of the left than of the right side; and the cases which I have seen, since my attention has been directed to the matter, also evince a much greater frequency of pleurisy of the left side. In 1846 I met with four cases of the disease in this side in succession.

132. MM. RILLIET and RARTHEZ state, that simple pleurisy is more frequently met with in the right than in the left side in *children*; but that pleurisy complicated with pneumonia occurs oftener in the left; while the simple and complicated cases united are more frequently seen in the left than in the right. Of all the products of inflammation in this class of subjects, these physicians found that false membranes were the most frequent, and these were sometimes the only lesion; next to these was a turbid serum, a purulent fluid being the most rare.

In 85 cases, false membranes were present in 79.	{	In the right pleura only, 27.
		In the left only, 33.
		In the two cavities, 14.
In the 79 cases in which there were false membranes, they existed alone or with redness only, 28 times.	{	In the right pleura only, 14.
		In the left alone, 13.
		In both, 1.

133 VIII. THE DIAGNOSIS OF PLEURISY requires only a very brief notice, after the full descriptions which have been given above of

the symptoms, signs, and consequences of the disease.—a. The greatest difficulties as to diagnosis present themselves in cases occurring in *children*, and in *adults* when the physician has not observed the earlier stages, or when the pleurisy is latent, and the quantity of fluid effused is not great. In infants and children under four or five years pleurisy is most frequently associated with pneumonia; but after that age it is often primary and uncomplicated. During *infancy*, pleurisy is detected with great difficulty; but it should be dreaded when the patient is seized with violent and constant crying or screaming, restlessness, hot and dry skin, dry, short cough, and the appearance of increased suffering upon being raised to the erect posture. Upon inspection of the chest, the side affected does not move so freely as the other during respiration, and auscultation detects a rubbing or creaking sound, which usually continues longer than in adults. In very young children there are generally also signs of pneumonia, especially crepitation, associated with these, and occasionally there is evidence, moreover, of bronchitis. In older children pleurisy is also often complicated with pneumonia, and, in rarer instances, with pericarditis; but in these latter, acute rheumatism is generally also present, or it has immediately preceded the thoracic complication. The chief difficulty, however, is in distinguishing pleurisy from pneumonia, and in ascertaining during life the existence of the association of the two diseases. The former usually commences in children with dry cough and acute pain, soon followed by a bronchial respiration, inspiration being attended by a metallic sound, while the respiratory sound is rarely much impaired, unless the disease is advanced. Change of position aggravates the symptoms. The febrile symptoms generally abate from the fourth to the seventh day; and previously the rubbing or creaking sound is often heard, especially before effusion has taken place; but this sound may also be present when the lung is implicated. In this latter case, there are generally also crepitation or sub-crepitation, accompanying bronchial respiration and mucous expectoration, which in older children is often copious and even tinged with blood. When the lungs are thus also affected, the febrile symptoms are usually more severe, and continue until the 7th, 8th, or 9th day, before they abate.

134. b. In the earliest stage, the pain of pleurisy may be mistaken for *pleurodynia*, or nervous pain in the side; for the absence of any distinctive physical sign at this period, unless in such cases as may furnish a rubbing or cracking sound, leaves us without proof of the existence of the disease, excepting that which may be inferred from short, dry cough, heat of skin, hardness or sharpness of the pulse, and other febrile symptoms, and these may be very slight, or insufficient to indicate the nature of the malady. But not only may these be so slight as to be almost wanting, unless occasionally towards evening, but pain itself may be wanting, or be so situated, and so slight, unless in motion or on exertion, as to render the disease entirely latent, as stated above (§ 49), until the effusion is so considerable, as it usually is in a short time, in these cases, as to develop the physical signs (§ 24).



135. *c.* Pleurisy may also be mistaken for *consolidation of the lung*, and this latter for it. This mistake is most likely to be made when the pleurisy is attended by a moderate amount of effusion, the walls and contents of the chest not being displaced. This lesion of the lung generally increases the vocal resonance of the affected side, whether heard or felt by the hand, and allows some sound of respiration, which is generally of a bronchial character, to be heard; and it thus may be distinguished from this state of pleurisy. "Partial pleurisies confined by adhesions," as Dr. WILLIAMS justly observes, "are less easily distinguished, because, where the lung is adherent, there may be as much bronchophony and respiration as in cases of consolidation; but, on examination, these will be found to be more circumscribed than in the latter case, all sound being absent in other parts, which farther present the signs of enlargement or displacement of the heart, liver, or mediastinum, with fulness of the intercostal spaces, generally more remarkably than usual. A similar irregularity in the shape of the chest will serve to distinguish pleurisy in the progress of cure by contraction of the chest, from the case of a consolidated lung." (*Op. Cit.*, p. 122.) Although I admit the truthfulness of these remarks, as respects many cases, yet others will occur to which they do not apply, and in which they cannot assist the diagnosis. They apply chiefly to the more developed and well-defined cases; but to others not so characterized, and to those which are more complicated, they will furnish but slight aids. Indeed, no precise statements can be offered as to the diagnosis of several states of pleurisy attended by adhesions, partial effusions, and alterations of the substance of the lungs, as none apply sufficiently to these ever-varying states to mark them with precision. The physician's accuracy of diagnosis, as regards them, will depend much upon the attention with which he has watched the course of the disease, and upon his acumen in detecting, and his sagacity in comparing and estimating signs, symptoms, and almost imperceptible and evanescent phenomena.

136. *d.* Chronic pleurisy is liable to be confounded with *tuberculous disease of the lung*, for some of the signs of both maladies are somewhat similar, and the constitutional symptoms and affection are often alike. Indeed, the one may pass into the other, or both may be present. There never is, however, the same amount of dullness on percussion and absence of respiration in the latter malady as in chronic pleurisy; while the enlargement of the side and displacement of the viscera, attending pleurisy with very copious effusion and empyema, never exist in phthisis. The puriform state of the expectoration, often observed at an advanced stage of chronic pleurisy, should not mislead the physician, for this appearance of the sputum occurs in the last stages of most diseases of the chest, and is an attendant upon a sympathetic chronic bronchitis, which gradually supervenes in their advanced progress, and is independent of any actual disease of the substance of the lung.

137. *e.* Protrusion of the intercostals may be looked upon as the surest sign of *empyema*; for it rarely accompanies a very copious and non-purulent effusion in the acute stage, while it is

generally present when the fluid is purulent, although actually smaller in quantity than before it assumed this character; this sign indicating rather the kind of fluid than the quantity, as justly insisted upon by Dr. STOKES and Dr. H. ROE. It should also be recollected that a small effusion into the right cavity may, when the patient is examined in the sitting or standing position, be mistaken for an enlarged liver, or the rising of this organ high in the thorax, or this latter may be mistaken for the former; while the presence of a considerable quantity of fluid in the left side may not be detected, owing to an inflated stomach having pushed the diaphragm before or behind it, or to the small quantity of fluid interposed between the parietes and the inflated organ, admitting of a clear sound upon a strong percussion, although a dull sound may be given out by a very gentle percussion. The absence of the vibratory thrill produced by the voice, and the decubitus, generally on the affected side (§ 30, *et seq.*), will farther determine the seat of effusion.

138. At an advanced period of empyema a copious expectoration of purulent matter may occur, and may lead to the inference of the existence of a pneumonic abscess, or of a tubercular cavity, or, at least, of chronic bronchitis, of the uncompressed lung. Instances of this kind have been noticed by ANDRAL, STOKES, and MAC DONNELL, and upon dissection no such complication could be detected. But true pulmonic abscesses are comparatively rare, and are not accompanied with copious expectoration. The last writer just named very justly infers that purulent expectoration in empyema, although attended by quick pulse, sweating, emaciation, and other hectic symptoms, is indicative of tubercular or pneumonic abscess, unless attended by unequivocal physical signs of these lesions; but, on the contrary, it is to be regarded as the consequence of an effort of the constitution to get rid of a large collection of purulent matter by one of the ordinary emunctories.

139. It should, however, be kept in recollection that the lung of the sound side often experiences, in the course of empyema, congestion of the mucous membrane of its bronchi, or fully-developed bronchitis, often passing into chronic bronchitis. In such cases the accession of chills, rigours, fever, increased difficulty of breathing, with the physical signs of bronchitis, generally indicate the complication, which in various degrees is a frequent consequence of the increased determination of blood that takes place to the sound lung, owing chiefly to the compressed and impermeable state of the lung of the affected side.

140. When a circumscribed purulent collection forms on the left side and advances externally ("the *empyema of necessity*" of French pathologists (§ 52, 56)), it may, owing to the pulsations of the heart communicated to it, be mistaken for a thoracic aneurism, or even for a malignant tumour in that situation. Mr. MAC DONNELL has pointed out this circumstance, and has published some interesting cases illustrative of this form of empyema, which he denominates "*pulsating empyema of necessity*." It may be distinguished from *thoracic aneurism*, (a) by the history of the case; (b) by the dullness extending over the whole side, the pulsation being felt only in the external tumour; (c)

by the absence of thrill, and of bellows sound ; and (*d*) by the extent and nature of the fluctuation. It cannot be mistaken for *encephaloid*, or other malignant disease, if the progress of the disease, and the existing phenomena, have received even tolerable attention. The absence of a persistent bronchitis, of a dark expectoration resembling black-current jelly, and the absence, also, of a varicose or enlarged state of the veins of the surface, and of œdema of the side affected, will assist the diagnosis.

141. It was shown by me in 1815, and on subsequent occasions in 1820, 1824 (see *Med. and Phys. Journ.*, vol. xlv., p. 530, and Notes to RICHERAND's Physiology, p. 626), long before the subject was noticed by TRIEDEMANN, GMELIN, LIEBIG, and others, that, when the functions of the lungs are in any way impeded, the liver often performs a vicariously increased function, thereby preserving the blood from the impure or morbid state into which it would otherwise pass. This increased function of the liver is very generally remarked in the course of empyema. But, in addition to increased function, there also not unfrequently supervene congestion, and more or less enlargement of the liver, owing to the difficult or impeded circulation of blood through the lungs, and the equally impeded return of it from the hepatic vein. This enlarged, or at least congested, state of the liver, in most cases of empyema of any considerable duration, should not be overlooked, or mistaken for a partial empyema of the right side, which, however, it may accompany as well as empyema of the left side. The enlargement of the liver from congestion, or from impeded and impaired function of the lungs, generally supervenes to the vicariously increased action of the organ, and is observed chiefly in the more chronic cases of empyema.

142. *f*. The diagnosis between pleurisy with effusion and *hydrothorax*, and between empyema and this latter, is by no means easy, unless the history of the case be well known. The circumstance of *hydrothorax* being generally consequent upon disease of the heart, upon a far advanced stage of disease of the lungs, especially congestive pneumonia, œdema of the lungs, &c., or upon the last stage of other forms of dropsy, as ascites, anasarca, &c., is sufficient to prevent any difficulty in the great majority of cases to which the term *hydrothorax* is strictly applicable. Yet passive effusion may occur, although in comparatively rare instances, either in one or in both lungs, and be distinguished with difficulty from the asthenic and latent forms of pleurisy, more especially when the passive effusion is confined to one side of the chest, which is seldom the case when altogether independent of inflammation of the pleura. When dropsy of the pleura, however, is caused by disease of the lungs, it is then generally confined to the same side as the affected lung, or is greatest on that side.

143. In most cases, the chief differences that can be observed between chronic pleurisy or empyema and *hydrothorax* are, that the dilatation of the intercostal spaces is comparatively slight in *hydrothorax*, while protrusion of them or of the diaphragm is not observed in this latter. Dr. STOKES imputes this circumstance chiefly to the pathological state of the pleura and the adjoining muscles, and to the puriform

character of the effused fluid ; but something may also be imputed to the amount of effusion, which is rarely so great in either pleura in pure *hydrothorax* as in pleurisy, and hence a change of sound, varying with the position of the patient, may generally be recognised in *hydrothorax*, unless the passive effusion is consequent upon the existence of several old pleuritic adhesions. Dr. STOKES adverts to the following diagnosis between empyema and *hydrothorax*, as given by HIPPOCRATES and noticed by LAENNEC: "You shall know by this that the chest contains water, and not pus, if, on applying the ear during a certain time on the side, you perceive a noise like that of boiling vinegar ;" and remarks that, when we consider the conditions of the lung in empyema and *hydrothorax*, the diagnosis of HIPPOCRATES seems much more accurate than LAENNEC has admitted. In empyema the lung is but rarely affected, and no râle is heard, "no sound of boiling vinegar ;" while *hydrothorax* rarely occurs without more or less œdema or congestion of the lung ; so that, the presence of liquid in the chest being admitted, the occurrence of râle would indicate *hydrothorax* rather than empyema.

144. IX. PROGNOSIS.—The prognosis of pleurisy depends upon the form, state, and progress of the disease; upon the previous health and age of the patient ; upon the rapidity and amount of the effusion ; and upon the duration of the malady, in connexion with the treatment which has been employed. The sthenic forms of the disease occurring in previously healthy persons, and brought early under treatment, although serious in their consequences, and therefore requiring a most watchful attention, generally yield to judicious treatment, especially when employed promptly, or before effusion into the pleural cavity has become abundant. If, however, pleurisy have been neglected, or improperly treated ; if it have attacked a cachectic or broken-down constitution, or assumed an asthenic form ; if it have been latent, and hence existed for some time before it was recognised ; if it have supervened upon disease of the lungs, heart, liver, or peritoneum—more especially upon tuberculous deposits in the lungs, it is a most dangerous, and in the latter circumstances more especially, even fatal malady.

145. When the disease attacks a person who has been exposed to depressing agents ; to cold, humidity, insufficient nourishment, and anxiety of mind ; when the effusion increases rapidly, notwithstanding the employment of judicious means of cure ; when it appears in the scrofulous diathesis, or affects the pleura of both sides, or is attended by purulent expectoration, emaciation, or night sweats, or when the constitutional symptoms assume the hectic character ; when debility increases, and the urine becomes scanty, or œdema of the extremities supervenes ; and especially when these very unfavourable symptoms advance or continue for some time, the danger should be considered as very great, more particularly in the latter circumstances now enumerated. The prognosis in the complicated, the chronic, and the empyemic states of the malady is always very unfavourable, but more especially when occurring in the debilitated, the cachectic, and intemperate ; the amount of danger being generally extreme when the disease has for some time re-



sisted the usual remedies, or when the constitutional powers give way.

146. In those cases of empyema in which the matter finds its way through the lungs or external parietes of the chest, although the danger is great, still recovery may take place if the vital influence be not much impaired, if hectic symptoms be not developed, and if extensive disorganization be not present. The strength, constitution, and age of the patient, in connexion with the other circumstances of the case, should guide opinion as to the result. In the great majority of instances, however, the spontaneous evacuation of the fluid affords only temporary relief, the subsequent discharge and the hectic fever ultimately sinking the patient. The prolonged retention of the matter, and the consecutive changes in the lungs and parts adjoining the fluid collection, before a spontaneous discharge can be effected, generally sink the constitutional powers, and prevent a restoration of the lesions which have taken place, which are, however, usually too extensive to admit of restoration under any circumstances. Those cases in which the discharge is procured by operation admit of a much more favourable prognosis, especially when the operation has not been too long delayed, or until the alterations of the lungs and adjoining organs and parts are not rendered too great to admit even of a partial removal; but in these cases the result much depends upon the peculiarities of the case, and the circumstances under which the operation is performed.

147. Acute pleurisy seldom proves fatal increfely from the amount of the effusion, until it is passing, or has passed, into the chronic state; and even then, so rapid a termination is met with chiefly in the cachectic, and in cases of double pleurisy, or when previous disease exists in the lungs or some other viscus. The rapid accumulation of the fluid, however, is a very unfavourable occurrence in any circumstances of the case, as it indicates great defect of constitutional power, and an inability to effect its removal. An opinion of the result cannot be formed correctly in any case of the disease, until the more acute symptoms have subsided, or until the effects of the means usually employed for this purpose become apparent; and then the issue depends much upon the age and constitution of the patient. When the sounds of percussion and respiration return, however gradually, and the other symptoms and signs disappear, a doubt need not be entertained of a favourable result, especially if the lungs furnish no indication of disease.

148. X. PLEURA-PNEUMONIA—*Pleuro-pneumonia*—*Pleuro-pneumonitis*—*Peripneumonia*—*Peripneumony*, &c.—or the association of inflammation of the pleura with that of the substance of the lung, is so frequent, that these distinct diseases have been very often treated of as one, and with the belief that the one does not occur without the other. This, however, has been shown not to be the case, although they are frequently conjoined, as I have shown above, and when treating of inflammation of the lungs (see art. LUNGS, § 73, *et seq.*). The intimate connexion subsisting between inflammations of the pleura and of the pulmonary parenchyma, and the frequent complication of these diseases, lead me further to remark, that *pleura-pneumonia* presents itself in practice in three states, which pre-

sent certain differences in their progress, according as either tissue is prominently affected: 1st. *Pneumonia* associated with slight pleurisy; 2d. *Pleurisy* complicated with slight pneumonia; and, 3d. *Pleura-pneumonia* properly so called, in which the two affections seem nearly equal in degree.

149. i. *Pneumonia associated with slight Pleurisy*.—In those cases in which inflammation of the lung reaches to the pleura, in any point, lymph is thrown out upon the free surface of that portion of pleura; but in persons of a previously healthy constitution, the lymph effused is usually in small quantity, forming a false membrane, which extends no farther than the portion of pleura covering the inflamed or hepatized portion of lung immediately underneath. If the disease be of the sthenic character, or if it be unconnected with cachexia, constitutional vice, or a contaminated state of the circulating fluids, the inflammation, thus extending to a portion only of the pulmonary pleura, does not spread over the surface of this membrane, although the lymph thrown out will frequently excite a corresponding irritation or inflammation of the portion of the costal pleura with which it comes in contact, and thereby give rise to adhesions between the opposite surfaces. If the pneumonia and consequent hepatization occupy a portion only of the lung, the effusion on the serous surface is only slight, consisting of a sero-albuminous, or sero-puriform exudation. But if nearly the whole lung be affected, then there is often little or no effusion, a very thin or imperfect false membrane only being seen on its serous surface, which is thicker along the edges and in the interlobular fissures, and in some other points when the inflammation had first reached this surface. This is a very common form of *dry pleurisy*, complicated with pneumonia; and in this complication the pleurisy is merely contingent upon the pneumonia, and scarcely at all modifies the severity or progress of the primary disease. M. LAENNEC remarks, that it would be very difficult to distinguish this particular complication from a pleurisy with copious effusion, if the patient had not been seen before this period; the absence of the thoracic resonance is here as complete as if the whole surface of the lung were covered by a pleuritic effusion, while the stitch in the side commonly attending the extension of the inflammation to the pleura would farther induce the belief that the disease was simple pleurisy. When, however, the lung is completely hepatized, without any attending effusion into the pleural cavity, there is always a strongly marked bronchopneumonia in different points, and particularly toward the summit and root of the lung: a sign which never exists in the same degree, or over the same extent, in pleurisy or pleuropneumonia. If the patient have been seen from the origin of the disease, the diagnosis is much more easy. If the disease be pneumonia, crepitation will have been heard previously to the complete cessation of the respiratory murmur; and the gradual diminution of the resonance on percussion, and the supervention of a friction or rubbing sound, as described when treating of the *dry form* of pleurisy (§ 42, *et seq.*), will leave no doubt of the nature of the affection. In pleurisy the loss of resonance is very rapid, and exists, if the lungs have been previously

healthy and without adhesions, over the whole of the affected side. Œgophony, moreover, is always perceptible, at least for one or two days.

150. ii. *Pleurisy complicated with slight Pneumonia*.—If the pleuritic attack be severe, and the effusion so rapid and abundant as suddenly to compress the lung, it is not uncommon for inflammation of some points of the pulmonary substance to occur, particularly in the lower lobe. These points sometimes remain distinct and of small extent, constituting one of the varieties of *lobular pneumonia*. The pulmonary inflammation is here much modified by the pleuritic effusion, as I have shown in the article *LUNGS* (§ 73), and it rarely extends much farther than a few lobules, and still more rarely advances to suppuration. This complication can only take place early in the attack, and before the effusion and consequent compression of the lung have become very considerable; as a lung greatly compressed is hardly susceptible of inflammation, the *symptoms* and *signs* of this complication are described in the article now referred to (§ 75).

151. iii. *Pleuro-pneumonia, properly so called*.—The association of an inflammation of the whole or part of the pleura, with considerable effusion, and of a severe pneumonia, is not so frequently met with as either of the two complications just mentioned. M. LAËNNÉC remarks, that pleurisy conjoined with pneumonia does not increase the danger of the latter; on the contrary, it lessens the danger, as above stated, by compressing the lung. On the other hand, the pneumonia at first augments the danger of the pleurisy, which is rarely fatal in the acute stage; but it favours a more rapid absorption of the effusion, by preventing this from becoming as copious as in simple pleurisy, the inflammation rendering the lung less compressible. Hence pleuro-pneumonia, *ceteris paribus*, may be regarded as less dangerous than either simple pleurisy or simple pneumonia.

152. Pleuro-pneumonia is recognised by the union of the signs of pleurisy and of pneumonia; and some of these signs are even more permanent in this complication than in either of the simple affections; for they mutually impede and retard each other's progress when these inflammations are conjoined. The crepitation on the one hand, and the Œgophony on the other, are thus often heard up to the period of convalescence. In cases of this kind, Œgophony is seldom simple; it is perceptible only at the root of the lung, around the lower angle of the scapula; and, from the vicinity of the large bronchial trunks, and the density of the pulmonary substance, it is usually combined with marked bronchophony. This conjunction of these two signs LAËNNÉC has likened to the squeaking of Punchinello.

153. XI. TREATMENT.—i. HISTORY OF THE TREATMENT OF PLEURISY.—(a) Among the several means advised by the older writers for the cure of pleurisy, *blood-letting* was considered of the first importance; but there are various circumstances which have been noticed in connexion with it by these writers that deserve a brief notice. HIPPOCRATES advised bleeding “ad deliquium animi.” ARÉTÆUS insisted upon the necessity of early and repeated venesection, but cautioned against carrying it so far as to

produce syncope. He distinctly stated the nature and seat of the disease, and remarked that it was neither sporadic nor epidemic. AËTIUS was the first to point out some of the conditions which indicate the impropriety of having recourse to blood-letting, and imputed these conditions to indigestion and crudities of the stomach. CÆLIUS AURELIANUS and other Methodists advised blood-letting, but condemned the practice of carrying it to the length of causing syncope. ALEXANDER TRALLIANUS seems to have been the first to advise local depletion for this disease, according to the manner of cupping then in use. AVICENNA, and other Arabian physicians, generally had recourse to venesection and cupping, and the rest of the antiphlogistic plan.

154. The question as to the greater efficacy of bleeding from the same side as that affected in pleurisy, or from the opposite side, was agitated at a very early period. The Greek and Latin authorities were divided in opinion as to this question. HIPPOCRATES, GALEN, and CELSUS advised bleeding from the arm of the affected side; while ARÉTÆUS, AËTIUS, and CÆLIUS AURELIANUS directed it from the opposite side. The discussion was carried down by the Arabians, who, however, generally bled from the arm of the unaffected side; and by the writers of the fifteenth, sixteenth, and seventeenth centuries, some of whom, as AMATUS LUSITANUS, VESALIUS, TRINCARELLI, RULAND, SALLANS, WIPACHER, RODRIGUEZ, BERTIN, and others, discussed the subject as one of the utmost importance.

155. Other circumstances, of greater moment than this, were at last noticed in connexion with bleeding for pleurisy, by SYDENHAM, CALLISEN, BAGLIVI, and others, who insisted upon the injurious tendency of bleeding in cachectic and asthenic states of the disease, or when the blood did not present a buffed or cupped appearance. MURSIGNA, STOLL, and many recent writers have likewise cautioned against bleeding in these cases, as well as in those which present a putrid character, or a bilious in connexion with an asthenic diathesis; and have likewise warned the inexperienced against repeating venesection, or carrying it too far merely because the blood was buffed: a caution of no small importance.

156. There can be no doubt of pleurisy being much more prevalent at some seasons or in certain years than at others, and thus assuming, according to the circumstances of season or locality, more or less of an *endemic*, or an *epidemic* form; and there is no less doubt of the character of the disease varying remarkably at different periods and in distinct localities; it being, in one or the other, of a much more phlogistic and acute form than in the rest, or assuming even an asthenic or latent character. And hence, indeed, may arise the fact that blood-letting and other parts of the antiphlogistic treatment have been advised with very different degrees of boldness by different writers. We find that, since the days of GALEN, prejudices existed in Rome against large bleedings in this and other acute diseases; and these were very probably well founded, in respect of that and all other large cities in ancient times, as they are as regards this city and other large towns at the present day. The opinions of medical writers are



too generally based upon the narrow or peculiar circumstances of their own practice, either previously to or at the time of their writing; and all have neither the inclination nor the time to acknowledge the change of opinions which farther experience and more diversified opportunities have occasioned. We find that DOVER, CLEGHORN, HUXHAM, and many others advised very large, prompt, and repeated venesection; and that RIVIERUS, LE MERCIER, STOLL, and SIMS recommended that it should be performed in both arms at the same time. A more enlightened experience, and more diversified opportunities of observation, have now demonstrated that this practice may have been appropriate in many of the circumstances in which these writers had recourse to it; but that there are other circumstances, in respect not only of the individual, but also of the season, locality, and epidemic constitution, which render it altogether unsuitable and injurious; while there are certain conditions of the disease which I have endeavoured to point out, that require very different or even opposite measures. In the more doubtful circumstances of the case, or when the propriety of bleeding from the arm, or of the repetition of such bleeding, admits of dispute, the application of leeches to the side, as advised by ZACUTUS LUSITANUS, SARCOMÉ, SCHMUCKER, and HUFELAND, should be resorted to.

157. (*b*) *Emetics* were formerly much resorted to, but they are now but little employed for the cure of pleurisy. They, however, have had the sanction of RIVIERUS, RULAND, BLEGNY, MURSINNA, MORGAGNI, WRIGHT, STOLL, TISSOT, ACKERMANN, and SCHELHAMMER; and I can add that, when they are discreetly prescribed, they are important aids in the treatment of most of the forms of the disease. They should not be exhibited until after bleeding has been resorted to in the more phlogistic cases. They will often relieve the dyspnoea and oppression attending the stage of effusion, and promote absorption, when judiciously selected and associated with other means which are suited to the circumstances of the case. *Purgatives* are much less beneficial than emetics in this disease. Very active purging is seldom requisite, unless when there are accumulations of excretions and morbid secretions to remove; but it is always necessary freely to promote the secreting and excreting actions of the abdominal viscera. Conformably with this principle, *diuretics* are generally beneficial, especially at an advanced period of the disease, or when effusion has taken place, and when conjoined with cooling diaphoretics or other appropriate measures.

158. (*c*) *Mercurials*, especially calomel, in full or even very large doses in the more acute cases, with antimonials, or opium, or with both, according to circumstances, are often, in this as well as in other inflammations of serous membranes, of the greatest advantage. They have been much recommended by LIND, WRIGHT, FINCH, HAMILTON, and others, and the experience of recent writers has confirmed the statements of their predecessors. The active exhibition of calomel, either alone or in the combinations now mentioned, is even more necessary in the early stages of pleuritis than in those of pneumonia; and, in the more advanced stages, or when effusion has taken place, either this or some other mercurial preparation, conjoined

with diaphoretics or diuretics, and aided by external rubefacients and derivents, is of the greatest benefit. I have often given the bichlorate in small doses, either thus associated, or with other tonics and alteratives, as cinchona, sarza, &c., with marked benefit, at an advanced stage of the disease, and more especially of the latent and asthenic forms.

159. (*d*) *Antimonials* are not so beneficial in pleurisy as in pneumonia, yet they have long possessed a high reputation in the former disease, and have been much confided in by AGRICOLA, MILLAR, BROCKLESBY, BELFOUR, LAENNEC, and many others. Of these preparations the kermes mineral and tartar emetic have been most employed, although the empirical powder of JAMES and others have also been prescribed with advantage. The kermes mineral was recommended by VON MERTENS, BANG, SIMS, MONTRAL, COLOMBIER, &c., in doses of one fourth or one third of a grain given every two or three hours, while the tartar emetic was adopted by CALLISEN, MILLAR, BELFOUR, LAENNEC, and numerous modern writers. Antimonials have rarely been confided in alone for the cure of pleurisy, but have usually been prescribed in aid of vascular depletions, and for the reduction of vascular action and the promotion of perspiration; the substances most beneficially conjoined with them being mercurials, opiates, and other sedatives, or cooling diaphoretics and diuretics, more particularly the solution of the acetate of ammonia, or of the nitrate of potash, and the nitric ether or the spirits of nitric ether.

160. (*e*) Opium and other narcotics have been used by several writers, but generally in combination with other medicines, according to the stage of the disease and circumstances of the case, and with the intention of allaying pain, and of promoting the operation of the substances with which they were conjoined; as with calomel by HAMILTON, to determine the constitutional operation of this medicine; with ipecacuanha and nitre by DOVER, to determine the diaphoretic action of these substances, or with diuretics to ensure their operation on the kidneys. Opium was much praised by KORUM for pleurisy; and certainly, in conjunction with calomel or other mercurials, and with an antimonial preparation, or in the form of DOVER's powder, as I have advised it in other inflammations of serous surfaces, it is of great service, especially after blood-letting in the more phlogistic cases; and with alteratives, or diaphoretics, or mercurials, &c., in the more advanced stages.

161. (*f*) Of other medicines which have been resorted to in pleurisy, there are few which deserve a particular notice. *Camphor* has been much praised by BAGLIVI, GRIMM, TISSOT, GRUELHANN, and SCHELHAMMER, especially in conjunction with nitre. I have prescribed this medicine very often in the more asthenic forms, and in advanced stages of the more sthenic stages of the disease, and frequently with great benefit, but generally with a mercurial alterative, or other substances, according to the circumstances of the case. *Ammonia* was employed by CHALMERS; HOFFMANN's *ether*, and other stimulants, by TISSOT; and *benzoin* by HOFFMANN; but they are serviceable chiefly in asthenic forms and contingent conditions of the

disease. I may add, that *aconite* was recommended by GEBEL, in combination with an antimonial medicine for the rheumatic form or complication of the disease, in which form, also, *arnica* was much used by several German writers.

162. (g) The *inhalation of warm vapour* was advised for pleurisy by HIPPOCRATES, and of numerous forms of warm, medicated vapours, by modern writers. I, however, much doubt their efficacy, unless as adjuvants, in this disease, in which, as well as in peripneumonia, this practice should not be overlooked, especially in cold and dry states of the atmosphere. In these circumstances of weather and of disease, I have had recourse to it on numerous occasions. In a case attended in 1826, by Dr. T. GORDON, Sir J. ANNESLEY, and myself, the vapour of boiling water was introduced into the apartment, and within the curtains of the bed, by means of a tube leading from a boiler on the fire of the room. As to the use of *medicated vapours*, I need add nothing to what I have stated respecting bronchitis (*see art. BRONCHI*, § 98, *et seq.*), as much of what I have there advanced is applicable to pleurisy as well as to pneumonia and bronchitis, and to most of these complications.

163. (h) *Demulcent and oleaginous medicines* were very generally employed by both ancient and modern writers, in expectation of obtaining a soothing effect from them as regarded the pain and the cough of pleurisy, and as a vehicle for more active substances. *Linseed oil*, and *decotions*, and *almond oil*, were chiefly thus prescribed by SYDENHAM, LANGE, SPINDLER, and others, and were often associated with *camphor*, *opium*, and other sedatives by GILBERT, DE HAEN, KORTUM, and numerous more recent authors. Many other demulcents and mucilaginous preparations have been used, as the *decocum althææ*, &c., but they require no farther notice at this place.

164. (i) Numerous *external means* were advised for pleurisy by most writers, from HIPPOCRATES to this time. *Warm fomentations* of various kinds, and both humid and dry, were much employed; and even *topical cold*, by evaporating lotions, or by means of ice or snow, as advised by BARTHOLINUS, was even resorted to. Of this latter but few modern physicians will form a favourable opinion, although certain analogical facts may be adduced in its favour. *Sinapisms*, and other rubefacient applications to the side affected, were advised by CELSUS and others of the ancients, as well as by the Arabian and modern writers; and they are certainly of more or less benefit, according to the knowledge by which a recourse to them is guided. The most beneficial rubefacient, however, which can be employed, the most appropriate to all circumstances of the disease, and the least liable to be injurious in any, is the *spirit of turpentine*, in the form either of epithem, or of liniment, or of embrocation, or conjoined with oil, or camphor, ammonia, and oil with opium; and repeated or renewed according to the effects produced, and to the peculiarities and complications of the case.

165. (k) *Vesicants* over the part affected were recommended by AMATUS LUSITANUS, CONRADI, BROCKLESBY, GARDANNE, GRIMM, THOMANN, DE HAEN, TRALLÉS, and ENGELHART. But they should be prescribed only after bleed-

ing in the more sthenic or phlogistic cases; be large, and repeated even oftener than once in the more chronic states of the disease; and be aided by mercurials, diuretics, and alteratives, according to circumstances. The propriety of applying them over the affected part, especially when there is reason to suppose that the costal pleura is inflamed, and when the patient is thin or emaciated, may be reasonably questioned. In these circumstances, I have generally directed them to be applied, either more or less below the seat of pain, or on the opposite side. In the more asthenic and chronic forms of the disease, a repetition of them, generally in quick succession, in different parts of the thorax, are often of great service, PLUMMER'S pill, with ipecacuanha and opium, being given at night, and small doses of the iodide of potassium and liquor potassæ, with sarsaparilla, being taken during the day. The repeated application of *moxas* to the affected side has been a common practice from the earliest ages in Eastern countries, and has been frequently had recourse to in Europe by modern physicians with considerable advantage in chronic cases of the disease. In these cases, as well as during convalescence from acute attacks, I have often prescribed a large plaster to be kept applied upon the affected side, consisting either of the emplastrum ammoniacum cum hydrargyro, or of a combination of this with the emplastrum picis compositum.

166. ii. TREATMENT ADVISED BY THE AUTHOR. —The *intentions of curæ* are nearly the same for the several forms of pleurisy, although each form requires a more or less marked modification of the plan and of the means by which these intentions are to be fulfilled. The *first* object is to arrest the progress of the inflammation; the *second*, to promote the removal of the products and the consequences of the inflammation; and the *third*, to enable the constitutional powers to resist, in the more chronic cases, the injurious influence of the structural changes produced, and, if possible, to counteract or overcome them.

167. A. IN STHENIC ACUTE PLEURISY, the obvious indication is to arrest the progress of the inflammation by the means recommended for other inflammations of this character affecting other serous tissues, namely, by *blood-letting* to an amount which the age and constitution of the patient, the hardness of the pulse, and the duration of the attack will suggest. If the patient be robust, if the disease has not advanced so far as to give rise to great effusion, and if the pulse be hard and inspiration painful, general bleeding should be promptly resorted to, and carried sufficiently far to relieve the respiration, and to make a decided impression on the pulse, without, however, producing full syncope, for the reasons stated in the article BLOOD (*see* § 64, *et seq.*). Contemporaneously, or nearly so, with the blood-letting, a full dose of *calomel*, *antimony*, or *ipecacuanha* and *opium*, should be given, taking care that the dose of the antimony or ipecacuanha should not be such as to occasion vomiting. The effect of these I have so frequently shown to be such as will promote the good effects of vascular depletion, and often prevent the necessity of repeating this measure, that I need not here recur to the subject. If, however, pain on in-



spiration, or when coughing, or hardness of the pulse, should return, blood-letting ought to be repeated, and the other medicines just named again be exhibited after the operation. In some cases, more especially if the patient be not very robust or be not plethoric, *local depletion*, by means of *cupping* a short distance from the spine, or of *leeches* near the part, may be employed in place of the second venesection; and, in more robust and plethoric persons, after the second blood-letting, if the pulse should rise, and the febrile symptoms increase. The application of leeches should be followed by a succession of warm poultices, or several folds of warm, moist cloths or flannels, covered by dry napkins.

168. It will generally be requisite to give some *purgative medicine*, in order to keep down febrile reaction, and derive the circulation from the seat of disease. But this medicine should not interfere with the effects of those just recommended, and therefore it ought not to be given until some hours afterward; and, during its operation, care should be taken to prevent the free perspiration, usually produced by the medicines previously given, from being checked. The purgative operation may be farther promoted, if it be required, by *clemata*, more especially such as contain the oleum ter-ebinthinæ, or may be left to them alone, particularly when the bowels are not confined. In addition to the means now advised, suitable *diaphoretics* should be given at short intervals. The most generally appropriate are those which consist of the liquor ammoniæ acetatis, spiritus ætheris nitrici, and either the vinum antimonii tartarizati or vinum ipecacuanhæ, with camphor water. To these may be added other medicines, such as digitalis or hyoscyamus, or both, as circumstances may suggest; or a preparation of colchicum may be substituted for the antimony or ipecacuanha, but its operation should be carefully watched.

169. In this form of the disease, and more especially if it have made considerable progress before it came under treatment, the repetition of the calomel with JAMES'S powder, or with ipecacuanha and opium, becomes necessary. The frequency of their exhibition should depend upon the dose prescribed and the urgency of the case. I have usually directed full or large doses, particularly of the calomel or opium, at intervals of six, eight, ten, or twelve hours, and the saline medicine, mentioned above, to be taken in the intervals, until the gums indicate a slight affection, or the evacuations assume a green or very dark hue.

170. The above treatment will generally accomplish the first intention, and the latter part of it partly fulfil the second. But it may happen that, when we have happily arrived thus far, exposure to a current of air, or some untoward circumstance, may occasion a *relapse*, or a *recrudescence* of the disease; and the physician will then propose to himself this question, Ought general blood-letting now to be resorted to, or should local depletion be confided in? In this state of the case he will duly consider the amount and effects of the previous vascular depletions, the duration of the disease, and the probable amount of effusion, the existing states of the pulse and of respiration, the pain and other symptoms, in connexion

with the age and constitution of the patient, and decide accordingly. But, if a due estimation of all these prevent him from venturing upon general blood-letting, he will decide in favor of the application of leeches, the number varying with the exigencies of the case; and he may even see occasion to repeat them, and to follow them with the warm poultices and fomentations already advised (§ 167).

171. In order to prevent the farther progress of the disease and its consequences, as well as to remove its more immediate results, additional means are often required, more especially after the inflammatory or acute symptoms are reduced. At first the *turpentine epithem* may be applied over the affected side, or folds of warm flannel moistened with this substance, or with embrocations containing a large proportion of it (see Form. 295, *ct seq.*). These may even suffice, and prevent the necessity of having recourse to other means; but if they do not produce a decidedly beneficial effect in the course of twenty-four or thirty-six hours, or little more, they should be replaced by a large *blister*, which will generally produce its effects in about six hours, when it should be removed, and the part be covered with a large warm bread-and-water poultice. This ought to be frequently renewed. It will rarely fail to procure a free discharge from the blistered surface.

172. If the disease has made considerable progress, or if the effusion is considerable, it will generally be requisite to keep up a slight mercurial effect on the gums, and to repeat the blister either over or near the part. But in no instance should the blisters, or the vesicating tissues employed in their stead, be applied longer than six or eight hours; they should be then replaced by warm poultices, which will cause them to rise, and prevent the inflammation produced by them from extending below the integuments. In some instances, particularly in those which have proved most obstinate, and when no mercurial effect has been produced, I have directed the blistered surface to be dressed with the mild mercurial ointment, or with this in part, and have generally seen benefit derived from the measure. If the disease be not cured by the above treatment—a contingency which generally arises from some complication or pre-existing affection, or from the advanced progress of the malady before it came under treatment, or from a constitutional vice, as the scrofulous or tubercular—it then assumes the *chronic form*, to which attention will be more particularly directed in the sequel.

173. B. THE ASTHENIC AND THE LATENT STATES OF PLEURISY (§ 47–50) are often advanced to a more or less copious effusion before they come under treatment; and for this reason, and still more from the state of the disease, they rarely admit of general blood-letting, unless they are seen at a very early stage, and the asthenic diathesis is not very prominent. An intimate knowledge of morbid actions, conjoined with close observation and an experienced recourse to remedial agents, can in no circumstances be more advantageously evinced than in the course of treating these and the preceding forms of pleurisy—in determining, in the sthenic, how far to carry, and

how often to repeat, vascular depletion, and in the asthenic and latent as to the propriety of adopting this practice, and as to the manner and the extent of carrying it out when it is determined upon. It should entirely depend upon the state of the pulse, the age and constitution of the patient, and the progress of the disease, whether a moderate blood-letting or leeches be prescribed. Cases may occur when both may be required, and others where neither is admissible, owing to the depression of vital power, and the great amount of fluid effusion which had taken place before the disease had come under treatment.

174. In these states—in those in which vascular depletions have been practiced, as well as in those in which they are inadmissible—recourse should be had, in a prompt and efficient manner, to alterative and diuretic remedies. If the effused fluid be not inferred to be of the puriform character—a state of the effused fluid very rarely observed in an early period, even of the asthenic and latent forms of the malady—calomel should be given, with opium and small quantities of camphor, twice or thrice a day; the infusion of digitalis, with the nitrate of potash, the spiritus ætheris nitrici and oxymel of squills, being taken in the intervals, in doses which the peculiarities of the case will suggest. The digitalis will be more certainly beneficial if it be given at first in as large doses as may be prudently exhibited, each dose, after the second or third, being diminished. The terebinthinate epithem or embrocation should, at the same time, be applied over the affected side, and be renewed according to the effect.

175. In cases of longer duration—when the disease has existed two or three weeks—and when the quantity of fluid effused is considerable, acute or inflammatory symptoms having subsided, the treatment should partly depend upon the means which had already been employed. If the patient be seen for the first time, the internal and external remedies just now mentioned should be resorted to; but if these or similar agents have been employed without avail, the pilula hydrarg. chloridi comp., with the pilula scillæ and digitalis, may be given night and morning, and two or three doses of the iodide of potassium in solution with the spiritus ætheris nitrici, or some other diuretic, in the course of the day. Blisters should not, at the same time, be overlooked; they may be repeated, according to circumstances, in the manner already recommended, in order to obtain their most beneficial effects, and to secure a free discharge from them. They are certainly beneficial, but not to the extent stated by some recent writers. In some instances I have prescribed the iodide of mercury internally, with small doses of squills and digitalis, with seeming advantage; and in others directed the iodide of lead to be used externally in the form of an ointment, according to the following formula, a small piece of it being well rubbed over the affected side every night, or both night and morning, the side being covered afterward by a piece of flannel:

No. 325. Plumbi Iodidi, ʒj; Unguenti Hydrarg. mitioris et Adipis præpar., ʒā ʒvj. Misce bene, et fiat unguentum.

176. The effects of iodide of potassium in this disease are very uncertain. In some I have found it very serviceable, in others of doubtful

advantage; and in a few I have considered it prejudicial. I have employed it in dropsical diseases of all kinds for very many years, since the time of its first preparation, and can, therefore, say, from considerable experience, that its effects should be carefully observed in the asthenic and latent forms of this disease; for, in some of the more extreme of these, it may prove, as I have found it in two or three cases, distressingly depressing, although given in very small doses. In these cases the iodide of iron, taken in sirup of sarza, may prove more serviceable, especially when aided by the continued application of the emplastrum ammoniaci cum hydrargyro, or by a plaster consisting of equal parts of this, and the emplastrum picis comp. In most cases of the disease, these last means will prove of great service in promoting the absorption of the fluid during early convalescence, or when the fluid is partly removed. At this period change of air—especially to a mild, pure, and dry air, or to the sea-side, in a sheltered situation, and suitable diet and regimen—avoiding vascular excitement, yet sufficiently supporting the powers of life, should always be recommended.

177. It is not unusual to observe, in the more asthenic cases of pleurisy especially, an abundant and rapidly-increasing effusion, occasioning the greatest distress, and even threatening the dissolution of the patient, by its pressure on, and displacement of the lungs, heart, and large vessels, notwithstanding a judicious recourse to internal and external means. When this result is met with, more especially in very delicate or scrofulous persons, or in the asthenic and latent states of the disease, the remedies already noticed having proved inefficacious, no farther time should be lost before recourse be had to *paracentesis thoracis*, to the removal of the fluid through an opening made in the parietes of the chest. It is obvious that, as soon as the medical treatment proves itself inefficacious, this operation should be resorted to, for delay will diminish the chances of success from its performance. As this operation is also required in the chronic states of the disease, more especially for empyema, it will be more particularly noticed hereafter.

178. *C. PARTIAL AND DOUBLE PLEURISY* (§ 51–62) require but little modification of the treatment already advised, which should be adapted to the peculiar features of individual cases. Where the symptoms are acute, and at the same time of the *sthenic* character, the antiphlogistic means should be employed accordingly, and with due reference to each feature of the case. When they partake more of the *asthenic* form, the measures mentioned in connexion with it then are requisite. It may be remarked that, while partial pleurisy more generally presents the former character, double pleurisy commonly possesses most of the latter, and especially requires prompt and efficient treatment, which, however, is in no way different from that which has been already advised.

179. *D. CHRONIC PLEURISY AND EMPYEMA.*—*a.* If the disease have become chronic before treatment has been employed, then the duration of the disease, the amount and probable nature of the effusion, and the urgency of the symptoms will suggest the measures which should be adopted. If the malady have become



chronic, owing to the failure of the means resorted to, or to the constitution of the patient, or to both causes conjoined, as usually observed, the question may still be entertained as to what may be farther tried. In the former circumstances, if the indications above stated (§ 137, *et seq.*) as to the purulent nature of the effusion be not present, and if the duration of the disease have not been above two or three weeks, then the internal and external treatment advised above (§ 174–177) may be tried—promptly and efficiently—before recourse shall be had to *paracentesis thoracis*. If, however, protrusion of the intercostal spaces, hectic and other symptoms indicate a puriform state of the pleural collection, no time should be lost before resorting to this operation. In the latter circumstances referred to, especially when the treatment has been judicious, no appropriate and efficient means having been overlooked, the operation is equally required, whatever may be the nature of the fluid collection, although, perhaps, it may be more urgently called for when indications of a purulent character are present; for where these indications exist no other means will save the patient. The several writers who agree in the propriety of having recourse to this operation—especially LARREY, J. P. FRANK, LAENNEC, FORBES, BELL, ELLIOTSON, WILLIAMS, DAVIS, and H. ROE—advise its performance when the effusion proceeds so rapidly as to threaten the life of the patient, or when it either increases or remains stationary under the use of the means already recommended, although the dyspnoea may not be urgent or the danger immediate, for the continuance of the morbid collection and the compressed state of the lungs may prevent this organ from recovering its functions. Dr. H. ROE justly remarks, that “for empyema paracentesis should always be performed the moment the nature of the case is ascertained. For serous effusions occurring in persons of scrofulous habits, or very delicate health, after pleuritic attacks, for the cure of which the necessary treatment has either failed or been neglected, paracentesis will generally be required.” (P. 208.)

180. *b.* There are certain *conditions* requisite to the success of the operation. It is most important that it should be performed before either the vital powers of the patient are too much reduced, or the thoracic viscera have undergone serious organic lesions. It is chiefly when the lung still possesses the power of expanding after the pressure upon it is withdrawn, that a cure can be effected without deformity of the side. If, however, the operation be delayed until the lung has become atrophied, condensed, or bound down by adhesions, so as to be incapable of expanding sufficiently to meet the ribs, either the vacuum will be rapidly refilled with fluid, or the shoulder will be depressed and the side contracted. This last change seldom occurs immediately after an operation, although it takes place gradually, and to a great extent, when the fluid is absorbed. The reaccumulation of the fluid will, therefore, be most likely to occur when the lung is incapable of expanding sufficiently after the operation. When this is the case, a space must necessarily intervene between the surfaces of the pleura, and either the fluid is thereby prevented from being drawn off during the operation, or it is replaced

by atmospheric air, which is always injurious to the pleural surfaces, and occasions a more puriform, and often an offensive renewal of the effusion, and the aggravation of both the local and constitutional symptoms, exhausting and ultimately destroying the patient. These consequences sufficiently show the propriety of an early recourse to the operation, but they are not satisfactory reasons for the neglect of it altogether, as urged by those who object to the performance of it.

181. When the operation is performed sufficiently early, even in the most rapid and urgent cases of empyema, the removal of the puriform collection allows the lung to expand, and the upper portions of the pleura to come in contact, and ultimately to adhere; and the adhesion gradually extends as the fluid is removed, until the opposite surfaces become agglutinated; and a cure is thus effected by the obliteration of the cavity throughout, or nearly so. In order to secure this desirable result, it would be most important to determine, were it possible, the exact period when the operation ought to be resorted to—when an operation would prevent the accession of those changes which usually become irremediable. It is manifest that, when indications appear of a puriform state of the collection, no delay should occur; and that, in many cases, it might be of advantage to ascertain, by means of the exploring needle, the exact nature of the effusion. If it be found that the fluid is serous, then Dr. H. ROE believes that we may wait till the end of the third week, in hopes that medical treatment may cause absorption; and, if it does not, that the operation should not be longer deferred; for he considers, and I think justly, that the operation should not be postponed to a later period, lest organic changes in the thoracic viscera may become irremediable, and that it is, therefore, better that it should be performed too soon, than that this risk should be incurred by delay. Cases are recorded of patients who had been tapped successfully for pleuritic effusions of several months' duration; but there was no proof that the lungs expanded to their full dimensions in those cases, and that the recovery was complete. Dr. ROE states, that no case has occurred to him in which the patient was *perfectly cured* when the operation was delayed until five or six weeks from the commencement of effusion. The non-expansion of the lung in these circumstances has always given rise to the introduction of more or less air into the cavity, in the cases which have come under my observation, however carefully the exclusion of it had been attempted; and the patient has usually sunk from a reaccumulation of a fetid purulent secretion, or survived with a considerable loss of lung.

182. *c.* The operation being manifestly necessary, in the circumstances now stated, and its performance not admitting of delay, the manner and the situation in which it is most advantageously performed requires some consideration. The situation in which the opening into the chest should be made has been pointed out by LAENNEC, and it has been generally adopted by later authorities. He recommends the space between the fifth and sixth ribs, a little behind the digitations of the serratus major, as being the most dependent point in the horizontal po-

sition, generally the freest from adhesion, and the seat of the greatest quantity of fluid. In this situation the operation was performed in all the cases recorded by Dr. H. Roe.

183. The manner of performing this operation has recently received due attention. Formerly surgeons advised operations implicating serous surfaces with a perfect indifference to the action of the air upon those surfaces. But the injurious action of the atmospheric air upon serous or shut cavities especially, and indeed upon other surfaces or parts denuded of their epithelia, or separated from their natural connexions, is now acknowledged by every enlightened observer. This is evidenced by the inflammatory irritation, terminating, in weak or unhealthy constitutions particularly, in offensive purulent discharges, and acute hectic fever. Of the three following modes of performing *paracentesis thoracis*, the one which should be adopted may be inferred from what I have just stated. According to one plan, an incision is made into an intercostal space, the fluid is evacuated at once, and the wound left open. Another method is to make an opening into the pleural cavity with a trocar, to keep the wound open by introducing a canula, or a catheter, or gum-elastic tube, by which the fluid is to pass off gradually. The third mode consists in making an opening by a trocar or otherwise, and allowing as much of the fluid to flow out as will escape without admitting the air, and in immediately closing the opening. This last method is that which I would recommend, from observation of the results of these several methods, and for the following reasons: *First*. When the air, even in small quantity, comes in contact, either with the pleural surface, or with the false membrane formed on this surface, the state of morbid action and the fluid secreted are still farther removed from the natural and healthy conditions, and rendered more injurious to the economy, and much less capable of restoration to states compatible with the continuance of life. *Secondly*. The continued access of the air will give rise to the thickening of the false membrane, and thereby prevent the lung from expanding, while it will render the secretion at first purulent, and afterward offensive and irritating to the surfaces containing it, and consecutively most contaminating to the circulation and whole frame. *Thirdly*. The operation performed so as to prevent the introduction of the air, although often required to be repeated at successive periods, closing the wound carefully in the intervals, admits of the gradual agglutination of the opposite surfaces of the pleura, does not interfere with the contingent absorption of the remaining fluid, and is compatible with the continued recourse to medical treatment appropriately to the peculiar features of the case.

184. I agree so entirely with what Dr. WILLIAMS has stated as to the manner in which this operation should be performed, that I here adopt his recommendation: "The spot for the introduction of the trocar should be determined with due reference to the physical signs; carefully avoiding every part where, or near which there is sound of respiration, voice, or not perfect dullness on percussion. A projection or fluctuation of an intercostal space give greater eligibility to a spot; and these circumstances

present themselves most frequently at the inferior lateral parts of the chest, from the third to the seventh rib, where, also, the soft walls of the chest are as thin as anywhere. In all cases it is a proper precaution to pass a grooved needle first, as recommended by Dr. T. DAVIES; for this at once determines the pressure of the fluid, its quality, and the thickness of the walls which contain it at that spot." The upper margin of the fifth or sixth rib offers most commonly the most favourable situation, avoiding, of course, the immediate vicinity of the known arteries and nerves, and especially of the heart, with reference to displacement, &c. "The patient should be lying on his back, inclining to the affected side, and not more raised than is necessary to the state of his breathing. The skin should be drawn aside, so that the puncture through it may not, after the trocar is withdrawn, correspond with that of the pleura, but form a valvular orifice. The trocar should not be pushed in farther than is necessary to clear the parietes, but the canula may be pushed farther after the stilette is withdrawn, and its sides should have several holes in them. As soon as the stilette is withdrawn, steady pressure should be applied by a bandage, or by the hands of an assistant, to depress the shoulder and sides, and to push up the diaphragm on the affected side to promote the flow of liquid, and to prevent the introduction of air through the orifice during any sudden or forcible act of inspiration. For the same reason, during a fit of coughing, if there appear any tendency to intermission in the stream of fluid, the orifice should be closed by the finger. The pressure should be steadily increased as the liquid flows; and if the stream should stop, a probe may be passed through the canula, to clear it of clots of lymph or other obstructing matter; but if still no more flows, a compress, or, if the liquid is purulent, a large poultice should be placed on the orifice; and then, and not till then, the pressure on the walls of the chest may be discontinued. The result will be, that the walls of the chest, expanding by their own elasticity on the removal of the pressure, will draw air into the compressed lung, which, being thus inflated, will begin to resume its part in the function of respiration and circulation, and will thus promote the absorption of the rest of the fluid, and improve the condition of the whole system. Even if the fluid should reaccumulate, the temporary expansion of the lung will have served to restore its natural properties, so that, when another quantity of fluid is again withdrawn, the organ will be better prepared for a restoration of its functions." (P. 28.)

185. Performed in the manner thus judiciously advised by Dr. WILLIAMS, the operation is free from risk, and will seldom fail to give relief. If the collection be purulent, it will often be necessary to repeat the operation several times; but if it be serous, one tapping, which will more or less expand the lung, will often be sufficient to give a turn to the disease, the complete removal of the effused fluid being effected by nature, aided by appropriate remedies. When the fluid is purulent, Dr. WILLIAMS recommends the injection of warm water with the view of displacing it; but, instead of doing this with a single tube, it should be done



through a double-cubed canula, the tube for injection being cautiously carried two or three inches into the chest, while the evacuating tube is merely long enough to pass through the walls. If warm distilled water be then thrown in by a syringe through the longer tube, it will drive the matter off through the shorter tube, and in this way the morbid secretion will be displaced by water, which is much more likely to be absorbed. If, after repeated evacuations, there be no apparent disposition to the expansion of the lung or contraction of the chest, and matter continues to be secreted, the writer now quoted advises a recourse to medicated injections, "such as a very weak solution of nitrate of silver, or chloride of soda." I have no experience of medicated injections in these circumstances; but I see no reason against a cautious recourse to them. The pleural sac may be treated, in these cases, as an abscess; and, if the discharge be unhealthy, we should endeavour to correct it, and to promote the healing of the diseased surface by such means as are found beneficial in analogous circumstances. When the discharge is fetid, it may be washed out, in the way just advised, by antiseptic injections, especially by chlorinated solutions, or fluids containing creasote. "The same practice may be advantageously pursued when the matter has pointed, and opened spontaneously, leaving a fistula which may remain open for months, or even years. Dr. TOWNSEND mentions the remarkable case of Dr. WANDELSTADT, who had been tapped thirteen years before, since which time the wound had remained open, and discharged daily from half a drachm to four ounces. The diseased side was much contracted, and did not move on breathing, yet he could blow the flute, walk fast, and actively perform his professional duties."

186. I believe that the HIPPOCRATIC method of evacuating the fluid at successive times, preventing the access of air, and closing the orifice in the intervals, is the best, because it gives the lungs time to expand, and prevents those changes in the inflamed membranes, and in the products of inflammation still retained in the pleura, that the admission of air would certainly produce. The practice of leaving the orifice open, and especially of leaving a canula in it, is attended by this mischief, namely, that the free access of air to the cavity either rekindles the inflammation of the pleura, of which the effusion had in great measure caused the resolution, or changes the character of the inflammation still remaining from an adhesive to a suppurating form, and ultimately even decomposes the matter which is formed. I have generally observed, when the access of air was allowed, that the fetor of the discharge was most manifest in two or three days, and that all the constitutional, and even the local, symptoms were aggravated.

187. Several recent writers, who have advocated the propriety of operating in the circumstances already stated, have not sufficiently recognised the importance of excluding the air, and have considered that, because it has been shown by the experiments of NYSTEN and others that air introduced into the cavity of the healthy pleura is removed in a short time by absorption without manifest detriment, no injury need be expected from its admission after

this operation. But circumstances are different as regards these experiments and the operation for this disease; besides, what has been inferred from *à priori* reasoning and from analogy has been proved by the experience of several candid observers, namely, that, although air may not affect a serous surface, when only temporarily brought in contact with this surface, it will certainly influence it, if allowed free communication with it; that, when this surface is inflamed already, the admission of air aggravates, and changes to an unfavourable form that inflammation; and that the air acts also injuriously upon the products of inflammation, both the consistent and fluid; changes their characters, decomposes them, and renders them more contaminating to the surrounding tissues. To prevent the injurious influence of air, it has been recommended to perform the operation under water, and while the patient is immersed in a warm bath. In certain circumstances, and more especially in the more prolonged cases, this expedient deserves attention, and even adoption.

188. Some writers have advised fluid injections into the pleural cavity, with the view of expelling both the diseased effusion and the air which may have been introduced; and it is not improbable that pure or distilled water, of the proper temperature, thus introduced, the orifice being accurately closed afterward, may have a beneficial effect, and be absorbed, although the morbid fluid was not absorbed, owing to its nature. If this measure were adopted, it should be employed in such a manner as to wash out the morbid matter as entirely as possible; and the fluid allowed to remain should not be so much as might prevent the lung from expanding, if it still possessed this power. Of the success of medicated injections in these cases, the evidence is not sufficiently conclusive. Dr. WILLIAMS states that Sir P. CRAMPTON used with success an injection of a weak solution of chloride of lime; but all stimulating injection must necessarily increase or perpetuate the inflammatory action in the surface, and thereby prove an obstacle to the expansion of the lung, and to the attainment of the end proposed by the injection, namely, the arrest of the effusion and the adhesion of the opposite surfaces. In some instances, however, the injurious effect may not result, while the beneficial effects may follow; and, therefore, such injections may be cautiously resorted to after other means have failed, and in the circumstances hereafter to be noticed (§ 189). In this state of the disease, and on occasions which the experienced physician will duly appreciate, he will agree with CELSUS in considering that the "*Anceps remedium melius est quam nullum.*"

189. In order to obtain the re-expansion of the lung, so much to be desired after the operation for empyema, and at the same time to increase the discharge of the accumulated fluid, it has been advised by LAENNEC and others to apply a cupping-glass with an exhausting syringe over the puncture. Some advantage might accrue from this expedient, if carefully performed; but it is not unattended by risk, both from injuring the lung by forcibly expanding it, and from allowing air to rush in through the opening upon removing the exhausting apparatus.

If these dangers could be sufficiently guarded against, the expedient might prove of service. The latter might be prevented, and the former could hardly be considered so great as to prevent a cautious recourse to it.

190. *D. THE COMPLICATIONS OF PLEURISY* necessarily involve the same principles of treatment as have been above developed.—(a) The most frequent complication, namely, that with *pneumonia*, forming *pleuro-pneumonia* (§ 93, 148, *et seq.*), requires very nearly the same treatment as I have recommended for either of the diseases when occurring simply, due regard being paid to the existing diathesis or states of vascular reaction and vital resistance. In this complication, however, and more especially when the sthenic character is manifest, the preparations of *antimony*, especially tartar emetic, are more frequently beneficial than in uncomplicated pleurisy; but they should be exhibited after blood-letting, and in the manner advised for pneumonia (*see LUNGS, INFLAMMATION OF*, § 96), or in conjunction with calomel and opium, as above prescribed (§ 167, 169); the other internal and external means advised for these maladies being employed as the circumstances of the case will suggest.

191. (b) When pleurisy complicates *eruptive* or *continued fevers* (§ 94), then the treatment must necessarily depend upon, 1st. The character or state of the fever; 2d. The period of the fever at which it occurs; and, 3d. The states of vital energy and vascular action characterising it. In these complications, the *asthenic* diathesis should generally be suspected, unless the character of the prevailing epidemic constitution and of the existing symptoms indicate the contrary, and the plan of cure suggested above for the asthenic or cachectic forms of pleurisy (§ 47, *et seq.*) ought therefore to be entertained, with such modification as the features of individual cases may require. It very frequently happens that the local disease is either not detected in these circumstances, or proceeds so insidiously and latently as to elude even close observation, until it has advanced far, or given rise to considerable effusion, and can admit only of the curative means which have been already recommended for the latent, the advanced, or the chronic states of the malady, as the case may be (§ 173, *et seq.*). In these complications I have seen great advantage derived from the terbinthinated epithems or embrocations, and the other external remedies mentioned above (§ 171, 175).

192. (c) The partial, adhesive, and chronic states of pleurisy which so generally complicate the advanced stages of *tubercular consumption* (§ 95) fall more legitimately under the treatment of that malady; but I may here remark, that the pleurisy which thus supervenes is not always attended by tubercular deposits, either upon the pleura or in the false membrane; although it is sometimes thus accompanied, more especially in the scrofulous diathesis, and in persons who have been exposed to depressing agents, as anxiety of mind, insufficient nourishment and clothing, and deprivation of air, exercise, and sunshine. In these circumstances, also, pericarditis may farther complicate the malady and present a tubercular character (§ 96). In both these forms of complication the friction sound is often heard on

auscultation, and then the nature of the mischief may be inferred with tolerable certainty, especially in the circumstances just stated. The treatment cannot be expected to be satisfactory in these cases, some of which are attended by either more or less anæmia or cachexia; but life may be prolonged for a very considerable period, even if it may not be saved, by a judicious recourse to chalybeate preparations, more especially to the iodide of iron with sarza, alternating this course with very minute doses of the bi-chloride of mercury, prescribed in tonic decoctions or tinctures, &c.

193. (d) In the complication of pleurisy with *hepatitis* (§ 98), and in that with *peritonitis* (§ 99, 100), the associated malady usually presents an acute character, which may pass into the chronic form if not promptly and actively treated. In these complicated states of disease, the means which are most serviceable are not materially different from those advised for the acute form of either of these uncomplicated diseases. It is generally of great importance to bring the system under the influence of mercury before effusion takes place or proceeds far; and this may be done by either the internal or the external use of the mineral, or by both modes, according to circumstances. In a case of remarkable urgency, to which I was recently called, a large blister was applied somewhat below the seat of suffering, after blood-letting was carried as far as appeared prudent; free vesication was promoted by warm poultices; and, after the cuticle was removed, the mild mercurial ointment was applied, and covered by a warm bread-and-water poultice. The most beneficial results were soon afterward observed, and the patient rapidly recovered. In these complications, the terbinthinate epithems and embrocation, advised above (§ 171), are often of great service, when judiciously employed and aided by the additional means which the state of the case will suggest.

194. In some of the complications of pleurisy just noticed, *paracentesis thoracis* can furnish only temporary relief; in others it may be most beneficial, while in a few it cannot be attempted with any sufficient prospect of advantage. It is not merely the complication which ought to be considered, but also every circumstance connected with the case, and more especially those connected with the primary malady, of which the pleuritic attack is the consequence. When this operation appears at all admissible in any of these associations, it should be resorted to as early as possible; for the several lesions mentioned above (§ 101) may soon be caused by the pressure of the effused fluid, and farther complicate a disease which an operation promptly performed might have removed.

195. *E. IN THE DARK RACES* (§ 102) pleurisy should be treated as I have advised for the asthenic and complicated forms already considered. Whether it assumes an *acute* or a *chronic* character in these races, I have always seen it more or less latent, complicated, and consecutive, more especially of tubercles of the lungs; tubercles having been found also on the surface of, or below the pleura, or in the false membranes after death (§ 102). When the effusion is great, paracentesis should be early employed. The few cases of this disease which I have seen in these races have not been so much



benefited by treatment as the natives of cold or temperate climates; but this was partly attributed to the unfavourable circumstances in which they were placed, and to the influence of a temperature and climate different from that to which they are suited by their organization.

196. *F. PLEURISY IN INFANTS AND CHILDREN* (§ 103) requires the same measures as I have advised for adults, due reference being had to age and to the susceptibility of the influence of certain remedies connected with infancy. In this class of subjects, pleurisy is most frequently consecutive and complicated, and the treatment should be prescribed accordingly. For very young children especially, some remedies which are most beneficial for adults with this disease should either not be employed at all, or with great caution. The chief of these are opium and other narcotics, tartar emetic, and blisters; but calomel may be given freely without risk, with small doses of JAMES'S powder, vascular depletions being promptly employed, and to an extent which the circumstances of the case will warrant. The terebinthinate epithem or embrocation will prove of great service, and will be attended by no risk, unless the utmost neglect be evinced. If the application of a blister be considered advisable, with the view of obtaining a discharge from the external parietes of the chest, it should not be continued longer than three or four hours, or until slight redness of the surface is caused by it, when a warm bread-and-water poultice should be applied, which will usually produce vesication without subsequent risk, if due attention be paid to the case.

197. In the acute stage of the malady, the treatment now advised, aided by diaphoretics and diuretics, should mainly be trusted to; but, as the chronic stage advances, and particularly as effusion increases, the iodide of potassium may be prescribed, with liquor potassæ and some preparation of sarza, or with the addition also of a diuretic; the terebinthinate liniment, or a liniment containing the iodine of lead, or iodine of potassium, being occasionally applied to the side, or the emplastrum ammoniaci cum hydrargyro, or equal parts of this plaster and of the emplastrum picis comp. If the patient evince a marked debility, or cachexia, anæmia, or constitutional vice in the chronic stage, the iodide of iron should be given in the sirup of sarza, and change of air, especially to the sea-side, be recommended; the external applications just mentioned, or the frequent sponging of the surface with warm salt-water, or with a tolerably strong solution of bay-salt in warm water, or the use of these alternately, being also resorted to. If effusion be considerable, especially if the patient live in a large town, change of air to the country, aided by suitable alterative and diuretic medicine, will generally remove the disease, unless it have become complicated, or the vital powers be very depressed, and the constitution cachectic.

198. Treatment, judiciously directed, is generally much more efficacious in this class of patients than in persons advanced in age, or even in adults; and the more serious consequences of the disease, as empyema, with or without fistulous opening, should not be considered hopeless, unless complicated disorganization exists. Whenever the effusion appears to be

puriform, no delay in resorting to paracentesis thoracis should take place in children, more than in adults; and in the former especially, it is hardly ever too late to perform this operation, particularly when the effusion is of this kind.

199. iii. *DIET AND REGIMEN.*—It is almost unnecessary to add anything on this topic, as it must be evident that both the diet and the regimen should be strictly antiphlogistic during the acute stage, more especially when the disease presents a sthenic character. As effusion advances, or becomes chronic, and especially if vital resistance be weak, it will often be necessary to support the powers of life with such means as will the least excite vascular action or accelerate respiration, and at the same time tend to increase the natural secretions and excretions. This becomes the more requisite in the scrofulous diathesis, or when the effusion is puriform, and attempts to discharge and prevent the return of the effusion are being made. But there is no aid to a judicious treatment that deserves more general adoption than change of climate, especially to the sea-side, to a mild air, and to a dry situation. A person who is recovering from pleurisy should guard, both during convalescence and for a long time afterward, against currents of cold air; against wet, cold, or damp feet; and against errors in diet; and he ought more especially to avoid standing upon cold stones, or floor-cloth, or in damp places. His shoes ought also to be changed after walking, immediately upon returning home.

200. XII. *STRUCTURAL CHANGES OF THE PLEURA NOT NECESSARILY ARISING FROM INFLAMMATION.*

CLASSIF.—IV. CLASS. II. ORDER. (*Author in Preface.*)

1. *DEFIN.*—*Lesions of the pleura not necessarily depending upon, although frequently associated with, inflammatory action, but often arising from diathesis, or constitutional vice or contamination, and seldom attended by distinct signs, although their presence sometimes may be inferred from the history of the case, and from various local and general symptoms.*

201. i. *DESCRIPTION.*—I have so fully described those lesions of the pleura resulting from inflammation (§ 112, *et seq.*), that I cannot farther advert to them than to briefly notice some of their associations with those alterations about to be considered. Certain lesions which I shall point out doubtless originate, in most cases, if not in all, in inflammatory action; but they subsequently undergo changes, which may be referred to morbid nutrition, this nutrition giving rise either to a transformation of the tissue to one of a different nature; to the transition of this tissue to another different from it, but not foreign to the economy, or to the production of a structure altogether adventitious to the healthy frame. It is thus that we perceive, as a consequence of pleuritis, and owing to the states and grades of action, and to the conditions of the constitution, cartilaginous or ossific deposits or transformations of the pleura in some cases; and, in the course of this disease, owing to constitutional vice, tubercular deposits either beneath the pleura, or in the albuminous or fibrinous deposits, or false membranes on the free surface of this membrane. The former le-

sions most probably originate in inflammatory action or irritation, the morbid nutrition proceeding as this action subsides; but the latter lesion is either coetaneous with the inflammation, or excites it, or is a consequence of it, in the scrofulous or tubercular diathesis. The lesions more immediately as well as remotely consequent upon inflammation of the pleura have been described above (§ 112, *et seq.*), with the exception of *gangrene, ulceration, and perforation* of this membrane, of which I proceed to take farther notice.

202. *A. Gangrene of the pleura* occurs only on very rare occasions, and chiefly as a consequence of either gangrene of the subjacent lung, or abscess of this organ, or external to the costal pleura. A sphacelated state of the pleura may also occur in an advanced stage of chronic pleurisy or empyema in the form of gangrenous ulcers, as remarked by LAENNEC, BARON, and CHOMEL, but this is very rare. Gangrene of the pleura is generally limited to a small space, and presents the appearances of irregular patches of a brownish green, livid, or very dark hue, that softens, ulcerates, and passes into a dark-grayish, dirty, and irregular surface, exhaling a fetid odour. Around these patches, indications of inflammatory action, with certain of the more usual consequences of this action, are generally observed.

203. *B. Ulceration and perforation of the pleura* are not infrequently met with, and are noticed, especially as regards their chief consequences, under the head of chronic pleurisy, and in the article PNEUMATHORAX. They may take place under a variety of circumstances, especially when they commence, as more frequently is the case, in the attacked surface of the pleura, perforation proceeding from this surface inward. In cases of abscess, or of tubercular softening and ulceration, or of gangrene of a superficial portion of the lung, softening and ulceration of the pleura covering this portion thus supervene, and sometimes go on to perforation. Hæmorrhage from injury or disease of a blood-vessel, or pulmonary apoplexy, may cause rupture of the pleura at the nearest point to the seat of effusion. Either ulceration or perforation, or rupture of the pleura, may likewise be caused by abscess seated in some place external to this membrane, as an abscess of the lungs, liver, &c.; or by hydatids, cysts, tumours, aneurisms, and injuries of any adjoining structure or part. In all these circumstances the perforation commences in the attacked surface, and advances into the pleural cavity; but it may proceed from within outward; but this is very rarely the case unless in general or partial empyema, when the matter is evacuated either through the lungs or at some part of the thoracic parietes, as already described (§ 87-92).

204. *C. Effusions into the Cavity of the Pleura.*—Those which depend chiefly on inflammatory action have been described above (§ 115, *et seq.*), and have been shown to consist of serous, sero-albuminous, or plastic products, which may undergo various changes of puriform matter, and more rarely of a sanguineous or sero-sanguineous fluid. Those which take place independently of inflammation are simple serous or watery effusive hæmorrhages, and the passage, owing generally to perforation or rupture of the pleura, of gaseous fluids, or of purulent, gan-

grenous, tuberculous, or cancerous matters into the cavity.

205. *(a) Watery effusions, or passive serous effusions,* require no farther notice than they have already received when treating of *dropsy* of the pleural cavity, they being usually independent of disease of the pleura itself (*see art. Dropsy*, § 158, *et seq.*).

206. *(b) Hæmorrhagic effusions* into this cavity, or *hæmorrhage*, may proceed from a hæmorrhagic form of inflammatory action implicating this membrane, characterized by deficient vital powers and a morbid state of the blood itself; or from loss of tone of this surface and of the capillaries ramified to it; or from this state conjoined with an hæmorrhagic tendency, or from rupture of an aneurism, or injury or disease of some vessel adjoining or involving the pleura. In the former states, the effusion, whether altogether sanguineous, which is very rarely the case, or sanguineo-serous, is an exudation from a greater or less extent of the pleural surface, this surface being more or less concerned in causing the effusion. In the latter this surface is generally healthy, the blood-vessels subjacent or adjoining it being principally affected. When blood is effused into the cavity of the pleura, inflammation is usually thereby produced; and generally with a rapidity according to the quantity and purity of the blood effused, the resulting phenomena varying with the condition of the patient and circumstances in which he is placed.

207. *(c) The effusion of gaseous fluids* into the cavity of the pleura is considered in the article PNEUMATHORAX, and of *purulent collections* I have already treated. *Tubercular and cancerous productions* often form within the pleura, but they also appear external to it, as well as involve its structure, as will be shown in the sequel. The passage of gangrenous, carious, ichorous, or other morbid products, from disorganization of an adjoining part into the cavity of the pleura, may likewise occur in the manner already stated; but, when this takes place, inflammation is thereby rapidly exerted throughout the serous surface. Simple *cysts* and *hydatids* are rarely or never formed within the pleural cavity, and are rarely developed externally to it, or, at least, in such situations as allow them to find their way into this cavity.

208. *D. Cartilaginous and osseous formations,* or transformations of the pleura, are not very rarely met with. In some instances these changes appear to exist immediately under or external to the pleura, or on its attacked surface, the membrane retaining its natural structure and polished surface. In others they seem more entirely to involve the pleura, as if arising from thickening and induration of this tissue, and advancing through the fibro-cartilaginous state to osseous transformation; and in some cases they are confined entirely, or in part, to the false membranes or adhesions formed on or between the pleural surfaces. They evidently result, as noticed above (§ 201), from a state of chronic inflammation or irritation that has passed into morbid nutrition, the fibro-cartilaginous condition being intermediate between simple thickening with induration and ossification. They have been found of various grades of thickness, from a line or two to an inch, and seated in or upon either the costal, the dia-



phragmatic, or the pulmonary pleura, and in some cases in the false membranes existing between and connecting these. In some instances the transformation is neither altogether cartilaginous nor entirely osseous, bony matter, in lamellæ, or in irregular forms, and in detached patches, existing between the layers of cartilage, or otherwise irregularly deposited.

209. These productions are found either in the form of smooth plates or lamellæ, or in that of irregular nodules, or they present a rough surface, with irregular acuminations or points. They are never met with to any considerable extent in connexion with the pulmonary pleura, without the subjacent lung being more or less consolidated. In rare instances, they have assumed a rounded, oval, or globular form, either with bases of varying sizes, or with narrow and short peduncles, their surfaces being smooth and shining, as if still covered by the pleura. These nodules may be single, or several may exist in the same case, their magnitude varying from that of a pea to that of a large cherry.

210. *E. Fatty appendages* have been found attached to the free surface of the pleura, but very rarely, at least entirely unconnected with adhesions between the opposite surfaces. I have met with these appendages in several cases, but in all they appear to have been developed by the formation of fat underneath a portion of false membrane, and between it and the pleura, the false membrane having been of old date. In some cases, old adhesions, having a polished serous surface, and a thick or rounded form, have consisted, excepting their surfaces, entirely of fat.

211. *F. Tubercles* may be formed either on the attached surfaces of the pleura in the subserous cellular tissue, or in the pleural cavity. In the former situation they chiefly consist of numerous small granulations under the pulmonary pleura; and sometimes they form more considerable masses developed beneath the costal pleura, and causing elevations of the pleural surface. Tubercles are never found within the pleural cavity, unless in connexion with false membranes or adhesions, and infiltrating or studding these, as described above (§ 120), thus constituting the *tubercular form of pleurisy*. But they may exist in both situations in the same case, as well as in the lungs and adjoining membranes, as the pericardium, peritoneum, &c. Tubercles may be formed underneath or upon the attached surface of the pleura; as just described, and may advance even farther in their development without any evidence of inflammatory action in their seats or vicinity. But the circumstance of their constant coexistence with certain of the products of inflammation, when they are found within the pleural cavity, or upon the free or internal surface of the pleura, suggests the question, whether they are the *cause* or the *result* of inflammation in the tubercular diathesis. That they are merely one of the products of inflammation in this diathesis, are excluded, in a rudimental state, with the lymph produced by the inflammation, and are further developed as the organization and other changes of that lymph advance, are circumstances rendered probable by their constant coexistence with these products; while the opposite doctrine, that they are the causes of the inflammation,

and of the consequent exudation of lymph in which they are enveloped, necessarily allows that they are first thrown out or formed upon the free serous surface, where they excite the irritation and inflammation, with its consequences found in connexion with them. Now if they are thus formed on the free serous surface, before inflammation is developed, it is reasonable to infer that they should be found, in some instances, before this effect is produced, or produced to an extent rendering the cause doubtful; but this has hitherto not been remarked (*see* § 120).

212. *G. The several forms of malignant or cancerous degenerations* have been observed involving the pleura, but generally consecutively, never primarily. These lesions, whether schirrous, carcinomatous, encephaloid, or fungo-hæmatoid, when they implicate the pleura, are consequent upon their existence in some other part of the economy, most frequently in the mamma, in the axillary glands, or in some other situation in the vicinity. They first extend to the subjacent cellular tissue, causing an irregular thickening and induration, with their characteristic forms of degeneration of this tissue, and an irregularity or unevenness of the serous surface, which ultimately becomes variously changed in color and consistence, according to the form and progress of the malady, until it altogether loses its natural hue, and is altogether involved in the malignant structure. At this advanced stage the surface and cavity of the pleura generally present more or less of a turbid, dirty, ichorous, or sero-sanguineous fluid, which is sometimes also offensive, or of a peculiar odour.

313. ii. SYMPTOMS AND SIGNS OF STRUCTURAL CHANGE OF THE PLEURA.—The *symptoms* and *signs* of these changes are mostly the same as have been described above as indicating the progress and advanced stages of inflammation of this membrane. Those changes, which are essentially the result of inflammation, most necessarily present these symptoms and signs which, in connexion with the history of the case, usually show the nature, if not always the exact extent, of the disease. But those lesions which consist of adventitious formations, as regards either the situation or the economy, frequently advance without any distinct symptom or sign from which their existence may be inferred.

214. (*a*) *Gangrene of the pleura* (§ 202) being met with chiefly as a consequence of gangrene of a portion of the lung, is preceded by the indications of this occurrence. When the symptoms of gangrene of the lungs (*see* LUNGS, § 173–175) are followed by an acute pain in the side, painful cough and inspiration, extreme anxiety and depression, followed generally by all the usual symptoms of the utmost vital exhaustion, then this lesion may be inferred. The physical signs may consist merely of dulness in percussion, of greater or less extent, with absence of the respiratory sound.

215. (*b*) *Ulceration of the pleura* (§ 203) is announced only when it has terminated in *perforation*. If the ulceration has proceeded from the attached surface into the cavity of the pleura, the passage of the matters, whether gangrenous, puriform, tuberculous, æriform, &c., the patient very suddenly experiences

acute pain in the side, with oppression, dyspnoea, and anxiety; and if air passes rapidly into the pleural cavity, these latter symptoms are not only sudden, but also extreme, and are attended by the physical signs of *pneumothorax*. When ulceration, followed by perforation, takes an opposite course, proceeding from the internal cavity externally, as stated above (§ 203), then the symptoms already described (§ 87, *et seq.*) as attending *empyema*, when terminating in this way, are usually observed.

216. (c) *Acute or inflammatory effusions into the pleural cavity* have been already fully noticed (§ 204–207) as respects the symptoms and signs they produce, and passive effusions into this cavity have been elsewhere treated of (*see art. Dropsy*, § 158, *et seq.*). Effusion of blood into this cavity, *hæmorrhax*, unless when it occurs from rupture of an aneurism, or from external injury, is a rare occurrence, as shown when treating of hæmorrhage into the pleural cavity (*see art. Hæmorrhage*, § 277). As a pure exudation in this situation, it is very rarely met with, although the exhalation of a greater or less proportion of red particles with the serum of the blood, in some extreme cases of asthenic acute pleurisy, or of cachectic pleurisy, is not very infrequent, and constitutes the *hæmorrhagic pleurisy* of LAENNEC. *Hæmorrhax*—or the effusion of blood into the pleural cavity, analogous to the hæmorrhages, active or passive, of other organs or surfaces—is so rare, that the phenomena attending or consequent upon it have not been satisfactorily observed, and they are hence imperfectly described. But, whether the blood poured out in this situation be a primary lesion, or consecutive of some other, or of local injury, I cannot view it, with M. LAENNEC, as an occurrence devoid of importance, as regards its effects upon the pleural cavity, or believe that the blood effused in this situation will be absorbed without producing inflammation in this cavity. My experience has proved that, although absorption does take place, inflammatory action, varying in character and intensity with the circumstances of the patient, is the most frequent result, as I have already shown (§ 206). It must be admitted that effusion of blood into the pleura will produce similar symptoms to those resulting from other effusions to the same amount. But it will be generally observed that indications—either local or constitutional, or both—of inflammatory action of the pleura will sooner or later supervene; and that the products of this inflammation, mingled with altered and nearly absorbed blood in the pleural cavity, will give rise to peculiar appearances, on examination after death, more distinctive of the immediately antecedent inflammation, than of the hæmorrhage which developed the inflammation. I have nothing to add at this place to what I have stated above respecting the symptoms and signs of purulent or of other effusion into the pleura (§ 63, *et seq.*), and have advanced in the *art. PNEUMOTHORAX*, when noticing the combination of æriform and fluid effusions into this cavity.

217. (d) *Cartilaginous and ossific formations* in the pleura are not indicated by symptoms or signs during life. They are merely contingent changes, occurring after chronic pleurisy, and are met with chiefly in persons who have lived

for a considerable time after such attacks, with more or less disorder of the respiratory functions, and probably with dulness on percussion, or with imperfect or absent respiratory murmur; and although their existence may possibly be in some instances suspected during life, they are unattended by any peculiar symptom or indication.

218. (e) *Tubercles* formed immediately beneath the pleura, occasioning small or irregular elevations of the membrane (§ 211), without much effusion, are generally attended by a rubbing sound during respiration; but if effusion exist, or if the tubercles be deposited in false membranes, their presence can be suspected only, and chiefly from the coexistence of the pleuritic lesion with tubercular consumption, or from the occurrence of this lesion in the scrofulous diathesis. Tubercular formations are most frequently found in one side only, in the same case, but they may exist in both cavities; and they may be present in both the pleura and in the pericardium. When this latter complication occurs, without much effusion within the pericardium, there is generally a cardiac rubbing sound in connexion with a similar sound during respiration.

219. (f) *Cancerous or malignant alterations* in the pleura may be inferred from the gradual, nearly latent, and chronic or sub-acute form, in which the pleuritic affection supervenes upon malignant diseases of the mamma, or in the vicinity of the thorax; and from the presence of symptoms and physical signs similar to those attending tubercular formations in this membrane. The rubbing sound generally continues for a considerable period, and until the subsequent effusion becomes copious; and the pleuritic symptoms appear chiefly when the cachexia attending the cancerous malady is well marked, and the system manifests more or less of the usual accompanying anæmia.

220. iii. *TREATMENT*.—The treatment of the organic lesions of the pleura now passed under review, should be directed entirely by the circumstances of the case, and by the evidence furnished of their individual existence, and of their morbid associations.—(a) If there be reason to infer the supervention of *gangrene* of this membrane, treatment is then very rarely of any farther avail than to prolong existence for a few hours, or at most a day or two; and this object can be attained only by the exhibition of restoratives, &c., as camphor, ammonia, quinine, myrrh, ammoniacum, &c.; for, although recovery from gangrene of the substance of the lungs may take place by the aid of these or similar means, it is very rarely procured when this lesion has extended to the pleura.

221. (b) As to the treatment of *ulceration and perforation*, of, and *effusions* into, the pleura, I can add nothing to what I have recommended to be done for the more advanced stages, and more chronic forms of pleurisy (§ 63, *et seq.*), for which, however, and more especially for the more simple states of effusion, the means there advised, when judiciously administered, will be often very successfully employed, especially when aided by a free use of the acetate of potash, so as to act manifestly both upon the bowels and kidneys; and by the external means above mentioned (§ 175, *et seq.*). If the causes and circumstances of the disease lead to the



inference that much blood is effused into the pleural cavity, or that this fluid constitutes the larger part of the effusion, I believe that the operation for empyema should not be delayed, otherwise inflammation, if it have not already appeared, will certainly supervene, in a form not readily removed by treatment, inasmuch as the blood, or at least its unabsorbed portion, will remain to perpetuate the disease, and favour the occurrence of consecutive lesions.

222. (c) The treatment of the other organic lesions of the pleura promises but few advantages when their presence are even presumed. *Tubercles* are very rarely present in this membrane, without existing in still greater abundance, and often in advanced states, in the lungs or other structures. Hence the treatment requires to be directed in many cases more to these organs than to this special lesion; and, even when the features of the case warrant the direction of remedies principally to this seat of disease, it will be difficult to suggest others more likely to be beneficial than those advised above for chronic pleurisy (§ 175–179). The *mistura ferri composita*, the iodide of potassium, the iodide of iron, the liquor potassæ with tonic infusions and sarsaparilla, or these variously combined, or conjoined with such other substances as the peculiar circumstances of the case will suggest, are most generally appropriate for these lesions, as well as for the effusions into the pleural cavity, by which these lesions are often attended, especially when aided by suitable means for the promotion of the alimentary and renal evacuations, and by external derivatives.

BIBLIOG. AND REFER.—*Hippocrates*, Περὶ Τῶν Πλευρῶν, Op., p. 515, 534. —*Galen*, De Loc. Affect., l. v., ch. 3.—*Celsus*, l. iv., ch. 6.—*Aretæus*, Cur. Acut., l. i., ch. 10.—*Attius*, viii., 76.—*Alexander Tral.*, vi. i.—*Oribasius*, Synopsis, &c., ix., 7, 8.—*Actuarius*, Method. Med., iv., 4.—*Cælius Aurelianus*, Morb. Acut., l. ii., 13.—*Octavius Horatianus*, ii., 4.—*Marcellus*, De Medicam., 24.—*Scapion*, ii., 21.—*Mesue*, De Ægri. Pect., 7.—*Avicenna*, Canon, l. iii., 10, 4.—*Haly Abbas*, Theor., ix., 21; Pract., vi., 13.—*Rhases*, Divis., 54.—*Paulus Ægineta*, l. iii., ch. 33. (Transl. by F. Adams, for Sydenham Society, p. 496.)—*F. Bonafides*, De Cura Pleuritidis per Venesectionem. 4to. Venet., 1533.—*A. Jurinus*, De Duratione Pleurit. per Venesectionem, 4to. Basil., 1527.—*V. Benedictus*, De Pleuritide Liber, 4to. Venet., 1536.—*J. F. Arma*, De Pleuritide, 8vo. Ferrara, 1549.—*P. Brisso*, Apologia de Incisione Venæ in Pleuritide, 8vo. Paris, 1558.—*Trincavelli*, De Vena secunda in Pleuritide, 8vo. Pat., 1563.—*V. Halleri*, Bibl. Med. Pr., t. ii., p. 46.—*Vesalius*, in ibid., t. ii., p. 32.—*W. Bulleyn*, Regimen against the Pleurisy, 8vo. Lond., 1562.—*F. Cassanus*, De Vnæ Sectione in Pleurit., 12mo. Patav., 1564.—*J. Wyer*, Observationum rararum Liber, de Scorb. Pestilenti, Angina, Pleuritide, Peripneumonia, &c., 4to. Basil., 1567.—*F. Cigalini*, Epist. de Oxyemellii Usu in Pleurit., 8vo. Tigur., 1592.—*R. Moreau*, De Missione Sanguinis in Pleuritide, 8vo. Paris, 1622; et De Loco affecto in Pleuritide, 8vo. Paris, 1641.—*M. Ruland*, Utrum in omni Pleur. Vena dextri Cubiti secunda? 8vo. Basil., 1627.—*Amatus Lusitanus*, Cur., cent. i., Nos. 12, 53, 59.—*N. Wright*, Thesca Medice de Pleur. Vera, 4to, 1635.—*Ballonius*, Opera, t. i., p. 24; t. iv., p. 313.—*V. Martinii*, Opuscula de Vesicantibus, de Orthopnea Pleuritidis, &c., 4to, 1636.—*Zacutus Lusitanus*, Med. Pr. Hist., l. ii.; et Prax. Admir., l. i., obs. 104.—*V. Baronius*, De Pleuropneumonia Flaminian Populatur infestante, 4to. Forol., 1635.—*G. Ballonius*, Liber de Rheumatismo et Pleuritide Dorsali, 4to. Paris, 1642.—*Riverius*, Observ., cent. ii., No. 93.—*B. Baldi*, De Loco affecto in Pleuritide, 8vo. Romæ, 1643.—*A. Cleti*, Circa Partem affectam Pleuritidis, 8vo. Romæ, 1643.—*Diemerbroeck*, Anat., l. ii., c. 13, p. 309; et Disp. de Morb. Thoracis, No. 1.—*Bartolinus*, De Usu Nivis Medice, ch. 26.—*Prosper Alpinus*, De Med. Ægypt., l. iii., cap. 4.—*A. Banda*, Discours contre l'Abus des Saignées, qui prouve que la Saignée n'est pas l'unique ni le plus assuré remède des Pleurésies, 8vo. Sedan, 1672.—*Sydenham*, Opera Edit. Societ. Sydenhami, 8vo, p. 244.—*Willis*, Pharmac. Ration., p. ii., sect. i., c. 8.—*J. S. Knisel*, Historia Pleuritidis et Abscessus Pectoris, 4to. Tubing.,

1690.—*C. Von Campen*, Collectanea Therapeutica de Pleuritide et Apoplexia, 8vo. Broda, 1692.—*F. H. a Fonseca*, Pleurologia, de Pleuritide ejusque Curatione, 4to. Lisbon, 1701.—*A. Pascoli*, Observat. de Pleuritide, 4to. Venet., 1702.—*Bonet*, Sepulchretum, l. iv., s. i., observ. 3, 20, 45.—*F. Hoffmann*, De Pleuritide et Peripneumonia, Opera Suppl., t. i., p. 165.—*Baglivi*, Prax., l. i., Opera, p. 35.—*J. B. Verna*, Princeps Morbor. Acurtor. Pleuritidis, 4to. Venet., 1713.—*A. Camerarius*, et *J. G. Seeger*, De Pleuritide Maligna; in *Halleri*, Disp. ad Med., &c., vol. ii.—*Friedl*, Comment. de Feb., No. v.—*Giffard*, in *Philosoph. Trans.*, No. 395.—*J. Tennent*, Epistle to Dr. Mead, concerning the Epidemical Diseases of Virginia, particularly Pleurisy and Peripneumony, &c., 12mo. Edin., 1742.—*Dover*, Legacy, &c., p. 144.—*Huzham*, Opera, t. ii., p. 168.—*J. N. Bouillet*, Mémoire sur les Pleuropneumonies Epidémiques, 4to, 1759.—*Morgagni*, De Sed. et Caus. Morb., Ep. xx, et xxi.—*Wright*, in *Med. Facts and Observations*, vol. vii., art. i.—*G. V. Zeviani*, Della Rachitide, et della Pleuritide, 4to. Verona, 1761.—*M. Flemyng*, On Adhesions of the Lungs to the Pleura, 8vo. Lond., 1762.—*Chalmers*, On the Weather and Dis. of South Carolina, vol. ii., p. 106.—*Bertin*, An in Pleuritide Sanguis mittendus e Brachio Lateris affecti, 8vo Paris, 1763.—*D. W. Triller*, De Pleur. Æstiva; in *Opuscul.*, vol. i., 4to. Lips., 1766.—*Cleghorn*, On the Diseases of Minorca, &c., p. 238.—*Mursinna*, Von Faulfiebern, p. 154.—*B. L. Tralles*, Commentatio de Usu Vesicantium in Pleuritide, 8vo. Bresl., 1776.—*S. Musgrave*, Gultonian Lectures, &c., on the Pleurisy and Peripneumonia, 8vo Lond., 1779.—*Kanoz*, in *Act. Reg. Soc. Med. Hann.*, t. iii., p. 246, et t. iv., p. 216.—*Bang*, in ibid., t. i., p. 10.—*Callisen*, in ibid., t. i., p. 60.—*De Haen*, Rat. Med. Pr., t. xi., ch. 2.—*Hamilton*, in *Edin. Med. Comment.*, &c., vol. ix., p. 7.—*Thomann*, Annales Wirceb., t. i., p. 9.—*C. Strack*, Nova Theoria Pleuritidis, &c., 8vo. Mogunt., 1786.—*Vitriarius*, De Signis Diagnosticis et Prognosticis Pleuritidis, &c., 4to. Giess., 1786.—*M. Stoll*, Rat. Med. Pr., t. ii., p. 362; t. iii., p. 54, 115; t. vii., p. 182.—*Sims*, Observations, &c., p. 45.—*Millar*, Observations on the Prevailing Diseases of Great Britain, p. 20.—*F. Fiorani*, Saggio sulla Pleur. Biliosa Epidemica, 8vo. Firenze, 1792.—*G. J. Maschke*, Historia Litis de Loco Venesectionis in Pleur., 4to. Ital., 1792.—*Portal*, in *Mém. de l'Acad. des Sciences à Paris*, 1789; et Sur le Traitement de plusieurs Malad., &c., t. ii., p. 54.—*Gebel*, in *Hufeland's N. Journ. der Pract. Arzneyk.*, t. i., p. 180.—*Conradi*, in ibid., t. iii., p. 763.—*C. Racine*, Recherches sur la Pleurésie et la Pénipneumonie latente Chronique, 8vo. Paris, 1803.—*Pinel* et *Bricheteau*, in *Dict. des Sciences Méd.*, t. xliii., p. 185.—*G. Andral*, Clinique Médicale, t. iii., 8vo. Paris, 1826.—*Chomel*, Dict. de Méd., t. xvii.—*Law*, Cyclop. of Pract. Med., vol. iii., p. 387.—*Andral*, Archives Générales de Méd., t. iii., p. 246. (On Inflammation of the Diaphragmatic Pleura.)—*Bonnet*, in ibid., t. xxi., p. 86.—*Schmidtman*, Observat. Med., t. i., p. 104.—*E. Gintrac*, Le Diagnostic des Affections Aiguës et Chroniques des Organes Thoraciques, 8vo. Lond., 1826.—*T. H. Laennec*, Treat. on Dis. of the Chest, &c.; transl. by *J. Forbes*, 3d ed., 8vo. Lond., 1829, p. 426.—*J. Houston*, Descrip. Catal. of Prepar. in the Mus. of Coll. of Surg. in Ireland, vol. ii., Pathology, p. 171.—*M. Hitz*, Recherches Cliniques sur quelques Points du Diagnostic de la Pleurésie; dans *Archives Génér. de Médecine*, 2d ser., t. xiii., p. 172, 1836.—*Heufelder*, Sur la Pleur. Chron. et l'Empyème; in ibid., 3d ser., t. v., p. 59, 1839.—*Cruveilhier*, Dict. de Méd. et Chirurg. Prat., t. iii., 8vo. Paris, 1835.—*W. Stokes*, A Treatise on the Diagnosis and Treatment of Diseases of the Chest, 8vo. Dubl., 1837, p. 459; *Lancet*, No. 619, p. 466.—*C. J. B. Williams*, The Pathology and Diagnosis of Diseases of the Chest, &c., 4th ed., 8vo. Lond., 1840, p. 103, and Library of Medicine, vol. iii., p. 108; *Med. Gazette*, March, and Apr. 28, 1838, p. 2. 161.—*Watson*, in *Med. Gazette*, Jan. 27, 1838, p. 696.—*Wilson*, in ibid., June 10, 1837, p. 395.—*Porral*, Journ. Hebdom. de Méd., t. iii., p. 215. (Hæmorrhagic Pleuritis, and Hæmorrhage into Pericardium.)—*Graves*, Clinical Medicine, &c., p. 792.—*Greene*, Dublin Journal of the Medical Sciences, vol. xvii., p. 275.—*R. L. Mac Donnell*, On Empyema; in ibid., vol. xxv., p. 1. (An excellent Memoir.)—*P. C. A. Louis*, Researches on Phthisis, Anatomical, Pathological, and Therapeutical, 2d edit.; transl. by *W. H. Walshe* for the Sydenham Society, 8vo. London, 1844, p. 276.—*C. E. Hasse*, An Anatomical Description of the Diseases of the Organs of Circulation and Respiration; transl. by *W. E. Swaine* for the Sydenham Society, 8vo. Lond., 1846, p. 181.—*C. Rokitaniski*, Handbuch der Pathologischen Anatomie, 8vo. Wien., 1842, b. iii., p. 43.—*G. Williamson*, Catal. of Prepar. in Museum of Army Med. Dep. Fort Pitt, &c., 8vo. Lond., 1845, p. 96.—*J. Paget*, Descrip. Catal. of Anat. Museum of St. Bartholomew's Hospital, 8vo. Lond., 1846, p. 282.

[For Am. Bib., see various works on the Theory and Practice of Med. and Pathology, referred to under Pneumonia, Phthisis, &c.; also various Am. Med. Journals, *passim*.]

PLEURODYNIA.—SYNON. *Pleuralgia*, *Pleurodynia* (from πλευρά, the side, and δόνην, pain)

*Pleuritis spuria, pseudo-pleuritis. Neuralgia thoracica, Pleurodyne*, Auct. Var. *Dolor lateris. Rheumatismus Pectoris*, Naumann. *Pleurodynie, Point de Côte, Fausse Pleurésie*, Fr. *Der Seitenschmerz, der falsche Seitenschick*, Ger.

CLASSIF.—I. CLASS, IV. ORDER (Author).

1. DEFIN.—Pain in the side, usually occurring and ceasing suddenly, independently of any physical sign of inflammation of the pleura, and generally connected with rheumatic, neuralgic, or hysterical affection.

2. *Pleurodynia* and *pleuralgia* are names in no way applicable to the painful affection under consideration, inasmuch as there is no evidence in favour of the pleura being at all implicated in it, unless it change its nature, or superinduce or pass into pleurisy. If, however, the word *πλευρα* be viewed, as it was by the ancients, as meaning the side, without reference to any particular part or structure of the side, these terms will appear much less objectionable. That this affection is not always rheumatism of the chest, as implied in the name given to it by NAUMANN, is a fact which experience will soon teach the inexperienced. Nor should it be viewed, as it has been by M. JOLLY and others, as inflammation of one or more of the muscles of the thorax. But it is often connected with rheumatism, either in some other part of the body, or with the rheumatic diathesis; and it may be converted or pass into inflammation of the pleura, or of the pericardium, owing either to the predisposition and constitution of the patient, or to injudicious treatment. When it thus presents a rheumatic character, then it is to be viewed and treated as I have advised in the article RHEUMATISM, although it is by no means demonstrated, however frequently it has been assumed, that the pain constituting the principal feature of the disorder is caused by an affection of the intercostal muscles, or of the fibrous fascia lining the chest.

3. I. CAUSES.—Persons of a nervous, susceptible, or irritable temperament; of the rheumatic and hysterical diathesis; those who are exposed to atmospheric vicissitudes, to currents of cold air, to marshy or humid exhalations, or to cold or wet in any way, and those who live in damp, cold, and low houses, or in cellars, &c., are the most liable to experience those rheumatic and neuralgic affections in the side which have generally received the name of *pleurodynia*. Owing to the greater exposure of males than females to these causes, the former are most liable to them; and adults and aged persons are more frequently affected than children and young persons. But all the causes of inordinate excitement, and of exhaustion or direct depression of the nervous system, both predispose to, and more immediately occasion, painful affections, in either side, as well as in other parts of the body. Owing to the prevalence of the above causes, especially those which proceed from season, climate, and the soil and water of a locality, pleuralgic affections may be so prevalent as to be *endemic*, but they can rarely be considered as epidemic, or as being so generally prevalent, even in those localities, as to deserve that character.

4. II. DESCRIPTION.—*Pleurodynia* varies much in character with the causes which produce it, and according as it occurs in a *rheumatic, neuralgic*, or *hysterical* diathesis, or presents either

of these forms.—(a) In the first of these forms, it may be either acute or chronic; in the former it is sudden, severe, lancinating, increased upon pressure, even upon the slightest pressure or contraction of the affected muscles. It often ceases as suddenly as it appeared, the pain shifting, or having shifted, to some other part. This more acute state of the affection is frequently attended by more or less fever, and the other phenomena of acute rheumatism. The chronic state is generally prolonged for many days, sometimes subsiding altogether for a time, and then suddenly recurring either in the same place, or in the vicinity. It occasionally ceases during the day, and recurs at night; or it disappears when warm in bed, to return at some period of the day. The pain is exacerbated during respiration; but this may take place either during inspiration or expiration only or chiefly, according as the muscles and nerves supplying be inspiratory or expiratory. Coughing, sneezing, and all movements which affect the muscles, occasion a sharp or cutting pain of the part.

5. (b) The *hysterical* and *neuralgic* forms of *pleurodynia* are more manifestly seated in the sentient nerves than the rheumatic, and are referred chiefly to some part between the sternum and spine. They are often connected with irritation about the origin of the dorsal nerves, or in the ganglionated roots of these nerves; this irritation, whether functional or inflammatory, being either seated there, or reflected thence from the renal or sexual ganglia, or nerves, or from the uterus and ovaria. These forms of *pleurodynia* are much more frequent in adult females than in males; in the nervous and irritable temperament; in persons who are subjects of *anæmia*, or who are liable to irregular determinations or distributions of blood; and in those especially about the period of the catamenia, and when this discharge is irregular, difficult, scanty, or interrupted. (See art. HYSTERIA, § 78, *et seq.*, and NEURALGIA, § 89, *et seq.*)

6. (c) Occasionally cases occur in which the pain cannot be referred either to rheumatism or to any neuralgic or hysterical condition, but rather to disorder of some one of the *digestive viscera*; to either the stomach, the duodenum, the colon, or the liver. In these cases *flatulence* is a very prominent symptom, the *pleurodynia* being entirely sympathetic of the distention or irritation caused by the flatus contained in one or more of these viscera. But, in addition to this symptom, other indications of disorder of the digestive organs are usually present, especially a loaded tongue, the edges being red or flabby; an irregular and flatulent state of the bowels; and an unhealthy condition of the secretions and excretions. These symptoms are, however, often present in the other forms of *pleurodynia*, but they exist in this generally in a very prominent manner, and without any evidence of rheumatism, or of hysteria having been previously complained of.

7. III. THE DIAGNOSIS OF *pleurodynia* rests upon, 1st, the phenomena immediately connected with the painful affection; and, 2d, the absence of the symptoms and physical signs of pleuritic, pericardiac, and pulmonary disease. If *pleurodynia* occur in connexion with rheumatism or in the rheumatic diathesis, or if the patient be subject to any form of hysterical af-



fection, or furnish any indication of spinal irritation, or be liable to disorder of the catamenial discharge, then it may be suspected that the pain is independent of inflammation of the pleura or lungs; but the suspicion can be confirmed only by a careful examination of the chest by percussion and auscultation, and by the absence of the physical signs attending inflammatory or structural diseases of the thoracic viscera. The negative evidence thus furnished, the absence of many of the rational symptoms of these diseases, the manifest nervous, or rheumatic, or dyspeptic character of the affection, and the several causes or circumstances which appear to have produced it, will generally guide the careful observer to a correct conclusion as to its nature and morbid relations.

8. IV. The TREATMENT should depend upon the conclusion thus arrived at. If the affection be manifestly rheumatic, the treatment advised for RHEUMATISM is required; and if the patient be young, robust, plethoric, &c., a moderate bleeding from the arm, or the application of leeches to the side, may precede other remedies. When the pain seems to depend upon disorder of the digestive organs, or upon biliary or other colluvies, then a suitable but smart emetic, followed, after an interval, by cholagogue aperients, by a warm bath, and by diaphoretics, will generally remove it. As this affection is merely the manifestation of a disorder seated more internally or deeply, the suppression of it by external applications should be avoided until the primary affection is removed by a treatment directed to it entirely or chiefly; and when all disordered secretions and excretions are removed, and when the functions and tone of the digestive organs are restored, then whatever of painful affection may remain may be treated by rubefacient and anodyne embrocations or applications, by tonics, and the other means advised for NEURALGIA. The treatment should in every respect be directed conformably with the morbid relations which the case may present. The very general connexion existing, in females, between this affection and disorder of the catamenia requires that treatment should be more especially directed to the removal of that disorder. In this form of the affection, as well as in every other, the intentions and means of cure should have for their objects the precise origin of this and of its associated evils, and the removal of the source of them just adverted to; for as long as it exists the symptomatic effects will recur again and again, or whenever circumstances favour their evolution.

BIBLIOG. AND REFER.—D. G. A. Richter, *Die Specielle Therapie*, b. i., p. 407.—Chamberet, in *Dict. des Sciences Médicales*, vol. xliiii., p. 217.—J. Jolly, in *Dict. de Méd. et Chirurg. Prat.*, art. *Pleurodyn.*—Williams, in *Lib. of Pract. Med.*, vol. iii., p. 134.

PNEUMATHORAX.—SYNON. *Pneumothorax*, Itard. *Pneumathorax* (from Πνεῦμα, air, and θώραξ, the chest). *Pneumatothorax*; *die Luftbrust*, Germ. *Pneumothorax*, Fr.

CLASSIF.—IV. CLASS, II. ORDER (see Preface).

1. DEFIN.—*The presence of air in the pleural cavity, occasioning collapse or compression of the lung, extreme dyspnoea and anxiety, and obvious physical phenomena.*

2. I. PATHOLOGY OF.—Pneumathorax is the

consequence of lesions, generally of both the lungs and the pleura, or rather of the lung implicating the pleura, allowing the irruption of air into the pleural cavity, and thereby suddenly occasioning severe circumscribed pain in one side, great anxiety, and extreme dyspnoea. It may occur at any period of the course of phthisis; and, as in one case in my practice, it may even take place before the patient has complained, or had recourse to medical aid. This dangerous and generally fatal result of pulmonary tubercles has attracted attention only in modern times. It is usually developed as follows:

3. (a) A tubercular cavity may extend to the pleura, inflame, and ultimately perforate this membrane, before adhesions have formed between the opposite surfaces, and thus the air will pass into the cavity of the pleura. This is the most common way in which pneumathorax occurs.—(b) One or more tubercles may form so close to the pleura as to perforate this membrane, and open into a minute bronchus, in the course of softening, even at an early period of the pulmonary disease, and without having produced a limited inflammation of the pleura, or adhesion of the opposite surfaces, at least in a sufficient degree to prevent the passage of air into the cavity of the pleura. This, however, does not occur so frequently as the former; yet I have met with two cases.—(c) In the course of partial pleurisy, the absorption of the contained fluid may leave a void, which is not occupied either by a contraction of the parietes of the chest or by the lung, which continues either condensed, or bound down by adhesions or false membranes. This vacuum, which may be either very small or more considerable, contains air secreted by the surfaces, by which the fluid was absorbed. Dr. WILLIAMS mentions two cases of this kind; but this is a rare form of pneumathorax.—(d) It has been supposed that the products of pleurisy may undergo such changes as will develop a gaseous fluid, especially in the more cachectic states of the disease, and at an advanced period, or shortly before death. Without denying the possibility of this occurrence before death, it may be admitted to take place, in some instances, soon after death. There is not, however, sufficient evidence of this change in the effused fluids in pleurisy having supervened during life to allow of its being ranked as a variety of pneumathorax.—(e) Air may also be present in the cavity of the pleura, owing to a fistulous opening through the parietes of the chest, or in consequence of a fistulous communication between this cavity and the bronchi on the one hand, and the external surface on the other.

4. The intimate adhesions which usually form between the pleura covering the tuberculated portion of lung and the costal pleura obviate the occurrence of pneumathorax; yet when these adhesions either do not take place, or when they are either incomplete or not intimate, and the softened tubercles or the extending ulceration perforates the pleura, then the air passes into the cavity, distends it, compresses the lung, and gives rise to the symptoms and physical signs of this organic mischief. Most frequently the resulting perforations are small, consisting of an oval aperture, or small fissure, three or four lines long, frequently in

the midst of a soft, dirty, grayish, or yellowish texture, which is easily torn. There is usually only one perforation; but several in the same case have sometimes been met with. The perforation occurs in about five sixths of the cases near the angles of the third or fourth ribs; that is, in a place corresponding with that where pain was felt, and where pleuritic adhesions, when not general, commonly terminate. In other cases it is more or less distant from the apex of the lung; but it very rarely takes place at the apex, owing to the frequency of adhesions in this situation.

5. Perforation of the pleura, occasioning pneumothorax, is much more frequent on the left than on the right side. This is probably owing to the somewhat more frequent occurrence, and the more advanced progress, of tubercular ulceration in the left than in the right lung. Dr. REYNAUD found, in forty cases of perforation, ascertained by post-mortem examination, that this lesion was twenty-seven times on the left side, and thirteen times on the right; and in ten similar cases, not demonstrated by examination after death, the left side was affected in six cases, and the right in four. Dr. HASSE met with pneumothorax nine times on the left and seven times on the right side. M. LOUIS observed this lesion seven times on the left side, out of the first eight cases which occurred to him.

6. The perforation generally depends upon the progress of ulceration, usually tubercular, very rarely gangrenous, through the pleura. In ordinary circumstances, when ulceration approaches the pleura, inflammation, with the exudation of plastic lymph, supervenes at that part of this membrane which is nearest the ulcerated cavity, and protects that part of it, either by covering it with a thick false membrane, or by uniting it to the opposite surface by this medium. If a firm adhesion of the surfaces has formed, and the ulceration proceeds, perforation of both the pleura and the false membrane takes place without being followed by pneumothorax; and even the parietes of the chest may ultimately be perforated, the adhesions of the pleural surfaces around the fistulous perforation preventing the air from passing into the cavity of the pleura. But in other cases, especially when either vital power and resistance are weak, or the lymph thrown out is of an unhealthy or unorganizable character, and hence neither false membranes nor intimate adhesions are formed, or are not formed in a state sufficient to protect the ulcerated surface, the air passes into the cavity of the pleura, at one or more points, upon sudden efforts, or severe fits of cough. Ulceration may advance until the pleura is nearly perforated, either without the production of a false membrane or of adhesion, or with these in a more or less incomplete state, when a severe fit of coughing, or a forced inspiration, or some effort, or even an external injury, causes the thinned or ulcerated point to give way suddenly, and induces all the symptoms and signs of pneumothorax.

7. II. SYMPTOMS AND SIGNS.—A. SYMPTOMS.—The effects of the perforation are *immediate* and *consecutive*.—(a) The *immediate effect* is to admit air more or less rapidly into the cavity of the pleura, which permits the lung to as-

sume that state of collapse to which its natural contractile property would reduce it, by equalizing the atmospheric pressure within and without it. In addition to the introduction of air and the dyspnoea thus rapidly produced, the sensibility of the part is generally also suddenly and severely excited, and, with the extreme dyspnoea and pain, great anxiety is felt. The connexion between the lesions and the symptoms is remarkably striking. The pain corresponds with the rupture of the thinned portion of pleura and the irruption of the tuberculous matter into the pleura, and is caused by these occurrences; while the threatened suffocation and anxiety are the effects of the rapid passage of air and of some fluid matter into the pleural cavity. Therefore, when acute pain, oppressed breathing, extreme anxiety, and the symptoms of acute pleurisy display themselves *suddenly* in one side of the chest of a tubercular or phthisical patient, we may suspect the occurrence of perforation of the pleura, and ascertain the presence of pneumothorax by examining the chest.

8. (b) The *consecutive effects* of perforation vary in different cases. Although perforation of the pleura will not fail to allow air to pass into the cavity, yet the size and other conditions of the opening modify the amount of air introduced and the effects which follow. If the perforation be very small, or if it be so placed that the walls of the chest close it upon expiration, or if it be below the level of the effused fluid, or if the opening be of such a form as to become valvular, and to close the aperture on expiration, air will pass into the cavity in accumulating quantity, and occasion an increased compression of the lung; and even suffocation in the course of a few hours, and before many of the consequences observed, in cases of longer duration, can take place. When, however, the termination of the mischief is not so rapid, the presence of air in a cavity neither accustomed to, nor organized for it, and of the matters which pass along with the air from the ulcerated cavity, excite with more or less rapidity great irritation and inflammation of the pleura, attended by acute pain, dry cough, dyspnoea, spasms of the intercostal muscles; quick, weak, or irregular pulse; heat of skin, and all the symptoms of acute pleurisy, with the physical signs of pneumothorax (§ 11), and of liquid effusion accompanying the air contained in the pleural sac.

9. When the aperture, by which air passes into the cavity of the pleura, is large, there is a frequent renewal of the air in this cavity; for the lung is kept in a state merely of collapse, and not of forcible compression; the air passing out of the cavity, as well as passing in, to a partial amount. The consequences are, a more copious purulent secretion takes place from the pleural surface, and this secretion always becomes more or less fetid if it continue for some time. The foregoing symptoms, however, are not of themselves sufficient to show the existence of pneumothorax; for, notwithstanding the sudden supervention of acute pain in the side, with oppressive dyspnoea and anxiety, and although, in some instances, these symptoms may be instantly felt after a fit of coughing, or upon exertion when the patient has felt as if something had given way in the



pained place, still all these phenomena may exist in some acute cases of pleurisy, without any perforation; while, on the other hand, perforation and pneumathorax may take place without any very acute or suddenly developed symptoms, although this is seldom observed. The physical signs, therefore, are chiefly to be depended upon for the diagnosis of this lesion.

10. When the quantity of air which is passed into the pleural cavity is great, if there be no adhesions between the opposite surfaces of the pleura, or if these adhesions be inconsiderable or admit of being much stretched, the lung is compressed and forced against or towards the spinal column. At the same time, the thoracic parietes on the affected side are distended, the ribs separated, the diaphragm depressed, and the mediastinum pushed to the opposite side. The widening of the intercostal spaces, the rounding and dilatation of the parietes, the much less degree of motion during respiration, and the much greater dimensions of the affected side upon admeasurement, sufficiently indicate the distention of the pleural cavity by the accumulation of a fluid; the nature of the fluid, whether gaseous or liquid, being readily indicated by the physical signs. The viscera are also displaced by the contained air. The heart and mediastinum are pushed to the right side, if the left be the seat of lesion; and towards the left axilla, if the right is so affected, and if the air be in great quantity, while the liver and stomach are pushed downward; the upper regions of the abdomen sometimes protruding more or less.

11. *B. THE PHYSICAL SIGNS* are the most important of the *consecutive effects* of pneumathorax, and are generally very distinctive. The air contained in the pleural cavity gives the walls of the chest a greater degree of resonance on percussion than when the structure of the lung is naturally distended with air. According as the quantity of air is great, so is the sound produced by percussion the more hollow or drum-like, owing to the farther removal of the collapsed or compressed lung from the parietes of the chest, and to the diminished entrance of air into the lung. Hence pneumathorax may instantly be detected by a remarkable contrast of physical signs, namely, by a very hollow or clear sound on percussion of the affected side, with little or no vesicular sound of respiration, while the healthy side gives a duller sound on percussion, but a much more distinct respiratory murmur.

12. Perforation of the pleura, and its consequences, pneumathorax, and the effusion of fluid, give rise to other phenomena which are farther *diagnostic* of these lesions. These are the *sounds* which have been termed the *metallic tinkling sound*, the *amphoric sound*, and the *sound of fluctuation*.

13. (*a*) *Metallic tinkling* has been variously accounted for by several writers, but none of the explanations, and some of them have been sufficiently singular, and others equally laborious, appear satisfactory. This sound is heard most distinctly when the pleura is perforated, when much air is enclosed in the pleural cavity, and when there is also some fluid effused. It seems to proceed from the air passing, during inspiration, through the pleural orifice of the perforation, which, being partially obstruct-

ed by fluid or mucus, occasions a noise similar to that produced by the breaking of a bubble of air contained by an albuminous or other fluid, and the vibrations, being propagated through the enclosed air, give rise to the *clink*, or *metallic sound* or *tinkling* in question. According to this explanation, although perforation of the pleura most commonly causes this sound, it may, nevertheless, be heard in other circumstances in which air is contained in the pleural cavity, provided that, during respiration, the air in struggling through a fluid forms bubbles, which, breaking on the surface of the fluid, causes a vibration which is propagated throughout the included air. From this it will follow, that whatever occasions such a degree of motion of the parietes of the chest, even *percussion* during the physical examination of this cavity, may occasionally develop this sound, which has so long puzzled many stethoscopists, which has mystified others, and which has concerned some but little who have paraded the stethoscope as a most serviceable instrument of charlatanry and humbug.

14. (*b*) The *tinkling sound* may thus present several modifications. Where the perforation is protected or obstructed by its position against the walls of the chest or below the level of the fluid, the tinkling may not be heard unless upon coughing or taking a full inspiration, so as to cause bubbles to be formed in the affused fluid. But the smallness of the perforation, provided that air passes through, will not prevent or obscure the sound, as Dr. WILLIAMS has supposed. "When the orifice is large and free, the air will pass in and out in ordinary breathing, and will produce in its vicinity a sound like that of blowing into the mouth of a glass bottle," or the bung-hole of a small cask, and hence this sound has been called *amphoric*. In these cases the diseased lung is merely collapsed, not compressed by the accumulation of air in the cavity as when the perforation is small, and as it is described above (§ 8-10).

15. The tinkling or metallic sound may be heard only in certain parts of the chest; only where the lung is non-adherent, and where the effused liquid does not reach; only where a cavity is distended by air so as to give the parietes of the cavity a certain degree of tension, and to furnish the condition upon which the sound chiefly depends. In the sitting posture, this sound is heard best about the mamma, and lower part of the axilla and scapula; but in those cases in which the accumulation of air and the distention of the parietes are the greatest, it may be heard in every part of the affected side; while in others, where the collection of air is small, it may be heard only at one spot.

16. When there is a liquid effused into the pleural cavity as well as air contained in it, the diagnosis is generally easy. Percussion shows the level to which the liquid rises, according as it varies with the position of the patient. The motions of the liquid, also, especially upon coughing, will also often give evidence of the presence of air in the cavity. Dr. WILLIAMS has stated that, "on change of posture and on coughing, the liquid will sometimes drop from the parts which have just been immersed; and the sound of this will exhibit the metallic ringing in so distinct a manner, that it resembles

the note which a glass or porcelain vessel yields when struck." (P. 132.) I think that Dr. WILLIAMS is mistaken in this; for, however change of position may produce this sound, whether as I have explained it or otherwise, I am certain that no dropping takes place, or can possibly take place, in the physical circumstances of the parts; but that, in all changes of position which can possibly be made, however extreme or opposite, the fluid will merely run down the parietes of the cavity, without dropping in any part.

17. (c) If the patient be shaken forcibly, or if he give the trunk a jerk, or an abrupt turn or shake, the sound, which was first mentioned by HIPPOCRATES as resembling the *splashing* of water, will be distinctly heard. This sign has been aptly termed *Hippocratic fluctuation*, and is heard when the ear is applied to the side at the time of *succussion*; the tinkling sound being also heard to accompany or to follow it, as the air bubbles break on the surface of the fluid or at the pleural orifice of the perforation. Fluctuation or splashing is best heard when there is much air in the cavity and a moderate or considerable quantity of liquid. Percussion will frequently indicate the proportions, if carefully performed.

18. III. The PROGNOSIS of pneumathorax is very unfavourable, not so much as regards the presence of the air in the pleural cavity as the lesions of which it is the consequence. Pneumathorax most frequently, especially when supervening at an advanced stage of tubercular consumption, rapidly hastens a fatal termination; but in more favourable circumstances, or earlier stages of that malady, life may be prolonged for some indefinite time after its occurrence; rarely, however, for a longer period than a few months. Dr. HOUGHTON has recorded a case of a bricklayer who lived eighteen months after perforation had taken place, and who might have lived longer if he had not imprudently exposed himself in his business, for the signs of a cavity had disappeared, the side had contracted, and his general health had much improved. Dr. STOKES has adduced the case of a gentleman who lived for many months, and who generally heard a splashing noise in his chest when on horseback. CAMBALUSIER and LAENNEC refer to cases which they consider to have recovered, but upon insufficient evidence. Dr. WILLIAMS states, that he has seen "two cases leave the hospital with the impression that they were nearly well, having gained flesh and lost the worst phthisical symptoms after the first severe consequences of the perforation had subsided." (P. 133.) My experience leads me to conclude, that, when the tuberculous disease is limited, when perforation occurs at an early stage of that disease, and when the constitutional powers of the patient are not much impaired—circumstances in which perforation rarely takes place—then life may be prolonged for a considerable period, if a cure even may not be effected. For it is not impossible for a superficial tubercle, or very small cavity, to perforate the pleura, and, by such perforation, or the rupture of the nearly perforated pleura, to allow the passage of air into the pleural cavity, the compression of the lung, and the exudation of lymph upon the surface of the perforated membrane, favouring the diminution or obliteration of the cavity,

and the occlusion, or even the cicatrization of the aperture. In these circumstances, therefore, it is not unreasonable to hope for a considerable prolongation of life, even although complete recovery may not take place. M. LAENNEC has adduced an instance in which the patient lived six years after pneumathorax appeared; and M. CHOMEL has considered perfect recovery not impossible, the parietes of the chest falling inward, as in recovery from certain cases of empyema (*see* PLEURA, § 78).

19. IV. TREATMENT.—This should vary with the several circumstances under which perforation or rupture of the pleura and the passage of air into the pleural cavity take place, with the period which has elapsed since the occurrence, and with the existing state of the patient. When the perforation and passage of air into the cavity have just occurred, the patient often presents many of the indications of having received a vital shock; he is pale, anxious, faint, feeble, and depressed physically and morally. At the same time, he complains of oppressive dyspnoea and pain, and his pulse is rapid and feeble. In this state lowering measures would be dangerous. Gentle restoratives, with opiates, are chiefly indicated, as camphor or ammonia, with morphia; but reaction often occurs, if the accumulation of air and the suffocative dyspnoea (§ 8, *et seq.*) prevent not its supervention. Nevertheless, the irritation and inflammation of the pleura produced by the air are generally attended by some indication of reaction after some hours, although this may be imperfect, or but slightly developed. The pain which is complained of should not be considered as a proof either of the presence or the amount of inflammation, or even of irritation of the pleura, for it is often greatest immediately upon the perforation and passage of air into the pleura, and before inflammation is developed by the occurrence. Besides, it is often occasioned by the stretching of adhesions which had existed, and is thus, as well as in other circumstances, independent of inflammatory action. Still we should be prepared for the supervention of inflammatory irritation of the pleura soon after the air has acted upon this surface, especially if the atmosphere at the time be cold and dry; and this complication of inflammation with the pneumathorax will be more certainly indicated by the states of the pulse, skin, and tongue than by the amount of pain. If the pulse become hard or constricted, the skin dry, and warmer over the affected side, or if the parietes of the side are tender or sore upon pressure or percussion, and if the patient be young, robust, or plethoric, or of the sanguine temperament, then blood-letting, general or local, the latter most frequently, but the former in some instances, and both in others, especially in the circumstances just stated; antimonials, mercurials, and opiates; cooling diaphoretics, aperients, and external derivatives and counter-irritants, as advised for *inflammations of the pleura*, are the means chiefly to be relied on. But these means should be directed with due attention to the peculiarities of individual cases, as insisted upon in the preceding article.

20. Instantly upon the occurrence of this lesion—within even a few minutes of it, as I have seen in one instance—but at any indefinite period afterward, the quantity of air drawn into



the pleural cavity may be so great, and the distention of the parietes of the side so very considerable, as to suggest reasonable fears of almost immediate suffocation, not only from complete compression of the lung of the affected side, but also from a less compression of that of the other side. In these circumstances, exit should be given to the air by puncturing the parietes of the thorax. I am aware that the propriety of resorting to this mode of relief has been questioned; but an instantly impending fatal result has to be averted; and in some instances it may be averted for a considerable time, almost always for a short time, and possibly for months, or even years, by resorting to this operation. I believe that recourse to this operation should not be delayed when pneumothorax has occurred at an early period of phthisis, or when the patient is young, not greatly reduced, or while he has not advanced very nearly to a probable termination of a disease which would certainly end fatally, even if perforation of the pleura had not taken place. The pain and risk of the operation are nothing in comparison with the continued distress experienced during the pneumothorax; and although relief may be only temporary, the operation may be repeated several times without increasing the risk of life, but, on the contrary, greatly diminishing it.\*

21. It is unnecessary to remark farther respecting the treatment of pneumothorax, inasmuch as the means which have been recommended for chronic pleurisy and empyema are generally applicable also for the more complicated malady which has just now been considered, due regard being had to the peculiar features of individual cases. (See art. PLEURA, § 175, *et seq.*)

BIBLIOG. AND REFER.—B. M. Itard, Dissert. sur le Pneumothorax ou les Congestions gazeuses qui se forment dans la Poitrine. Paris, 8vo, An. xi.—R. T. Laennec, Treatise on the Dis. of the Chest, &c.; transl. by J. Forbes, 8vo. London, 1829, p. 499.—J. Forbes, Original Cases, with Dissections and Observations illustrating the Use of the Stethoscope and Percussion in the Diagnosis of Dis. of the Chest, 8vo. Lond., 1824.—Rayer, Archives Génér. de Médecine, t. xvii., p. 345.—Various Cases illustrative of Pneumothorax. See t. v., p. 17 et 321; t. vi., p. 104; t. viii., p. 456.—Littre, in Journ. Hébdonad. de Médecine, &c., t. i., p. 49.—Lenoir, in *ibid.*, t. i., p. 312.—Lenormand, in *ibid.*, t. ii., p. 293. (*A case in which Recovery appeared to have taken place.*)—Duncan, in Edin. Med. and Surg. Journ., vol. xxviii., p. 302. (*Chiefly Cases illustrating the association of Empyema and Pneumothorax.*)—Gerard, in Med. and Chirurg. Review, Oct., 1836, p. 562.—W. Stokes, Treatise on Dis. of the Chest, &c., 8vo. Dubl., 1837, p. 527; and Dublin Journ. of Med. Sciences, Sept., 1840.—C. J. B. Williams, On the Path. and Diag. of Dis. of the Chest, p. 125; and Lib. of Pract. Med., vol. iii., p. 130.—A. M. Saus-

\* In 1833, a case of pneumothorax occurred in my practice, at an early stage of phthisis; the patient being young and robust, and not having lost flesh or strength. The nature of the mischief was prominently characterized: the heart was pushed remarkably far to the right side; and the rational and physical signs were all marked and extreme; the dyspnea and distress were great. I advised that an opening should be made for the exit of the air; and the friends of the patient desired that Sir A. COOPER should make it. We met a few hours afterward; he admitted his ignorance of the nature of the lesion. I fully explained the cause of the symptoms, and of their extreme urgency; but he refused to perform the operation, stated that he had never performed it with the view of letting out air, and that he would not now do any thing so novel, although he would have been ready to undertake it when he was a much younger man. Having heard Sir ASTLEY's determination, the patient's friends would not allow the operation to be resorted to by any one else; and the patient died, asphyxied, a few hours afterward. The operation, if it had been resorted to in this case, might have prolonged life for a very considerable period.

sier, Recherches sur le Pneumothorax et les Maladies qui le produisent, les Perforations Pulmonaires en particulier, 8vo. Paris, 1841.—Chomel, in Dict. de Méd., 2d edit., art. Pneumothorax.—P. C. A. Louis, Recherches on Phthisis, &c.; transl. by W. H. Walshe for the Sydenham Society, p. 328. (See, also, BIBLIOG. AND REFER. to art PLEURA.)

## POISONS—POISONING—POISONED—SYMPTOMS AND TREATMENT OF.

### CLASSIF.—GENERAL AND SPECIAL PATHOLOGY AND THERAPEUTICS.

POISONS may be DEFINED to be *substances which act injuriously upon the human body*. The number of substances which may be comprised under this definition, even in the present state of our knowledge of the productions of the three kingdoms of nature, is very great; and many of these, owing either to their weak powers, or to the imperfect state of our knowledge of their effects, will receive only a slight notice, or be entirely overlooked. It should, however, be recollected that there are many substances which act injuriously when improperly employed either as articles of food or as medical agents; this improper employment having reference rather to the quantity used, and the conditions of the frame in which it is employed, than to the injurious nature of the substance. The definition, therefore, may be extended as follows: *Substances which exert a deleterious influence on the human frame, when taken internally or applied externally, as regards either their nature or the quantity of them employed; or which tend, in either respect, to destroy life when thus used.*

1. While the word *poison* refers to the substance exerting the deleterious influence, *poisoning* is the commission of the injurious act, and *poisoned* is the state or effect resulting from the substance or agent employed. These words may thus be viewed as referring respectively to the *agent*, the *act*, and *actor*, and the *effects* or pathological states produced by the poisonous agent. It is obvious that the investigation of the *first* and *second* of these, with due precision, belongs to *legal medicine* or *medical jurisprudence*, and that it consequently does not fall within the scope of my work. I have only briefly to consider the *symptoms* and *effects* of *poisons*—the *pathological states* produced by substances, whose injurious effects have been observed and recorded by medical authorities, and the best *means* of *preventing*, *counteracting*, or *removing* these states. Before, however, I venture to discuss the pathological effects of individual poisons, and the treatment of these effects, I shall briefly consider, 1st. *The modes in which poisons are employed or exhibited.* 2d. *The action of poisons.* 3d. *The channels through which poisons act in producing their effects.* 4th. *The general effects of poisons;* and, 5th. *The special operation of poisons.\**

\* The following *Synopsis* will show the extent of consideration which a due discussion of the subject now before me ought to comprise. My limits, as well as the scope of the work, will admit only of a hasty view of the several topics here enumerated:

1. MODES IN WHICH POISONS ARE EMPLOYED OR EXHIBITED.
  - i. To the Respiratory organs—Inhaled or Inspired.
  - ii. Taken into the stomach.
  - iii. Applied externally—(a) The cuticle not having been removed.
  - (b) To a surface the cuticle of which has been removed.
  - (c) Introduced by or into a wound.

2. I. THE MODES IN WHICH POISONING TAKES PLACE, whether the act is felonious, intentional, or accidental—whether it is suicidal or from intentional exposure to the agent—are more diverse than may appear on a hasty view of the matter; and the effects produced and the treatment required are thus equally diversified: 1st. *Several gases, vapours, or fumes of volatile or vaporizable substances have been intentionally exhibited, or accidentally inhaled, so as either to arrest the respiratory actions, or to impede or obstruct, or otherwise influence the changes produced in the blood by respiration, as well as those changes of function, and sometimes even also of organization, which take place either primarily or consecutively in the nervous centres.* Several vapours or fumes, medicinal as well as poisonous, may be inhaled into the lungs with the view of producing certain anticipated effects. Some of these are thus employed more or less beneficially. Others are more obviously injurious, or even fatal; and a few have recently been directed to purposes which are considered beneficial, after the very superficial and empirical view which has hitherto been bestowed upon this mode of employing them. The vapours of several substances possess the power not only of impeding the changes produced in the blood by the air during respiration, but also of altering the physical characters of the blood itself and the

state of the nervous functions. These alterations of the blood and nervous systems are produced not only immediately upon the blood circulating in the capillaries of the air cells, and upon the organic nerves supplying the respiratory organs, but also consecutively, owing to the passage of the vapour to some amount into the circulation, and to the actual admixture of it in the blood, and to its action on this fluid and on the nervous centres. The vapours of alcohol, of all strong spirituous liquors, of most ethereal fluids, of spirits of turpentine, and several volatile oils, produce a more rapid effect when inhaled in more or less concentrated states than when these substances are taken into the stomach; and if the vapour inhaled be much concentrated, or if the inhalation be continued for some time, the changes produced in the blood, and the effects on the nervous system, are such as to endanger or to destroy life. This more immediate and intense effect arises chiefly from the extent of surface upon which the vapour acts, and from the rapid imbibition of fumes or vapours by the respiratory mucous surface. But this subject will be more fully shown in the sequel, when the special operation of certain injurious agents is considered. Most of its pathological and therapeutical relations are discussed in the article ASPHYXIA.

3. 2d. The most frequent way in which poisons are exhibited is *that by the mouth, the injurious substance being taken into the stomach either alone, or simply diluted, or in the drink or food.* It is obvious that the symptoms and the effects of any poison are much modified by the state of dilution or of admixture with alimentary articles when thus exhibited, and by the condition of the stomach at the time, especially as regards the nature and amount of the contents of this viscus. The state of the constitution and of the health, and other circumstances connected with the person poisoned, as well as with the agent employed, also materially influence the effects produced in different cases by any individual poison, although the quantity exhibited is the same. The rejection by vomiting of a portion of the poison, the time that has elapsed from the moment of exhibition, the amount and character of the evacuations it may have produced, and the precise nature and character of the effects observed at the period when the patient has been first seen by the physician, require, both individually and in connexion, to be duly considered by him, the inferences which he must promptly draw from these being made the basis of the most prompt measures of aid. The digestive mucous surface being protected by a mucous secretion, and by the secretions furnished by the collatitious viscera, and frequently containing more or less partially-digested matters, in addition to the vehicle of the poisonous substance, an injurious effect is produced upon it much less readily in many instances, owing to these circumstances, as well as to the nature of the poison employed, than upon some other parts where the poison is more rapidly absorbed and carried into the circulation. Besides, the injurious substance is often in great part thrown off the stomach, or passed through the bowels; and that which remains, by irritating and inflaming the villous surface, is thereby prevented from being absorbed, or so entirely absorbed

- (d) Injected into blood-vessels.
- iv. Injected into the larger bowels.
- v. Introduced or injected into the sexual organs.
- vi. Injected into the urinary organs.
- II. THE ACTION OF POISONS.
  - i. Poisons act locally and primarily.
  - ii. Remotely and consecutively.
  - iii. Both locally and remotely.
  - iv. Chemically.
- III. CHANNELS THROUGH WHICH POISONS ACT.
  - i. Primarily and locally.
    - a. On the nerves of the part.
    - b. On the capillaries and vessels of the part, and the contained fluids.
    - c. On the irritability of the tissues.
    - d. On the general structure of the part.
  - ii. Sympathetically, or by nervous influence; or through the media of the organic and animal systems of nerves.
  - iii. Organically, or by imbibition or endosmose, and absorption; or through the medium of the circulating fluids.
- IV. GENERAL EFFECTS OF POISONS.
  - i. Depressing nervous influence and vascular action; lowering vital power.
  - ii. Inordinately exciting nervous influence, either organic or animal.
  - iii. Inordinately exciting vascular action.
  - iv. Exciting nervous influence and vascular action; exciting vital power.
  - v. Exhausting nervous influence; or exhausting vital energy.
  - vi. Altering nervous influence and vital power.
  - vii. Producing a succession of two or more of these states or effects.
- V. SPECIAL OPERATION OF POISONS.
  - i. Abstracting the animal caloric or depressing the calorific process in a part, or throughout the body.
  - ii. Benumbing, depressing, or suppressing sensibility, or the organic nervous influence.
  - iii. Paralyzing involuntary motion and voluntary movements.
  - iv. Softening, liquefying, or dissolving one or more tissues or textures.
  - v. Irritating particular organs or parts.
  - vi. Astringing and increasing the tone or vital cohesion of certain tissues.
  - vii. Diminishing or increasing the irritability of contractile parts.
  - viii. Augmenting certain secretions and excretions.
  - ix. Stimulating the ganglial, spinal, or sensory nerves.
  - x. Altering the vital actions—the secretions and nutrition of particular organs or textures, according to the substance employed, and the mode of employment.



as it might otherwise be, into the circulating fluids, absorption, imbibition, and endosmosis not so readily taking place in these circumstances as in others. Nevertheless, the injurious impression made by the substance taken into the stomach upon the nervous systems, and especially upon the organic or ganglionic, may continue or may increase, and be extended to several of the collatitious viscera, and even to remote organs, as the brain, spinal cord, heart, lungs, and kidneys—to the former by nervous communication, and to the latter partly by this channel, and partly through that of the blood and vascular system, either mode of operation predominating in different cases, according to the poison which has been taken. I need not, however, dilate farther on this topic, as it will receive numerous illustrations in the sequel.

4. 3d. *When poisons are applied to the external surface of the body*, the effects are contingent upon the state of the cuticle, which forms an efficient protection against injurious substances, excepting such as are most irritating or virulent; and even many of these latter are inoperative, unless they are allowed to remain applied to the surface for a considerable time.

—(a) *The protective power of the cuticle varies in different temperaments and constitutions*, substances which produce little or no effect when applied to the cutaneous surface of one person rapidly affecting others when thus employed. This difference most probably depends upon the varying grades of density, thickness, &c., of the cuticle, and possibly, also, upon the vascularity and sensibility of the subjacent tissues.

5. (b) *Poisonous substances, applied to the skin after the cuticle is removed*, or even to a mucous surface, but more particularly to this surface when its epithelium is detached, produce their effects with great rapidity, the period varying, however, with the situation, the duration of contact, and the nature and state of the substance. The effects depend upon the nature and intensity of the impression made upon the tissue, upon the sensibility and vascularity of the part, upon the rapidity and amount of imbibition and absorption, and upon several other circumstances, which will be more fully set forth hereafter.

6. (c) *When a poison is inserted in a wound*, the effects will be nearly co-ordinate with those which result from its application to a surface deprived of its cuticle or epithelium, some variation, probably, resulting from the nature and situation of the wound, and upon the degree in which the injury may favour the retention, and the situation facilitate the absorption of the poison.

7. (d) *The passage of the poison into a vein, or the injection of it into a vessel*, is productive of the most rapid effects, relatively to the operation of the particular agent employed; for not only is a local effect thereby produced, but the poison, being directly carried into the circulation, operates, according to its nature, both upon the blood and vascular system, and upon the nervous centres, and the vital and excreting organs.

7\*. (e) *When a poisonous substance is employed externally in either of the modes now indicated*, the effects depend principally upon

its nature. Numerous specific or other animal poisons, and several virulent vegetable poisons, are thus inoculated; and diffusive or septic inflammation and destruction of the cellular tissue, erysipelas, the contagious exanthemata and fevers, inflammations of the lymphatics, veins, arteries, and glands, various specific diseases, as rabies, smallpox, &c., and other virulent maladies, in which the organic nervous energy is depressed or annihilated, and the circulating fluids are contaminated, are thereby produced. The inoculation of most of these poisons is accidental, but it may be intentional—felonious or suicidal. Certain of these poisons, when allowed to remain in contact with the surface, may produce their usual effects, although the cuticle or epithelium is entire; but when they are brought in contact with an abraded surface, or introduced into a punctured or incised wound, the effects are rapid, and vary in character with the nature of the poison, and the affection of the constituent tissues of the part injured, some occasioning a septic contamination—a solution and disorganization of the cellular tissue, which rapidly spreads, and poisons the circulating fluids; others affecting the veins, and producing asthenic and spreading inflammation of them, with all its worst consequences; several inflaming the absorbents and absorbent glands; and certain others implicating two or more of these, and often the nerves, arteries, and other structures in addition, the secondary and more remote effects being still more complicated, and the ultimate results being often speedily fatal. Numerous illustrations of what I have now advanced will appear in the sequel, when certain animal poisons come under consideration, and may be adduced from the history of infectious and contagious maladies.

8. 4th. *Poisons may be injected into the large bowels*, either accidentally or intentionally, and produce in this situation their peculiar and even fatal effects. Even certain of them may be thus employed medicinally, and, owing either to the ignorance of the prescriber of their influence in this situation, especially in some diseases and states of vital power and action, or to idiosyncrasy of constitution, their operation may be most dangerous or even fatal. Some injurious substances, when taken into the stomach and mixed with the aliments, are somewhat changed by the action of the secretions, while the primary impression produced by them is thereby impaired or modified, and the absorption of them is delayed or prevented, if, indeed, they be not instantly thrown off by vomiting; but there are many which, when thrown up into the large bowels, act more rapidly and more virulently than if they had been taken into the stomach, owing to rapid absorption often taking place in the large bowels, and to the circumstance of their being less likely to be changed in this situation.

9. 5th. *Poisons have been introduced into the sexual organs*, especially of the female, where they have produced their local as well as constitutional effects, the former of these effects being severe according to the nature and quantity of the substance thus employed, and the latter depending upon the same circumstances. This mode of poisoning, as well as the next,

10. 6th. *The injection of poisons into the uri-*

nary passages, is of rare occurrence; it has, however, been employed both feloniously and accidentally; while the treatment of several maladies of the sexual and urinary organs, by means of injections of various stimulating, astringent, tonic, or acrid substances, has caused, either directly or indirectly, most injurious, or even fatal results, especially when these have been resorted to in cases to which they were inappropriate.

11. II. OF THE ACTION OF POISONS.—*Poisons*, according to the definition of the word given above, may act, 1st. *Locally and primarily*; 2d. *Remotely and consecutively*; and, 3d. *Both locally and remotely*. Thus the substance applied either to the external surface, or inhaled into the lungs, or taken into the stomach, may only corrode or inflame the part with which it comes in contact, this effect being so intense as to endanger or even to destroy life. It may produce but little or no lesion or visible change in the part to which it is applied, and yet, through the medium either of the nervous systems or of the circulating fluids and vascular system, it may destroy the individual. And lastly, it may, after having occasioned more or less remarkable local changes, affect the nervous systems, or the vascular system and fluids, or both the nervous systems and the vascular system, with the fluids, secretions, and excretions, thereby destroying life, and sometimes altering even the structure of several of the organs of the body before life is extinguished. Sufficient illustration of these modes of action will appear in the sequel; but I must consider them individually and more particularly, and with reference to the tissues which poisons seem especially to affect, and the channels and media through which they act.

12. I. OF THE LOCAL AND PRIMARY ACTION OF POISONS.—Whether or no the injurious action of a substance be limited to the part to which it is applied, or be extended much farther and to distant parts of the frame, it is of moment that we should have some acquaintance, the more intimate and accurate the better, with the nature of the effect produced locally, and with the changes in the constituent tissues of the part.—(a) Certain substances, as aconitine, prussic acid, &c., even when applied to an external part, protected by its cuticle, will occasion numbness or want of sensibility, without any other visible change, the local effect thus produced in the *nerves* not proceeding farther, unless the application be protracted or repeated, or the activity of the poison be great, or the cuticle be removed. This effect upon the sensibility evinces not merely a special operation of the substance, but also a disposition or power possessed by it to affect more generally and sympathetically the whole nervous systems, although certain parts of this system may betray the effect in a more remarkable degree.

13. (b) Other substances produce a more severe local effect, and yet this effect will continue altogether, or more or less, limited to the part, the injurious operation being caused rather by the intensity and extent of the irritation locally excited than by any other more extended impression or change produced by it. Substances occasioning a local injury or irritation, as mechanical irritants, fragments of broken glass, &c., excite the organic and animal sen-

sibility in the part with which they are brought into contact; and soon afterward the vessels, the capillaries especially, and contractile parts are implicated, and even farther local changes of structure ensue, owing to the effusion of lymph, serum, &c., and to the alterations thereby produced.

14. (c) Certain substances, while they benumb the sensibility of the part to which they are applied, also impair the irritability of the fibrous or contractile tissues; and others, while they excite the sensibility, also increase for a time both the susceptibility and the power of contractile or irritable parts, ultimately exhausting these properties, according to the nature and quantity of the substance employed, and thereby showing the intimate connexion existing between sensibility and irritability, and demonstrating that substances which either benumb or excite, or exhaust the one, similarly affect the other. The more active of these agents may thus destroy life by their local effects, especially when they act upon vital organs or parts. Even mechanical agents or irritants, by their intense action locally, and the nature or functions of the organ, surface, or tissue with which they come in contact, may destroy life by their local effects entirely or chiefly. The changes produced by numerous substances are of such a kind as admit of their usual procession being observed. First, the nerves of the part and the sensibility are either benumbed or excited, or irritated, or exhausted, and the contractile property of fibrous tissues similarly affected. Then the capillaries and the contained fluids are implicated, and all the phenomena, either of congestion or of inflammation, with the usual results, are developed, according to the nature of the agent employed.

15. (d) Other substances act so rapidly, and produce so general an effect upon the constituent tissues of the part, involving them all in the effect produced, or inducing disorganization with so great rapidity as to render it difficult, if not impossible, to determine the particular element or tissue primarily or principally affected, or to trace the procession of changes. Intense heat and cold, numerous chemical agents, and some septic poisons derived from the animal and vegetable kingdoms, produce this more intense and disorganizing effect upon the part to which they are applied. Some congeal, constrict, desiccate, corrugate, carbonize, or otherwise destroy the structure; and others dissolve, liquefy, or annihilate the vital and physical cohesion of the several textures, which fall into a state of dissolution or pulpy destruction with varying degrees of rapidity.

16. II. OF THE REMOTE OR CONSECUTIVE ACTION OF POISONS.—The primary impression or action of poisons is seldom such as to destroy life of itself, or without producing remote or consecutive effects. If, owing either to the intensity of the local action, or to the extensive disorganization produced in the part, death should quickly follow the application of an injurious or poisonous substance, the effect may be imputed chiefly to the shock received by the vital power, unless the agent acts directly upon a vital organ, whose circulation and functions it is capable of immediately arresting. A corrosive substance, as nitric or sulphuric acid,



&c., taken into the stomach, owing either to its nature or the quantity employed, or to both, causes death in a very short time; but this result is not owing merely to the local action, but to the shock produced by a severe injury inflicted upon an organ supplied by nerves from the organic or ganglionic nervous system, and intimately associated in function and organic nervous energy with the organs most necessary to the continuance of life. The local injury is inflicted; the whole body instantly experiences or feels it; the shock, or injurious impression, is rapidly transmitted throughout the whole organic nervous system; and if it be intense, it annihilates not only the vital influence of the organ on which it primarily acts, but also, and through the medium of the organic nervous system, the action of the heart, of the diaphragm, of the lungs, of the brain, &c. Thus the more immediate of the remote effects are produced, sometimes with a rapidity which might lead to the inference that the local impression and the consecutive result are but one operation. More frequently, however, this result takes place with much less rapidity, the primary injurious impression inducing a succession of pathological phenomena, which often admit of due recognition, as they are manifested in either the nervous or the vascular system, or the blood, or the secretions, or the excretions, or in several or even in all these, as will appear in the sequel.

17. It is obvious that, while some injurious agents, from their nature or the quantity, may act either locally or remotely, primarily or consecutively, or in either of these chiefly, there are others which act *in both modes*, either one predominating over the other, according to the agent or agents employed. The mineral acids, in large quantity, or in a concentrated state, act locally, destroy the textures, occasion a general shock of the frame, and even terminate life. In small quantity, or less concentrated, the local action is much less intense, and remote effects are developed, and are such as admit of being traced. Various vegetable or narcotic poisons produce but slight or no apparent local change, yet affect organs remote from the seat of application in a very remarkable manner; and many substances change not only the tissues, on which they primarily act, but also the states of distant parts; these substances even deriving their chief appellations, as acro-narcotics, &c., from their compound properties.

18. III. THE MEDIA OR CHANNELS BY WHICH POISONS ACT.—It is of great importance to trace the channels through which substances act injuriously on the frame; for the knowledge of these enables us on many occasions to prevent or to arrest the effects produced by these substances. But in order that the media or channels of remote or consecutive effects should be recognised, it is necessary, in the first place, to ascertain the local and primary operation of the substance, the more remote effects of which we are desirous of tracing in the successive changes produced by it. It becomes, therefore, desirable to consider, 1st. *The nature of the local and primary impression produced by a poison.* 2d. *The extent and amount of the sympathetic effect, or of the operation by nervous communication or influence as far as this may be*

*known; and, 3d. The organic operation of a poison, or the circumstance of the imbibition and absorption of the substance injurious employed, and the probable extent or amount of the mischief produced which may be imputed to this mode of operation.* As poisons thus act *locally, sympathetically, and organically*, or in the ways now specified, and as it is obvious that the action of a particular poison is not limited to any one of these modes, although it may operate in either way more prominently than in the others, it may not be superfluous to consider the matter more in detail.

19. i. *The nature of the local and primary impression produced by a poison* is not always readily ascertained; for, owing either to the quantity or the intensity of action of the substance employed, the several constituent systems and tissues of a part may be so instantly and generally impressed and altered by that substance as not to furnish distinct evidence of the tissue primarily affected, as I have above contended; but in other circumstances the local changes, as well as the consecutive effects, often admit of analysis, although sometimes imperfect, the results necessarily varying with the circumstances of particular cases.

20. A. *The nerves* of the part, whether the organic, the sensory, or the motory, are evidently primarily affected according to the texture to which the poison is applied, or are the first to manifest the effect, unless the substance be such as rapidly to change the organization of the structure; and according as either of these orders of nerves is implicated or impressed, so will the secretions, the sensibility, or the movements of the part be affected.

21. B. *The irritability* of contractile tissues is also altered by poisons, more especially by those which change the state or functions of the organic nervous system. If what I have contended for in the article IRRITABILITY, namely, the dependence of this very prominent vital property upon the organic nervous influence, be admitted, it necessarily follows that this property will be co-ordinately affected by whatever changes the state of this influence; and a close investigation of the operation of many poisons proves that those substances, as certain animal poisons, which inordinately depress or altogether annihilate this influence, affect the irritability of the contractile tissues in a similar manner and in a co-ordinate degree.

22. C. *The capillaries and vessels* of the part must also be changed, as regards their vital properties, whenever the organic nervous influence and irritability are affected; and the change of these vessels must be necessarily similar, as to kind and degree, with that primarily produced in the organic nerves and contractile tissues. There is every reason, also, to believe that the change is not limited to the capillaries and smaller vessels, but extends more or less manifestly to the contents of these vessels, more especially to the red globules and to the fibrin of the blood which they contain; the condition of the former constituent of the blood in these vessels, and the quantity or state of the latter, being always very materially altered by the morbid impression made upon the organic nervous influence and irritability of the part, and upon the vital properties of the capillaries, the physical and chem-

ical characters of the blood in these vessels being thereby thus rapidly changed.

23. *D.* The alterations thus produced in the organic nervous influence, in the irritability, in the state of the capillaries, and in the contents of these capillaries—in the blood—of a part to which a poison has been applied, must necessarily soon be followed by farther changes in the whole of the tissues constituting the part—in its *whole structure*—and these changes will be rapid, extensive, and diversified in character, according to the nature of the poison, and as it acts prominently upon either the nerves, or the capillaries, or the fluids, or the other constituents of the part, or in any of the particular modes which will come under consideration in the sequel.

24. *ii.* *The sympathetic operation of poisons*, or the action of a poison on parts remote from that to which it is applied by means of the nervous system, or by any of the orders of this system—the organic, the sensory, and the motory—evidently obtains to a very considerable extent, especially as respects the action of some poisonous substances; but, as this medium of operation is not the only one, and as it is frequently associated with that about to be considered, namely, the blood and vascular system, either channel being more or less operative in producing the remote effect, according to the nature of the substance and state of the system, it is often difficult to determine the precise extent to which either contributes to the ultimate result. It will, however, be shown in the sequel, that certain substances, when taken into the stomach, or injected into the bowels, or otherwise brought into contact with parts supplied chiefly with the organic or ganglionic nerves, have not merely the sensibility of these nerves excited, but also the involuntary movements of parts distant from that to which the substance was applied remarkably affected, owing to the local irritation being transmitted through the medium of this order of nerves, and the connexion of these nerves with nerves of sensation, and with the roots of the spinal nerves; and, farther, owing to this connexion, the effects are often extended to the spinal cord and to the brain, and thence reflected upon voluntary muscles and the extremities of the body, the resulting phenomena varying with the nature of the injurious agent and the temperament and constitution of the person poisoned by it. It is unnecessary to illustrate this topic at this place, as it is fully discussed in the articles *IRRITATION* and *IRRITABILITY*, and especially in that on *SYMPATHY* or associated morbid states.

25. *iii.* *The organic operation of poisons*, or the imbibition and absorption of them, or the action of them through the media of the circulating fluids, as the lymph, the chyle, and the blood, is one of the most important ways in which the effects of these substances are produced. Still, this way is not always the same, the route varying with the organ or part to which the poison is applied, and with the nature and action of the particular poison employed. The imbibition or endosmosis of some substances through membranous tissues is often much more rapid than that of others; but much depends upon the physical state of the poison, and concentration of the solution of it employed, and other circumstances. The passage of

some substances into the blood, when either applied to a mucous surface, or to a surface denuded of its cuticle, or epithelium, or introduced into a wound, is often much more rapid than might be supposed, if the fact had not been demonstrated by experiments. Nevertheless, the rapidity of the introduction of certain poisons into the circulation has been, according to a few observations I have made, overrated by some writers, who have considered that the passage of a poison into the blood may take place in a very few seconds. It will certainly occur in much less than a minute in some cases; but I doubt the extreme rapidity contended for by some physiologists. Great rapidity of absorption is observed chiefly as respects certain saline or virulent vegetable and animal poisons, which are readily imbibed by the capillaries and carried into the blood. Substances which are absorbed by lacteal or lymphatic absorbents act much more slowly, and several of them require a considerable period before they reach the blood, especially if the vessels which have absorbed them pass through glands; and when this is the case, the glands are often affected, and in some instances, when the poison is not very virulent or rapid in its operation, the glands either altogether arrest or delay, for a longer or shorter time, the progress of the mischief.

[It is now generally conceded that poisons are not instantaneous in their action, but that sufficient time always elapses between the application of a poison and the first symptom of its action to admit of its contact with the tissue which it affects. Thus, hydrocyanic acid requires, according to Professor BLAKE, of St. Louis, eleven seconds before it will take effect, when applied in large quantity to the tongue of a dog; and death does not occur under thirty seconds. He found fifteen seconds elapsed after ten drops of *conia* had been injected into the femoral vein of a dog, before symptoms of the action of the poison appeared; and death did not occur until thirty seconds after the injection. Dr. B. has also showed that the time required for a substance to be absorbed by the capillaries and diffused through the body, may not exceed nine seconds. The same experimenter has proved that the celerity of action of any poison is in a direct ratio with the rapidity of the circulation: a fact of great importance as connected with the *modus operandi* of medicinal as well as poisonous agents.]

26. The poison having been carried into the circulation either by the lacteal absorbents, or by the lymphatics, or by the capillaries and veins, according to the seat or part to which it is applied, and the action which it exerts on the constituent tissues, produces ulterior effects, which are about to be briefly considered, owing to its action, 1st, on the blood itself, in which it mixes, and which it contaminates; 2d, on the blood-vessels and heart; 3d, on the nervous ganglia and plexuses; 4th, on the spinal cord and the sensory and motory nerves; and, 5th, on the brain and organs of sense.

27. *iv.* Those poisons which act more or less *chemically* are most readily imbibed, are absorbed most directly and rapidly, and change not only the physical characters, but also the chemical constitution of the blood, as far as we are acquainted with that constitution. They



change the colour, and there is reason to suppose that they affect also the organization of the red globules; they alter or diminish the fibrin, and variously affect the saline and albuminous constituents of the blood. But there are few of those substances which act thus chemically upon the blood, especially alkalis, acids, and numerous neutral salts, that do not also affect the vital condition of this fluid, and change this condition and its chemical constitution both in relation to each other, and in connexion with the vessels and heart, and with the nervous centres, more particularly the nervous system actuating the circulating apparatus.

28. IV. GENERAL EFFECTS OF POISONS.—i. *Some substances or agents depress nervous influence and vascular action*, and thereby lower vital power; the depression being either relative or absolute, and varied in its effects, according to the agent and the quantity, intensity, or duration of its operation. The application, for instance, of cold, or, more correctly, the abstraction of vital caloric, when moderate or of short duration, or acting upon a surface or part only of the body, depresses vital action in that part during its continuance; but reaction takes place when the depression is limited as to seat and time, owing to the determination of the circulation to more internal or to vital parts, or when muscular action accelerates the flow of blood in the vessels. But when cold, owing to its intensity or continuance relatively to the state of the system while exposed to it, renders torpid the organic nervous influence, and retards or interrupts capillary and venous circulation through a considerable extent of the frame, reaction may not take place, or may occur so imperfectly or irregularly as not to relieve internal congested organs; and if it occur, it may be attended with, or develop inflammation in some predisposed organ.

29. There is, perhaps, no other agent which tends so completely to depress both the nervous and vascular functions, so as even to overwhelm them altogether, as cold, when it acts either intensely or for a long period relatively to the constitution and circumstances of those subjected to its influence, or when it exceeds in grade that which has just been stated to admit only of imperfect reaction. Like other agents, therefore, cold is either a tonic, a sedative, or destructive of life, according to its grade and the manner of its operation on the living economy; but there is scarcely another physical agent whose sedative effects are so equally manifested upon all the general systems and functions of the frame, and without directly producing some other operation, unless the respiration of air, loaded with carbonic acid, or with sulphureted hydrogen, or prussic acid used in any form, be exceptions. Aconite and colchicum are sedatives to the sensory and organic nerves especially, but they also irritate the surfaces to which they are applied; and digitalis and tobacco act chiefly on the heart and vascular system, without materially depressing the nervous functions of animal life, or the functions of the brain and spinal cord. When, however, these, or other substances, which produce a general sedative or depressing effect, as respects nervous influence and vascular action, are exhibited in large or injurious

quantities, their subordinate operations are then so masked as to escape notice, or are so inconsiderable as not to deserve attention. Certain poisons, which produce a narcotic effect upon the nervous system, when given in moderate doses, exert a sedative influence upon the vital actions generally, when taken in still larger or poisonous quantities, as shown by opium, belladonna, conium, hyoscyamus, &c., when so exhibited.

30. The sedative effect, when it becomes injurious, is generally not limited either to the part to which the agent is applied, or to a particular system or organ. Besides depressing nervous power in the surface or viscus to which a sedative poison is applied, and causing capillary and venous congestion, the morbid impression is propagated along the nerves to more distant parts, especially to the nervous centres, while the poison itself is partially absorbed, and, mixing with the blood, it acts directly upon the nervous masses, and more or less, also, on various organs, according to its specific influence. This being the general effect—the result being depressing, and ultimately destructive of organic nervous power and vascular action, with varying degrees of rapidity, according to the nature of the poison and the quantity employed—it may be imputed, according, also, to the nature and quantity of the agent, to either of these channels or media principally, or to all of them, although in different grades, the fatal or injurious operation arising through these sources singly, or conjointly, but in varying proportions.

31. ii. *Some poisons inordinately excite nervous influence and vascular action*, or stimulate vital power for a time. Heat and oxygen are the most influential agents in producing this effect, and they perpetuate it perhaps longer than any other without exhausting vital action, especially upon withdrawing them. Alcohol, the ethers, ammonia, and numerous other stimulants, may become poisons when exhibited in large quantities, or when long employed, owing partly to their effects locally, but especially to their influence, through the media of the nervous and vascular systems, and of the blood, upon the nervous masses or centres, and upon the liver and excreting organs. It is seldom, however, that stimulants destroy life before they have induced either exhaustion co-ordinate with the stimulating action, or effusion to an amount sufficient to interrupt the functions of a vital organ, or alterations of the circulating fluids incompatible with the continuance of the nervous functions or of the heart's action, or even inflammatory or structural changes of some important viscus, or some two or more of these changes.

32. iii. *Exhaustion of organic nervous power, and of sensory and motory influence*, or of vital energy generally, is one of the most manifest general effects of substances given in quantities sufficient to destroy life in a short time. This exhaustion is especially remarkable when it is caused by substances which injuriously impress the nervous systems, or which act so rapidly as to render it difficult to determine whether the impression of the agent be transmitted by means of the nerves to the heart and brain, or whether the substance is itself absorbed into the circulation, where it directly

acts upon these organs, or whether it acts in both ways. Poisons which may be said to kill by exhausting the vital actions must necessarily be considered as having first produced an excessive stimulating effect, which has so rapidly passed into exhaustion as to leave the primary operation unobserved or even unobservable, for exhaustion implies antecedent stimulation. Nevertheless, if the operation of many of the substances which are generally said to destroy life by exhausting vital power, when given in large quantities, be considered with reference to their effects upon the living economy in small doses, it will be found either that the quantity which is stimulating is very small, or that the stimulating operation of the substance, even in such quantity, is very equivocal; and, if it may be admitted to exist, it rapidly lapses into a distressing or peculiar form of exhaustion, as may be allowed in respect of tobacco and various narcotics. From this it will appear that the poisonous effect of the same substance may be imputed by one person to the powerful sedative effect it had produced in the quantity or dose in which it had been given, and by another to the extreme exhaustion consequent upon a great and rapidly evanescent stimulation, &c., according to the views each may entertain of the physiological action of the substance in question.

33. iv. *The general effects of poisons cannot be viewed as merely dynamic: they also alter or change the states of nervous influence and of vascular action.* Those substances which prove rapidly poisonous, owing to their nature or the quantity taken, evince the dynamic operation more remarkably. This may, however, be owing to the circumstance that the dynamic action is much more recognisable than any change in character or kind of action, during the short period intervening between the impression of the agent and a fatal result. It is chiefly such poisons as act slowly, or some of those which are more virulent, but which, when taken in small quantities, are not rapidly fatal, that produce more or less manifest alterative effects. Still, these effects are not solitary; they are generally associated with one or two of the general effects already noticed, and also with certain others, which are more specific, or which appertain to the poison in question, and in some respects characterize its operation when employed either medicinally or otherwise. The alterative effects of poisons being recognised with difficulty, in connexion with other more general and remarkable results, unless the operation is slow, and as these effects are more peculiar or specific, and, at the same time, more complicated, I shall proceed to consider them more in detail, and endeavour to analyze them, or show their more special influences, although I cannot do so at this place in so full and satisfactory a manner as I am desirous of doing.

34. V. *THE SPECIAL OPERATION OF POISONS.*—It is obvious to the experienced observer of the operation of the more active agents of nature upon the living economy, that very few act in one unvarying manner, or that any one of them produces a single effect, or acts solely upon a single function or part, without also affecting others more or less. All that such an observer of the more special actions, either of

medicines or of poisons—and most of the former possess the latter property—can expect, is this, that, although any one of these substances produces certain general results, and extends its influence more or less to different functions and even to remote organs, some particular surface, function, or viscus; some one of the chief factors of life, or of the constant actions and results which these factors produce; some of the manifestations of life in particular tissues, systems, organs, or parts, will be more prominently affected than others, or be chiefly, but not solely, changed by the action of that substance. In the analytical survey I am about briefly to take, it must, therefore, be considered, that the special action of any single poison is not confined to the production of one only of the several effects which I shall have to notice under the separate heads which the analysis furnishes; but that it extends to more than one system or viscus, although some one manifests it much more than another, and alters certain vital properties and functions, or a particular property or function, more than others. When the symptoms and changes produced by individual poisons, and the modes of obviating and removing these changes, come under consideration, then the associated and even complicated nature of these changes will be made more evident.

35. i. *Some injurious agents abstract the caloric, or depress the vital calorific process not only in the part to which they are applied, but also throughout the body.* This effect may be produced by the application of cooling substances, or by whatever lowers the organic nervous influence and vascular action, or by both modes of action produced either simultaneously or in rapid succession. A large quantity of cold water or of ice taken into the empty stomach, especially when the system is exhausted by fatigue, or when the body is perspiring freely, may not only abstract the animal heat from parts requiring a certain elevation of temperature for the performance of their functions, but also depress the organic nervous influence actuating these parts, so as to produce capillary and venous congestion, or an arrest of the circulation, and other consecutive effects, until the action of the heart ultimately ceases. Although cold fluids may destroy life very rapidly when taken largely in these circumstances, in the manner now stated, and owing to the influence of cold upon vital actions, as noticed above (§ 28, 29), yet there are hardly any substances which are poisonous owing chiefly to this mode of action, although there are several which, when employed in large or frequent doses, produce a refrigerating and depressing effect along with other changes of a more prominently injurious nature, more especially the hydrochlorate of ammonia, the nitrate of potash, and various other salts and dilute acids, which not only depress the calorific process, but also chemically and physically affect the blood and vascular system, and through this medium the nervous system also.

36. ii. *Certain poisons act more especially in destroying the sensibility, or the functions of the sensory and of the organic nerves, in benumbing, depressing, or suppressing sensibility, and the organic nervous influence.* Of these the most remarkable are monk's-hood and its active prin-



ciple aconite, cold; ether and alcohol, when absorbed or injected into the blood, or when their vapour is inspired; belladonna, conium, morphia, and most of those which have been denominated narcotics, sedatives, and stupeficients. But these produce also a paralyzing effect, remarkably depress the organic nervous influence, diminish irritability, impede secretion and excretion, or even irritate the mucous surface to which they may be applied, as colchicum, tobacco, hyoscyamus, opium, &c. [*Chloroform* is another very active poison, which may be ranked under this head, as it exerts a directly depressing influence over the heart and cerebro-spinal system of nerves; and if breathed for a few minutes, would inevitably destroy life.]

37. iii. *Other poisons more prominently paralyze the organs of voluntary motion, while they impair the irritability of involuntary parts, diminish sensibility, and depress the organic nervous influence,* especially hemlock and its alkali, conia, hydrocyanic acid, and the cyanides, carbonic acid, sulphureted hydrogen, &c.; stramonium, cannabis indica, tobacco, digitalis, the preparations of lead, &c.

38. The substances which act energetically upon the nervous system, in impairing either the sensibility or the irritability and the voluntary movements of muscular parts supplied by nerves respectively belonging to these systems, have not their actions limited to one of these functions only, although either may be more prominently affected according to the poison employed. Their effects may, moreover, be extended even to secreting and excreting organs, such poison acting more or less on particular functions than on the others. When either of these substances is taken into the stomach in quantities which are injurious, not only are the nerves of the part affected, but absorption of the poison takes place to a certain extent, and the injurious impression made upon the nerves by it is transmitted along the organic and sensory nerves to the ganglia, brain, and spinal cord, which are farther affected according as the substance is present in the circulation. Some of these poisons seem to affect one order of the nervous system more than another; certain of them impress more especially the organic or ganglial nervous system, deranging the several functions depending chiefly upon it; others affect the brain, consciousness, and sensibility, and impair more or less the voluntary movements and other allied functions; and these several results are, moreover, varied not only with the quantity of the poison taken, but with the circumstances connected with its exhibition and the constitution and temperament of the person who is its victim.

39. iv. *Certain poisons produce a septic action, weakening and dissolving the vital cohesion of tissues, or softening and even liquefying the structures.* These substances not merely depress the organic nervous energy of the parts with which they come in contact, but they also produce a physical or chemical change in the tissues, contaminating the fluids, and favouring the imbibition and absorption, not only of the poison itself, but of the contaminated fluids of the poisoned part. Animal matters act chiefly in this way, more particularly the poisons of serpents, of fish, decomposing or putrid animal

substances, the animal poison generated in sanities and preserved or dried meats, the secretions and fluids in disease, or after death; especially after malignant and infectious maladies, and still more especially if any of these be applied to a punctured wound, or to an abraded surface. In most instances the local action of these poisons is evinced by the part being pained, swollen, livid, or otherwise discoloured, soft or boggy, sometimes numbed, and changed in temperature, often rapidly passing from a burning heat to coldness, or being cold from the commencement. These changes proceed from the extremities to the trunk, from the periphery to the centre, and extend more or less rapidly, with remarkable sinking of vital power, a very quick or irritable pulse, and manifest indications of contamination of the fluids and soft solids, more especially when the poison has been applied to an external surface, or to a wound. When it has been taken into the stomach, distressing nausea, vomiting, anxiety, and feeling of sinking, evidently owing to depression of the organic nervous energy, are then generally observed, with other symptoms varying with the particular poison which has been taken, as cutaneous blotches or eruptions, coldness of the surface, suppression of urine, rapid, weak pulse, watery stools, &c., &c.

40. The animal poisons which act in the way now described affect chiefly the *vital conditions* of the parts to which they are applied; depress organic nervous influence, and loosen the vital cohesion of the tissues, while they contaminate the fluids; but there are other substances, which soften or liquefy the tissues, in consequence rather of a *chemical* than a *vital* operation, although the vital conditions are also to a certain extent affected. These are the *alkalies*, the sub-salts, or those saline substances in which the alkali is the predominant element, the bichlorate of soda, the iodide of potassium, the alkaline sulphurets, the preparations of antimony, of mercury, &c., when used in large quantity or long employed. These substances act locally, more or less energetically, as now stated, especially the pure alkalies; but they are also rapidly absorbed, and they then alter the vital conditions of the nervous and vascular systems, and the chemical constitution of the blood, especially as regards the red globules and fibrin, the proportions of which they even diminish, especially when they have been employed for a considerable time. When thus used, they also liquefy, and favour the absorption of morbid growths or tumours, while they relax generally the soft solids.

41. v. *That various poisons excite the ganglial, spinal, and sensory nerves, or either of these orders of the nervous system, more than the others,* will be admitted; but this effect is generally varied and associated, according to the nature of the particular substance employed, with other changes manifested by secreting surfaces and organs. The stimulating operation is evidently exerted primarily upon the nervous organization of the part to which the substance is applied; and for a time it tends to concentrate the nervous power, and even vascular determination and action, towards the surface or viscus thus acted upon. Subsequently, however, the effects become more or less diffused; but the rapidity of the diffusion of the stimulating influence over

the frame depends upon the nature and quantity of the substance employed, the state of the organs upon which it has acted, and the temperament, constitution, and habits of the subject acted on. The principal question is, whether or no the general or remote effects are produced by nervous influence, or by the rapid passage of the substance into the circulating fluids, and the consequent operation of it upon the several organs and structures of the frame, or by both these modes, either of them predominating according to the circumstances just stated.

42. *A.* As to the action of stimulants on the nervous system, on either the ganglial, the sensory, or motory, or upon any two or all of these divisions of the system, there can be no doubt as respects that part of it supplying the organ to which the poison is applied; the question being as to the extension of the stimulating operation to distant parts by means of this system. Formerly, the remote effect was imputed altogether to this system, the other mode of action just referred to being overlooked or discarded. From 1819 until 1826, I made many experiments with stimulating substances and tonics, vegetable and mineral, some of which were published in the journals of the day (especially in the *London Medical and Physical Journal*, and *London Medical Repository*), with the view of determining the *modus operandi* of many active agents upon the frame; and I demonstrated beyond dispute that this is not the only mode of action, as regarded the great majority of them, which, although acting more or less in this way, operate also, and even mainly, through the medium of the circulating fluids.

43. That the stimulating impression made upon the organic or sensory nerves of the viscus to which the substance is applied is transmitted, more or less remarkably, by means of these nerves to remote parts, which it thus affects, appears extremely probable; for there are several analogies, considerations, and even proofs, both physical and pathological, of this being the fact; and, moreover, these remote effects are often reflected upon other distant parts. Thus the stimulus existing in, or acting upon, an internal viscus, may be transmitted by the organic nerves to the adjoining ganglion, or to the great semilunar ganglion, or to the spinal cord, or to the brain, becoming an object of either obscure or distinct sensation or consciousness, and there the effect may cease, or be reflected thence upon other parts, affecting the actions of involuntary organs, through the media of ganglial nerves, or exciting the movements or sensibility of voluntary parts through the medium of the spinal cord. The remote effect may be produced more or less by either order of nerves or nervous masses, ganglial, cerebro-spinal, or sensory and motory, according to the nature and quantity of the substance employed, and the mode of employing it. Much of the misconception and confusion which have existed as to the operation of agents on and through the medium of the nervous organization have arisen chiefly from the following circumstances: 1st. Experimenters have considered the organic nerves as forming a part of those proceeding from the cerebro-spinal axis; 2d. They have viewed the distinct orders or divisions of the nervous system as identical, and as performing the same functions; and, 3d. They have over-

looked the fact that it is impossible to separate the vascular system from the nervous, so as to isolate each, and that it is equally impossible to cut off the nervous communications existing in distant parts while the arterial communications are allowed to continue, inasmuch as all arteries are surrounded by a reticulum of ganglial nerves. It is owing mainly to these circumstances, and their consequences, that so many ill-planned and ill-performed experiments on living animals have been made; experiments which could furnish no correct inferences, which, moreover, were undertaken to decide points not admitting of being thus decided, and which could not prove the basis of even a loose hypothesis, far less of sound doctrine. Considering, therefore, as will appear more fully in the sequel, that poisonous as well as medicinal agents produce an impression upon the nerves of the part to which they are applied, that is not limited to such part, but which often affects sympathetically distant parts, although in various degrees and modes, according to the nature and state of the substance employed, I proceed to remark upon the operation of stimulants through the medium of the circulation.

44. *B.* That numerous stimulating substances—vegetable, saline or mineral, and animal—are more or less rapidly imbibed by the tissues, and absorbed into, and are afterward eliminated from, the circulation, are among the best established facts in physiological science. The effects which these substances produce, when taken either medicinally or in hurtful doses, are chiefly owing to this mode of action, although the impression primarily made by them on the several divisions of the nervous system is also more or less influential in producing these effects; but the exact extent of that influence can hardly be determined. That the majority of stimulating substances are actually absorbed into the circulation, to an extent varying with the substance employed, and the state and mode of its employment, has been fully established, inasmuch as they have been detected in the blood itself, and in the several secretions and excretions. The special operation of many stimulants thus depend not only upon their primary impressions upon the nervous system, but also upon their presence in the blood, and their action on the nervous masses and centres, and more specifically upon the functions of certain organs and surfaces, particularly upon those organs by which they are eliminated from the blood. The alcoholic, the ethereal, the balsamic, the camphoraceous, and several other classes of stimulants, both vegetable and mineral, act in the way now stated.\*

\* During 1819, 1820, and 1821, I made a number of experiments upon the operation of several active substances; and the results of those which I made with the terebinthines were published in the *London Medical and Physical Journal* for July, 1821. At that time it was generally believed that medicinal as well as poisonous substances acted upon the nervous system directly and entirely, the results depending altogether upon this system, without reference to the blood and vascular system, and without distinction between the organic, the sensitive, and the motory divisions of the nervous system. I believe myself to have been, if not the first, at least among the first, to determine by experiments the action of these substances through the medium of the blood, and to show that many of these substances act differently upon the different orders of the nervous system; upon the organic nerves either chiefly, distinctly, or differently from their action on the cerebro-spinal. (See *Lond. Med. and Phys. Journ.*, July, 1821, p. 112, *et seq.*, and August, 1821, p. 165, *et seq.*)



45. vi. That many poisonous substances are capable of *astringing the tissues and of increasing the tone or vital cohesion of certain structures, when employed in small quantities, cannot be doubted*; but this effect more rarely follows their employment as poisons, unless in the case of mineral poisons; and then the operation of these, especially when used in large or injurious quantities, is more chemical than vital; several of them, as the mineral acids and salts, combining to a certain extent with the tissues and the liquid elements of the tissues, altering the constitution of the capillaries and of the capillary contents, and thereby affecting the state of vital function and action. Many of the substances which act as stimulants, by the greater permanency of their effects, and by their action, in the manner now stated, upon the tissues, have an astringing operation. Substances acting thus on the economy have not their effects always limited to the parts to which they are applied; for I have ascertained that they are absorbed, especially when much diluted, or when dissolved, into the circulation, and are afterward carried out of it chiefly by the kidneys and skin. The metallic salts and the mineral acids severally act in this way more or less rapidly, energetically, and manifestly; and produce their effects on parts of the frame the most remote from those to which they were applied. The metallic sulphates and nitrates, the superacetate of lead, the balsams and resins, the phosphoric, the mineral, and many of the vegetable acids, although acting in the way now stated, severally produce other effects, when employed in hurtful quantities. Some of them excite certain of the organs concerned in excreting them from the circulation; others of them depress or exhaust the organic nervous influence and the irritability of the heart and other contractile parts; and many of them alter the constitution of the blood, especially of the red globules and fibrin, so as to render this fluid unsuitable to the perpetuation of the nervous and vital functions.

46. vii. *Numerous substances act especially upon the irritability of contractile parts, and either impair or increase this vital property, according to the nature of the substance.* These modes of action evidently result from the impression produced either primarily upon the organic nerves of the part, or consecutively upon the ganglia, the poison having been carried into the circulation, or from both these modes of operation. Prussic acid and the prussiates, monk's-hood, tobacco, aconite, digitalis, arsenious acid, colchicum, antimonials, borax, and boracic acid, ergot of rye, nitre, and several other substances, when employed in large doses, *depress* the organic nervous power, and the irritability of involuntary organs, especially of the heart, without directly impairing the functions of the brain and spinal cord, and of voluntary parts, although affecting them through the media of the ganglial and vascular systems. Other substances affect the irritability by increasing it at first and *exhausting* it afterward, the effect varying with the substance and the quantity employed. This operation probably obtains in respect even of some of the articles just enumerated, as arsenic and antimony. Other substances *excite* the irritability of both voluntary and involuntary organs more or less remarkably, as

nuxvomica and strychnia, brucia, St. Ignatius's bean, snake-wood, [the different species of rhus], &c.

47. viii. *Numerous articles act more especially in augmenting certain secretions and excretions; and they produce these effects either by their direct action on the organs to which they are applied, or by their consecutive operation, through the medium of the circulation, upon the organs and surfaces which they specifically influence.* Thus, emetics and purgatives taken into the stomach excite or irritate the organic nerves supplying the villous surface of the alimentary canal, and thereby increase the secretions and involuntary movements of the tube, each substance possessing either an emetic or a purgative property acting in a manner more or less peculiar to itself, and producing, moreover, in some cases, additional effects. Other substances, as many of those which act upon the kidneys, as the terebinthines, several salts, particularly the nitrate of potash, the nitrate of soda, the acetate of potash, cantharides or its active principle, and various other articles, are absorbed into the circulation, and excite especially the kidneys, so as to increase their secretion, or even to over-excite or inflame them. Other substances, through the medium of the circulation, affect the exhalations and secretions from the bronchi; and others, again, those from the skin. But this subject need not be farther pursued at this place.

48. ix. *That some articles irritate particular organs or parts in a way more or less peculiar to these articles, either when directly applied, or absorbed and carried in the blood to the organ affected by them, may be admitted.* But although this operation, and those just noticed, constitute the chief modes in which substances are expected to act medicinally—their principal therapeutical effects—yet they are merely subordinate to the more energetic or violent results produced upon the nervous influences and vital actions, when the same substances are employed in hurtful quantities.

49. x. *In connexion with this irritating operation, varying with the substance employed and the mode of its employment, an alterative action is also produced; the vital functions, the secretions, the sensible qualities and conditions, and the nutrition, of particular organs and parts being changed in kind or character, as well as dynamically or in degree.* These effects are manifested chiefly when poisonous substances are given repeatedly in small doses, are employed medicinally, or with the view of producing deleterious effects slowly and latently. Numerous medicines have acted injuriously in this way, as well as in the two preceding modes, in consequence of having been employed injudiciously; inappropriately as respects the nature of the disorder, and either during too long a period, or in too large or too frequent doses, the effects thereby produced having been mistaken for the progress of the disease. When substances have thus produced an alterative effect or change of action in any one or more organ or part, they have generally been absorbed to a greater or less extent into the circulation, and have operated, through the medium of the blood, on the tissues, or on the organs eliminating them from the system.

50. xi. *Substances which irritate or excite inor-*

dinately the parts or tissues to which they are applied, determine or solicit increased circulation and vital action to these parts, and proportionately diminish vascular action in distant parts, or in the viscera less intimately connected or associated in function with those on which these substances act directly. Many articles are employed medicinally with the intention of producing these effects, as *revulsives, derivatives, or revellents*; and many of the phenomena observed as consequences of poisoning depend upon this revulsive or derivative operation. This effect arises chiefly from the influence of the organic nerves, which, when irritated, influence the circulation in the associated capillaries and arteries, increase the vital expansion and action of these vessels, and augment the exhalations and secretions from them; the results varying, in kind and in grade, with the irritant or substance thus affecting the organic nerves of the part to which the increased action is thus determined.

51. VI. THE CIRCUMSTANCES WHICH MODIFY THE EFFECTS OF POISONS require to be briefly noticed.—(a) The *quantity* used materially affects the action of a poison, so much so that the most virulent poison is medicinal, or even salutary, when taken in minute doses. Thus prussic acid in a very small dose is soothing and antispasmodic, in a large dose it annihilates the vital action. Several poisons, in small quantities, slightly irritate or inflame the digestive canal, but in larger doses they produce convulsions, coma, and death.

52. (b) *The aggregation and degree of dilution* very materially modify the operation of a poison. The more minutely a deleterious substance is divided, and the more completely it is dissolved in oil or in water, the more energetically and the more rapidly it will act, especially when taken into the stomach. This necessarily follows from the preparation thus made for the action of the poison over a large surface, and for the imbibition of it by the tissues and absorption by the vessels. Certain substances, which are extremely active when thus prepared, remain for some time inactive when they have been taken in a concrete or aggregated state. The dissolving influence of the juices of the stomach, and of the secretions poured into the duodenum, is not without influence upon certain poisons, when taken in an undissolved state; for the carbonate of barytes and arsenite of copper are more soluble in these than in water. The operation of poisons is farther changed by aggregation and by degree of dilution. Camphor, in weak dilution, is cooling, sedative, and soothing; in stronger dilution in oil, or minutely divided in mucilage, it is exciting; and, in still larger quantity, productive of delirium, coma, or convulsions; and in fragments it may occasion inflammation, or even ulceration of the part to which it is applied. Certain poisons in a state of vapour, or even substances which cannot, in their usual states, be viewed as poisons, when employed in a state of vapour may become poisonous, if they be applied to extensive surfaces of the frame. Thus the inhalation of the vapour procured from numerous ascertained poisons, narcotics, and others; or of the vapour of ether, of alcohol, [of chloroform], and of certain volatile oils, when continued even for a short time, rapidly affects the frame, owing to the remarkably great extent of living

surface to which substances in a state of vapour are thus directly applied, to the extent of the impression produced by them on the organic nerves, and to their rapid absorption into the circulation.

53. (c) *Chemical conditions or combinations*, and the states in which chemical substances are employed, modify the effects produced. Some chemical substances, when employed in a concentrated state, act locally merely, as the mineral acids; but when taken internally in a state of weak dilution, they are carried into the circulation, and act upon and through the medium of the blood. Morphia, being insoluble, is comparatively inert, unless very minutely divided, but when dissolved in a fixed oil, or in alcohol, or combined with an acid, it becomes very active; and numerous substances which, in an uncombined state, are most deleterious, become innocuous when chemically combined with their opposites, as alkalies with acids, and *vice versa*. But this topic is so trite that I need not pursue it farther.

54. (d) *Admixture* of various substances, alimentary or others, either before or after ingestion, varies the effects; generally by diminishing the activity of the poison, owing to slow absorption and imperfect or intercepted contact with the villous surface of the stomach. If, however, the poison be taken in a state of complete solution, and if the substances taken with it, or those already present in the stomach, serve to dissolve or minutely divide it, they may not impede, but, on the contrary, ensure its action. If it be swallowed in a state of imperfect division or in fragments, the alimentary or other substances given with it may so involve these particles, or the mucus of the surface may so protect the organ, as either to diminish its effects, or to occasion vomiting, by which it may be altogether or partly thrown off. Dr. BOOTH has recorded an instance of an ounce of corrosive sublimate having been swallowed after a full meal, without any remarkably bad effects having been produced, full vomiting having been speedily induced; and other cases are referred to by Dr. CHRISTISON (see above, § 3).

55. (c) *The organ or tissue* to which a poison is applied has been already stated materially to influence its action on the economy, both locally and generally (§ 3–10). It has also been stated that the cuticle protects the skin more or less from the action of poisons, even the most corrosive and subtle; and it is not until it be removed or destroyed that the poison acts, or if it act, the effect is much more slowly produced. The mucous surfaces are much more readily acted upon: still the mucus and epithelium covering them protect them to some extent, and render them less susceptible of the poisonous impression, and less prone to imbibition and absorption, than serous surfaces, or denuded or incised parts. These latter parts, or wounds of any description, may, however, escape, if they bleed so freely as to wash away the poison. The rapidity of action varies much with the tissue to which the poison is applied, and is manifestly attributable to the celerity with which absorption proceeds in such tissue, and the extent of surface presented to the poison. Thus it is very rapid when a fluid poison is injected into the bronchi.

56. It is worthy of mention, as remarked, but



not explained, by Dr. CHRISTISON, that the poisons which seem to operate energetically on the sentient extremities of the nerves, and indirectly through the brain and spinal cord, act not at all upon the divided surfaces of the brain and large nerves, or upon the course of the latter; as proved in respect of prussic acid, opium, strychnia, and several narcotics. This circumstance may be partly owing to the mode of operation of poisons above contended for, viz., upon the organic nerves, or the organic and sensory nerves chiefly; the application of them to a cut portion of the fibrous structure of the brain, or of a nerve, not being likely to produce any farther effect than what may arise from the division of certain fibres of these structures. The effects of poisons on different parts depend much upon the vascularity and the disposition to imbibition and absorption possessed by the texture to which the poison is directly applied. The connexion also subsisting between the texture and the more vital organs, especially the dependence of the part upon the organic nervous system; the state of the vessels, the amount of hæmorrhage from them, and a variety of circumstances, also modify the results.

57. Mineral and vegetable poisons are much less controlled or influenced in their action by the organ or tissue to which they are applied than animal poisons are. The digestive canal and its secretions change the usual operation of mineral poisons but little; some vegetable poisons are somewhat more modified by the digestive organs in certain cases; but several animal poisons, which, if applied to a denuded surface, or to a wound, would be rapidly fatal, may be so altered by these organs as to be productive of but little disorder when taken internally.

58. (f) The operation of various poisons, especially of narcotic and sedative substances, is modified, also, by *habitual use* of them, and by *idiosyncrasy*. While use diminishes the poisonous effect, idiosyncrasy more commonly increases it. A person who has become addicted to opium, or even to some other narcotics, may take as much at once, with advantage, as would destroy the life of a person not accustomed to the substance; and a person may be almost poisoned by a substance, or an article of diet, as a particular kind of fish, that would not disorder others. The influence of habit, or use, is shown chiefly by the organic poisons, particularly those already mentioned. Inorganic or mineral substances have not their injurious operation so remarkably impaired by use. Dr. CHRISTISON supposes that this "effect of habit is nothing more than an increased power acquired by the stomach of decomposing the poison, just as it gradually acquires an increased facility in digesting some alimentary substances which are at first indigestible" (p. 29). This may be the case in part; but something is probably, also, owing to a gradually diminishing susceptibility of the impression produced by narcotics in the organic nerves, and of the nervous system generally, owing to their frequent exhibition.

59. (g) The *moral and physical states* of the system also modify the operation of poisons, especially of organic poisons, narcotics especially. Great mental excitement, anger, pas-

sion, &c., delay, or, to a certain extent, counteract the operation of narcotic and sedative substances, while the depressing passions hasten and ensure their effects. Several diseases, especially those of the nervous systems, as tetanus, rabies, mania, hysteria, &c., admit of large doses of opium, or of other narcotics, being given without injurious effects. Other substances, however, which are more sedative than narcotic, as tobacco, colchicum, prussic acid, &c., and which act more upon the heart, are not tolerated so manifestly during these diseases. Febrile diseases, especially during the stage of excitement and increased vascular action, delay or counteract in some degree the action of some poisons; while the same maladies, and more especially pestilential fevers and pestilential cholera, particularly during the stage of exhaustion, show that the frame is more or less insusceptible of the impression usually made by poisons. This want of susceptibility is owing to the low or exhausted state of vital function throughout the body, and to the absence of those vital conditions, or the commencing departure of these conditions, by means of which agents act upon living bodies.

60. Other diseases, or a predisposition to them, as to apoplexy, palsy, or congestive states of the brain, diseases of the heart, inflammatory states of the stomach or intestines, congestions of the liver, &c., may severally favour the operation of certain poisons, while these latter may excite or determine an attack of these maladies. Where there is an apoplectic or paralytic tendency, a small dose of a narcotic may occasion a serious effect, or even produce a seizure; and, when there is serious organic change in the heart, a large dose of a sedative, as of hydrocyanic acid, colchicum, or even a moderate dose, may terminate life. The irritant poison, which may be innoxious in some instances, may be fatal in others, where disease of the stomach or bowels, or a tendency to it, already exists; but this subject requires no farther illustration. It should also be kept in recollection that blood-letting, either soon after or before a poison has been taken, accelerates the action of such poison, if it remain in the part, by promoting its absorption.

61. VII. CIRCUMSTANCES WHICH SHOULD SUGGEST SUSPICIONS OF BEING POISONED.—(a) *The sudden appearance of severe symptoms while the patient is in health.* It is comparatively rare that a substance can be taken in an injurious quantity without almost immediately producing serious ailment. Without denying the occasional production of slow poisoning by the practiced poisoners of the Middle Ages, and of the succeeding two or three centuries, it may be admitted that this mode of poisoning was not so frequently attempted or accomplished as is generally supposed. At the same time, it should not be overlooked that poisons may be administered, as they sometimes have been, during the *illness* or the *intoxication* of the poisoned person, in order that the act may appear as the result of these states. The poison may even be added to the patient's medicine, or substituted for it, as has been shown on several occasions. Generally, the symptoms of being poisoned appear either immediately, or within an hour after the poison has been taken; and

it very rarely occurs that they are deferred beyond two hours, or three hours at the farthest. There are occasions, however, in which slow poisoning may occur unintentionally, and the symptoms be gradually and very slowly developed. I have met with several instances, in a somewhat long course of practice, of active and cumulative medicines having been given in large or frequent doses for so long a time as to produce dangerous, and even fatal effects; these effects having been mistaken, owing to the ignorance of the practitioner, for the progress and issue of the natural disease. Colchicum, digitalis, tobacco injections, opiate injections, tartar emetic, the preparations of iodine, and several other substances, have thus produced effects for which they did not receive the credit.

62. (b) *The appearance of severe symptoms after a meal, or after taking any substance, fluid or consistent, into the stomach, or after any substance has otherwise been exhibited or applied, should also be a source of strong suspicion.* What I have said above (§ 2-11), as to the several modes of poisoning, is sufficient to show that poisoning may be produced in various ways, besides the usual way of mixing the poison in the food or drink of the poisoned person. When, therefore, violent or fatal symptoms occur suddenly, or proceed rapidly, diligent inquiry should be made as to the time, nature, and kind of the patient's last meal, as to the circumstances and occurrences to which he has been exposed, as to the persons with whom he last had communications, and as to his habits and morbid tendencies. It should be kept in recollection that disease may exist, even for a long time, without occasioning suffering so great as to prevent his usual avocations; and that the stomach itself even may be the seat of disease, and yet a full meal may be taken, after which the most violent symptoms may supervene suddenly and carry off the patient. This is not an infrequent occurrence in cases of perforation of the stomach met with in practice, especially in young women (*see* *Stomach, Diseases of*). A fatal result, presenting the symptoms of poisoning, may also follow the ingurgitation of a large meal, or of indigestible substances, after long fasting, or of cold fluids when exhausted.

63. When several persons have partaken of the same meal, or of the same substances, as the individual who has been attacked with severe illness, the circumstance of the greater or less disorder of all, according as a particular article was partaken of, or the escape of any or of all, with reference to the meal generally, or to any particular article which it comprised, should receive due consideration; for, when all, or several of those who have partaken of the same meal, suffer more or less, the suspicion of poison amounts almost to proof, while the illness of one merely, others who had partaken of the same article not being affected, is a presumptive indication of the disorder being owing to other causes. In estimating, however, matters of this kind, the liquors and fluids drank, and the congruous nature of these, the one with the other, and with the several articles of diet also partaken of, should be taken into the account. Although it may be inferred that all who partake of the same poisoned dish will suffer according to the quantity partaken of, yet such is not always the case; for the

poison may be unequally mixed in the food; and, as respects certain poisons, especially those most frequently employed in this manner, as arsenic, a larger quantity of the poison may prove more innocuous than the smaller quantity; for the former may be vomited, while the latter may be retained and act most violently.

64. It ought to be recollected that various articles of diet may produce symptoms which may be more or less severe in all who have partaken of either of these articles, and these symptoms may depend upon the nature of the article itself, and not upon the admixture of any poison. Nevertheless, the article of diet is poisonous; but there is generally in this case no criminal poisoning; for the state and probable effects of the article are generally unknown, and not suspected by any one until the effects appear. Rancid bacon; unclean or improperly-fresh pork; dried or ill-cured meats and sausages; various kinds of fish, whether diseased or imperfectly cured, or kept too long; [cheese]; the flesh of diseased or over-driven animals; several kinds of shell-fish, [as oysters and muscles], especially when out of season; tainted or fly-blown meats, &c., are often productive of irritating and depressing, or acro-sedative effects, and have suggested the arrangement of these articles in the class of poisons which act in this manner.

65. (c) *The state of the patient's spirits or feelings previously to his seizure, and other matters which circumstances may suggest, should receive attention.* Acute observation and inquiry, exercised with due discretion and proper feeling by the physician, will often throw considerable light upon the origin and the agent of poisoning; will indicate either the accidental, the suicidal, or criminal nature of the act. The acumen required in such circumstances as present themselves in connexion with poisoning cannot be aided by what I can say on the topic; it will generally be sufficiently exercised by the well-educated practitioner of the present day; but the following should be more particularly observed, in all their relations, as upon them depend not only the recognition of the poisonous substance, but the treatment and life of the poisoned person, and the discovery and punishment of the guilty.\*

66. **MATTERS REQUIRING THE ATTENTION OF THE PHYSICIAN WHEN SUSPICIONS OF POISONING ARE EXCITED.**—When severe illness occurs in the circumstances just noticed, endeavours should be used to ascertain every particular as to circumstances and manner of its appearance. The vessel, utensil, or bottle, or paper which contained the injurious or suspected article; the remains of such article, whatever it may be, and of the food or drink which had more recently been taken; the matters thrown off the stomach, and the substances on which the sus-

[\* During the prevalence of malignant cholera in 1832, we mistook a case of poisoning by arsenic for an attack of this disease. A lady took more than a drachm of the arseniate of potash, as we afterward ascertained, with the intention of destroying her life; which was followed by severe retching, vomiting, cramps, lividity of skin, cold and clammy state of the surface, and the other symptoms which usually attended a severe attack of cholera. During the prevalence of this disease much greater caution will be necessary on the part of the practitioner, or he will be liable to err in diagnosis. The symptoms which attend a violent attack of cholera scarcely differ from those caused by the irritant class of poisons.]



peeted article has been spilt or rejected, should be carefully examined, in order to ascertain the nature of the poison; and, in cases of criminal poisoning, they ought to be preserved and chemically investigated, as fully set forth in works on *Medical Jurisprudence*. If death take place, the examination of the body as to position and external appearances should be minute; and the contents of the alimentary canal, and of the urinary bladder, as well as the digestive organs, and, in some instances, other organs also, should be carefully investigated, both anatomically and chemically, in order to ascertain the actual presence of the poison and the amount of structural change produced by it. Numerous other matters connected with the poisoned person, and with the appearances of the various objects around him, both before and after death, ought to be noted; but, as these have especial reference to judicial proceedings, I must refer the reader to medico-legal works, especially to what has been stated by Mr. TAYLOR in his "*Medical Jurisprudence*."

67. VIII. THE SYMPTOMS CAUSED BY POISONS cannot be duly considered until I treat of the operation of individual poisons. I may, however, remark, that the symptoms usually assigned to many poisons have not been observed with accuracy nor described with due precision; and that they do not in many cases admit of either accuracy or precision, as they vary with the dose of the poison, and with the circumstances shown above (§ 51, *et seq.*) to modify them more or less. It will be seen from the *arrangement* I have adopted in discussing the action of particular poisons, that I have attempted to take a more intimate view of the effects produced by them than has usually been taken, and to base upon these effects a classification which may aid not only the recognition of the injurious agent, but also the adoption of appropriate means for the removal of these effects. It must have been manifest to all who have observed the operation of poisons, that many acrid or irritant poisons do not produce nearly the same nor similar symptoms; that several substances which have been arranged as acro-narcotic poisons produce no narcotic effects, unless contingently; that vitally depressing agents have been classed with pure narcotics, the effects resembling narcotism sometimes observed being merely those of departing cerebral functions, and that the effects which have been imputed to local irritation only have been quite as much owing to change of function throughout the economy, or to extreme vital depression. M. ORFILA, who has devoted himself so ably and remarkably to the subject now before me, and has performed so many experiments with poisons on the lower animals, has certainly reduced the classes of poisons to a too limited number, and has erred in considering many of the symptoms, as well as of the lesions after death, to have been caused by the poisons experimented with, instead of viewing them as partly the results of the injury inflicted on the animals the subject of experiment. Other experimenters no less deserve the same imputation. When he as well as they inform us that certain poisons were given to dogs, that, in order to prevent their rejection by vomiting, the œsophagus was tied, and that, in addition to various lesions

thereby produced, the lungs were found congested or inflamed, can we be warranted in assigning the pulmonary lesion to the poison only? Is not some part of these or of other lesions observed owing to the injury inflicted by the operation or by the ligature on the nerves in the vicinity, or on those actuating the œsophagus or adjoining parts?

68. i. The more intimately and accurately the symptoms of poisons are observed, the more easily will they be distinguished from natural diseases; and it is of the utmost importance that the former should not be mistaken for the latter. The distinctions will be noticed in the sequel; but I may here state, that the features of *gastritis*, *enteritis*, *gastro-enteritis*, *peritonitis*, *bilious* and *malignant cholera*, the *several forms of colic*, *malignant* or *adynamic dysentery*, *internal strangulation of the intestines*, *strangulated hernia*, and *perforations of the stomach or intestinal canal* may be very closely simulated by poisoning with most of the substances classed under the heads of *acrid and corrosive*, *acro-sedative*, *acro-alterative*, and *septic poisons* (§ 106); the particular features of the assumed disease varying with the particular poison, the quantity taken, and the various circumstances already shown to modify its operation; and that *apoplexy*, *epilepsy* and *convulsions*, *diseases of the brain or spinal marrow*, *diseases of the heart*, *rupture of internal viscera* or of *large vessels*, and *spontaneous congestion of the lungs* may likewise be simulated by the operation of many of the poisons ranked under the classes *depressing* and *paralyzing*, *exciting* and *exhausting*, *narcotic* or *stupefying*, and *narcotico-acrid*, the particular or special effect varying according to the circumstances just alluded to.

69. From this it will readily appear that the difficulty of inferring, with any degree of accuracy, the particular poison which has been taken, from its effects only, is extremely great; and hence the necessity of obtaining farther information as to its nature from what may remain of the vehicle in which it has been taken or otherwise employed, from the matters vomited or evacuated by the bowels, and from other sources or circumstances. In examining the symptoms caused by poisons, care should be taken to estimate as accurately as possible the remaining vital and nervous energy of the patient, to ascertain by the hand and by the ear, or stethoscope, the impulse and energy of the contractions of the heart, to observe the manner in which position affects the state and feelings of the patient, as well as the pulse, and to distinguish between effects which are truly narcotic and those which are still more serious, viz., those proceeding from extremely depressed or departing vital manifestation of the brain. Equal care should be exerted not to mistake increased irritability for excitement or augmented power, and not to confound a very rapid or a very open and compressible pulse with consecutive inflammation, although inflammation may be actually induced, but it is of an asthenic or spreading kind when it thus appears; for these states of the pulse may arise merely from some degree of remaining irritation, from the alterations produced in the blood, or even from a portion of the poison still irritating the organic nerves and vascular system. In fine, care should be taken not to mis-

take the constitutional commotion consequent upon vital shock and exhaustion for sthenic or increased vascular action; and not thus be induced to deplete and lower the system, when we should calm its agitations and support its powers.

70. *ii.* THE DURATION OF POISONING necessarily varies with the virulence of the poison, with the quantity taken, and the repetition and frequency of the dose, and with the circumstances stated above as modifying the operation of poisons (§ 51, *et seq.*). Owing to these and a variety of other causes, appertaining either to the nature of the poison or to the state of the poisoned person, and to the effects more immediately resulting from a combination of these, poisoning may be, 1st, *acute or rapid*; 2d, *chronic or slow*.

71. *A. Acuteness or rapidity of action* is usually the result of the virulence and quantity of the poison; but, owing to the greatness of the quantity, the poison may be rejected by the stomach, and the expected result may either fail, or be more slowly produced. The state of the stomach, especially as respects the contents of the viscus, may also cause a similar issue, by absorbing much of the poison, and protecting the stomach from it.

72. *B. Chronic or slow poisoning* may result, 1st. From the lesion caused by a large dose of an active or virulent poison, which, although insufficient of itself to produce immediate or rapid death, owing to the above or other causes, is still sufficient to occasion changes leading, more or less directly and manifestly, to a fatal issue, *acute* thus subsiding into *chronic* poisoning; 2d. From the nature and quantity of the substance, which had been given in such a dose at first as to produce a slow but fatal effect; 3d. From the repeated ingestion of small quantities, which have gradually developed structural changes, or which, by their cumulative and latent influence, have ultimately burst forth into active operation. Illustrations of these several manifestations of the effects of poisons will appear in the sequel. Of the writers who have discussed the action, the effects, and the treatment of poisons, none has so judiciously marked the distinction between *acute* and *chronic poisoning* as Dr. PEREIRA, in his very distinguished work on the *Materia Medica*.

73. IX. THE GENERAL DIAGNOSIS OF POISONING.—The diagnosis of poisoning in the *living* and *dead body* is *general* and *special*. The former I shall briefly advert to; the *special diagnosis of poisons, or of poisoning*, requires a recourse to the most precise analysis, to chemical manipulations and chemical tests, and falls not within the scope of my undertaking.—i. *The general diagnosis of poisoning during life* has been partly considered in the preceding sections (§ 23–72), and it is more fully exhibited in the description of the several poisons about to be noticed; but farther evidence is to be obtained from the presence of poison in, or the absence of it from, the articles or fluids partaken of by the patient, and from the matters vomited by him. When poison is found in the matters vomited in the presence of a medical or scientific man, the proof of poisoning is much stronger than when it is found in the remnants of food partaken of; inasmuch as it is evident from this that the poison has actu-

ally been taken; whereas, in the latter case, it may have been put into the food with some sinister purpose, and not have been swallowed at all. Mr. TAYLOR justly remarks, that it should be recollected, while investigating a case of poisoning in the living subject, that this act is sometimes *feigned*, and at others *imputed*. It is very easy for an evil-intentioned person to put poison in food and to accuse another of having administered it, and to introduce poison into the matters, either vomited or discharged from the bowels. The detection of poison in the matters thrown off the stomach affords no decisive proof that it has been swallowed, except under two circumstances: 1st. When the accuser actually labours under the usual symptoms of poisoning; in which case there can be no feigning. 2d. When the matters are undoubtedly vomited into a clean vessel, in the presence of the medical man, or of some person on whose testimony perfect reliance may be placed; these matters never having passed from his view, from the moment of their rejection from the stomach until their analysis, examination, or due custody, under proper seals.

74. *A. The time at which death occurs after the first symptoms of poisoning* is of importance, inasmuch as death from natural causes rarely occurs in so short a time as from poisoning. Having ascertained all the circumstances connected with the attack, and all the symptoms manifested from the moment of attack until death, the exact time which has elapsed from the former period until the latter should be correctly estimated, as one of the elements for the formation of an accurate opinion as to the existence or non-existence of poisoning, and even as to the particular cause or agent of it. When a poison has been given in large quantity, the result may be supposed most likely to occur in the shortest time in which it is usually found to act. But the circumstances pointed out above (§ 52, *et seq.*) may delay its action or its ultimate effects. Poisons not only differ from each other in the period they take to produce a fatal result, but the same poison differs remarkably in this respect in different persons, although the several circumstances, as far as they may be known, appear to be nearly the same. Hence it is difficult to determine the shortest period in which a given poison will destroy human life, when swallowed in large quantity; and little reliance can be placed upon the circumstance of an imputed death from a certain poison having occurred too rapidly or too slowly, as a proof of its not having been taken; for an empty state of the stomach, the retention of the poison, and an exhausted state of the poisoned person will accelerate, and a full stomach and free vomiting will delay, the fatal result. On this subject Mr. TAYLOR states, that a large dose of strong *prussic acid*, *i. e.*, from half an ounce to an ounce, will destroy life in from ten to twenty minutes. In one case of this kind of poisoning, the particulars of which I had occasion to investigate, death must have taken place in about five or six minutes. If the person who is poisoned by this acid survive an hour, or even less, there are hopes of his recovery. *Oxalic acid* may prove fatal, in the dose of from half an ounce to one or two ounces, in a period varying from ten minutes to an



hour; and if the poison be not dissolved when swallowed, the period may be very much longer. The *strong mineral acids* destroy life, in large doses, in from twelve or sixteen hours to twenty-four hours. *Arsenious acid* usually is fatal, in periods varying from twelve hours to two or three days; but it may cause death in much shorter periods—in one, two, three, or four hours—an hour being about the shortest time. Mr. TAYLOR, however, remarks, that there is nothing to prevent arsenic from destroying life in one hour; and that, in a case which was most probably one of poisoning by arsenic, death took place in half an hour. The shortest time in which *opium* has been said to destroy life is three hours; but the period usually varies from six to twelve hours; but with it, as with all other poisons, the fatal issue may be protracted long beyond the limits mentioned of the more common period.

75. While the rapidity with which death from poison may take place is duly recognised by both professional and other persons, the fact that the same or other poisonous substances may occasion death slowly as well as suddenly, and even as slowly as the most chronic diseases, has not been sufficiently regarded, and the evidences connected with these effects have not been sufficiently, even if at all, investigated. There can be no doubt—and several instances of the fact have come under my own observation in the course of practice—of powerful medicines—of poisonous substances—having been too frequently or too long prescribed, in what was then considered full medicinal doses, now more justly estimated as dangerous quantities, and the consequences have been attributed to the progress of disease, to idiosyncrasy, or to other causes than the real. To those slow or chronic operations of poisons I shall advert when treating of individual poisons. It should not, however, be overlooked that disease of the heart and apoplexy may produce death as suddenly as a most virulent poison; and sometimes even more suddenly than any poison, with the exception of hydrocyanic acid. Death may occur almost instantly from organic disease of the heart, and but rarely within an hour from apoplexy, this acid being, perhaps, the only substance, unless in the very rare instances above noticed, which occasions death in so short a time; but, unless it be employed to commit murder, some traces of this poison are usually found at hand.

76. *B.* It may so happen that the *duration* of the symptoms is the only or the chief medical diagnosis of poisoning. In this case there must be both difficulty and uncertainty; and an opinion should not be formed without farther aids, although a careful review of all the known circumstances of the case, and of all the appearances about the person poisoned, may lead to very probable, and even correct inferences. In *acute poisoning*, or when life is rapidly destroyed, the diagnosis is generally more easy than in the *chronic*, or when death is occasioned by the consecutive effects of poison. But in many, even of the chronic cases, the cause of death is more or less manifest; as when a person who has swallowed a mineral acid, only partially recovers, and continues for many months afterward to complain of stricture of the œsophagus,

of which he ultimately dies. More frequently, however, it is most difficult to assign, with legal strictness, the ultimate result to the primary agent; to connect the fatal issue with the changes first produced by the poison, in cases of chronic poisoning; for numerous fortuitous influences or contingent agents may have intervened to re-enforce, modify, aggravate, or otherwise affect the earlier alterations, and thereby to subvert the regular succession of morbid phenomena from the first impression of the efficient cause until the fatal issue.

77. It is chiefly in a medical and strictly practical point of view that the slow effects of poisons—that *chronic and slow poisoning*—becomes interesting, and even most important: a form of poisoning altogether neglected by medical jurists, because rarely admitting of proof which may not be impugned. Corrosive sublimate, iodine, the arsenical solution, strychnine, digitalis, colchicum, and many other substances may severally be given in doses so large, or for so long a time, either with a beneficial or with a criminal intention, as to destroy life after a more or less prolonged period. In these cases the slow operation of the poison may occasion symptoms which may not be recognised as the effects of the medicine; or little or no effect may appear for a considerable period, until it suddenly breaks forth with such violence as to threaten, or even suddenly to destroy, the life of the person to whom the substance has been thus administered. But the effects may be both marked and characteristic of the poisonous substance prescribed, and yet be viewed as a part of the disease, and even identified with the disease which it was employed to remove. I hope, however, to direct a more especial attention to this matter in the sequel than it has hitherto received.

78. *ii.* The *diagnosis of poisoning furnished by post-mortem appearances* has been very ably considered by the recent writers on medical jurisprudence. Mr. TAYLOR, whose accuracy is generally commendable, remarks, that “in relation to external appearances there are none indicative of poisoning upon which we can safely rely. It was formerly supposed that the bodies of persons who were poisoned putrefied more rapidly than those of others who had died of natural disease; and evidence for or against poisoning was at one time drawn from the external appearance of the body. This is now known to be an error; the bodies of persons poisoned are not more rapidly decomposed, *ceteris paribus*, than those who have died a sudden or violent death from any other cause whatever.” (P. 42.) To the above too general and positive inference the following exceptions may be made: 1st. That external marks or changes may be left on parts of the external surface, as the mouth, face, neck, hands, and near the outlets of the natural canals, which not only may indicate poisoning, but even the particular substance employed, as several of the corrosive and irritant poisons. 2d. I have had proofs furnished to more than one of the senses—namely, to sight, smell, taste, and touch—that certain poisons, which I have classed under the head *septic and disorganizing*, actually produce a more rapid solution of the vital and physical cohesion of the tissues, or a more rapid progress of those *post-mortem* changes

either preceding or constituting putrefaction, than is usually met with, all the circumstances being otherwise the same. 3d. These senses have furnished me with evidence that certain poisons will sometimes delay these changes, at least in some parts, and even about the outlets of mucous canals.

79. *A.* The several *internal*, and especially the *digestive viscera*, however, are the quarters in which the physician should endeavour to ascertain the fact of poisoning, in defect or in aid of other evidence. The mouth, throat, œsophagus, stomach, and intestinal canal often furnish proofs of it, especially when acrid, corrosive, or irritant poisons have been employed; and although these proofs consist of the most severe lesions, and even of almost complete disorganization, they are often insufficient of themselves to show the particular poison which has been swallowed, or even the action of any poison at all, without proof of its actual presence, or other additional evidence, so completely do these lesions assume, in many instances, the appearances consequent upon certain natural diseases. Much of the difficulty of distinguishing the effects of poison from the consequences of disease is owing to the period which has elapsed from the time of death until that of making the examination; for during that period various *post-mortem* alterations supervene, which obscure certain of the more intimate changes existing at the moment of, or just previously to dissolution. Much of the softening, of the corrosion, or of the dissolution of tissues, found twenty, twenty-four, or thirty-six hours after death, has taken place during that period; and even the changes observed in the colour of the blood and of the several membranes and tissues, have chiefly occurred subsequently to death. In cases where the poison is of a virulent, septic, or of a chemical nature, as the strong mineral acids, or the alkalis, and when these have not been entirely thrown off during the short period of life following their ingestion, it may reasonably be supposed that the portion remaining in contact with the tissues will produce some change of the structures, even after death—will affect the dead textures as we perceive such substances to act in some of the operations of domestic economy, and either hasten or delay the solution of vital or physical cohesion, or otherwise change the appearance and condition of the textures by combining more or less intimately with them. In cases proving thus rapidly fatal, many of the poisons, especially the corrosive, the mineral, or saline, will be found either in the contents of the stomach or bowels, or in contact with the villous membrane of these viscera, or may even be detected by chemical analysis in the coats of the stomach, or even in the liver or in the blood.

80. Death, however, may take place suddenly, and various morbid changes may be detected in the digestive canal, resembling, or even identical with, those produced by certain poisons; but unless the poison be detected in the matters vomited during life, or in the contents of the stomach, or of other parts of the canal, or in the blood, or in the substance of the viscera, the evidence furnished by these changes alone is altogether inconclusive; for similar changes may occur about the time of

dissolution in cases of sudden death, or previously, or even subsequently to death, in various diseases not necessarily causing the confinement of the patient until shortly before, or even not until a few hours before death. To these alterations I now more particularly advert.

81. *a.* *Redness* of the villous membrane of the stomach and intestines is generally caused by acrid, corrosive, or irritant substances; but it is not of itself a sign of poisoning upon which much dependence can be placed, for it may be inconsiderable where corrosion and disorganization, caused by the most corrosive poisons, are the greatest; it usually characterizes all inflammatory diseases of the digestive canal, and it may be very remarkable in cases of sudden death from accident, external injury, or other causes producing fatal shock, and independently of any existing disease, or of the ingestion of any irritating agent, as shown by Dr. YELLOLY, and subsequently confirmed by numerous observers. It has been shown, 1st. That vascular congestion of the villous surface of the stomach, with a florid or dark-red hue, is not a proof of disease, and is not inconsistent with a state of health at the time of dissolution or shortly before it. 2d. That this state of redness and congestion, found in some cases after death, is not even proof of gastritis. 3d. That it is not alone an indication of the ingestion of a poison, or even of any irritant. 4th. That the vascularity of the villous membrane is an injection of the venous capillaries and veins, the redness depending, in the instances observed the soonest after death, upon the arterial character of the blood congesting the venous capillaries; and in those observed the latest after dissolution, upon the transudation of the colouring matter, or to the post-mortem changes.

82. *b.* It is obvious that *redness*, as well as *congestion* of the villous membrane of the stomach, is liable to various changes during the time elapsing from death until examination. These changes are not only such as take place in ordinary circumstances during this time, both in the blood itself and in the tissues, but those also which are more especially caused by the morbid impression of the poison by the treatment resorted to, and by the action, previously and subsequent to dissolution, of the poison upon the textures and upon the blood itself. When the redness is caused by poisons which not only irritate, but arrest more or less the putrefactive process, then it may be inferred to continue the longest after death. Mr. TAYLOR found it continue in the stomach and duodenum of the exhumed body of a man poisoned by arsenic, twenty-eight days after he had been interred.

83. *c.* *Ulceration* of the internal surface of the stomach is seldom observed in cases of poisoning, and never unless in those which have been manifested by well-marked symptoms previously to death. Ulceration is more frequently caused by arsenic than by any other poison, and this poison may even be found lodged in the edges of the ulcers, which present more generally the appearance of small circular abrasions of the villous membrane, which is more or less generally inflamed, or inflamed in the intervals between the ulcers, the inflammation sometimes extending to the duodenum and intestines. Ulceration from disease is not unusual



(*see* STOMACH, *Diseases of*); but in these cases the inflammation surrounds the ulcer, which often has tumefied or thickened margins, while the ulcers produced by poisons present different appearances. The history of the case before death will generally enable the physician to determine to what cause the ulceration should be imputed. But ulceration should not be confounded with *corrosion*. Ulceration, although a morbid, is also a vital process, in which the secretions, the nutrition, and the absorption of the part are disordered, consecutively of inflammation. Corrosion is a disorganization of the intimate structure by a chemical action, which destroys the vital properties, and dissolves the vital cohesion of the textures; the corroding substance combining more or less with the tissues upon which it acts. Ulceration requires time to produce it; corrosion takes place instantaneously or almost immediately (*see* more fully on this subject, DIGESTIVE CANAL, § 36, *et seq.*).

84. *d. Softening of the inner surface of the digestive canal* is a frequent effect of poisons, and is often found associated with corrosion, but is more diffused. Softening may be often viewed as merely a lesser grade of corrosion, especially when it extends to the several coats. It is generally most remarkable in the stomach, but, when it is limited to this organ, it cannot be considered as a consequence of poisons unless the inference be supported by farther evidence, inasmuch as it is, when thus limited, most commonly the result of disease. When it is caused by poisons, corrosions of some parts often accompany it; and the softening is frequently extended from the fauces down the œsophagus, into the stomach and duodenum. This change should, however, never be considered as a result of poison, unless the poison be detected in matters which have been vomited, or in the contents of the digestive canal, or in the coats of this canal; for it is, even when thus extended, a very frequent result of disease, more especially in infants and children.

[In this connexion, it should be borne in mind that softening of the gastro-intestinal mucous membrane, especially that portion lining the stomach, is very frequently met with in intemperate subjects; indeed, it is the most common pathological change met with in such cases.]

85. *e. Perforation of the digestive canal* is sometimes found, upon dissections, after the ingestion of poison, but it is also not unfrequently a consequence of disease. When caused by poison, it is commonly merely the extension of corrosion through all the coats of the viscus, and is most frequently found in the stomach, but it occurs in rare instances, also, in the duodenum and œsophagus. Perforation, like all other alterations of the digestive canal, although preceded by symptoms of poisoning, is not a proof of this act, unless the other proofs just noticed be also present. When it is a consequence of disease, it is produced by ulceration, which rarely or never occurs in cases of sudden or rapid poisoning, ulceration being the result of a morbid process requiring some time for its production; but this topic will be noticed in the sequel (§ 114), and it is fully discussed in the article DIGESTIVE CANAL.

86. *f. The villous coat of the stomach may present other lesions which may furnish stron-*

ger evidence of poisoning than any of those already noticed. These are *corrugation*, *partial detachment*, *dark discoloration*, resembling *charring*, of the villous membrane; *ecchymosis*, or *small extravasations of dark, coagulated blood*, underneath this membrane, which is raised into small elevations, and a *dark-red or livid engorgement of the capillaries and veins*. These changes are most frequently found in the stomach; but they are sometimes seen, although in a less marked degree, in the duodenum, and even in other parts of the intestinal canal.\* Some degree of *induration* of the villous membrane of the stomach has been found in some cases after poisoning with sulphuric acid.

87. *g. A post-mortem change*, which has been variously denominated, and especially as *spon-taneous softening*, *pulpy degeneration*, and *spon-taneous perforation* of the coats of the stomach, is met with upon dissection, in rare instances. When this alteration is found in a patient who evinced no indications of gastric disease during life, and when it is unattended by any inflammatory appearances, the coats being gelatinous or pulpy, it may then be viewed as a consequence of the action of the gastric juices after death, as first stated by JOHN HUNTER, and rendered probable by the more recent researches of CARSWELL, BURNS, SHARPEY, and others. But a nearly similar change may be the result either of poisons or of disease. In the former case, which will be more particularly noticed hereafter, evidence of poison will generally be found either in the organ itself, in its contents, or in the matters vomited; and, in the latter, gastric disorder will have been manifested previously to dissolution, and the pulpy softening or perforation will be accompanied with some indications of inflammatory irritation, although in the aphthous, mesenteric gastric, and gastro-enteric diseases of children, and more especially of infants, about the period of teething, weaning, and, when improperly fed, softening, and even perforation of the stomach will occasionally be found, inflammatory appearances either not existing, or, if they have existed, having altogether disappeared soon after death. (*see* DIGESTIVE CANAL, § 35, 42).

88. *iii. The other means of diagnosis*, so frequently adverted to above, namely, *the detection of the poison by chemical analysis and tests*, and the support which *moral circumstances* may afford the evidence, belong more especially to the medical jurist.—*A. The moral circumstances and appearances*, falling under the observation of the physician, should always be carefully remarked by him, not only as they may suggest to him the existence of poisoning, and thereby direct his attention to every point and aspect of the case, but also as they may be required from him in the judicial investigation, in which he will appear as a principal evidence. In every instance admitting of the least suspicion of poisoning, it is the duty of the medical man to ascertain as fully as in his power the whole range of symptoms or morbid phenomena; to observe assiduously the progress of the symptoms, from the moment they came under his notice until their termination in recovery or in death; to obtain information from those best

\* All these appearances result from the habitual use of distilled liquors, and when met with, the habits of the individual should be closely investigated.]

able to furnish it, as to the circumstances connected with the origin and progress of the seizure; to trace their origin in obvious or imputed causes; to connect them, as far as may be done, with such causes as usually produce similar effects, and to determine, as far as possible, the presence of such causes in the case in question; and, if death take place, to note carefully all the changes observed in the dead body.

89. The importance of care and circumspection in these matters is shown by the fact that, although instances often occur in which the diagnosis of poisoning cannot be established, unless the poison be actually detected, to the satisfaction of the tribunals, still it may be sufficiently so to warrant the physician in the adoption of such measures as the symptoms will suggest for the recovery of the patient. And it should be recollected that, even in the event of death, there are many poisons which, owing to their nature, cannot be detected by any analysis or test, while there are others quite susceptible of analysis, which may be so changed or mixed with substances, alimentary and others, as to escape detection by chemical agents, either in the vomited matters, or in the contents of the viscera, or in the blood. In many such cases, there may be satisfactory proof of the persons having been poisoned, and, in some, conviction has actually followed, although the poison has not been detected in the dead body; the symptoms, the appearances after death, and the moral circumstances being sufficient to establish the fact. Moreover, due attention to every circumstance connected with the history and progress of the case, as insisted on above (§ 61-72), will enable the physician to ascertain, even during the life of the patient, the particular poison employed, or, in default of this, the class of poisons to which it belongs, and to adopt a plan of treatment, which, if not successful, may nevertheless be appropriate to the symptoms and circumstances of the case. In the event of death, also, he will be more surely directed in his search for the substance which caused it, and his analysis and tests will be chiefly suggested and guided by the changes which the *post-mortem* examination will disclose.

90. B. As soon as suspicions of poisoning are excited, or indications of it evinced, the *portions of the substance* which has produced the symptoms should be sought for on the persons of the poisoned and of the suspected individual; and if the substance cannot be found in the pure state, or in that of mixture with other substances, a chemical analysis should be instituted of the *several articles, fluid and consistent, of which the patient last partook*; and this inquiry should be full and satisfactory; for one portion of a dish may be poisoned, and not the other; the gravy, and not the meat; the sauce, and not the fish; the pie-crust, and not the fruit, &c., &c. The salt may contain arsenic, and nothing else at table may contain this poison; and so on as respects various articles, and as regards several poisons. *The matters vomited, and those evacuated from the bowels, the former especially, should be chemically examined, or tested, as soon as possible, and during the life of the patient, whenever there is doubt as to the nature of the poison, in order that the treatment may be as appropriate as possible;*

but as tests, and a chemical laboratory, cannot be carried about with the physician, the physical appearances and characters of the matters thrown up should be carefully observed, in connexion with the history of the case, and the existing symptoms, and the treatment directed accordingly. The vomited and evacuated matters ought, however, to be carefully preserved for chemical analysis, and those thrown off the stomach should be compared with the *matters found in the stomach and intestines after death*. These matters, with the digestive canal itself, and often with the collatitious and other viscera, should then be made the objects of chemical research, in order to satisfy the ends of justice. But this subject does not fall within the scope of this work.

91. X. DIAGNOSIS OF POISONING DURING DISEASE.—This is a topic which has been slightly adverted to above (§ 59, 60) as one which has received but little attention from medical writers, and which hardly admits of satisfactory elucidation.—(a) *Poisoning, either criminal, accidental, or suicidal, while the poisoned person is the subject of disease, or under medical treatment*, has occurred oftener than has been commonly suspected. Poisoning in these circumstances has certainly been attempted, and even accomplished, much more frequently than it has been detected, owing, 1st. To the difficulty of determining the symptoms during life, and the changes after death, which belong respectively to disease and to poison; 2d. To the facility with which a poisonous substance may be added to, or substituted for, the patient's medicine, without suspicion being excited; 3d. To the symptoms caused by the poison being mistaken for the severity and progress of the disease; the previous duration of illness and other circumstances preventing any inquiry as to the cause of death; and, 4th. To the circumstance of the poison which has been employed not admitting of chemical detection, either from its nature, or from the state of admixture or combination in which it has been taken. The difficulties in forming a correct diagnosis when a person is poisoned, in the course of disease, is heightened by the acuteness and severity of the malady; and when a poison has been administered whose operation is such as closely to resemble, or as to appear, an aggravation of the symptoms of which the patient had complained, then the diagnosis can hardly be established, unless by the detection of poison in the matters vomited or in the evacuations from the bowels or kidneys, or in the body after death.

92. (b) When a patient is suffering from diseases of *debility*, or is labouring under *exhaustion, anæmia*, the effects of *losses of blood, and chronic discharges*, poisoning is more readily effected, especially by depressing, paralyzing, and acro-sedative substances, than in other circumstances; and the effects, especially when the poison has been administered in successive doses, or at intervals, are not readily recognised or distinguished from the progress of the malady. In these states, also, of the patient's health, more especially when hæmorrhage or vascular depletions have preceded the ingestion of poison, absorption of it into the circulation more readily and more injuriously takes place, and the patient furnishes much less of vital resistance to its fatal operation.



93. (c) I have had several reasons to believe, from the history of cases, &c., that poisoning has been both attempted and accomplished in the *puerperal states*, especially during the first two or three weeks after delivery; the operation of the poison having been mistaken for one or other of the diseases incidental to that state; and having been such as not to be distinguished from such disease unless by the discovery of the poison, aided by various moral considerations.

94. (d) *Acute diseases of the digestive canal and associated organs* may have existed for a longer or shorter time, and irritant, acro-sedative, or corrosive substances may be administered accidentally, criminally, or from ignorance, which may so aggravate the attack as to render it dangerous or fatal. The heroic practice of medicine, so general and so much lauded, even within the range of my own observation and recollection, by those who concealed their ignorance by the swaggering boast of being "practical men," and that the literature and science of medicine were beneath their notice, as they were certainly beyond their reach, has furnished me with several proofs of actual poisoning having been committed by those self-sufficient and illiberal mediceasters in the treatment of the diseases just mentioned. I have often seen, and had still more frequent occasion to remark, in medical writings, the recommendation of the most irritant purgatives, in excessive doses, in cases of enteritis, or in dysentery, with the intention of removing obstructions, or of expelling matters which had no existence, the substances prescribed either causing inflammation, or increasing that which already existed, and urging it on to a fatal issue. Irritant, corrosive, acro-sedative, or acro-narcotic substances, given either in poisonous quantities, or in so frequent doses as to become poisonous, in the course of these maladies, could not readily be recognised by their effects in these circumstances, nor even by chemical research, if the employment of them were concealed, and the mischievous tendency of their operation were not known.

95. (e) Even in *chronic diseases* of the alimentary canal, especially *chronic dysentery*, or the *chronic diarrhoea* of warm climates, the exhibition of repeated doses of acrid purgatives, or of other medicines, with erroneous views of the nature of the case, and of the operation of the substance prescribed, has converted a complaint by no means serious into one which has become rapidly fatal. I have seen this practice in various places, and I could adduce numerous cases in which it has been recorded in published works, or in the case-books of hospitals, furnishing useful, although fatal, beacons in navigating the shoals of medical practice.

96. (f) Persons already the subjects of *diseases of the heart or of the lungs* may be cut off by a criminal, or an incautious use of various sedative, acro-sedative, or acro-narcotic substances, especially when taken in too frequent doses, or continued for too long a time. Digitalis, tartar-emetic, colchicum, aconite, &c., may be given in these diseases so as to produce a fatal result, without the symptoms being suspected as being caused by poison, or the result being viewed otherwise than as the *natural termination of the disease*; and the examination

of the body after death, and chemical research, will fail of discovering the cause. From 1810 until 1830—a period abounding with medical cant, heroic and empirical practice, and disgusting dogmatism—certain substances came into very general use, from the abuse of which much mischief accrued, even within the sphere of my own observation; calomel, tartar-emetic, colchicum, digitalis, and, more recently, iodine, were often given in such excessive doses, or continued in smaller quantities for so long a time, as to induce more serious diseases than those for the cure of which they were resorted to. The natural maladies had the efforts of nature to aid them, if these efforts had been developed or duly directed; but the substances which were employed subverted vital energy, suppressed the natural efforts, produced morbid actions and organic lesions, which were mistaken for the course or turn of the primary malady; and, when they failed of causing death, occasioned a new or different form of disease. A patient had disease of the valves of the heart and dropsical effusion; large doses of infusion of digitalis were prescribed to act as a diuretic, and this effect was sometimes produced, and a certain amount of ease resulted; but quite as frequently the disease was arrested in a different way; the action of the heart was so much weakened by this treatment as to become insufficient to overcome the obstacle to the circulation, and death was the consequence. Early in the present century, colchicum and tartar-emetic were lauded as antiphlogistic remedies, as they certainly are, and were often brought in aid of the copious blood-lettings and various other empirical means unduly lauded by the ignorant pretenders and writers of the day. More than one writer of great but ephemeral popularity extolled these substances, and prescribed them in excessive doses for the inflammatory and other diseases of the lungs and bronchi, both of children and adults; and I am confident that, in the former class of patients more especially, they were employed in such quantities, and for so long a time, as to prove fatal to more than they cured. The vital resistance, which so successfully opposes the progress of disease in most instances where there is no constitutional vice, was completely overthrown by these and similar means; and while vitality was either suppressed, impaired, or altogether destroyed by them, no opposition could be furnished to the unfavourable progress and consequences of the disease.

97. This subject might be pursued with reference to the diseases of other organs, and to various constitutional and febrile maladies; but I have, perhaps, stated what may be more than sufficient to rouse the attention of those who are not sufficiently aware of the importance which ought to be attached to it; well-educated, closely observing, and, in virtue of these, the only experienced practitioners, hardly require to be reminded of the several matters which these suggestions will undoubtedly recall to their recollection. Any further notice which this subject may require, will be taken of it in the discussion of the effects and treatment of individual poisons.

98. XI. THE GENERAL PRINCIPLES OF TREATMENT.—What I have advanced will show the importance which should be attached to the

operation of poisons, as forming the basis of rational measures of prevention and cure. Before I proceed to notice the injurious operation of particular poisons, and the treatment which each appears to require, I shall first offer a few remarks upon certain intentions and principles of treatment, which are more or less generally applicable, according to the mode of poisoning which has been resorted to. These brief remarks will refer to the *prevention*, to the *counteraction*, and to the *removal of the effects of poisons*.

99. *A. Prevention of the action of poisons* may be attempted in certain circumstances, and may succeed either partially or completely. A poison may be swallowed, and, if the means be immediately resorted to, it may be removed before it has acted, or acted to a very injurious extent. —(a) The means of removal are *emetics* and the *stomach-pump*. Of the former, but little may be said more than that they often fail to act, owing to the paralysis, or want of power of contracting, experienced by the parts concerned in the act of vomiting from the action of the poison which has been swallowed. It is, therefore, requisite to give powerful and warm emetics, as the sulphate of zinc, with capsicum, mustard, &c., according to the nature of the poison which has been taken; the intention being to excite the organic nervous influence at the same time that the discharge of the poison is procured, when this latter is of a sedative or narcotic kind.

100. (b) The removal of the contents of the stomach by means of an apparatus, such as that now in general use under the name of *stomach-pump*, although suggested by several persons long before the practicability of such means was actually put to the test, was first demonstrated, as being efficacious in cases of poisoning, by Messrs. Jukes and Scott in 1822, then medical practitioners in Westminster; and, in many instances, it is the most efficient and certain mode of removing the poison; but it is liable to certain objections. The perforations in the end of the tube may be obstructed, or the canal of the tube choked by the alimentary substances present in the stomach, and the withdrawal of the contents and of the poison will be thus delayed or even prevented, if fluids be not injected into the stomach by this tube, in order to remove the obstruction and dilute the contents of the viscus. In cases, therefore, in which imperfectly dissolved poisons have been taken, or where a greater activity may be imparted to the poison by dilution or solution, the recourse to injections may be injurious, and the use of this apparatus may be less efficacious, in these circumstances, than an active emetic, which often empties not only the stomach, but the duodenum also, and increases the secretions of the villous surface and of the liver, thereby washing off the adhering portions of the poison, or preventing the imbibition and absorption of them. When, however, a judiciously-prescribed emetic fails to act, or in cases in which an emetic may be inferred to be inactive, or in other doubtful circumstances, recourse to the stomach-pump should not be a moment delayed.

101. The removal of the poison is an indication which is not confined to cases in which the substance has been swallowed. It is equally

important in instances of *external poisoning*, the object being the prevention of the imbibition and absorption of the poison. There are two modes by which this intention may be accomplished: 1st. The application of a ligature above the part which has been inoculated with the poison, or between it and the trunk, so as to arrest its absorption and contaminating influence, and the diffusion of its impression by means of the nerves. This mode of prevention has been in use from the earliest ages, and is practiced by most savage tribes. It is obvious, however, that this practice would be inefficacious if nothing farther were attempted, and that the poison would act as soon as the ligature was removed. The great advantage of the ligature is to delay the operation of the poison until it can be either generally or partially removed by suction, or counteracted by local applications and internal remedies. Many substances are poisonous when applied to the skin denuded of its cuticle, or when inserted in a wound; and may yet come in contact with the mucous surface of the lips and mouth without risk, if there be no abrasion of the epithelium: and hence *suction* of a poisoned wound with the mouth, after the application of a ligature, where this can be applied, or suction without this antecedent in other circumstances, has been resorted to from the earliest ages, and is still practiced in all uncivilized countries. The ligature, by arresting the return of blood, while arterial action increases the capillary injection, and even augments the discharge from the wounded surface, thereby favours the removal of the poison by suction, or by any other mode of exhausting the air over the part which may be adopted.

102. The intention of removing the poison introduced into a wound by exhausting the air over the wounded part was strenuously contended for by the late Sir D. BARRY; and for this purpose he advised the application of the *cupping-glasses*; and in situations where a ligature cannot be applied, cupping-glasses are the best means of sucking out the poison, or the blood and serum contaminated by the poison, from the part. But not only is absorption thus prevented, and the poison withdrawn, but the injurious impression made by the substance on the nerves of the part is prevented from extending, owing to the pressure produced by the margins of the glasses. We have certainly not improved in modern times upon the treatment of poisoned wounds recommended by the ancient Greeks, Romans, and Arabians, as Mr. ADAMS has fully shown. NICANDER, CELSUS, DIOSCORIDES, GALEN, and nearly all the Arabians, advise the application of a ligature, and then the extraction of the poison by sucking, by cupping instruments with scarifications, cauteries, escharotics, &c. They likewise prescribed remedies with the view of altering or counteracting the effects of the poison. If the poison was of a depressing kind or produced cold, they resorted to stimulating and heating medicines; if it was of an opposite nature, they gave refrigerants; but they most frequently had recourse to articles of a heating nature, as they believed that the greatest part of poisons destroyed life by producing cold.

103. *B. The counteraction of the operation of the poison* is the next indication; and it often suc-



ceeds in respect of some, especially if attempted soon after the poison has been swallowed or applied; and the substances which thus counteract the poison have been called the *antidote*, or *counter-poison*. The antidotes of some poisons, especially of some mineral poisons, are well ascertained; and it is chiefly to chemical science that we are indebted for this knowledge; but we know but little of the means of counteracting many other poisons, especially those of the vegetable and animal kingdoms. Those antidotes whose actions have been ascertained are, 1st, those which form chemical combinations with the poison that are not injurious, as alkalies with acids, &c.; and, 2d, those substances which deprive acrid and corrosive poisons of their properties, or which form insoluble compounds with the poison. Certain antidotes are complete and efficient, if administered sufficiently early, or before organic or vital changes of a dangerous nature have been produced; others are only partially efficacious, as ammonia in cases of poisoning with prussic acid.

104. Means which enable the system to resist the action of a poison may be ranked in this category. Those which prevent the absorption of the poison, as several of those which have been already noticed, or such as counteract the depressing influence of certain poisons, as the spices, cayenne pepper, aromatics, spirituous liquors, &c., in cases of animal or fish poisons, are often more or less efficacious. When poisons are taken in large quantities, the economy, especially the nervous system, sustains more or less of shock; and, if appropriate means be immediately used to aid it in rallying, a greater degree of vital resistance will be opposed to the progressive advance of the effects. From these remarks, it may be inferred, that in our endeavours to counteract the operation of a poison, we should attend to the following cautions: 1st. To avoid all means which may render the poison more soluble, or which may dissolve it, or add otherwise to its activity; thus we should not give wine or vinegar soon after a large quantity of opium has been taken. 2d. To avoid such measures as may promote the absorption of the poison into the circulation, as blood-letting. 3d. In cases of poisoning by depressing agents and narcotics, or such as destroy nervous power and irritability, medicines, emetics or others, which act in a somewhat similar manner, as tartar emetic, ipecacuanha, &c., should not be exhibited. 4th. That the shock sustained by the ingestion of virulent poisons should be counteracted by energetic means of a stimulating and restorative kind, administered according to the peculiarities of the case; and that vomitings, however frequent, should not prevent the exhibition of these, in cases of narcotic, depressing, and animal poisons, or even in others, unless the vomitings proceed from the action of corrosive and very acrid poisons.

105. *C. The removal of the progressive effects of the poison, and opposing the tendency to death*, remain to be put in practice either when the first and second intentions cannot be attempted, owing to the time which has elapsed from the exhibition of the poison, or after one or both have failed. To be successful in these circumstances, the physician should be well acquainted with the physiological action of poisons, and with the phenomena by which this

action, in its progressive phases, are indicated; with the symptoms and progress of the mischief; and with the pathological states produced by individual poisons, and more immediately inducing death; he should be acquainted with the operation of active substances on the economy, both in medicinal and in poisonous doses, in order that he may duly recognise the nature and effects of the latter doses, and may apply the former to the removal of these effects, according to rational indications. That a knowledge of the physiological and pathological actions conjoined, consequent upon the exhibition of a poison, and of the ultimate changes of which death is the result, is of the utmost importance to the physician, is evinced by the fact that it is this very knowledge which, in extreme cases, and after other indications and means have failed, enables him to devise farther measures which may still be successful. Thus, if it be ascertained that the poison, in the advanced course of its effects, has produced paralysis of the muscles of respiration, or spasm or closure of the glottis, means directed to the continuance of respiration, or the production of artificial respiration, may yet save the patient. This fact has been demonstrated on several occasions, and other analogous illustrations of the principle will appear in the sequel. It is obvious that nothing farther can be advanced with due precision under this head, until the effects of the individual poisons are considered.

106. XII. CLASSIFICATION OF POISONS.—The effects, and the ultimate results of poisons being so diversified and complex—many producing nearly similar or variously modified effects, and the same substance evincing very different phenomena in different persons and circumstances, the effects of a single poison being thus neither constant, nor always distinctly developed—it follows that a satisfactory classification of them can hardly be expected. Indeed, all attempts at classification must be conventional; for if we endeavour to arrange them conformably with their physiological action, or according to the systems or tissues on which each appears especially to act, we shall find, as must be manifest from what I have already advanced, that many of them act upon, or through the media of, two or more systems, and upon several functions; and that the substance which affects one person, or one system, in a more or less definite manner, operates differently in others, the effects varying with the circumstances shown to modify the operation of poisons (§ 51, *et seq.*). Although we should have regard to the succession of changes consequent upon the ingestion of a poison until the ultimate results appear, still we have here comparatively little concern with those which follow the employment of the same substance in small or medicinal doses. It is the deleterious action which should be observed, and the best means of counteracting that operation, and of averting or removing its usual effects. The question is not whether or no opium, morphia, or hydrocyanic acid, &c., be stimulants, sedatives, or narcotics, or entitled to other appellations which have been given them; but it is practically, to which of these properties, or to what other property, are the injurious effects chiefly owing, and by what successive changes are these ultimate effects pro-

luced? It is principally the progressing and advanced alterations of vital function or of structural lesion that are to be arrested and remedied, and it becomes most requisite that we should not only know the nature of these changes, their whole extent, and their probable issue, but also that we should arrange those substances which operate in similar or nearly similar modes, and induce similar results, in order that the treatment which may be found successful against one poison belonging to this category may be advantageously extended to the others. That an arrangement of poisons should be adopted according to this principle, with reference to the operation and effects of these agents, and that the classification may thus be made practically useful in a therapeutical point of view, is shown by the extension by the author of the affusion of cold water on the head and neck to cases of poisoning by various narcotic and sedative poisons. The cold affusion had been employed for ages for intoxication and insensibility caused by inebriating liquors; and the author, having repeatedly seen it thus employed with success, had recourse to it in 1821, in a case of poisoning by *opium*, published in 1822 in the *London Medical Repository* (vol. xviii., p. 29), and in 1825 he recommended, in the work now named (vol. xxv., p. 40), this practice in cases of poisoning with *prussic acid*, and with other poisons belonging to the same classes as those just named; and this treatment has been found most efficacious in states of vital depression and insensibility produced by narcotics and sedatives generally. The propriety, therefore, of adopting a classification based upon the most prominent operation and effects of individual poisons, as being the most practically useful, must be apparent. In venturing to recommend an arrangement different from that which has been suggested by Dr. PARIS, and from that advised by FODÉRÉ, and adopted, with certain modifications, by ORFILA, and still further modified by CHRISTISON, DEVERGIE, BECK, TAYLOR, and several other recent writers,\* I have been influenced chiefly by the firm conviction, entertained without any doubt from the first enunciation of these classifications, that they were inadequate and inaccurate; inasmuch as the principal operation and effects produced by several virulent poisons had no place given them, or did not fall within the scope of the arrangement, and as various substances were classed under heads to which they could not with due accuracy be assigned, and were hence viewed

as productive of effects of which they were altogether innocent, while those which they did actually produce were not at all, or not sufficiently recognised. Thus prussic acid and the prussiates were arranged in the class narcotics, and numerous substances were classed as irritants, whose operation in this respect was the least considerable of the several effects produced by them. From the observations made above as to the general and special operation of poisons on the animal economy (§ 28, 34, *et seq.*), the following classification is suggested as corollaries: i. *Acrid and corrosive poisons.* ii. *Depressing and paralyzing, or sedative poisons.* iii. *Exciting and astringent.* iv. *Exciting and exhausting poisons.* v. *Irritating and depressing or paralyzing—acro-sedative poisons.* vi. *Irritating and alterative—acro-alterative poisons.* vii. *Narcotizing or stupefying poisons.* viii. *Narcotizing and irritating—narcotico-acrid poisons.* ix. *Septic or disorganizing poisons—dissolving the vital cohesion of tissues.*

107. As to these classes, I may remark, that the operation of the substances arranged under the first is more or less strictly local, when the quantity of either is large, or when the poison is concentrated; but that when certain of these substances are employed in small doses, or in weak solutions, they will then act in such a manner as may warrant the arrangement of them under different heads. The third and fourth classes might have been comprised in one and divided into two orders, but I considered it better to have too many classes than to subdivide them. I may offer the same remark as to the fifth and sixth classes, but for practical purposes I preferred the arrangement as it stands.

108. XIII. OF THE SPECIAL EFFECTS AND TREATMENT OF POISONS.—CLASS I. ACRID AND CORROSIVE POISONS.—*The irritant poisons of several recent authors.* The numerous substances arranged by recent writers as irritants, comprise many which I have here denominated and expressed more strictly in accordance with their real operation. It surely cannot be admitted, moreover, that the substances which I am about to consider under this class destroy life by merely irritating the surface to which they are applied. Is there no local lesion produced beyond irritation? That the local action amounts to something far beyond irritation will be admitted by every one who is in the habit of observing closely, or of attaching precise meanings to words. The want of precision is here chiefly owing to the circumstance of these writers having classed under the same kind those substances which are most acrid and corrosive, and most limited in their sphere of action, with others which are really but slightly irritant, and which are destructive of life by producing other and very different effects from irritation. This will become more apparent in the sequel.

109. i. OF THE SYMPTOMS AND DIAGNOSIS OF POISONING BY ACRID AND CORROSIVE SUBSTANCES.—The symptoms vary with the degree of solubility, the concentration of the solution, and with the nature and admixture of the substance. When the poison is very soluble or is fluid, and very corrosive, the mouth and tongue evince most severe symptoms; there are burning and pricking or darting pain, redness, swelling with exudation of lymph, or corrosion and destruc-

\* The arrangement proposed by Professor FODÉRÉ was as follows:

i. Septic poisons. ii. Narcotic or stupefying poisons. iii. Narcotico-acrid. iv. Acrid or rubefacient. v. Corrosive or escharotic. vi. Astringent poisons.

ORFILA at first adopted, with slight modifications, the above arrangement, but afterward reduced the classes to the following:

i. Irritants. ii. Narcotics. iii. Narcotico-acrids; and, iv. Septic poisons.

CHRISTISON, BECK, and TAYLOR have adopted this arrangement of M. ORFILA, discarding most undeservedly the class septic poisons.

The classification suggested by Dr. PARIS is based upon the presumed mode in which individual poisons act.

i. Poisons which act through the medium of the nerves without being absorbed, and without exciting local inflammation. ii. Those which enter the circulation, and act through that medium with different degrees of force, on the heart, brain, and alimentary canal. iii. Those which act locally on the mucous membrano of the stomach, exciting a high degree of inflammation.



tion of the mucous membrane or epithelium, and an acrid and burning sensation in the mouth and fauces. These sensations and alterations extend more or less to the pharynx, and along the œsophagus; and the patient is incapable of swallowing, or, if he attempt to swallow, the matters are spasmodically rejected. When the poison is fluid, as a mineral acid or an alkali, the burning pain and change of structure rapidly produced in the mouth, throat, and œsophagus, and all the symptoms referable to those parts, precede disorder of the stomach; and in some instances the poison is not conveyed farther than the œsophagus, owing to its violent action on the pharynx, and the spastic contraction of this part and of the upper part of the gullet. When, however, owing to the peculiarities of the case, or to the less solubility or state of admixture of the poison, the mouth and throat are but little or slightly affected, the stomach then evinces the chief disturbance. Pain, sickness, or nausea, burning heat, and vomiting, are rapidly produced. In some instances the burning pain and acrid constriction extend from the mouth or pharynx, along the œsophagus to the stomach. The pain and vomiting follow immediately upon the passage of the poison into this viscus. The rejected matters consist at first of the contents of the stomach, with more or less of the poison, and subsequently of mucus and serum, often streaked with blood and mixed with bile, but frequently also altered by a portion of the poison being conjoined with them. Owing to the rapid rejection of its contents, and of the greater portion of the poison, the stomach may be chiefly or almost alone affected. This is the case, however, in comparatively rare occasions, for some of the poison most commonly passes into the duodenum, and often also into the small intestines, especially when the poison, as arsenic, is not very soluble, or is taken in an undissolved state; and in these circumstances some time may elapse between the ingestion of it and the occurrence of vomiting. But when this or any other poison is taken in such quantity and state as to produce a corrosive effect, the action on the stomach is manifested very soon after its ingestion; and is attended by more or less tenderness, tension, and soreness in the upper regions of the abdomen, and by a terrified or an anxious expression of countenance.

110. When an acrid or corrosive poison reaches the intestines—which may not occur when the poison is very active, and the lesion of parts above the pylorus is intense, and the shock to the vital endowment consequently great—most acute burning or lacerating pains more or less constant, but aggravated at intervals, are felt around the umbilicus or over the whole abdomen, and are attended by a sensation of twisting, sometimes by a feeling as if the intestines were drawn against the spine, and often by a distressing aching in the loins extending to the epigastrium. The abdomen is always tense and tender, but at first there is no swelling, but rather a retraction of the parietes; but distention from flatus generally supervenes. Purging is frequently present with tenesmus, and sometimes with excoaration of the anus. After feculent matters are passed the stools are mucous, watery, or serous, streaked with blood, or contain a considerable quantity of

blood. The affection of the bowels may be the prominent effect, the stomach being comparatively but little disturbed; but more frequently the whole alimentary canal is affected, and vomiting and purging, with distressing pain and vital depression, are present at the same time.

111. As the operation of the poison proceeds painful and scanty micturition occurs; hicough sooner or later appears, and becomes distressing; the pulse is rapid, small, and weak; the strength and spirits are prostrated, the features sunk, the surface is covered with clammy cold sweats, the extremities are cold and shrunk, and the voice fails. In cases where the poison excoarates the fauces, pharynx, or upper portion of the gullet during deglutition, the irritation often extends more or less to the epiglottis and glottis, producing wheezing or difficult respiration, hoarseness, or spasm of the glottis, and, in rarer instances, even death by asphyxia. It will appear from this that this class of poisons produce effects which may readily be mistaken for several of the diseases mentioned above (§ 68); and to the diagnosis between these effects and those diseases I shall next briefly advert.

112. A. CERTAIN LESIONS OF THE STOMACH are attended by symptoms, especially near a fatal termination, very closely resembling those produced by corrosive substances.—(a) *Rupture and partial laceration of the stomach* may follow sooner or later after a full meal, and owing to the circumstance, as well as to the attendant phenomena, occasion suspicions of poisoning, which, however, an examination of the body after death readily disproves. Instances have occurred of persons who have eaten too largely, either after long abstinence, or after having suffered from dyspeptic disorder, and who have been seized with violent but ineffectual attempts to vomit, pain in the stomach, sudden collapse, and death in a short time, preceded by abdominal tumefaction and tenderness. On dissection, laceration of the coats of the viscus and the passage of the alimentary matters into the peritoneal cavity have been found. In the case described by M. LALLEMAND, which occurred after long privation and dyspeptic symptoms, the patient exclaimed that she felt her stomach tearing itself open. The laceration was five inches long; the coats were not diseased, but the pylorus was indurated. Dr. CHRISTISON refers to two cases in which the laceration appeared to have been caused by the accumulation of gases arising from depraved digestion. In these, as well as in cases where the distending matters have been more consistent, the laceration has been owing as much to weakened vital cohesion of the coats of the stomach as to the amount of the distending matters. Instances of rupture of the stomach have been recorded by Dr. ROBERTS and Mr. WEEKS; and upon dissection no sufficient cause of the occurrence was detected. It may be, therefore, inferred that flatulent distention of the stomach having occurred, as it usually does, when the vital tone and cohesion of the organ are most impaired, spasmodic reaction or contraction of the parietes had taken place, during which laceration had been the result. The rupture may be only *partial*; as in the case related by Mr. CHEVALIER, where the symptoms of corrosive poisoning occurred after a very full meal, at-

tended by vomitings of blood towards its close. Upon examination after death, the inner coat of the stomach was torn in several places, and that of the duodenum was also extensively lacerated.

113. (*b*) *Rupture of the coats of the stomach at the bottom of a chronic ulcer, or perforation of the stomach*, may be attended by similar phenomena to those caused by corrosive poisons. 1st. The ulceration may have existed and been attended by paroxysms of pain, or of retchings, and when it had proceeded as far as the peritoneal coat, or partially through the muscular coats, the distention of a full meal, or of flatus, in connexion with efforts at vomiting, has produced *rupture of the tissue forming the bottom of the ulcer*, and the escape of the contents of the viscus into the peritoneal cavity. 2d. The ulceration may have gone on to *perforation* without any evidence of rupture or laceration. Perforation may, however, take place without the escape of the contents of the stomach into the peritoneal cavity; the peritoneal surface around the perforation having become agglutinated to an adjoining viscus, as in two cases which occurred in my practice.

114. *Perforations of the stomach* are described in the articles DIGESTIVE CANAL (§ 36-43) and STOMACH; it is, therefore, only necessary to state at this place, that the symptoms attending them in their course, and towards their fatal termination, should be carefully distinguished from poisoning; for the diagnosis is not always easy. Perforation occurs most frequently in females between 16 or 17 years, and 25 years of age, especially in the scrofulous diathesis, in the sedentary, and in connexion with disordered catamenia, and in delicate or weak constitutions. The severe symptoms, especially sudden and acute pains, retchings, or vomitings, anxiety, vital depression, &c., generally occur after eating or drinking, and especially after a full meal; and, if perforation has actually taken place, there is always vital shock or collapse, accompanied by the extension of pain and tenderness, with more or less tumefaction or tension, over the whole abdomen. In these cases, the advanced symptoms and death are results of the peritonitis caused by the matters which have escaped into the peritoneal cavity; and the vomiting is often slight, consisting chiefly or altogether of articles recently taken. There is seldom purging, which frequently accompanies poisoning, although constipation is not so generally observed as stated by some writers. The appearances found after death, and a careful examination of the articles partaken of, and of the matters thrown up, are the chief means of diagnosis.

115. *B. LESIONS OF THE INTESTINES AND ALLIED PARTS* may be attended by symptoms resembling the action of corrosive poisons.—(*a*) *The duodenum*, as well as the stomach, may be ruptured, independently of external violence, without any other apparent cause than overdistention, and retchings while in this state. Dr. CHRISTISON refers to an instance of a man who was seized after dinner, when mentally excited, with violent pain in the stomach, vomiting, and failing pulse, soon followed by death. The mucous surface of the duodenum was much inflamed; and, four inches and a half from the pylorus, a laceration extending through a

third of the circumference of the bowel was observed.

116. (*b*) *The passage of gall-stones*, and the violent pain, vomitings, and vital depression accompanying this affection, may suggest suspicions of poison; but the slowness of the pulse, or the absence of febrile symptoms, the tolerance of pressure in the region of the stomach, or the presence of jaundice, will, in some instances, indicate the nature of the case. Still these symptoms cannot be relied upon, and they may not be present; other circumstances duly investigated furnishing the chief sources of diagnosis. Besides, gall-stones may produce severe irritation, with abdominal or epigastric tenderness and tension, as well as pain and vomiting; and when these occur soon after the ingestion of food or drink, they furnish sufficient reasons for careful observation and examination on the part of the physician. An elderly lady, after slight jaundice, was suddenly seized with violent pain in the stomach, vomitings recurring in frequent fits, followed, after some hours, by most excruciating pains, incessant retchings, coldness of the skin, and failure of the pulse. In seven hours from the fresh accession of suffering she expired. The hepatic duct was found torn across, a gall-stone at the opening of the cystic duct, and three pounds of blood and bile in the peritoneal cavity, which was inflamed in different parts. (*Journal des Prog. des Sc. Med.*, t. xiv., p. 245).

117. (*c*) *The sudden flow of acrid bile into the duodenum*, especially during warm seasons, after this secretion had accumulated in the gall-bladder and ducts, is not infrequently the cause of symptoms which have been mistaken for the ingestion of acrid poisons. This is most likely to occur where a person who is subject to this biliary accumulation takes some article which disagrees with him, or some cholagogue purgative. I have met with two or three instances of persons who complained of the symptoms I have described as diagnostic of biliary accumulation or obstruction (see GALL-BLADDER, § 18, *et seq.*, and LIVER, § 48, *et seq.*, and § 78, *et seq.*), and for whom a moderate purgative dose was ordered. But the medicine having removed the obstruction, the passage of acrid bile into the duodenum occasioned symptoms of so violent a nature—retching and vomitings, diarrhœa, pains in the stomach and throughout the abdomen, &c.—as to suggest suspicions of an acrid or corrosive poison having been given, instead of the medicine prescribed. The bile which passed into the duodenum in these instances possessed sufficient acidity to occasion many of the symptoms of poisoning.

118. (*d*) *Bilious cholera* may likewise be mistaken for the effects of acrid or corrosive poisons; indeed, it is most difficult in many cases to distinguish between them, and still more difficult to point out any means of diagnosis which can be depended upon. Much will depend upon the acumen of the physician, and the view he takes of the history of the case, and all the circumstances attending it. The nature of the ingesta, and the state of the matters ejected, should be carefully inquired into; and if heat, acidity, or darting pains be felt in the mouth, pharynx, or œsophagus, their occurrence *before* or *after* the vomiting ought to be ascertained.



and the mouth and pharynx should be examined. These symptoms seldom even attend, and never precede bilious cholera; while they very frequently, indeed most commonly, precede poisoning with acrid or corrosive substances. Blood is never seen in the matters thrown from the stomach in cholera, whereas it is frequently seen in these matters when the vomiting has been caused by these poisons. Bilious cholera, or any state of cholera observed sporadically in this country, even when excited by indigestible articles of diet, rarely terminates fatally within 48 hours, and, indeed, very seldom thus terminates even in a much longer period, whereas the effects of corrosive poisons are much more rapidly fatal.

119. (c) *Pestilential cholera* is also liable to be mistaken for poisoning with acrid substances; but the same circumstances as have been just noticed serve to distinguish between them, with the exception of the rapid termination of the former, which is frequently equally rapid with the latter. But the prevalence and infectious nature of this pestilence, the general symptoms, the state of the surface and of the extremities, and the appearances and odour of the fluids thrown off during the progress of the malady, will readily distinguish it from poisoning, especially if the physician have seen cases of it on any former occasion.

120. (f) *Inflammation of the stomach, or of the intestines, or of the peritonæum*, may be confounded with poisoning with corrosive substances, the first of these more especially. Acute gastritis, uncomplicated with inflammation of an adjoining viscus, seldom occurs primarily in temperate climates, and not very frequently in warm countries, unless as a consequence of the excessive use of spirituous liquors or other stimulants; but it does occur more frequently both in England and Scotland than Dr. CHRISTISON has inferred from the statements of M. Louis. Acute gastritis sometimes is produced primarily—and formerly it was produced more frequently—by drinking excessively of spirituous liquors, and the severity of the symptoms were occasionally such as to equal the violence of those occasioned by acrid poisons; but the history of the case, the symptoms of intoxication, the odour and appearances of the matters rejected, &c., will sufficiently point out the nature of the affection. It must be admitted that the possibility of acute gastritis being produced by natural causes is a question of great interest and importance to the practical physician. Dr. CHRISTISON remarks, that the possible occurrence of this disease, independently of poison, is the only obstacle in the way of a decision in favour of poisoning when, in cases characterized by signs of violent irritation during life and early death, bright redness, ulcers, and black granular, warty extravasation are found in the internal surface of the stomach; and in regard to their effects he adds, that they can very rarely indeed arise from natural causes, or, indeed, from any other cause than poison. Admitting the truth of this, I may state, that violent gastritic symptoms, death after some hours, with vascular injection, redness of the inner surface of the stomach, and numerous ecchymoses, have occurred, without sufficient evidence of poisoning, unless, in some instances, the excessive use of spirituous

liquors be considered as such, and to which it is strictly entitled. When ulcers, excoriations, abrasions, or corrosions of the inner surface of the viscus are found, in cases which have terminated rapidly, and in connexion with bright redness, ecchymosis, &c., there can be little doubt of the ingestion of an acrid or corrosive poison, although it may have escaped detection. An important sign in cases of gastritis, as well as of cholera, is the absence of excessive heat or burning in the throat, or of painful and difficult deglutition; which very frequently precede the vomiting in cases of poisoning by acrid substances, and which seldom attend and never precede the vomiting from spontaneous gastritis or enteritis.

121. (g) *Acute enteritis, gastro-enteritis, or peritonitis*, may, in some instances, give rise to suspicions of poisoning; and the physician will consequently be induced to inquire, as in the diseases already noticed, 1st. As to the time at which vomiting appeared after a meal, or after the ingestion of any article whatever. 2d. As to whether the disease was ushered in by chills or rigours, or is attended by febrile reaction or commotion. 3d. As to the state of the bowels, of the evacuations, and of the matters thrown off the stomach. 4th. As to the symptoms referable to the mouth, throat, and œsophagus. 5th. As to the presence or absence of diarrhœa, and of excoriations at the anus; and, 6th, into all the circumstances connected with the history and existing state of the case. The causes assigned for the attack; the relations subsisting between these causes, and the supervention of chills or rigours, of vomitings, and of consecutive febrile reaction; the existence of constipation, and the absence of lancinating pains or burning sensations in the mouth, throat, and œsophagus at the commencement, and of painful and violent purging and excoriations of the anus at an advanced period, with other particulars connected with the history of the case, will distinguish most instances of spontaneous inflammation of the digestive organs and of the peritonæum from poisoning with acrid or corrosive substances.

122. (h) *Perforation of the intestines*, as well as perforation of the stomach, always terminates fatally; and when it is attended by symptoms simulating those which are caused by acrid poisons, an examination after death will show the nature of the case. (See DIGESTIVE CANAL, § 40, *et seq.*, and INTESTINES, § 80, 81.)\*

123. (i) *Colic, iliac passion, and strangulated hernia* may severally be mistaken for poisoning with corrosive substances, especially when they are attended by violent retchings or vomiting; or poisoning by these substances may be mistaken for these. *Internal strangulation, intussusception of a portion of intestine*, and the existence of *intestinal concretions*, or other causes of obstruction, may likewise occasion symptoms closely resembling poisoning, especially the vomitings, pain, anxiety, and vital exhaustion attending them. But the history of the case, the obstinate constipation, the appearances and odour of the matters thrown off the stomach; the sensations of the patient as to the seat of obstruction and pain; and the lesions found after death, with the other cir-

\* This statement is too broad; perforation of the intestines, though generally, is not always fatal.]

cumstances already adverted to, will serve to distinguish these maladies from the effects of poisons.

124. Having taken a view of the features distinguishing certain natural diseases from the effects of corrosive or acrid poisons, I should now proceed to describe the *structural lesions* produced by these latter; but as these lesions differ very remarkably from each other, according to the particular substance causing them, I shall briefly notice them in connexion with the especial consideration of the several substances acting chiefly by their corrosive or acrid properties, or by the *local changes* produced in the viscera, with which they are brought in contact; and for facility of reference, I shall treat of them in alphabetical order.

125. *i. ACIDS.*—*A. ACETIC ACID*, in its concentrated state, *acts* chiefly as a corrosive agent. Although, in its various forms, it is in daily use, it is rarely the cause of death, even when swallowed by mistake in considerable quantity. Its injurious effects have been described by ORFILA, BARRUEL, SCHUBARTH, and HÉBRÉART.

126. *a.* According to the last-named experimenter, a small quantity of acetic acid dropped into the *windpipe* occasions difficult and hissing respiration, croupy cough, and death in two or three days, the surface of the larynx and trachea being covered with a false membrane similar to that found after croup.

127. *b.* The concentrated acid, *applied externally*, acts as a corrosive agent on the tissues. In this state it operates chiefly locally, dissolving the albumen, fibrin, and gelatin; and is but slightly absorbed. It coagulates, and renders dark the blood in the capillaries.

128. *c.* If *injected into the veins* in a strong or concentrated state, or if the quantity be considerable, it changes the physical appearances of the blood, and alters the colour and condition of the red globules. According to Dr. POMMER, when it is dilute, or about the strength of the distilled vinegar in common use, several ounces of it may be injected into the blood without material mischief; but the more recent experiments of ORFILA throw much doubt upon this inference.

129. *d.* Acetic acid *taken into the stomach* in large quantity, but more especially in a very concentrated state, and if the stomach be empty, produces agonizing pain, and a sensation of burning in the stomach, with anxiety at the epigastrium, and convulsions, and death after a few hours. In this concentrated state it acts chiefly locally, and is not absorbed in an appreciable degree. It affects violently the nerves of the organ, the affection being propagated to the large visceral ganglia; and it coagulates the blood in the capillary vessels of the organ, and arrests the circulation through them, occasioning also a vital shock. In dilute states and in frequent doses, this acid acts chiefly through the medium of the blood, lowering nervous energy and vascular action, as will be shown hereafter. (See next CLASS.)

130. *e.* The *appearances after death* by the concentrated acetic acid are, lividity of the integuments of depending parts of the body; a brownish and leathery appearance of the mouth, fauces, and pharynx; and a similar change extending down the œsophagus to the stomach or to parts of this viscus. The inner surface of

the œsophagus presents large patches of a dark-brown hue, with reticulations of injected capillary vessels. The stomach, in some places, has a grayish tint, interspersed with dark-redish spots, with numerous ecchymoses, and several large, black elevations, consisting chiefly of coagulated blood in the sub-villous cellular tissue. A livid or black hue of the fundus or near the pylorus; a thick, dark, pulpy matter adhering to parts of the internal surface of the organ; and the presence of more or less of the acid in this viscus or in the intestines, have also been observed. The intestines are not materially altered.

131. *f. Treatment.*—Draughts containing calcined magnesia, or the alkaline or magnesian carbonates; the cautious use of the stomach-pump, as the villous surface of the œsophagus and stomach is readily injured by mechanical agents after corrosive poisons; the injection of magnesian or alkaline solutions, and the removal of the contents of the viscus soon afterward by this apparatus, are the measures more immediately required. Subsequently, albuminous or demulcent fluids, mild broths, arrow-root, sago, and various mucilaginous and farinaceous articles of diet, may be given in small quantities, and frequently.

132. *B. THE HYDROCHLORIC, THE NITRIC, AND THE SULPHURIC.*—As these acids, usually denominated the *mineral acids*, when used in poisonous states and quantities, produce similar phenomena, and require the same means for the counteraction and removal of their effects, I shall consider them under the same head, and, in some respects, in connexion. *Hydrochloric acid—muriatic acid—spirit of salt*—is not infrequently employed as a poison; but the *nitric acid—aqua fortis*; and the *sulphuric acid—vitriolic acid—vitriol—oil of vitriol*, are not infrequently resorted to, for purposes of murder or suicide, or of external injury short of murder. Either of these acids may be swallowed by mistake, or be employed in various criminal ways. TARTRA adduces an instance of a female who, having been intoxicated, was poisoned by nitric acid, which was mixed with wine and poured down her throat. A woman was convicted of murdering her husband by pouring sulphuric acid down his throat while he lay asleep with his mouth open; and several instances have occurred of the same acid having been given in poisonous doses, in place of the medicines which had been prescribed. The mineral acids, especially the sulphuric, have likewise been employed, by abandoned persons, to poison their own infants; but they are much more frequently resorted to as a means of suicide. They have also been employed, from motives of revenge or of dislike, to disfigure the countenance or person; the concentrated acid being squirted or thrown over exposed parts of the body. Mr. TAYLOR states that the external application of nitric acid has been a criminal cause of death on many occasions. In one instance this acid was poured into the ear of a person while sleeping, and it led to the slow destruction of life.

133. *a.* The *symptoms* occasioned by the mineral acids, *when swallowed in a concentrated form*, are of the most violent description, but the alterations produced by them on the organization are chiefly local and structural. Dr. CHRISTI-



son justly remarks, that they afford the purest examples of true corrosive poisons, their poisonous effects depending entirely on the organic injury they occasion in the textures to which they are applied; and that it is of use to set out, in the investigation of the effects of poisons, by determining the phenomena presented under such circumstances. I shall have more immediately to describe the violent symptoms and the severe structural change produced by these substances before a fatal result ensues; and in the sequel to show the much less violent phenomena, and the very slight local signs which other poisons hitherto classed with these leave of their operation, and yet prove more rapidly and certainly fatal than they; and few will fail of being struck by discovering the great extent of lesion the animal frame will sometimes endure from the former—the most violent of all corrosive substances—and yet recover; and the very slight alterations locally produced by these other poisons, whose operation is so rapidly fatal. These circumstances will of themselves prove sufficient to warrant an arrangement in which substances differing so very materially in their local and constitutional effects as those alluded to should not be classed, as they hitherto have been, under the same head, but should be arranged under different classes, according to their most prominent mode of operation and effects.

134. *b.* The mineral acids may produce fatal effects when *applied externally*, when *injected into the veins or into mucous canals*, when *inhaled in the form of fumes*, and when *swallowed*. When *applied externally* in a concentrated form, or even in a state of strong dilution, they irritate, corrode, or inflame the skin. The nitric, or rather the strong nitrous or fuming nitrous acid, produces these effects most severely; but the sulphuric and hydrochloric act almost as violently as it. In the stronger states these acids chiefly act locally and disorganize the tissues, the coagulation of the blood in the capillaries and the destruction of the organization on which they act generally preventing their imbibition and absorption.

135. *c.* When *injected into the veins*, even in a state of considerable dilution, they coagulate the blood, and thus destroy life; but when the dilution is still greater, or such as to allow of the circulation and presence of either of these acids in the vessels of the heart, ganglia, or brain, before coagulation even partially takes place, it may reasonably be inferred that the vital manifestations of these organs will be thereby rapidly subverted.

136. *d.* If the fumes of either of these acids, or any of the gaseous forms which they assume, either singly or in states of admixture with other gases or vapours, be inhaled, the most severe effects on the respiratory passages and lungs are produced. When either nitric oxide gas, or nitrous acid vapour, hydrochloric acid gas, chlorine, or sulphurous acid, in more or less strong states, is attempted to be inspired, spasm of the glottis is produced by it, and its entrance into the respiratory organs is thereby prevented. In a weaker form, either of these acid vapours may pass into the lungs, but it irritates and inflames the mucous surface of the larynx and trachea, the inflammation extending along the bronchi to the air-cells and lungs, pro-

ducing dangerous or even fatal laryngitis, bronchitis, or pneumonia, or a complication of these. Several instances are on record of persons having been destroyed by the violent and extensive inflammation of the respiratory surfaces produced by these fumes, and by the nitric oxide gas converted into nitrous acid vapour by mixing with the atmosphere.

137. *e.* The injection of either of these acids into mucous canals with a criminal intention has been rarely recorded. But an instance is published in the *Medical Gazette* (vol. xvii., p 623), abridged from a French journal, of sulphuric acid having been given in an enema by mistake for oil. As soon as the enema was injected, the patient uttered distressing screams, passed the night in the utmost agony, and died in the course of the following day. Numerous instances have been published of the murder of children with sulphuric or nitric acid, chiefly the former, which has generally been poured into the mouth or throat. When poisoning is effected in this way, the acid may not reach the stomach; it may not even get farther than the pharynx or upper portion of the œsophagus. Being poured into the mouth or throat of the child when asleep, or when crying or struggling, a portion of it irritates the epiglottis, or even escapes into the glottis, occasioning strangulating cough, and asphyxia by closure of the glottis, with violent inflammation or disorganization of the pharynx and adjoining parts, as observed in some cases when acid has been swallowed accidentally.

138. *f.* When either of these acids, or an admixture of these acids, has been swallowed, the effects vary conformably with the circumstances mentioned above (§ 51, *et seq.*). These effects have been most ably investigated by TARTAR, with reference more especially to nitric acid, which, as well as the sulphuric and hydrochloric, may be employed for the purposes of suicide, or of murder, or may be swallowed accidentally. However taken, with whatever motive, or in whatever quantity or degree of concentration, the acid may not, especially when taken accidentally, reach farther than the pharynx or œsophagus, its acidity, the violence of its effects, or the discovery of a mistake arresting deglutition before any portion of it could have reached the stomach. Nevertheless, fatal results may rapidly ensue owing either to the extensive disorganization of textures in, and adjoining to, the pharynx, or to the inflammation or corrosion of the larynx, the tumefaction of these parts closing the glottis, and either causing or threatening asphyxia. In these cases, although the acid may not reach farther than the upper part of the œsophagus, the effect upon the larynx may be so violent as rapidly to produce suffocation, if tracheotomy be not performed. M. TARTAR considers that the mineral acids produce effects which may be arranged as follows: 1. Speedy death from violent corrosion and inflammation. 2. Slow death from a peculiar organic change of the stomach and intestines. 3. Imperfect recovery, the person remaining liable ever after to irritability of the stomach. 4. The recovery of perfect health; but the operation, by means of asphyxia, caused in the way now stated, should be ranked as a fifth mode or variety.

139. *g.* The most common symptoms are those

of the first of these varieties, namely, burning pain, and acrid acid taste in the mouth, extending to the throat; extreme heat and pain between the sternum and spine, extending to the epigastrium and stomach, where it is most excruciating, and attended by extreme anxiety, by most painful or impossible deglutition; and an increase of these on attempts to swallow, on pressure, and on coughing. Eructations often take place from the stomach, and aggravate the sufferings of the patient, especially in the situations just named. The lips are commonly shrivelled, and are, at first, whitish, and afterward yellowish, if nitric acid have been taken; and brownish, if sulphuric acid. Excoriations or corrosions, but rarely blisters, are sometimes observed on or about the lips, or on parts of the skin with which the acid may have come in contact, as the cheeks, neck, breast, or fingers; and these marks undergo the same change of colour as observed in the lips and mouth. The inside of the mouth and of the cheeks is also more or less shrivelled, white, or corroded; and the teeth often in a very few hours become loose, brown, or yellowish-brown. The colour of the tongue varies with the acid, and the time which has elapsed from the application of the acid; but it is often yellowish, or yellowish-brown. Deglutition is so difficult, that attempts to take fluids are followed by the forcible rejection of them by the nose, the pharynx being spastically contracted. The matters vomited are generally brownish or black; and if they fall on marble or limestone, they produce effervescence. Afterward they are mixed with altered blood, and with membranous shreds, which resemble portions of the villous coat of the stomach, and sometimes actually consist of these, but most generally of coagulated mucus. The bowels are obstinately constipated, and the urine is scanty or suppressed. The abdomen, especially its upper regions, is tender and swollen. The pulse is very weak, and, toward the close, very small, imperceptible, or intermitting. It is seldom very frequent, and it may even continue but little or not at all accelerated throughout. The countenance, at first expressive of anxiety, pain, and distress, soon becomes collapsed, pale, and the extremities cold or clammy. The breathing is laborious, is often attended by singultus, and the movements of the diaphragm increase the pain of the stomach and epigastrium. In many cases the irritation and swelling in the pharynx and epiglottis, or even in the larynx, cause fits of suffocative cough, with croupy respiration, and, where the larynx has been more particularly injured, suffocation may not merely be threatened, but actually produced.

140. In some instances, especially when the quantity of acid which has passed into the stomach has been large, the symptoms may be less excruciating, but more rapid; while in others there may be a deceitful tranquillity, and life may be somewhat longer sustained. Thus, in the case adduced by TARTRA, of a woman who had been intoxicated, and was poisoned by aquafortis mixed in wine, although there were both pain and vomiting at first, yet none of these symptoms were afterward complained of, death taking place within twenty hours; but the intoxication probably obscured the sensibility, while the admixture with much wine modified

the operation of the poison. The intellectual faculties generally remain unimpaired to the last. Should the patient survive the first effects of the poison, the nuncous membrane of the fauces, pharynx, or œsophagus may be detached and discharged in irregular shreds, or in portions of considerable size, or even in a perfect cylinder.

141. *h. The duration* of this variety of corrosive poisoning may vary from two or four hours, as in the cases recorded by REMER and SINCLAIR, to two or three days; but life may be prolonged to ten or fifteen days. The usual period is from twelve to forty-eight hours. Death may be caused altogether by asphyxia, owing to the closure of the larynx, [the acid not reaching the stomach]; and if tracheotomy be resorted to, life may be thereby prolonged, as in the case recorded by Mr. ARNOTT; but death more frequently results; the structural change, the violent impression made upon the nerves, the vital shock, the coagulation of the blood in the vessels of the parts with which the acid came in contact, and the local arrest of the circulation and of the associated vital functions, combining to produce the fatal issue. [In these cases death generally results very speedily, often within a few minutes.]

142. *i. The quantity* of a mineral acid capable of producing fatal effects cannot be stated with any precision, as the result depends upon the several circumstances stated above (§ 51, *et seq.*) Dr. CHRISTISON remarks that the smallest fatal dose of sulphuric acid which he has found recorded, was one drachm, which was taken with sugar by mistake for stomachic drops by a stout young man, and produced death in seven days. A man has recovered after taking six drachms. In a case of poisoning with hydrochloric acid, an ounce and a half proved fatal in about twenty-four hours; and in another case, alluded to by TAYLOR, a man walked about three quarters of a mile after taking nearly an ounce. Mr. ORR and Dr. CRAIGIE refer to two cases of recovery, although two ounces of the concentrated sulphuric acid had been swallowed in each.

143. *k. The symptoms of the second of these varieties*, according to TARTRA, are at first those already described, but they soon abate in violence. The patient then becomes affected with general fever, dry skin, difficult breathing, tension of the abdomen, spasms, and pains of the limbs, salivation, and occasional vomiting, particularly of food and drink. The salivation is attended by fetor, and membranous flakes, resembling the villous coat of the stomach, are vomited. These flakes are most probably membranous exudations of lymph, resembling those of croup, thrown out on the excoriated and inflamed surface of the organ. Worms are sometimes discharged dead and exoriated by the acid. The functions of digestion and assimilation are arrested, or remarkably impaired, and the frame becomes extremely debilitated and emaciated. Death usually takes place in periods varying from a fortnight to several months. TARTRA adduces an instance in which death did not take place until after eight months, the vomiting of membranous flakes continuing until the last.

144. *l. The third and fourth varieties* described by M. TARTRA are characterized, as respects the former of these, chiefly by the greater mildness of the symptoms from the commencement, and



by the patient continuing through life liable to attacks of pain in the stomach, vomiting of food, and general disorder of the digestive functions. The latter consists of cases of perfect recovery. Of 55 cases of poisoning by the mineral acids recorded by TARTRA, 26 died; 19 of the primary, and 7 of the secondary effects. Twenty-nine recovered, and of these 21 perfectly. Suicidal cases, for obvious reasons, were more frequently fatal than the accidental.

145. *m.* The strong mineral acids, as above mentioned (§ 137, 138), may not reach the stomach, especially when the poisoning is accidental or attempted criminally. The effects produced by them, under these circumstances, upon the pharynx, œsophagus, and larynx, being often so violent as to occasion death in a few days. Several instances of this kind have been recorded; and even when a person has discovered his mistake, and taken only a small portion, which could have reached no farther than the pharynx or upper part of the gullet, partial recovery may take place, with stricture of the upper portion of the œsophagus; or fatal inflammation of the pharynx and larynx, with or without asphyxia, may be the immediate result. That a large proportion of the children poisoned, by the abandoned classes, with the mineral acids, die from the effects of the poison on these parts, without reaching the stomach, is proved in some cases by the appearances observed after death, and is rendered probable in others by the circumstances under which the act is perpetrated. In the case recorded by Mr. ARNOTT, the injury was confined chiefly to the larynx and gullet, the stomach being distended with food and very little affected. The symptoms were general depression, with croupy respiration and threatened suffocation, for which tracheotomy was performed, with relief to the breathing; but the patient died, with symptoms of general exhaustion, in thirty-six hours, without presenting any marked signs of the operation of the acid on the stomach.

146. In the circumstances and in the concentrated form, in which the stronger mineral acids are poisonous, whether taken accidentally, or with a suicidal intention, or given with a criminal object, danger or death arises chiefly from the local or structural change; comparatively little of the acid, as stated above (§ 134), being carried into the circulation. But these acids may be taken in such states of dilution as will admit of their absorption, and action on the frame through the medium of the blood; and thus they may produce noxious effects, especially when given frequently, or in too large quantity, or a form of *slow poisoning*; but as they do not act by producing a corrosive effect, when given in states of dilution which admit of their absorption, they will be considered, in this form of exhibition, under the class to which the different effects they then produce more appropriately belong.\*

147. *n.* *Appearances after death from the concentrated mineral acids* may be confined chiefly to the fauces, pharynx, larynx, and œsophagus, and may be comparatively slight in the stomach. The whole of the alimentary canal, from the mouth to the anus, should be examined, and the lesions of the upper portions should be

carefully observed; as these portions, especially those particularized, suffer most in cases of poisoning with these substances. Spots on the skin, about the mouth and lips, are often present, and should be examined. If the case have proved fatal within the usual period, and if the concentrated sulphuric acid have been swallowed, the inner surface of the mouth is generally white, softened, and corroded, the mucous coat is readily detached, and the tissues underneath are of a dark red. The same change is observed in the fauces, pharynx, and œsophagus, the colour of the mucous surface of these parts sometimes being brownish or ash-gray. The mucous membrane is often more or less corroded, partially detached, and, in the œsophagus, assumes longitudinal plicæ, owing to the contraction of the canal and its partial detachment. The stomach is usually contracted, corroded, and sometimes perforated. When opened, its contents are commonly of a dark brown or black hue, of a tarry consistence, and consisting chiefly of altered blood and mucus. The existence of acidity depends upon the treatment and the period which had elapsed from the ingestion of the acid. The villous surface of the stomach is traversed by black striæ, is more or less corrugated, or is generally of a brownish or black colour, which is not removed by washing. Between the rugæ and underneath the blackened membrane, the issues are of a deep or dark red hue; but this redness and the blackness of the villous membrane are sometimes partial, or in patches of various extent. The small intestines, especially when much of the acid has passed into the stomach, are more or less inflamed, their contents much resembling those of that viscus. When perforation of the stomach has taken place, all the coats are much softened, especially in the vicinity of the perforation, the margins of which are black, irregular, and very soft. The contents of the viscus may not have escaped through the aperture; but if they have passed through, the adjoining organs are generally altered by the acid. Mr TAYLOR refers to a case in which the spleen, the liver, and the coats of the aorta were found corroded and blackened by the acid which had escaped through the perforation.

148. When the acid has been taken in a diluted state, or at least in a less concentrated form, and if the patient live some days or weeks, the œsophagus is more or less constricted, and its mucous surface inflamed or otherwise changed. Inflammatory lesions are commonly found in the stomach, and the corrosion or charring of the villous membrane is not so great as described above. The blood in the vessels is always very dark; that in the vessels of the stomach and spleen is almost black and coagulated. In the more prolonged cases the villous coat of both the œsophagus and stomach is either more or less abraded, ulcerated, or almost entirely destroyed. The pylorus is generally constricted. In these cases the patient sinks from the irritability of the stomach, from the almost total arrest of the functions of digestion and assimilation, and from the action of the acid upon the blood and nervous systems. In some, at least, of these cases, and especially when the acid has been much diluted, a partial absorption of it into the circulation takes place, and changes the colour

\* In these cases they may readily be detected in the urine.—*Lond. Med. Gazette*, May 27, 1842.]

and state of the blood, and acts otherwise injuriously on the frame, as will be noticed more fully in the sequel.\*

149. *o. The appearances produced by the nitric and nitrous acids* are not materially different from those caused by sulphuric acid. The external surface of the lips often present yellowish or yellowish brown spots, the cuticle being easily detached. Yellowish spots are sometimes found about the neck, or on the hands. A yellow frothy liquid escapes from the mouth and nose. The abdomen is often distended with flatus. The inner surface of the mouth and cheeks is of a whitish or yellowish colour. The pharynx, larynx, and œsophagus are softened, tumefied, of a yellowish or brown colour, and their mucous membrane is easily detached, or it is already detached in long shreds or folds. The stomach is similarly altered. It is rarely perforated, and is often distended with gas. The villous membrane presents extensive patches of a yellowish, brown, green, or black hue, and the coats of this viscus are remarkably softened throughout. The duodenum is often changed in a similar manner, although not so extensively; the other intestines are seldom much altered. The non-perforation of the stomach is most probably owing, as Mr. TAYLOR suggests, to the circumstance of the acid having been swallowed, in most instances, while the stomach contained much alimentary matters. When death takes place rapidly, the contents of this viscus generally yield more or less of the acid. When the larynx is implicated by swallowing this or any of the other strong mineral acids, more especially if suffocation have been thus produced, the lungs and mucous membrane of the trachea and bronchi are congested with black blood. In more chronic cases, especially if the patient has lived several weeks, softening, redness, and ulceration in various stages of the mucous membrane of the œsophagus and stomach are found. The œsophagus is often constricted, and constriction is sometimes, also, met with in the pylorus and duodenum.

150. *p. The hydrochloric acid* produces similar symptoms and appearances after death to those which have been now described. Cases of poisoning by this acid are much more rare than by the other strong mineral acids; but those which have been observed with due attention present the same phenomena and lesions as are produced by nitric acid.

151. *q. Instances of poisoning by an admixture of mineral acids*—by the *nitric and muriatic acids*—*aqua regia*, which is often used in the arts for dissolving gold and platina—and by the *nitric and sulphuric acids*—*aqua regina*, which is employed for dissolving silver, may occur, but they have been very rarely met with. ORFILA

\* The following case is reported by Dr. TOOTHAKER, in the Boston Med. and Surg. Journal, vol. xv., p. 270. An ounce of the official muriatic acid was swallowed by mistake, and immediately succeeded by violent burning of the mouth and fauces, a sense of suffocation, and spasms. Olive oil was given, followed by milk and water, thickened with calcined magnesia. Copious vomiting succeeded. An emetic was next administered, and this again followed by magnesia. The strength was greatly reduced, and the extremities so cold as to require the application of sinapisms. The next day there was pain and costiveness, but these were relieved by a dose of castor oil. After this, the patient gradually recovered, although not without subsequent symptoms consequent upon the action of the corrosive substance which he had taken.]

has given one instance of poisoning by the latter of these combinations. The symptoms and post-mortem appearances were much the same as those already stated, but approached the nearest to those caused by the nitric acid, which predominated in the mixture. The *nitro-muriatic acids* most probably produce symptoms and changes very closely resembling those described above, especially those in connexion with nitric acid (§ 139–149);\* but they have not hitherto been recorded.

152. *r. Treatment.*—The difficulty of swallowing, in almost every instance of poisoning by these acids, is the great obstacle to the treatment of their effects. The means and the intentions which should guide the employment of them are obvious; but when the constriction of the pharynx and the spasmodic action of the pharyngeal muscles are such that all articles are forcibly rejected upon every attempt to swallow them, the most influential antidotes and remedies are altogether prevented from exerting their effects. If, however, the patient be still able to swallow, calcined magnesia, or the carbonate of magnesia, should be instantly given in milk, or in any mucilaginous fluid; but if these are not immediately to be procured, finely-powdered chalk, whiting, common soap or soda should be substituted, and taken in milk, or in water, or in oleaginous or mucilaginous fluids, according as either may be in instant readiness. The success of treatment entirely depends upon the rapidity with which the *antidote* is administered. Oleaginous and mucilaginous fluids should be freely administered. Linseed or olive oil, linseed tea, gruel, milk, [flour and water], are severally of use when they can be swallowed, either alone or as the vehicles of the antidotes just named.

153. If swallowing be impossible, owing both to the constriction and to the tumefaction and irritability of the pharynx and œsophagus, the propriety of introducing the remedies now mentioned by the tube of the stomach-pump into the stomach should be considered. The tumefaction of the coats of these passages, the corrosion and softening they have experienced, and their partial detachment, and the frequent recurrence of severe singultus, are often such as almost to preclude the introduction of the tube, and to risk perforation of the canal in the attempt. ORFILA, in 1817, recommended a recourse to the stomach-pump, which, however, was first proposed by BOERHAAVE, and strongly advised by RENAULT and DUPUYTREN shortly before the recommendation of ORFILA. But, although thus approved of, this apparatus appears never to have been brought into use until

\* The plan of my work and my limits prevent me from entering upon the *chemical analysis and tests* of the several poisons. If these several topics cannot be fully discussed with reference to the states, combinations, &c., in which poisons should be investigated by the medical jurist, and to the various objections which may be urged against certain methods of analysis and tests, in ever varying circumstances, they should be entirely relinquished; and it is preferable that the reader should consult either of the able productions of BECK, CHRISTISON, ORFILA, DEVERGIE, TAYLOR, and GUY, as to these matters, than that I should give an insufficient account of them; and to such an account my limits must necessarily have confined me.

[The American reader will have little cause to regret the omission of this part of toxicology, inasmuch as the works of TAYLOR, BECK, and GUY are in almost every medical library. The editor would particularly recommend the recent work of TAYLOR on Poisons, as containing everything needed or known on this important branch of medicine.]



1822, when its utility was demonstrated by the practitioners mentioned above (§ 100.) It is obvious that the prospect of having recourse to it with advantage, in the circumstances now under consideration, must depend upon the peculiarities of the case, and the acumen and dexterity of the surgeon.

154. When the larynx is affected, causing difficulty of breathing approaching to suffocation, *tracheotomy* should be performed; nor should this operation be then delayed, as prolonged difficulty of breathing causes more or less congestion of the lungs and bronchial membrane, which always accelerates a fatal issue, which issue the lesions of the stomach and œsophagus might not otherwise have produced.

155. Having neutralized the acid, our chief endeavours should be next directed to the removal of the effects which may be inferred to have been produced by it. Mucilaginous fluids, almond or spermaceti emulsions, gruel, decoction of marsh-mallows, gum-water, sugared water, thin broths, especially veal broths and jellies, may be severally given, and warm baths may be allowed. If the patient complain of colicky pains, of dysuria, or of tenesmus, starch, or other demulcent and oleaginous enemata, especially those with olive oil, with gruel or with veal or mutton broths, &c., should be administered from time to time; for, under any circumstance of the case, these enemata will be of service.

156. The symptoms of *pharyngitis*, or of *œsophagitis*, or of *gastritis*, or of the association of these affections, which frequently continue until either a fatal issue or recovery results, should be treated conformably with the principles advised for these maladies. But generally the amount of vascular depletions required for the idiopathic sthenic inflammations of the alimentary canal is not required after poisoning by these strong acids. The frame has received both a severe injury of its violent organs and a violent shock; and the former generally prevents the reaction usually consequent upon the latter. Hence venesection may not be required, or it may even be dangerous: the habit of body, strength, age, and circumstances of the case, in connexion with the degree and character of existing vascular action, being the guides to the adoption either of this practice or of moderate local depletions, or merely of emollients, of demulcent broths, of mucilaginous diluents, of gelatinous and farinaceous articles, and of external derivatives.

157. The irritability of the stomach, and the spasms and pains of the voluntary muscles and extremities which often continue for several days, both in cases which recover and in those which end fatally—these pains and spasms being caused by the injury and irritation sustained by the visceral or ganglionic nerves, the morbid conditions of these nerves being extended to the sensory nerves, and reflected upon the voluntary muscles by the motory nerves—are among the most distressing symptoms which are afterward experienced, and are alleviated with the greatest difficulty. In these circumstances, emollient and tonic substances may be given in small and frequent doses, with opium or the tinctura camphoræ composita; or the simple infusion of roses may be prescribed, with tinctura opii; or the compound

tragacanth powder, with the pulvis eretæ compositus cum opio, &c.; and warm terebinthinate epithems or embrocations should be repeatedly applied to the abdomen. Nourishment of a mucilaginous, gelatinous, or demulcent kind should be taken in small quantity and at short intervals; and if deglutition continue difficult, strong broths and animal decoctions ought to be administered *per anum*. For this latter important and sometimes fatal affection, the emollient linctures and other means recommended for *acute and chronic inflammations and stricture of the œsophagus* (art. OESOPHAGUS, § 43, *et seq.*), may be appropriately have recourse to. (See, also, STOMACH, *Diseases of*.)

[We have treated three cases of poisoning by sulphuric acid, two of which died and one recovered. The poison was drank from a vial, by accident in every case, and the quantity swallowed from one to three drachms. The symptoms were those detailed above. Death occurred in one case from the inflammation extending down the trachea, causing all the symptoms of croup, and causing death by suffocation, about the 5th of August. In the other fatal case, death occurred on the third day, from acute gastritis. In the case of recovery, alkalies, as whiting, with abundance of mucilage, were freely and early administered.]

158. *s. Sulphate of Indigo.*—Poisoning by this substance is chiefly accidental. Mr. TAYLOR has observed that, as this compound is nothing more than a solution of indigo in sulphuric acid, the symptoms and post-mortem appearances caused by it are the same as those which have been described as produced by the latter substance. Poisoning by it may be suspected when, with these symptoms, the internal surface of the mouth has a blue colour, the vomited matters also having a deep blue tint. In two instances, in which about an ounce each was swallowed, death took place: in one case, eleven hours afterward, and in the other in seven hours and a half. It was remarked that the urine which was passed had a bluish tinge, indicating the absorption of some portion of this compound into the circulation. The treatment of poisoning by the sulphate of indigo is not different from that directed for the effects of the mineral acids.

159. *C. OXALIC ACID.*—Poisoning by this acid is generally accidental or suicidal. Of nineteen cases of poisoning by this substance in the coroners' return for 1837 and 1838, fourteen were suicidal. Owing to the resemblance of this acid to Epsom salts, it has sometimes been taken for them. Mr. TAYLOR thinks that its intensely acid taste prevents it from being often used with criminal intentions, although he has known several instances of murder having been attempted by it.

160. *a. The symptoms* are immediate, and so intense as often to have destroyed life before the arrival of the practitioner. If the poison be taken in large quantity—from half an ounce to an ounce dissolved in water—a burning acid sensation is felt in the fauces, throat, and œsophagus, followed immediately by vomiting. In some instances the impression of the acid on the stomach has been so intense as to paralyze this viscus, and the parts associated with it in the act, and little or no vomiting has occurred, death, however, rapidly taking place;

in other cases, the vomiting has been incessant until death. The vomited matters are intensely acid, and have a green, or nearly black, colour, consisting of the alimentary substances, and afterward chiefly of altered mucus and blood. Extreme anxiety, pain, and tenderness are felt at the epigastrium; and often, in both, hypochondria, followed by spasms, singultus, convulsions, collapse of the features, and of all the vital actions, by clammy perspirations and cold extremities. Attending these there are often, also, stupor, unconsciousness, a small, irregular, and almost imperceptible pulse, deep and slow respiration, numbness of the limbs, and death.

161. In smaller quantity, and in somewhat greater dilution, the sensation of acidity, of burning in the throat, and the vomiting varies accordingly. Should the patient survive some time, owing either to the quantity of the poison taken, to the presence of food in the stomach, or to the discharge of the greater portion of the acid by vomiting, soreness and constriction of the throat, painful and difficult deglutition, irritability of the stomach, thirst, tenderness at the epigastrium, hiccough, diarrhoea, flatulence, and great depression of the vital powers are the most constant symptoms. Soreness of the mouth, swelling of the tongue, and numbness and tingling of the limbs, are often also experienced; the patient either dying after two, three, or several days, or slowly and altogether recovering. But recovery is generally attended and followed by more or less disorder, or tendency to disorder, of the digestive organs.

162. *b. The quantity of oxalic acid* which may destroy a human life has not been determined. The immediate rejection or the retention of the poison by the stomach, and the promptness or absence of medical aid, necessarily determine the result. Mr. SEMPLE recorded a case in which two drachms, dissolved in water, were swallowed. Vomiting took place immediately, and the symptoms had nearly disappeared in about twelve hours. A man swallowed three drachms; vomiting instantly occurred, and he recovered in a few hours. A girl is stated by Dr. BABINGTON, of Coleraine, to have taken forty grains: severe symptoms of gastric irritation supervened; but although, as in the other cases, medical aid was procured, the recovery was protracted. Mr. TAYLOR states, that a smaller dose than half an ounce generally has not been fatal; although it may be inferred, from the very dangerous effects caused by much smaller quantities, that much less than this may destroy life, if judicious treatment be not resorted to. When the dose of this poison is upward of half an ounce, death is commonly the result; but instances of recovery have occurred where the quantity was much greater than this, and judicious treatment has been promptly administered.

163. *c. The period at which death may take place* varies with the circumstances already alluded to. Dr. CHRISTISON mentions a case where an ounce of this poison killed a girl in thirty minutes, and another where the same quantity was fatal in ten minutes, this being the shortest period on record. When the dose is half an ounce, or upward, death commonly takes place within an hour or two. But in

stances have occurred in which life has been prolonged for thirteen or fourteen hours. Mr. FRAZER has recorded a case which was prolonged to twenty-three days; irritability of stomach, singultus, fever, and exhaustion being the prominent symptoms.

164. *d. Appearances after Death.*—The mucous membrane of the mouth, fauces, and œsophagus is usually white; but it is sometimes partially covered by the dark matters discharged by the stomach. This membrane may be readily detached in these situations, as well as in the stomach. This organ is commonly much softened and pulpy, and contains a dark-brown, acid liquid resembling coffee-grounds, from the admixture of altered blood with it. Blood-vessels are seen ramified distended by coagulated, black blood. In a case where nearly two ounces were taken, and death was rapid, the coats of the stomach presented nearly as carbonized an appearance as that occasioned by sulphuric acid. The œsophagus presents similar changes. It is generally pale, seems as if boiled in water, and its inner membrane is raised in longitudinal rugæ or folds, interrupted by patches of abrasion. The upper portions of the intestines, especially the duodenum, are sometimes slightly inflamed or softened, but they are not otherwise remarkably altered. In Mr. FRAZER's case, in which life was prolonged twenty-three days, the villous coat of the stomach and gullet was either softened or entirely detached. The muscular coat was exposed in several places, and was thickened, softened, injected, and inflamed. This acid has not so corrosive an action on the coats of the stomach as the strong mineral acids, as it rarely entirely perforates these coats, although it softens them and destroys their physical as well as vital cohesion. In some instances the inner surface of the trachea has been found inflamed, owing to its anatomical connexion with the œsophagus. In a few cases the lesions have been very slight, although the symptoms were severe; but little beyond softening of the coats of the stomach having been remarked.

165. *e. Death is the result* of the corrosive action of this acid upon the organization of the upper portions of the digestive canal, especially of the stomach, the nerves of the organ being more particularly affected. But the operation of this poison is thus limited only when large doses of it are taken, and then the local injury and disorganization and consequent vital shock are sufficient to destroy life. It has not been found to affect the larynx so as to threaten suffocation. When swallowed in smaller quantity, or in states of dilution, it is manifestly absorbed, and acts upon the nervous system and on the blood (§ 25, *et seq.*). Much of the change observed, both in the tissues of the stomach and in the blood, in cases of rapid poisoning by this substance, has arisen from the action of such portions of it as have still remained in, or been imbibed by the stomach at the time of death, the changes found on inspection having been partly thus produced *post-mortem*.

[Dr. C. T. JACKSON has reported an interesting case of poisoning by oxalic acid, in the thirtieth volume of the Boston Med. and Surgical Journal, p. 17. A man, aged 30, took, February 1st, at half past eight A.M., about one third of a



tea-cupful, or about one ounce, of the crystallized oxalic acid, mistaking it for Epsom salts. He immediately perceived, by the strong acid taste, burning sensation in the throat, &c., that he had made a mistake, and he immediately drank a large quantity of warm water to excite vomiting, which produced the desired effect. He also took ipecacuanha by the advice of a physician. This was followed by antimony in emetic doses, and castor oil. When called at half past eight P.M., Dr. J. found him in a state of complete prostration; face, lips, throat, and tongue swollen and livid; pulse almost extinct, fluttering, and irregular; heart, in a continual fluttering palpitation; great jactitation and distress, with incessant vomiting. The matter evacuated by vomiting was a thick, grumous, and jelly-like fluid, of a yellow colour, mixed with white flocculi. He complained of no pain at the epigastrium, or over the bowels, on pressure, but the distress and anxiety were very great. The matter first brought up by vomiting was of a dark chocolate colour. Dr. J. ordered carb. lime,  $\text{zij}$ , mixed with camphor and opium, five grains: this was given in divided doses, but rejected; an enema of soap and water was also given. February 2d, face tumid, and of a livid colour; tongue swollen and livid, pulse 130; urine entirely suppressed; gave an infusion of salts and senna; vomiting continued for two or three days, with great distress and anxiety; tongue became covered with a brown coat, with a red, dry tip; great thirst, no pain. The case was treated like one of gastritis, with general and local bleeding, morphia, &c. On the 6th, his mind began to wander, and petechiæ appeared on the face, head, chest, nates, &c., appearing as if sprinkled with blood. He continued to fail, and died on the 10th, ten days after taking the poison.

*Post-mortem Examination.*—Muscles rigidly contracted; numerous petechiæ; emphysema of lower lobe of left lung; unusual infiltration of serum in lungs; left side of heart empty of blood; the right contained a small quantity; gall-bladder distended with yellow bile; stomach contained a yellow fluid, evidently coloured with bile; stomach remarkably corrugated; mucous membrane very bright red, especially in small curvature of the organ and around the cardiac orifice; numerous small ulcers in the mucous membrane, which was much thickened and soft; the mucous surface of the duodenum was red, and also thickened, and studded with ulcers; also that of the jejunum and ilium congested; Peyer's glands not enlarged; small intestines contained soft, yellow, fluid fecal matter; the large intestines contained scybala of fecal matter; mucous membrane healthy; spleen natural; bladder contained some urine.]

166. *f. Treatment.*—The antidotes against this poison should be most promptly resorted to. The best are chalk, calcined magnesia, or the carbonate of magnesia. These should be abundantly mixed in water, or milk, or in any oleaginous or demulcent fluid instantly at hand. Lime-water and oil may also be given. As chalk is the best antidote, Dr. CHRISTISON advises that even the plaster of the apartment should be broken down in order to be given; but it would be difficult to reduce the plaster in a very short time to a powder sufficiently fine to admit of admixture, and of deglutition

in the existing state of the patient. Free dilution—copious draughts of demulcents, emollient decoctions, &c., are generally of use; but they should be given in large quantities, and their rejection, by irritating the fauces, should be encouraged. If dilution be not free and frequent, it may be injurious, by dissolving the poison and by favouring its absorption. If vomiting can be produced after the antidotes and much fluid have been taken, it should be encouraged by means of oleaginous and emollient fluids; but recourse to the stomach-pump is of doubtful efficacy, as it may injure, or even perforate the softened coats of the œsophagus and stomach. When it can be easily introduced, and when there is little or no singultus, antidotes and demulcent fluids having been already freely swallowed, then it may be of use, if vomiting does not take place, for the removal of the contents of the stomach, and for the introduction of remedial agents when deglutition cannot be accomplished. But it should not be overlooked that the pharynx and gullet have sustained nearly as great an injury as the stomach, and that the too early use of this apparatus will prevent the antidotes and other medicinal substances which should be swallowed from exerting a salutary effect upon those parts. As the salts which the alkalies form with oxalic acid are as injurious as this acid itself, neither the alkalies nor their carbonates should be given after poisoning with it. The consecutive effects of this substance should be treated as those of other corrosive poisons, or as the operation of this acid requires when given in small or diluted doses, and when acting as will hereafter be shown. (See next CLASS.)

167. ii. ALKALIES.—*Ammonia, potash, soda, and their carbonates—pearlash, soap-lees.*—*a.* The vapour of strong ammonia may rapidly destroy life, when inhaled, by producing acute inflammation of the larynx and trachea, often extending to the bronchi and lungs, and all the symptoms of violent croup. When ammonia is held too near the nostrils to rouse persons from syncope, its vapour may act more or less as an irritant of the respiratory mucous surfaces, and be injurious not only in this way, but also in as far as it prevents a due supply of air to the lungs.

168. *b. The symptoms occasioned by the fixed alkalies*, when taken in large quantities, are nearly the same as respects the caustic states of these alkalies; the subcarbonates and carbonates being more mild in their operation. Poisoning by these substances is generally caused by accident. When the caustic alkalies are swallowed, an acrid, corroding taste and pain, with a sensation of burning and excoriation, are felt in the mouth and throat; these latter sensations proceeding along the œsophagus to the stomach and epigastrium. Vomiting often occurs, and the matters thrown off usually consist of soft substances, resembling the softened, detached portions of the villous tissue, with mucus, often mixed with dark, discoloured blood, and with alimentary articles more or less altered, in the first instance. Both these and other associated symptoms vary with the concentration and quantity of the alkali; but vital depression soon appears. The mouth, tongue, and throat present a tumefied, soft, flabby, and inflamed appearance; the surface becomes cold and clammy; the pulse feeble,

small, and quick; singultus is often present; the pain extends to the central and lower regions of the abdomen, and diarrhœa supervenes and becomes urgent and exhausting. The symptoms are somewhat less severe when the carbonates have been taken, unless the dose of these has been very large and the solution very strong.

169. *c.* *Ammonia* and its sesquicarbonate produces nearly the same symptoms as the fixed alkalies; the chief differences being, that strong solutions of the former occasion a more violent burning pain in the fauces, œsophagus, and stomach than the latter, the larynx being oftener implicated. But poisoning by ammonia is not common, cases of it occurring chiefly by mistake, which is most frequently discovered before much of it is swallowed; and then the fauces, pharynx, larynx, and œsophagus are severally more or less affected, according to the strength of the solution. Ammonia is not so productive of vomiting as the fixed alkalies, when taken in poisonous doses, the symptoms being more closely allied to those of gastritis, associated with enteritis and œsophagitis; and it seldom occasions diarrhœa. In the more concentrated states ammonia also occasions singultus and convulsions.

170. *d.* The quantity required of these substances to produce death necessarily varies with the concentration of the solution, and with the state of the stomach as respects the quantity of aliments in it, and other circumstances. The caustic alkalies are fatal in smaller quantity and in less time than the carbonates and the preparations of ammonia. ORFILA adduces two instances in which half an ounce of the carbonate of potash was fatal, the patients having lingered for several months. The exact quantity, however, cannot be assigned; for a comparatively small one, if the alkali be caustic, or if it implicate the larynx, may be rapidly fatal.

171. *e.* The duration of the symptoms, or period which usually elapses until death occurs, may be very short, especially as respects the caustic alkalies. Mr. TAYLOR estimates the shortest period at three hours; and in this case death was caused by three ounces of a strong solution of the carbonate of potash. When the substance attacks the larynx, as often occurs in respect of the mineral acids, this period will also be short. The more immediate effects of the caustic alkalies usually terminate fatally in two or three days; the softening and disorganization of the villous surface of the digestive canal, and the arrest of circulation in the vessels supplying this canal, terminating life in a very few days, and even in a shorter time, if the extent of injury be such as to occasion severe vital shocks in addition. When the injury is less, or the vital resistance to it greater, the patient may linger for weeks, or even months; the solution, abrasion, or excoriation of the villous surface of the stomach, and of other parts of the canal, being attended by pain and tenderness in the hypochondria and other regions of the abdomen, with vomitings, anorexia, indigestion, diarrhœa, and often, also, with difficult or nearly impossible deglutition. Owing to the injury or destruction of the digestive villous surface, digestion and assimilation are impaired or arrested, and the patient sinks from

the inanition thus occasioned by the local injury; whatever amount of absorption of the poison may have taken place into the circulation, in cases where the substance has been more diluted, and the local injury less, acting a very subordinate part in producing the ultimate result.

172. *f.* The appearances after death consist chiefly of a diffiuent softening, abrasion, or detachment of large portions of the villous surface of the fauces, pharynx, œsophagus, and stomach; and sometimes also of parts of the duodenum and intestines. The internal surface of the canal, especially of the stomach, presents a chocolate colour; and the contents are fluid, viscid, and often dark from the admixture of exuded blood. The softening of the coats of the stomach sometimes extends to all the coats, but especially to the more internal; and much resembles the gelatinous softening met with in the stomach in rare instances, and attributed to the action of the gastric juices after death (see § 84-87); but there have been more tumefaction and darker discoloration in the poisoning now being considered. When death has been produced by ammonia or its sesquicarbonate, the softening and tumefaction have been attended by signs of inflammation and excoriation, inflammatory appearances existing also in the trachea and larynx.

173. *g.* Of the action of the alkalies and their carbonates it may be concluded that, in their concentrated states, in large quantities they are fatal chiefly by their local action, in the way stated above (§ 171, 172); and that, in weaker forms or in small doses, they are more or less absorbed, as demonstrated by the composition of the urine and other secretions but they are generally eliminated by the mucous excretories before they accumulate in the blood to a very injurious amount.\*

174. *h.* The treatment of the alkaline poison consists in the immediate exhibition of fluid containing vinegar, or any of the vegetable acid which may be obtained with the least delay. If any of these be not quite at hand, draught of beer or of malt liquors; or demulcents with oil, or milk, gruel, &c., may be taken until these acids are procured. A tepid infusion of chamomile flowers is afterward of use in promoting vomiting, and it may be given with or without moderate doses of the sulphate of zinc. The stomach-pump may be more injurious than beneficial, especially if the caustic fixed alkalies have been taken, for the tumefaction and softening of the coats of the œsophagus and stomach are often so great as to render it difficult to introduce the tube without causing laceration or injury.

The treatment of the secondary effects of these poisons consists chiefly in removing the effects which may be inferred from the symptoms still to continue. At first demulcents, oleaginous and emollient substances, may be administered, and afterward gelatinous and far-

\* When injected into the veins, ORFILA believed that the alkalies caused death by coagulating the blood. I find it remarked in my note-book, when detailing some experiments with the alkalies, in which I was concerned in 1820, that "the alkalies and their carbonates, when injected into the veins, appear to destroy life by impairing organic nervous energy, the irritability of the heart, and the functions of the brain, and by their influence on the nervous masses and structures while circulating in the blood-vessels and capillaries."



inaceous articles of food in small quantities may be given. An attempt may be made, with caution, to restore the tone of the villous surface, by giving small doses of *creasote* with demulcents, or of the pyroligneous acetic acid, or the compound infusion of roses with small doses of quinine, or of the sulphate of zinc, or such of the tonic and astringent infusions or decoctions as may be found to agree the best with the stomach. When the difficulty of swallowing and continued irritability of the stomach excite fears of abrasions of the villous coat of the digestive canal, and if diarrhœa warrant the supposition that this lesion extends as low as portions of the intestinal tube, then astringents and tonics, vegetable or mineral, as either appears most appropriate, should be given in small but frequent doses, with small quantities of opium, in demulcent and emollient vehicles. By attempting to support vital power by suitable means, and to restore the tone of those parts of the villous surface which have been the least injured, nature will thereby be the better able to reproduce in some measure the abraded portions, or in some way to supply their functions. In other respects the treatment, the diet, and the regimen should be adapted to the features of particular cases, with a careful observation of the *juvantia* and *lædencia*.

175. iii. ANTIMONY—CHLORIDE OF.—*Butler of Antimony*.—This is the only preparation of antimony which I shall notice as a *corrosive poison*; the other preparations of this metal being more or less absorbed, and acting otherwise on the system. The *chloride*, as usually employed, is a very corrosive liquid, varying in colour, according to the quantity of iron it contains, from a light yellow to a dark red. Poisoning rarely occurs from it. Mr. TAYLOR, however, refers to three cases which have been recently recorded: two were caused by mistake, one intentionally; and in this last between two and three ounces of this solution were swallowed.

176. a. The *Symptoms* were in many respects the same as those described above as being caused by the caustic alkalies: a burning pain in the throat, course of the œsophagus, and stomach; constant efforts to vomit; collapse of the features, coldness of the surface and extremities, and faintness; a small, weak, and frequent pulse; pains in the abdomen, with tenesmus, but no evacuations. To these succeeded drowsiness, convulsions, and, in the suicidal case, death in ten and a half hours. The two accidental cases recovered, much smaller quantities of the poison having been taken.

177. b. *On inspection after death*, the fatal case presented the internal surface of the digestive canal, from the mouth to the jejunum, of a black and charred appearance. The mucous membrane was destroyed throughout this extent: "there was none of this membrane, in general, remaining, only a flocculent substance, which could be easily scraped off with the back of the scalpel." The subjacent coats were so soft as to be torn with the greatest ease.

178. c. The *treatment* should consist chiefly of copious draughts of water, or emollients and demulcents containing sugar, and, after free vomiting has been procured, with opium or sirup of poppies. If vomiting does not imme-

diately follow the ingestion of this poison, ORFILA recommends that a decoction of cinchona, or of willow or oak bark, or of powdered gall-nuts, should be freely taken as soon as possible. The treatment of this poison does not differ from that advised for the fixed alkalies as respects either these substances or those mentioned under that head. See, also, the *preparations of antimony* in CLASS V.—ACRO-SEDATIVE POISONS.

179. iv. IODINE AND BROMINE.—A. a. *Iodine* acts differently on the economy, according to the concentration of the tincture or solution of it which may be used. In a state of strong spirituous or ethereal solution it acts as a powerful corrosive of the tissues to which it may be applied; but in weaker solutions, and in various states of combination, it is much less corrosive, or is merely an irritant, and is more or less copiously absorbed into the circulation. In these states it acts as an irritant and alterative, or *acro-alterative poison*, in which class I have considered it and its preparations.

180. b. The *fumes of iodine*, when inhaled, produce a violently irritating effect upon the respiratory passages, especially the larynx and trachea. If the vapour is concentrated, it occasions constrictive irritation and inflammation of these parts, which may be followed by asphyxia. In milder states it occasions inflammation of the air-passages, with or without pneumonia. I have seen more than one case in which the vapour of iodine had been resorted to in the treatment of pulmonary consumption, with the effect of producing dangerous bronchitis, owing to the strength of the vapour which had been inhaled.

181. c. *Applied externally*, iodine, in a concentrated or pure state, or in that of a strong tincture, acts as a caustic, and changes the cuticle to an orange-yellow colour, causing desquamation, and, if allowed to remain, inflammation and destruction of the tissue with which it comes in contact. In weaker states of solution it acts as a desiccant of secreting or mucous surfaces, and inflames them more or less intensely. Hence, if injected, even in these states, into mucous canals, or taken into the stomach, it would act as an acrid corrosive poison.

182. d. *When iodine is swallowed* in a more or less pure or concentrated form, it produces the most violent sufferings, especially if the quantity be large; but the effects vary remarkably with the state and contents of the stomach at the time of its ingestion; for if this viscus contain much bread, potatoes, or farinaceous or amylaceous articles of food, the iodine will be thereby rendered much milder in action by forming an iodide of starch, as Dr. PEREIRA has remarked. Spirituous solutions of iodine, or the iodured solutions of the iodide of potassium, when swallowed in more or less strong or concentrated forms, cause a most acrid sensation, with constriction, burning pain, and dryness of the throat, descending down the œsophagus to the stomach, where they produce lacerating pains and efforts to vomit, extreme thirst, tenderness of the epigastrium, with anxiety, tremours, loss of strength, palpitations, faintness, sinking of the pulse, suffusion of the eyes, and restlessness. Dr. JAHN mentions a case in which an over-dose occa-

sioned violent pain in the abdomen, vomiting, profuse bloody diarrhoea, coldness and blanching of the skin, rigours, rapid pulse, &c. In a case noticed by Dr. CHRISTISON, a drachm and a half of the iodureted solution of the iodide of potassium produced acute pain and burning in the pit of the stomach, nausea, followed by vomiting of yellowish matters, which had the taste of iodine; by restlessness, headache, giddiness, and pallor of the countenance; and by recovery after five days. In a fatal case recorded by ZINK (*Journ. Comp.*, t. xviii., p. 126), the symptoms were restlessness, burning heat and dryness felt from the throat along the course of the œsophagus to the stomach, unquenchable thirst, palpitations, and a frequent, unequal, and weak pulse, violent priapism, copious diarrhoea, parched tongue, tremours, and faintness. The patient was bled; the blood was cupped and buffed. He died after five weeks. In another case, in which the tincture of iodine caused slow poisoning and death, M. ZINK found the following lesions:

183. *c. Appearances after Death.*—The intestines were distended with gases; effusion had taken place into the peritoneum; and adhesions had formed between several of the viscera. The gullet was much reddened internally, and remarkably constricted. The stomach was distended, and was externally inflamed in patches, and in one place apparently excoriated. It was inflamed internally, and corroded to a great extent near to the pylorus; the peritoneum covering the corroded part was detached and perforated with numerous small holes. The intestines were reddened and inflamed in places with patches approaching to splacelation. The liver was enlarged, and of pale red or rose colour. The gall-bladder contained a large biliary calculus. The spleen seemed inflamed in some places. The pleura contained some serum.

184. *f.* The quantity of this poison required to destroy life depends upon the concentration of the solution employed, and the nature and quantity of the aliments in the stomach. When the iodine is pure or in large quantity, in whatever state it may be employed, it acts as a corrosive or caustic poison, causing death by its local action. In states of weaker solution, or in combinations which weaken its action, or in small doses often repeated, it produces *slow poisoning*, as will be shown hereafter. It is then absorbed, and it accumulates in the system, producing emaciation and various morbid changes. The quantity required or the time taken to produce death has rarely been remarked in respect of this poison. Dr. GARDNER states that a scruple of pure iodine, in the form of tincture, destroyed a child four years of age in a few hours.

185. *g.* The treatment of the more corrosive states in which iodine may be given is not satisfactory. The stomach-pump should be early employed, and vomiting encouraged by giving fluids containing anylaceous and farinaceous substances. Starch enemata should also be thrown up, and demulcents taken frequently. [Irritation should be relieved by opiates.] In other respects the treatment should be the same as recommended for *gastritis*.

186. *B. BROMINE* is but little known as a poison. Its vapour is most irritating when

brought in contact with the conjunctiva.—*a.* When its vapour is *inhaled*, violent cough, a feeling of suffocation, with dryness and constriction of the larynx, are occasioned, and are soon followed either by inflammation of the respiratory passages, or by asphyxia. FRANZ had violent cough and sense of suffocation, followed by headache, instantly after momentarily breathing the vapour of bromine.

187. *b.* When a *watery solution is injected into the veins*, according to the experiments of FRANZ, BARTHEZ, DIEFFENBACH, and BUTZKE, it appears to coagulate the blood, and causes immediate death, preceded by convulsions.

188. *c.* Taken into the stomach, it is a more corrosive poison even than iodine. BUTZKE, after swallowing a drop and a half of this substance in half an ounce of water, felt heat in the mouth, œsophagus, and stomach, followed by colicky pains. Two drops occasioned nausea, hiccough, and increased secretion of mucus. (See CHRISTISON on Poisons, p. 1-5, and PEREIRA'S *Mat. Med.*, vol. i., p. 250.) From these experiments it is evident that bromine acts in a similar way to iodine in every respect; but that it is poisonous in smaller quantities than iodine, although the *symptoms* and changes produced by it in the digestive canal are the same as those occasioned by that substance. The treatment is the same for both poisons.

189. *v.* LIME acts as a corrosive poison when taken into the stomach, or applied to a vital part, in its caustic and unslacked state; but it is rarely so employed, even accidentally; two cases of this kind only being noticed by medico-legal writers. It is evident, from its caustic action, that the ingestion of it, or its introduction into mucous canals, will be followed by corrosion, and inflammation of the tissues with which it comes in contact. When employed in its quick state, it will even decompose or destroy the structures by imbibing their watery or fluid constituents.

190. *a.* When *swallowed*, it occasions heat, constriction, and pain in the throat, descending to the stomach, with unquenchable thirst, nausea, retchings, severe colicky pains, constipation, and the usual symptoms of corrosive poisoning, followed by nearly the same changes as have been already described, especially inflammation and corrosion of the parts with which it had come in contact.

191. *b.* The treatment should be the same, as respects *antidotes*, as that advised for poisoning by the fixed alkalies (§ 174), especially an immediate recourse to vinegar, lemon-juice, or any vegetable acid, and to demulcent drinks. Subsequently, if symptoms of gastritis, or gastro-enteritis are developed, vascular depletions, and the usual treatment of these diseases, should be prescribed.

192. *vi.* PHOSPHORUS, when minutely divided, proves a violent corrosive poison. According to the experiments of MAGENDIE and ORFILA, when it is dissolved in oil and *injected into the veins*, it occasions almost instantaneous inflammation of the bronchi and substance of the lungs.

193. *a.* It may be taken into the stomach either as an empirical remedy or accidentally; but its effects on man have not been often observed. It was at one time much employed, in small doses, in medical practice, especially as an aphrodisiac, and it probably occasioned dangerous



symptoms even when thus prescribed. It is generally *slow* in its operation, although it is poisonous in very small quantities, particularly when melted in warm water or in oil. The most rapidly fatal case I find noticed is that by Dr. FLACHSLAND. A young man took, at the recommendation of a quack, some of this substance on bread and butter, to cure general debility, constipation, and impotence. He was immediately seized with violent pain in the stomach, continual retchings, discharges after injections that shone in the dark; and he died in forty hours. The quantity of phosphorus taken was not known. Dr. CHRISTISON states, that a grain and a half proved fatal in a case which was mentioned by M. WORRE. A stout young man, having taken half a grain without injury, took a grain and a half in hot water. Seven hours afterward he was attacked with pain in the stomach and bowels, with incessant vomiting and diarrhoea, excessive tenderness and tension of the belly, and died exhausted in twelve days. M. JULIA-FONTENELLE relates the case of an apothecary who, after taking in one day first one grain of phosphorus, and then two grains, without experiencing any effects, swallowed next day three grains at once in sirup. In the evening he felt generally uneasy from a sense of pressure and constriction in the abdomen, which continued for three days, when he was seized with violent and continual vomiting of matters which had an alliaceous odour. On the seventh day, spasms, delirium, and palsy of the left hand supervened, and death speedily ensued. It is manifest that, if applied to wounds, or introduced into any of the natural canals, the effects would be very violent, and even fatal after a longer or shorter period.

194. *b.* The *morbid appearances* after poisoning with this substance have been recorded only in the cases observed by WORRE and FLACHSLAND (§ 193). In the case of the former, where only one grain and a half of this poison was taken, the skin was generally yellow, and livid in places. The lungs were gorged with blood. The muscular coat of the stomach was inflamed. The other coats near the two extremities of the organ were black. In Dr. FLACHSLAND's case, much fluid blood was discharged on making the first incisions. The omentum and external surfaces of the stomach and intestines were red. The villous coat of the stomach presented an appearance of gangrenous inflammation, which Dr. CHRISTISON suggests to have been black extravasation only; and the duodenum was similarly affected. The large intestines were contracted to the size of the little finger, and the mesenteric glands were enlarged. The kidneys and spleen were inflamed.

195. *c.* *Treatment.*—Large quantities of demulcent liquids should be exhibited, and magnesia given to neutralize any phosphorous and phosphoric acids which may be formed. Vomiting should be early encouraged by large mucilaginous draughts; and inflammation allayed by general and local depletions, or the latter only, or both, according to the peculiarities of the case. Dr. PEREIRA advises parts burned with phosphorus to be washed with a weak alkaline solution, to remove any phosphorous acid which may perpetuate the irritation.

196. vii. SALTS, CORROSIVE ALKALINE.—*Saline Caustics.*—Of the *alkaline salts*, the most

*corrosive* are the *bichromate of potash* and the *binoxalate of potash*. Several other alkaline salts, which have usually been arranged with corrosive poisons, exert their fatal influences otherwise than by any corrosive effect they produce on the digestive canal; this effect never amounting to more than irritation and inflammation, which are of themselves insufficient to cause death in the short period sometimes observed.

197. *A.* The *bichromate of potash* is extensively used in dyeing. Accidents may hence occur from it, although it may not be resorted to with suicidal or criminal intentions. In a case in which a strong solution of it was taken, burning pain in the throat, violent vomiting, and the other symptoms of corrosive poisoning, and death in five hours, were occasioned. On *examination* after death, extensive destruction of the mucous membrane of the stomach and small intestine was found. Dr. CHRISTISON remarks that, when this salt was first introduced into the art of dyeing, the workmen, who had their hands frequently immersed in its solution, were attacked with obstinate ulcers in the parts touched by it, and that these sores gradually extended deeper and deeper without spreading, until they actually sometimes made their way through the arm or hand.

198. *B.* The *binoxalate of potash*, when taken into the stomach, produces the same *symptoms* and *structural lesions* as have been described as the consequences of the ingestion of *oxalic acid*; and the treatment of instances of poisoning by the bichromate of potash, or by it, differs in no way from what has been advised for poisoning with that acid (§ 166).

199. viii. SALTS—METALLIC.—Several of these salts exert a corrosive action on the living tissues; and, when taken into the stomach, in states of strong solution or in substance, they destroy life chiefly in virtue of this action; but in smaller doses, and in weaker solutions, they act differently, are more or less abundantly absorbed, and produce effects which rank them under certain of the *classes* of poisons to be considered in the sequel. It is chiefly with reference to this corrosive and local action that I have here to notice them.

200. *A.* *Antimony.*—The several preparations of antimony liable to become poisonous, with the exception of the *chloride* (§ 175), act as irritant and depressing agents, and are therefore treated of in the *Class Aero-sedative poisons*.

201. *B.* *Bismuth—Subnitrate of—Magistery of Bismuth—Bismuthi trisnitas.*—Poisoning by this substance has rarely occurred. In the experiments of ORFILA, forty grains of the *nitrate of bismuth* introduced into the stomach of a dog produced all the symptoms of corrosive poisoning, and death in twenty-four hours; the villous coat of the stomach being reduced to a pulpy mass, and eroded in parts. The *subnitrate* was found to produce the same symptoms and lesions as the *nitrate*, but a much larger dose was required.

202. *a.* In a case in which the *trisnitrate* was taken, in the dose of two drachms, the patient was immediately attacked with burning pain in the throat, vomiting of brown matters, purging of watery stools, cramps, and coldness of the limbs, intermitting pulse; followed by inflammation of the throat, difficult deglutition, a constant nauseous metallic taste, hiccup, labori-

ous breathing, suppression of urine, swelling, and tension of the belly, salivation, delirium, &c. He died on the ninth day.

203. *b.* On inspection it was found that, from the pharynx to the rectum, there were but few points of the digestive canal free from change. The tonsils, uvula, pharynx, and epiglottis were gangrenous, the larynx spotted black, the gullet livid, the stomach very red, with numerous purple pimples; and the whole intestinal canal was red and gangrenous in places, especially at the rectum. The endocardium was bright red. Probably in this case there was partial absorption of the salt, which had thus inflamed the endocardium; if, indeed, the redness was not merely the result of *post-mortem* eoloration.

204. *c.* *Treatment.*—No chemical antidote is known to this poison. Emollient drinks should be given abundantly, and the poison evacuated from the stomach as speedily as possible by means of the stomach-pump, or otherwise. Afterward demulcent eneinata ought to be administered. A strictly antiphlogistic treatment should be adopted, to prevent inflammation, or to remove it if it have supervened. Opiates in full doses, camphor, and demulcents should also be exhibited.

205. *C. COPPER*.—The preparations and compounds of, are violent poisons; but, although they produce an active emetic effect when taken into the stomach, they act in large doses more upon the nervous system than locally, or as corrosive or caustic agents. These preparations have seldom been given with a criminal intention, owing to their acrid taste, unless with the view of producing abortion, and with this object the *sulphate* has been often taken. Poisoning by them is most frequently the result of accident. When swallowed in the largest quantities they sometimes occasion the least serious effects, owing to their instant rejection by vomiting. They, nevertheless, often produce, either most *acute* and virulent poisoning, or effects which are more slowly developed, thereby occasioning a *chronic* form of poisoning. Even in the most acute or rapid cases, the lesions they produce on the digestive canal may be the least remarkable, while in the slow or chronic form these lesions may be severe.

206. *a.* The symptoms, as respects the digestive organs, are nearly the same as in other instances of corrosive poisoning; but the vomiting is most rapid and copious, and the rejected matters present a remarkably *blue* or *green colour*, sometimes with minute or broken crystals of the salt. Abdominal pain is acute, and is attended by diarrhœa, extreme anxiety, and spasms of the extremities. *Jaundice* is sometimes met with: a symptom rarely observed in other cases of acute or corrosive poisoning. Stupor, coma, insensibility, convulsions, and sometimes paralysis, supervene early, and terminate life in periods varying from three or four hours to several days. In the more *chronic* states, these symptoms are developed and proceed more slowly; the discharges present a greenish hue, especially if verdigris have been taken, and the salt may be detected in them. The digestive canal evinces the most severe disorder: vomiting, copious eructations, salivation, diarrhœa, tenesmus, dysuria or suppression of urine, cramps, convulsions, prostration

of strength, &c., continuing for several days, or until death or recovery takes place.

207. *b.* On dissection, of the chronic cases especially, evidences of inflammation, in various parts of the digestive canal, have been found, generally attended by softening, tumefaction, ulceration, and more rarely with perforation of all the coats of the tube. These lesions are often more remarkable in the intestines than in the stomach. The digestive villous membrane presents a green colour, or even minute particles of the poison. These lesions are not constant; but the nervous system betrays, in the great majority of instances, marked functional disorder. Therefore, poisoning with the salts or oxides of copper will be farther considered under the *Class Acro-sedative Poisons*.

208. *c.* *Treatment.*—The chemical antidotes for the cupreous preparations have been stated by Dr. PEREIRA to be the whites of eggs, given abundantly, or whatever may contain most *albumen*. In the absence of eggs, milk or wheat-flour should be employed. *Iron filings* have been proposed by NAVIER, PAYEN, and CHEVALIER, and subsequently by DUMAS and ENWARDS; the iron decomposing the cupreous salt, and precipitating the copper in the metallic and inert state. The *ferrocyanide of potassium* is also said to be a good antidote; a drachm or two of it may be taken with safety. *Sugar* was proposed by M. DUVAL: its efficacy, although denied by ORFILA and VOGEL, has been recently contended for by POSTEL. (PEREIRA, *Mat. Med.*, vol. i., p. 776.)

209. The efforts of the stomach should, however, be promoted in order to procure the discharge of the poison; and, with this view, the whites of raw eggs, milk, warm mucilaginous drinks, &c., should be given frequently and liberally, and, as well as starch, administered as enemata. The stomach-pump may be of service in some instances; but, when vomiting follows freely and abundantly the ingestion of these draughts, it may be more injurious than beneficial. Inflammatory symptoms should be combated in the usual way, according to their severity and the peculiarities of the case. The nervous symptoms require a recourse to external derivatives, and the other means which will be mentioned in the sequel. (See *Class Acro-sedatives*.)

210. *d.* In the more *chronic* cases of poisoning with the cupreous compounds, opiates in full doses, with or without creasote and camphor, may be given in demulcent vehicles; or the sirup of poppies may be similarly exhibited or administered in enemata, and be aided by warm baths and external derivatives; but these means should not be resorted to until the poison has been evacuated from the stomach and bowels.

211. *D. GOLD*.—*Hydrochlorate of—Chloride of—Iodide of Gold*, and some other preparations of this metal, have been recently employed in medicine, especially on the Continent, and may, from accident or otherwise, occasion poisoning.—*a.* Dr. CHRISTISON states that the poisonous properties of the *chloride* are powerful, and closely allied to those of the hydrochlorates of tin and nitrate of silver. The chloride of gold occasions death in three or four minutes when injected into the veins, even in



very minute quantities, and the lungs are found after death so gorged with blood as to sink in water. (ORFILA, *Toxicol. Génér.*, t. i., p. 593.)

212. *b.* If the chloride of gold be *swallowed*, corrosion of the digestive canal takes place; and the salt is so rapidly decomposed that none is taken up by the absorbents; and death ensues from the local injury solely. Even in doses so small as a tenth of a grain, it has caused much irritation of the stomach. The form of fulminating gold has produced alarming poisoning where it was used in medicine. PLENCK says that it excites griping, diarrhœa, vomiting, convulsions, fainting, salivation, and sometimes even occasions death. HOFFMANN repeatedly saw it prove fatal, the most prominent symptoms being vomiting, great anxiety, and fainting. In one of the cases the dose was only six grains.

213. *c. Treatment.*—The *antidotes* for the preparations of gold are the same as those found most successful for poisoning by corrosive sublimate, especially the whites of raw eggs, or *albumen*, large draughts of milk, &c. The gastro-enteric symptoms should be removed by vascular depletions, derivatives, emollient enemas, warm baths, opiates, &c.

214. *E. IRON.*—None of the preparations of iron fall under the class of corrosive or caustic poisons, unless the *tincture of the sesquichloride*, and it owes its injurious operation, when taken in large quantities, to the excess of acid, the *symptoms* and *lesions* produced by it being the same as those occasioned by *hydrochloric acid* (§ 150).

215. *F. MERCURY.*—The *preparations* of this metal often cause poisoning, which may be either *acute* and *rapid*, or *chronic* or *slow*, according to the quantity taken, to the repetition of the doses, and to the modes of employing them. In large doses, the more active of these preparations act rapidly, and are corrosive and acute poisons; but, in small or repeated doses, their effects are chronic or slow, and they act as *acro-alterative poisons*, in which class I shall consider this mode of their operation, in connexion with that of some other preparations of mercury. It is thus chiefly the *acute* or *corrosive action* of these preparations which I have here to consider; the *chronic*, or consecutive effects, will fall under the class just referred to.

216. *a. The Bichloride of Mercury—Corrosive Sublimate.*—The poisonous operation of this substance has been ably investigated by ORFILA, CHRISTISON, PEREIRA, DEVERGIE, BECK, TAYLOR, and others. The *symptoms* caused by a large dose of the bichloride appear either immediately, or in a very few minutes after having been swallowed. A coppery or metallic taste is felt in the mouth; and if the poison be in a state of solution, sensations of remarkable acidity, burning constriction, and corrosion are felt in the mouth, fauces, and pharynx, descending to the stomach, where, in whatever state it may have been taken, pain is very soon occasioned by it; is increased on pressure, and is followed by nausea and vomiting, the matters thrown up consisting of the alimentary articles remaining in the stomach, and afterward of stringy masses of white mucus, streaked or mixed with blood. To these supervene difficult deglutition, the rejection of whatever is taken into the stomach; sometimes a sense

of strangulation or suffocation; the extension of pain over the abdomen, and intolerance of pressure; violent purging, and lacerating pains of the bowels, followed by tenesmus and mucous and bloody stools; anxiety, restlessness, and short or laborious respiration; a quick, small, and contracted pulse; burning thirst, and a white, dry, constricted state of the tongue and mouth; anxious expression of countenance, at first with flushing, subsequently with collapse and twitchings of the muscles of the face; suppression of urine or dysuria; cold sweats, great debility and sinking; sometimes pyalism; sinking and irregularity of the pulse; and coldness of the extremities. Death is often preceded by stupor, insensibility, convulsions, or twitchings of the limbs, or even by paraplegia.

217. Poisoning by this substance *differs* from that produced by *arsenic*: 1st. The well-marked taste, and the acidity and irritation of the throat and œsophagus, produced by the former, are much greater than by the latter; 2d. The symptoms are more violent and immediate upon the ingestion of this poison than after arsenic; 3d. The evacuations are oftener mixed with blood, and irritation of the urinary organs, or suppression of urine is more frequent than after poisoning with arsenic. The symptoms caused by corrosive sublimate resemble, in the most acute cases, and at the commencement, an attack of common *cholera*; subsequently, when the patient survives two or three days, they resemble those of *dysentery*, especially as respects the existence of tenesmus, and of mucous and bloody stools; and when pyalism, or affection of the salivary glands, is not present.

218. *b. Appearance after Death.*—These are confined chiefly to the digestive canal. The mucous membrane of the throat and œsophagus, and sometimes, also, of the mouth and fauces, is softened, and of a whitish or bluish gray colour; that of the œsophagus, especially near the cardia, is partially corroded. The villous surface of the stomach often presents a slate-gray or grayish tint, arising from the action of the poison, as supposed, upon this surface during life. Underneath, the tissues are more or less inflamed, sometimes in patches, and large black ecchymoses, or extravasations of blood, are often found underneath the villous membrane. In rarer cases this membrane is only simply inflamed. The coats of the stomach are corroded, discoloured more or less, and often softened so as not to admit of removal without laceration. Perforation, however, is very rare. Similar changes to the above are met with in the small intestines and in the large bowels, especially in the sigmoid flexure of the colon and rectum, but not to so great extent as in the stomach, although sloughing ulcers are more frequently met with in these latter situations. The colon is generally very much contracted. In cases which have not been very rapidly fatal, sloughing ulceration, dark discolouring of the ulcers or in their vicinity, and softening, are met with in several parts of the digestive canal. Various alterations of the urinary organs are occasionally observed; but these are neither constant nor uniform, with the exception of contraction of the urinary bladder, which is always observed. The epiglottis and trachea

are sometimes inflamed, and the endocardium often presents indications of inflammation. The coats of the stomach and intestines and the collatitious viscera often yield mercury on analysis. Poisoning by this substance does not delay the accession or progress of decomposition, as observed in respect of poisoning by arsenic.

219. *c. The quantity which may destroy life* varies greatly with the circumstances adduced above (§ 51, *et seq.*). The *smallest* quantity instanced by Mr. TAYLOR is *three grains*, this having been given to a child by mistake for calomel; but he believes that *two*, or not more than *three grains*, have proved fatal in an adult. If this quantity—even two grains—be taken at once on an empty stomach, I do not doubt that it is capable of producing a fatal result, if medical aid be not procured; but I state this chiefly from much experience of the medicinal exhibition and properties of this substance. When this poison has been taken on a full stomach, or when free vomiting has followed the ingestion of it, or when medical treatment was not long delayed, very large quantities have failed to produce death. A case is recorded by Dr. BOOTH (*Medical Gazette*, vol. xiv., p. 63), in which an *ounce* was taken, and, owing to these favourable circumstances, recovery was effected.

220. *d. The period at which death takes place* varies, in the *acute cases*, from two or three hours to five or six days. Mr. ILLINGWORTH (*Med. Gaz.*, vol. xxxi., p. 557) met with an instance of death from the sublimate in from two to three hours. Death from this substance in from ten to twenty-four hours is common; but life may be prolonged for several, or even many days, although the dose of the poison has been very large, when medical aid has been soon obtained. In these, the symptoms of *slow or chronic poisoning* have generally appeared; and the effects—ptyalism, diarrhœa, tenesmus, &c.—described in connexion with the *acro-alterative* action of this and other preparations of mercury, have usually been observed. *Acute poisoning* by this substance is the result of the chemical action, and the destruction of the tissues caused by the contact of it. The fatal issue is produced by the extent of lesion of the digestive canal, aided by the shock to vital power and nervous energy. Whatever absorption may occur in the circumstances more favorable to this mode of operation and in the more prolonged cases, will farther aid this issue, owing to the injurious influence which an excessive amount of the poison in the circulation will exert upon the heart and nervous masses.

221. *e. The treatment of acute poisoning* by corrosive sublimate consists of the *removal* of the poison, of the administration of *antidotes*, and the counteraction and removal of the effects produced.—(a) The *removal* of the poison from the stomach is best procured by the encouragement of vomiting by means of copious draughts of fluids, containing or consisting of the antidotes about to be noticed. Mr. TAYLOR states that, “if vomiting do not already exist, it must be promoted by the exhibition of emetics.” But it may be urged against this advice, that the circumstances are rare which admit of emetics; for they may increase the

mischiefs in the stomach, or otherwise complicate the case; or time may be lost in waiting for their operation, which may not soon take place, unless they are of an energetic kind. A recourse to the stomach-pump is liable to the objection already urged against it, in cases where the œsophagus and stomach are constricted, corroded, or softened by the poison (§ 174). Swayed by these considerations, I advise an immediate recourse to such draughts as are most likely to promote vomiting, and thereby the rejection of the poison, and to convey at the same time the *antidote* which may be obtained with the least delay.

222. (b) The *antidotes* are chiefly those which more or less efficiently decompose the corrosive sublimate: these are *albumen*, the *gluten* of wheat, *milk*, *iron filings*, and *meconic acid*.—*a. Albumen* appears to decompose the sublimate, so as to render it almost inert. Dr. CHRISTISON has adduced several cases proving the remarkable efficacy of this antidote. The celebrated Baron THENARD swallowed inadvertently a concentrated solution of corrosive sublimate; but by the immediate and abundant use of the whites of eggs, he suffered no material harm. Raw eggs—both the whites and the yolk—should be taken most abundantly, and ought not to be withheld, even although the poison has been taken for a considerable time; for this antidote is often efficacious notwithstanding, and is the one most to be depended upon. PESCHIER states that one egg is sufficient for every four grains of the poison; but no harm can result from taking many, as they will be thrown off by vomiting; indeed, they should be so given as to promote vomiting.

223. *β. Gluten* has also been recommended by Professor TADDEI. It may be prepared by washing flour in a muslin bag, under a current of water; but it will be preferable, when albumen cannot be procured, to mix flour in water, and give it in abundance: it will thus often promote vomiting (§ 221), and act as an antidote. *Milk*, in the absence of albumen or flour, may be likewise given, or *gum-water*, *linseed tea*, or sweetened water. *Iron filings* are stated to be useful, by reducing the sublimate to the metallic state. *Meconic acid* is also said to be an antidote, by forming an insoluble meconate of mercury. But, as Dr. PEREIRA justly remarks, a knowledge of this fact is of little practical value, since the acid is not generally procurable; and tincture of opium, which contains it, cannot safely be used in sufficient quantity; for Dr. CHRISTISON finds that five grains of corrosive sublimate require an infusion of thirty-three grains of opium to precipitate the whole of the mercury. Mr. TAYLOR states, that the *protochloride* of tin, in the proportion of one part to fifteen parts of water, has been recently proposed by M. POUJET as an antidote. But the efficacy of this substance has not been sufficiently tested in the human subject. These antidotes, even albumen, cannot be expected always to be successful. The sooner they are given the greater is the chance of success. Several instances, however, have been recorded of their failure, owing either to delay in their exhibition, or to the perfect solution and quantity of the poison, or to other circumstances of the case. Hence it will always be proper to exhibit the antidotes, as already advised (§ 222).



especially the eggs, in large number, and in the way most likely to promote vomiting.

224. (c) The effects produced by the poison, as far as these are indicated, should next attract the attention of the physician. These approach, in some cases, to the more common forms of gastro-enteritis, or of dysentery, or even of peritonitis; but the vascular action is generally less sthenic than in those, owing to the extent and severity of the injury sustained by the villous membrane and nerves of the digestive canal, and hence vascular depletions cannot be carried to the same extent as in these diseases. They are, however, generally required, most frequently locally by leeches, rarely by venæsection, or by both modes in the same case. Demulcents with opiates should be freely administered, and emollient and anodyne enemata be thrown up. Fomentations, rubefacient embrocations, &c., ought to be applied to the abdomen, and frequently renewed; and warm baths resorted to occasionally.

225. (d) The diet, as recovery advances, should consist chiefly of farinaceous articles, of light panada, gruel, demulcent drinks, milk, rice-milk, or creams, and broths made of the flesh of young animals; and flannels ought to be worn nearest the skin.

226. f. The *nitrate of mercury* are corrosive poisons. They are easily dissolved in water, especially if there be a little excess of acid present. Mr. BIGSLEY has recorded (*Med. Gaz.*, vol. vi., p. 329) the case of a boy who dissolved some mercury in a strong nitric acid, and swallowed about a teaspoonful of the solution. He was instantly seized with excruciating pain in the pharynx, œsophagus, and stomach; urgent anxiety, cold skin, small pulse, colic, and purging. He sank rapidly, and died in about two hours and a half. The fauces, œsophagus, and stomach were found, after death, corroded and inflamed. The treatment is the same for poisoning by these salts as for that by corrosive sublimate. The diluted proto-chloride of tin is suggested as an antidote by Mr. TAYLOR.

227. g. *Bicyanide of mercury* is a most active corrosive poison. A person swallowed twenty-three grains of this substance, and was immediately attacked with all the symptoms characterizing the ingestion of corrosive sublimate; and, on inspection after death, the same lesions of the digestive canal were observed. The treatment is also the same as that already recommended for poisoning by the sublimate.

228. h. *White precipitate*—the ammonio-chloride of mercury; *red precipitate*—the red oxide of mercury; *turbith mineral*—the subsulphate of peroxide of mercury; *cinnabar* and *vermilion*—the persulphuret of mercury; and *calomel*—the chloride of mercury, are severally acid poisons, in very large or repeated doses, and may even corrode the digestive canal; but their effects are uncertain as respects this mode of action, and therefore they will be more appropriately considered hereafter; when also poisoning by the external use of mercurial preparations, and by other modes of employing them, will be noticed.

229. G. SILVER—*Nitrate of—Lunar caustic*—is a powerful corrosive poison, when employed in substance or in strong solutions. It rapidly combines with, and is ultimately decomposed by the tissues, the acid corroding them. It is,

in these states, a local and disorganizing agent, and is not absorbed unless it be employed in small and frequent doses. There are very few cases of poisoning by it on record, and these have not been detailed with any precision.—a. The symptoms produced by this poison are most probably but little different from those caused by several other corrosive poisons; but, judging from its effects in large medicinal doses, diarrhœa is most probably not occasioned by it.

230. b. *Treatment*.—The antidote for nitrate of silver is common salt, which, acting upon the nitrate, forms nitrate of soda and chloride of silver, which is innocuous. The contents of the stomach should be removed, and the symptoms alleviated, by demulcents, opium, external derivatives, and local bleedings; by emollients containing salt, and by anodyne enemata.

231. H. TIN—the *Chlorides or Muriates of*.—A mixture of these is extensively used in the arts, and may hence produce accidental poisoning; but instances of such an occurrence are extremely rare. They appear to act as local corrosive poisons when taken in large quantity, and to occasion the usual symptoms of this class of poisons. They are decomposed by many organic substances, and then the treatment of poisoning by them should consist of the liberal and frequent ingestion of albumen, milk, and demulcents; and, after the stomach has been completely evacuated, of the administration of opium, emollient enemata, &c.

232. I. ZINC—*Chloride of*.—a. This substance, now employed as an antiseptic, when taken into the stomach, or applied to any living tissue, in states of strong solution, is a powerful caustic, or corrosive poison. It may be inferred to produce the usual symptoms of corrosive poisons, as I am not aware of an instance of poisoning having been caused by it; and its effects may be treated by the administration of the carbonate of soda, or any of the alkaline carbonates, with albumen, demulcents, and other means already recommended for caustic and corrosive poisons.

233. b. *Sulphate of Zinc—white vitriol*—has been considered as a corrosive poison; but its corrosive and local action is very rarely so great as to occasion death, even when given in very large quantity, for it is generally immediately thrown off the stomach, and occasions merely an irritant and astringent action; and, with reference to this action, it will be considered in the third class of poisons.

234. ix. VEGETABLE ACIDS.—There are numerous vegetable productions which produce poisonous, or at least injurious effects, when taken into the stomach; or when applied externally, or otherwise employed. Many of these act chiefly locally, inflaming and corroding the tissues; while others produce less local irritation, but are absorbed to a greater or less extent, acting thus remotely and injuriously upon the nervous centres and on vital organs. Under this class, I shall very briefly notice such of the vegetable poisons as act chiefly on the digestive villous surface when swallowed, and locally as respects the parts to which they may be applied.

235. a. *Anemone nemorosa*—A. *pratensis*—A. *Pulsatilla*, and A. *sylvestris*, are severally very acid poisons. BULLIARD states that an old man with rheumatic gout applied the bruised root of A. *Pulsatilla* to the calf of his leg on going to bed; violent suffering, with sphacela

tion of the part, ensued. Animals have exhibited marks of intense inflammation of the stomach and rectum after having swallowed it. *A. nemorosa* is said to produce dysentery in sheep. The inhabitants of Kamtschatka make use of this plant to poison their arrows. ROBERT and VAUQUELIN extracted a fluid of an acrid taste and pungent odour from the flowers of the *A. pratensis*, which acted like a caustic on the tongue.

236. *b. Arum maculatum*—Wake-robin—*A. Dracunculus*, and other species of arum are acrid poisons in the recent state, and when not acted upon by heat. They occasion a burning pain and swelling in the throat; difficult and painful deglutition. BULLIARD states that three children, who ate of the leaves of the *A. maculatum*, were thus affected, and experienced horrible convulsions. Two of the three died after some days. The *Calla palustris*, or *Water Arum*, excites a similar action to the above.

237. *c. Bryonia dioica*—*Bryony*.—The root of this plant occasions vomiting, violent pain, profuse alvine evacuations, and faintings. PYL mentions a fatal case from taking two glasses of an infusion of the root to cure an ague. TORMINA and purging soon supervened, and killed the patient. It occasions violent inflammation in the large and small intestines, and of the stomach. BRANDES imputes the acrimony of the plant to a principle which he has called *bryonine*, which induces intense inflammation of the parts to which it is applied.

238. *d. Caltha palustris*—*Marsh Marygold*—has been noticed by several writers as an acrid poison, inflaming the œsophagus, stomach, and bowels, even of the lower animals. A family of five persons in Germany, after partaking of it, were all seized, in half an hour, with pain in the stomach, sickness, vomiting, diarrhœa, and dysuria; and, on the following day, with a general swelling of the body, and a copious eruption. They, however, all recovered. In addition to the inflammatory action produced by it in the digestive canal, it appears to be absorbed, and to occasion general vascular excitement, and irritation of the urinary organs and skin.

239. *e. Chelidonium majus*—*Celandine*—has a bitter and acrid taste, and causes inflammation of whatever parts to which it may be applied. When taken into the stomach it inflames the digestive mucous surface, and is partially absorbed; exciting the brain and nervous system; and causing congestion of the lungs. These latter effects, especially that on the brain, are more remarkably produced by *C. Glaucium* *Clematis Vitalba* (*Virgin's bower*)—*C. Flammula*—*C. erecta*—*C. integrifolia*, are all acrid and caustic. When applied to the skin, they produce redness, pustules, and excoriations. STORCK and MUELLER prescribed them in some chronic affections, especially syphilis, rheumatism, and scrofula, in small doses, in the form of infusion; continuing their use for some weeks with alleged benefit. M. ROQUES states that they occasion dysentery in animals. The powder of the leaves, in doses of one, two, or three grains, has also been employed. They are exciting, diaphoretic, and alterative in small doses; but in large doses they destroy life, by the intense inflammation they produce in the whole course of the digestive canal.

240. *f. Croton Tigulum*—*Purging Croton*.—

The seeds of this plant have a burning, acrid, and nauseous taste. They were formerly employed as a hydragogue-purgative; but, on account of the violence of their operation, were laid aside. One seed is sufficient for a dose, and even sometimes excites violent vomiting and purging. More recently the *expressed oil* of this plant has come into use. Dr. PEREIRA met with a case of poisoning by inhalation of the dust of the seeds. The patient had been employed for several hours in emptying packages of the seeds. He complained of loss of appetite, of a burning sensation in the nose and mouth, followed by pain at the epigastrium, and copious lachrymation. He became giddy and insensible, but recovered. His bowels were not affected.

241. The oil causes rubefaction, and a vesicular or pustular eruption, when rubbed on the skin; and when rubbed on the abdomen, it often purges. When swallowed in one or two drops, it produces a burning acrid taste in the mouth and throat, and acts as a drastic purge, procuring watery motions, and sometimes an increased secretion of urine. It appears to be partially absorbed; but it evidently acts as a sedative irritant of the digestive mucous surface. The only case of poisoning which is known to have been caused by it was that of a young man, ill of typhoid fever, who took by mistake two and a half drachms of the oil. Three quarters of an hour afterward the skin was cold, and covered with a cold sweat; the action of the heart and pulse was scarcely perceptible; the respiration difficult, and the extremities blue. An hour and a half afterward there were excessive involuntary alvine evacuations, but no vomiting; the abdomen was tender to the touch; and a burning sensation was felt in the œsophagus. The blueness extended over the body; the surface became insensible, and death took place after four hours. This oil, even in the usual purging dose, sometimes acts violently, generally speedily, although not certainly, occasioning much depression of the vascular system, and a feeling of debility.

242. *g. Cucumis Colocynthis*—*Bitter Apple*.—The spongy or medullary part of the fruit is a drastic cathartic, causing inflammation of the villous surface of the bowels, and bloody evacuations. This substance has caused death in several instances owing to mistake. A woman swallowed a teaspoonful and a half of colocynth powder, and died in twenty-four hours. A person took two glasses of a decoction of colocynth, and died in a short time. VAUQUELIN discovered the active principle of this plant, and called it *colocynthin*.

243. The *symptoms* are, at first, frequent alvine evacuations; great heat and colicky pains in the bowels; dryness of the throat, and unquenchable thirst; a small and rapid pulse; redness of the tongue; a fixed pain around the umbilicus, and tenderness. To these succeed coldness of the extremities, cramps, sinking of the powers of life, and death. On *dissection*, the whole digestive canal exhibits marks of inflammation, which is often most intense in the stomach and large bowels, the villous membrane of which is abraded, readily detached, or even ulcerated. The intestines are studded with black spots or ecchymoses; the inflam-



mation sometimes extends through all the coats; the peritoneum being inflamed, and either adherent to its opposite surfaces, or covered by a false membrane, or containing a whitish fluid and florenti.

244. *h. Cyclamen Europæum* is a violent irritant, exciting vomiting and purging. BULLIARD states that its root produces cold sweats, dizziness, and convulsions; the patient voids blood both by vomiting and by stool, the super-purgation and inflammation proving even fatal.

245. *i. Daphne Gnidium* (*Spurge-flax—Flax-leaved Daphne*)—*D. Mezereum* (*Mezereon*).—The bark of these plants acts as a corrosive poison when applied to living tissues. I have frequently employed the mezereon bark as an external irritant, instead of caustic alkali, in forming an issue. When swallowed, it inflames the digestive canal, causing heat and dryness of the throat; salivation, abdominal pains, frequent vomitings, bloody stools, giddiness, and feebleness of the limbs; and the lesions above described (§ 243). The *Daphne Laureola* is also poisonous, and produces nearly the same effects as the other species.

246. *k. Delphinium Staphisagria—Stavesacre—Palmated Larkspur—D. tricornis*.—The acrid property of these plants is lodged in the alkaloid, which LASSAIGNE and FENEILLE discovered in them, and which is an extremely acrid irritant. The local effects of these plants are evidently the most striking. They have been found to inflame intensely the digestive mucous surface when swallowed, but not to produce any alteration of other organs.

247. *l. Euphorbia Officinaria*.—The stalk of the various species of the genus *Euphorbia* furnishes a milky juice, which, on being dried, is called *euphorbium*. It is a gum-resin, which contains an active principle, styled *cuphorbin*. A teaspoonful of the gum-resin was administered by mistake; and it occasioned a burning sensation in the fauces and throat, rapidly extending to the stomach, and causing incessant watery vomitings. The pulse became remarkably rapid and irregular; a cold perspiration broke out, and death took place after two days. The body was inspected eight hours after death; the coats of the stomach could be torn with the greatest ease; the internal surface of the viscus was studded with gangrenous spots; the spleen was enlarged and much softened, and the inner coat of the aorta was beautifully injected with blood, and highly inflamed. The after lesion was probably caused by the partial absorption of the poison in this case.

248. Many of the species of the genus *Euphorbia* are poisonous, as the *antiquorum*, *canariensis*, *Tirucalli*, *Peplus*, *helioscopia*, *verrucosa*, *platyphyllos*, *palustris*, *hibernica*, *amygdaloides*, *sylvatica*, *exigua*, *mauritanica*, *neriifolia*, *Esula*, *heptagona*, &c., and have been employed in poisoning spears, arrows, &c. The species *Lathyrus* and *Cyparissias* are said by LAMOTTE to have proved fatal when administered in a *glyster*. A person allowed his closed eyelids to be rubbed with the juice of the *E. Esula*: inflammation took place, and it was followed by the loss of the eye. A boy six years old ate some of the *E. Peplus*. It produced vomiting, purging, spasms, a weak, small pulse, inability to swallow, insensibility, cold extremities, and death. On dissection, the tonsils, fauces, and

pharynx were seen very much inflamed. The villous membrane of the stomach and small intestines were very red; but that of the large intestines much less so. The urinary bladder was very contracted. The epiglottis and larynx were highly inflamed. The lungs were healthy. The veins of the dura mater were congested. The blood was fluid. The brain was healthy.

249. *m. Gratiola officinalis—Hedge Hyssop*—acts chiefly locally, causing inflammation of the part which it touches. It has produced death rapidly when an extract of it was injected into the veins.

250. *n. Hippomane Mancinella—Manchineel-tree*.—The wood of this tree, when green, excites inflammation of the skin when rubbed against it. The dust of the wood is so acrid as to excite inflammation of the respiratory passages, or asphyxia, when inhaled with the air. Dr. R. MADIANNA found that the juice excited inflammation when applied even to the sound skin. ORFILA and OLLIVIER applied this juice to a wound in the cellular tissue with a fatal result. When given internally, it soon destroyed life; the stomach and intestines being found, on dissection, very highly inflamed.

251. *o. Jatropha Curcas—Indian Nut*.—The seeds of this plant are a violent poison, exciting incessant vomitings, purging, severe pain, vital depression, and death. Its fatal effects are more rapid when it is taken into the stomach than when introduced into the cellular tissue. When swallowed, it produces intense inflammation of the digestive canal. Mr. BENNETT states that it is used as a purgative by the natives of the Philippine Islands, an over-dose producing intense pain, vomiting, and purging; their only antidote being large draughts of cold water.

252. *p. Juniperus Sabina—Savine*.—The leaves and tops of this plant contain an acrid poison, in the form of a volatile oil of a remarkable odour. They are acrid and irritant in the state either of infusion, powder, or tincture, and yield a light yellow oil, in which the active properties of the plant chiefly reside. The powder, or the infusion, or the oil has been often taken in excessive doses, in order to procure abortion, the power of accomplishing which effect it does not possess more than any other violent irritant. When employed with this intention, it not unfrequently destroys the life of the mother, and sometimes even before an abortion is procured. Mr. TAYLOR states that in a case in which the savine powder was taken with a fatal issue, he found a green fluid in the stomach, which, with the œsophagus and small intestines, was highly inflamed. The poison was identified by placing the minute portions of the leaves found in the stomach under a powerful microscope. A girl, to procure abortion, took a strong infusion of savine leaves, which produced violent pain in the abdomen and strangury. She miscarried two days afterward, and died four days after that. On dissection, extensive peritoneal inflammation was found. The inside of the stomach was very red, and checkered with patches of florid extravasation (CHRISTISON, *Op. Lat.*). While this substance acts locally, it is also partially absorbed, and, through the medium of the blood and urine, affects the urinary organs.

253. *q. Momordica Elaterium*.—Wild or Squirt-  
ing Cucumber.—The fecula deposited by the  
expressed juice of the fruit of this plant—*elaterium*—contains the active principle to which  
the properties of the plant are imputed, and are  
chiefly, if not altogether, owing. Drs. CLUT-  
TERBUCK, PARIS, MORRIES, and PEREIRA have  
examined this fecula, and found that its active  
principle—*elaterin* or *momordicine*—which is  
soluble in alcohol, is a very active purgative in  
the dose of one twentieth of a grain. *Elaterium*—the fecula of the juice of the fruit—  
when of the best quality, is a drastic and hydra-  
gogue purgative in the dose of the one twelfth  
of a grain. Its acridity is such that it inflames  
and ulcerates the fingers of those who pre-  
pare it. Although acting thus energetically as  
a local irritant, it appears also to be partially  
absorbed, and even to have its irritant action  
transmitted by means of the nervous system  
to parts more or less remote. When taken in  
a large dose, it produces violent hypoca-  
tharsis and very copious watery stools, being the  
most energetic hydrogogue purgative known.  
Even a quarter of a grain of the purest kinds  
of *elaterium* may produce this effect and pro-  
cure the discharge of several pints of fluid by  
the bowels. An over-dose occasions not mere-  
ly violent griping pains in the abdomen, but  
also increased frequency of pulse, a dry tongue,  
great thirst, and dampness and coldness of the  
skin. A female took, by the advice of a quack,  
in divided doses, two grains and a half of *elaterium*  
and sixteen of rhubarb. They produced  
incessant vomiting and purging, which did  
not yield to treatment. She died in thirty-six  
hours. On dissection, the villous membrane of  
the stomach and intestines was intensely in-  
flamed. The colon was contracted: the other  
viscera were healthy. (*Boston Med. Mag.*, vol.  
iii., p. 25.)

254. *r. Narcissus Pseudo-narcissus*.—*Daffodil*  
—*Meadow Narcissus*.—The extract of this plant,  
applied either externally or internally, produces  
violent retchings, followed by death, owing to  
intense inflammation caused by it in the stom-  
ach and intestines, even extending to the rec-  
tum.

255. *s. Ranunculus*.—Several species of this  
genus of plants are remarkably acrid and cor-  
rosive, especially the *R. acris*, *R. sceleratus*, *R.*  
*Flammula*, *R. arvensis*, *R. bulbosus*, *R. alpestris*,  
*R. aquatilis*, &c. The leaves, flowers, and ex-  
pressed juice irritate, inflame, and ulcerate the  
external surface, according to the duration of  
their application; and, when swallowed, they  
excoriate the tongue, mouth, and throat; cor-  
rode and inflame the stomach, and tumefy the  
oesophagus and pylorus, occasioning extreme  
pain, retchings, &c. (PLENCK.)

256. *t. Rhus Toxicodendron*.—*Poison Oak*.—  
*Poison Ivy*.—FONTANA, ALDERSON, BARTON,  
BIGELOW, and others, have noticed the intense-  
ly poisonous action of this and several other  
species of the genus *Rhus*. A small portion  
of the milky juice applied to the skin excites  
burning, swelling, inflammation, and small ves-  
icles containing a sharp transparent humour;  
and nearly the same symptoms are produced  
by touching the leaves. Dr. ALDERSON states  
that sphacelation has followed contact with the  
acid juice of this plant in some cases. Drs.  
CUTLER and BIGELOW mention various noxious

effects to have followed the handling and the  
burning of the wood of the *Rhus vernix*, or *poi-  
son sumach*. The inflammation produced by the  
several poisonous species of this genus appears  
to present peculiar characters, with a marked  
disposition to diffusion, tumefaction, and gan-  
grene, or to assume the form I have described  
when treating of *diffusive inflammation of the*  
*CELLULAR TISSUE*. The leaves and juices of  
these species have been employed in medicine  
as excitants, and are supposed to produce not  
only intense irritation, but also considerable  
stupefaction; and hence it may also be consid-  
ered as a powerful *acro-narcotic poison*. (See  
CLASS VIII.)

[Poisoning by the *Rhus vernix* is very com-  
mon in the United States, and may occur from  
touching or smelling any part of the plant, and  
some individuals are so susceptible as to be  
affected by the volatile vapour which escapes  
from it: others handle the plant with impunity.  
The cutaneous inflammation caused by it  
will generally yield to a wash of sub-borate of  
soda (horax) or acetate of lead. In cases we  
have witnessed, inflammation appeared on the  
skin, in large blotches, in about 48 hours after  
exposure to it; chiefly on the face and extremi-  
ties; soon after, small pustules appeared on  
the inflamed parts, and became filled with wa-  
tery matter, attended with an almost insup-  
portable itching and burning. In two or three  
days the eruptions suppurated, after which the  
inflammation subsided, and in a short time the  
ulcers healed.]

257. *u. Stalagmitis Cambogioides*.—*Habraden-  
dron Cambogioides*.—The gum-resinous exuda-  
tion from this plant occasions, in large doses,  
nausea, vomiting, griping pains of the bowels,  
copious watery stools, &c. In excessive doses  
it acts as an acrid poison. A drachm caused  
horrible retchings and purging, followed by syn-  
cope and death. The fatal effects consequent  
upon taking a great number of MORISON'S pills  
have been owing to the gamboge contained in  
them. The symptoms in these cases were vom-  
iting and purging, pain and tenderness of the  
abdomen, coldness of the extremities, and sink-  
ing of the pulse. On examination *post mortem*,  
inflammation, ulceration, and sphacelation of  
the intestines were found.

258. *v.* There are many other plants, as sev-  
eral species of the *Rhododendron*, *Pedicularis*,  
*Plumbago*, *Phytolacca*, *Ricinus*, *Sambucus*, *Sed-  
um*, *Tanacetum*, *Pastinaca*, &c., which possess  
very acrid properties, and which, when taken  
into the stomach, occasion symptoms and le-  
sions similar to those caused by the plants al-  
ready mentioned. Others produce not merely  
more or less inflammation and excoriation, but  
also other functional and organic changes,  
which rank them in the classes which follow.

259. *y.* 1st. The action of the acrid vegeta-  
bles is generally exerted upon the tissues with  
which they come in contact, in which they oc-  
casion inflammation, excoriation, or corrosion,  
ulceration or sphacelation, with the symptoms  
usually attending these lesions, according to the  
parts in which they are produced. 2d. The fa-  
tal effects of these poisons are more certainly  
developed when they are taken into the stom-  
ach than when applied externally, or intro-  
duced into the cellular tissue; for, in the former  
case, they affect a greater extent of surface,



having an intimate connexion with the organic class of nerves, and, through these nerves, developing a wider range of morbid symptoms than in the latter. 3d. Some of these poisons, in addition to these local effects, are partially absorbed, and produce changes either functional or structural—nervous or vascular—in other remote organs, as the lungs, the urinary organs, the nervous masses, &c.

260. *z.* The treatment of the vegetable acids consists chiefly of the expulsion of them by encouraging vomiting, by means of mucilaginous draughts; and of allaying irritation by opiates, external derivatives, emollient and anodyne enemata, and local depletions. Opium may be given in full or frequent doses, and rubefacient embrocations or fomentations assiduously applied over the abdomen. I have found the turpentine fomentations, opiates, starch enemata, with the compound tincture of camphor or sirup of poppies, the most generally efficacious; and, if vital depression supervene, camphor, ammonia, decoction of cinchona, or aromatic infusions are the most serviceable. During recovery, the diet and regimen advised during convalescence from the effects of several corrosive poisons should be adopted (§ 157–174).

261. CLASS II. DEPRESSING AND PARALYZING POISONS—SEDATIVE POISONS.—There are several agents which destroy life by the extent to which they abstract the vital caloric, depress the nervous energy, and lower the action of the heart and vascular system generally. In virtue of these modes of operation, they destroy vitality without any very obvious pre-existent excitement, and without producing either the appearances or the symptoms or lesions attending local irritation. The effects of these agents are manifested by the states of function and of vital manifestation and action, and by no farther lesion than may be attributed to failure or loss of function or action; by the absence of such structural changes as are calculated to account for death, conformably with our acquaintance with the extent and consequences of pathological conditions. Of this mode in which certain poisons act, I have already taken a general view (§ 28–30). I shall, therefore, notice as briefly as possible those agents which come under this class—which destroy life by acting in this way, and independently of such structural lesions as are of themselves calculated to produce the result. It may, however, be here remarked, that there are numerous substances which, in addition to more or less manifest lesions of structure produced by them, act also as sedatives or depressants of nervous energy and vital action, which produce more complicated effects or associated results, and which thereby constitute other classes of poisons, more especially the fifth class.

262. *A.* ACETIC ACID, in various states of concentration or purity, may be so employed as to act as a sedative. It has been considered above (§ 125) with reference to its corrosive operation, or to its employment in larger doses, and in states of strong concentration. But when taken in states of dilution, and when the use of it is continued for a considerable time, it acts not only as a sedative, but also as a slow poison. These effects depend in some degree on constitution, and the quantity of it usually taken; for, in moderate doses, both

it and the mineral acids are tonics and refrigerants, and increase the appetite, while in larger doses, or when too long continued, they impair or otherwise affect the assimilating processes, and even change the constitution of the blood. When very dilute acetic acid is taken, especially during vascular excitement or in febrile states, it allays thirst, lowers the heat of surface, and increases the urine. It is certainly absorbed to a greater or less extent; and, both locally and through the medium of the circulation, it exerts some degree of astringent action. I have met with several instances of disorder from the protracted use of this acid, amounting nearly, and in one quite to that observed in the following case: A young lady enjoyed good health, was plump, had a good appetite, but was afraid of becoming too fat. She was advised to drink a small glass of vinegar daily: she did so, and her plumpness diminished; but, after some weeks, she began to complain of a short, dry cough; her body became lean and wasted; her breathing short and difficult, and the usual symptoms of tubercular consumption supervened. On dissection, all the lobes of the lungs were studded with tubercles. The long-continued use of acetic acid seems to favour the development of several organic changes which originate in debility. MORGAGNI believed that it favoured the production of schirrus of the pylorus.

263. *B.* ACIDS—THE MINERAL.—The action of these acids in large quantities, and in strong and concentrated states, has been already considered (§ 132, *et seq.*); in which states they act locally and as corrosives. But in states of weak dilution they operate differently, their effects varying with the quantity and continuance of the use of them. Many years ago I made a series of experiments with these acids in different states of dilution, and for various periods; and most of them were made upon myself. I found, 1st. That the sulphuric, the nitric, and the hydrochloric acids were severally absorbed into the circulation when taken in states of dilution short of producing corrosive effects. 2d. That, after periods varying with the amount and frequency of the dose, and with the acid taken, the presence of the free acid could be detected more or less abundantly in the urine. 3d. That sulphuric acid appeared sooner in the urine than the nitric or hydrochloric, and that the nitric required the longest time to appear, and the largest doses; but as to this particular, I was not quite satisfied. 4th. That the sulphuric acid evinced the most decided refrigerant and sedative action, especially when much diluted. 5th. That the use of these acids was at first tonic and refreshing, and to some extent astringent and diuretic; but that, when continued for some time, and when they were more abundantly absorbed, especially the sulphuric, they then were depressing; occasioning indigestion, weakness of the pulse, and in my own case, after the sulphuric acid had been taken some time, intermissions of the pulse, and impaired impulse of the heart, the urine at this time containing free sulphuric acid, or this acid in excess. 6th. That a too long continuance of these acids, particularly of the sulphuric acid, not only impaired digestion and assimilation, but also weakened the heart's action, lowered irritability, caused emaciation, disordering the bowels, and the secre-

tions poured into the digestive canal. 7th. That these acids act as refrigerant tonics only when employed for a short time in such quantity as may render drinks agreeably acid; that they are most beneficially prescribed in this manner, in order to remove a particular diathesis or specific condition; and that they are slow poisons when long continued in healthy states of the frame, the good effects often imputed to them resulting either from other causes, or from vital resistance and the efforts of nature. 8th. They affect, when continued for some time, the constitution of the blood. 9th. The mineral acids, when thus employed, are excreted from the blood chiefly by the kidneys and the skin.

264. *C. ALKALIES AND THEIR CARBONATES*, when taken in states of weak solution, or continued for too long a time, or in doses short of producing the effects described above (§ 167, *et seq.*), impair more or less remarkably vital power and vascular action. These substances are readily absorbed into the circulation, whence they are eliminated chiefly by the kidneys, and slightly by the skin. The prolonged use of them may occasion slow or chronic poisoning, owing to the effects produced by them on the digestive mucous surface, and on the urinary organs; for they manifestly favour the too rapid detachment or exfoliation of the epithelium covering the villous and mucous membranes of these viscera, while they alter the constitution of the blood, and affect the healthy states of the hæmato-globulin. When thus improperly employed, their operation as sedatives tends rather to favour the origin and development of organic lesions and chronic diseases, which may ultimately terminate life, than to cause death in a more direct and immediate manner.

265. *D. COLD*.—The abstraction of animal heat may, from its intensity or continuance, destroy life. Cold is a powerful sedative; hnumbing the sensibility, weakening muscular motion, and lowering vascular action. It also favours internal congestions, especially of the lungs, brain, and liver, and ultimately of the large veins and right side of the heart; these congestions increasing the effects of cold on the sensibility and on the vascular system to a fatal amount, unless judicious means of counteraction be adopted. The fatal effects of cold are favoured by repose; by the drowsiness, somnolency, or lethargy which it induces, and by a passive submission to this feeling; by previous excesses in spirituous liquors or intoxicating drinks, or even by the use of those at the time of exposure, if active exercise be not taken. But it is unnecessary to pursue the subject farther at this place than to associate its effects with other injurious agents, for the purposes of diagnosis, and of comparison with the action of other sedatives, or even with narcotic poisons, as this agent has been noticed above (§ 28, 29), and specially treated of with reference to its effects and treatment. (See *art. COLD*.)

266. *E. DIGITALIS*.—*Digitalis purpurea* has been usually classed with narcotics, or aer-narcotics; but it is more properly a sedative than a stupefying agent, as this latter property is either not at all, or imperfectly evinced; and whatever narcotic effect may be considered as actually produced by it, in any instance, is to

be imputed entirely to the depressed, paralyzed, or departing manifestation of cerebral function. The irritation caused by digitalis in the digestive canal is not great, does not proceed to inflammation, and is attended by marked depression of vital power. The effects produced by it on the heart obviously depend upon the quantity taken, the rapidity of its absorption, or the accumulation of it in the system, and upon the other peculiarities of the case, and particularly upon those connected with the constitution of the patient. In many its ingestion, even in a very large and poisonous dose, produces acceleration of the pulse—sometimes remarkable acceleration; but the pulse is always then weak, compressible, or small, the acceleration being manifestly, as in other cases of great quickness of pulse, an evidence of extreme depression of organic nervous influence and vital power. But, as the irritability of the heart and other muscular parts become impaired with the depression of the organic nervous influence upon which it depends, the increased frequency of the heart's action, if it have occurred, subsides more or less rapidly into remarkable slowness and irregularity, with or without intermissions, until the action ceases altogether.

267. The noxious operation of digitalis is manifested in all animals. One drachm of the powder acts as a sedative in horses affected with inflammation. Two ounces destroyed this animal in twelve hours. The influence of this poison on the heart of the horse is various. At first, the action of this organ is sometimes accelerated; in other instances it is not affected; and in some it is retarded. It generally occasions diminished muscular power, convulsive movements, tremours, and loss of sensibility. Of the numerous writers who have discussed the operation of digitalis, there is none who has estimated it so accurately as Dr. PEREIRA, or at least so conformably with my own experiments, and with my observations of its effects during a period of thirty years. Many years ago, I tried the effects of it upon myself in large doses, in different forms of preparation; and in practice I have pushed it, in some instances, as far as appeared compatible with the safety of the patient.

268. *a. Symptoms*.—Dr. PEREIRA has distinguished three grades of operation of foxglove, or of poisoning by this plant; and I shall adopt the division.—(a) *The first degree* is that usually produced by small and repeated doses, and consists chiefly of nausea or loss of appetite; of alteration of the heart's action and of the pulse, which becomes irregular, or accelerated, or slower than natural; of depression of spirits, of impaired strength, and of increased secretion of urine. These symptoms observe no regular order, sometimes the diuresis, at others nausea, and occasionally the affection of the circulation being the first to appear. The influence of digitalis on the circulation is by no means uniform. In some cases the pulse is accelerated or rendered full and soft; in others it is slower or irregular; in many it is intermittent; and in others it is not materially affected. A small dose, in some instances, reduces the frequency of the pulse, and renders the pulsation irregular or intermittent, or both; while a very large dose may be taken without any material effect upon the action of the heart.



In the summer of 1816, I took, while in good health, two drachms of the tincture at one dose; and, finding no farther effect from it than loss of appetite and slight depression, I took another drachm three hours afterward. I find in my note-book that the pulse was not affected by it during that and the subsequent day, farther than it was readily accelerated by the least exertion, and that very slight nausea, but no drowsiness, was produced by it. Dr. WITHERING, in one case, found the pulse fall to 40 pulsations in a minute, and Dr. Fogo, in another, to 36. The lowest I have seen it from the use of foxglove was 44; but 50, or even lower, is not infrequent. The slowness is sometimes preceded not only by acceleration, but also by increased fullness and softness. Even when the pulse is much slower than natural, in the recumbent posture, it generally rises very remarkably above the usual frequency in the sitting, and still more in the standing position. This is owing to the weakened state of the heart, caused by the digitalis, an increased frequency of contraction being required to compensate the loss of power, especially in positions unfavourable to an abundant supply of blood to the brain, by which the cerebral energy may be developed and the nervous influence of the heart thereby re-enforced and increased. This effect of position upon the action of the heart of a person under the influence of digitalis should be kept in recollection, and he should not be allowed suddenly to assume a sitting or standing posture; for the heart, already remarkably weakened, is unable to act sufficiently, or to overcome the increased obstacle which either of these postures furnish to it, especially when it loses the usual supply of cerebrospinal nervous influence, or even when it experiences a diminution of that supply. Owing to these conditions, and to insufficient attention being paid to them, a patient may be seized with fatal syncope while he is under the operation of this substance; and there is every reason to believe that this occurrence has actually taken place oftener than once in these circumstances.

269. The influence of digitalis on the pulse is more remarkable in debilitated and anæmiated persons than in the plethoric or robust. Sometimes no effect is produced on the pulse in respect of number, force, or regularity, until nausea, vomiting, or headache is experienced; and occasionally a comparatively moderate dose may occasion these symptoms. SHROEK, as quoted by PEREIRA, experienced from two grains of foxglove nausea, headache; small, quick, and soft pulse; dryness of the throat; giddiness, weakness of the limbs; and some hours afterward his vision became dim, with a sensation of pressure on the eyeballs.

270. The cumulative effect of digitalis is one of the most important facts to be kept in view in connexion with the use of small and repeated doses of this plant. After an indefinite time, during which the foxglove has been thus employed without any very marked effect, or with a slight effect merely, dangerous symptoms, in some instances terminating in death, have suddenly appeared. These generally consist of remarkable irregularity, frequent intermissions, or extreme weakness and slowness of the heart's action; giddiness; pallor of the coun-

tenance; nausea; vomitings; watchfulness; impaired sensibility; and sometimes convulsions. Dr. PEREIRA and Dr. HOLLAND, however, consider this emulative effect very rare. But this depends upon the time during which the digitalis has been exhibited, and the amount of the dose.—Early in the present century, when this plant, especially the infusion of it, was given in large doses, and very indiscriminately, in dropsies, I met with several instances of the cumulative operation of it in most dangerous forms; and two of these occurred in patients for whom I had myself prescribed it, and in whom I had watched its effects. One of these perfectly recovered from both this operation of the remedy and from the disease for which it was prescribed (dropsy); the other also recovered from this effect, and was partially benefited by the medicine; but the disease—tubercular consumption—ultimately terminated as usual. Salivation is an occasional consequence of the use of digitalis in repeated doses; and it may occur even after a few moderate doses, as noticed by WITHERING, BARTON, PEREIRA, and myself.

271. (b) *The second grade* of poisoning by digitalis is that which is most frequently produced by too large or too long-continued doses. The symptoms are described with great accuracy by Dr. PEREIRA. They are usually nausea or actual vomiting, slow and often irregular pulse, coldness of the extremities, syncope, or tendency to it, giddiness, confusion of vision, and loss of muscular power. The sickness is sometimes attended by purging, but oftener by dysuresis, occasionally by neither. The patient complains of a sensation of weight, pain or throbbing of the head, especially the forehead; of giddiness, of weakness of the limbs, and watchfulness. He sees objects dimly, or of a green or yellow hue; or he sees motes, sparks, or mists before his eyes. The pulse is feeble, sometimes accelerated, at other times slow, but is affected by the slightest exertion. There is remarkable tendency to syncope upon raising the head from the pillow, and to profuse cold sweats; sometimes delirium, stupor, salivation, and loss of sensibility supervene. There is much difficulty in assigning the quantity of the drug capable of producing these effects, whether taken in a single dose or in divided quantities. Much will depend upon the state of the plant, the kind of preparation, and the constitution of the patient. I may, however, here state, as the result of experiment and observation, that very large doses—three or four times the usual doses of either of the preparations, or even more—may be given without any effect during inflammatory action; that febrile excitement, physical exertion, and a high range of temperature seem to suspend the action of even very large quantities of the drug; while the depressing passions, cold, the contemporaneous use of antimonial preparations, of colicium, or of refrigerants, manifestly accelerate and heighten their effects.

272. (c) *The third or fatal grade* of poisoning by digitalis is characterized by retchings, purging, griping pains in the bowels, remarkable faintness, cold sweats, anxiety, and depression of spirits, collapsed features, vertigo, dilated pupil and disordered vision; a slow, feeble, irregular, and small pulse; extreme physical de-

pression and exhaustion, inability to sustain a sitting or upright posture, involuntary evacuations, low delirium, insensibility, convulsions, stupor, and death.

273. *b. The appearances after death by digitalis* have not been accurately observed. There is, perhaps, no drug which has been employed, either medicinally or criminally, the operation of which has been more inaccurately described than this has been. Digitalis produces but slight irritation of the digestive mucous surface, the nausea, retchings, &c., sometimes observed resulting more from the efforts of nature to throw off a depressing and poisonous agent than from any inflammatory action produced by it, these symptoms depending upon the reaction of vital organs upon an injurious influence affecting the ganglial or splanchnic nervous system rather than upon irritation. The symptoms which have been imputed to narcotism and to congestion of the brain arise from very different states; for the giddiness complained of, the convulsions even, and all the symptoms which may be referred to the brain, I am convinced, by careful observation, are results of impaired circulation in this organ, of weakened nervous energy, and of a deficiency of blood in the vessels within the head. I have always found the carotids pulsating weakly; the head cool, and the features sunk; and it is well known that convulsions as often result from a diminution of blood within the cranium as from congestion or excess—perhaps oftener. Doubtless, when convulsions occur, this state is altered, and congestion is the consequence; so that, when convulsions precede dissolution, a congested state of the vessels of the brain and of its membranes will be found. Digitalis acts as a poison, and even as a medicine, by depressing the organic or ganglial nervous energy, and consequently by lowering irritability and the tone of vascular action. The manifestations of life in the several organs are thereby similarly affected, the functions of absorption and of urinary secretion being the least disordered. The ultimate result is, that the depressed states of organic nervous power and of vascular action primarily caused by digitalis, impair the cerebro-spinal influence, and the functions of sense and of muscular motion depending upon that influence; and that these states severally act and react on each other when the poison is energetic, or its operation not counteracted, until the action of the heart ceases altogether.

274. *c. The treatment of poisoning by digitalis* must depend upon the circumstances of the case. If the symptoms are produced by a large quantity of the drug taken at once, and if there be reason to infer that it still remains even in part on the stomach, the removal of it either by the stomach-pump or by vomiting should be procured. The sulphate of zinc is the most suitable emetic in this case, and it should be given in a full emetic dose with powdered capsicum, and vomiting should be encouraged by means of warm diluents containing stimulants, as ammonia, camphor, &c. When the poison is evacuated from the stomach, or when the symptoms are consequent upon repeated doses of it, or result from its cumulative influence, an immediate recourse to stimulants, as brandy, ammonia, camphor, opium, cardiac tinctures, cap-

sicum, should be had; and mustard poultices, blisters, or other rubefacients ought to be placed over the epigastrium. Strong coffee or green tea may also be freely given. In the instances of cumulative poisoning by this plant which occurred in my practice (§ 270), camphor and ammonia, with capsicum, were chiefly employed, and green tea for drink. The noxious effects of digitalis, however produced, are not readily removed, but require the lapse of several days before they entirely disappear, the disorder of the pulse and the affection of the eyes being the last to depart. During the treatment of the effects of this poison, the patient should be kept in a recumbent position, a change to the sitting posture being allowed only with the utmost care.

275. *F. LEAD.—The preparations of lead* are severally poisonous. The metal itself is not injurious, if it remain unchanged; but when reduced to an oxide or a carbonate, it becomes injurious. Small shot have been swallowed in order to remove obstructions in the bowels, and evacuated without producing any inconvenience. Dr. BRYCE (*Lancet*, Dec. 31, 1842) has recorded a case, however, of a man who took three ounces of small shot (No. 4). On the third day he complained of great depression and anxiety, with sunken features, coldness of surface, dizziness, and numbness in the arms and legs. These symptoms continued to increase; purgations were administered to overcome the obstinate costiveness, and in a fortnight he recovered. In this case the metal was either oxydized or reduced to a salt in the stomach or intestines. The chief compounds of lead which have been found injurious are, the *carbonate*, the *acetate* and *sub-acetate*, the *chloride*, the *iodide*, and the *oxide*, combined either with vegetable acids or with fatty substances; and either of these may produce *acute* or *chronic poisoning*.

276. *a. Acetate of Lead—Sugar of Lead.*—This salt is productive of acute or chronic poisoning, according to the dose, the repetition of it, or the mode of its administration. ORFILA found that, in large doses, it caused pain, vomiting, and death; and that when its action was slower, and absorption took place, paralytic and convulsive symptoms appeared. Owing to the disposition of the salts of lead, and especially the acetate, to combine chemically with the tissues, the villous surface of the digestive canal, in cases of acute poisoning with this salt, is whitened or otherwise discoloured by it. Injected into the veins, or applied to wounds, it affects the nervous system, causing vertigo, paralysis, or coma, and convulsions, and congestion of the lungs.

277. *b. The symptoms* produced by the ingestion of this salt vary with the dose. Ten grains taken daily for seven days caused a sensation of tightness in the breast, a metallic taste of the mouth, constriction of the throat, debility, sallow countenance, slow respiration and circulation, turgid and tender gums, ptialism, numbness of the fingers and toes, pains of the stomach and bowels, costiveness, but no nausea. These symptoms are described by Dr. LAIDLAW, and agree with the symptoms I have myself observed in cases where large doses of this substance have been taken for several days. When much larger or poisonous



doses, as three or four drachms or upward, have been swallowed, a pricking, constrictive, and peculiar pain is felt in the throat and in the course of the œsophagus; pain, anxiety, and distressing aching are felt at the epigastrium, and diffusing themselves over the abdomen; vomiting takes place, and is attended by paroxysms of colicky pains, which are not increased by pressure, as in cases of inflammation, but, on the contrary, are relieved by it. Aching and anxiety, with a sensation of constriction of the abdominal contents towards the spine, are experienced in the intervals between the severe paroxysms of pain; the bowels are constipated; the skin is cold, and the strength prostrated. Giddiness, coma, convulsions, and death supervene, if suitable aid be not administered. This very *acute form* of lead poisoning is, however, comparatively rare. Much more frequently, after suffering for several days with the abdominal symptoms, the parietes of the abdomen being at first retracted, and subsequently tense and distended with air, owing to the paralyzed state of the muscular coats of the intestines, the patient complains of cramps or loss of power of the muscles of the extremities, or of numbness or complete paralysis. The bowels continue constipated; vomiting occasionally takes place, preceded or attended by severe paroxysms of pain; torpor, coma, or convulsions supervene; or death takes place suddenly or unexpectedly.

278. *c.* The effects of this salt often pursue a more *chronic* course, and then are in all respects similar to those described when treating of *painters' colic*. (See art. COLIC, § 25, *et seq.*) Dr. A. T. THOMSON (*Med. Gaz.*, vol. x., p. 689) has contended that the acetate of lead does not become poisonous until it is converted in the body into the state of a carbonate; but there is no proof of the carbonate having a more deleterious influence than the acetate. Dr. C. G. MITSCHERLICH has even shown that the acetate is not less injurious than the carbonate, especially when mixed with acetic acid, in which form it is more energetic than when given in the neutral state. (TAYLOR, *op. cit.*, p. 169)

279. *d. Sub-Acetate—Diacetate of Lead—Goulard's Extract of Lead.*—This substance has caused death in a few instances, and is a more powerful poison than the neutral salt, probably owing to its containing a larger quantity of the oxide. Mr. TAYLOR states that two cases of poisoning by GOULARD'S extract occurred in 1840 in two children of four and of six years of age. The quantity taken was not great, but both died in thirty-six hours, with symptoms very closely resembling those of pestilential cholera. The bodies were inspected (§ 285). Mr. MARSHALL, however, mentions a case of recovery from two fluid ounces of this extract.

280. *e. Carbonate of Lead—White-lead Ceruss.*—It is insoluble in water, but still possesses poisonous properties, a decided proof, as Mr. TAYLOR remarks, among numerous others, that insolubility does not prevent a substance from exerting a poisonous action on the system. The gastric and biliary secretions, or the presence of a free acid in the digestive canal, may dissolve a sufficient quantity to be deleterious. In a case reported by Dr. SNOW, a child, aged five years, ate a portion of the carbonate, ground up with oil, not larger than a marble. During

three days, pain in the abdomen and constipation alone were complained of. On the third day the symptoms were greatly aggravated, and vomiting occurred. The child died ninety hours after the injection of the poison; some very offensive stools, of a greenish-black colour, having been passed just before death. A female, aged thirty-three, took, by mistake for magnesia, from six to eight drachms of the carbonate of lead. Five hours afterward, Mr. CROSS found her in a cold perspiration, breathing heavily, with a frequent, small, constricted pulse. There were vomiting, dryness of the throat, anxious expression of countenance, and severe colicky pains. The extensor muscles became paralyzed, and the flexors rigidly contracted. Sulphate of magnesia, with dilute sulphuric acid and castor oil, were given her, and very dark evacuations were procured. In four days she was convalescent.

281. These cases sufficiently illustrate the *symptoms of the acute form* of poisoning by carbonate of lead. The *chronic form* of poisoning by this substance, characterized by severe paroxysmal pains in the bowels, constipation, paralysis, &c., is identical with *painters' colic*. (See COLIC, § 25, *et seq.*) This form of poisoning is frequently caused by the absorption of the poison either by the lungs, or by the skin, or both. It has been found that, where the carbonate of lead was ground in a dry state, both the labourers and animals have died from its effects, owing to its diffusion in a state of impalpable powder in the air. Even the air of a newly-painted room, especially when it is slept in, will, in some constitutions, produce acute or serious effects; but the chronic operation of this agent is most common. The diagnostic symptoms of this latter form of poisoning have been fully stated in the article referred to; but recently Dr. BURTON has shown, that blueness of the edges of the gums, where they join the bodies of the teeth, generally attends, or even precedes, the usual symptoms of this form. Dr. CHOWNE, however, contends that the presence or absence of this sign is not connected with the effects of lead. Chronic poisoning by the carbonate of lead is not infrequently caused by water which has passed through lead pipes, or been kept in lead cisterns, especially if these have been new, and if the water contain carbonic acid. Hard water, or water containing the sulphate of lime, or any of the neutral salts, produce little or no action on metallic lead. (See GUY'S *Hosp. Rep.*, vol. iii., p. 70.)

[As most of our large cities are supplied with water from lakes or streams conducted to reservoirs, and hence distributed, through iron or lead pipes, to the inhabitants, it becomes a question of great importance whether lead should be employed for such a purpose. The following facts are worthy of record in this connexion:

"The salt of lead formed by the contact of water with the metal is the carbonate. This salt is produced either by the action of water containing carbonic acid, or by water containing little or no saline matter. The carbonate is mixed with a small proportion of the hydrated oxide of lead. In the case of pure water, the free access of atmospheric air is essential to the change, for distilled water deprived of its gases by boiling, and excluded from the air, has no action on lead. When rain, or distilled,

or very soft water is left in contact with pure lead, with the free access of air, a white powder collects in a few minutes around the metal, and this goes on increasing till, in a few days, white, pearly scales are formed, which either float on the water, or fall to the bottom of the vessel. The formation of the carbonate and the corrosion of the metal go on as long as the air has free access to the water. At the same time a small quantity of lead is dissolved.

"On the other hand, various saline substances held in solution in water have the effect of preventing the formation of the carbonate. Indeed, all the neutral salts possess this power in a greater or less degree. Sulphate of lime affords the most complete protection, so small a quantity as one part in 5000 effectually preventing the formation of the carbonate. Some kinds of river water, as that of the Thames and the water used in Edinburgh, contain saline matters in sufficient proportion to render the use of lead perfectly safe. The same remark applies to most spring waters. But the waters of some rivers and springs are so destitute of saline matters as to act powerfully on lead.

"It may be stated, then, as a general result, that the action of water on lead, and the consequent danger of conveying and preserving it in pipes or cisterns made of that material, varies directly as the purity of the water. It follows that we may render the use of lead for such purposes perfectly safe by the artificial admixture of saline matter with the purer kinds of water. Sulphuric acid, by forming an insoluble sulphate of lead, is also an efficient protection. The use of lead is attended with most danger when it is employed to collect or preserve rain or snow water, or spring water of unusual purity, and the danger is increased by the use of leaden lids to cisterns, the pure water rising by a natural process of distillation, and collecting on the lid.

"There is one cause which greatly facilitates the action of water on lead, and which may act with sufficient energy to neutralize the preservative effects of saline matter, and be even increased by its presence, namely, the galvanic action excited by the contact of some other metal with the lead, or of the solder used for joining the sheets of lead. It must, moreover, never be forgotten that carbonic acid, if present in the water, will completely counteract the preservative effect of the salts above mentioned. We cannot, indeed, too strongly deprecate the use of lead for cisterns and water pipes under any circumstances."

The Croton water of New York contains only about four grains of solid matter to the gallon, and is consequently so pure as to act upon lead with great rapidity. The same remark will apply to the water about to be supplied to the city of Boston. Mr. EWBANK, of New York, has invented a process of tinning lead pipe, which is said to render it perfectly safe against the action of water. But it is evident that if any portion of the pipe remains untinned, galvanic action will be set up, and the lead dissolved still more rapidly. On the whole, iron pipes only should be employed for this purpose. See my appendix to *TOWERS'S Illustrations of the Croton Aqueduct*; New York and London, 1843.]

282. *f. Iodide of Lead.*—*Pulmbi Iodidum.*—As this substance is employed in medicine, it is ne-

cessary that the injurious effects produced by it should receive attention. It is a fine yellow powder, sparingly soluble in cold water, but readily soluble in boiling water. Twenty-four grains of the iodide were given to a cat, in two doses, with an interval of four hours between them. The animal suffered violent colic, and died in three days; but no signs of irritation were observed after death. Iodide of lead in doses of from five grains to thirty were given to a bulldog. On the fifteenth day the animal refused food, and kept in the recumbent posture. He died on the eighteenth day, having swallowed altogether upward of ten drachms of the iodide. During the whole period he had only three or four intestinal evacuations. I have employed this substance both internally and externally; but it has not, in the form I have prescribed it, produced any marked signs of irritation.

283. *g. The effects of the chloride of lead and of the chromate of lead* I have not observed; but there is every reason to believe that they would be poisonous in large doses, the latter especially. The sulphate of lead has usually been considered as inert by ORFILA and others. The nitrate of lead acts in a similar manner to the acetate.

284. *h. The Oxides of Lead.*—The yellow oxide, and the brown oxide—peroxide—are but little known unless to chemists. Litharge and minium (red-lead) are much used in the arts, and have caused poisoning accidentally. Liquids used for culinary or dietetic purposes, especially if they contain a free acid, may become impregnated with oxide of lead, derived from the glaze of the vessel in which they are kept forming poisonous salts. Litharge glaze may also be dissolved by alkaline and fatty substances. All newly-glazed vessels yield traces of lead on boiling in them acetic acid or caustic potash; the oxide of lead being dissolved by the acid or alkali. Litharge was formerly much employed to remove the acidity of sour wine, and convey a sweet taste; an acetate, or some other vegetable salt of lead being in these cases formed. Many years since, a fatal epidemic colic prevailed in Paris owing to this cause. The adulteration was discovered by FOURCROY. Wine thus adulterated is known by its being blackened by hydro-sulphuret of ammonia. Cider, new rum, and sugar are sometimes the medium of conveying the salts of lead, owing to lead or its oxides being employed in certain parts of the apparatus or substances used in their manufacture. Dr. TRAIL found that, when new rum is kept in oaken casks, the tannin of the oak is slowly dissolved by the spirit, and the lead is precipitated in an insoluble form, the spirit thus becoming wholesome.

285. *i. The appearances observed after death from lead poison* have been very loosely described; and those which have merely been the results of congestion, of the coagulation of the blood in the veins and venous capillaries, with more or less discoloration from the chemical action of the poison, have been stated to have been inflammatory. Dr. MITCHELL found that, when the dose of the acetate was large, the villous surface of the stomach was chemically changed by it—softened, corroded, and reduced to a whitish colour, owing to the combination of the salt with the tissue. When



given in a small dose, the acetate was decomposed by the gastric secretions, and exerted no corrosive action on the villous surface. When this salt was reduced to a state of an albuminate and dissolved by acetic acid, death took place with great rapidity; but the stomach was not found corroded. This effect was produced by the neutral salt only, and not when the dose was small, or when the poison was combined with an acid. (TAYLOR.)—In the cases of poisoning with GOULARD'S extract mentioned above (§ 279), the villous membrane of the stomach was found by Dr. BIRD of a gray colour, but otherwise perfectly healthy. The intestines were contracted, in one instance more so than in the other. In a case of acute poisoning by this extract that terminated fatally in forty-eight hours, the villous coat of the digestive canal, from the œsophagus downward, was softened, and was said to present inflammatory appearances. The mucus on the internal surface of the canal contained much of the poison. The changes observed after death from the *chronic form* of poisoning by lead are described at another place. (*See Colic*, § 25, *et seq.*)

286. *k. The modus operandi of the preparations of lead deserves attention.* These preparations, according to their physical conditions and modes of administration, may act locally or remotely, or in both ways. Certain of them, as the neutral acetate, by combining with the tissues, may act chiefly locally, and be only slowly absorbed. Their remote action may arise from their absorption from the digestive canal, from the skin, or from the lungs. When thus absorbed, to such an amount as to affect the organic nervous and vascular systems, the following effects appear: the temperature of the body sinks, the pulse becomes smaller and slower, the capillaries are somewhat constricted, the secretions from mucous surfaces diminished, and hæmorrhages, where they exist, are checked. This sedative and constringent operation is manifested chiefly in exhaling and secreting surfaces and organs. If the poison continue to be absorbed, the nervous and muscular systems are more or less affected, and the nervous and muscular systems of organic life are the first to betray disorder; as evinced by anxiety at the epigastrium, colicky pains through the abdomen, especially in the course of the colon, spasm of the muscular coats of the bowels, impaired secretion, and constipation. As the effects proceed, pain extends to the spine and to the limbs, spasms affect the muscles, especially of the extremities, or partial loss of sensibility or of the power of motion, or of both, appears. Ultimately the palsy becomes more or less complete, or giddiness, sopor, coma, or convulsions supervene, or even death takes place preceded by either of these.

287. Thus a *sedative* and an *astringent* action, and subsequently *morbid sensibility*, followed by *spasm*, and next by *palsy*, are produced by the absorption of these poisons. These effects generally appear to a greater or less extent, *first*, in the organic or involuntary, and extend to the animal or voluntary, nervous, and muscular systems. But occasionally they are only slight in the former, although severe or even fatal in the latter; or they are most severe in, or altogether limited to, the former. There can be no doubt of these effects being produced

by the presence of the poison, in the state either of an oxide, or of a salt, or in some other form or compound, in the blood, and in the tissues. ORFILA detected lead in the urine of a female who swallowed an ounce of the acetate; TIEDEMANN and GMELIN in the blood of animals poisoned by it; Mr. TAYLOR in the milk of a cow poisoned by the carbonate; and Professor COZZI, WIBMER, and others, in the blood, muscles, and viscera, after painters' colic.

288. *l. Treatment.*—The more acute form of poisoning by any of the preparations of lead requires the exhibition of demulcents or diluents, holding in solution some sulphate—as of soda, magnesia, potash, or alumina. If vomiting does not follow the free exhibition of these, the sulphate of zinc may be given, or the stomach-pump be cautiously had recourse to, or the throat or fauces may be tickled. If the patient has been poisoned by the acetate, the carbonates should be avoided, as they would increase the activity of the poison, while the sulphates would render it inert. Albumen and casein, the albuminous principle of milk, precipitate the oxides of lead, and are, therefore, excellent antidotes when given in large quantities. The treatment should be somewhat different in cases of acute poisoning by the carbonate of lead. Mr. TAYLOR remarks, that the alkaline sulphates should not be employed as antidotes for these, since it requires long digestion at a high temperature for these salts to react on the carbonate of lead, and even then the decomposition is only partial. He suggests, therefore, the administration of an alkaline sulphate mixed with vinegar, or some weak vegetable acid, such as lemon-juice. Emetics or the stomach-pump should also be employed. Afterward the bowels ought to be duly evacuated, and oleaginous and demulcent enemata thrown up. If irritability of stomach continue, opium should be given, and the colicky and paralytic symptoms ought to be treated as advised in the article *Colic* (§ 60-68).

289. *G. HYDROCYANIC ACID AND THE CYANIDES.—Oil of bitter Almonds, &c.—Prussic acid*, since its operation has been more generally known, especially as respects its rapid and unerring effects, has been frequently employed for self-destruction, and in some instances even for murder. Death has also occurred from it, owing to accident. In 1837-8 there were twenty-seven cases of poisoning by it, nearly all of which were suicidal. This substance has been variously classed by writers on *Medical Jurisprudence*; some have viewed it as a *narcotic*, because it produces insensibility in fatal cases. Others have considered it as an *irritant* poison, because it often produces spasms or convulsions, although no evidence of irritation is furnished by it on the tissues. But spasms or convulsions attend all intense impressions on the nervous system, especially when these impressions destroy life. Others, again, believe it to be both narcotic and irritant, or *narcotico-irritant*; and, not being content with imputing to it a single property which it does not possess, assign to it two properties of which it is equally devoid; for no one becomes unconscious from it, or is spasmodically or convulsively affected by it, if, indeed, they be so affected at all, until life is departing or about to depart. As it, therefore, *annihilates* the manifestations

of life in a few seconds, and in a way in which no irritant or narcotic ever acts, however energetic, comparing its action with theirs; and as there are no other terms which convey the idea of its mode of action better than *sedative* or *paralyzing*, I am obliged to adopt them, as indicating the *privation of sensibility and all vital action*, the chief properties evinced by it, when applied in a poisonous dose to a living body, as indicating the *annihilation of life*.

290. Common hydrocyanic acid is a mixture of the pure or *anhydrous acid* with water, and sometimes with alcohol. As it is kept in shops, it varies from 1·3 to 6·5 *per cent.* of the anhydrous acid. The *two* chief forms in which it is kept are that of the London Pharmacopœia, which contains 2 *per cent.*, and that of SCHEELÉ, which contains from 4 to 5 *per cent.* of anhydrous acid.

291. *a.* The *symptoms* caused by poisonous doses of this acid vary with the mode of exhibiting it, and with the quantity up to a certain amount; but, beyond that, the effects are tolerably uniform. *Inhaling the vapour* of hydrocyanic acid produces death more rapidly than any other mode of employing this poison. Dr. PEREIRA caused the almost instantaneous death of a rabbit by applying its nose to a receiver filled with the vapour. This acid also acts rapidly when applied to an *abraded surface* or to a *wound*. SOBERNHEIM states that an apothecary at Vienna died within an hour after the entrance of the acid into a wound in the hand produced by the glass vessel in which it was contained. Even when applied to the sound skin it produces some degree of action. After applying SCHEELÉ's acid to the fingers a short time, I experienced numbness, extending considerably above the place of application, that continued for several hours, and on one occasion the whole day. Dr. CHRISTISON says that M. ROBQUET's fingers were numb for several days after their exposure for some time to the vapour of the acid. Judging from these facts, this acid cannot be viewed as devoid of influence upon the *unabraded or whole skin*.

292. *b.* On *mucous membranes* this poison acts with rapidity and certainty. Mr. NUNNELEY, whose researches into the operation of this substance have been most extensive, states, that when applied upon a mucous membrane, as the conjunctiva, the rectum, or the vagina, prussic acid acts with as great rapidity as when swallowed. A knowledge of this is of importance, as poisoning may be effected in this way, and detection of the crime would be very difficult. The action of the acid on the lungs, when air impregnated with it is breathed, is not only rapid, but certain in its effects, and is one of the easiest modes of exhibiting it, but the most difficult, after a few hours, to detect, as the odour, being so diffusible, is very soon dissipated.

293. *c.* When *swallowed*, prussic acid produces almost instantaneous effects, if the quantity be sufficient to destroy life, or if the stomach be not loaded with food, which may intercept a large portion of it, and delay its operation.\*

But the *symptoms* produced by a dose hardly or barely sufficient to cause death are different from those observed when the quantity is large, and death very rapid. The effects are more rapid and certain in young and delicate persons; in weak constitutions, and when the stomach is empty, than in the middle-aged and the robust, and when the stomach contains more or less food.—(a) A *small, poisonous dose* occasions a bitter, warm taste, which is soon followed by sensations of faintness and giddiness. The respiration becomes slow, difficult, and spasmodic, the pulse small or imperceptible; and insensibility supervenes, often with convulsions; a state resembling an epileptic paroxysm being sometimes produced. The pupils are either contracted or dilated, and the eyes staring. If the treatment about to be recommended be resorted to in this state, recovery usually takes place rapidly, vomiting often occurring.

294. (b) In a *large or rapidly fatal dose*, the phenomena are such as hardly admit of observation; death follows so quickly, and is attended by so few symptoms, excepting the cessation of sensibility, of breathing, and of the heart's action. In the case of a chemist in my vicinity who took more than an ounce of SCHEELÉ's preparation, death must have occurred in a few seconds, neither spasms nor convulsions having been observed. In a case communicated by Mr. FRENCH to Mr. TAYLOR, seven drachms of the common prussic acid were taken, and about two minutes afterward he was found lying on the floor insensible. There were no convulsions of the limbs or trunk; but a slight flickering motion was observed about the muscles of the lips. Respiration seemed to cease for some seconds; it was then renewed in fits, expiration being deep and slow. The deceased took the poison while ascending the stairs; his body was found on the landing; the bottle had rolled some distance from him; the stopper was lying in another direction. SIMON relates a case in which an ounce was taken; the symptoms were the same. The hands and feet were cold, and no pulse could be felt. The finger-nails are often of a livid colour, and the hands clinched. When the dose is large, the odour of the acid is generally exhaled from the mouth.

295. *d.* The utterance of a *scream or shriek* has been said to be indicative of poisoning by this acid; but Mr. TAYLOR states that this symptom does not occur in the human subject; and Mr. MILLS, the deputy coroner, says that his inquiries show that it does not occur. There is merely a gasping for breath, or a low moaning or sobbing noise. Mr. NUNNELEY found that the shriek or cry did not occur in more than about one half the number of cases of animals, and only in one third very loudly. When it was uttered in animals, it was of a peculiar kind, and so indicative of distress as to give an idea of consciousness on the part of the animal of impending death; it was characteristic of the poison. When the dose of prussic acid is small but still fatal in the human subject, *convulsions* have sometimes been observed; but they have not been met with when the dose has been large and death rapid. In these latter cases the symptoms have been scarcely noticed, but are probably the same as seen in the lower animals, namely, imperceptible pulse,

(\* Hydrocyanic acid never operates instantaneously, as we believe, there always elapsing a sufficient interval for it to reach the brain through the medium of absorption. This fact has been abundantly proved by the experiments of Mr. BLAKE.)



insensibility, a few deep and slow respirations, and death. Mr. NUNNELEY's experiments, as well as the history of several cases in which large quantities of this poison have been swallowed, show that death is seldom so rapid as to prevent volition and voluntary motion being exercised for a few seconds afterward; but in a few seconds death often takes place without a struggle. The most rapidly fatal case with the particulars of which I am acquainted, was that of a gentleman whom I knew, and which occurred in 1828. Above an ounce of SCHEELÉ's acid was taken. Instantly upon swallowing it, he must have repented of his act, for he hastily called out, brandy, ammonia, repeating the words, fell down, and never moved afterward. In some few instances, Mr. NUNNELEY found the action of the poison so expeditious as to prevent the slightest exhibition of voluntary motion; but in the majority of warm-blooded animals and dogs, about twenty seconds elapsed before the symptoms were manifested; thus allowing, presuming that a similar interval would occur in man, sufficient time for several acts being performed, which were supposed by many to have been doubtful, if not impossible, after the ingestion of the poison.

296 *e.* It has been supposed that this acid possesses an *accumulative property*; that after having been taken for some time, in moderate doses, without any apparent mischief, it may, without any remarkable increase of quantity, suddenly give rise to all the effects of poisoning. Mr. TAYLOR states that one case is reported which renders this opinion probable, and another has been communicated to him which tends to confirm it. Dr. LONSDALE, who has paid some attention to this matter, does not admit that prussic acid possesses this property, on account of its volatility and diffusive influence; and although I have very frequently prescribed this substance, I have not seen any proof of an accumulative influence. Mr. TAYLOR states that serious effects have followed slight alterations made in the dose; but I have never met with such. The proper test is to observe whether or no such effects follow the persistence in the use of the same dose. It is very important, practically, to determine the question.

297. *f. Post-mortem Appearances.*—In cases of suicide or accident, the vessel which contained this poison will generally be found near the body. But the person poisoned may have thrown it from him upon swallowing its contents. The body commonly exhales an odour of prussic acid for some time after death; but if it has remained exposed for some time before it is seen, and especially if it be exposed to the open air, or in a shower of rain, the odour may not be perceptible. Putrefaction is said to be accelerated after death by this poison. This appeared to have been the case in two instances which I had occasion to observe. Mr. TAYLOR doubts this effect. ORFILA states that in most sudden deaths, from whatever cause, putrefaction is, *ceteris paribus*, accelerated. Externally the body is commonly livid; the nails are blue, the hands clinched. The jaws are closed; and there is some foam about the mouth, especially when death has been preceded by convulsions. The face is bloated and tumid; the eyes prominent, shining, and glassy;

and the veins are congested with dark blood. The stomach and alimentary canal are generally in a natural state; the internal surface being sometimes red or congested, as often seen after sudden death. The lungs are generally more or less congested. The brain is usually congested, especially in the less rapidly fatal cases, and when convulsions have preceded death. The blood is sometimes found quite fluid, in others thicker or semi-coagulated. It is generally of a dark colour; but Mr. TAYLOR, quoting HELLER and METZDORFF, says that it is occasionally red, or even of a pinkish hue. Other changes noticed by writers may be viewed as accidental. Indeed, there is no organic alteration observed that can account for death from this poison. Those now stated—and they are the chief met with—are slight, and are seen in other cases of sudden death. Life is so soon destroyed by this agent as not to allow of any change beyond simple congestion taking place. In a case reported by Dr. GREGG, where an ounce of the acid was swallowed, a patch of dark-red extravasation was found under the villous coat near the pylorus. In a case recorded by Mr. POOLEY, the blood was of a very dark colour; but the lungs were not congested; in one by Mr. HICKS they were much congested; while in another by Mr. NUNNELEY they were only partially congested. In an instance reported by Mr. CRISP, the abdominal and thoracic viscera were all healthy, the blood imparting to them a purple hue. (TAYLOR.)

298. On opening the stomach the odour of prussic acid is frequently perceptible, and if the quantity taken has been large, the odour may continue for several days after death. If the inspection has been recent after a large dose, the odour is often perceived in all the cavities, and even in the blood. This odour has a distant resemblance to that of bitter almonds; but it is accompanied with a peculiar impression of acridity on the nostrils and back of the throat. But this odour—the diluted odour of bitter almonds—may be perceived by some persons, and not by others; or it may be entirely absent. It may not be present, or not perceived in a very sensible manner in the dead body, if the dose of the poison has been small; or if the patient has survived a short time after it has been taken; or if it be masked by other odours; and if the body has been dead some time, or has been exposed to the air, &c. (§ 297).

[In a case which occurred in this city this day (March 22d, 1848), where a gentleman of middle age took a large quantity of hydrocyanic acid, and died in his chair, the body presented a livid appearance. The pupils of the eyes were much dilated, and the muscles of the body very rigid. On opening the chest, the lungs were found of a dark colour and much congested with blood, and presented the appearance of liver when cut. The liver was of a dark colour, and congested. The left side of the heart was empty. The right side contained a little fluid blood. The stomach contained about a gill of dark, bloody fluid, which emitted a strong odour of prussic acid. The mucous membrane was of a dark-red colour, softened and corrugated. The intestines were of a red colour. The existence of prussic acid in the stomach was so evident that there could be no doubt it

was the cause of death. In two other cases, the odour of the acid was evident on opening the cavity of the chest, as well as the stomach.]

299. *g. Relation between the Rapidity of the Effects and the Quantity and Concentration of the Poison.*—Dr. CHRISTISON has shown, that beyond a certain dose the weak and the strong acids appear to act with equal rapidity. Experiments on animals and facts observed in the human subject, show that a dose of the poison sufficient to cause death may have this effect in as short a time as a very much larger one; that a drachm of SCHEELE'S acid may cause death as rapidly as three or four times the quantity, especially if the poison be taken on an empty stomach, and if the person be weak, or debilitated by disease. It hence follows, that if two drachms of this acid be fatal in a given time, it cannot be inferred that twice or four times the quantity will be fatal in one half or one fourth of that time. Mr. NUNNELEY states, "that, when called to a person poisoned by this acid, we cannot, merely from the length of time he has survived, or the evidence of the symptoms, determine any thing with certainty as to the degree of concentration or dilution of the acid, nor, except within wide limits, much as to the absolute quantity taken." (P. 83.) He, moreover, found that concentration does not heighten the effects of this poison, but that dilution to a moderate extent even renders them more speedy, probably from bringing the poison in contact with a larger extent of surface at the same instant. It may happen that a dose just sufficient to destroy life may fail, or be longer in producing its effects, owing to its interception by the food on a full stomach, or by other circumstances pointed out above; but a quantity sufficient to destroy life under any circumstances may have this effect with as great rapidity as three or four times that quantity. Hence there is no relation, beyond a certain amount, between the rapidity of the effects, and the quantity or concentration of this poison.

300. *h. Quantity required to destroy Life.*—Dr. GEOFFREY relates an instance of a quantity of the acid having been taken equal to twenty-seven drops of the dilute acid of the London Pharmacopœia (at two per cent.) without any effect, the dose having been gradually raised to this amount; but when the dose was raised to thirty-six drops, the patient in two minutes was seized with the usual symptoms, and nearly lost his life. The quantity of anhydrous acid swallowed in this dose was only about two thirds of a grain; but, as this substance had been taken in gradually increased doses, the probability of an accumulative effect having here resulted should be taken into consideration: a question of great practical importance, but one which is solved with difficulty. Mr. HICKS furnishes, in the case which he has reported, the *smallest dose* which has been determined with accuracy as productive of death. A healthy adult female took a dose equivalent to *nine tenths* of a grain of anhydrous prussic acid, to forty-nine drops of the dilute acid of the pharmacopœia, and to twenty-five of SCHEELE'S acid. She died in twenty minutes. In a case observed by Mr. T. TAYLOR, a stout, healthy man swallowed exactly the same quantity by mistake, remained insensible for four hours, when he vomited, and began to recover. The vomited matters had

no odour of the poison, and hence absorption of it had probably taken place. This quantity, nine tenths of a grain of anhydrous acid, or *one grain*, may therefore be viewed as sufficient to destroy human life, although a somewhat smaller dose may have this effect in certain circumstances, or a somewhat larger dose may fail of producing it in others. Mr. TAYLOR thinks that the *largest dose* from which an adult has recovered was in a case reported by Mr. NUNNELEY. The person swallowed forty minims of an acid, at  $3\frac{1}{4}$  per cent. The man was for a short time conscious, got into bed after taking it, and spoke. He felt his jaw become stiff, and then remained insensible until roused by the cold affusion. Although recovery took place in this case, still the inference just stated as to the quantity which may destroy life, remains unaffected by it.

301. *i. The period at which death takes place* differs in different cases, although the dose taken may have been the same. This may be expected from the different circumstances above shown to influence the operation of poisons. In the seven cases which occurred in Paris, from the same dose of the poison given to each at the same time, death took place after periods varying from fifteen minutes to three quarters of an hour. It is only when the dose is just sufficient to cause death that an individual survives from half an hour to one hour; but I know of no case in which the period was longer than an hour. In one instance, in which seven drachms were taken, death took place within five minutes; and in another, where an ounce was swallowed, within ten minutes. In the case referred to as that in which the smallest fatal dose was observed, death occurred in twenty minutes. When the quantity is two drachms or upward, the period of death varies from two to ten minutes.

302. But it is necessary to distinguish between the periods at which insensibility and absolute death take place; for, although death does not commonly ensue until after a few minutes, insensibility, the loss of volition and consciousness may occur in a few seconds. Dr. LONSDALE states, that a drachm of SCHEELE'S acid would affect an ordinary adult within the minute, and three or four drachms within ten or fifteen seconds. When the acid is stronger, and the quantity larger, he believes the annihilation of the sensorial functions to be immediate. Mr. TAYLOR remarks, with reference to this topic, that while, as a general rule, insensibility may supervene from a large dose in a few seconds, the individual occasionally retains a power of performing certain acts indicative of consciousness, volition, and locomotion, for a few seconds.

303. *k. Diagnosis of poisoning by Prussic Acid.*—But little is required to be said as to this topic, after what has been already advanced. The effects of this poison will be readily distinguished from those of *opium* or of other *narcotics* or *acro-narcotics*, as the coma caused by these poisons is seldom seen until after the lapse of a quarter of an hour, or twenty minutes; while insensibility from this acid, even in small doses insufficient to cause death, is very rarely delayed beyond two minutes. Besides, the patient may be roused from the narcotic influence of opium or other narcotics;



but he cannot be roused from that produced by prussic acid until he entirely recovers from it. Convulsions furnish no diagnostic evidence. In poisoning by this acid, a fatal issue always occurs within an hour, more frequently within a quarter of an hour; while poisoning by the substances referred to seldom terminates fatally before a period varying from six to twelve hours. The odour of the acid, when perceived, is also an important diagnostic proof (§ 297, 298).

304. It is of the greatest importance that the effects of this poison should not be confounded with death from *epilepsy*, *apoplexy*, or *disease of the heart*, in either of which death may take place within the period in which prussic acid proves fatal. A *post-mortem* examination will generally furnish the diagnosis, when no other evidence can be obtained, or can be depended on, especially as regards apoplexy and cardiac disease; but as respects epilepsy the proofs may be incomplete, unless the odour of prussic acid be present. It may likewise be important to determine whether the poisoning by this acid has been *suicidal* or *accidental*, especially if the life of the individual be insured. In general, the several circumstances observed in connexion with the case are such as at once explain the nature of it; but there are no means by which suicide may be more secretly perpetrated than by that now discussed. As to this topic, I must refer the reader to what has been stated by Mr. TAYLOR and Dr. CHRISTISON.

305. *l. Modus operandi.*—The local and primary operation of this poison is certainly upon the nerves of the part. This is shown by the numbness produced by it when applied even to the unabraded skin. In some experiments I made with it many years ago, it was found to impair the irritability of muscular parts, and in some instances to destroy this property altogether in those parts to which it had been applied. It also in these experiments caused dilatation of the capillaries, with congestion and stagnation of the blood in them. That the local impression made upon the nerves, more especially upon those of the cerebro-spinal system, is rapidly transmitted to the brain, medulla oblongata, and spinal cord, cannot be doubted; for the abolition of the functions of those parts of the nervous system is generally so instantaneous, especially when the stomach is empty, that it cannot be imputed altogether to absorption of the poison, although absorption undoubtedly takes place very rapidly, and destroys life: the insensibility resulting more immediately from the impression of the poison, the arrest of the heart's action, and death proceeding consecutively from the absorption of it. That this poison is absorbed is fully proved by the detection of it, by chemical agents, in the blood, and by the odour of this fluid in the cavities when they are opened, and in several viscera; thus showing that its operation on organs remote from the part to which it is applied, and the death of the individual, take place mainly through this channel; that the heart is paralyzed, and its action altogether arrested by the presence of the poison in the blood. There is, however, sufficient reason to believe that the very decided and immediate impression produced by it upon the nerves of the part to which

it is applied is rapidly propagated to the *medulla oblongata* and brain, through the medium of the nerves, before the poison reaches the nervous centres, or heart, by the medium of absorption, or through the channel of the blood; for Mr. NUNNELEY found that, "when the acid was administered by the rectum or the vagina, both hind legs of the animal were sooner affected than the anterior part of the body." (P. 76.)

306. *The cause of death*, in cases of poisoning by prussic acid, appears, after the best attention I can give the subject, and after much experience of its medicinal effects, to result as follows: 1st. The deleterious impression made by the poison upon a sufficiently large surface, or to a certain amount, being transmitted by the nerves to the *medulla oblongata* or its vicinity, causes insensibility, and, if that impression is not of overpowering or annihilating intensity, convulsions also. 2d. That the deleterious impression is less violently, or more slowly developed or extended through the ganglionic nervous system; and that, before life is destroyed by the impression made on the nervous system, absorption of it, to a greater or less amount, into the circulation takes place; and, 3d. That the presence of the poison in the blood entirely abolishes the already impaired respiratory and circulating functions by its action upon the nervous centres, and on the heart itself. The poison may thus be viewed as acting primarily upon, and through the medium of the nervous system, and consecutively, by absorption and through the channel of the circulation; the latter completing what the former mode may have failed of accomplishing.

307. *m. The chemical combinations of hydrocyanic acid* are more or less poisonous.—(a) COLLON, ROBQUET, SCHUBARTH, and MAGENDIE have demonstrated the poisonous action of the *hydrocyanate of ammonia*, and of the *hydrocyanate of potass*. A dog was killed in twenty minutes with twenty drops of the diluted acid neutralized by ammonia; and another in three hours by twenty-five drops neutralized by potash. Nevertheless, ammonia is one of the best antidotes to the action of this acid, when administered after the poison. ORFILA relates a case in which six grains of the hydrocyanate of potassa proved fatal within an hour in the human subject, when administered in an injection.

308. (b) The deleterious properties of the *ferrocyanates* or *triple prussiates* are much more doubtful than those of the former. Some experimenters with it have found that the *ferrocyanate of potass* is poisonous in large quantities; while others state that it possesses little or no deleterious property. WOLLASTON, MARCET, EMMERT, MACNEVEN, and SCHUBARTH say that a drachm, or even two drachms, of this substance may be given with impunity to man or the lower animals.

309. *c. The sulpho-cyanic acid*, a substance analogous in its nature to the ferrocyanic acid, was once supposed, like it, to be a poison of great activity; but this, Dr. CHRISTISON adds, admits of some doubt. Dr. WESTRUMB considers it more poisonous in the form of *sulphocyanate of potassa*. WIMBER reports that SOEMMERING found both this acid and the salt to be poisons of great energy; for half a drachm of concentrated sulpho-cyanic acid given to a dog occasioned immediate death, and the same

quantity of the salt killed another in one minute. These substances require farther investigation. They are certainly more energetic than they have been viewed by Dr. CHRISTISON. Dr. WESTRUMB detected this salt in the blood and in the viscera.

310. (*d*) *Cyanide of potassium* is a poisonous salt much used in electro-gilding and plating. It is a solid, sometimes a chalky-looking, at others a crystallized substance, and without odour until put into water, when it is freely dissolved, forming an alkaline solution, from which prussic acid is abundantly evolved. It is used medicinally on the Continent. Mr. MALAGUTI states that a dog was killed in a few minutes after taking less than three grains of the cyanide in solution, and that the largest dose that should be given to the human subject is five sixths of a grain. A person was killed at St. Malo by too large a quantity of it having been prescribed. Another person died at Breslau after fifteen minutes from taking a dose of a mixture containing fifteen grains of this substance. The symptoms were the same as those produced by the pure acid.

311. *n. Various vegetable substances contain hydrocyanic acid*, and are poisonous in consequence. The plants which have been found to yield hydrocyanic acid belong to the division *Drupaceæ*, of DE CANDOLLE's natural order *Rosaceæ*. They are the *bitter almond*, *cherry laurel*, *bird cherry*, *peach*, and the *mountain ash*. The poison is procured from these, according to Dr. CHRISTISON, in two forms: as an essential oil, and as a distilled water. The *distilled waters* yield hydrocyanic acid, and an essential volatile oil, which also retains much of this acid, which is peculiar, and which requires farther investigations into its constitution and effects; but I must refer the reader to Dr. PEREIRA's *Materia Medica*, where the subject is fully discussed. (See vol. ii., p. 1536.)

312. (*a*) *The volatile oil of bitter almonds*, and even the bitter almonds themselves, are poisonous, and owe this property to prussic acid, none of which, however, exists already formed in the kernel of the fruit, nor is it produced unless by the agency of water on the kernel. Even the mastication of the kernel produces the poison which destroys life. Mr. TAYLOR found that mere trituration of the almond kernel with water produced hydrocyanic acid. There are instances on record, wherein these almonds, when eaten in large quantity, have produced dangerous symptoms, and even death. The *volatile essential oil* is a most active poison; its deleterious action depending entirely upon the hydrocyanic acid which is intimately combined with it. Five pounds of the almonds are said to yield about half an ounce of the oil, and the quantity of anhydrous acid contained in it varies, according to Dr. CHRISTISON, from eight to fourteen *per cent*. It is thus at least four times as strong as the dilute prussic acid of the pharmacopœia. Sir B. BROWNE, happening to touch his tongue with a rod which had been dipped in this oil, suffered almost instantaneously an indescribable sensation at the pit of the stomach, feebleness of the limbs, and loss of power over the muscles; these effects being, however, quite transient, but sufficiently evincing the rapid propagation of the deleterious impression through the medium of the nervous system.

313. Several instances of poisoning by this oil are recorded; and some have been noticed by CHRISTISON, PEREIRA, and TAYLOR. The last of these writers adduces the following: A druggist swallowed by mistake half an ounce of "almond flavour." In half a minute he fell down in a state of syncope, his face being deadly pale, and his pulse imperceptible. After some time he rallied, and vomited some undigested food and bile strongly impregnated with the odour of bitter almonds. Delirium, with slight convulsions, came on. He then became sensible, and conversed upon his condition; but he again gradually relapsed into delirium, his eyes being prominent and brilliant. In a few minutes he again became sensible, and slowly recovered. The quantity of "almond flavour" which he had taken contained about half a drachm of essential oil. In a case which occurred to Dr. BULL of Hereford, seventeen drops of the oil destroyed the life of a woman aged forty-nine in half an hour. Mr. TAYLOR here justly remarks upon the disgraceful state of medical police and legislation in this country, in the fact of a most virulent poison being sold for the purpose of flavouring pastry and liquors; but Mr. TAYLOR cannot surely be ignorant that British legislation does not concern itself with means which either destroy or preserve human life, until public opinion or an overwhelming necessity compels attention to such matters, and then they become objects of disgusting jobbing and disgraceful traffic, the measures which they produce benefiting chiefly the subservient supporters of a political party, the members of a clique, the satellites of power, and the worshippers of mammon.

314. Even a very small dose of this oil may cause fatal effects. Mr. TAYLOR, among other interesting cases, gives the following: A girl about eight or nine years of age swallowed about a teaspoonful of "ratafia," composed of one part of the essential oil of bitter almonds and seven parts of spirit. About seven drops of the oil were taken. When seen immediately after the accident there were complete insensibility, closed eyelids, brilliant and glassy eyes, dilated pupils, quick pulsation of the carotids, no pulse at the wrist, relaxation of the muscles of the extremities, and rigid contraction of the muscles of the lower jaw. Cold affusion with stimulants, stimulating frictions, and emetics were employed. Vomiting was induced; the ejecta had a strong smell of prussic acid; and the child recovered. (SMITH, in *Lancet*, June, 1844.) In a fatal case of poisoning by this oil, no odour was perceptible about the mouth when the body was found; but upon inspection, a powerful odour of prussic acid escaped from the cavities. All the viscera were in a healthy state. (*Med. Gaz.*, April 7, 1843.) The vapour of this oil, although it may cause vertigo or stupor, is not likely to produce death unless it be inhaled for a considerable time.

315. (*b*) *Laurel water*—*Cherry laurel water*—is a very weak solution of prussic acid, containing about a quarter of a grain per cent. of the strong acid. In large doses it produces the usual effects of prussic acid. *Cherry laurel* was formerly much used for flavouring liquors and sweetmeats. Almost every part of the plant is poisonous, especially the leaves and kernels, but the pulp of the cherry is not. *Cherry laurel*



oil is a weaker poison than the oil of bitter almonds, and contains about three per cent. of the anhydrous acid. COULLON relates an instance of the death of a child from the application of the leaves to a large sore on the neck. The distilled water and the oil of this plant are poisonous when introduced into the rectum, or into the cellular tissue, or injected into a vein, and when thus employed, or when swallowed, they occasion giddiness, palsy, insensibility, convulsions, and death; thus acting in a similar manner to the pure acid.

316. (c) *Peach flowers and kernels, and the fresh young shoots of the plant*, are poisonous. COULLON adduces two fatal cases of poisoning with *peach blossom*. But the effects are different from those produced by pure hydrocyanic acid, as the peach blossom acts more as an irritant of the digestive canal, and causes, in addition to insensibility and convulsions, efforts to vomit, and violent purging. A medical man swallowed half an ounce of a liquid prepared by digesting gin on a large quantity of *peach kernels*. He became giddy, and had violent constriction of the fauces, and dimness of sight. He vomited and recovered. (TAYLOR.) There are other plants which yield a distilled water and an essential oil containing more or less prussic acid; but as these are not used, at least in this country, I shall only refer to Dr. CHRISTISON's excellent work respecting them.

[We have in this country the *Prunus Virginiana* (wild cherry), *Prunus nigra* (black cherry), and *Prunus Caroliniana*, all containing hydrocyanic acid; besides the *Amygdalus Persica*, or peach (its kernels, leaves, and flowers), *Sorbus* (mountain ash), &c.

The leaves of the wild cherry are often poisonous to animals, as calves and sheep, and birds are intoxicated by its berries. An oil may be obtained by distillation from the bark, which proves extremely destructive to animal life. Mr. PRAETER, of Philadelphia, supposes this oil, when purified, to be identical with the *hydruret of benzole* (purified oil of bitter almonds) of LIEBIG and MOHLER, and that its deleterious properties are due to prussic acid alone. Children have been known to be poisoned by eating freely of the fruit of the wild cherry. The symptoms observed have been vomiting, stupor, dilated and insensible pupil, loss of strength, small and frequent pulse, pale skin, clinched jaws, inability to speak or swallow, and cold extremities. Aqua ammonia is one of the best remedies in these cases, with mustard cataplasms to the stomach and extremities. Birds are sometimes intoxicated by this fruit, and easily caught. The bark of the black cherry has proved poisonous in several instances when infused in cider. The kernels of the peach are often distilled for the purpose of impregnating *cau de noyau*, which proves poisonous when taken in any quantity.]

317. o. *Treatment of Poisoning by Prussic Acid and its Compounds*.—(a) The remedy which is most efficacious in the treatment of the effects of these poisons is fortunately one which may generally be obtained without delay, namely, *cold water*, the *affusion of which upon the head, occiput, and nape of the neck* rouses the patient from his insensibility more rapidly than any other means. This treatment was first recommended by the author of this work in the *Lon-*

*don Medical Repository* for July, 1825. It then attracted no attention, and was not even noticed by any of his contemporary editors. Dr. HERBST, of Göttingen, however, in 1828, three years afterward, recommended the same remedy, and the recommendation was then noticed in the British medical journals. The author, however, asserted his prior claims in the ninth and tenth volumes of the *Medical Gazette*. Dr. HERBST made several experiments on animals to show the efficacy of this treatment, which has now been tested in many cases in the human subject. It is, of course, the more successful the earlier it is employed; but as long as respiration and the heart's action continue, it should be resorted to and repeated according to its effects. The presence of convulsions, or of general palsy in addition to insensibility, should not prevent the administration of it. Indeed, convulsions and spasms may furnish grounds for hopes of success from it; and in cases where the insensibility and general palsy have been extreme, the occurrence of convulsions or spasms has been indications of commencing benefit. The water should be about the temperature of spring water; should be made to fall in a full and large stream upon the head—the vertex, occiput, and neck, and be repeated at short intervals, according to its effects, and in a similar way to that advised by the author for poisoning by opium. (See *Lond. Med. Repos.*, vol. xviii., and hereafter.)

318. (b) *Ammonia* has been considered by many as the most energetic antidote. It was advised by Mr. JOHN MURRAY, and may be employed by inhalation, or in any other manner, according to the state of the case. When given internally, the strong *aqua ammonia* should be diluted with twelve parts of water. It is most advantageously employed when the patient is roused, or even partially roused, by the cold affusion; and then the *inhalation* of the vapour of ammonia, if properly managed, is more efficacious than the ingestion of the remedy, which may not be accomplished, or even attempted, when insensibility, convulsions, and spasms of the muscles of the jaws are urgent.

319. (c) *Chlorine* has also been advised as an antidote for this poison by RIAUX, BUCHNER, SIMEON, COTTEREAU, and VALETTE. ORFILA considers it the most efficacious antidote of any hitherto advised. Unfortunately, the patient may be dead before the antidote can be procured in almost every instance in which it will be required. The excellence of a remedy will avail the patient but little when it cannot be procured, or when he is no longer capable of breathing or swallowing it when it reaches him, even when it has been procured with the utmost rapidity.

320. The means, therefore, upon which confidence may be placed are the cold affusion, the inhalation of the vapour of diluted ammonia, or of chlorine, when it can be obtained in time, and the ingestion of stimulants. As this poison is usually taken with a suicidal intention, an excessively large dose is generally swallowed; and this excessive quantity often precludes success from any of the means already mentioned, or from any other. The immediate evacuation of the stomach by the stomach-pump, or the administration of a zinc emetic, conjoined with cordials and stimulants, as cap-

sium, &c., ought not to be overlooked. As this poison and its compounds cause congestion of blood within the cranium, blood-letting or cupping on the nape of the neck may prove most beneficial in some cases, where this effect appears most urgent, and the habit of body admits of this practice. But it should not be overlooked that blood-letting may accelerate the absorption of the poison; and therefore the stomach should be emptied in the first place, if it be considered that much of the poison still remains in it.

321. *H. ZINC—OXIDE OF.*—This substance is not productive of serious effects even when taken in large quantity. Owing to its insolubility, its absorption must be slow. When taken internally for a long time, it acts as a slow poison, and produces a *tabes sicca*. A gentleman, for the cure of epilepsy, took daily twenty grains of the oxide, until he had consumed 3246 grains, which must have been a course of five months' duration. At the end of this time he was pale, wasted away, almost idiotic, and the surface of an earthy hue. His tongue was thickly coated, the bowels constipated, the inferior extremities cold and oedematous, the abdomen tumid, the superior extremities cold and shrivelled, and the skin dry like parchment; and the pulse about sixty, thready, and almost imperceptible. Under the use of purgatives, a light, nutritious diet, and tonic and diuretic medicines, he rapidly recovered; but still remained subject to epileptic attacks.—(*Brit. and For. Med. Review*, July, 1838.)

322. *I. THE VAPOURS OF ETHER, [OF CHLOROFORM], AND OF ALCOHOL*, when inhaled into the lungs until they are imbibed by the blood circulating in the bronchial surface and lungs, produce a paralyzing influence upon the cerebro-spinal nervous influence, the vapours of the ethers paralyzing or altogether suppressing sensibility; and the vapour of alcohol affecting more especially voluntary motion, or both voluntary motion and sensibility.\* Owing to these effects, the consideration of these agents might have fallen under the present class; but I shall notice them more particularly under the class of *stupefying or narcotic poisons*.

323. *CLASS III. EXCITANTS—STIMULANTS—EXCITING AND EXHAUSTING POISONS.*—There are various substances which are simple excitants or stimulants, as respects either the nervous influence or vascular action, and which, when taken in moderation, are in no way injurious, unless a too frequent recourse be had to them. If, however, those be administered in excessive doses, they may produce injurious or even fatal results, owing either to excessive stimulation or to its consequences, especially exhaustion, congestion, effusion, and other changes in vital organs. Fatal effects, however, from most of the substances comprised in this class, are comparatively rare; and when they produce these effects, they operate more or less upon, or through the medium of the blood; and thereby seriously affect the functions of the brain, heart, and lungs. It is not improbable that certain

excitants may act so energetically upon the nervous system, and, through them, upon the vitality of the frame, as rapidly to exhaust or destroy the influence of these systems, and vitality in all its manifestations. An intense electric shock, or lightning, may produce this effect; and we may conceive a shock from a galvanic battery of such violence as immediately to occasion the same result. In these cases the agent acts upon and through the medium of the nervous systems, although the blood and vascular system, and the muscular structures, may manifest the chief or only lesions.

324. *i. ALCOHOL—spirits of wine, spirituous liquors*, such as *gin, whisky, brandy, rum, and arrack*, have been taken in so large quantities as to produce not merely intoxication, but even death, in a few hours. The poisonous operation of alcohol has been ably investigated by Dr. CHRISTISON. In the article *DRUNKENNESS*, I have described the slowly-developed effects and ultimate results of habitual drunkenness; and the articles *DELIRIUM TREMENS* and *Granular Degeneration of the Kidneys* are illustrations of certain other forms of slow or chronic poisoning by spirituous and other intoxicating liquors. It will be necessary for me, therefore, at this place to notice only the more acute forms of poisoning by alcohol and its compounds.

325. *A. The symptoms* of the more acute states of poisoning by alcohol are, violent excitement of the nervous functions, and of the passions or emotions; flushed face; excited vascular action, followed by giddiness; confusion of thought; various mental affections, varying with the character of the individual; delirium; dozing, passing into profound somnolency, which, after several hours, is interrupted by headache, sickness, vomiting, and terminates in a heavy or stupid headache, giddiness, or nervous exhaustion. Such is the more favourable course of severe intoxication; but a more unfavourable result may accrue, either during the stage of vascular excitement, or in the following period of congestion, the somnolency deepening into profound coma, terminating in death. Dr. CHRISTISON furnishes the following illustrations of this state of poisoning: Two brothers drank in half an hour three bottles of porter, into which twenty-four ounces of whisky had been secretly mixed by a companion in order to intoxicate them. In the course of drinking, both became confused; and fifteen minutes after finishing the last bottle one of them fell down insensible, and had no recollection of what happened for twelve hours; but he recovered. The other staggered a considerable distance for an hour, and then became quite insensible. In four hours he was comatose; the breathing stertorous and irregular; the pulse eighty, and feeble; the pupils dilated and not contractile, and deglutition impossible. He remained in this state till his death, which took place fifteen hours after this debauch.

326. In this state of acute alcoholic poisoning, an apoplectic tendency may be developed into a true *apoplectic seizure*; and the usual appearances of apoplexy be found within the cranium after death, this seizure occurring either in a simple form, or associated with paralysis, especially hemiplegia. This result takes place either during the somnolent stage—this stage passing into profound coma—or a partial re-

\* We regard the effects of ether and alcohol, when inhaled in the form of vapour at least, as exactly identical, and both occasioned chiefly by the carbon and hydrogen which enter so largely into their composition, combining with the oxygen of the blood, thus substituting carbonic acid and water for the stimulating portion (oxygen) of the vital fluid.]



covery from somnolency occurs, and apoplexy, either gradually or suddenly, appears after the effects of intoxication have nearly or altogether passed off. An individual reached his home in a state of intoxication; he became lethargic, and died in the course of twenty minutes. On examining the body, Dr. ALISON could not discover any morbid appearance, except some watery effusion in the ventricles and on the surface of the brain. The contents of the stomach had a strong smell of spirits. This case, however, presents a more rapid course than is usually observed when intoxication passes directly into coma and apoplexy. A man drank thirty-two ounces of rum in the afternoon, and was comatose most of the ensuing night. Next morning, although very drowsy, he was sensible when roused; and in the evening he was convalescent. But, two days afterward, he became delirious, and in two days more comatose and apoplectic. No other morbid appearances than congestion were found in the brain.

327. In some instances, the lethargy and insensibility caused by acute intoxication are attended by *violent convulsions*, which have presented either an hysterical or an epileptic form. I was called to a female who had drunk a large quantity of spirits in a short time. She was muscular and robust, violently convulsed, unconscious, and occasionally she uttered the most distressing screams. Recourse was had to the cold affusion on the head, the convulsions assumed more of the hysterical character, and the coma was diminished and soon ceased. In another case, also of a robust female, whom I attended with Mr. LAMBERT, convulsions of an epileptic character appeared during the insensibility caused by the ingestion of a large quantity of spirits. When I saw her the symptoms were exactly those of a violent epileptic attack, and, as in the former case, characterized by the strong smell of spirits. The convulsions continued for a long time, and then passed into violent phrenitic delirium, which was not removed for several days; but recovery, complete and lasting, followed cold affusions and copious local depletions. A medical student, after drinking four bottles of Champagne, during and after dinner, besides some other wines and liquors, became phrenitically delirious. Violent convulsions supervened and recurred at intervals, during which the phrenitic symptoms continued. I saw him about thirty hours after his debauch; the maniacal delirium, and the brief attacks of convulsions, recurred almost hourly, attended by the most intense indications of vascular determination to the brain and its membranes. The treatment about to be recommended was adopted, and he recovered.

328. *B.* A still more acute state of poisoning than the above, by alcoholic liquors, is sometimes met with. When these liquors are swallowed in large quantity, in a very short time, there is seldom much preliminary excitement. Coma occurs in a few minutes, and gradually assumes an apoplectic character. The face is livid or pale, sometimes ghastly; the breathing stertorous, and with a spirituous odour; the pupils dilated and insensible, sometimes contracted; and death often takes place in a few hours. Tetanic convulsions occasionally appear in this form, although not so frequently as

in the preceding. Instances of this rapid form of poisoning have been recorded by ORFILA, BEDINGFIELD, MARX, and others. Dr. CHRISTISON mentions an instance of a man who drank at once a bottle of whisky. He died in four hours with symptoms of pure coma.

329. The effects of alcoholic liquors are greatly heightened, and often to a fatal extent, by exposure to cold either after or during the ingestion of the poison; and intoxication and insensibility more rapidly result. This is owing not only to the sedative influence of cold, but also to the partial or complete arrest of the excretion of the spirituous vapour by the lungs and skin. Most of the accidental deaths which have occurred in this country from exposure to cold during intemperate weather have been caused by a too free use of spirituous liquors just previously to such exposure, insensibility, coma, and death supervening.

330. Numerous instances have occurred, especially in this metropolis, of various liquors containing alcohol, especially malt liquors, having been made the vehicles of other poisons, and given with the intention of robbery or murder. The poisons thus administered have been usually opium or prussic acid, especially the tincture of opium. Such cases may be recognised by the fact that the effects are of a much more severe character than could result from the quantity of alcoholic fluid which had been taken. In these cases it is often very difficult to decide whether the symptoms are caused more by the alcoholic liquor than by the poison with which it was drugged.

331. *C.* The appearances observed after fatal acute poisoning by alcohol consist chiefly of increased vascularity of the internal surface of the stomach, sometimes with ecchymoses, the villous membrane presenting either a bright red, or a dark brown, or some intermediate hue; of congestion of the brain; of an increased quantity of fluid in the ventricles and between the membranes; and sometimes of effusion of blood in the substance of the brain, or between the membranes, or of a bloody serum in the latter situation. When death takes place rapidly, a strong odour of spirits may be perceived in the contents of the stomach; and in less rapid cases this odour has been said to have been perceived in the serum effused within the cranium; but this may not be felt if some time has elapsed before the inspection has been made (See art. DRUNKENNESS, § 8.)

332. *D.* The quantity required to destroy life cannot be determined. Much depends upon the age, habits, &c., of the individual, upon the state of the stomach, and upon the treatment. Young persons, not accustomed to spirits, may be killed by a comparatively small quantity. Mr. TAYLOR adduces the following: A boy, aged seven years, swallowed three ounces of brandy; shortly afterward he was observed to stagger. He was sent to bed, and vomited violently. In about four hours he was in a profuse perspiration, and his head, face, and neck were very red. Half an hour afterward he was found insensible, strongly convulsed, and the skin cold. He died in about thirty hours. Addiction to spirituous liquors often enables the system to tolerate a large quantity without much effect. A large, powerful young man, thus addicted, in the presence of the author

swallowed for a bet a bottle of rum within half an hour. He was hardly affected by it. A full stomach previously to the ingestion of spirits also affords a greater tolerance of this poison.

333. *E.* The *period* which elapses from the ingestion of the spirits until death occurs also varies with the circumstances just mentioned. Mr. TAYLOR states that the shortest period which he has seen reported occurred in a case of a man who swallowed a bottle of gin for a wager. In a quarter of an hour afterward he became intoxicated, and soon after that insensible, and died in *half an hour*, although a large quantity of the spirit had been removed by the stomach-pump. Dr. CHOWNE adduced an instance of a boy, aged eight years, who was found insensible half an hour after having taken about half a pint of gin. The liquid drawn off his stomach seven hours afterward had no odour of gin, nor was the odour of it perceptible in his breath. He was insensible and motionless; the limbs relaxed and powerless, the face pale, and the surface cold. The pulse was quick and feeble. He died, without rallying or recovering consciousness, *sixty-seven* hours after taking the poison. On *inspection*, the brain was found healthy. There were slight effusion of serum, and distention of the veins of the pia mater. The stomach was pale. No exact *period* can be assigned for the fatal termination of the effects of this poison, this termination depending chiefly upon the absorption of the spirit into the circulation, and upon the rapidity and extent of the absorption; the quantity accumulated in the blood, especially when the kidneys, lungs, and skin do not rapidly excrete it, suppressing the cerebral functions and impairing the irritability, and ultimately arresting the action of the heart.

334. *F. Treatment.*—The contents of the stomach should be withdrawn by the stomach-pump as speedily as possible; and the cold affusion ought to be resorted to immediately, in order to remove the symptoms of intoxication, or the insensibility or coma which may have already appeared. Previously to 1822, the treatment of dangerous cases of poisoning by alcoholic liquors, as well as those by narcotics, was not understood, and was certainly far from being successful. In July of that year, cases demonstrating the good effects of the cold affusion on the head in poisoning by these agents, were published by Mr. WRAY and myself (*Lond. Med. Repos.*, vol. xviii.); and the efficacy of the practice in cases of poisoning by spirits has been vouched for by Dr. OOSTROM in an able memoir on intoxication. He states that, where the temperature of the head is steadily high, and that of the surface not much reduced, it is a safe and efficacious remedy.

[We have resorted to this treatment with the greatest success, by turning a stream of cold water upon the head from a pitcher for a considerable time; in this way vomiting will often be brought on, and the patient relieved from all symptoms of intoxication.]

335. Having removed the contents of the stomach and used the cold affusion, the liquor ammoniæ acetatis with the ammonia in excess should be freely given in camphor water. Cases are comparatively rare which admit of blood-letting or even of local depletions. In young, robust, and plethoric persons not ac-

customed to intoxication, and when the affection of the brain is of a phrenic character, then vascular depletions are often required; but they should be resorted to with caution, and their effects carefully watched. When the insensibility and coma are profound, and when they resist the cold affusion on the head, the liquor ammoniæ acetatis, with the carbonate of ammonia and camphor water, should be given; and if deglutition cannot be effected, they ought to be conveyed into the stomach by the stomach-pump, or administered in enemata. Warmth, and the promotion of a free perspiration, are always beneficial. In other respects the treatment is the same as described in the articles DRUNKENNESS, and DELIRIUM WITH TREMOUR; the more *chronic states* of poisoning by alcohol being there discussed, especially under the former of these heads.

336. ii. THE ETHERS—especially the *sulphuric*, the *nitric*, and *hydrochloric*—may occasion dangerous or fatal effects when taken in excessive quantity, or when their vapours are too long *inhaled*.—*A.* When taken into the stomach, the operation of the ethers is analogous to that of spirituous liquors. M. ORFILA performed several experiments with them on the lower animals; but as these were accompanied with placing ligatures on the œsophagus, little importance can be attached to the results. I am not acquainted with any dangerous effects which have occurred from swallowing any of these ethers; and I believe that they may be taken in larger doses than they are usually prescribed, and be productive, in certain states of disease, of much benefit.

337. *B.* The *inhalation of ether*, especially the sulphuric, has lately come into vogue for the abolition of sensibility, in order that surgical operations may be performed with comfort, and even pleasure, to the patient. But it appears doubtful to me, after witnessing several instances of the inhalation of ether, whether or not the risks contingent on it do not more than compensate for the escape from pain during an operation.\* The inhalation of ether to the extent of annihilating, even for a short period, the sensibility, must necessarily be attended by changes in the nervous system; and even in the blood, otherwise a most important function—and one presiding over and directing all our animal functions—could not be entirely subverted for a time; and it may be inferred *à priori* that congestions of the brain and medulla oblongata, congestions and inflammations of the bronchi and of the lungs, and alterations of the blood, especially as regards the red globules and fibrin, will result from the passage of so large a quantity of ether into the circulation as is usually required to produce insensibility; and I believe that these results have actually accrued already, in some instances, from the practice; and that, although matters may have

[\* As ether has been employed thus far, we believe this remark perfectly just; but it remains to be proved whether ether may not be used, like other medicinal agents, with such prudence and caution that its benefits may preponderate over its evils. Its use, as well as that of chloroform, is at least justifiable, where, in severe operations, the danger of sinking, from the shock of the operation, is greater than that from inhaling these powerful agents—presuming, of course, that they prevent the shock, which is generally conceded. In the ordinary operations of dentistry and minor surgery, they should, in our judgment, be entirely abandoned.]



proceeded favourably as respects the operation, congestive bronchitis or congestive pneumonia has nevertheless been developed by it; while the absorption of purulent matter, and the occurrence of phlebitis, after great operations, have been favoured by it, by lowering the general amount of vital resistance, by affecting the constitution of the blood, and by weakening the tone of salutary vascular reaction.

338. The attempts recently made to introduce the *inhalation of ether* into general practice for the alleviation of the *pains of parturition*, as well as for trifling operations and unimportant occasions, are fraught with some danger; and I am confident that a farther experience will prove my predictions to be correct. I may here explicitly state what the danger is, as regards the *puerperal state*; namely, the supervention of *convulsions*, of *hemorrhage*, *maniacal delirium*, *puerperal fevers*, sinking of nervous power in various ways, but especially in the form of *cardiac syncope*, and inflammations of the *respiratory organs*, or of the *brain*.

339. Instances were, a few years since, published of a druggist's maid-servant having been found dead in bed, owing to the air of her apartment having been loaded with the vapour of nitric ether by the breaking of a jar containing a large quantity of this substance. She was found lying on her side, with her arms folded across the chest, the countenance and posture composed, and her whole appearance that of a person in deep sleep. The stomach was found red internally, and the lungs were gorged. The brain was not examined. A young man was found completely insensible from breathing air loaded with sulphuric ether, and remained apoplectic for some hours. I am acquainted with an instance of similar effects having accrued, from the vapour of strong spirits having been inhaled while the person was transferring the contents of a large cask into bottles.

340. C. The *treatment of insensibility* caused by ether is not materially different from that produced by ardent spirits. The cold affusion on the head and neck is the most to be confided in, if the case be in any way alarming.

[To this should be added external revulsives, as mustard, &c., and internal stimulants in the form of ammonia, camphor, &c. Exposure to fresh air, and friction, are by no means to be neglected.]

341. iii. CAMPHOR.—There are few substances the action of which is more variable, according to the dose, the mode of exhibition, state, and constitution of the patient, &c., than camphor. Hence its operation has been differently described, and its employment in disease has not been always judicious or beneficial. Having been in the habit of prescribing it, often in large doses, in various dangerous diseases, I was induced, on two occasions, to take a considerable quantity, in order to ascertain its effects from my own sensations; and on several other occasions I have taken smaller doses. These experiments were made chiefly in 1823 and 1824, and the results were published in the *London Medical Repository* for September, 1825.

342. A. The *vapour of camphor* is injurious to insects; and when long inhaled by man, it

occasions headache, pallor of the countenance, slight irritation of the respiratory mucous surfaces, followed by slight reaction of the circulation, especially in the brain and lungs. *Locally*, on the *denuded dermis*, or on the *mucous surfaces*, it appears to impress the nerves of the part; and, after rendering the part at first pale, it increases capillary injection and redness, and develops moderate vascular reaction in it. Whether applied to the skin denuded of its cuticle, or taken into the stomach, or injected into the rectum or other mucous canals, camphor is readily *absorbed* into the circulation, and is eliminated from it chiefly by the lungs and skin, and not perceptibly by the urinary organs, although it is believed to affect those organs.

343. B. The *primary action* of camphor is exerted chiefly through the medium of the nervous system; but *consecutively*, and as it becomes *absorbed* into the circulation, its action is more fully manifested on the brain, on the heart and vascular system, and on the lungs, especially on the bronchial mucous surface, as it is eliminated by the respiratory organs from the blood. The following are the results of my experiments with this substance, above alluded to (§ 341).

344. Camphor produces effects varying with the dose, and the period which elapses from the administration of it. When taken into the stomach, triturated with oil, or divided minutely by means of mucilage, magnesia, &c., fifteen grains produce the effect of half a drachm given in the form of pills or bolus, or less minutely divided; and this latter quantity sometimes produces, especially when the stomach is empty, and taken in oil or much diffused in mucilages, &c., and in certain constitutions, very severe effects. Given, therefore, in doses of from fifteen to thirty grains, diffused in mucilage, it produces the following effects, which, as they are progressively different, may be divided into *three stages*.

345. a. In the quantity just mentioned, camphor occasions a peculiar sensation of heat and constriction in the throat, and along the œsophagus as it is swallowed, followed by a similar feeling, attended by slight anxiety, at the epigastrium and region of the stomach. The sensations of internal heat and of constriction in this situation continue for some time, and are attended by slight thirst, a more constricted and slightly accelerated pulse, and a colder state of the extremities. The surface of the body also becomes cooler, and a sense of chilliness and of coldness, greater than the actual loss of temperature, is produced; yet there is, at this time, a feeling of internal warmth and excitation, as if the energies of more remote parts were drawn towards the stomach. To these sensations are added pallor of the countenance, vertigo, pindiculation or slight rigours. The head is cool, the action of the carotids somewhat diminished, and the respiration slow or natural.

346. b. In from one to two hours, the constriction and diminished action of the surface and extremities have passed off, and replaced by more or less reaction and determination of blood to the head and periphery of the body. The pulse becomes fuller and stronger; animal heat is increased; the features are more de-

veloped, and the colour returns or is increased; the vertigo, pandiculation, chilliness, and rigours having disappeared. Shortly afterward, headache, flushed face, excited pulse, sometimes noises in the ears, various but slight affection of sight, watchfulness or slight mental excitement, or delirium and disturbed sleep, in some instances, are experienced.

347. *c.* These effects having continued a few hours, the excitement of the pulse and of the brain subsides; the heat of the skin passes into a free perspiration; the pulse becomes slower and softer, and a refreshing sleep terminates the headache and slight disturbance of the brain and organs of sense; and the nervous and muscular systems remain composed. These are the usual effects of a large dose (from fifteen to thirty grains) of this substance upon a healthy person, when it is not repeated. Where smaller quantities are taken every four, or five, or six hours, the effects constituting the second stage are chiefly manifested to an extent in proportion to the amount of the doses. When dissolved in oil or in spirits, it appears to act with greater activity, and to be more readily absorbed into the circulation, where, if the dose be large, or if the doses are repeated at short intervals, it acts energetically upon the nervous system, over-exciting the brain, and causing maniacal delirium, and even convulsions and death. It seems also to possess antiseptic properties.

348. *C.* The *smallest quantity* which has produced symptoms similar to the above, calculated by their severity to cause alarm, is *one scruple*. I have often, however, given this quantity, and repeated it a second and a third time at intervals of six and eight hours, with marked benefit, in low and malignant states of fever. When given in an enema, and in a state of minute division, it often acts with great rapidity, and sometimes with great severity. Dr. CHRISTISON adduces a case where half a drachm was thus administered, and severe nervous symptoms were produced. I have often prescribed as much as this, but never more, in an enema, for insensibility or profound coma, and either alone or with asafetida; and it has sometimes been efficacious, but never injurious. In a case of most profound and protracted coma, in which deglutition was abolished, to which I was called with Mr. KINGDON and another practitioner, this substance, administered in an enema, in a very large dose, roused the patient, and procured ultimate recovery. Mr. TAYLOR adduces a case by Dr. SIEMERLING, in which a man, aged sixty-nine years, swallowed *two drachms* for the relief of rheumatism. Three hours afterward he resembled a drunken person. He complained of burning heat in the throat and stomach, of throbbings in the head, and pains in the course of the spine; of ringings in the ears, and dazzling light before his eyes. To these succeeded subsultus tendinum, and insensibility, and profuse perspiration. This last state was, however, of short duration; and he slowly recovered.

349. Dr. WENDT mentions a case in which eight scruples were taken dissolved in spirit, the *largest dose* hitherto mentioned. Vertigo, dimness of sight, delirium, and burning pain in the stomach, but no vomiting, were the only

symptoms. The man who took this quantity was an habitual drunkard; but he recovered. I have often found that drunkards may take large quantities of this substance without producing any unpleasant symptom; and I have given it in very large doses (from ten grains to one scruple) with opium for the delirium of drunkards, with marked benefit.

350. *D.* The *appearances* occasioned by poisonous doses of camphor have not been observed in man. According to the experiments of ORFILA and SCUDERY, the mucous membranes of the stomach, duodenum, and urinary organs were inflamed, and the membranes of the brain injected. The other appearances were less constant. All the cavities had a strong smell of camphor.

351. *E. Treatment.*—When the effects of camphor are not very severe, they soon pass off. But when they become alarming, whatever of this substance may still remain in the stomach should be removed by an emetic or by the stomach-pump, and demulcents with opiates, or henbane, or poppies, and the cold affusion on the head, or the shower-bath, ought to be resorted to, if maniacal delirium supervene. If convulsions or insensibility appear, the cold affusion, injections with asafetida or ammonia, and other stimulants may be administered. If strangury occur, demulcents and emollient enemata are generally of the greatest service.

252. *iv.* CHELIDONIUM MAJUS and C. GLAUCIUM produce inflammation of parts to which they are applied; but they appear to be partially absorbed, and to act upon the nervous system, causing delirium in cases where they have been partaken of by mistake. In M. ORFILA's experiments, they occasioned remarkable congestion of the lungs, whether taken into the stomach or applied to wounds.

353. *v.* HEAT, in its various forms and appearances, may be very briefly considered under the present category, as it may become more or less rapidly injurious, or even destructive of life.—*a.* *Atmospheric heat*, or the *temperature of an apartment*, may be so high as to interfere with the respiratory functions; to impede the decarbonization of the blood; to excite, and ultimately to exhaust, the nervous energy; to change the state of the blood; and, lastly, to disorder all the excreting functions, and to arrest the vital actions. When, with a high range of temperature, the living body is exposed to a stagnant state of the air, when there is not a sufficiently rapid renewal of the atmosphere, then the noxious effects are produced with a rapidity co-ordinate with the degree of atmospheric stillness; and asphyxia is produced with proportionate celerity. But when the elevation of temperature is not so great, although still high, nor ventilation so imperfect, then the deleterious changes are less rapid, and assume a slow form, inducing various *chronic affections*, more especially of the liver, stomach, and bowels, and often also of the spleen. Fatty liver, various states of enlargement and chronic change of this organ, bilious fever, &c., are not infrequent consequences of this cause, and very frequently occur, even among the inhabitants of cold regions, who shut themselves up in close apartments, warmed by stoves, during the cold seasons.



354. It is important to remark, although the circumstance must be obvious, that the air, when raised to a high temperature by the usual means resorted to in factories—by heated air, by steam, or hot water transmitted through metal pipes to different parts of the building—readily becomes stagnant, and that due ventilation is with difficulty preserved in connexion with this mode of warming, although the great numbers of persons usually employed in these places require a more than usually rapid renewal of the air. The consequences are, that the persons there employed rapidly vitiate, or even poison the air which they breathe, independently of any deleterious miasm which may be generated by the articles, materials, apparatuses, or appliances used in these manufactories.\*

355. *b. Warm Baths, Vapour Baths, Fumigating Baths.*—Medicated baths, and various natural warm or mineral baths, although beneficial when appropriately resorted to, may nevertheless become, owing to their exciting and exhausting influence, most deleterious in various states of the system, even in health, and still more so in several diseases. What is a most successful medicine when judiciously employed, becomes either a rapid or a slow poison when it is not appropriately prescribed.

356. Heat applied to the external surface in such excess as to produce scalds or burns, especially when an extensive surface is implicated, is productive of danger or death, not so much by the extent or severity of the local injury, as by the sympathetic development of inflammation of mucous or serous surfaces and its consequences.

357. *c.* The injury produced by swallowing hot or boiling fluids is dangerous or fatal, according to the amount or seat of local lesion. When the fluid is of a temperature as high as 200° or 212°, it rarely gets lower than the upper part of the gullet, and the injury is generally limited to the pharynx, epiglottis, and larynx. Accidents sometimes occur from drinking hot or boiling water from a teapot or kettle; and Dr. M. HALL has adduced the accounts of four such which occurred to children; and in all *cynanche laryngea* was produced. Two of these cases terminated by suffocation, one was relieved by tracheotomy, but died soon afterward, and the fourth recovered after having been nearly choked. (*Trans. of Lond. Med. and Chirurg. Soc.*, vol. xii., p. 1.)

358. *vi. A.* IPEACACUANHA has been considered by some as an irritant, and by others as an acronarcotic; but, strictly speaking, it cannot be viewed as either—not as an irritant, as it does not irritate or inflame the capillaries of the surfaces to which it is applied; nor as a narcotic,

for it does not stupefy. Its impression is primarily upon the nervous organization of the part to which it is applied, and is rapidly followed by muscular contraction or reaction, when the quantity of the substance is such as to produce an impression sufficiently strong to develop this effect. The susceptibility of the influence of this substance is remarkably great in some persons—so much so as to occasion the most distressing effects. When this susceptibility is great, even the presence of a few grains of ipecacuanha in the same apartment as the person thus constituted is sufficient to produce a sense of suffocation, tightness in the chest, nausea, depression, or faintness, or other disorder, varying with the idiosyncrasy of the individual; but the most frequent affection is one resembling asthma. I have met with several persons who are thus affected by the odour of ipecacuanha, or by the impalpable powder of this substance, when any of it is inhaled; and seen two instances of most distressing suffering produced by it. It is not unusual, also, even when this susceptibility of the effluvium of the drug does not exist, to meet, in the course of medical practice, with persons upon whom very minute doses of any of the preparations of ipecacuanha produce more or less distress, especially nausea, retching, and depression.\*

359. *B. Emetia [or Emetina].*—The active principle, or alkaloid of ipecacuanha, whether taken into the stomach or applied to a wound, occasioned, in the experiments of MAGENDIE, death after some hours, preceded by vomiting and coma, the lungs and stomach being found inflamed.

360. *C. Treatment.*—It is rarely that any thing more than time is required to remove the effects of ipecacuanha; for an over-dose of it is prevented from becoming injurious by its immediate rejection from the stomach. It is chiefly when, owing to idiosyncrasy, its more distressing effects are produced, that treatment is requisite. In the cases which I have treated, an open, free, and warm air, camphor with henbane taken in demulcents, and a warm mustard poultice applied over the lower part of the sternum and the epigastrium, soon removed the disorder. When nausea, retchings, and depression occur from small doses of this substance, or when the operation of it becomes exhausting or too prolonged, then small doses of ammonia and creasote, or this latter in an aromatic and emollient draught, will afford relief.

361. CLASS IV.—EXCITING AND CONSTRICTING POISONS.—*Nervous and Muscular Excitants.*—Although numerous medicinal substances act more especially upon both the nervous and the muscular or contractile systems, yet there are comparatively few of them which act so violently upon these systems as to produce death, unless they are employed improperly in the treatment of diseases, and aggravate existing morbid conditions, by interrupting the salutary efforts of nature, and by arresting or preventing the evacuation of hurtful or contaminating matters. Several substances, while they more or less excite the nervous and contractile tis-

\* [The present mode of warming apartments by means of close and air-tight stoves is, for the same reason, highly injurious, and ought to be abandoned, and either the open grate, the Franklin stove, or fireplace substituted. In a late visit to the Massachusetts General Hospital, we were exceedingly gratified in finding cheerful fires in open fireplaces in the different wards, although the building is chiefly warmed by heated air. We were informed by Dr. WARREN that, since open fires had been introduced, erysipelas, which was formerly a frequent disease in the hospital, had entirely disappeared. Wounds, also, sooner healed, and patients recovered more speedily from accidents and other diseases; puerperal females, also, had a more rapid convalescence, and altogether the effects were in the highest degree beneficial. We trust that the same mode of ventilation will be introduced into our other hospitals, and that more attention will be paid to the subject in all our public and private buildings, especially school-houses and churches.]

\* [The late Dr. URIAH TURNER of this city, a gentleman of high nervous temperament and great genius, and who was liable to severe attacks of asthma from inhaling the smallest quantity of the odour of ipecacuanha, fell a victim to an attack of this kind, induced by swallowing a few ipecacuanha pills by mistake.]

ues, become materially or chemically combined with the parts with which they are brought into contact, more especially with mucous membranes, by which they are readily imbibed. Tannin, gallic acid, and the gallates, krameria, alum, kino, catechu, solutions of several of the mineral salts, &c., while they excite nervous and contractile parts, and thereby produce a tonic effect, are partially imbibed by, or combined with, the tissues to which they are applied; and although this latter operation is not very manifest in the living textures, it is sufficiently demonstrated in dead animal matter, which is thereby preserved from decay for longer or shorter periods. The constricting influences of these and of similar substances are displayed more upon the exhaling and secreting surfaces to which they are applied than upon remote structures and organs; but when the quantity is more considerable, or when the dose is often repeated, they are then more abundantly imbibed and absorbed into the circulation, and act more or less energetically upon the nervous centres and contractile parts. Most of these substances, however, are not poisonous unless they are taken in excessive quantities, or are employed inappropriately in certain states of disease.

362. But there are some of them which are among the most virulent poisons in nature, and are exceeded only by prussic acid in their poisonous influences. These substances act chiefly by exciting the nervous systems, the excitement being propagated to the spinal cord, and reflected thence upon the muscular system, the irritability of contractile parts being inordinately excited, and being followed by various consequences, according to the persistence or the exhaustion of the excitement, and to the parts more especially affected. These substances generally increase the sensibility, and in this respect chiefly they differ from narcotic or stupefying poisons. They do not paralyze or diminish muscular contraction, but, on the contrary, inordinately excite this function, so as frequently to become incompatible with the continuance of life, tetanic asphyxia being often the more immediate cause of death. They produce no visible change in the tissues to which they are applied, or in the alimentary canal; or, if any change is observed, it is accidental, not necessarily connected with the operation of the poison, and insufficient to account for any portion of the phenomena or symptoms they produce. They act chiefly by being absorbed, and through the medium of the circulation, upon the nervous centres, more especially upon the spinal cord; and they owe their activity to an alkaloid principle which is poisonous in an extremely small dose.

363. i. ALUM.—*Sulphate of alumina and potash* can hardly be considered as a poison, although it may prove injurious when taken in very large quantity or in various disorders. It acts as an excitant and astringent, and is absorbed into the circulation; whence it is excreted chiefly by the kidneys. Its beneficial operation in lead colic is owing to its exciting the organic nervous and muscular structures of the digestive canal. M. ORFILA has detected this substance in the stomach, liver, spleen, and urine.

364. ii. NUX VOMICA—STRYCHNIA, &c.—Several species of the genus *Strychnos*, namely, *S.*

*nux vomica*, *S. Sancti Ignatii*, or St. Ignatius's Bean, *S. Colubrina*, *S. Guianensis*, *S. Ticuté*, which yields the *Upas Ticuté*, an Indian poison, &c., are extremely active poisons, and owe their activity to an alkaloid principle which has been called *Strychnia* or *Strychnine*. This substance has an intensely bitter taste, perceptible even when one grain is dissolved in 80 lbs. of water. It is sparingly soluble in water, but more abundantly in alcohol and the volatile oils. It exhibits an alkaline action, and forms neutral and crystallizable salts with the acids. Dr. CHRISTISON killed a dog in two minutes with one sixth part of a grain injected in the form of an alcoholic solution into the chest. He has seen a wild boar killed in the same manner with a third of a grain in ten minutes. There is little doubt that half a grain introduced into a wound might kill a man in a few minutes. It acts most rapidly and energetically when a solution of it is injected into a vein.

365. A. The symptoms produced by strychnia are uniform and striking, when this substance is applied in a large, poisonous dose. The animal is at first agitated, and is soon afterward seized with startings and stiffness of the limbs, which increase until it is attacked with a fit of violent general spasm, in which the head is bent back, the spine stiffened, the limbs extended and rigid, and the respiration checked by spasm of the respiratory muscles. An interval of calm succeeds, during which the sensibility is generally more than usually acute, and the senses unimpaired; but another paroxysm soon follows, each successive attack being more severe, and the intervals shorter, or less marked, until at length the severity of the fit, and the duration of the spasm of the respiratory muscles, terminate in suffocation. Dr. CHRISTISON has observed the first symptoms of this poison in from 60 to 90 seconds after the application of it to a wound; and 45 seconds after its injection into the pleura. MM. PELLETER and CAVENTOU have seen them appear after 15 seconds, when injected into this cavity. M. BOUILLAUD says that it has no effect when applied directly to a nerve.

366. B. As to the quantity of strychnia likely to destroy life, much will depend upon the mode of application, and its administration in a dissolved or undissolved state. There is no doubt that one half, or even one third of a grain, when dissolved and injected into a vein, would be sufficient to destroy a man. Three eighths of a grain given medicinally produced violent tetanic convulsions, spasms of the extremities, trismus, opisthotonos, spasmodic contraction of the respiratory muscles, &c. Dr. PEREIRA has given the particulars of a case which favours the idea that strychnia, like digitalis, accumulates in the system, and suddenly occasions violent symptoms after the exhibition of it in small and frequently repeated doses, and which demonstrates the poisonous operation of this substance in man. A Swede, between fifty and sixty years of age, suffering from general paralysis, one side being more affected than the other, took one eighth of a grain of strychnia three times a day for some weeks, without effect. The dose was increased to one quarter of a grain thrice daily, also without effect. It was farther increased to half a grain, twice or thrice a day; and this dose was taken for some



days before the effects of this substance were manifested. The patient was found in a fit. The whole body was in a state of tetanic spasm; the trunk and limbs were extended; the shoulders thrown back; the muscles rigid and hard; the face and chest were of a purple colour; respiration had ceased, and the pulsation of the heart was very weak. Artificial respiration was imperfectly kept up by compressing the thorax; and the circulation was somewhat restored. The deep purple colour of the face went off. The man sighed, and the respiration returned; but the spasms very soon appeared with increased violence, and attacked the respiratory muscles. Respiration entirely ceased, the surface again became purple, but the circulation still went on. Artificial respiration was continued imperfectly, when the relaxation of the muscles would allow of it, but was this time ineffectual. The heart soon ceased to beat, and the purple colour of the surface was instantly replaced by the pallor of death.

367. A young man swallowed forty grains of strychnia. The symptoms commenced in a quarter of an hour. Trismus and spasm of all the muscles speedily appeared, and the whole body became as stiff as a board. The lower extremities were extended and stiff, and the soles of the feet concave. The skin became livid, the eyeballs prominent, the pupils dilated and insensible, and the patient lay in a state of universal tetanus. A remission occurred, but the symptoms soon became aggravated, and the patient died asphyxiated owing to spasm of the muscles of respiration, in about an hour and a half after taking the poison. On inspection, twenty hours after death, the body was very rigid. There was affusion in the spinal sheath [probably only the spinal fluid], and the upper part of the spinal marrow was softened; the brain was congested, but the alimentary canal was in its normal state. (*Lancet*, Jan. 27, p. 647, 1838.)

368. Mr. FRENCH informed Mr. TAYLOR that a person took a grain of strychnia at a dose. Vomiting occurred, and no ill effects were produced; but half this quantity may give rise to dangerous symptoms, when taken for the first time. When commenced with in small doses and gradually increased, the system may become gradually habituated to its influence, until a large dose is reached, when its effects may be suddenly and fatally manifested, as in the case mentioned above (§ 366).

369. The operation of *strychnia*, or of its salts, or of any of the substances which contain this poison, should not be mistaken for *tetanus*. This disease is developed much more slowly, and death takes place after a much longer time, than in cases of *acute* poisoning with any of these poisons. But if the dose be small and frequently repeated, a much less acute form of poisoning may be produced, and one which may, with great difficulty, be distinguished from *tetanus*. An attempt was made to defraud insurance offices in London, by insuring the life of a young woman very largely, and destroying her by administering strychnia in porter.

[Dr. W. C. WARNER, of Bristol, Vt., died suddenly at Montpelier, October 11, 1846, aged 39, while attending the Legislature, from taking about one fourth of a grain of strychnia. In less than five minutes he felt a constriction of

the throat and tightness of the chest, with rigidity of the muscles, on attempting to move. He complained of want of air, and requested the window to be raised. He was immediately seized with a tetanic convulsion, in which his head was drawn back, his countenance became livid, fluid matters issued from his mouth, with frequent moans; the palpebræ constantly in motion. The first paroxysm lasted some five minutes, which was succeeded by an interval of partial calm, during which it was difficult for him to articulate with distinctness. He made several efforts to vomit, by exciting the fauces with his finger: there was such constriction about the throat as to prevent swallowing. This interval lasted about five minutes, when another paroxysm succeeded, by a little starting and stiffening of the extremities, and immediately the whole body was thrown into a tetanic spasm, which lasted two or three minutes, when life was extinct, in about 14 minutes from the time of swallowing the poison. The intellect remained clear to the last.—(*Bost. Med. and Surg. Journ.*)

In one case, where we recommended strychnia endermically, one third of a grain, applied to a blistered surface, nearly proved fatal; the patient, a stout man, being thrown into violent tetanic spasms, which lasted, with intervals, for more than two hours.]

370. *C. Nux Vomica*, the *Bean of St. Ignatius*, the *Upas Tieulé*, the *Wourali poison*, and the other substances enumerated above (§ 364), owe their poisonous properties to *strychnia*. St. Ignatius's bean is said to contain nearly three times the quantity of this alkaloid found in *nux vomica*. But this last substance is most frequently employed as a poison. The symptoms produced by it are similar to those caused by strychnia, but are less severe. *Nux vomica* is usually taken in the form of powder. It has an intensely and persistent bitter taste; and generally tetanic spasms appear in from five to twenty minutes after it has been taken. The symptoms are altogether the same as have been described, and death is produced by the asphyxia consequent upon the spastic contraction of the thoracic muscles.

371. Mr. BAKER states that *nux vomica* is taken by many of the nations of Hindostan habitually, generally night and morning, beginning with an eighth part of a nut, and gradually increasing the dose to an entire nut, or about twenty grains. If it be taken immediately before or after a meal, it never occasions any ill effects; but if this precaution be neglected, spasms are apt to ensue. As this substance is taken in a state of coarse powder, and not in greater quantity than one nut, and frequently after having been half roasted, it is probable that it is only slowly acted upon by the juices of the stomach; and that the modifying influence of habit as regards it is not considerable. Mr. BAKER adds that it is thus used as a preservative from lepra and some other chronic disorders; but it is more likely that it is taken on account of its tonic and aphrodisiac properties. The habitual use of this substance proves that the cumulative influence imputed to it above does not exist. (*Trans. of Med. and Phys. Soc. of Calcutta*, vol. i., p. 140.)

372. *D. As nux vomica*, in powder, in extract, and in tincture, is an excellent remedy in several

disorders, and is frequently used medicinally, the symptoms indicating its injurious operation should be more fully described. When large doses are given, the stomach often becomes disordered, the appetite impaired, and the bowels constipated. The muscular system and the sensibility are next affected. All the senses are more than usually acute. The sensibility of the surface to cold, or to slight touch, is remarkably acute; and depression of spirits, anxiety, and a feeling of weakness and weight in the limbs are complained of. Mr. PEREIRA remarks that the limbs tremble, and slight rigidity or stiffness is felt upon motion. The patient staggers, and, when he stands, a slight tap on the ham brings on a convulsive motion, which nearly throws him down. If the medicine be persevered in, these effects increase, and the voluntary muscles are thrown into a convulsed state by very slight causes. The sudden contact of external bodies acts like an electric shock upon him, and produces a convulsive paroxysm. A deep inspiration, turning suddenly in bed, startling sounds, &c., have a similar effect. The farther use of nux vomica renders the symptoms still more intense; the fits of spasm now occurring spontaneously, and without any of these provocations. It acts upon the bladder and genital organs, and exerts an aphrodisiac effect on both sexes. The pulse, however, is but little increased in frequency, and is sometimes calm even when muscular rigidity has appeared. Preceding and accompanying these effects, great sensibility of the surface, painful formications, and acuteness of the senses are experienced. The intellectual powers are unimpaired. If the use of this substance be continued, especially in an increased dose, the symptoms are still more violent, and tetanus, tetanic asphyxia, and death succeed each other with great rapidity, as they follow large doses of *strychnia* (§ 365).

373. *a.* Dr. CHRISTISON states the smallest quantity of nux vomica likely to produce death to be three grains of the alcoholic extract; which is not so small a dose as fifteen grains of the powder, which was fatal in a case adduced by Dr. TRAIL. Thirty grains, taken in two doses, caused death; and fifty grains (equal to a quarter of a grain of *strychnia*) were fatal in an hour.

374. *b.* The period after the ingestion of the poison at which death usually occurs is generally from one to two hours, but Dr. CHRISTISON mentions a case that terminated in fifteen minutes. When this poison destroys life within a few hours, or in still shorter time, vomiting rarely occurs, and the patient dies from the tetanic asphyxia. But when death does not take place thus suddenly in a fit of spasm, the person continues to be affected for twelve, or eighteen, or twenty-four hours with similar or milder paroxysms, and may expire from exhaustion, or entirely recover. A fatal termination by exhaustion is not, however, so frequent as that by asphyxia. M. J. CLOQUET met with a case of fatal exhaustion consequent upon the violent and repeated spasms produced by this substance. The tetanic fits returned for more than twenty-four hours, the sensibility being very acute. Death did not take place until the fourth morning. (*Nouv. Journ. de Med.*, t. x., p. 157.)

375. *c.* There are several instances of recovery on record. SOBERNHEIM states that a young man took half an ounce of this powder, and experienced the usual symptoms. After the administration of emetics he recovered. Dr. BASSEDOW has recorded a similar case, recovery following the operation of emetics. Mr. BAYNHAM states that a girl swallowed half an ounce of the powder; the usual symptoms appeared, but the treatment having been prompt, they subsided in about four hours from their first appearance, and the next day she was only feeble and exhausted. He says that he has often prescribed a scruple of nux vomica three times a day without any ill effects! In this, as well as in other cases, there was neither vomiting nor purging until they were produced by the treatment. A strong dose of sulphate of zinc caused free vomiting in a few minutes. (*Lond. Med. Gaz.*, vol. iii., p. 445.)

376. *E. Appearances after Death.*—These vary with the rapidity with which death takes place, and the period after death at which the body is examined. In a case recorded by Mr. OLLIER, death took place in an hour, and the changes were slight. The stomach was almost natural, although between two and three drachms of the powder of nux vomica had been taken. The vessels of the brain were somewhat congested; the heart flaccid, empty, and pale. In a case which was rapidly fatal, detailed by M. OLLIVIER, and examined by him and ORFILA, the body was found remarkably rigid, although not less than forty hours had elapsed since death. The more depending parts of the external surfaces were purplish. Much serous effusion was found on the surface of the cerebellum, and softening of the whole cortical substance of the brain, but especially of the cerebellum; this case confirming the opinion of FLOURENS, that nux vomica acts especially on the cerebellum. The lungs were congested with black fluid blood. (*Archives Génér. de Med.*, t. viii., p. 18.) In a case mentioned by Mr. TAYLOR, a quantity of the powder was found in the stomach, to the internal surface of which it adhered tenaciously. The vessels of the brain were congested. No other changes were noticed. The spastic contraction of the muscles seems to pass into the state of cadaverous rigidity after death, without intermediate flaccidity.

377. *F. Treatment.*—The most efficacious treatment of poisoning by the substances containing strychnia is an immediate recourse to the stomach-pump, and, if this apparatus is not at hand, to the more powerful emetics. Dr. CHRISTISON remarks, that, when nux vomica in powder has been taken, it adheres tenaciously to the inner surface of the stomach, and that the means used to evacuate the stomach should therefore be assiduously continued. Emetics may not act, as in Mr. OLLIER's case, therefore they ought not to be solely confided in. If the patient be not attacked with spasms in two hours, he may be considered likely to recover. In cases of poisoning with *strychnia*, the efficacy of any treatment is very doubtful, for the quantity which is poisonous is so small, and its absorption so rapid, that means must be instantly resorted to in order to be efficacious. Dr. CHRISTISON quotes M. DONNÉ, who states that he has found iodine, bromine, and chlorine



to be antidotes for poisoning with this, as well as the other vegetable alkaloids; these substances, he says, forming, with the alkaloids, compounds which are not deleterious, and which, being in chemical union, are not readily decomposed. Animals, he states, which had taken one grain of strychnia, or two grains of veratria, did not sustain any harm, when tincture of iodine was administered immediately afterward; but the delay of ten minutes in the administration of the antidote rendered it useless. Farther evidence is required as to these antidotes. Dr. PEREIRA remarks, that probably astringents, as infusions of galls, green tea, &c., would be serviceable. To relieve the spasms, narcotics may be employed. SACS and others have recommended opium. As conia is the counterpart of strychnia, it deserves a trial. Dr. PEREIRA applied it to a wound in a rabbit affected with tetanus from the use of strychnia; the convulsions ceased, but the animal died. In the absence of conia the extract of hemlock may be tried. To relieve the symptoms consequent upon the endermic application of strychnia, acetate of morphia applied to the same part has given relief. (PEREIRA, Op. cit., p. 1306.) In a case in which I pushed strychnia so far as to occasion severe spasms, spirits of turpentine were applied with tincture of opium in the form of an embrocation along the spine, and were administered in enemata with asafoetida, and the spasms very soon disappeared.

378. iii. BRUCIA—*Brucia Antidysenterica*, or *false Angustura Bark*.—This vegetable alkaloid causes symptoms of the same kind as strychnia. According to ANDRAL, brucia is twenty-four times less powerful than strychnia; but the bark itself appears to be nearly as strong as *nux vomica*. Professor MARC took an infusion of this bark in mistake for true *Angustura*; and, although the dose was only three fourths of a wineglassful, yet he was seized with nausea, pain in the stomach, giddiness, sense of fulness in the head, ringing in the ears, stiffness of the limbs, pain on every attempt at motion, locked jaw, difficult articulation, &c. These symptoms continued two hours, and abated under the use of ether and laudanum. Dr. EMMERT states, that a boy who died from taking this poison experienced so distressing a state of sensibility in the intervals between the spasms, that he begged not to be touched, as he was thereby thrown into a paroxysm. This physician has investigated the operation of this poison, and he believes that it acts directly on the spinal cord, and not through the intervention of the brain. In his experiments division of the medulla oblongata, artificial respiration being kept up, or division of the spinal cord, did not prevent the effects of the poison from being manifested in the parts supplied with nerves below the division. The symptoms and treatment of this poison are the same as those of strychnia, and of the substances which contain it. There are few other substances which are productive of death by operating in such a manner as to bring them under the present category; but the *Cocculus Indicus* and the *Coriaria myrtifolia* appear to possess properties in many respects similar to the foregoing. [The *Rhus toxicodendron*, and some of the other species, possess

tetanic properties similar to those of strychnia and brucia.]

379. iv. COCCULUS INDICUS.—*The Berries or Fruit of the Anamirta Cocculus*.—*Cocculus Indicus* is poisonous to all animals. It acts on the cerebro-spinal nervous and muscular systems, causing tremblings, staggering, tetanic convulsions, and death. It does not appear to increase the sensibility; and the coma observed is rather the result of the exhaustion of vital influence by it, than of any narcotic property, which is only produced when the dose is large, and at an advanced period of its operation. ORFILA says, that this poison acts like camphor on the nervous system, and principally on the brain. M. GOUPIE states, that it communicates its poisonous properties to fish, which have been killed by it, and more especially to barbel. It is frequently added to malt liquors for the purpose of increasing their intoxicating powers. Its active principle has been called *Picrotoxine*. Dr. PEREIRA observes that, from accounts he received from an excise officer, the action of this poison is exerted more upon the voluntary muscles than upon the intellectual powers; and that, notwithstanding the severe prohibitory statutes against the employment of *Cocculus Indicus* in brewing, there is every reason to believe that it is extensively used; but a solution of the extract being employed, the detection of it is rendered very difficult. MORRICE, a writer on brewing, directs three pounds of *Cocculus Indicus* to be added to every ten quarters of malt. "It gives," he says, "an inebriating quality, which passes for strength of liquor, and prevents second fermentation in bottled beer, and consequently the bursting of bottles in warm climates;" pleasant information this for those who indulge in these liquors; and satisfactorily accounting for the injurious operation of them on the human frame. According to WEPFER and ORFILA, this substance in poisonous doses exhausts the irritability of the heart.

380. The treatment of poisoning by *Cocculus Indicus*, or by *picrotoxine*, consists in the prompt removal of the poison from the stomach, and in having recourse to the means advised for the effects of *nux vomica* (§ 377).

381. v. CORIARIA MYRTIFOLIA possesses properties similar to the foregoing. It is frequently found as an adulteration of senna. According to Professor MAYER, it produces violent fits of tetanus, followed by apoplectic coma. A grain injected into the jugular vein of a rabbit occasioned in about five hours a single convulsive paroxysm, which proved immediately fatal. SAUVAGES has recorded two cases of death caused by the berries. M. FÉE has adduced five cases of poisoning, owing to the adulteration of senna with this substance; and one of them proved fatal. The symptoms were violent convulsions, locked jaw, and colic. M. ROUX also published, in an interesting memoir, three cases which came under his own observation, one of which proved fatal; the symptoms being sparkling and rolling of the eyes, locked jaw, loss of voice, convulsions recurring in paroxysms of the duration of eight or ten minutes, and death after sixteen hours. Of those fatal cases the membranes of the brain, on dissection, were found congested in one, no other change being observed; the internal surface of the stomach and bowels was injected

in another; and in the third no alteration could be detected. The treatment for poisoning with this substance does not differ from that recommended for the substances containing strychnia (§ 377).

382. CLASS V.—IRRITATING AND DEPRESSING POISONS.—*Irritating and Paralyzing—Acro-Sedatives*.—Although this class of poisons is more or less allied to the third and fourth classes, and not less so the sixth and eighth, still it is distinct from all of them: 1st, in the alterations of function and structures produced by it; and, 2d, as respects the treatment required to remove these alterations. The substances ranged under this class not only affect the nerves of the part to which they are applied, but irritate them, and excite more or less of morbid action of the capillaries. In conjunction with this local action, they are more or less imbibed by the membranes, and absorbed into the circulation, thereby affecting, each with modifying influence, the vital manifestations of the systems and organs of the body. Their general operation, when administered in very large or poisonous doses, is to irritate the tissues with which they come in contact, and to depress vital power throughout the frame, or to paralyze the functions of certain organs or parts. The irritating action they exert locally is extended, especially as respects some of them, to adjoining viscera; and this action is also exerted in those excreting organs which eliminate them from the blood, although often very slightly or inappreciably. But it is rare to observe after death evidence of irritation and its consequences to such an extent as to account for the fatal issue; and therefore we are induced to infer that, although these changes may have aided in producing this result, the depressing influence exerted upon the nervous systems, and upon the vitality of the frame in general, by this class of poisons, is that to which their fatal operation is mainly due. Even in those cases in which evidence of irritation, and the changes consequent upon this condition, are the most remarkable, although death may, according to the views of some, be ascribed chiefly or altogether to those changes, still they are insufficient of themselves to account for the rapidity of this issue, especially when they are compared with the extensive disorganizations observed after the more corrosive poisons, whose action is strictly local, and which often do not cause death until after prolonged periods of suffering.

383. 1. ACONITE—*Monk's-hood*—*Aconitum napellus*.—*Aconita*—*Aconitine*—*Aconitina*.—According to the observations of Dr. FLEMING, the species *napellus*, and its varieties, are the most poisonous of the genus. The amount of numbness and tingling felt on chewing the root indicates the respective activity of the various species; the power of exciting these sensations residing in the *aconitina*, which the plant contains. The most active official preparations are the tincture and alcoholic extract; but all parts of the plant are poisonous, this property residing in the *aconitina*, the alkaloid discovered in *Aconitum napellus* by GRIEGER and HESSE. Cases of poisoning by this plant are not frequent. I have seen only one instance; but injurious effects have followed, although rarely, from a too large dose of the tincture.

The expressed juice and the official preparations are most rapidly fatal when injected into a vein, or into a recent wound. They are also injurious in smaller quantity, and with greater rapidity, when introduced into the serous cavities, or in the cellular tissue, than when taken into the stomach; and they are poisonous, also, when introduced into the mucous canals.

384. A. Applied locally, aconite produces very slight irritation of the tissues; but it often excites a sense of heat. It hardly occasions any visible change of the part. On the nerves it acts as a local sedative, especially to the nerves of sensation, occasioning numbness and tingling. The loss of sensibility is followed by impairment of muscular contractility and irritability. It does not appear, according to Dr. FLEMING's experiments, to produce dilatation of the pupil; and he states that the topical application of the poison is unaccompanied by pain, redness, or swelling, even when the physiological and remote effects are produced to the greatest extent; the peculiar sensations caused by chewing the root being unattended by any inflammatory irritation.

385. B. The remote or constitutional operation of aconite depends upon the absorption of it, as shown, 1st, by the rapidity and intensity of the remote action being in proportion to the absorbing powers of the part to which it is applied, and to the facility with which the preparation employed is capable of being absorbed; 2d, by the circumstance of no remote effects, or but slight effects, being produced when it is applied to the sound skin, although the topical action indicates that the nerves were affected by it, in the manner above stated. Being imbibed and absorbed into the circulation, it acts upon the nervous system, and more especially on the cerebro-spinal nervous system; impairing the sensibility and the functions of sense, and diminishing the power of muscular action. It seems also to impair organic nervous influence and irritability, proving a sedative of the cardiac and vascular actions, and reducing, as shown by Dr. FLEMING, the strength, volume, and frequency of the pulse more or less, according to the dose. This antiphlogistic or sedative operation of aconite has been fully evinced in various diseases for which I have prescribed it. It is of importance to determine whether or no the frequent or continued exhibition of this substance produces a cumulative action. Although I have often prescribed aconite, yet I have not had reason to believe that this action has ever occurred. Dr. FLEMING, however, states that two individuals were affected with general tremours, severe pain in the head and eyeballs, constant lachrymation, intense photophobia, heat of skin, quick pulse, and great restlessness, symptoms which were distinctly attributable to the continued use of this substance.

386. C. The symptoms produced by poisonous doses of the aconite are, a sense of warmth in the stomach, with a numbness and tingling, and feeling of distention of the tongue and lips, sometimes with slight nausea, followed by vomitings or retchings. The countenance becomes pale and sunken, and muscular power prostrated. The senses are impaired, but consciousness remains, or slight wandering delirium appears. Some persons feel as if they were dying



or sinking. The voice is whispering or lost; the respiration weak and superficial; the pulse weak or slow, small or irregular. The surface is cold, and covered with a clammy sweat. At a more advanced period the patient becomes speechless, deaf, and blind. The pupils are at first contracted; but afterward, sometimes general muscular tremors or slight convulsions supervene; the pulse, at first slow, becomes imperceptible, the coldness of the surface and extremities increases, and the patient dies from syncope. In a case in which I was consulted, petechial ecchymoses appeared on the surface of the body and on the face, and marked congestion of the brain occurred with hemiplegia, yet the patient recovered, the palsy having nearly disappeared when I saw him some years afterward. In most cases, especially when any part of the plant has been ate by mistake, heat, sense of constriction, numbness and tingling in the mouth and throat are the first symptoms complained of. Vomiting or diarrhoea is generally present, with swelling of the abdomen. A lady was poisoned by eating the root in mistake for horseradish with roast beef. She could not thus have taken much of it; but shortly afterward slight vomiting, with abdominal pains, came on, and although emetics, &c., were used, she died in three hours.

387. The symptoms may appear immediately after taking the poison or not for one or two hours, the delay being owing to the part and state of the plant taken, and to the presence of food in the stomach. Five grains of the fresh extract of aconite were given to each of three patients in the hospital at Bourdeaux. In a quarter of an hour after taking the poison, they had tremors of the muscles, a pricking sensation over the body, and severe vomiting followed. They became unconscious; and on recovering their senses they complained of confusion of sight and intense headache. The pulse was slow and irregular, the respiration short and hurried; the skin was cold and clammy. Two of the patients recovered. Dr. GROGHEGAN adduces two cases, one of which died in an hour and a quarter after eating the root, and the other in two hours. One drachm of the root has proved fatal, but it is probable that less than this would kill an adult. Dr. MALE died from the effects of not more than eighty drops of the tincture taken in ten doses, over a period of four days, the largest quantity taken at once having been ten drops.

388. *D.* The alkaloid, *aconitine*, is the most virulent poison known, exceeding even prussic acid. One fiftieth part of a grain of aconitina proved nearly fatal. Its operation and effects are altogether the same as those of aconite, only much more intense.

[A ease of poisoning by *aconitina* has recently been reported by Dr. GOLDING BIRD, of London (*Med. Gazette*), which, from its interesting nature, we present to the reader. It is the first ease of the kind, we believe, ever published, although there are several on record where the roots and leaves of the aconite have accidentally produced death. There are few agents, Dr. BIRD thinks, more likely to be employed by the secret poisoner, with greater certainty of escaping detection, than aconitina.

A gentleman of high intellectual attainments, and holding an important position in society,

swallowed intentionally about two and a half grains of *aconitina*. From collateral evidence, it appeared probable that almost immediately after having taken it, he must have fallen and struck his head a severe blow against some furniture in the room. The poison, or the blow, or both, produced violent vomiting, as the room was flooded with vomited matter. Dr. BIRD saw the patient about eight hours after taking the poison. The patient was then fearfully collapsed; the surface cold and sweating; quite pale; the heart's action scarcely perceptible; pupils sensible to light; no paralysis either of sensation or motion; intellect unimpaired. The most prominent symptom was incessant and severe vomiting of a brownish fluid. This vomiting was, however, peculiar, and perhaps hardly deserved that title, the patient being really seized with a kind of general spasm, during which he convulsively turned on his abdomen, and with an intense contraction of the abdominal muscles he jerked out, as it were, the contents of the stomach, with a loud shout, depending, apparently, on the sudden contraction of the diaphragm. These exhausting and distressing symptoms occurred every minute or two. On attempting to make him swallow any fluid, a fearful spasm of the throat took place, producing the distressing effects so well known in hydrophobia; this was not produced by the sight of water, but the convulsive movements of the body, and emptying of the stomach, were excited by abruptly touching him. He was placed in a hot bath, and afterward removed to bed, covered with blankets, and a large mustard poultice to the sorculus cordis, and an enema of turpentine administered. He remained in much the same state, the sedative effects of the *aconitina* on the heart gradually lessening, so that in the course of seven hours the pulse became perceptible, though very weak; the hydrophobic symptoms were, however, then produced by every attempt to swallow, so that none of the medicines suggested could be made use of. Enemata of beef tea, and yolk of egg, with ten drops of laudanum, were administered, with the view of affording support and quieting the patient. He passed a dreadful night of exhaustion and spasm; intellect perfect, and even vivid, so as to astonish the by-standers. By two o'clock the following day the poison had so far ceased to operate, that the patient was regarded as convalescent.

The *aconitina* must in this case probably have nearly all been discharged by vomiting, and yet most violent effects followed. Dr. BIRD seems inclined to believe that the convulsive vomiting and imperfect hydrophobia are characteristic of the effects of this poison, differing, however, from the effects of aconite root, with the exception of the sedative influence on the heart. This, however, is in accordance with a fact well known, viz., that a pure alkaloid often differs materially in its physiological action from that of the plant from which it is obtained, as in the case of the alkaloid *coniin*.]

389. *E.* Death is produced by aconite owing to the sedative influence caused by it on the nervous system, or to its paralyzing effect upon the muscles of respiration, or to the impaired irregularity of the heart, fatal syncope supervening. The death of the human subject takes place generally by syncope, which sometimes

occurs suddenly, unexpectedly, and immediately: the fatal sedative and paralyzing influence of the poison on the nervous system appearing chiefly in experiments on the lower animals, when the dose of the poison has been very large.

390. *F. The appearances on dissection* have been very imperfectly observed. Venous congestion, to a greater or less extent, has generally been found. In some instances, engorgement of the brain and membranes, with considerable sub-arachnoid effusion, has been met with. In the cases recorded by PALLAS, DEGLAND, and GEOGHEGAN, inflammatory appearances were present in the alimentary canal. The lungs were generally congested, and the blood very dark.

391. *G. The more diagnostic or characteristic phenomena* produced by this poison are numbness and tingling of the mouth and throat, or parts to which it is applied; vomiting or retching, with tumefaction of the abdomen, numbness, tinglings or tremours of the extremities, contraction of the pupils, slowness or failure of the pulse and of the heart's action, and death from this last change.

392. *H. Treatment.*—If retchings only have occurred without free vomitings, an emetic, consisting of sulphate of zinc with capsicum, or of mustard mixed in water, should be administered. If the poison have passed into the intestines, or sufficient time have elapsed for this to have taken place, warm purgatives and enemata should be resorted to. Stimulants, as warm brandy and water; camphor or annomonia, with capsicum, and small doses of opium; sinapisms or terebinthinated embrocations over the epigastrium, or along the spine; strong coffee, and frictions of the surface, are the means chiefly to be confided in.

393. *ii. ARSENIC.—Arsenious Acid.—Arsenic and its Compounds.*—Of all the varieties of death by poison, none is more important, as Dr. CHRISTISON remarks, than poisoning by arsenic. The facility with which it as well as all other poisons may be procured in this country, and the ease with which it may be secretly administered, lead to its adoption for the purpose of murder. It is fortunate, therefore, that there are few substances, and hardly any other poison, which can be detected in such minute quantities, and with so great certainty, according to the full and minute directions which will be found in the works of ORFILA, PARIS, BECK, CHRISTISON, DEVERGIE, PEREIRA, TAYLOR, GUY, and others. The compounds of arsenic met with and employed in the arts, and by which life may be destroyed either accidentally or intentionally, are, 1. The protoxide of Berzelius, or fly-powder; 2. Arsenious Acid, or white arsenic; 3. The Arsenite of Copper, or mineral green; 4. The Arsenite of Potass, or Fowler's solution; 5. The Arsenate of Potass; and, 6. The various sulphurcts, pure and impure, as Realgar, Orpiment, and King's yellow. Of these, arsenious acid, or white arsenic, is that most frequently administered as a poison. Mr. TAYLOR states, that in 1837 and 1838 there were 185 cases of poisoning by this substance in England, the greater number of which were cases of suicide and murder.

394. White arsenic possesses a very feeble acid reaction, although it combines with alkalis.

It has, in small quantity, hardly any taste, and hence the frequency and risk of its employment. It is sparingly soluble. Cold water dissolves from half to one grain to one fluid ounce of water; and boiling water allowed to cool upon the powder dissolves a little more than one grain to the ounce of water. Mr. TAYLOR states that the presence of organic matter in a liquid diminishes the soluble power of the liquid. Viscid or mucilaginous fluids, of course, suspend the finer parts of the powder of this substance. The solubility and action of arsenious acid are said to be increased by admixture with nitre. This writer states that a teaspoonful of powdered arsenic weighs about 150 grains, a table-spoonful 530 grains, and a pinch about seventeen grains.

395. *A. Symptoms.*—Arsenic, taken into the stomach, produces different forms of poisoning, according to the quantity and state of the poison, as respects admixture, &c., and to the state of the stomach and constitution of the individual, according to the various modifying circumstances already mentioned (§ 51, *ct seq.*). The forms of poisoning thus resulting are, 1st. *Acute*; 2d. *Chronic*; and the acute assumes two varieties, which have been distinguished and described by Dr. CHRISTISON.

396. *a. The acute form* of poisoning with this substance is differently characterized according as the arsenic affects more especially the alimentary canal, or the nervous system, and vital powers.—(a) When the digestive canal is more particularly attacked, signs of violent irritation are manifested along its whole course, with faintness, sickness, burning pain, and tenderness in the region of the stomach. When the poison has been taken in a state of solution, these symptoms are felt very soon after its ingestion—generally from ten to fifteen minutes; but, in other circumstances, it usually does not begin to act until half an hour after it is swallowed; and its operation is seldom delayed beyond an hour. Several cases are, however, recorded in which the action of the poison was not manifested for several hours—for three, four, five, or even seven hours. Dr. CHRISTISON thinks that it is delayed for a longer or shorter time by sleep. The sickness and pain are soon followed by retchings and vomiting, especially when drink is taken. There are also heat, dryness, and tightness in the throat and pharynx, creating an incessant desire for drink, attending and occasionally preceding the vomitings. Sometimes this affection of the throat is very slight. When it is severe, it is often attended by fits of suffocation and convulsive vomiting, and by hoarseness and difficulty of talking. The matters vomited after alimentary matters have been thrown off are yellowish or greenish, and in the more protracted cases they are streaked or mixed with blood. Soon after the appearance of the gastric symptoms, diarrhœa generally supervenes; but in some instances, instead of diarrhœa, the patient is harassed by ineffectual calls, or tenesmus. About this time the pain at the pit of the stomach is excruciating, and is likened to a fire within him. It often extends over the abdomen, which becomes tense, tender, and sometimes swollen; but occasionally drawn inward at the navel. If diarrhœa be considerable, or has continued for a short time, pain, heat, and excoriation of



the anus are complained of. In some instances, the burning pain and irritation with vascular injection appears to extend from the mouth to the anus; and there are frequently, also, observed signs of irritation of the air-passages and lungs, with shortness of breath, tightness across the lower part of the chest, and occasionally darting pains. Sometimes symptoms of pneumonia are more fully developed. The urinary organs are often affected, the patient being distressed by frequent, painful, and difficult micturition, by pain in the bladder, or swelling of the penis. Females frequently experience burning pain, swelling, or excoriation of the labia pudendæ. Occasionally the irritation is so great as to cause suppression of urine; but the disorder of the urinary organs rarely occurs unless the lower bowels are also severely irritated, and the case has been protracted for two or three days. Soon after the appearance of the first symptoms, the *pulse* becomes feeble, small, and rapid, and subsequently irregular, and hardly perceptible. The surface of the body and extremities are cold, and often covered with clammy cold sweats. The feet and hands are often livid. The features are collapsed, and expressive of extreme suffering and anxiety. The conjunctiva is often very much injected; and the eyes are red and sparkling. The tongue and mouth are parched; and aphthous appearances are sometimes observed in the throat. Convulsive motions, especially of a slight form, and consisting of tremours or twitchings, often commence in the trunk and become more general. When the diarrhœa is severe, or has continued for a short time, cramps in the legs and arms are severe and frequent. Delirium sometimes appears towards the close, and is occasionally attended by stupor. Death takes place calmly, but is sometimes preceded by convulsions. In some instances, a remission of the symptoms has been observed, particularly when life has been prolonged till the close of the second or third day. In cases such as now described, constituting the most frequent variety of the acute form, death occurs about twenty-four hours after the ingestion of the poison, and generally before the close of the third day; but, in rare instances, life may be prolonged until the fifth or sixth day.

397. (b) In the *second variety* of acute poisoning by arsenic, the signs of irritation and inflammation of the digestive canal are either slight or altogether absent; death ensuing in five, six, or seven hours, or at a period too early for the full development of inflammatory action, owing to the impression of the poison on the organic nervous system, and on the general vitality of the frame. When Sir B. Brodie injected a solution of the oxide into the stomach of a dog, the pulse was rendered slow and intermitting, and the animal became palsied in the hinder legs, lethargic, and died in convulsions. In some cases of this variety, one or two attacks of vomiting occur at the usual interval after taking the poison, but it seldom continues; extreme faintness, amounting almost to syncope, being the most uniform symptom. Pain is usually felt at the epigastrium, but it is sometimes very slight, and unattended by the other signs of inflammation. Occasionally there are oppression, stupor from depression, or slight convulsions; but the faintness and gen-

eral sinking of the vital powers are the prominent phenomena, death commonly taking place in a few hours. Even in the more protracted cases, and where life continues till the second day, extreme vital depression is the most striking feature. Dr. CHRISTISON remarks that this acute variety has been observed, 1st, when the dose of the poison was very large; 2d, when it was in small masses; and, 3d, when it was in a state of solution. The first and last of these circumstances account for the rapidity and character of the symptoms, as furnishing the conditions favourable to a general or extended impression of the substance on the villous coat of the stomach, and a rapid absorption of it into the circulation; but the second circumstance just named admits not of so ready an explanation. Cases of this variety of poisoning by arsenic are not frequent; but Dr. CHRISTISON has referred to twelve instances in illustration of it; and which sufficiently show that the most rapid cases of poisoning by arsenic are not always attended by either violent or well-marked symptoms. It should, however, be recollected that the present variety passes insensibly into the former; that many cases will present phenomena approaching more or less either of the varieties now described, or intermediate between them.

398. All the above symptoms are not present in every case of the acute form, for pain may be entirely absent, although the quantity of the poison has been very great; the greatness of the quantity, as just stated, having been supposed to have been the cause of its absence. But Mr. TAYLOR states, that a case occurred in Guy's Hospital, where only forty grains had been taken, and the patient died without complaining of pain. The symptoms of intestinal irritation are seldom wanting, or there is vomiting if there be no purging. But Mr. TAYLOR refers to a case in which there was neither vomiting nor purging. Thirst, although a most common symptom, may also be absent.

399. *b. The chronic form of poisoning by arsenic may also present two varieties or states.—*  
(a) In one the symptoms may at first be acute and inflammatory; but these may subside, with or without treatment, and signs of nervous irritation and vital depression become most prominent; or the inflammatory and the nervous symptoms may appear together, and proceed *pari passu*. The nervous affection varies in different persons. It chiefly consists of partial or incomplete palsy in some cases, or of more or less complete epilepsy in others, or of partial or irregular convulsion; or they may even resemble those of hysteria, of tetanus, or of delirium, passing into stupor. Five individuals partook of a dish poisoned with arsenic, and were seized with the usual symptoms of inflammatory irritation of the alimentary canal. One of these had an epileptic fit on the first day, which returned on the second, with frequent twitches of the muscles of the trunk, numbness in one side, and heat and tingling of the feet and hands. Another had tremours of the right arm and leg, followed by epileptic fits in the night, which returned the next fifteen days at the same hour in the evening, and afterward recurred at intervals for several months.

400. Of the *secondary* effects of this variety of arsenical poisoning, *palsy* and spasm, or *con-*

tractions of the extremities, are the most frequent. The palsy is generally partial, and often commences at the fingers or toes, and proceeds gradually upward. Dr. MURRAY (*Edin. Med. and Surg. Journ.*, vol. xviii., p. 167) has given an instructive account of this effect of arsenic. Four persons were affected about an hour after breakfast with the primary symptoms of poisoning by arsenic. But, in addition to these, the muscular debility was extreme; and in two amounted to true partial palsy. One of them lost altogether the power of the left arm. The other had great general debility, and long-continued numbness and pains of the leg. In a case of an over-dose of the arseniate of potassa, the paralytic affection consisted in the loss of sensation and of motion of the hands, and the loss of motion in the feet, with contraction of the knee-joints.

401. (b) In some instances, especially when the dose of the poison has been small and frequently repeated, instead of the acute or inflammatory symptoms at the commencement, indications of slow or chronic poisoning approach insidiously, and may be mistaken for chronic disease of the digestive organs or of the nervous system. HAHNEMANN has briefly defined *slow poisoning* by arsenic as "a gradual sinking of the powers of life, without any violent symptom—a nameless feeling of illness, failure of strength, an aversion to food and drink, and all the other enjoyments of life." This is, however, not a correct view of such cases, although it may represent a few of the most slow or chronic states produced by this poison; as with the gradual sinking of vital and of muscular power, there are generally more or less of the symptoms about to be enumerated also present: Protracted indigestion with flatulence, pain in the stomach or bowels, sometimes in the course of the colon; slight diarrhœa, or tenesmus, or both; furred tongue, with dryness, constriction of the throat, and thirst; severe attacks of flatulence, sometimes with hiccough when substances are taken into the stomach; occasionally salivation or exfoliation of the epithelium of the lips, cheeks, and throat; inflammation of the conjunctiva, with suffusion of the eyes, intolerance of light, and frequently with a dark circle surrounding the eyes; irritation of the skin, often with an eruption—the *Eczema arsenicale*—and exfoliation of the cuticle, and falling out of the hair; extreme muscular weakness, tremours, paralysis, spasms, or contractions of the limbs; sometimes convulsions, anxiety, faintness, or syncope; shortness of breathing, dry cough; palpitations on slight exertion, or upon being startled, remarkable weakness, smallness, and irregularity of the pulse; emaciation, swelling or œdema of the extremities; nervous headache, mental depression, sometimes low delirium, stupor, or even death, have supervened upon excessive or too long continued doses of arsenical preparations. I once suffered severely from dyspepsia and excessive flatulence, caused by an accidental over-dose of FOWLER'S solution; and I have met with several cases where the above symptoms—some in one case, others in another, &c.—have followed the use of these preparations. There is also some reason to believe that endocarditis and lesions of the valves of the heart have been excited by the too liberal employment of the

arsenical solution. I have at present a patient with disease of the cardiac valves, who has taken the solution in very large doses, and during several protracted courses, for lepra.

402. B. The application of arsenic to sores, ulcers, or eruptions; or to wounds, or to blistered or other surfaces deprived of its cuticle, often has produced fatal poisoning. When arsenic is thus applied, both local inflammation is excited or increased, and constitutional effects are produced by its absorption. WEPFER states that a girl, affected with psoriasis of the scalp, had it rubbed with a liniment of butter and arsenic; and was soon seized with acute pain and swelling of the whole head, fainting fits, restlessness, fever, delirium, &c. She died in six days. Similar cases are recorded by AMATUS LUSITANUS, ZITMANN, BELLOC, ROUX, BLACKADDER, and others; the arsenic having been applied to sores or ulcers. HARLES remarks, respecting the propriety of the outward application of this substance, that it may be applied with safety to abraded surfaces, to common ulcers, or to malignant sores, even when highly irritable, provided the part be not recently wounded, so as to pour out blood. This distinction is not, however, to be confided in under every circumstance; for the poison may be absorbed without being imbibed by the venous capillaries of the part.

403. When arsenic is thus applied, inflammation of the part, extending more or less, is generally produced. In some instances the local irritation is but slight, or altogether absent; but it is in others very severe. The lesions consequent upon the absorption of the poison, when thus employed, are irritation of the stomach and bowels, especially of the rectum; various affections of the nervous system, as spasms, convulsions, palsy, &c.; faintness, and vital depression. In several instances palsy has appeared in parts adjoining that to which the poison was applied. An arsenical preparation was long employed to destroy a tumour on the right side of the neck, and was followed by complete palsy of the muscles of the neck and arm of that side.\*

\* [We have known three cases of death, caused by the absorption of arsenic, from cancer plasters applied by quacks for the cure of this disease. The patients died from peritonitis and enteritis, the poison being determined to the serous surfaces, there producing the ordinary symptoms of inflammation of these organs. A case is reported by Dr. HOSACK, in the *American Medical and Philosophical Register*, vol. iii., p. 389, where palsy of the right arm and neck was occasioned by the external application of arsenic, for the purpose of removing an encysted tumour on the side of the neck. Dr. MOORE HOIT, of New York, has reported a fatal case from the absorption of arsenic applied to a tumour at the angle of the jaw. (*New York Med. and Phys. Journal*, vol. iii., p. 375. In France, the *pâte arsenicale* is used, consisting of *cinnabar*, 70 parts; *Sanguis draconis*, 22; *arsenious acid*, 8; made into a paste at the time of applying it. In England, PLUNKETT'S Ointment is used, consisting of *arsenious acid*, sulphur, and the powdered leaves of the *Ranunculus inflammatum* and *Cotula fetida*; also, DAVIDSON'S Remedy for Cancer, *arsenious acid* and powdered hemlock. In the United States, we have, among others, DAVIDSON'S Cancer Plaster, the active ingredient of which is *arsenic*; the *poke-root* is also used, in form of an extract, but arsenic is mixed with it in all cases by the cancer quacks.

A medical gentleman, during the past year, being greatly annoyed by a carious tooth, was induced, by the urgent solicitation of several of his friends, to apply to the affected part a paste, in which it was ascertained the white oxide of arsenic was one of the ingredients. Within a period of two hours, local inflammation took place so rapidly as to involve the whole of the jaw of one side. Before many hours had elapsed, though active antiphlogistic means were promptly adopted, the inflammation soon involved the fauces, throat,



404. *C. The Poison may be administered in Enemata.*—FODÉRÉ adduces the following case: A lady was under treatment for some slight disorder, but died unexpectedly after symptoms of poisoning. It was afterward discovered that her servant, after unsuccessful attempts to poison her by dissolving arsenic in her soup, had succeeded by administering it in injections. In this way, doubtless, all the effects of arsenic may be produced, and the poison be the less likely to be detected after death, this mode of poisoning requiring all the vigilance which the physician can exert.

405. *D. This Poison may be introduced into the Vagina.*—Among other instances of this mode of poisoning adduced by ANSIAULX and CHRISTISON, the following is recorded by Dr. MANGOR: A farmer near Copenhagen lost his wife under suspicious circumstances, and six weeks afterward married his maid-servant. In a few years he attempted, aided by another servant, to poison his second wife. Having failed, he introduced a mixture of arsenic and flour into the vagina after coition in the morning. The symptoms appeared about midday, and death took place next morning. The murderer married, soon after, his guilty paramour, and after a few years got rid of her in a similar manner. About three in the afternoon she was seized with shivering, and with heat and pain in the vagina; the poison having been introduced in the morning. The remembrance of her former crime excited her suspicions, and she wrung from her husband a confession. On the local symptoms, acute pain in the stomach, incessant vomiting, and delirium supervened: death took place after twenty-one hours. On dissection, grains of arsenic were found in the vagina, although frequent lotions had been used

larynx, and trachea, and he died in extreme distress, with what was recorded as laryngitis, before twenty-four hours had expired from the commencement of the fatal application.

"This powerful agent" (arsenic), says Dr. FRANCIS, "whether given internally or applied externally, is capable of destroying life with equal certainty. A valuable member of our community, the late Mr. O., fell a victim to the empirical practice of arsenic, in the form of unguent, applied to a small tumour situated between his shoulders. In this case," adds Dr. F., "I had an opportunity of testing the accuracy of Mr. BRODIE's idea of the action of the arsenious acid on the human constitution. Mr. BRODIE considers this mineral poison in its operation to produce its effects primarily on the nervous system, and that death is the result of the suspension of the functions of the heart and brain. In Mr. O.'s case this theory was verified. There was paralysis of almost every limb of the body, and every joint seemed to be greatly enlarged and tumid; the intellectual functions were nearly destroyed; he died suddenly and unexpectedly, in a manner characteristic of death by arsenical poison."—*Facts on Medical Jurisprudence, New York Med. and Phys. Journal*, vol. ii.

We have facts confirmatory of this pathology in the issue of cases in which arsenic is preposterously employed for the cure of tinea capitis.

GILMAN DAVIS, of Portland, Maine, reports a case (*Boston Med. and Surg. Journal*, vol. xxviii., p. 214) of poisoning by arsenic in a woman, who took half an ounce of arsenic, attended with severe vomiting, but no pain or thirst. She took the carb. ferri in large doses, but died the next day.

Dr. STORER, of Boston, reports several cases of poisoning, in the *Boston Medical and Surgical Journal*, vol. xxiii., p. 345-8. In one case, that of Mr. KINNEY, who was supposed to have been poisoned, there was found extensive ecchymosis of the mucous membrane of the stomach, which Dr. S. considers characteristic of poisoning by this substance, and which, with the bloody tinge of the fluid in the cavity of the peritoneum and pericardium, would serve to distinguish the case from one of cholera. In one of the other cases there was no vomiting, although emetics were given, nor any pain of any kind complained of, nor swelling of abdomen. Death ensued five hours after the poison had been swallowed, perfectly rational, and without a struggle.]

in the treatment. The labia were swollen and red, the vagina flaccid, the os uteri gangrenous; the duodenum was inflamed, the stomach natural.

406. *E. Poisoning by Arsenic may take place through the Respiratory Organs.*—This usually occurs in consequence of the accidental inhalation of arsenical vapours. OTTO TACHENIUS, a chemist of the sixteenth century, quoted by Dr. CHRISTISON, states, that he once incautiously happened to breathe the fumes of arsenic, and was surprised to find his palate impressed with a sweet, mild, grateful taste, such as he never experienced before. But in half an hour he was attacked by pain and constriction of the stomach; then with difficult breathing, general convulsions, an unspeakable sense of heat, bloody and painful micturition, and, finally, with such an acute colic as contracted his whole body for half an hour. He recovered from these alarming symptoms by taking oleaginous drinks; but during all the succeeding winter he had low hectic fever. There can be no doubt of arsenical vapour or fumes being rapidly poisonous, when inhaled in a concentrated state, or even when very diluted, if longer breathed; and then they may produce slow or chronic poisoning. The vapour may even be employed in this way with criminal intentions. Dr. CHRISTISON has quoted several writers and cases illustrative of this mode of poisoning. The following is a most instructive instance of the kind: An apothecary inhaled the fumes while subliming arsenic, and was soon after seized with frequent faintness, constriction at the præcordia, difficult breathing, constant thirst, parched tongue and throat, great restlessness, watchings, and pains in the feet. He had afterward profuse daily perspirations and palsy of the legs, and several months elapsed before he quite recovered. (See B. TIMEUS, *Case. Med.*, L. vii., c. 11; and CHRISTISON, *Op. cit.*, p. 302, for similar cases.) PARACELSUS, being one day enraged with an acquaintance, held him over an alembic in which arsenic was subliming; but the object of his temper nearly lost his life.

407. *F. Applied to the sound skin*, arsenic has either no effect, or merely a slow and slight effect, unless under certain circumstances. If the poison be simply placed in contact with the skin it seldom acts; but if it be rubbed upon the skin, especially when mixed with fatty matters, it acts chiefly locally, producing a pustular eruption or eschars; but according to REHAULT it produces no constitutional disorder. This statement, however, should not be depended upon; for there are several facts recorded that prove arsenic sometimes to have been productive of very serious local and constitutional effects when applied to the human skin, either in the state of fine powder, or in the form of ointment, liniment, or paste. In these cases, several of which are adduced by Dr. CHRISTISON, the symptoms were faintings, giddiness, pain in the stomach, vomitings, tenesmus, ardor urinæ, tremblings of the limbs, low delirium, hectic fever, debility, prolonged recovery, and falling out of the hair.

408. *G. Diagnosis.*—Poisoning by arsenic may be mistaken for the severer states of cholera, or even for a case of pestilential cholera. The propriety of deciding the question from the symptoms alone, as to whether or no poi-

poisoning has been produced by arsenic, belongs more especially to the writer on Medical Jurisprudence. This question has been ably discussed by Dr. CHRISTISON and the other writers so often referred to. But the diagnosis between poisoning by this substance and natural disease falls more especially within my province. It should be admitted that the diagnosis is often difficult; but due attention to the history of the case, especially in respect of the accession of the attack; the prickings, burning sensations, or heat, redness and constriction in the throat, and in the course of the œsophagus, especially early in the attack; the redness of the eyes; the swelling, heat, pain, and excoriation of the anus; the tenesmus, and the burning or colicky character of the abdominal pain; the ardor urinae, dysuria, and heat of the urinary passages; the increased suffering on speaking and swallowing; the consecutive eruption of pimples, or excoriations of the lips, tongue, and throat; the nature of the nervous symptoms, particularly the epileptic form of convulsions, the incomplete or partial palsy, the nervous sinking, anxiety, and muscular tremours, and the low delirium, are diagnostic of poisoning, especially by this substance, and are rarely present, even individually, in cholera, and perhaps never in such states of association as are observed after the administration of arsenic. But strict attention to the phenomena and recollection of the symptoms, as described above, will show the nature of the case with tolerable certainty; although much more precise information, as respects both the moral circumstances and the chemical investigation, will be required for the administration of justice.

409. *H. The Organic Lesions produced by the Preparations of Arsenic.*—These have been described most ably by Dr. CHRISTISON, and illustrated by reference to numerous cases, to which I must refer the reader. The changes produced by arsenic are numerous, and varied in most instances, according to the quantity administered, the state of the stomach at the time, and the period the patient lived after its ingestion. Similar changes are usually observed after poisoning by the external application of the substance to those produced by its internal administration. The most remarkable alterations are generally found when the quantity swallowed has not been very large, and when the individual has lived sufficiently long to admit of the development of inflammatory action and its more immediate consequences. When death has taken place very rapidly—in a shorter period than eight, or ten, or even twelve hours, little or no change is often observed. In these cases it may be presumed that the impression of the poison on the organic nervous system, and the action consequent upon its absorption on the heart and nervous centres, cause death before vascular reaction could supervene.—*a.* Much more frequently, however, the internal surfaces of the stomach and duodenum, often also of the œsophagus and pharynx, on the one hand, and of the intestines, more especially the rectum and colon, on the other, evince signs of inflammatory irritation and certain of its more immediate results, especially capillary injection, sometimes with small ecchymosis, or slight extravasations of blood, or softening of the villous coat, or effusion of lymph, or ulcerations. Red-

ness, with vascular injection, is seldom absent from the throat and gullet, when the patient has lived above a few hours. In the stomach the colour is often a dull or brownish red; or it is of a brighter hue, interspersed with dark striæ of altered blood. The ecchymoses and larger extravasation of blood are always of a dark hue. Ulceration rarely occurs, and chiefly in cases where death has not taken place until after the second or third day. Although inflammatory appearances may be absent in cases which have ended rapidly, yet they have been found in the stomach in several which have terminated in five, six, seven, or eight hours after the administration of the poison. Thickening, or tumefaction of the villous membrane, with more or less softening, a friable state of it, and even abrasions of minute portions, are occasionally observed. Gangrene and perforations of the stomach or intestines are never found. Changes, which have been mistaken for gangrene, have consisted chiefly of extravasations of dark blood. The ulcerations said to have been found in some instances when death has taken place a few hours after the ingestion of the poison, are very probably minute abrasions or excoriations of the villous surface. A sanguinolent fluid is sometimes found in the cavity of the stomach; and occasionally arsenic, variously altered in its appearance, is found closely adhering to the internal membrane. The colon is often much contracted and its inner surface inflamed, especially the sigmoid flexure and the cæcum. The rectum is generally much inflamed and excoriated, the latter change extending around the anus, particularly when life has continued one, two, or three days.

410. *b. The respiratory organs* sometimes are found congested, and the bronchial membrane more or less reddened. Occasionally the pleura is injected, and slight effusions of serum exist in the pleural cavities. The heart is generally flabby, and sometimes the inner surface, particularly the columnæ carneæ and valves, is more or less reddened. The blood is often fluid, and generally dark-coloured. Slight effusions of serum and congestion are occasionally found within the *cranium*. Inflammatory changes are frequently seen in the *urinary passages*, and often extending to the female sexual organs.

411. *c. The antiseptic influence* of arsenic, more especially upon those parts where this substance exerts its injurious action, or where it is brought in contact, has recently attracted attention and been fully established. It thus very frequently not only preserves these parts, more especially the alimentary canal, from putrefaction, but also the alterations which it had produced in them. It may be presumed that the amount of antiseptic effect will depend very much upon the quantity of the poison, and upon the retention of it in the body at the time of death. If much of it remain in the stomach and bowels, or become absorbed and continue either in the blood or in the several tissues and organs, an antiseptic and mummifying effect may be expected; but if the poison be discharged by vomiting and purging, and eliminated from the body before death takes place, then the putrefactive process will proceed as usual, or even with greater celerity. This effect of arsenic in arresting the progress of putrefaction seems to be the result of a chemical action exerted by



this substance upon the fluids and soft solids of the body.

412. *I. The quantity of arsenic likely to destroy life* depends upon a variety of circumstances. But *four grains*, or even *three*, may kill a child, if it be taken in solution or when the stomach is empty. Dr. CHRISTISON adduces the case of a child who died in six hours after taking four grains and a half in a state of solution; and a woman, 70 years of age, was killed by four grains. Mr. TAYLOR states that a young lady died after eating a portion of cake which could not have contained more than *four grains*, and probably less than three grains. He states that three of a party at dinner who had partaken of the port wine on the table were seized with symptoms of arsenical poisoning. The wine was found to contain about one to two grains of the poison in each fluid ounce. A lady took a quantity containing less than two grains of arsenic. In about half an hour she experienced faintness, violent vomiting, but no pain. She recovered after a few hours. A gentleman took as much as contained little more than two grains. His symptoms were similar, but more severe. If he had taken another glass of the wine, he might have been killed. Although the wine was saturated with arsenic, yet no peculiar taste was perceived. The escape of these persons was probably owing to the circumstances of the wine having been taken on a full stomach, and of its having been soon followed by violent vomiting. It is probable that from one to two grains would prove fatal to a child or to a debilitated person, and three grains to an adult. On the other hand, cases of recovery from the ingestion of large quantities are not infrequent. A person recovered after taking half an ounce, the poison having been carried off by vomiting and purging; but instances of recovery from so large a quantity are very rare, and are owing to the arsenic having been taken on a full stomach, and to its speedy evacuation.

413. *K. The period at which death takes place from arsenic* varies with the circumstances so often alluded to. Dr. BORLAND informed Mr. TAYLOR of a case in which two ounces of arsenic were taken, and death took place in less than *two hours* from syncope. There was neither pain, vomiting, nor diarrhoea. Such rapidly fatal cases are very rare. But the time at which death takes place is not strictly dependent upon the quantity of the poison taken. There are many cases reported in which death has occurred in from three to seven hours, but much more frequently it does not supervene until a period varying from twelve or eighteen hours to three days, in the acute forms of poisoning by this substance. In thirteen cases recorded by Dr. BECK, the smallest quantity taken having been one drachm, and the largest two drachms, the shortest period for death was four hours, the longest two days. In one instance, two ounces of the poison destroyed life in three hours and a half; but in another case four or five grains killed a person in four hours; so little does the rapidity of the effect depend upon the dose or quantity. When the poison has been administered in small and repeated doses, and in cases of *slow* or *chronic* poisoning, and in some instances of the external application of it, and when a partial recovery from the

first effects has occurred, a fatal issue may not take place until many days or weeks after its administration.

414. *L. The modus operandi of arsenic* has not always been rightly estimated. This substance has been generally considered as a tonic; but, judging from my experience of its action in my own person, and in the treatment of many diseases, I cannot believe that it possesses any tonic properties, but, on the contrary, that it exerts an *irritating* and *depressing influence*; its chief medicinal effects being *anti-periodic* and *alterative*, effects which result from the employment of it in very small and frequently repeated doses; an irritating and depressing, or paralyzing action, following the administration of larger doses. Its local operation is chiefly as an irritant, capillary injection, inflammation, and its immediate consequences usually occurring. But the primary impression produced by large quantities of this poison is probably sedative as respects the nervous system, both locally and generally, inasmuch as death, preceded by signs of vital depression, often takes place before inflammatory appearances are developed. That *arsenic is absorbed* into the circulation, and affects this fluid, the heart, and the nervous centres, are facts which the detection of it in the liver, spleen, kidneys, [serosity of blisters], lungs, and urine, fully proves, and which the changes in these organs farther serve to show. Even when it is applied to an abraded surface, or to parts which admit of its absorption, it has been found to affect more especially the inner surface of the stomach, duodenum, and large bowels, and it has been detected in these situations by chemical research. It appears to exert a specific influence upon the alimentary canal, irritating and inflaming it, and, at the same time, depressing the organic nervous energy. It exerts, also, a marked action on the emunctories by which it is carried out of the circulation, especially the urinary organs, the villous surface and glandular apparatus of the large bowels, the skin, and lungs; exciting, irritating, or inflaming these, according to the quantity existing in the circulating fluids.

415. *M. Treatment.*—As the poisonous operation of the preparations of arsenic is chiefly owing to the absorption of them, it is obvious that, before they can be absorbed, they must be dissolved—either dissolved when administered, or subsequently by the juices of the stomach. Therefore, no substance ought to be recommended as an *antidote* unless it possesses the property of rendering the arsenic insoluble, or of preventing its solubility; and no known compound possesses this power to any considerable extent. The *hydrated sesqui-oxide of iron* possesses this property to a certain extent. Mr. TAYLOR performed many experiments on this antidote, and obtained the following results: 1st. When arsenious acid is *dissolved* in water, and agitated with twelve or fifteen times its weight of the hydrated oxide, the poison is precipitated with it in a very insoluble form. 2d. When the poison is mixed and agitated in a state of *powder* with the oxide, there is little or no effect, the poison being only mechanically diffused through the oxide. 3d. When the poison in powder is mixed with oxide of iron, rendered alkaline by ammonia, so much appears to

combine with the iron as the quantity of alkali present will render soluble in cold water. The rest is diffused in granules through the oxide. Most of the experiments, he adds, in favour of this antidote have been performed in solutions of arsenic; and therefore the results are irrelevant, since arsenic is most frequently taken in powder, and often in very coarse powder. Recently the *acetate of the sesquioxide of iron* has been recommended as an antidote by M. DUFLOS; but Mr. TAYLOR found that, in respect of arsenic in *powder*, it is as inefficacious as the hydrated oxide, even when an alkali is added, to produce effectual precipitation; and that, with regard to the solution, the poison is more readily precipitated by the hydrated oxide than by the acetate of iron. Other antidotes have been mentioned, more especially large doses of *magnesia* and *charcoal*; but they deserve little credit, and are no farther serviceable than by involving the poison more or less, and thereby preventing its action upon, or its absorption by, the surface of the stomach: an intention which may be accomplished more completely by albumen, milk, and various other substances. The substances formerly lauded as antidotes have been shown, by the researches of RENAULT, ORFILA, and others, to be quite inefficacious; whatever of success may have followed their exhibition having been owing to the several circumstances shown above (§ 51, *et seq.*) to modify, counteract, or prevent the operation of poisons.

416. So little advantage, therefore, being likely to be derived from antidotes, our chief hopes should be placed on the immediate evacuation of the poison from the stomach, and upon the removal of the injurious effects which may have been produced. If *vomiting* has not taken place, or is insufficient, it should be promoted by an emetic of sulphate of zinc, or sulphate of copper, or by mustard taken at intervals in a wineglass of water, or by tickling the throat with a feather; or the contents of the stomach may be removed by the stomach-pump, avoiding as much as possible the introduction of fluids when the poison has been taken in a state of powder or of imperfect solution. When vomiting takes place, it may be promoted by taking albumen, milk, thick mucilaginous fluids, linseed tea, &c.; and, although the patient should not be allowed to exhaust his strength in retching, without some one of these fluids being taken for the stomach to act upon, still it should not be taken in too large a quantity at one time, in order that the stomach may contract frequently on itself, and thus expel from its surface the mucous secretion which often envelops the poison, and protects the inner surface of the organ from its action. Mr. TAYLOR advises a saponaceous liquid, made of equal parts of oil and lime-water, to be given; and Dr. PARIS a free exhibition of olive oil. When vomiting has commenced from the action of the poison, an emetic or the stomach-pump is then necessary, as this operation will proceed, when aided by the fluids just mentioned.

417. Having by these means discharged the poison from the stomach, there generally remain two formidable morbid conditions produced by it to be removed. These are inflammatory irritation and action of the alimentary canal, and nervous or vital depression, with va-

rious concomitant phenomena. This association is of the most perplexing kind, inasmuch as the means calculated to relieve the one aggravates the other. Nevertheless, if there is sufficient reason to infer that the poison is altogether evacuated, and more especially if the first impression or shock produced by the poison has passed off, the pain and vomiting having developed more or less reaction, blood-letting, general or local, or both, will be practiced with advantage; but if too early resorted to, the absorption of the poison and the vital shock may be both increased by it. Terebinthinated epithems, sinapisms, or blisters over the epigastric region, or over the greater part of the abdomen, and a free exhibition of opium by the mouth, and in starch or mucilaginous enemata, are generally most beneficial; but before opium be given, the entire evacuation of the poison should be ensured. Subsequently, and when the irritation of the bowels assumes a dysenteric character, or when tenesmus or dysuria is urgent, the opium may be conjoined with ipecacuanha, camphor, nitrate of potassa, tragacanth, &c.; and these may be administered also in enemata. The medicated warm-bath; fomentations to the perinæum and anus, preceded by the application of leeches to those parts, and a farinaceous or mucilaginous diet, are important parts of the treatment.

418. The *nervous symptoms* often accompanying the vital depression produced by the poison are most successfully treated by opium taken with small doses of camphor; by the application of terebinthinated embrocations; and by mild tonics and restoratives in small doses, and in demulcent vehicles. If palsy continue after the removal of disorder of the digestive organs, exercise in the open air, the preparations of nuxvomica, or strychnia cautiously prescribed, and external irritants are the chief means of cure. If the bowels become confined, either during the more chronic cases, or during recovery or convalescence, olive oil, taken in frequently repeated doses, and administered in enemata, is the most appropriate aperient. During convalescence, and for a long period afterward, dyspepsia, flatulence, and various states of disorder of the digestive organs often continue for a long time, and are best relieved by change of air, by travelling, and by strict attention to diet; by the adoption of a bland, farinaceous diet, avoiding spirituous liquors, and the substances pointed out as injurious in the article on INDIGESTION.

419. iii. COLCHICUM AUTUMNALE — *Meadow Saffron*.—All the parts of this plant are poisonous at such periods of the year as occasion their development or perfection, but they vary slightly in their effects. The several preparations of the plant have lately been much employed in medicine, on account of their influence in paralyzing or diminishing morbid sensibility, in removing pain, and in increasing the functions of excreting organs, especially of the digestive canal, the liver, and kidneys; its effects on these, however, being by no means certain. In large doses, it acts as an irritant of the alimentary canal; and as a sedative, often remarkably depressing vascular action and vital power. Even from small or medicinal doses, these injurious effects are manifested in some instances, and not in a few of these the vital depression is ex-



treme, and consequent upon one third or one fourth of the usually prescribed medicinal dose. I have seen on several occasions poisonous effects produced by too great temerity in the use of this medicine; and these effects were not manifested so injuriously on the digestive canal as on the nervous system and vital influence; extreme sinkings, failings of the pulse, and syncope, following its ingestion. In two instances—in one a powerful man—a single dose of only ten minims of the tincture, which I prescribed for gout, produced alarming symptoms; and a drachm, taken by a medical man contrary to my advice, produced effects from which he recovered with difficulty. In some constitutions, owing to idiosyncrasy, it acts with remarkable severity, particularly as respects the vital depression produced by it. GEIGER and HESSE discovered a principle in this plant, or alkaloid, which has been called *colchieina*, *colchicia*, or *colchicine*, and which neutralizes acids, and forms with them crystallizable salts.

420. A. The symptoms arising from poisonous doses of colchicum have been described by Messrs. FEREDAY, CHEVALLIER, DILLON, HADEN, and CHRISTISON. The corns, the seeds, the flowers, and the leaves of the plant produce nearly similar symptoms when taken in large quantities. An hour, or an hour and a half, after the ingestion of the poison, acute pain, followed by retchings, vomiting, and tenesmus or purging, or both, is experienced. The pulse soon becomes feeble, the countenance anxious, and afterward the matters vomited are dark-coloured, and the purging profuse and watery. The pulse is excessively slow or feeble, the respiration hardly perceptible or feeble, the muscular weakness extreme, and the urine suppressed, the watery portions of the blood being discharged by the bowels and stomach. The patient sinks after a period, varying with the dose and the constitutional powers, from a few hours to three or four days; but there are neither convulsions, nor insensibility, nor delirium, unless in a few instances. Mr. TAYLOR states that a burning pain is felt in the throat and œsophagus; but this is not mentioned in the details of some cases, and probably it depends much upon the state in which the poison is taken. Mr. MANN communicated to him a case in which three drachms and a half of the wine of colchicum were taken in divided doses, and caused death on the fourth day. There was no inflammation of the mucous membrane found on dissection, but simply extravasation of blood into the mucous follicles. Mr. TAYLOR states, that a man took a decoction made with a table-spoonful of the seeds and a pint and a half of water. He was seized with vomiting and purging, which were incessant until death, which took place in about thirty-six hours. The only appearance of note was, that the stomach had a violet or purple hue. A gentleman swallowed, by mistake, an ounce and a half of the wine of colchicum: he was immediately seized with severe pain and the other symptoms, and died in seven hours. In another instance, where an ounce was taken, death occurred in thirty-nine hours. Most of the cases recorded of poisoning by this substance have been detailed imperfectly and loosely. In Mr. FEREDAY's case, which has been given more fully than the others, there was no cerebral disturbance.

421. B. The chief appearances observed on dissection, were a patch of redness in the internal surface of the stomach, near the cardiac orifice, and a slight effusion of blood between the muscular and peritoneal coat of a portion of the jejunum. The omentum was turned up between the stomach and convex surface of the liver behind, and the diaphragm in front. The pleuræ were somewhat reddened, and the lungs much congested with black blood. The heart was flabby, and its structure easily broken down. The surfaces of the lungs, diaphragm, and heart were covered with ecchymosed spots. The bladder was empty. The face, neck, front of the thorax, insides of the thighs, and the integuments of the scrotum and penis, were covered with patches of purple efflorescence. (*London Med. Gaz.*, vol. x., p. 160.) In the bodies of the children mentioned by BERTH there was considerable redness of the stomach and small intestines. In GEIGER's case, inflammatory appearances were seen in the stomach and small intestines. In a case related by M. CHEVALLIER, and in another adduced in the *Edinburgh Medical Journal*, no alterations were found. (CHRISTISON, *op. cit.*, p. 792.)

422. C. Treatment.—Retchings often continue for some time, and are ineffectual; therefore still vomiting should not be expected without the aid of an emetic, which may consist of sulphate of zinc or mustard mixed in water. The stomach-pump may be employed if the patient be seen soon after the ingestion of the poison. After the evacuation of it from the stomach, it remains to counteract the injurious impression produced by it on the organic nervous system, and upon the heart and nervous centres by its absorption into the circulation; and the only means we can employ with these intentions with any hopes of success, are opium, ammonia, camphor, capsicum, and creasote, variously combined, according to circumstances. I have had very frequent recourse to the preparations of colchicum in practice, but have seldom given them in full doses without conjoining them with one or more of these substances, which have always prevented any unpleasant symptoms from following their administration. Where idiosyncrasy, also, has stood in the way of their exhibition, I found these medicines prevent any sinking and distress, and to remove these effects when they have appeared. There can be no doubt, therefore, that these remedies are most appropriate in cases of poisoning by colchicum. They may be aided by sinapisms, or terebinthinate embrocations, or epithems over the abdomen, and by mucilaginous or oleaginous draughts and injections, which may be made the vehicles of the remedies just advised.

423. iv. HELLEBORE.—*Black Hellebore*, *Helleborus Niger*—*White Hellebore*, *Veratrum Album*—*Veratrum Sabadilla*—*Veratrine*—*Veratria*.—The operation of black hellebore and of veratrum is nearly similar; and the alkaloid of the latter—*veratria*—produces the same action as either of these, a much smaller quantity being required to produce the same amount of effect.—A. *Black hellebore*, in poisonous doses, causes a burning pain in the stomach and intestines, vomitings, purging, cramps in the lower extremities, cold sweats, faintness, paralysis, sometimes insensibility from exhaustion or vital depression, and extreme weakness of the

pulse. Death appears to result from the excessive vomitings and purging, and impaired irritability and action of the heart.

424. *B. White hellebore*—*Veratrum album*—acts as a local irritant, exciting at the same time the nerves of the part. In excessive doses, it irritates the digestive mucous surface, and depresses nervous and vital power. The symptoms are violent vomiting and purging, sometimes of blood; tenesmus, and griping pains in the bowels. These are preceded or attended by a burning sensation in the mouth, throat, and œsophagus; constriction of the throat, with a sense of strangulation; and are soon followed by a small or almost imperceptible pulse; by faintness, cold sweats, tremblings, giddiness, loss of voice, blindness, and dilated pupils, insensibility, syncope or convulsions terminating life. In some cases, noticed by Dr. PEREIRA as having occurred to Dr. RAYNER, these symptoms were present, with the exception of purging.

425. *C. Veratria* is poisonous in very small doses. Mr. TAYLOR states that a physician prescribed for a lady one grain of veratria divided into fifty pills, and three were directed to be taken for a dose. Not long after the first dose had been swallowed she was found insensible, the surface cold, the pulse failing, and with other symptoms of approaching dissolution. She remained some hours in a doubtful state, but ultimately recovered. If the veratria was well mixed in the pills, the dose was here not large; but this admits of doubt.

426. *D. The treatment* of poisoning by these substances is similar to that recommended for other poisons belonging to this class. After the evacuation of the poison, the effects should be attempted to be removed by means of stimulants conjoined with opium. In a case treated by Dr. PEREIRA, the infusion of nutgalls seemed to give relief. Coffee has been recommended both as a drink and as a clyster. The external applications already advised in similar circumstances should not be withheld. Demulcents should be made the vehicles for stimulants, astringents, and opiates.

427. *v. Food Poisons*—*Poisonous Food*—*Poisonous Fish*—*Poisonous Meats*—*Poisonous Cheese*.—Various articles of food not infrequently occasion injurious effects, and even death in a few hours. The slighter effects have sometimes arisen from idiosyncrasy; but not so frequently as supposed by some writers. This cause may be admitted in respect of those instances which have sometimes occurred of a single person only having been affected, of several who have partaken of the same article or dish. Poisonous articles of food—fish, meats, &c.—have hitherto been classed as *acro-narcotics*. As they are more or less irritant, and as acrid and irritant convey ideas nearly related, the first part of the appellation somewhat approaches the truth; but that they produce narcotic or stupefying effects cannot be so readily conceded, inasmuch as this particular effect no farther appears than as it results in some instances from the sinking of vital and cerebral power, and the diminution of sensibility owing to this state. These poisons, in truth, act as irritants of the alimentary canal, and as sedatives or depressants, or paralyzers of organic nervous or vital energy. While they irritate the mu-

cous surfaces, and glandular apparatus of that surface, they rapidly depress vital power; and the irritation they occasion passes not into inflammatory action, but into excessive secretion and exhalation; or, if inflammatory action be developed, it is of an asthenic and spreading form. That these poisons do not act locally only, may be inferred from the ultimate effects being much more serious in most instances than the amount of local lesion can explain; from their contaminating nature, from the ready imbibition of them by mucous surfaces, and from their speedy absorption from these surfaces. The various articles which are sometimes productive of poisonous effects occasion modified or even different symptoms; but they are remedied by very nearly the same means.

428. *A. Poisonous Fish*.—Several species of fish, both in this climate and between the tropics, are always poisonous; and others are injurious only occasionally or rarely. Some accounts of the poisonous fishes of the tropics have been given by Drs. THOMAS, CHISHOLM, and FERGUSON; and various memoirs and notices of the poisonous fish found in Europe have been published by Dr. BURROWS, Dr. COMBE, Dr. EDWARDS, Professor ORFILA, and Professor CHRISTISON. I had occasion many years ago, within the tropics, to treat a case of poisoning by fish, which nearly proved fatal; and I have seen two or three instances of poisoning by mussels in this country; but there was no danger in these cases, although the symptoms were severe. The fish which are the most frequently injurious in this country are all the kinds of edible shell-fish, especially mussels, cockles, periwinkles, lobsters, crabs, and craw-fish. And either of these, when kept too long after having been boiled, or when only parboiled and reboiled after various intervals, as sometimes practiced by the lower dealers, will produce more or less disorder. Salmon and eels are also sometimes poisonous, but the former is injurious chiefly when out of season, or when insufficiently preserved.

429. *a. The symptoms* produced by poisonous fish differ much in different persons; and certain of the effects observed are more or less owing to idiosyncrasy; but the most violent and fatal operation is not so frequently, if at all, owing to this cause.—(a) Thirty persons were poisoned by mussels in Leith in 1827, and of these two died. The symptoms were carefully observed and described by Dr. COMBE. No one complained of anything peculiar in the smell or taste of the mussels, and none suffered immediately after eating them. An hour or two or more elapsed, and then the bad effects consisted rather in uneasy feelings and debility, than in distress referable to the stomach. After eating two or three, and various numbers above this, the lowest number, slight tension at the stomach, with heat and constriction of the mouth and throat, was complained of. These were succeeded by a difficulty of swallowing and speaking freely, by prickly feelings in the hands; by numbness about the mouth, gradually extending to the arms, with great debility of the limbs. Two or three had cardialgia, nausea, and vomiting; but these were not general or lasting symptoms. The muscular debility was present in all the cases. An unpleasant taste was felt in the mouth. There was slight



pain in the abdomen, on pressure, especially in the region of the bladder. The secretion of urine was suspended in some cases, in others it was free, but passed with pain or effort. The action of the heart was feeble, and the breathing unaffected. The face was pale, and expressive of anxiety; the surface somewhat cold, the mental faculties unimpaired. One of the two fatal cases died in three hours, the other in six or seven hours. In one case only did the symptoms of irritation pass into those of inflammation of the digestive canal. The instance which was treated by me within the tropics was characterized by constant vomiting, by remarkable loss of muscular power, by rapid failure of the heart's action, coldness and clamminess of the surface, and sinking, with intermissions of the pulse. This form of fish poisoning may be called the *paralytic*, or vitally depressing, this condition predominating over the irritant.

[We have known vomiting, and all the symptoms of acrid, irritant poisons, produced by eating of halibut, crabs, lobsters, oysters (out of season), mussels, &c. In one instance, a family of six were poisoned by eating mussels, of which one died, with all the symptoms of aggravated cholera morbus. Dr. A. C. Post has reported a case of poisoning, from eating a portion of the liver of the halibut, in the *New York Journal of Med.*, vol. i., p. 101. The patient was attacked soon after eating with pains, nausea, vomiting, and headache; and soon after the skin began to exfoliate from his face, and successively from every part of the body. The disease went off in a few days under the use of diaphoretics and the warm bath.]

430. (b) In the other form of poisoning by fish, cutaneous eruptions, with or without asthma, or asthmatic symptoms without external eruption, are generally present, and signs of local or general irritation predominate. From one to two or three hours after eating the fish, especially mussels, uneasiness, or sense of weight at the epigastrium; heat, and constriction of the mouth and throat, with thirst; numbness, prickings, and itchings of the surface, particularly of the extremities; difficulty of breathing, lachrymation and swelling of the eyelids, and an eruption resembling urticaria are complained of; but sometimes the eruption is papular, sometimes vesicular, and it is always attended by heat and itching. These symptoms are sometimes attended by vomitings, by colicky pains and diarrhœa; but these are often absent, or of short continuance. In the cases related by MOHRING, the eruption was preceded by dyspnœa, lividity of the face, insensibility, and convulsions. In Dr. BURROWS's cases, the symptoms began with dyspnœa, nettle-rash, and swelling of the face, conjoined with vomiting and colic; delirium and convulsions supervened, and death took place in three days. In MOHRING's cases the symptoms appeared in a few minutes; in those by Dr. BURROWS not until twenty-four hours after eating.

431. (c) Fish kept too long before or after having been cooked, or otherwise spoiled, especially salmon and shell-fish, has, in two or three instances which I have observed, produced symptoms differing more or less from the two forms of fish poisoning now described. The poison causing the above effects exists in the fish when cooked, is present in the fresh or live

state, and is not produced by changes that have taken place, either after death or after cooking. But the injurious effects occasioned by such changes as occur after the death, or the cooking of the fish, are different from the foregoing; and are not attended by either the rapid sinking of vital power on the one hand, or the dyspnœa and eruption on the other. The injurious operation in the circumstances now stated, very much resembles an attack of colic, with vomiting, or an attack of cholera; there being generally severe vomiting with griping pains, occasionally purging with cramps of the extremities, much debility, and sinking of the pulse; but these latter symptoms are not so severe as in the first form, and death has not occurred in any of the cases which I have seen.

432. b. The source of the poison, in these cases and forms of fish poisoning which are produced by fresh fish, has been a matter of speculation. In the numerous cases observed by Dr. COMBE the mussels were fresh, plump, and healthy-looking; and Dr. CHRISTISON analyzed some of those which were taken from the stomach of one of his patients without being able to detect a trace of copper, to which the poisonous operation of fish has been attributed. That idiosyncrasy has, as Dr. EDWARDS contends, something to do with the injurious effects of fish, is true in few or rare instances. Dr. CHRISTISON remarks, that a relation of his could not partake of salmon, trout, herring, turbot, or lobster, without being attacked with violent vomiting; and several instances of the kind have been mentioned to me by persons who have possessed this peculiarity; to which, however, fish poisoning cannot be imputed in the great majority of cases. In the nearly fatal case seen and treated by me in a most intimate friend now living, who was never disordered by any kind of fish on any other occasion, and has always been in the habit of partaking freely of every kind of fish, no such idiosyncrasy existed. The mussels, which proved to be poisonous to thirty persons in Leith, were minutely examined by Drs. CHRISTISON, COMBE, and COLDSTREAM; and it would appear that nothing particular was detected in their appearance; excepting that the liver appeared much larger, darker, and more brittle than in the wholesome fish. The poisonous mussels were all taken from one spot, and every person who partook of them was more or less severely affected, according to the number who ate of them. Animals suffered as severely as man, a cat and dog having been killed by them. It is very probable that, as respects these mussels, and perhaps also as regards some other shell-fish, the poisonous principle exists in the liver, as suggested by the statement of Dr. CHRISTISON, but what that principle is has not been ascertained. In the cases of poisoning of two women by mussels, M. BOUCHARDAT states, that he detected sufficient copper to account for the effects; but it is not detected in most cases, and even when present, the quantity found is too small to account for the poisonous effects on the human subject. There can be no doubt, as I have suggested above, that much of the injurious effects of various kinds of shell-fish, eels, &c., arise from a sickly state, produced by the means used to bring them alive to market, and that the choleric and colicky symptoms described (§ 431) as

being often produced by salmon and other kinds of fish, arising chiefly from changes subsequent to the death and cooking or preserving of the fish.

433. *c. The treatment of fish poisoning* should depend much upon the time that has elapsed from the eating of the fish until the commencement of the symptoms; and this may vary from a few minutes to twenty-four hours, or even more. If the period has been short, and the fish still remains in the stomach, an active emetic, as mustard, or the sulphate of zinc, should be given with a large dose of capsicum, and the vomiting encouraged by means of diluents, conjoined with stimulants, aromatics, spices, &c. The elapse even of a long period between the ingestion of the fish and the appearance of disorder, should not prevent a recourse to emetics, for the fish may, in its poisonous state, remain long unchanged in the stomach. If vomiting has taken place without the aid of an emetic, it should not be considered sufficient unless there has been an abundant discharge of undigested or other matters, the treatment now advised being required nevertheless. If the irritability of the stomach become excessive, it will be of no avail to attempt to remove it by means of opium and effervescing draughts, unless they be conjoined with powerful stimuli and warm spices; for this state of the stomach is always in fish poisoning attended by sinking of the vital powers, especially of the heart's action, and by colicky pains and flatulent distention of the bowels. Powerful stimulants, aided by warm embrocations, rubefacient epithems, or sinapisms, over the epigastrium and extremities, are then required. I believe that capsicum—the true cayenne—or small bird-pepper—is an antidote to fish poison, when taken freely. In the nearly fatal case, which I treated within the tropics (§ 429), after other means had failed to allay the vomitings and rally the powers of life, and after brandy and water had been thrown off the stomach, a teaspoonful of powdered cayenne was mixed in a tumblerful of brandy and water (equal parts of each), and taken at a draught. All the symptoms were instantly mitigated, and the next day nothing more than debility was complained of. That the constant vomitings attending this and some other states of poisoning is owing to more than irritation—is owing in some degree to exhaustion of vital power, is shown by the instant arrest of both the nausea and the vomitings by so powerful an excitant as that now mentioned, and which I have prescribed in somewhat similar conditions with equal advantage. I have employed this spice, especially in an early part of my practice, and in malignant diseases, in very large doses, believing that it is not so irritating to the stomach as its impression on the nerves of the mouth and palate would indicate, but that, on the contrary, it imparts a salutary stimulus to the digestive canal, and counteracts the influence of many depressing agents. If the poisonous fish have passed into the bowels, causing colicky pains, flatulent distention of the abdomen, and sinking of the vital powers, enemata, containing spirits of turpentine, with castor oil; and, in extreme cases, asafoetida or capsicum, or both, should be administered and repeated, according to circumstances, and the warm turpentine embrocation or epithem ought to be applied over the abdomen.

434. *B. POISONOUS MEATS.*—Certain kinds of meat are sometimes poisonous even in a fresh state, independently of any disease. Others are poisonous owing to some disease of the animal at the time of death. Others, again, are injurious in consequence of changes which have occurred after the animal has been killed—these changes arising either from the deposit of the ova; or exuviae of insects—from fly-blowing, or from decomposition, or the more slowly developed combinations of the elementary particles which take place in imperfectly preserved or salted provisions, especially in sausages, dried meats, bacon, &c. The secretions of certain animals are poisonous during their lives, especially those possessed by them for the purposes of self-preservation; and the fluids and secretions of others are sometimes poisonous, both during life and after death, owing to the nature of the disease of which these animals are the subject. These latter infect the healthy, contaminating the fluids and soft solids. They are fully considered in the articles BLOOD, DISEASE, and INFECTIO, and in those devoted to the specific forms of disease to which they give rise. Some notice is also taken of certain of them when treating of *Septic Poisons*.

435. *a. Fresh pork* is often injurious, and gives rise to various symptoms, according to the idiosyncrasy of the individual and to the manner in which the animal had been fed. In the East, especially in warm climates, pork is often injurious, and productive of diarrhoea and dysentery; effects which I have seen caused by it in several instances in this country. The Mosaic law forbade the use of it; and there can be no doubt of the wisdom of this law as respects warm countries, and I believe as regards all countries. The *poisonous effects* of fresh pork vary. In the most severe cases it has produced a dry and burning sensation in the throat, with heat and pain in the stomach, retchings and vomiting; a sense of sinking at the epigastrium; a weak, small, and irregular pulse; coldness of the extremities, a cold and clammy perspiration, and colicky pains in the abdomen and around the umbilicus. In other cases the pain has been confined to the stomach alone, or it has been situated in some other part of the abdomen. In addition to these symptoms, there have sometimes been remarkable swelling of the face extending over the scalp without any vesication or redness, swelling and tenderness of the abdomen, an eruption resembling urticaria over the breast, legs, and arms, and a quick, sharp pulse. In rarer instances, there have been neither retchings nor vomitings, but severe colicky pains, and sinking of the pulse and vital powers. Such were the more acute cases of poisoning with pork, and of which Dr. McDEVITT has detailed six cases, all of which were produced by fresh or recently salted pork, and especially by roasted pork. He believes that the injurious effects are produced chiefly by the fatty parts; but I have reason to believe that the viscera are still oftener injurious. [In this country, a preparation of pork called *head-cheese* is more frequently injurious than any other variety of this food, and this is probably owing to incipient decomposition in the centre, as in the case of the German sausages.]

436. The symptoms may appear any time from three or four to thirty hours after the in



gestion of the meat. When the symptoms are delayed until seven or eight hours after the pork has been eaten, they much resemble those of either violent colic or enteritis, and are attended by a sense of sinking or of impending dissolution, and a weak, intermitting pulse, &c. In other cases, especially when a longer period than this has elapsed from the ingestion of the poisonous food—from twelve to twenty-four hours—diarrhœa, or an attack resembling cholera, or dysenteric symptoms of a severe character, have taken place. In many instances the symptoms are slight, especially when the offending article has been evacuated speedily by vomiting or by copious evacuations from the bowels; and even when the symptoms assume an alarming character, the discharge of it, when fully accomplished, is followed by immediate relief of all the symptoms. When only one, of several of those who have partaken of this food, has been thus affected, then we may infer either that the affection is owing to idiosyncrasy, or that the part eaten by the individual has been tainted or otherwise changed; but I am acquainted with occasions on which great numbers of persons, as a large portion of a regiment of troops, have been affected after eating fresh pork, some very severely, with the symptoms above described, or with diarrhœa, or colic, or dysentery.

437. *b. Bacon* seldom produces symptoms of *acro-sedative* poisoning unless those parts of it generally on or near to the surface, which have undergone change during the process of preserving, or near the large vessels. Mr. TAYLOR states, that one fatal case from poisoning by bacon occurred in the metropolis in 1836; and I have seen very severe effects produced by a minute portion of a spoiled or rusty part of ham or bacon having been swallowed. But equally severe and nearly similar symptoms have followed the ingestion of a very small piece of either *mutton* or *veal*, when fly-blown or otherwise changed. Mr. TAYLOR states, that meat of any kind, when too recently killed or decayed, may produce severe effects, and even death. I believe, however, that decay, unless far advanced or connected with the deposition of the ova or exuviae of insects, or the generation of mouldiness, or the lowest forms of animal life in the preserved articles, will not produce of itself the severe symptoms constituting acute or fatal poisoning.

438. *c. Animal substances of various kinds* have become poisonous, owing to changes during their preservation, which Dr. CHRISTISON has called a "*modified putrefaction*." In Germany and other countries, where animal substances are preserved by drying and smoking chiefly, and without much salt, some unknown injurious principle appears to be developed in these substances from the combinations of their elementary particles during the process of preservation. The articles in which these injurious changes have been observed are sausages, bacon, and hams, dried mutton and beef, cheese, smoked salmon, and various other dried or preserved animal substances.

439. *(a) Sausages* have proved most frequently poisonous; but it is possible that they may, at least in some instances, have possessed this property independently of any changes during their preservation, and that it may have existed

in the flesh or viscera of the animal, especially the pork, when quite fresh, of which the sausages were made. This circumstance is rendered the more probable by the accounts of three cases which terminated fatally from the effects of sausages made with the liver of an apparently healthy pig slaughtered only a week before. The inspection of the bodies threw no light on the more immediate cause of death in these cases. (*Lond. Med. Gaz.*, November, 1842.) But the poisonous effects so frequently observed in Germany to be produced by sausages more evidently are developed by a modified putrefaction or by a combination of the elementary particles, taking place during the process of preservation, and different from the usual states of putrefaction. The sausage poison has been described by Dr. CHRISTISON from the materials furnished by KERNER, DANN, and HORN. In a period of little more than thirty years, 234 cases of sausage poisoning occurred in the state of Würtemberg, and of that number 110 proved fatal. Those sausages which have been found poisonous have usually been of large size, and cured by drying and smoking with wood. They become deleterious in the spring after they have been long kept, and been alternately frozen and thawed; and are poisonous only at a particular stage of decay, and cease to be so when putrefaction has fully advanced. Those that are poisonous possess an acid reaction, are soft, have a nauseous putrid taste, and an unpleasant sweetish-sour smell. The central parts are chiefly deleterious, these parts being poisonous even when the surface is wholesome.

440. *(b) The poison of cheese*, as observed in several Continental countries, and rarely in this, appears to be developed by analogous changes in the curd to those observed in sausages; and is more properly developed by a partial decomposition having taken place in the curd before it was subjected to pressure, than by any change subsequently to this process. Dr. CHRISTISON thinks that the cheese poison is occasionally met with in Cheshire, where among the small hill-farms the limited extent of the dairies obliges much of the curd to be kept for several days before the quantity required for large cheeses is accumulated.

441. *d. The symptoms* produced by spoiled *sausages, cheese, bacon, hams, and salmon*, which has become partially decomposed before, or after being cured, are probably very nearly the same in respect of each of these articles; but they have been more frequently and precisely observed and described as regards the ingestion of spoiled sausages. Generally, the effects of these are not manifested until twenty-four hours, or two, three, or even four days after they have been eaten. This tardiness of operation is probably owing to the difficulty of digesting them, and the slowness of their absorption. The first symptoms are pain in the stomach, vomiting, purging, dryness of the mouth and nose, and hoarseness or loss of voice. Deglutition becomes difficult and painful; the pulse fails, swoonings ensue, and the skin is cold and ultimately insensible. The eyes, eyelids, and pupils are almost motionless. The secretions and excretions are at last suspended, but often profuse diarrhœa continues throughout. Fever is rarely present, and the mind continues unaffected. Fatal cases end with convulsions and

oppressed breathing between the third and eighth day. In cases of recovery, convalescence is very long protracted.

442. *c. The appearances on dissection* have been described as observed in cases of sausage poisoning. There are usually signs of inflammatory irritation in the internal surface of the digestive canal. The throat is white and dry; the œsophagus thickened; the stomach and intestines reddened, and croupy exudations are formed on the surface of the trachea. The heart is flaccid, and the body is said to resist putrefaction. But it is evident, from this account, that the structural changes consequent upon poisoning by these articles of food have not been observed with due care and precision.

443. *f. The treatment of poisoning by pork, or by sausages, preserved meats, and other articles too long kept or imperfectly preserved*, should not differ materially from that recommended for fish poison. The chief indication is to procure the discharge of the offending substance as speedily as possible, by means of the emetics conjoined with the warm spices already mentioned (§ 433). If it be inferred that it has passed the pylorus, the enemata advised for fish poison, and the external applications also recommended, should be resorted to. In cases of poisoning by these substances, *creasote*, conjoined with warm spices, with small doses of opium, and with ipecacuanha if diarrhœa or dysenteric symptoms appear, will be found of great service, especially when the stomach becomes irritable. In most cases, also, mustard poultices, or turpentine epithems, over the epigastrium or abdomen, will be of service; and they ought never to be omitted in the more acute and dangerous cases.

444. *C. DISEASED ANIMAL SUBSTANCES, FLUIDS, SECRETIONS, &c.*—*a. The flesh of over-driven animals*, especially if these animals have been deprived of drink for some time before they were killed, and probably also their viscera, produce injurious effects, especially in cachectic constitutions. But, according to the experiments of M. MORAND, the flesh of such animals is perfectly wholesome when cooked and eaten, although the application of the blood, or raw flesh, to a scratch or wound, or even to the sound skin, is often followed by dangerous or fatal effects: sometimes consisting of an eruption of gangrenous boils, the *pustule malignes* of the French, at other times appearing as diffuse inflammation of the skin, or of the cellular membrane, or of both.

445. *b. The viscera and offal of animals* occasionally produce analogous effects to these just mentioned, even on the unabraded surface. Sir B. BRODIE has shown that the contact of these with abraded or wounded parts may cause chronic states of erysipelas, &c. I have seen several instances of the scratches or pricks of the fingers of cooks by the bones of hares or of other animals, and even abrasions of the skin, having been followed by inflammation of the absorbents or of the veins, or by diffusive inflammation of the cellular tissue.

446. *c. The flesh or viscera of diseased animals*, and especially of those which have died of epidemic or epidemic distempers, are undoubtedly injurious, and even in some instances rapidly fatal. Mr. TAYLOR states, that four members of a family in Oxfordshire, in the spring of 1841,

dined in good health upon part of a sheep which had died of a disease then prevalent among cattle. The symptoms which followed this meal resembled those of irritant poisoning, accompanied by others indicating an affection of the nervous system. One of the patients, a child, died in less than three hours; the others recovered. There was no poison discovered in the food, nor in the body, nor was any poisonous vegetable used at the meal. (*Op. cit.*, p. 214.)

447. *d. There are certain districts in North America*, in which the *milk and flesh of animals*, especially cattle, acquire poisonous properties from the grass [or some vegetable] on which they feed. The disease thus produced in persons who partake of this poisonous food has been named in America the “milk-sickness,” or “trembles.” These districts lie to the west of the Alleghanies, and those who venture within them are obliged to abstain from the flesh of the cattle within the same limits, as well as from the milk and its preparations. It appears from the report of Drs. HOSACK, POST, and CHILTON, that the inhabitants of some of these districts, with a reckless disregard of human life, carry the butter and cheese, which they dare not themselves eat, to markets at a distance; and that thus symptoms of poisoning, and even death, for which the medical attendant cannot account, are frequently produced. According to the same report, the cattle from these districts are sent in great droves over the mountains, hut, in order to deceive the purchasers, they are sent to New York by a southern route. The flesh of these animals occasions aggravated symptoms of cholera. “The viscera of these cattle are often found diseased; the livers most generally so.” Owing to the symptoms of poisoning which have followed the use of beef, butter, and cheese from these districts, the American government caused a medical inquiry to be instituted into the matter, and the reporters recommended the sale of these articles to be prohibited. In the event of this recommendation being adopted, it is not improbable that the poisonous food may be exported to England. (*See Edin. Med. & Surg. Journ. for July, 1844.*)

[Cases of poisoning by eating smoked beef, cheese, head-cheese, and ham, are not of unfrequent occurrence in this city. In December, 1841, about forty cases of poisoning from eating smoked beef occurred in a particular neighbourhood, all of which could be traced to the same source. About nine hours after partaking of the food, pain and uneasiness were experienced at the præcordial region, which, extending to the back and loins, were only temporarily relieved by the dejections which followed: vomiting now supervened, attended with great thirst and a burning sensation at the pit of the stomach; indeed, the irritability of this organ soon became so great, that no substance, either as food or medicine, could be retained by it for an instant. These symptoms soon assumed the most aggravated form; extreme prostration followed; the functions of the nervous, muscular, and digestive systems were much impaired, and the period of convalescence was very protracted and tedious. In one case only did the attack prove fatal. There can be no doubt, I think, that the poison was generated by partial decomposition after the death of the



animal; or it is possible that the animal which furnished the beef was diseased. Analysis proved that the beef contained no mineral or vegetable poison. A decoction made from it, when thrown into the circulation, caused death in about three hours and a half; while a similar preparation, made from sound beef, produced no morbid signs in the animal experimented on.

A peculiar endemic prevails in certain portions of the Western States, called the *milk-sickness*, or *trembles*. The former name has its origin in the circumstance that the disease is frequently communicated to man by the use of the milk or butter of an infected animal, though it will be as readily produced by eating the flesh; and the latter name arose from the symptoms of a *trembling motion* of the voluntary muscles manifested in cattle. Horses as well as cattle die by the poison, and dogs, cats, buzzards, turkeys, chickens, and crows die by eating the flesh of animals that have perished by this disease. Sometimes the animals are affected to that degree that their flesh and milk will produce the disease in man, and yet they themselves manifest no unhealthy symptoms whatever. (*American Med. Recorder*, vol. vi., p. 257). Dr. GRAFF, of Edgar county, Illinois, says, "Hundreds of persons throughout the West and Southwest are annually perishing from its attacks. Butter and cheese manufactured from the milk drawn from the infected cows are supposed to be the most concentrated forms of this poison. They possess no distinguishing appearance, colour, or taste from the healthy article. A very minute quantity of either will suffice to develop the disease in man. The cream ordinarily be added to the coffee drank at a single meal is said to have induced an attack. The butter or cheese eaten at one repast has frequently been known to prove effective. The property is not contained in any of the elements of the milk exclusively, but distributed throughout the whole of them, being possessed by the buttermilk as well as the whey." The same writer remarks (*Am. Jour. Med. Sciences*, 1841), "That a murderous practice is now carried on in certain districts, in which the inhabitants will not themselves consume the butter and cheese manufactured, but, with little solicitude for the lives or the health of others, they send it in large quantities to be sold in the cities of the West, particularly Louisville, Kentucky, and St. Louis, Missouri." The committee who reported upon the subject of poisoned beef, already referred to, Dr. FRANCIS, chairman, observe, "From the inquiries which we have made, we have ascertained that immense droves come from the West to supply our markets; they are driven across the mountains and reach New York from the south; hence they are called by the dealers 'Southern cattle.' Many of these cattle become diseased on the route, and are then exchanged for the pasturage of the herd. In this condition they are frequently slaughtered by the farmers, the flesh sent to the city and exposed for sale, producing in persons who make use of it symptoms of aggravated cholera morbus. Physicians attest that they have frequently met with such cases, which it was impossible to account for in any other way." It is a well-known fact that the liver, in southern and western cattle, is very liable to

be diseased; so much so that it is always cast away, it being actually unknown as an article of diet. The late Dr. FERRY observes (*N. Y. Journ. of Med.*, Nov., 1843), "Among the cattle of our western country, and especially of Ohio, there are frequently found in the liver the most extraordinary heterologous formations. This viscus is often discovered completely studded with osseous sacs, containing a dark grumous fluid, in which lives a species of entozoa, having physical characters almost identical with the native leech. Of these leeches, as many as fifty or sixty may be found in a single liver, so that not a cubic inch of normal liver remains." The cause of the milk-sickness is as yet unknown, though it is generally attributed to some poisonous vegetable.]

448. The above interesting and important fact is an ample illustration of what has been stated by some physiologists, namely, that certain secretions may acquire poisonous properties from the nature of the ingesta, without the individual appearing to be materially disordered. I have repeatedly had occasion to observe, that the *milk of a nurse* has produced all the symptoms of slow poisoning, occasioning vomiting, diarrhoea, and sinking of vital power, with or without convulsions in the child which she suckled; and that this state of the milk has not been occasioned alone by the nature of the ingesta, but also by the more violent mental emotions. That the nature of the food may thus affect the secretions without materially disordering the animal, is farther shown by the poisonous nature of the *honey* in some districts, as that of Trebizond, which is said to be collected from poisonous plants. I believe that the deleterious effects of pork are chiefly owing to the unwholesome nature of the food upon which the animals had lived for some time before they were slaughtered.

449. *e. Poisonous honey*, especially as met with in Trebizond, causes, according to Mr. ABBOT, violent headache, vomiting, and a condition resembling intoxication. A large dose produces deprivation of all sense and power for some hours afterward. These effects agree with those mentioned by XENOPHON, in his account of the "Retreat of the Ten Thousand." PLINY also takes notice of this poisonous honey. TOURNEFORT ascribes this property to the bees feeding on the *Azalea pontica*. (*Lond. & Edin. Philos. Mag.*, vol. v., p. 314.) The poisonous effects of honey have also been observed in North America, by Drs. BARTON and HOSACK, who consider that the injurious property is owing to the various species of *kalmia*, the *Andromeda mariana*, the *rhododendron*, the *Azalea undiflora*, and the *datura* on which the bees have fed. The symptoms mentioned by Dr. BARTON are dimness of sight, or vertigo, succeeded by a delirium, which is sometimes mild and pleasant, and sometimes ferocious; ebriety, convulsions, with foaming at the mouth; pain in the stomach and intestines, vomiting, purging, and, in a few instances, death. Sometimes vomiting is among the earliest symptoms, and in that case the patient is readily relieved, although a temporary weakness of the limbs remains. (*American Philosoph. Trans.*, vol. v., p. 65.) In the cases recorded by Dr. HOSACK, the chief symptoms were violent vomiting, cold extremities, a livid appearance of the counte-

nance; the pulse having been remarkably reduced. In these instances the honey was of a dark-reddish colour, and of thicker consistence than usual. (*Edin. Philosoph. Journ.*, vol. xiv., p. 91.)

450. *f.* The treatment of poisoning by the *flesh of diseased animals* (§ 444–448), judging from the effects or symptoms as far as they have been described, should not materially differ from that which I have recommended for poisonous fish (§ 433). Having expelled the injurious substance by emetics, and by purgatives and enemata, if it have passed the pylorus, the powers of life should be developed by means of the tonics, stimulants, aromatics, spices, external applications, &c., there prescribed; and especially quinine, camphor, capsicum, and opium. In the cases of *poisoning by honey*, just noticed, the efforts of nature suggested the best remedy, namely, the early discharge of the injurious substance from the stomach and bowels by emetics and purgatives. I believe that, in all cases of poisoning by injurious articles of food, the best purgative that can be employed is, a combination of spirits of turpentine, castor oil, and capsicum, taken on the surface of coffee, or some aromatic water; enemata, containing the same medicines, being also administered according to the circumstances of the case.

451. VI. MINERAL AND SALINE ACRO-SEDATIVES.—A. THE ANTIMONIAL COMPOUNDS act as irritants of the surface or part to which they are applied, and, owing to their absorption chiefly, and probably also to their more immediate influence upon the nervous systems, they depress vital power and vascular action. The *chloride of antimony*, the preparation which is the most corrosive and irritant, has been noticed above (§ 175, *et seq.*), and shown to be injurious principally in consequence of its local effects. But the other official preparations of antimony exert a much more remote and extensive influence, more especially the *potassio-tartrate*, the *sesquioxide*, the *oxysulphuret*, or kermes mineral, and the *compound antimonial powder*, which was intended to represent the empirical powder of Dr. JAMES. The medicinal properties of these preparations differ more or less; but, when given in excessive doses, the first, or the *potassio-tartrate of antimony*, may be considered as representing their injurious effects, both local and constitutional. When treating of it, therefore, my observations will apply also to the other compounds of this metal.

452. *a.* The *antimony-tartrate of potash*, or *potassio-tartrate of antimony*, or *emetic tartar*, is a powerful irritant when applied to any part, or even to the cutaneous surface, in a state of minute division or strong solution; and generally causes an eruption of painful pustules resembling those of ecthyma or small-pox, and various constitutional changes, according to the dose and the mode of employing it. As this preparation is the most prescribed, it is of importance that its *local and remote effects* should be well understood. (*a*) When applied to the *cutaneous surface*, *emetic tartar* gives rise to somewhat different results, according to the mode of its application. In a state of strong solution it occasions an eruption of small semiglobular painful pustules; in that of powder sprinkled over a plaster, or mixed in an oint-

ment, the pustules are larger, and, when fully developed, are flattened, with a central dark point, contain a puriform serum and an albuminous deposit, and are surrounded by an inflammatory border. The central dark point soon extends, and forms a dark crust as desiccation of the pustules advances, that is afterward thrown off. The internal use of this substance in large or poisonous doses sometimes gives rise to a similar pustular eruption, or to aphthous spots, in the mouth, fauces, pharynx, œsophagus, and intestines, but more frequently to redness, and other inflammatory changes in the gastro-intestinal villous surface; attended by pain in the region of the stomach extending over the abdomen, and by vomiting, followed by purging.

453. (*b*) The *constitutional or remote effects* of tartar emetic and other antimonial preparations vary with the dose. In *small doses* emetic tartar increases the secretions of the liver and pancreas, and the secretions and exhalations of the gastro-intestinal villous surface; and as it passes into the circulation, it increases subsequently the perspiration and the mucous and urinary excretions. In *larger doses* it excites nausea and vomiting, relaxes the skin, and augments the mucous secretions and exhalations. In still larger quantities it depresses the organic nervous energy, relaxes the muscular structures and all the tissues, and gives rise to general exhaustion. With its emetic operation it occasions distressing nausea and sinking, and is sometimes uncertain in the amount of its effects, the emetic action being slight, while the depression and diarrhœa produced by it are extreme. *Excessive doses* of this substance have acted as a violent irritating and depressing poison, and produced death, especially in children, and infants when it has been given frequently, and in too large quantities for this class of patients; the sinking of vital power and death, which have in no rare instances ensued, having been mistaken for the progress and result of disease. ORFILA states that in one case a scruple, in another, twenty-seven grains nearly proved fatal, and that forty grains caused death. The symptoms in these were vomitings, pain and tumefaction of the epigastrium extending over the abdomen, hypercatharsis, delirium, convulsions, and, in the fatal case, death on the fourth day.

454. The above should be viewed as the effects of this substance on the healthy body only, for it has been found that, in states of inflammatory excitement, in local inflammations, and fevers attended by high vascular action, the system will tolerate quantities of tartar emetic, which have been productive of the most dangerous effects in other conditions of the œconomy. This salt has been given in enormous doses by RASORI in these states of disease, and the statements of this physician have been partially confirmed by LAENNEC and others. I have attempted, however, to give very large doses of it in pneumonia; but, if I advanced above five or six grains in the twenty-four hours, distressing diarrhœa and depression followed the emetic action of it, and I have been obliged to desist. Some source of fallacy must exist, as regards either the purity of the medicine, or the retention of it in the stomach and bowels, from either of which it may have been more or less



completely rejected; or then we must infer that an excessive quantity of it acts less energetically than a very small dose: an inference which receives no support from the external application of it, or when it is administered or applied so that its operation, especially as an irritant, may be subjected to the senses of the observer. It should, however, be noticed, that in cases of oppression of the brain, and of coma, large doses of this salt may be given without producing vomiting, and, if fever be also present, without occasioning any very remarkable effect, until dangerous sinking of the powers of life, or diarrhoea, or both appear. This is the more apt to occur in children and young subjects, and requires more attention than it has received.

455. The symptoms produced by antimonial taken in poisonous doses are, in the majority of instances, such as have been just described; but when taken in states which may affect the mouth or palate, a strong metallic taste is perceived in the mouth, both at the time of swallowing and afterward; and even during convalescence from large quantities, this taste sometimes continues, with an aphthous eruption in the mouth and fauces. There are generally also syncope, small, weak pulse, great prostration of strength, cold, clammy perspirations, vertigo or tremour; spasms of the extremities, convulsions, in the more dangerous cases; and these symptoms generally precede death in fatal cases. Dr. Beck mentions an instance in which fifteen grains of tartar emetic killed a child. I am confident of having seen fatal effects follow the exhibition of a smaller quantity, given in divided doses, in cases of croup to which I had been called.

456. *L. Tartar emetic*, when injected into the large bowels, or into other mucous canals, produces nearly similar effects to those already described; and is also, in these circumstances, absorbed into the circulation, through the medium of which, as well as when injected into the veins or introduced into wounds, it acts specifically upon the stomach, producing, as M. MAGENDIE has shown, a very decided action on this organ, when thus employed. When applied to the skin, in the form of powder, or of strong solution, to produce an artificial eruption, it rarely occasions any constitutional effects of a severe character, or resembling those occasioned by the ingestion of a poisonous dose. Yet such effects have occurred, and have been attended by nausea and vomitings, and even by diarrhoea.

457. *c. After death*, the villous surface of the stomach and duodenum has been found reddened and covered by a slightly adhering layer of mucus. Mr. TAYLOR states, that in a man who had taken forty grains of tartar emetic within a period of five days, and who then had died apoplectic, the stomach was found much reddened and inflamed in irregular patches, the redness passing into a violet tint; but there was no ulceration of the internal membrane; the duodenum was in a similar state, and the small intestines were but slightly inflamed. In animals poisoned by this substance it is usual to find inflammation of the gastro-intestinal mucous surface.\*

\* [We several years ago reported a case of poisoning by antimony, with the post-mortem appearances, which may be found in Beck's *Med. Jurisprudence*.]

458. *d. Treatment*.—The evacuation of the poison from the stomach by the stomach-pump, or by encouraging vomiting by irritating the fauces, or by the free administration of warm water, milk, or demulcents, should be enforced. Any vegetable infusion containing tannin, or an infusion of green tea, oak bark, or of the yellow cinchona bark, may be given freely; as the tannin combines with oxide of antimony to form an insoluble compound, thereby suspending the operation of the poison. But Dr. PEREIRA states, that although cinchona decomposes emetic tartar, it does not destroy the activity of this salt; for that, in many instances, from one to two grains of the salt were given with the yellow bark, and nevertheless nausea or vomiting occurred. In most instances of poisoning by the preparations of antimony, opium is most beneficial, especially when conjoined with small doses of camphor, and even of capsicum when the depression is urgent. Mustard epithems on the epigastrium, and the warm bath, and several of the other measures advised for the removal of the effects of other substances already considered under this class, will also be found of service.

459. *B. BARYTA AND ITS SALTS* are poisons of which but little is known as to their operation on man. Pure baryta is met with only in the laboratory of the chemist; but it is a caustic poison. The principal salts are the chloride, nitrate, acetate, and carbonate, the last of which is insoluble. The sulphate is said not to be poisonous, as it is insoluble; but, as Mr. TAYLOR remarks, it would be well to establish this by experiment, since insolubility ought not to be received as evidence of the inertness of any substance, although it is erroneously assumed to be so, and is the chief basis of the doctrine of chemical antidotes. Arsenite of copper and calomel are as soluble as the sulphate of baryta, and yet they act powerfully on the body. The instances of poisoning which have occurred from baryta have been caused by the chloride and the carbonate.

460. *a. The symptoms* produced by the chloride of baryta were a combination of irritation of the alimentary canal, and severe affection of the nervous system, especially vertigo, convulsions, and paralysis. In one case half an ounce was fatal in two hours. In another, one ounce destroyed life in an hour. It has been found to affect the system powerfully even in small doses. ORFILA has shown that the chloride of barium is absorbed, especially when given in small or moderate doses. He states that he has found it in the liver, spleen, and kidneys of animals killed by it.

461. The carbonate of baryta is said to have been fatal in two cases, in each of which one drachm only was taken. But, in a case recorded by Dr. WILSON, it appears not to have been nearly so virulent. A young woman swallowed half a tea-cupful of the powdered carbonate mixed with water. She had fasted for twenty-four hours. The powder had no taste. In two hours she had dimness of sight, double vision, ringing in the ears, pain in the head, throbbing in the temples, with a sensation of distention and weight at the epigastrium, and palpitation of the heart. She afterward complained of pain in the legs and knees, and cramps in the calves. She vomited twice a fluid like chalk and water.

The skin was hot and dry, the pulse frequent, full, and hard. These symptoms gradually subsided, and she recovered, although the pain in the head and epigastrium continued long. (*Lond. Med. Gaz.*, xiv., p. 488.)

462. *b.* The morbid appearances produced by the salts of baryta have not been described as they occur in man. In the lower animals the mucous membrane of the stomach is usually found of a deep-red colour, unless death has taken place very rapidly, and in this case the alimentary canal is healthy. In all the animals which in Dr. CAMPBELL's experiments were killed by the chloride applied to wounds, the brain and its membranes were much injected with blood; and in one of them the appearances were those of congestive apoplexy.

463. *c.* The Treatment of poisoning by the salts of baryta consists chiefly in the speedy administration of an alkaline or earthy sulphate, as the sulphate of soda or of magnesia. The poison is thus converted into the insoluble sulphate of baryta, which, if not altogether inert, is nearly so. But the alkaline sulphates are of but little service where the carbonate of baryta has been taken, unless in procuring the more rapid discharge of the poison by the bowels. In Dr. WILSON's case, just mentioned, the copious evacuations from the bowels consequent on the exhibition of the sulphates were evidently beneficial, and tended to the recovery of the patient. Unless the patient be seen early, any treatment will prove inefficacious. Where the carbonate of baryta has been taken, Mr. TAYLOR recommends recourse to emetics and the stomach-pump; or, as chemical antidotes, a mixture of vinegar with an alkaline sulphate.

464. *C. COPPER, THE PREPARATIONS AND COMPOUNDS OF,* have been considered above (§ 205, *et seq.*) with reference to the corrosive and acute action of these substances when administered in large doses or quantities. But in smaller quantities, or in repeated doses, they act locally as irritants of the gastro-intestinal villous surface, and constitutionally as sedatives or paralyzers of nervous and vital power; this latter effect resulting both from the influence primarily produced by them upon the nervous systems, and from their operation, through the medium of the circulation, upon the heart and nervous centres. The cupreous compounds are most likely to act in this way, and in a chronic form, when they contaminate articles of food, as remarked on many occasions. The salts of copper, which are the most frequently administered in large doses for the purposes of suicide and murder, are the *sulphate* and *subacetate*, and these act chiefly as corrosive acute poisons, as stated above (§ 205). But these, as well as the other compounds of this metal, may be so employed or administered as to produce the symptoms most characteristic of *acro-sedative* poisoning.—*a.* In most instances the gastric symptoms are similar to, but not so severe as, those attending the corrosive operation of the poison, while the nervous symptoms are of longer duration. There are generally burning pain in the throat and stomach, anxiety, vomitings, acute pains and great swelling of the abdomen, but no diarrhoea; afterward painful and difficult deglutition, with swelling of the throat and face, oppression of the pulse, salivation and ulceration of the gums, spasms, convulsions, or

paralysis, sometimes jaundice, &c. The irritability of the stomach and cramps, or paralysis, often continue long, and are attended by costiveness and dysuria or suppression of urine.

465. *b.* The *sub-chloride of copper*, oxychloride or Brunswick green, is sometimes formed when common salt has been used in a copper vessel, and in this way, as well as when employed as a pigment, it has given rise to accidental poisoning. A boy of three years swallowed about a scruple of this salt. Vomiting and coldness of the extremities followed, and continued until death. On dissection there was no change indicative of the action of an irritant poison, excepting slight congestion of the vessels of the brain.

466. *c.* Copper vessels are acted upon by articles of food or drink, especially if these articles contain saline substances or acids, or become acid while kept in these vessels. Thus wines which are more or less acid, substances containing vinegar, or any other acid, soups or broths, especially if they contain vegetable matters, and are liable to become acid, and fatty substances, when kept only for a short time in copper utensils, are not infrequently productive of accidental poisoning. FALCONER and others have shown that metallic copper undergoes no change by contact with water unless air be present, when a hydrated carbonate, mixed with oxide, is formed. When an acid, or an oily or fatty matter, is in contact with the metal, then this change more rapidly takes place, and the liquid or fat acquires a green hue. Hence no acid, oily, or saline liquid should be prepared or kept in copper vessels. Nor should fruits, pickles, or preserves be either kept or prepared in them. The quantity of the poison which may be formed in these circumstances may not be sufficient to produce fatal poisoning, but they may be quite enough to cause severe gastro-nervous or acro-sedative effects. GMELIN was consulted respecting a violent disease which prevailed among a whole brotherhood of monks. The symptoms were obstinate and severe colic, retching and bilious vomiting, flatus, costiveness, burning pain in the pit of the stomach, under the sternum, in the region of the kidneys and extremities, with paralytic weakness of the arms. He found, on inquiry, that all the kitchen vessels—the pots, pans, milk pail, and butter dishes—were made of copper. Similar instances of culinary poisoning have been mentioned by CHRISTISON and other writers.

467. *d.* It is stated by Mr. TAYLOR, that the use of the alloy called *German silver*, which is a sort of *white brass*, consisting of copper, zinc, and nickel, and containing about 50 per cent. of copper, may be productive of acro-sedative poisoning where articles, as spoons, made of this alloy, are allowed to remain in contact with acid, oily, fatty, or saline substances. A lady in Paris, in 1838, after having had eels for dinner, was awakened in the night by headache, nausea, followed by vomiting and colic. Her physician ascertained that the eels had been cooked with butter and vinegar in an earthenware vessel; and he found the spoon, which was of German silver, presenting on different parts greenish spots. Chemical analysis showed that a poisonous salt of copper had been thus produced; and the fact was farther proved by



polishing the spoon and placing it in a similar mixture. Half an hour afterward green spots were perceived on the spoon, and in twelve hours it was quite green, as well as the butter in contact with it.

468. *c. Arsenite of copper, or SCHEEL'S Green*, being extensively used as a pigment, both in the arts and in confectionery, has occasioned dangerous effects. Dr. GEOGHAGAN informed Mr. TAYLOR, that fourteen children in Dublin, in 1842, suffered symptoms of poisoning owing to their having eaten confectionery ornaments coloured with this substance; and jaundice followed in two or three of those cases. Three lives were nearly sacrificed at a school near Manchester by the same cause: they suffered from violent vomiting, severe pains in the stomach and bowels, and spasms of the extremities.

469. The green colour of the matters vomited, in cases of poisoning by the cupreous compounds, has been mistaken by some for bilious vomiting. But this colour is generally owing to the poison, and not to the presence of bile in the vomited matters; for the bile is generally obstructed, and the liver and intestines more or less paralyzed by the influence of the poison on the organic nerves, as shown by the jaundice, and by the flatulent and colicky distention of the abdomen in these cases.

470. *f. The modus operandi of the cupreous compounds* appear to vary with the preparation, with the quantity swallowed, and the state of the stomach at the time, as respects especially the quantity and nature of the contents of this viscus. They certainly produce, as shown above (§ 207), a corrosive action on this organ when taken in large quantities, and in other circumstances favourable to that action; while, in other cases, this action is but slight, the fatal issue chiefly resulting from the change produced by them in the nervous system. Their organic action, or the disorganization produced by them locally, is mainly owing to their chemical combination with the albumen, or with one or more of the animal tissues. They evidently, also, affect the nerves of the part with which they come in contact, altering the innervation of the surface or viscus. They are also more or less imbibed by the surfaces and tissues, and carried into the circulation, thereby farther depressing and otherwise changing the irritability and innervation of the structures, the poisonous action of the cupreous salts being produced in this way chiefly, especially when given in repeated doses, or applied to a wound, as shown by the absence of corrosive or other local effects, and by the fact of these salts having been detected in the blood and viscera of animals poisoned by them. Dr. DUNCAN found that the application of the sulphate to a wound produced death in twenty-two hours, and yet the body appeared everywhere in a healthy state; but SMITH and ORFILA state that the acetate applied to wounds caused only local inflammation.

471. *g. The diagnosis of cupreous poisoning* is of some importance, seeing that the symptoms caused by it closely resemble those produced by arsenic and corrosive sublimate. According to ORFILA, the first symptom occasioned by the compounds or salts of copper is violent headache, which is followed by vomiting and cutting pain in the bowels, and by cramps and

pains in the legs and thighs. Generally there is a coppery taste in the mouth and throat, and an aversion from the smell of copper. Jaundice is a common symptom, and is never observed in poisoning by arsenic or sublimate. Fatal cases terminate with palsy, insensibility, and convulsions. This order of the symptoms is, however, by no means generally observed; for the headache often does not appear until after the vomiting; and the paralytic state, either of the sensibility or the power of motion, is often early. The chief diagnostic signs on which any reliance can be placed, are the coppery taste of the mouth, with a peculiar astringency and watering of the throat, with ulceration in the more chronic cases; vomitings and eructations of greenish, or greenish-blue matters, and frequently jaundice, or slight yellowness of the surface, which, however, does not appear in some cases until after death.

472. Cupreous substances, when taken in minute quantities for a long time, or when used by workmen who are inattentive to cleanliness, according to the observations of PATISSIER, MORAT, and others, are productive of a greenish sallow hue of the countenance; of an infirm and decrepit state of the body; and of severe attacks of colic, with partial or slight palsy; the children of persons thus rendered infirm being rickety and puny.

473. *h. The appearances on dissection of fatal cases* are most varied and uncertain. In some, the corrosive action of the poison already described (§ 207) is the most remarkable, especially in the stomach and duodenum. In others, equally or even more rapidly fatal, little or no structural change of these viscera is observed; nor even inflammatory appearances of the stomach and bowels are met with. In the majority of instances, however, the alimentary canal is more or less inflamed; and it very commonly presents a greenish hue, especially the stomach, œsophagus, and duodenum. The external surface is generally jaundiced or slightly yellow. The blood is of a dark hue, and fluid in some cases, and coagulated in others. The lungs and the sinuses of the brain are more or less congested; and the brain is sometimes more vascular than usual.

474. *i. The Treatment of the slow or acro-sedative form of poisoning by cupreous substances* should be based chiefly on the method stated above (§ 208, *et seq.*). After the evacuation of the poisonous substances as there advised, albuminous and saccharine substances should be given, and irritability of the stomach ought to be quieted, as it tends remarkably to lower the depressed vitality of the frame, by opium conjoined with camphor and creasote, and by external derivatives applied over the epigastric region. If inflammatory action be manifested, the usual local and general measures indicated by the state and associations of this condition ought to be prescribed.

475. *D. SALTS OF POTASH.—a. Chromate of Potash.—Chrome—Bi-chromate of Potash.*—This salt is extensively used in dyeing; yet poisoning by it is rare; but instances have been recently recorded. A concentrated solution of it causes all the symptoms and structural changes of corrosive poisons. In small doses it occasions vomiting, diarrhœa, paralysis, and death in the course of some hours. It appears to be

more or less absorbed, and to depress and otherwise affect nervous and vital power. In a case described by Mr. WILSON, of Leeds (*Lond. Med. Gaz.*, vol. xxxiii., p. 734), where a large quantity of this poison had been taken, the poisoned person not having been seen until soon after death, the countenance was pale, placid, and composed; the eyes and mouth closed; the pupils dilated; no marks of vomiting or diarrhoea, nor discharge from any of the outlets of the body, nor any stain upon his hands or person, or upon the bed linen, or furniture, could be detected. On dissection, a pint of turbid, inky fluid was found in the stomach. The mucous membrane of this organ was red and very vascular, particularly about the cardiac orifice. The brain, its membranes, and all the other viscera were quite healthy. The contents of the stomach furnished the chromate on analysis. In this case the chrome produced neither vomiting nor purging, and did not act by any irritating influence; but by its sedative action entirely. Hence it may be viewed as causing, according to the dose, state of the stomach, and other circumstances, either a decided corrosive effect, or an acro-sedative action, or even a purely sedative or fatally depressing operation. The treatment appropriate to poisoning with this salt is recourse to emetics or the stomach-pump, and to the administration of magnesia or chalk, mixed in water.

476. *b. Nitrate of Potass.*—TARTRA denies that this salt possesses any poisonous properties; and it is stated to have been given, for medicinal purposes, in doses varying from six to twelve or even sixteen drachms in the twenty-four hours. (*Med. Chirurg. Rev.*, April, 1844, p. 549.) As it is much employed in the arts, accidents occasionally occur from it; and, in a large dose, as when taken in mistake for some purging salt, serious or even fatal results may be produced by it, although its effects are somewhat uncertain. Two men swallowed each one ounce of nitre by mistake for GLAUBER's salt, and almost instantly experienced a sense of coldness in the course of the spine, trembling in the limbs, with vomiting and purging; the stools were bloody. They recovered in the course of a few days. In another case recorded in the same work, an ounce of nitre was fatal in thirty-six hours. (*CASPER'S Wochenschrift*, b. xviii., 1841.)

477. The symptoms and structural lesions produced by a poisonous dose of this salt will appear from the following details: M. ORFILA states that a lady took an ounce of nitre by mistake, and in a quarter of an hour suffered nausea, vomiting, and purging; and the muscles of the face were convulsed, the pulse weak, respiration laborious, and the extremities cold; but there was a burning pain in the epigastrium. She died three hours after taking the salt. On dissection, the stomach was found inflamed and the villous coat detached in places. Near the pylorus the inflammation approached to gangrene. A large quantity of fluid, coloured with blood, was found in the stomach. Dr. GEOGHEGAN communicated to Mr. TAYLOR the following case: A man took, by mistake for salts, from an ounce to an ounce and a half of nitre. Severe pain in the stomach followed, with violent vomiting, but no purging. He died in about two hours after taking the salt. On examination, a

bloody mucus was found in the stomach; the villous coat was of a brownish-red colour, generally inflamed, and detached from the adjacent coat in places. None of the poison was detected in the stomach; but its nature was determined by the analysis of the portion left in the vessel from which it was taken. It is evident that the rapidity of the fatal result in this case was owing to the extent of the local injury, to the shock sustained by the constitution, and to the absorption, in a very short period, of so large a quantity of the salt into the circulation; this salt being rapidly absorbed, especially in solution, and acting not merely as an irritant, but also as a powerful sedative.

478. *c. Sulphate of potass*, according to Mr. MOWBRAY (*Med. Gaz.*, vol. xxxviii., p. 54), is much employed in France as a popular abortive, and when thus administered has proved not infrequently poisonous. It has also been employed in this country with the same object, and in one case, at least, with the same results, as shown by Mr. TAYLOR. In one case two drachms acted most powerfully, and in another four drachms, administered to a lady after her confinement, acted as an irritant poison. Another lady took, about a week after her delivery, about ten drachms of this salt, in divided doses, as an aperient. After the first dose she was seized with severe pain in the stomach, with nausea, vomiting, purging, and cramps in the extremities. These symptoms became augmented after each dose, and she died in two hours. On inspection, the villous surface of the stomach and intestines was found pale, except the valvulæ conniventes, which were reddened. The stomach contained much reddish liquid, which was found to contain only sulphate of potass.

479. *d. Oxalate of Potass.*—Salt of Sorrel.—*Bin-oxalate of potass* is an active poison, owing chiefly to the oxalic acid. It is much employed under the name of "essential salt of lemons," and instances of poisoning have occurred from its having been taken by mistake, some of which have been adduced by Mr. TAYLOR. The following case is recorded by Mr. JACKSON: A female, aged 20, took about an ounce of this salt in solution. About an hour and a half afterward she was found on the floor quite faint, having been very sick. The nature of the poison was soon ascertained, and four ounces of *mistura cretæ* were administered. She was then in a state of extreme depression; the pulse could hardly be felt; the skin was cold and clammy; the lips and face were pale, and rigours continually affected the whole body. She complained of a scalding sensation in the throat and stomach, of pain in the back, of soreness of the eyes and dimness of vision. The conjunctivæ were injected and the pupils dilated. She was wrapped in warm blankets; ether, tincture of opium and camphor were administered, and reaction took place. The patient afterward recovered. Most probably the greatest part of the salt had been thrown off the stomach before she was found. The treatment of this case throughout was as judicious as successful.—(*Med. Gaz.*, vol. xxvii., p. 480.)—A lady, recently confined, took by mistake an ounce of this salt. She had scarcely swallowed the dose when she was seized with violent pain in the abdomen and convulsions; she died in eight



minutes. The mucous membrane of the stomach and small intestines was found inflamed. A tea-spoonful of this salt was taken for three successive mornings, and produced severe vomiting; about an hour after the third dose the patient expired. There was no examination of the body. It is evident from these cases, that this salt is a powerful aro-sedative poison, its depressing operation being most energetic.

479\*. *c. Bi-tartrate of Potass.*—*Cream of tartar* is a most useful medicine, even in large doses; but it may be poisonous if a too large quantity be given. I have prescribed as much as two drachms three times in the day, in cases of dropsy connected with obstruction in the liver, with great benefit; but this dose should not be continued long, and its effects should always be carefully watched. Mr. TAYLOR states, on the authority of Mr. TYSON, that a man took four or five table-spoonfuls of cream of tartar, and was seized with violent vomiting and purging, with pain in the abdomen, thirst, feebleness of pulse, and a paralyzed state of the thighs and legs. The fluid vomited was of a dark-green colour, and the motions had the appearance of coffee-grounds. Death took place in forty-eight hours, and, on *inspection*, the villous coat of the stomach and duodenum was found highly inflamed; the cardiac portion of the stomach being of a deep-red colour, with spots of black extravasation. This organ contained a thick, brown fluid, coloured by bile. The intestinal canal was more or less inflamed.

480. *f. The nitrate of soda, the sulphate of magnesia, the bichlorate of soda, the chloride of sodium, and other salts, which are harmless in small or moderate quantities, are injurious, and act as irritants and depressants when taken in large or excessive doses, especially in states of disease or of constitution which are favourable to their injurious operation.*

481. vii. THE SULPHURETS OF POTASSIUM AND SODIUM.—*The alkaline sulphurets* have very rarely occasioned poisoning in this country; but they have caused fatal accidents in France, where they are frequently employed for baths and for the manufacture of artificial sulphureous waters. They act as powerful irritants of the digestive mucous surface and depressants of nervous and vital power, exhausting at the same time the irritability of contractile tissues. These latter effects are in great measure owing to their absorption into the circulation. M. ORFILA and M. CAYOL have recorded cases of poisoning by these sulphurets. The quantity taken in each of these was three drachms and upward. Two of the cases terminated fatally in less than *fifteen minutes*; the other patients who recovered were dangerously ill for some days. The rapidly fatal effects of these poisons were probably owing more to the change produced by them in the state of organic nervous influence, than to disorganization of the villous coat of the stomach.

482. *a. The symptoms* in these cases were burning pain and constriction in the throat, gullet, and stomach, frequent vomiting; at first sulphureous, the air of the chamber being tainted with the odour of sulphureted hydrogen, and afterward sanguinolent; purging, at first sulphureous, afterward mucous and bloody; sulphureous exhalations from the mouth; acrid

taste on the palate; pulse quick, afterward feeble, fluttering, and almost imperceptible; followed, in the cases which recovered, by inflammatory reaction of the digestive canal, extending to the œsophagus; and by mortal faintness and convulsions in the fatal cases.

483. *b. The structural changes* in the fatal instances were great lividity of the face and extremities, and loss of the muscular contractility immediately after death. The stomach was red internally, and lined with a crust of sulphur. The duodenum was also red. The lungs were soft, gorged with black fluid blood, and did not crepitate.

484. *c. The Treatment* seems to consist in the instant administration of any diluent at hand, and frequent doses of common salt. If inflammation of the stomach, &c., supervene, local and general antiphlogistic measures and external derivatives will be required. Dr. CHRISTISON observes, that the chloride of soda may be called the antidote against this poison, as it decomposes the sulphureted hydrogen which is evolved, the rapid disengagement of which he considers to be the cause of death in the quickly fatal cases. The chloride of lime is equally efficacious with the chloride of soda.

485. viii. TARTARIC ACID.—Oxalic acid in small doses, and tartaric acid in large quantities, are productive of nearly similar effects. *Tartaric acid* has, until lately, been regarded as not poisonous; but an instance lately occurred of this acid having been given to a man instead of aperient salts, in the dose of one ounce, with fatal effect. The whole of this was swallowed at once, dissolved in warm water. He immediately exclaimed that he was poisoned, complained of a burning pain in the throat and stomach, and compared the sensation to that of being all on fire. Soda and magnesia were administered with diluent drinks. Vomiting commenced, and continued until his death, which took place nine days afterward. Tartaric acid was found in the dregs of the cup, and the person who made the mistake admitted the act and the substance which he had thus given. On *inspection of the body*, nearly the whole of the alimentary canal was found inflamed. (See TAYLOR, in *Op. cit.*, p. 104.)

486. The *Treatment* of poisoning with this acid is the same as that for *oxalic acid* (§ 166), which, when given in smaller quantities than those usually productive of the corrosive action described above (§ 160, *et seq.*), is partially absorbed, and, with its local irritating operation, occasions also marked depressing and paralyzing effects; and either an acute, or sub-acute, or chronic form of poisoning, according to the quantity taken, the circumstances of the case, and the treatment employed soon after its ingestion. In the slower form of poisoning by *oxalic acid*, as well as that by *tartaric acid*, as soon as the poison is removed by vomiting or the stomach-pump, remedial measures should not be confined to the removal of the local irritation merely that is produced by it, but ought to be extended to the restoration of the nervous and vital powers, which are more or less depressed by the influence of the poison on the nerves of the alimentary canal, and, by absorption, upon the heart, nervous centres, and constitution generally; and with these intentions the means already recommended for the more

energetic aero-sedatives will be found the most successful for the removal of the consecutive effects, and for the slower forms of poisoning caused by small doses of oxalic acid, and by large quantities of tartaric acid.

487. ix. THE NECROSCOPIC POISON.—POISON IMBIBED FROM RECENTLY DEAD BODIES.—*A. Source and Nature of the Poison.*—The fluids of bodies recently dead, or that have not passed into an early stage of decomposition, not infrequently produce the most dangerous effects, especially when they come in contact with an abraded surface, or are inoculated in any way. The effects vary with the disease of which the person died, with the constitution of the infected individual, and with other circumstances. I have had several occasions of observing and treating the effects of this species of animal poison. Since I first published my views as to the nature and treatment of these effects, in 1823, and again in 1833, I have been more fully convinced of the accuracy of these views; and, moreover, they have received the support of experienced observers, and especially of Mr. TRAVERS, in more recent publications. The poisonous action of the fluids of dead bodies is most acutely exerted when these fluids are inoculated; but they sometimes act upon the perfectly sound skin, there being no scratch, puncture, or abrasion through which they could be introduced, the existence of either of these greatly facilitating and aggravating their operation. In the observations I offered respecting this poison (in the *London Medical Repository for July, 1823*), I stated, 1st. That this poison is distinct from any other animal poison, generated or transmitted during life; 2d. That it is different, in its nature and effects, from putrid animal matter; 3d. That it does not appear to exist in the blood, either during life or after death; 4th. That it is produced during the changes which are more immediately consequent upon the loss of life; and, 5th. That it is present chiefly in the secreted and exhaled fluids on the surface of membranes, especially serous membranes, or in cellular or parenchymatous parts. I then remarked that, as respects the distemper inoculated from another body which has recently ceased to live, and as regards the nature of the animal poison which causes the distemper, and the manner of its operation, it may be inferred that it is produced by the textures before their vital properties and cohesions are quite extinct, because putrid animal matters occasion different and less dangerous effects; that as all morbid poisons possess certain properties bestowed on them by the organic nervous or vital influence of the vessels and structures secreting them, in consequence of previous disease, either of these parts or of the frame generally, which properties they preserve for a time until the elementary particles composing them enter into different combinations, so may the secretions and fluid exhalations occasionally experience, during the period in which organic nervous influence and vitality are forsaking the tissues which secrete them, such a change as amounts to the acquisition of virulently poisonous properties, and that these fluids, thus changed, affect the nerves of the part to which they are applied, and, consecutively, the whole frame, the cellular tissue in the vicinity of the glands above the seat of inoculation generally evincing

more or less disorganization, and sometimes, also, the integuments, the fasciæ and tendinous sheaths, the absorbents, or veins, or both, and even the serous surfaces of adjoining cavities. This poison being productive of the most dangerous effects, and on numerous occasions, it is of the utmost importance, especially to medical men themselves, that its operation, and its counteraction and treatment, should be carefully investigated.

488. a. The poison communicated by recently dead bodies has been described, and illustrated by the details of cases, by Dr. DUNCAN, as constituting a form of diffusive inflammation of the cellular tissue, and by Mr. TRAVERS, as occasioning a variety of constitutional irritation. But the doctrine inferred from these denominations is too restricted to be applicable to the distemper which this poison develops. Diffusive inflammation of the cellular tissue certainly often exists as a consequence of the contamination produced by the poison; but it is preceded and attended by constitutional effects—by states of the circulation and nervous system—of the most malignant or virulent description. Constitutional irritation is equally present, and is certainly more or less immediately consequent upon the local irritation, impression, or alteration, or whatever the local effect may be; but so are depression of organic and cerebro-spinal nervous power, changes in the states of vascular action and of the blood, asthenic inflammation of the cellular tissue, and often, also, of the integuments, or of the absorbents or veins, or of adjoining serous surfaces. The truth is, that this poison produces an almost specific effect upon the tissues in the vicinity of glands above the seat of its application; but this effect may be limited to the cellular tissue, or extended to several other tissues; and it may be confined to the axilla, or extended to more deep-seated parts; it may not implicate, in a visible manner, any of the structures of the arm, although the poison was inoculated in the finger, and the cellular tissue in the axilla is most extensively diseased, no change between these situations being detected; and it may most virulently affect the nervous and vascular systems, and depress vital power and resistance, when the local changes are the least extensive or apparent.

489. b. It is of some moment to know the *diseases which impart this poisonous property* to the recently dead body; but, as to this, we have no precise information. Although the distemper which is the result has most frequently been produced by the inoculation of the fluids of bodies which had died of inflammations of serous surfaces, or of erysipelas, or of puerperal diseases, yet has it occurred also after the inoculation of the fluids of bodies which have died of other visceral or inflammatory maladies—of enteritis, peritonitis, &c. More than one person has even been infected by the same dead body, this occurrence evincing a greater virulence of the poison, in that body, owing either to the nature of the disease of which it died, or to the period after death at which the examination was made. That this has probably depended chiefly upon the former of these causes may be inferred from its frequent occurrence when the body has died of erysipelas, puerperal peritonitis, or other states of puerperal fever; while, on the other



hand, there is equal, if not stronger, reason to believe that the poison imbibed in dissection is not the result of diseased action, simple or specific, in the living subject, but is altogether generated immediately after death, although certain diseases may favor its generation at this period. That the poison is not the result of the disease of which the patient died, is shown by the facts, 1st. That this poison has been imbibed during the examination of bodies of persons who have died suddenly, and in health, in consequence of accidents; that poisonous effects have been produced by the fluids of a body which has been killed by an accident, or has died of a non-contagious disease; 2d. That the distemper developed by this poison presents a specific character, differing only in the degree of severity and the extent of the contingent local inflammation, whatever may have been the malady of which the subject which furnished the poison died. Still, the larger proportion of cases of this distemper have their origin from the fluids of bodies recently dead from inflammations, by which an abundant exudation of morbid fluids is accumulated, and in which the thoracic and abdominal viscera are examined and handled. In most instances which have fallen under my observation, the bodies from which the poison was imbibed were still warm when examined, and many of them had died of puerperal diseases. Mr. TRAVERS remarks, also, that the subjects were recent. Not one had been buried; some were yet warm. Even of those in which demonstration, not inspection, was the object, the bodies were in a perfectly fresh state; and he remarks a circumstance, which has also struck me, namely, that when the dissection has been performed before the body has entirely parted with its warmth, a faint and peculiarly oppressive odour is emitted, which is disagreeable, not to say revolting, even to persons habituated to dissection, and which not infrequently creates nausea.

490. *c.* The question may be asked, Whether or not the poisonous fluid may produce its effects when applied to the *perfectly whole cutaneous surface*, or only when this surface is punctured, or the cuticle abraded, in the part which comes in contact with it? I can answer this question in the affirmative from my own experience, and from statements made to me by others in the frequent habit of making inspections. I have seen severe constitutional disorder of the specific kind produced by this poison in two instances, in which the subjects had died of puerperal disease, the surgeons who assisted me in the examinations, and who thus imbibed the poison, having had no abrasion of the cuticle whatever. The fluids accumulated in the serous cavities occasioned, in these two instances, a sensible smarting over the surfaces with which they remained for a time in contact. But I believe that such instances are rare compared with those which are owing to some scratch, abrasion, or puncture of the cuticle.\*

491. *d.* Another question suggests itself, namely, *Whether or no this poison is the same as the infectious emanation which caused the disease of which the person died; is allied to a specific contagion existing still in the body which has died in consequence of it?* We know that the poison under consideration is frequently imbibed from bodies which have died from puerperal diseases, from visceral inflammations, from erysipelas and other maladies. But the distemper produced by this poison is not in any respect the same as any of these diseases, there being no farther resemblance than in the febrile disturbance present in all of them, and in the vital depression and weak state of vital resistance. That small-pox, syphilis, erysipelas, glanders, and even scarlet fever may be transmitted by the recently dead body; and that the power of transmitting these specific contagions may be retained by the bodies which have died of them for a considerable but an indefinite time, I believe; but when the body is surrounded by clothes of any kind, this power of transmission is retained by the clothes rather than by the body itself; for, as soon as the latter undergoes decomposition, the power of transmitting the specific malady which caused death appears to have ceased, especially if there be a free admission of atmospheric air, because the contagious secretions are also decomposed, and, by their decomposition, have lost their specific and poisonous properties. It cannot, however, be inferred that the distemper produced by the poison imbibed from recently dead bodies is allied to any of the maladies which has most frequently caused the deaths of the bodies from which the poison was imbibed.

492. *B. Symptoms.*—(*a*) In some cases, the following is the usual procession of morbid phenomena. 1. A few hours after puncturing a

the finger up the arm, along the neck, to the tip of the ear. Matter formed within the proper sheath of the flexor tendon of the finger, and the wound in the finger continued to discharge freely after the sheath was laid open. Delirium, rapid pulse, &c., continued, and was followed by rigours and profuse colligative sweating, and soon afterward by extreme depression, and death. 2d Case. The maid-servant who fomented this woman's hand, on the third day after the incision of the finger, complained of pain and tension of the point of the fore-finger of the right hand, with constitutional disturbance and delirium. She had neither wound nor seration of any kind. Acute fascial inflammation of all the fingers, back of the hand and fore-arm, followed, and abscesses formed, requiring free incisions. 3d Case. A laundress, who washed the sheets taken from the bed of the first of these patients shortly before her death, "had no sooner opened and immersed them in water, than she was overpowered by an effluvia, which she described as peculiarly offensive, and instantly complained of a most severe darting pain in the axilla and shoulder. Nausea and faintness followed, and in the evening she had a rigour which lasted three hours. In the morning she was much fevered, and on the two succeeding nights violently delirious. The pain she now complained of affected the outer side of the upper arm, from the elbow to the shoulder, but there was neither redness nor swelling of this part." Afterward the pain shifted in the axilla and pectoral region, and two days afterward a deep pectoral abscess presented itself. She ultimately recovered. In neither of the second or third cases was there any breach of the cuticle, by which absorption of, or contamination by, a poisonous fluid could be facilitated. Mr. TRAVERS adds, that the laundress was attacked at the one and the same instant with nausea and faintness from the stench, and with acute lancinating pain from handling the linen; and that a woman who was present informed him that the laundress turned as pale as death, and exclaimed with agony, from the pain she felt in the arm within two minutes of unfolding the sheets. I quite agree with this very able surgeon in remarking that this was surely the operation of a subtle poison on the nervous system, as it is only through this medium that it could operate so instantaneously.

\* The following cases, abridged from Mr. TRAVERS'S work, are remarkable, as they are examples of a distemper, in the local and constitutional symptoms, closely akin to, if not actually identical with, that produced by the poison imbibed from recently dead bodies, although the poison, in the second and third cases, was imbibed from the secretions of the first case while she still lived. 1st Case. A female, while suckling, had a poisoned wound of the finger, followed by pain, fever, and delirium. The pain extended from

finger in the examination of a body, pain is felt in the puncture. It soon increases to the utmost agony, and is attended by symptoms of constitutional irritation, the nervous system being agitated to a violent degree. No trace of inflammation beyond slight redness of the puncture is observable; and no evidence of inflammation of the absorbents or veins can be detected. In a case recorded by Mr. TRAVERS, death took place forty hours after the puncture was received, with all the symptoms of agonizing excitation of the nervous system, the distemper resembling hydrophobia. 2. In other cases, the puncture is also not attended by any evidence of inflammation, but, in ten or twelve hours afterward, feelings of indisposition are complained of; violent rigours are soon experienced, followed by febrile reaction, nausea, or vomiting, and most rapid pulse. Severe pain is felt about the shoulder, axilla, or pectoral muscle; but no trace of inflammation can be detected between the puncture, generally of a finger, and the seat of pain. Anxiety, depression of spirits, delirium, profuse perspiration, singultus, most rapid and small pulse, insensibility, and death supervene. 3. In some instances, from ten or twelve to twenty-four hours after the imbibition of the poison, languor, depression, shivering, and sickness at stomach are experienced; a *vesicle*, or *pustule* resembling that of smallpox, is observed in the punctured or abraded part, and pain is felt in the shoulder or axilla, or both, but without any sign of inflammation of the lymphatics, or of any other tissue of the arm. The pain extends to the breast of the same side, and is attended by nervous excitement, thirst, watchfulness, headache, a hot and dry skin, a frequent and weak pulse, afterward by delirium, irritability of stomach, by swelling or redness about the axilla or pectoral muscle, by sinking of the powers of life, and often by death. 4. In other cases, no vesicle or pustule forms in the seat of puncture, but severe constitutional symptoms are rapidly developed; the pulse in a day or two rises to 120 or 130; delirium soon appears; slight swelling and excruciating pain affect the axilla and breast, attended by diffuse swelling, patches of colour, and severe pain in different and distant parts of the body, by nausea and vomiting, by singultus, and sometimes by yellowness of the conjunctiva and skin; followed by a weak, small, and rapid pulse, exhaustion, laborious breathing, and death. 5. In all the preceding *phases* of this distressing distemper, the puncture or abrasion by which the poison was imbibed, and the tissues in the vicinity, have presented no alteration, excepting the superficial vesicle or pustule observed in some instances, and no local lesion or disorganization appears until after the constitutional symptoms have been fully developed, and then it takes place near or on the trunk, in the situations already mentioned. But, in another class of cases, the wound or puncture of the finger suppurates, not, however, until after severe constitutional symptoms have appeared, especially rigours, vomitings, pain in the axilla or shoulder, very rapid pulse, physical and mental depression, with white or loaded tongue, dry and hot skin, &c. The puncture or abrasion now begins to suppurate, and swelling extends along the finger and sometimes over the hand. Sphe-

lation of the cellular tissue, and often also of the tendinous structures, takes place; the pain in the axilla or shoulder is followed by diffused and slightly coloured swelling, extending sometimes to the integuments of the same side of the body. As the disease continues, headache, watchfulness, delirium, irritability of stomach, thirst, and singultus vary in severity; and, if no alleviation take place, these symptoms increase; the physical and mental exhaustion are extreme; restlessness, followed by insensibility and coma, appears, and death takes place after periods varying from four or five to twelve or fourteen days. 6. In other cases, a diffused swelling, tension, and redness affect the wounded finger, subsequently to the occurrence of severe rigours, prostration of strength, frequency of pulse, and other constitutional symptoms. The swelling, tension, and redness extend to the hand, or up the arm, upon which numerous vesicles form, followed by tumefaction, and insulated patches of colour on the shoulder, breast, and back, on the same side of the body. The febrile and the nervous symptoms continue to increase with the development of local lesions; and the pulse, strength, and constitutional powers generally become weaker, death taking place in the majority of cases after periods varying as just stated. 7. In some instances, after the appearance of rigour, fever, nervous and other general symptoms, the axilla becomes painful and swollen. Diffusive inflammation proceeds extensively from this part through the cellular tissue, extending in some cases to both sides, and suppurates or sloughs; inflammation of, and effusion into the pleura, often ultimately supervening. Death generally takes place in these cases with the usual symptoms, and after the indefinite period already mentioned.

493. From the above brief account of the several *phases* of this dreadful distemper, it may be inferred that the local inflammatory action is an unessential and subordinate feature of the disease in its severest forms; that the distemper actually consists of prostration of the nervous influence and vital energy generally, the local irritation arising from the impression or imbibition of the poison occasioning slight change of structure in some instances, and more extensive inflammation and disorganization in others, as already noticed, and as will be more fully described; and that the contamination produced by this poison is characterized by preternatural excitement of the nervous and vascular systems, without power or vital resistance, that soon passes into rapid exhaustion. A circumstance deserving of notice in this distemper is the remoteness of the local inflammation, in the great majority of instances, and in all its above phases, excepting the sixth, from the part at which the poison is imbibed; and the absence of any sign of inflammation of the absorbents or veins in a great proportion of the cases between the seat of injury and that of pain and inflammation. But this phenomenon is also remarked in other maladies produced by a specific animal poison, as syphilis. It would appear that this poison, whether conveyed by the absorbents or by the nerves, especially those supplying the blood-vessels, affects the glands of the axilla, and probably also the axillary plexuses of nerves, in an especial man-



ner, and that the surrounding cellular tissue becomes asthenically or diffusively inflamed in consequence, and the consecutive lesions are thereby produced.

494. *C. Prognosis.*—Much depends upon the severity of the constitutional symptoms at an early period of the distemper, and upon the treatment then adopted. Those cases in which the local affection is the least severe, and the nervous and febrile symptoms most prominent, are the most dangerous; and, if the disease be not arrested at an early stage by most decided means, these symptoms, and with them the local inflammation, rapidly increase and pass beyond the influence of any remedial means whatever.—*a.* The prognosis is generally most *unfavourable* when the irritability of the stomach extends to the diaphragm and is attended by hicough; when the tongue becomes brown or dry, or both; when the pulse rises above 120 in a minute, and is weak or small; when anxiety and mental depression are great, the features sunk, or the extremities cold; when a lurid, dirty, cachectic, or yellowish hue of the countenance and general surface is observed, and more especially early in the distemper; when the individual has been previously out of health, is cachectic, or the subject of disease of the heart, or of a varicose state of the veins; and when delirium becomes continued, and is attended by unconscious evacuations. In these circumstances few or no hopes of recovery may be entertained; but, nevertheless, active measures, such as I shall recommend, should not be relinquished. If these symptoms be accompanied with signs of extensive local disorganization, the chances of recovery are diminished, owing to the probable absorption of morbid matter into the circulation. Still, energetic measures should be prescribed; but, unless these measures are of a powerfully restorative kind, they will be productive of no benefit, especially if hicough be present; and even when most restorative, they may fail, or may not be retained on the stomach, particularly at a far advanced stage of the distemper.

495. *b.* A more *favourable* result may be anticipated if the pain is less violent, if the pulse becomes less frequent, and the delirium is only present at night. If sleep be obtained, if the tongue continue moist, if singultus be not present, and if medicines be retained on the stomach, more sanguine hopes of recovery may be entertained. As respects the local affection, much will depend upon the rapidity and extent of its progress under the integuments and muscles of the affected side; and the amount of ease obtained from incisions, and the discharge of purulent matter. If the discharge be followed by a limitation of mischief or disorganization, and if the inflammation of the deep-seated cellular tissue has not implicated the pleura, it may be hoped that such measures as assist vital resistance may still prove successful, not only by arresting, but also by remedying the already existing disorganization. Of eight cases which I have seen of this distemper, seven recovered; but all these came under my care at an early period. The fatal case occurred in a gentleman who was the subject of varicose veins, and was otherwise cachectic. I saw him shortly before his death, which took place after a short period from the imbibition of the poison

during the examination of a recently dead subject; the local symptoms in his case having been slight, but the nervous and constitutional disturbance most severe and rapidly fatal.

496. *D. Appearances after Death.*—These have been but imperfectly described, and comparatively few of the fatal cases have been examined. The lesions observed are, 1st. Those which are found in the external parts of the body; and, 2d. Those which are detected in the cavities and in the viscera.—(*a*) In the former, the changes are in some instances very slight, or hardly appreciable, unless in the vicinity of the axillary glands, in others most extensive. These changes may consist of serous infiltration of the cellular tissue surrounding these glands, which are generally more or less enlarged or inflamed, or both, or of a sero-puriform, or puriform infiltration, with or without destruction of the cellular tissue itself, as described in the article on diffusive inflammation of the CELLULAR TISSUE (§ 20, *et seq.*). In some instances the disorganization proceeds so far between the pectoral and respiratory muscles as to implicate the pleura, the external surface of the *costal-pleura* being also inflamed. The *muscles* themselves are sometimes changed, especially in the vicinity of the sphacelated cellular tissue or of the collections of puriform matter; the muscular fibres being of a dirty yellow colour, and devoid of cohesion. The *veins* are sometimes implicated, but seldom to a great extent, unless those which pass through the inflamed and disorganized cellular tissue. The *absorbents* between the puncture and the axillary glands sometimes betray no change, neither the superficial nor the deep-seated. In some instances, these vessels appear thickened or enlarged, and are, in various places, surrounded by sero-puriform, or puriform collections, in small quantities, in the cellular tissue. The *arteries* of the limb are rarely altered, excepting the smaller branches, which either supply the disorganized cellular tissue, or which traverse it. The state of the *nerves* has not been accurately observed, or has been reported as not materially changed; but in one or two instances the nerves of the arm, especially the internal cutaneous nerve, have been found inflamed. The *aponeuroses*, the *fascia*, the *theae*, and the *tendons* have sometimes been found inflamed, or surrounded by, or covering, or containing puriform matter or pure pus. Lesions of one or more of these structures are chiefly seen in those cases which are noticed as constituting the fourth, fifth, sixth, and seventh phases of the distemper (§ 492); in many of those cases, which are ranked under the first, second, and third phases, these lesions, excepting those of the cellular tissue and axillary glands, are either wanting, or so slight as not to be remarked. The lesions of these several tissues are generally most remarkable when the limb and external parts in the vicinity of the axilla present the more evident signs of disease or disorganization; and the symptoms during life vary with the texture more especially implicated, as shown in the articles upon the diseases of these textures. In the majority of cases, and more especially when the poison has been imbibed from a very recent or warm subject, no alteration can be traced after death in the arm, or any connexion between the abrasion or punc-

ture of the finger and the changes existing in the vicinity of the axilla and pectoral muscles, more than could be observed during life.

497. (b) If the external alterations have been but superficially observed, the visceral changes consequent upon this poison have been still more imperfectly described, if, indeed, described at all. The most prominent lesions have been observed in the *pleura*, particularly in that of the affected side, when the diffuse inflammation of the cellular tissue and its consequences have extended to the *pleura*. In these cases the *pleura* is inflamed, generally throughout that side of the thorax, and the cavity contains a turbid serum, or a large quantity of bloody serum, with flakes of lymph floating in it. The inflammation extends from the costal to the diaphragmatic and the mediastinal *pleura*, and even to the pericardium, the pulmonary *pleura* being also inflamed. The *lungs* are rarely affected, but they have been found more or less congested. The *heart* has been seen somewhat flabby, and its right side and *vena cava* have presented inflammatory appearances. The stomach, intestines, liver, &c., are generally represented as natural, and the brain, spinal cord, and their membranes either have not been examined, or they are said to have been unaltered.

498. *E. Causes predisposing to Infection by this Poison.*—There are manifestly circumstances which predispose to the infection of this poison, and increase the virulence of the distemper produced by it. Attention to these causes may aid in preventing, or even in counteracting its effects. The operation of this, as well as of all animal poisons, is favoured by whatever lowers the powers of life or weakens the vital resistance to injurious agents; by the depressing emotions, by fear especially, by disordered states of the digestive organs, or by accumulations of secretions and fecal matters in the digestive canal; by a languid, impoverished, or an impure state of the circulating fluids; by general cachexia or anæmia; by fatigue, want of sleep, or exhaustion of nervous energy; by excesses of all kinds; and by an irritable and susceptible state of the nervous system. Probably also idiosyncrasy, the nervous and irritable temperaments, a debilitated state of the frame, or natural delicacy of constitution or conformation, favour the morbid impression of this poison, and impart a greater intensity to its effects. My experience has shown that these circumstances are influential in the way now stated; while their opposites are equally influential in resisting the operation of the poison, or in rendering the effects less dangerous.

499. *F. Nature of the Distemper.*—The constitutional symptoms are generally the same in all cases of this terrible malady, and differ merely in severity and the rapidity of their course. They always precede the more prominent local alterations, but become more severe with the progress of these. In addition to several other phenomena characteristic of this distemper, it is generally observed, in the more prolonged cases, that, previously to a termination in death or recovery, swelling and inflammation affect a portion of the limb interposed between the original wound and the first seat of pain. The swollen parts present a redness very unlike that of erysipelas; for the tint is that of peach-blossom, and is very small in ex-

tent compared with the extent of the swelling, and is seen for a very short time, perhaps for a few hours only, never longer than a few days, on the same spot, and next is observed in some distant part, possibly even on the opposite limb. Besides, this peculiar redness, vanishing quickly from a part, does not leave any vesication or desquamation after it, as is seen in cases of erysipelas. When the swollen parts are incised they yield only a small quantity of blood, or serum and blood, unless the incisions are delayed until the effused fluid assumes a puriform character. On this topic Dr. COLLES remarks, that this peculiar disease, the effect of slight wounds received in dissection, presents much less of inflammation of the wound or its vicinity than occurs in the various diseases to which slight injuries more frequently give rise. Here the injury seems to produce mischief by exciting a fever, which in its turn induces a swelling and redness of very peculiar character, although at length (if the patient chance to survive) it will end in inflammation and suppuration of the wounded limb. (*Dub. Hosp. Rep.*, vol. iv., p. 247.)

500. Having seen the inoculation of this poison so frequently during examinations of puerperal subjects, and of persons who had died of erysipelas, the question suggested itself: Can the distemper which results be merely a form of erysipelas produced by inoculation? But this idea was met by the fact that it has been caused by wounds or abrasions received in the examination of recent subjects, irrespective of the disease which produced death, although my experience has shown that these maladies, and inflammations of serous membranes attended by fluid effusion, have most frequently occasioned it. There still remains much to be ascertained respecting it, before accurate views as to its nature can be entertained; for the changes produced in the nervous systems and centres, the appearances of the blood, both during life and after death, and the possibility of propagating a similar distemper by the serous fluids of the body of one who has died of it, or by the secretions during life, have not been investigated. Strongly impressed with the imperfect state of our knowledge of the pathology of this distemper, owing chiefly to the very superficial examinations of the bodies of those who have died of it, and to the general adoption of a very injurious practice in the treatment of it—a practice which has proved unsuccessful in the great majority of cases for which it has been prescribed, and which is yet persisted in with little variation, I would, nevertheless, suggest the following views as to its nature, especially as they have been the basis on which I laid my indications of cure in the cases which were treated successfully.

501. *a.* The poison communicated by, or imbibed from, a recently dead human body is of a specific nature, and produces a specific malady; specific, more especially, as respects the constitutional symptoms, and peculiar, as just shown, as regards the consecutive pain and inflammation in the axilla, arm, and side.

502. *b.* This poison is connected with the secreted and exhaled fluids before they have undergone any change or decomposition, and before any of the properties imparted to them during life, or during the departing vitality of



the frame, has escaped from them; the loss during decomposition of properties derived from, or depending upon the state of vitality, rendering them inert. In these respects, as regards the source of morbid properties, and the loss of those properties, the fluids producing this peculiar malady in every respect resemble the fluids infecting small-pox, measles, scarlet fever, &c.; are identical with the infection of the exanthemata; decomposition or putrefaction destroying, while recent production increases, the poisonous properties.

503. *c.* There is every reason to infer, from facts already before the profession, that this poison exists, probably in various and varying grades of activity, in the serous and exhaled fluids of all human bodies recently dead, whether from accident or disease, and irrespective of the nature of the disease; but that certain maladies, especially those in which the serous membranes and the circulating fluids are most liable to be especially affected, as puerperal diseases, erysipelas, peritonitis, &c., appear, in the present state of our knowledge, to cause this distemper the most frequently.

504. *d.* We do not possess evidence of this infection being communicated by a person labouring under the effects of poison—by a living person;\* and this may arise from the circumstance of the fluids which are more especially or specifically infectious or poisonous being those which exist in shut or serous cavities or in viscera, and which cannot hence be imbibed during life; although other fluids, exhalations or secretions, which are probably less poisonous or infectious, may communicate a modified or less virulent malady, as, indeed, seems to have been the case on some occasions, as noticed below.

505. *e.* The morbid impression made by the poisonous fluid imbibed from a recent subject, seems primarily to affect the nerves of sensation in connexion with those of organic life;

\*Dr. NELSON states, in his account of the illness of Mr. NEWBY, who died from the effects of this poison, that Mr. N.'s assistant had an erysipelatous inflammation of the fauces, and the pupil an attack of low fever, during the latter part of Mr. NEWBY'S illness; that the housemaid was severely affected with cyanicæ tonsillaris; that the nurse had a slight attack of pyrexia, with pain and stiffness at the back of the neck, followed by erysipelas, which proved fatal; and that another who assisted just after Mr. N.'s death had also erysipelas, but recovered. Dr. NELSON adds, "Was the disease which destroyed Mr. N. erysipelas produced by inoculation and affecting the cellular substance of the breast and parts adjoining? Did the five cases which occurred during his disease and after his death arise from erysipelatous contagion?" (*Medical and Phys. Journ.*, Aug., 1823.)

Mr. DELPH, surgeon, imbibed this poison from a woman who had died a few hours previously of visceral inflammation, the body being still warm when it was examined. The woman who nursed this person and washed the linen was seized with fever. Mr. SMART, who assisted Mr. DELPH in this examination, was also attacked with symptoms of low fever on the second day afterward, and with numbness and inability to move the right arm. The side became tender and swollen; the fever typhoid, and the sensorium much affected. During the early part of Mr. SMART'S illness he was taken care of by a servant who happened to wound the index finger of the right hand. The wound became inflamed, swollen, and livid; and although early opened, much pus was discharged, and the extensor tendon had suffered. A tumour soon afterward formed in the axilla, which was also opened. This man was removed to his father's house, and was nursed by his mother, who had an attack soon afterward of inflammation of the hand, with much fever. In none of the above cases "were the absorbents of the arm inflamed, showing the red line which usually marks the track of the mischief from the punctured part into the system." (TRAVERS, *Op. cit.*, p. 327.)

and, as these nerves are intimately associated with the vessels and absorbents of the limb, on the one hand, and with the ganglial system on the other, the morbid impression or irritation produced by the poison is followed by a general disturbance or tumult of all the functions actuated by the ganglial or the organic nervous system; by excessive vascular action, without nervous energy or vital resistance, these states passing into exhaustion, with sinking of vital power, and contamination of the circulating fluids.

506. *f.* The primary impression of this poison is not only irritating, and productive of exquisite pain, in many instances, and of inordinate excitement in most, but it is also of a depressing nature, inasmuch as it often is followed by a numbness in the vicinity of the puncture, or by aching, or feebleness of the limb; the local change thus primarily produced being probably a chief cause of the consecutive changes which take place, especially after the frame is infected, in the glands and other structures in the axilla and its vicinity of the inoculated side.

507. *g.* The constitutional commotion, generally developed from ten to twenty hours after the imbibition of the poison, is displayed by all the organs actuated by the ganglial system, and by the brain; both the organic and the cerebro-spinal nervous systems evince much disorder, and this disorder is characterized by altered or excited sensibility, and by deficient energy; the functions of vital organs being co-ordinately affected, vascular action remarkably excited, and the blood, and all the secretions from it, ultimately more or less altered, as in malignant distempers.

508. *h.* The nature of the constitutional commotion, of the vascular excitement in this malady, has been misunderstood by most practitioners and writers, and the character of the pulse misinterpreted; and, because there have been very acute pain, and remarkable frequency of pulse, often with delirium, many have most unwarrantably inferred the existence of sthenic or true inflammatory action, instead of its opposite, and had recourse to large vascular depletions, which have aggravated the pain, increased the frequency and weakness of the pulse, and induced or rendered more severe and continued the delirium. Oh! that ignorance would be less presuming, and not actually inflict the death it is blindly attempting to prevent.

509. *i.* The state of predisposition of the poisoned person, depending upon temperament, constitution, and the existing health, is most probably influential in developing the primary impression and the consecutive effects, or in aggravating their severity. This has been proved by cases which have come under my own observation, where surgeons, who have aided me in the inspection of very recent bodies, have, without any wound or abrasion of the cuticle, or after such injury, complained only of comparatively slight constitutional symptoms, which yielded to treatment, without the local symptoms having appeared.

510. *k.* In most cases no morbid connexion can be traced between the puncture, or the point of inoculation, and the subsequent alterations which take place in the axilla and vicinity: no change is observed in any of the tissues

between this situation and the puncture or scratch in the finger or hand; unless the change exist in some of the nervous fibres, and be of such a nature as not to admit of recognition by the unaided senses. The constitutional commotion is generally ushered in by altered sensibility of the poisoned part and of the arm, but is unattended by any visible change, although in some cases the absorbents, either superficial or deep-seated, appear to be affected, and is characterized by its early appearance, and by remarkable physical and moral depression and anxiety, followed by rigours, which are succeeded by reaction and excessive nervous and vascular excitement, devoid of energy or vital power. The alterations which occur in the axilla and vicinity never commence until the constitutional disturbance is produced, generally after the rigours and consequent reaction, and are preceded by exquisite pain, often extending to the shoulder and arm.

511. *I.* The inflammatory changes in the axilla and vicinity do not take place in some of the most violent and dangerous cases; the poison, apparently, not being intercepted by the glands, and affecting chiefly the nerves and exerting its noxious influence upon the nervous systems and constitution generally.\* These changes are merely contingent upon the majority of cases, and do not constitute the disease; the constitutional affection not only preceding them, but being also over-proportioned to them. They are, moreover, in some instances, entirely absent, as in the first phases above specified (§ 492). I therefore agree with Mr. TRAVERS in stating "that the local inflammatory action is an unessential and subordinate feature of the malady in its severest form; the disease itself consisting in a direct prostration of the vital forces, marked by preternatural excitement and rapid exhaustion."

512. *G. Treatment.*—It has been justly remarked by Dr. COLLES that, "whatever difference of opinion may be entertained as to the nature of this affection, it will be allowed that, although some few have escaped, yet the plans of treatment hitherto pursued have all proved quite unequal to contend with so formidable a disease." But the plan which he proceeds to advise has nothing to recommend it in preference to those which have been previously adopt-

ed, if, indeed, any definite or rational plan had ever been prescribed. The means which had usually been employed consisted of blood-letting, general and local, opiates, fomentations, purgatives, &c.: the blood-letting having been prescribed for the insufficient reasons that the pulse was rapid, and the febrile symptoms and delirium excessive: reasons more correctly indicating the propriety of adopting very different measures. Dr. COLLES, knowing that this treatment was most frequently followed by an aggravation of the malady, simply advises calomel in doses of three grains every three or four hours, with the intention of quickly exciting pyalism. But, despite of the magic number three, he might consider himself most fortunate if he succeed at all in this intention, and "fortunate beyond compare" if he succeed either quickly or with a perfectly favorable issue.

513. The virulent poison imbibed from a recently dead body invades the healthy frame with a rapidity and intensity proportionate to the deficiency of vital power opposing the invasion; and whatever means are administered to the person infected by this poison, calculated to lower vital power and resistance, will only aggravate the effects by accelerating the absorption, and facilitating the operation of it upon the frame. All animal poisons exert more or less of an asthenic influence upon the healthy body—an influence which is not only morbid, not merely an alteration from the healthy condition, but also one of depression, a condition characterized by an imperfect as well as altered manifestation of the functions of life, and tending to the extinction of those functions. But when this primary effect is not so intense, relatively to the powers of life, as to overwhelm these powers altogether, they react against it, oppose it, resist its extension, and often completely overcome it. In many instances the impression made by the poison on the nervous system, and the contamination induced in the circulating fluids, lead to a violent struggle between these changes and the powers which resist them; the struggle ultimately terminating either in the removal of these changes or in the annihilation of the powers which have opposed them. Now, if I have observed and interpreted aright the phenomena produced by the poison in question, this is what actually occurs after the imbibition of it by the healthy frame: *first*, asthenic and morbid action; *secondly*, vascular excitement, the morbid influence on the nervous and vital powers still continuing; and, *thirdly*, disorganization and death, which are rapid in proportion to the invasion of the cause, and the failure of the vital powers of resistance. If it were asked, What are the measures which are most likely to increase not only the first and third of these effects, but also the second? I could not hesitate to answer, those very measures which have been hitherto too generally adopted to remove them. It may, however, be contended that the reaction which supervenes requires to be moderated by blood-letting in order to prevent its exhaustion; but I have shown that the reaction is most morbid—is a tumultuous excitement, deficient of power or constitutional resistance; that the pulse is that of irritation—of what JOHN HUNTER would call constitutional alarm; that the blood is not inflammatory, and the coagulum is not firm; and,

\* The following case illustrates this rapid and violent form of the malady: Mr. E., medical student, punctured his finger in opening a body recently dead. This occurred at noon (of Monday), and in the evening of the same day he found the wound painful. During the night the pain increased, and symptoms of high constitutional irritation were present on Tuesday morning. No trace of inflammation, however, was apparent beyond a slight redness of the spot at which the wound was inflicted, which was a mere puncture. In the evening he was visited by several physicians, but no local change could be discovered. The nervous system was agitated in a most violent and alarming degree, the symptoms nearly resembling the universal excitation of hydrophobia; and in this state he expired at three o'clock on Wednesday morning, forty hours from the injury. (TRAVERS on *Const. Irritation*, p. 262.) This case, and other instances of a less violent character, seem conclusive of one of two things, namely, either that the poison acts upon and affects the constitution through the medium of the organic nervous system, or that it is absorbed into the circulation in some cases without inflaming the absorbents or glands, or veins, occasioning the most severe effects upon the nervous system and vital energy, although inflammation of these structures, more especially of the glands and the surrounding cellular tissue, is often produced in consequence of the affection of the nervous system, or of the absorption, or of both.



moreover, that the rapidity of the pulse, and the severity of the delirium, and all the other symptoms are aggravated by this measure; and are of such character, and are attended by such phenomena, as ought to suggest a very different method of cure.

515. When treating of *diffusive inflammation* of the CELLULAR TISSUE, I pointed out the means which should be employed, both as *prophylactic* and *curative*, in the treatment of this disease when connected with, or consequent upon, poisoned wounds. Since that article was written, my farther experience has proved the correctness of my views, in respect both of the prevention and cure of the effects arising from the poison imbibed in the dissection of recently dead bodies, as stated in that article (§ 34, *et seq.*); and, therefore, I now more strenuously advise the adoption of the principles and means of treatment there recommended.

516. *a.* The *prophylactic* means should be promptly applied, and should consist chiefly of a *ligature* applied above the puncture, scratch, or abrasion, when the situation of either admits of its application, or a cupping-glass, or even a common wine or ale glass, may be applied in other circumstances, the air being excluded in the usual way, or suction or pressure may be employed: afterward the wound should be carefully washed, and a pledgit of lint, wet with spirits of turpentine, placed over it. This application I have found more efficacious than any other, and it is not productive of any local irritation. When these measures have not been taken, or not taken sufficiently soon, the part wounded should be viewed as still containing a portion of the poison, and be subjected to them, although several, or even many, hours may have elapsed; and the constitutional powers ought to be fortified by means of pure air and generous living.

517. If *constitutional disturbance* should appear notwithstanding, or if it have already appeared owing to a neglect of prophylactic treatment, it should be promptly met by stimulating diaphoretics conjoined with tonics; and by warm or stomachic aperients, conformably with the principles maintained when discussing the treatment of *diffusive inflammation* of the *cellular tissue* (§ 34, *et seq.*) and of the *lymphatics* (§ 17, *et seq.*). The decoction of cinchona, therefore, should be given with liquor ammoniæ acetatis and full doses of the sesqui-carbonate of ammonia; and the bowels evacuated by means of a draught with equal parts of the spirits of turpentine and castor oil, and of an enema, containing the same substances, with or without ten grains of camphor. These may be subsequently repeated, according to circumstances.

518. *b.* The chief intentions of cure are, *first*, to prevent infection; *secondly*, to resist the extension of the mischief if infection have actually taken place; and, *thirdly*, to relieve the urgent symptoms, both constitutional and local, which usually appear when the disease is fully and unfavourably developed. The *first* of these having been premised, the *second* should be energetically employed, notwithstanding the tumultuous state of the vascular excitement or the delirium which may be present. The medicines just recommended ought to be early prescribed, and the dose of the ammonia suited to its effects. Instead of the combination of the

cinchona now mentioned, the decoction may be given with the chlorate of potass and the hydrochloric ether; and either of these combinations may be aided by the addition of camphor, by warm aromatics, by spices, &c., more especially by capsicum, which often prevents or alleviates the sickness and irritability of the stomach, and even the singultus of a more advanced stage of the distemper. If these do not relieve the disorder of the stomach, creasote should be given with camphor, capsicum, and small doses of opium, these medicines being generally indicated, when restlessness, watchfulness, or delirium supervenes. When, however, this last symptom appears, the doses of these substances ought then to be increased, and the morphia substituted for the pure opium or its tincture; full doses of these being given shortly before bedtime. Morphia or opium, or such of the preparations of opium as may be prescribed for the nervous symptoms of this malady, should be given in a very full dose, and conjoined with camphor or with capsicum or other warm spices, a full dose being given in the evening, and a smaller one in the morning. The infusion or decoction of cinchona may be also conjoined with other medicines, as the bicarbonate of potash, or soda, or ammonia, and be taken in a state of effervescence with citric acid or lemon juice; but the carbonate should be in excess, and the warm spices or aromatic tinctures be added. In the advanced stages of this malady, and for the local lesions which supervene in the course of it, the treatment should in all respects be such as already advised in the article on *diffusive inflammation* of the CELLULAR TISSUE (§ 34, *et seq.*).

519. *x.* PUTRID ANIMAL MATTER is productive of injurious effects when taken into the stomach; but these effects are much more serious when such matter is applied to an abraded surface, or to a wound, and more especially if it be injected into a vein.—*A.* As to the *ingestion* of this matter, Dr. CHRISTISON well observes, that “to those who are not accustomed to the use of tainted meat, the mere commencement of decay is sufficient to render meat insupportable and noxious. Game only decayed enough to please the palate of the epicure has caused severe cholera in persons not accustomed to eat it in that state. The power of habit in reconciling the stomach to the digestion of decayed meat is inconceivable. Some epicures in civilized countries prefer a slight taint even in their beef and mutton; and there are tribes of savages who eat with impunity rancid oil, putrid blubber, and stinking offal. How far putrefaction may be allowed to advance without overpowering the preservative tendency of habit, it is not easy to tell.” Something, however, is due to the nature of the beverages taken along with the articles in this state, and to the powers of digestion and assimilation possessed by those who partake of such food, in enabling them to resist the injurious effects produced by it in others.

520. *B.* The *exhalations* produced by putrid or decaying animal matter have generally been viewed as most noxious, until Dr. BANCROFT, the apostle of modern non-infection, endeavoured to prove, in a most ponderous volume, their very harmless nature. The present state of information, and the good sense, not only of

medical men, but of all competent observers, have completely disproved this absurd and injurious opinion. These exhalations are generally more or less noxious, especially when inhaled into the lungs for some time, or in certain states of predisposition to be infected by them, or in grades of considerable concentration, or when dissolved in the humidity of the atmosphere. M. MAGENDIE demonstrated that dogs confined over vessels in which animal matter was decaying experienced similar effects to those observed in the experiments performed by him and M. GASPARD upon the introduction of putrid animal matter into the veins. These effects resembled in every respect the *putrid form of fever* described in the article FEVER (§ 472, *et seq.*). The fact that putrid effluvia generate fever in man has been sufficiently demonstrated to require any illustration at this place, and has been sufficiently proved by evidence referred to in various parts of this work, and by proofs which have come under my own observation. The instances which have been adduced in opposition to it by Dr. BANCROFT, PARENT-DUCHATELET, and others, prove only that these exhalations are not poisonous in every case or occasion of exposure to them, and that habit and other circumstances may impart to some persons an immunity from their usual effects. These exhalations have often produced not only *putrid* or *adynamic fevers*, but also an *adynamic form of dysentery*; and in some cases which I was lately called upon to treat, I had every reason to infer that these exhalations may produce dysentery by their action upon the mucous surface of the anus, when resorting to such privies as contain large accumulations of fecal matters, especially during warm seasons. An asthenic form of irritation and inflammation, with adynamic fever, was observed in these cases, the local affection extending from the margin of the anus upward along the mucous surface of the rectum and colon; and, in three instances, affecting also the vagina and uterus in a similar manner, and with similar discharges.

521. C. When putrid animal matters or fluids are *inoculated* or inserted into *wounds*, or applied to *abraded surfaces*, extensive local inflammation of a diffusive or spreading kind, with very low or adynamic fever, is developed, owing to the rapid contamination produced locally as well as in the circulating fluids, and death takes place, unless the mischief be early arrested by a very active stimulating, antiseptic, and tonic treatment. The injuries received from dissection of putrid bodies, and by cooks when dressing very high game, are of this kind, they being generally attended by a diffusive cellular inflammation and adynamic fever, and are different, in both the local and the constitutional phenomena, from the injuries received in the dissection of recent bodies, although allied to them in many respects. (See CELLULAR TISSUE—Diffusive Inflammation of.) Putrid animal matters occasion somewhat different effects, according to the nature of the matter, the degree of putridity, and the constitution of the individual, but these effects are more or less allied to those produced by poisons which I have viewed as septic, and classed accordingly. (See CLASS SEPTIC POISONS.)

522. D. The Treatment of the effects produ-

ced by putrid animal matters received into the stomach is in every respect the same as that recommended for the poison of pork or of sausages, &c. (§ 443, 450). After the offending matters have been evacuated, either by encouraging vomiting or producing it by the means just advised, *creasote* may be given with the warm spices already mentioned, and these may be mixed with powdered charcoal or in solutions of the chlorides, and taken in doses which the urgency of the case will suggest. If dysenteric symptoms supervene, these medicines may be conjoined with ipecacuanha and opium, or may be administered in enemata; and the rest of the treatment recommended in DYSENTERY, according to the form which the case may assume, may be adopted. I have lately given, in some dysenteric cases which have been produced by putrid animal exhalations, small and repeated doses of creasote, and a weak solution of the chloride of zinc, with marked benefit. The chloride of lime may also be given in small, but often-repeated doses, and lime-water, with milk, or in effervescence, or Carara-water, may be used as beverages. The effects caused by the *inhalation* of putrid effluvia require similar means to those prescribed for the adynamic or putrid forms of fever. (See ARTS. DYSENTERY and FEVER.) The treatment of local contaminations by putrid matter is not different from that about to be recommended for *septic poisons*.

523. xi. TOBACCO.—*Indian Tobacco*—*Lobelia Inflata*.—*Virginian Tobacco*—*Nicotiana Tabacum*.—The poisonous operation of these two plants closely resembles that of each other, the latter being the most energetic.—A. In doses exceeding fifteen or twenty grains, the *Lobelia* causes speedy and severe vomiting, with distressing nausea and sense of sinking at the epigastrium; sometimes purging, cold perspirations, giddiness, headache, tremours, and great relaxation and prostration of strength; failure, with intermissions of the pulse, sometimes a prickly sensation through the body to the extremities, and a smarting in passing the urine. In doses above thirty or forty grains of the powder, it produces death in a few hours, if it be not thrown off the stomach by the speedy vomiting induced by it. The most prominent symptoms are then, according to Dr. WOOD (*Lancet*, April, 1837, p. 144), extreme prostration, great anxiety and distress, and ultimately death, preceded by convulsions. Fatal effects have often resulted from the empirical use of this plant in America, owing chiefly to its not having been rejected by vomiting, as is sometimes the case. The effects produced by it are the same as those now described when it is administered in an enema.\*

\* [The *Lobelia*, or Indian tobacco, is a violent acrid irritant, and has occasioned many deaths from its improper use by empirics. The following cases are examples of the fatal effects of this article when improperly administered:]

The sixth volume of the Massachusetts Reports contains an account of the trial of SAMUEL THOMPSON for the murder of EZRA LOVETT, by administering *lobelia*. It appears that the patient, being confined by a cold, sent for Mr. T., who gave him three powders of *lobelia* in the course of half an hour, each of which vomited him violently, and left him in a great perspiration during the night. The next day two or more powders were given, each of which operated by vomiting, and occasioned great distress. In like manner, two other powders were given the subsequent day, leaving the patient in a state of great prostration. Several days after this, finding the patient still worse, Mr. T. gave sev-



524. *B. Virginian tobacco*, in the present state of society, is one of the most important plants in nature, and one of the most deleterious poisons furnished by the vegetable creation. In whatever way tobacco is used, whether chewed, smoked, or snuffed, habit impairs, and even modifies its effects. Sir B. BRODIE found that the infusion of tobacco thrown into the rectum, paralyzes the heart and causes death in a few minutes; but if the head of the animal be previously removed, and artificial respiration kept up, the heart remains longer unaffected, proving that tobacco disorders this organ through the medium of the nervous system. On herbivorous animals the effects of tobacco are less marked than on man.

525. *a.* In small doses, tobacco causes heat in the throat and warmth in the stomach, followed, especially if the dose be somewhat greater, by nausea, giddiness, and vomiting. In larger doses, it occasions nausea, vomiting, purging, a distressing feeling of sinking at the epigastrium, but rarely any pain. It seldom promotes sleep or evinces any narcotic influence beyond what depends upon its sedative action. In poisonous doses, its most remarkable effects are languor, feebleness, great and depressing anxiety, fainting, relaxations of the muscles, trembling of the limbs; vision and all the senses are enfeebled, the ideas confused. The pulse becomes small, weak, irregular, or intermittent; the respiration laborious; the surface and extremities cold and clammy. Recovery generally takes place if the symptoms proceed no farther; but if the vomiting continue, or if the purging be frequent, the tendency to faint

becomes urgent, the features sunk, the muscular powers paralyzed, the pulse progressively weaker, the extremities and surface colder, and covered by cold sweats; and, ultimately, convulsive movements, general paralysis, torpor, and death take place.

526. *b.* Tobacco is used in various ways, the effects produced by it being remarkably influenced by *habit* in whatever way it may be employed, at least up to a certain amount or dose. In the form of *snuff* it acts locally chiefly. The habitual use of snuff blunts the sense of smell, and, if it be taken in excess, dyspepsia, with peculiar symptoms, and a cachectic appearance of the surface, are produced by it. Dr. PROUT considers the dyspeptic symptoms caused by snuff to be peculiar and severe, and that malignant diseases of the stomach and liver are sometimes occasioned by this practice, when excessive or long continued.

527. *c.* *Smoking tobacco* in any way produces many of the symptoms described above, if it be long continued by a person unaccustomed to it. Dr. M. HALL detailed a case which nearly terminated fatally; the subject of it having, for his first essay, smoked two pipes. Dr. CHRISTISON refers to two cases recorded by GMEIN, which were fatal; seventeen pipes in the one, and eighteen in the other having been smoked at a sitting. This practice has been adopted by some with the idea that it is a prophylactic against endemic, epidemic, and contagious diseases; but there are really no grounds for this opinion. Smoking, especially when very frequently indulged in, weakens the digestive and assimilating functions, lowers the tone of the nervous system, imparts a pale, sallow, and cachectic hue to the countenance and skin, and induces functional disorder of the stomach, liver, and bowels. The soothing and flattering visions with which the practice of smoking feasts the weak and effeminate mind, lead to its adoption by most classes; but it is an enervating and an emasculating luxury; the offspring of those who indulge in it in excess being weak, puny, or stunted in growth; or of a nervous, susceptible, and scrofulous conformation. It often, also, induces a desire for spirituous liquors.

528. *d.* *Chewing tobacco* is even a more deleterious habit than that of snuffing or smoking. It is practiced chiefly by sailors and the natives of the United States of America. In sailors, the sea air probably counteracts its injurious influence; but when commenced in boyhood, as is often observed in this class, it stunts the growth, and in all circumstances it weakens the organic nervous energy and the mental powers, impairing also the powers of application. Persons habituated to this mode of using tobacco are irritable, restless, and miserable when deprived of it, and feel a distressing sinking at the epigastrium. If they continue long to indulge in it, they lose their healthy appearance, and, although they may not evince any severe or specific disease, the nervous system—the mental powers especially, are weakened by the habit, and they become prematurely aged and short-lived. [These remarks can only apply to tobacco when employed in excess; for, as above remarked, “habit impairs, and even modifies its effects.”]

529. *e.* The application of tobacco to a recent

eral more powders, which produced great distress, and at length ceased to operate. Still more lobelia was administered, until the patient lost his reason, and became convulsed so as to require two men to hold him. To relieve these symptoms, two more powders were forced down, and the patient soon expired.

The accused was tried for murder, but for want of sufficient evidence of malice prepense, he was acquitted.

A very similar trial took place before the Court of Sessions in the city of New York, in December, 1837, in which a Thompsonian doctor by the name of FROST was tried for killing a Mr. FRENCH, by the administration of lobelia. In this case, lobelia was freely and repeatedly administered, both by mouth and injection; besides which, the patient was repeatedly steamed, and took large quantities of “composition tea.” This course was continued until inflammation of the stomach, bowels, and brain was induced; delirium, with great prostration, took place, and the patient sank, exhausted.

On this trial, several botanic physicians testified that lobelia was not dangerous in any doses. The accused was found guilty, and sentenced to incur the penalty of fine and imprisonment.

Another trial of a similar kind took place at Binghamton, N. Y., in May, 1844, which is reported in the New York Journal of Medicine and Surgery for November, 1844, by Dr. DAVIS.

The patient had been complaining for some days. The accused, Dr. DRAKE, commenced by giving some medicine to prepare the stomach for an emetic. The next morning he gave at least a tea-spoonful of the seeds of lobelia. About noon, the patient became much distressed for breath: ginger tea was ordered, of which three tea-cups were given; a decoction of lobelia, containing a quantity of the seeds, was next administered in divided doses: convulsions set in, and the patient expired. On a post-mortem examination, a table-spoonful of lobelia seeds was found in the stomach; the mucous membrane of the stomach was softened and much inflamed; the intestines also were much inflamed. The botanic physicians testified that lobelia would not excite inflammation under any circumstances, and that it does not possess poisonous properties. The accused was found guilty. Other cases could be given to the same effect, all going to prove the dangerous effects of this article when given in considerable doses. (See *Bigelow's Med. Bot.*, vol. i., p. 181; *Phil. Journ. of Pharmacy*, vol. v., p. 300; vol. ix., p. 98.)

wound, to an abraded surface, or to sores, is often attended by serious or even fatal effects. Mr. Weston has recorded a case in which the expressed juice of tobacco was applied to the head of a boy, aged eight years, for the cure of tinea capitis. Death took place three hours and a half after the application. Three children were seized with giddiness, vomiting, and fainting from the application of tobacco leaves to the scalp for the cure of an eruption.—(*Ephemer. Cur. Nat.*, Dec. ii., Ann. iv., p. 467.)

530. *f.* Tobacco has not infrequently been employed fatally in an *enema*. I have witnessed this result from half a drachm of the infusion having been thus prescribed. An instance is adduced in the British and Foreign Medical Review (vol. xii., p. 562), in which the decoction of twelve grains in six ounces of water, used as an enema, was fatal. Cases of a similar result from larger quantities of this plant, administered in this way, have been recorded by DESAULT, GRAHL, COOPER, BELL, and others; and it has not infrequently caused death when thus employed by empirics. The symptoms produced by it, thus administered, are similar to those already described; nausea, relaxation of the muscles, failure of the pulse, tremours, faintness, cold sweats, and excessive sinking, or fatal syncope, being the most characteristic phenomena.

531. *g.* The appearances on dissection, as described by Dr. GRAHL, are thus stated by Dr. CHRISTISON. Great lividity of the back, paleness of the lips, flexibility of the joints (two days after death), diffuse redness of the omentum, without gorging of the vessels, similar redness with gorging of vessels on both the outer and the inner coats of the intestines; in some parts of the mucous coat patches of extravasation; and unusual emptiness of the vessels of the abdomen. The stomach was natural, the lungs pale, the heart empty in all its cavities, and the brain was natural.

532. *h.* The operation of Virginian and Indian tobacco is nearly the same. The action of Virginian, or common tobacco, is similar to that of *foz glove*; but it is slightly irritant of the digestive mucous surface, and much more paralyzing, causing more decided relaxation and depression of muscular power, with trembling. It, moreover, acts more decidedly upon the secretions and upon exhaling surfaces. The action of this poison differs from that of *Belladonna*, and from that of *Stramonium* or *Hyoscyamus*, in the contraction of the pupil when applied locally or taken in poisonous doses, and in the absence of any affection of the throat, and of delirium or other cerebral symptoms. The influence of tobacco differs also from that of *aconite*, in its more decided effect upon the muscular system, while *aconite* paralyzes the sentient nerves, occasioning numbness and tingling, which are not observed after the administration of tobacco.

533. *i.* *Treatment*.—Poisoning by swallowing this plant, or preparations of it, is very rare, a few cases only being recorded. The discharge of the poison from the stomach, by the means usually resorted to, should be as speedy as possible. There is no chemical antidote to it yet known; but Dr. PEREIRA thinks that the vegetable acids and astringents, the infusion of nut-galls, of green tea, &c., may be employed

with benefit. In order to allay the vomiting and depression of vascular action, ammonia, brandy, capsicum, and other spices, with small doses of opium; the cold affusion on the head, if congestive or apoplectic symptoms occur; the use of strong coffee; sinapisms over the epigastrium, and the other means advised for the other poisons of this class, are chiefly deserving adoption.

534. xii. VEGETABLE ACRO-SEDATIVES OF DIFFERENT SPECIES, besides those already noticed, have produced serious effects; but their operation, and the symptoms they occasion, have not been satisfactorily observed. The chief of these are the following: *A. CASTOR SEEDS*.—The seeds from which castor oil is extracted contain in the embryo a most active acro-sedative poison, a few of them being sufficient to produce violent purging and death. Mr. TAYLOR adduces the following illustration of their effects: A lady, aged 18, ate about twenty of these seeds, one of her sisters ate four or five, and another two. In the night of the evening on which this took place, they were all taken ill. The deceased, who had taken the largest number, felt faint and sick about five hours afterwards, and vomiting and purging came on, and continued through the night. The following morning she presented all the symptoms of malignant cholera. The skin was cold and dark-coloured; the features contracted, and the breath cold; the pulse was small and wiry; there were restlessness, thirst, pain in the abdomen; and she lay in a drowsy, half-conscious state. Whatever liquid was taken was immediately rejected, and the matters passed by stool consisted chiefly of a serous fluid tinged with blood. She died in five days without having rallied. On inspection, a very large portion of the mucous membrane of the stomach was found abraded and softened in the greater curvature. There was general vascularity of the organ, and the abraded portion presented the appearance of a granulating surface of a pale rose-colour, and was covered by a slimy mucus. The small intestines were inflamed, and their inner surface abraded. The two sisters recovered. Two or three of the seeds act as a violent depressing cathartic. The irritant poison resides in the embryo, and is not expressed with the oil, which, in its fresh, or non-rancid state, is a mild purgative.

535. *B. IATROPHA MANIHOT—Iatropa Manihot*.—The fresh root, or the juice of this plant has been long known as a violent poison. It produces nausea, vomiting, and purging; pain, tenesmus, swelling of the body, loss of sight, coldness of the extremities, faintings, and death. Dr. BECK refers to cases in which the juice had produced these effects within an hour. The dissection of one case furnished no alteration, excepting that the stomach was found shrunk to half its natural size. The noxious property of this plant is destroyed by heat.

536. CLASS VI. IRRITANT AND ALTERANT POISONS.—ACRO-ALTERANT POISONS.—This class of poisons is very closely allied to the *fifth*. It comprises those substances and preparations which, either in acutely or chronically poisonous doses, not only irritate the digestive surfaces, but also alter the vital properties and manifestations of the tissues—not so much dy-



namically, as in the preceding classes, as in character or kind. When administered in large doses, the alterative effects may not become very apparent if they produce death in a short period, if they are so given as to prove *acutely* poisonous; but during their *slower* or more *chronic* operation, and during recovery from their acute action, the alterative effects are more fully evinced. Several of the substances comprised under this class are much employed medicinally, and have been, and even still are, prescribed, although much more rarely, so as to produce most injurious effects, owing to the alterant influence exerted by them upon the functions of several surfaces and organs, and not upon the functions merely, but even upon the organization of the structures ultimately and remotely. There are several substances which have been already considered, that produce also an *acro-alterative* effect, when administered in smaller quantities or in repeated doses. But as these, when employed as poisons or in large quantities, act either as *corrosive* poisons or as *acro-sedative* poisons—in the one case corroding or disorganizing the tissues to which they are applied, and in the other depressing, or altogether annihilating nervous influence or vital power—I have thought it preferable to treat of them under these classes. Even the same poison, however virulent, does not act in a certain definite manner and specific mode, but in different ways, according to the amount, repetition, or continued exhibition of it; and to the various modifying influences already described (§ 51, *et seq.*). Poisons are not to be viewed as specific entities, producing certain and determinate results, but as powerful agents affecting nervous influence, vascular action, vital power and resistance, and even the organization of the frame, in varying modes and grades; the more manifest effects furnishing, by their prominent features especially, such characters as enable us to arrange and classify them. And thus we find that many poisons, as corrosive sublimate, the concentrated acids and alkalies, several mineral and other saline substances, and even the vegetable acids, act as corrosive and acute poisons, and destroy life, chiefly by the intensity of their local action, when taken in sufficient quantity in certain states of the stomach, while the same substances, when administered in smaller or repeated doses, or in states of greater dilution, or when their exhibition has been too long continued, are fatal, or are injurious, owing to different modes of action, and to their remote and secondary effects produced by different channels, their effects having a very intimate reference not only to their quantities and modes of exhibition, but also to the constitution and states of the sufferer at the time. Hence many corrosive poisons, when thus or otherwise exhibited, act as sedatives, or as irritants, or as *acro-sedatives*, and produce effects similar to those classed under these several heads, or act as *acro-alteratives*, and operate in nearly similar modes to those substances now about to be noticed.

537. i. *BELLADONNA*—*Deadly Nightshade*.—*Atropa Belladonna*—*Atropia*—has usually been classed as a narcotic, or *acro-narcotic* poison; but although the last stage of poisoning by it is often attended by sopor or insensibility, it is

not strictly a narcotic, as will appear from the symptoms produced by it. The leaves, roots, and berries of the plant are poisonous, and produce nearly the same effects in equally powerful doses. On dogs, this plant causes dilatation of the pupil, plaintive cries, efforts to vomit, staggering, weakness of the posterior extremities, frequent pulse, a state resembling intoxication, and death (PEREIRA). I have seen dangerous, and in one instance nearly fatal effects result from the medicinal use of preparations of this plant.

538. A. The symptoms vary remarkably with the dose and the frequency of its repetition, with the mode of administering it, and the constitution of the sufferer. The most rapid appearance, and the most comatose state of the symptoms have followed the administration of an infusion or extract of this plant in an enema. Dr. SCHARF states, that four ounces of an infusion of the root injected as a clyster produced coma and death in five hours. In a case to which I was called, the extract had been introduced into the rectum as a suppository, but the exact quantity I could not learn. Apoplectic coma soon followed, from which the patient recovered with difficulty, delirium both preceding and following the coma. The poisonous operation of belladonna is most rapidly and fatally developed, when any of the preparations of it is administered as an enema.

539. a. The local or irritant action of this plant is not very intense, and is exerted primarily upon the upper portion of the digestive canal, especially the fauces and œsophagus, causing dryness and redness of the throat with slight difficulty of swallowing, and but seldom vomitings or purging. In some instances soreness of the throat, difficult deglutition, and even aphthous inflammation of the fauces have been more remarkable; and in rarer cases, bloody stools, strangury, and even bloody urine have appeared consecutively, or have accompanied the nervous symptoms. The irritation of, and eruption on, the skin, characteristic of this poison, appears chiefly after a frequent or prolonged use of small doses of it. This eruption has been observed by me in several instances where I had employed belladonna. It has been likened to that of scarlatina; but it has as frequently resembled the eruption of measles. It has sometimes followed the use of the extract in ointments which I have prescribed for irritable states of the rectum or uterus.

540. b. The alterative operation of the preparations of belladonna is varied and uncertain, and is exerted chiefly on the nervous systems, more particularly upon those portions which are most intimately connected with the manifestations of sensibility and intellect. Thus we observe dilatation of the pupils, insensibility of the irides to light, dimness of vision, diminished feeling, vertigo, staggering, delirium, and occasional sopor, successively follow the excessive use of them. The alterative operation of this poison on others of the systems or organs of the body is problematical, although the uterine functions have been said to have been influenced by it. This plant, especially the tincture and inspissated juice or extract of it, is a valuable remedy, not merely as an anodyne, but also as an alterative in several diseases; but, if exhibited without due caution, especially in

children, or in whooping-cough, it is liable to be followed by injurious or even dangerous effects. Accidents from this poison most frequently are observed in children, who sometimes eat the berries.

541. The husks and seeds of the berries are very indigestible, and may remain long in the stomach or bowels, whether the case recover or prove fatal, especially if free vomiting has not been early procured. In one case the seeds were vomited towards the close of the third day. (*Med. Obs. and Inq.*, vol. vi., p. 224.) In another case the black husks appeared in the stools after the use of laxatives on the second day. In several other cases adduced by M. BOUCHER, fragments of the fruit were vomited on the second day, and passed by stool on the third, although actively treated from the commencement. But this can occur only when the fruit has been taken accidentally or by mistake; but all cases of poisoning by belladonna are not of this kind. Even the administration of preparations of this plant for medicinal purposes may be such as to occasion either dangerous or fatal effects, especially in children; and the juices of it may be given with felonious intentions. They have been so employed, either mixed in wine or in other fluids, in the commission of murder; and even to aid the commission of thefts or robberies; decoctions and infusions of various parts of the plant having likewise been used for the same purposes, as recorded in numerous works of the preceding two centuries. Dr. CHRISTISON remarks, that other species of *atropa* are probably similar in their properties to belladonna. WILMER quotes instances of frantic delirium having occurred among shepherds, as well as their cattle, from eating the *Atropa mandragora*, which was used by the ancients in medicine.

542. *B. Atropia*, the active principle of this plant, is not likely to be employed as a poison. Given to the lower animals, it produced the same symptoms as the berries or the leaves. One tenth of a grain caused in the human subject dryness of the mouth, constriction of the throat, difficulty of swallowing, dilatation of the pupil, headache, and stupor.

543. *C. Diagnosis*.—Whatever part or preparation of this plant may have been taken into the stomach, or otherwise administered, dilatation of the pupil is always observed if the dose is poisonous. This symptom precedes the delirium, the character of which is peculiar and diagnostic, especially when viewed in connexion with the state of the pupil, and the dryness, soreness, or constriction of the throat. The delirium is generally gay, extravagant, pleasing, talkative, more rarely furious. It is sometimes attended by uncontrollable laughter, and occasionally by loss of voice. Vision is obscure, the iris is insensible to light, and the eyeball sometimes red and prominent. A state resembling somnambulism has, in rare cases, been observed. The sopor or lethargy produced in the more severe cases generally does not appear for a considerable time after the poison has been taken. Giddiness first occurs, and is followed by the delirium, which may continue for several hours before sopor takes place; but in some instances the sopor has occurred more early, and has been followed by delirium. Occasionally, even in the same case, the delirium,

which preceded the stupor, returns when the stupor goes off; and very frequently the stupor is not distinct at any stage, showing that this poison should not be classed with narcotics. Convulsions are not frequently produced by it, unless in children; in adults they are slight, or confined to the muscles of the face; but *subul-tus tendinum*, or catching of the extremities, is frequent. The periods at which the symptoms appear vary much. Giddiness may appear in a few minutes, or not until two or three hours, and the affection of the eyes about the same time, or soon afterward. The delirium may be delayed for some hours. These symptoms may continue for two or three days. They generally persist much longer than in cases of narcotic poisoning. In some instances these symptoms, especially the blindness and state of the pupil, giddiness, tremours, and other nervous affections, continue several days, or even weeks.

544. *D. The appearances after death* have not been observed in many instances. In a case described by GMELIN, the subject of it died twelve hours after eating the berries. The body was examined twelve hours after death, and yet putrefaction had commenced, so that the abdomen was swollen, the scrotum and penis distended with fetid serum, the skin covered with dark vesicles, and the brain soft. The blood-vessels of the head were gorged, and the blood everywhere fluid, and flowing profusely from the mouth, nose, and eyes. M. ROQUES describes somewhat similar changes to the above, and states them to be usually found after poisoning by this plant, especially the swelling of the abdomen, livid spots on the surface, exudations of blood, or of a bloody froth from the mucous canals, especially the mouth and nostrils, and sudden and rapid putrefaction, preceded by general intumescence of the body. When the berries, husks, or seeds have not been vomited or passed by stool, they are sometimes found in the alimentary canal, and furnish evidence of the nature of the case; when they have been evacuated, and are detected in the discharges, they assist the diagnosis, which is seldom difficult when any part of this plant has been eaten accidentally, or otherwise administered. (*See* M. ROQUES, *Phytographie Médicale*, t. i., p. 229, *et seq.*)

545. *E. Treatment*.—The speedy and complete evacuation of the poison from the stomach, by means of an emetic of zinc, to which capsicum may be added, in order to arouse the paralyzed organ, should be first attempted, especially when the fruit has been eaten. In these cases the stomach-pump ought not to be confided in alone, although it may be required in aid of the emetic, the free operation of which should be duly promoted. The older writers strongly advised recourse to vinegar, and either it or other vegetable acids will prove serviceable after the poison has been evacuated. The cold affusion on the head and neck is indicated for the removal of the delirium or sopor; but it should not be continued too long at a time. In some cases tepid affusion may be substituted for the cold. Dr. PEREIRA suggests the administration of nut-galls or green tea. I found full doses of camphor and chloric ether successful in a case in which the inspissated juice, administered by the rectum, proved nearly fatal, tepid affusions having been also administered.



546. ii. CANTHARIDES—*Cantharis Vesicatoria*—the Blister Beetle or Spanish Fly—*Cantharidin*—*Vesicatorin*.—Cantharides may be poisonous in any of the forms in which they are employed in medicine—in that of powder, or of tincture, of vinegar, of cerate, ointment, or plaster. Applied *topically*, they excite the nerves of the part, and irritate and inflame the capillaries, occasioning first a sense of heat, followed by pain, redness, and slight swelling. They are readily absorbed into the circulation, or their active principle, *Cantharidin*; and, in addition to their local action, they produce very energetic effects upon the vascular and nervous systems, especially on the spinal cord, and upon the urinogenital organs.—A. Their *local action* is irritant and inflammatory; their *remote operation* is alterative, exciting, irritating, and inflaming, according to the amount and repetitions of the dose; their *primary* influence being exerted on the nervous systems, their *secondary*, or consecutive operation, being produced chiefly through the medium of the blood. They are eliminated by the kidneys, on which, and on the urinary bladder and passages, they produce the effects just described. They are thus closely allied in action to several substances comprised under the class of acrid and corrosive poisons, on the one hand, and to many of those belonging to the excitant and irritating classes on the other. The local action of cantharides is nearly the same wherever they are applied, and their remote effects are also the same, whether they are taken into the stomach or applied to the skin denuded of its cuticle, or to a wound, or thrown into a vein. They have destroyed life when taken as an aphrodisiac, or to produce abortion, or accidentally. They are very rarely employed to produce murder or suicide.

547. B. *Symptoms*.—a. These vary with the mode of exhibiting this poison and the quantity of it administered. When it is taken in large or repeated doses, or to an amount sufficient to produce a *sub-acute form* of poisoning, heat and pain in the throat, stomach, and intestines are experienced. To these are soon added thirst and pain in the loins, extending along the ureters to the bladder, with a burning sensation in this viscus, a frequent desire to evacuate the urine, which is passed frequently, in small quantity, with difficulty, and sometimes more or less tinged with blood. The pulse is frequent and hard, the skin hot, and the respiration quickened. The nervous system is somewhat excited, painful priapism, with or without satyriasis, being also present. In still larger quantity the effects are more *acute*. A violent burning is felt in the throat, gullet, and stomach, with pain and tenderness in the epigastrium, extending over the abdomen, with sickness and vomitings. To these are added extreme thirst, and pain in the loins and bladder; dryness and heat of the mouth, sometimes with fetor or with pyalism; and incessant desire to void urine, the attempts to evacuate it being attended by excruciating pain, and nothing but drops of blood or of bloody urine being passed, and excessive tenderness of the whole abdomen. The heat and constriction of the throat increase, and are attended by distressing difficulty of deglutition. Violent griping pains of the bowels, with purging or with tenesmus, bloody stools, &c., are generally experienced. The difficulty of deglu-

tion is often accompanied with a dread of fluids, although the thirst is urgent, and the matters vomited consist chiefly of mucus, or flakes of lymph streaked with blood. The priapism is painful and constant. The genital organs being swollen and inflamed. In some instances maniacal delirium, tetanic convulsions, and coma supervene, and terminate life; in others the delirium is less marked, giddiness, faintings, sinking of the pulse and vital powers, and other symptoms of gangrene consequent upon acute inflammation, being present. *Death* is more immediately produced either by the inflammation and consequent gangrene of the alimentary canal, or of the genital and urinary organs, or partially of both, or, if the patient live somewhat longer, by the intensity of the nervous symptoms.

548. b. The *duration* of the symptoms depends upon the susceptibility of the individual to the action of cantharides, upon the preparation of it administered, and upon the treatment. The tincture is followed by a more immediate effect than the powder. Even in fatal cases death seldom takes place before three or four days, and it may not occur until after two or three weeks, from the consequence of the inflammation produced in the alimentary canal, or in the urinary passages, or even in the brain, or spinal cord, or their membranes. Sometimes the nervous symptoms do not appear until several days after the ingestion of the poison. The *quantity* which may be considered sufficient to destroy life depends upon the nature and strength of the preparation. ORFILA has seen twenty-four grains of the powder prove fatal; but as abortion was first produced, it is probable that this circumstance not only accelerated, but also aided this result, which occurred on the fourth day. The smallest quantity of the tincture which has caused death is one ounce, the individual having lived fourteen days. But, while smaller quantities may occasion dangerous or even fatal results, much larger may fail of producing very serious effects, the circumstances so frequently referred to remarkably affecting the issue. Instances have occurred of *blistering plaster* having been swallowed by mistake. In one case, half an ounce of the plaster, containing two drachms of the powder, was taken, and death occurred in twenty-four hours (*Edin. Med. and Surg. Journ.*, Oct., 1844), the shortest period in which cantharides have been fatal.

549. c. The application of cantharides to the skin as a *vesicant*, or external irritant, being very generally adopted, is in many cases productive of fatal consequences, owing to the severity of the local alterations, to the intensity of the inflammation and sphacelation they sometimes occasion, and to the spreading of these effects, and, more rarely, to their influence upon the urinary organs and nervous system. The mischief thus produced occurs chiefly in infants or young children of a cachectic habit of body, or in those with either a deficiency or an exuberance of blood, or when the application is too long continued, or is followed by injudicious topical dressings. It is most likely to occur when the blister is applied on children infected with the more adynamic or malignant forms of the exanthemata, especially measles and scarlet fever and is allowed to remain too long upon

the part, or after redness is produced. The admission of the air to the denuded surface, and the application of rancid ointments as dressings, are also often concerned in producing these serious local effects.

550. *C. Apparances on Dissection.*—In the acute cases, and when death has taken place after a few days, the mouth, œsophagus, stomach, and small and large intestines, as well as the kidneys, ureters, bladder, and genital organs, have been found inflamed, and even, in rare instances, sphacelated in parts. In an instance where an ounce of the tincture had been taken, and death did not occur until the fourteenth day, the villous coat of the stomach was not inflamed, but it was pulpy and easily detached; but the kidneys were inflamed. In the most rapidly fatal cases the powder may be detected adhering to the villous coat of the stomach. In more prolonged cases, congestion or increased vascularity of the brain, cerebellum, spinal cord, and their membranes have been observed. Ulceration of the bladder in some instances, and even sphacelation of the genitals, have been mentioned.

551. *D. Treatment.*—Cantharides are productive of severe irritation passing into acute or sub-acute inflammation, according to the quantity administered; and their absorption is followed by inflammation of the urinary organs, and by excitement, and sometimes by inflammatory irritation of the nervous centres. The indications of treatment are hence obviously, 1st. To remove the poison by emetics, and by encouraging vomiting; and, 2d. To allay the inflammatory action in these parts. When the sufferer is seen sufficiently early, and vomiting has not commenced, ipecacuanha should be given in copious emollient and demulcent draughts, and its operation promoted by tickling the fauces, by the tepid infusion of chamomile, &c. The inflammatory symptoms require general and local blood-letting; but if there be reason to infer that any of the poison still remains on the stomach, the discharge of it should be procured or attempted previously to resorting to depletions, lest absorption be promoted. When blood-letting is prescribed, it should be employed in a decided manner, and aided by demulcents containing small or moderate doses of camphor and nitre, with opium, henbane, &c. Emollient injections into the large bowels and into the bladder, and warm baths, hip-baths, fomentations, &c., are always beneficial. Oil was once supposed to be an antidote to cantharides; but there is no known antidote to this poison; and oil is now ascertained rather to aggravate than to alleviate the symptoms, by dissolving the active principle of cantharides.

552. Poisoning by the external application of cantharides requires the same treatment as now advised. In these cases, the urinary organs are generally more affected than the digestive canal, and diluents, demulcents, opium with camphor, are chiefly required, unless in the more severe cases, when blood-letting is necessary. But these cases generally soon recover, unless the poison be applied to a very large surface or to a recent wound; and in these the protection of the surface from the air and full doses of opium are requisite. During recovery the digestive and urinary organs long remain irritable, and the nervous system sus-

ceptible; therefore a bland farinaceous or vegetable diet should be adopted, and continued for some considerable time, and flannel worn nearest the skin.

553. iii. CHLORINE AND THE CHLORIDES.—*A. Chlorine gas* produces violent spasm of the glottis if it be inspired in a pure state.—*a.* Mixed with air it causes a sense of tightness of the chest, of suffocation and violent cough, owing to the irritation of the bronchi and spasm produced by it—a state of artificial asthma. [Chlorine is apt to produce severe pain in the back part of the head, and a powerfully depressing effect upon the circulatory system, as we have repeatedly witnessed.] This effect, if not excessive, generally passes off with increased mucous expectoration. When much more diluted with air, it occasions a sensation of warmth in the chest, and promotes expectoration. As a principal fumigating and disinfecting agent, it is liable to produce injurious effects, when air too strongly impregnated with it is breathed; but it is chiefly in manufactories that it is most likely to be hurtful, although the irritating effects of chlorine are less powerful on those accustomed to inhale it. Dr. CHRISTISON was told by a chemical manufacturer in Belfast, that his workmen can work with impunity in an atmosphere of chlorine, where he himself cannot remain above a few minutes. The chief effects produced by inhaling this gas by the workmen are more or less emaciation from the absorption of fat, acidity and disorder of stomach, which are usually corrected by chalk.

554. *b.* When diluted with air, or aqueous vapour of 116° F., and applied to the external surface, it produces peculiar sensations similar to the stinging of insects, accompanied with copious perspiration and determination of blood to the skin, and sometimes followed by an eruption of minute papulæ. In a pure form, its action on the skin is similar, but more energetic. A repeated or prolonged application of the gas to the skin is followed by soreness of the gums and mouth, or fauces, occasionally by slight ulceration, and generally by a more abundant as well as altered state of the salivary and biliary secretions. Mr. WALLACE believed that it tranquillizes while it excites nervous power; and Professor ALBERS, that it is stimulating locally, and antiphlogistic remotely. Many years ago, I examined its operation with Mr. WALLACE in London (in 1823), and subsequently in Dublin (in 1834), and inferred that it is locally irritant or stimulating, according to the amount of dilution, and remotely alterative as regarded nervous power and glandular action. Whether inhaled or applied to the external surface, it is absorbed, as shown and ascertained by Mr. WALLACE and myself, by the state of the urine.

555. *c. Treatment.*—It is chiefly owing to its accidental inhalation in too strong a state of dilution that injurious effects have arisen from this gas. The inhalation of the vapour of warm water, of the spirit of wine, or of ether, has been recommended for the removal of the effects of chlorine; but Dr. PEREIRA states, that he has tried these when suffering himself, without the least benefit. In a case related by KASTNER, sulphureted hydrogen was said to have afforded great relief; but this agent should be used with great caution, as it is itself a powerful poison.



556. *B. Chlorate of Potash* was supposed to be an active stimulant and antiseptic, and, in large doses, an irritant poison. I have frequently employed it since 1816, both in public and private practice, especially in the more malignant states of disease, as an antiseptic, disinfectant, and tonic; but I have been much disappointed in its effects, which I have not found such as I expected, or by any means certain. It, however, diminishes the fætor of the excretions, even those from the skin, as evinced in the putrid and adynamic states of fever, and it is absorbed into the circulation, from which it is excreted chiefly by the kidneys; and it may be detected unchanged in the urine. I have employed it in large doses without obtaining other effects than nausea and vomiting. It appears to be locally irritant, and remotely alterative and diuretic.

557. *C. The chlorides and the hypochlorides of soda and lime* produce effects much resembling those caused by chlorine; but these vary remarkably with the degrees of dilution. In concentrated states they are caustic and irritant; in states of dilution, irritant or stimulant, antiseptic and alterative. I employed these substances largely in practice, especially public practice, when they were first discovered, and found them useful in dysentery and malignant forms of disease; the secretions and excretions in which they remarkably corrected and improved, while they appeared, particularly when aided by appropriate medicines, to support the powers of life. I am, however, unacquainted with injury from the administration of them. When taken in excessive doses they are most likely to occasion gastro-enteric irritation, for which albuminous fluids, the whites of eggs, milk, and oleaginous or mucilaginous diluents are the most suitable remedies. If these salts have been taken in very large quantity, emetics or the stomach-pump may be required; and, after they have been evacuated by these means, these fluids should be abundantly exhibited. Acids must be avoided, lest they should disengage chlorinic gas in the stomach (PEREIRA).

558. *IV. IODINE, THE COMPOUNDS OF.*—The corrosive action of pure iodine, and of strong solutions, or rather tinctures of it, has been already considered (§ 179, *et seq.*). It remains only to notice the locally irritant and remotely alterative injurious effects of the compounds of this substance, or of small doses of it, when either too long employed, or given in such forms as produce *slow or chronic poisoning*. The preparations most likely to produce these effects are the *tinctures* and the *iodides*, as the iodide of potassium, or the iodurcted iodide, the iodide of sulphur, and the iodide of iron. In some constitutions, any of the preparations of iodine occasion, even before a few doses of either are taken, and although the doses are very small, remarkably depressing effects, and generally without any signs of local irritation. I have met with several instances of this very unusual and severe effect of these preparations in practice, and in three of these, the preparations of colchicum were also injurious in very small doses. In general, iodine is not hurtful unless the dose is considerable, or be repeated too frequently, or its use too long continued.—*a. The irritating operation of iodine is most read-*

ily manifested by irritable temperaments and dyspeptic persons. In these, and in other persons in larger doses, it occasions nausea, loss of appetite, cardialgia or heat of stomach, subsequently colicky pains, relaxation of the bowels, diarrhœa, salivation, diuresis, &c. If this substance, or any of its compounds, be still administered, these effects go on increasing, and are attended by soreness of the mouth, severe colic with diarrhœa, emaciation, rapid absorption of the fat surrounding the inammary glands in females; headache, vertigo, sometimes drowsiness or stupor. When iodine is taken in smaller doses, so as not to cause injurious irritation, it acts as a tonic and alterative, and improves both the strength and flesh. But, if too long persisted in, several of the above effects afterward appear.

559. *b. In larger or more frequently repeated doses*, the effects are more severe, and amount to what have been designated *iodism*. These are generally severe vomiting and purging, colicky pains, thirst, and fever; a frequent, small pulse, sometimes a dry cough; cramps of the extremities; rapid emaciation, with occasionally a darker hue of the skin and hair, especially if the iodine has been taken for a long period. In some instances wasting of the *manimæ* or testes, and most of the symptoms of chronic gastro-enteritis. It is rare, however, to meet with instances of these effects from iodine, unless it have been given in a most imprudent manner, or too long persisted in, and even then something should be imputed to idiosyncrasy.

560. *c. In still larger doses* the symptoms either approach, or are identical with, those attending the corrosive form of poisoning by iodine (§ 182). When iodinic preparations have either been long continued, or often repeated, especially in large doses, so as to produce not merely an irritant operation, but also a constitutional change—a marked alterative effect, various contingent phenomena, of a more or less severe character, referable either to the nervous system or to the heart and lungs, are apt to appear, especially stupor, tremours, vertigo, faintness, irregularity of the pulse, alarming sinking, shortness of breathing, restlessness, and even death. In these cases the system may be viewed as saturated with the iodine, notwithstanding that the kidneys have been eliminating it from the circulation, as proved by its presence in considerable quantity in the urine; for it has been detected in the viscera and tissues in such circumstances, and even several days after the administration of iodine had been relinquished. The *appearances in fatal cases* have been already described (§ 183).

561. *d. The treatment of the more chronic or acro-alterative form of poisoning* by any of the preparations of iodine, consists in the removal of gastro-enteric irritation by local depletions and counter-irritation. Demulcent and mucilaginous substances should be given with the preparations of opium or of poppy; and starch or emollient enemata, with sirup of poppies or the tinctura opii composita, should be thrown up from time to time. Warm baths are generally useful. The diet should be chiefly farinaceous or amylaceous, with or without milk; and during convalescence, the regimen and diet recommended for *gastro-enteritis* and the more inflammatory states of *indigestion* ought to be adopted.

562. *V. MERCURY, THE PREPARATIONS OF.*—The poisonous operation of the *bi-chloride* has been already considered (§ 215). But life may be destroyed or put in jeopardy by an excessive or prolonged recourse to any of the preparations of this metal.—*A. Fluid mercury* is inert when swallowed as long as it retains its pure metallic state; but it may be slightly oxydized in the alimentary canal, and thus acquire activity, especially if it be long retained in the bowels. Many years ago it was the fashion to swallow fluid mercury, and, more recently, large quantities of it were often given in order to remove obstructions. It rarely, however, produced unpleasant effects from having become oxydized. ZWINGER states, that four ounces occasioned profuse salivation four days after swallowing it; and LABORDE records the case of a man who retained seven ounces for fourteen days, and was attacked with profuse salivation, ulceration of the mouth, and paralysis of the extremities. I was lately called to a man who had taken, some time previously, seven pounds' weight of fluid mercury with a suicidal intention. His medical attendant informed me that it produced a painful sense of weight and constriction in the abdomen, the body having been bent forward; but it caused no farther disorder, and continued to pass off at intervals for some days.

563. It was not unusual, during the last and preceding centuries, to wear belts with fluid mercury around the body for months, or even years; but the practice was not always devoid of harm; for, in some cases, profuse salivation, and other specific effects of this metal, appeared either suddenly or with great severity.

564. *B. The injurious effects of mercurial vapours* have been shown in the article on ARTS and EMPLOYMENTS, as causing Disease (§ 24, *ct seq.*); and the *trcnor mercurialis*, with the several cachectic and cerebral symptoms associated with it, is there described. This form of *shaking palsy—tremblement mercuriel*—is chiefly met with in workmen whose employments subject them to mercurial vapours. If the emanations still continue to operate, in any circumstance of their evolution, various cachectic symptoms, vertigo, loss of memory, imperfect and unsteady action of the muscles, slight atonic convulsions, and even delirium, epilepsy or apoplexy, terminating in death, are the not infrequent results. Salivation, ulceration of the mouth and gums, hæmorrhages, and emaciation are frequently also produced by mercurial vapours. In 1810, the Triumph man-of-war, and a small vessel, received on board several tons of quicksilver at Cadiz. Owing to the rotting of the bags the mercury escaped, and the whole of the crews became more or less affected. In the course of three weeks 200 men were salivated, and two died. All the lower animals in the vessels—cats, dogs, sheep, fowls, rats, mice, and cockroaches—were destroyed.

565. *C. The mercurial compounds* are all injurious, not excepting even the sulphurets, when taken in excessive quantities, or when their use, even in small doses, is very long continued.—*a. The local action* of mercurials is irritant and alterant; but the bi-chloride and nitrates, in states of more or less concentration, pass beyond this state of action, and are, as shown above (§ 215, *et seq.*), caustic and corrosive, al-

though, when very much diluted, they, as well as the chlorides, diminish both irritation and vascularity in the surfaces to which they are applied.

566. *b. The consecutive and remote operation* of mercurials vary with the preparation and the modes of employing it. When taken internally in *small doses*, they promote all the abdominal secretions and excretions, especially the biliary and pancreatic secretions. If the doses be *repeated*, these effects are not only increased, but others are also added; the mucous surfaces and skin manifest an augmented exhalation, the gums become red and tender, the urinary secretion is increased, and the catamenia promoted; absorption proceeds more rapidly, the pulse becomes somewhat accelerated, and the strength slightly impaired. The repetition or number of the doses, as well as the amount of each required to produce these changes, vary with the constitution and idiosyncrasy of the individual, and the amount of action upon the bowels. If the mercurial be continued longer, or after these effects commence, or if the doses be larger than are necessary to produce them, the redness and tenderness of the gums pass into swelling; the tongue, which was at first broad and soft at its edges, becomes flabby and swollen; a coppery taste is perceived in the mouth, which, with the gums, is sore and tender; *salivation*, more or less profuse, supervenes; the salivary glands are tender and swollen, the teeth are loosened, the breath betrays a peculiar odour and fetidity; the pulse is now more accelerated, the strength much impaired, and emaciation more rapid as the salivation proceeds and increases; the quantity of saliva discharged sometimes amounting to several pints in the twenty-four hours. Such may be said to be the *first stage* of chronic poisoning by mercurials, as frequently produced formerly for the purpose of curing certain diseases, especially the venereal disease; but now very rarely required either for this or any other distemper. During salivation, the urine, according to Dr. PEREIRA, does not contain a trace of albumen. The mercurial action alters the secretion of the salivary glands, and causes it to approach more nearly the fluids exhaled from inflamed serous membranes.

567. *D. The first stage* of poisoning by mercurials is generally such as now described; but occasionally other and more serious phenomena appear after a more or less liberal recourse to any of them, and *assume the features of distinct maladies*. An acquaintance with these contingent effects of the constitutional action of mercurials is of great importance to the practitioner. They are not so much owing, in most instances, to the preparation employed as to the idiosyncrasy, or the state of health of the individual; a scrofulous constitution, the venereal taint, and other causes favouring their occurrence. The maladies which may be ranked under the first stage of chronic poisoning by mercury are, *first*, what has been called *mercurial disease—Morbus mercurialis, hydrargyrosis, cachexia mercurialis, &c.*, and which presents various forms or states; and, *second*, what has been named *pseudo-syphilis*, or *cachexia syphiloidea*, or what is supposed to be syphilis modified by the mercurial disease.

568. *1st. Mercurial disease* may be viewed as



the generic appellation of several morbid conditions resulting from mercurial preparations—from a few grains only of blue pill or of calomel in some constitutions, or from large and repeated doses of these or of other compounds of the metal in others.—(a) *Excessive salivation*—*Ptyalismus mercurialis*—*Stomatitis mercurialis*—may occur from a small dose of any mercurial, or from large or excessive doses. It is oftenest met with after small or moderate doses, and is then the result of peculiarity of constitution. The mouth rapidly becomes violently affected; the tongue is swollen so that it hangs out of the mouth, and prevents the patient from speaking and eating; the gums are tumefied and ulcerated, ulceration often extending to the cheeks; the teeth are loosened or drop out, owing to the sloughing of the gums; the salivary glands are enlarged, tender, painful, and the surrounding cellular tissue congested or infiltrated; and the quantity of salivary discharge remarkably increased, sometimes ten or twelve pounds being secreted in the twenty-four hours. With the progress of these symptoms debility and emaciation make rapid progress; and, with sloughing of the gums, caries of the alveolar process not infrequently takes place. If the mercury be continued, involuntary movements of the muscles, or states of incomplete palsy may appear, and the patient sink from extreme vital depression. Even when the mercury is relinquished, the inordinate salivation and other symptoms may still continue, and be arrested with the greatest difficulty. Indeed, such is the case whenever this effect follows the use of a small dose of mercury, and depends upon idiosyncrasy. In some instances, the ulceration and sloughing are followed by contraction of the arches of the palate, and by inability to open the mouth sufficiently. Occasionally the salivary glands become remarkably enlarged, tender, and inflamed, and the surrounding parts swollen (*Parotitis mercurialis*), and the mouth ulcerated, before the salivation commences, the salivary discharge relieving the extreme swelling and pain of the glands; but this most frequently occurs when the patient has been exposed to currents of cold air, or to cold and humidity upon the accession of the mercurial action.

569. (b) *Mercurial Purging*.—*Diarrhœa mercurialis*.—Excessive purging occurs sometimes after a moderate dose of a mercurial; and may arise from an excessive accumulation of bile in the gall-bladder and ducts having been suddenly let loose, in which case the evacuations are greenish or dark; or from an excessive secretion of the pancreatic fluid having been produced, and then the evacuations are pale, watery, frothy, or ropy, and are attended by pain, heat, or tenderness in the region of the pancreas. (See *PANCREAS, Diseases of*.) Excessive diarrhœa after mercury has been ascribed by DIETERICH (*Die Merkurialkrankheit*, Leips., 1837) to a species of pancreatic salivation caused by mercury, and called by him *ptyalismus pancreaticus mercurialis*, or *ptyalismus abdominalis, diarrhœa salivæ*, &c.

570. (c) *Mercurial fever*.—*Febri mercurialis*.—*F. salivosa*—is generally caused by the excessive use, or by very large doses of mercury, and seldom appears until after some days. It is attended by dryness of the mouth, redness

and swelling of the gums and tongue, great acceleration of pulse, with restlessness, headache, hot and dry skin; swelling or tenderness of the parotids, sometimes extreme, as already noticed (*Parotitis mercurialis*), and loss of appetite and nausea. This state of irritative fever generally terminates with a profuse salivation, more rarely with purging or sweating, or with some form of cutaneous eruption (§ 574).

571. (d) *Mercurial cachexy*.—*Cachexia mercurialis*.—is a more frequent consequence of the prolonged use of mercury, and even of the repeated exhibition of calomel, than is generally supposed; and, as far as my own observation extends, it constitutes, in various modifications, the most frequent form of slow poisoning by mercury. It is not infrequently produced by prolonged efforts to affect the salivary glands in the treatment of hepatic or other diseases, and is characterized by the usual symptoms of irritative fever, without flushings, but with great pallor, emaciation, and manifest æmîa. There are, also, loss of appetite, depression of spirits, disordered bowels, with offensive stools; and occasionally swelling of the salivary glands, redness or sponginess of the gums, or ulcerations of them and of the mouth, cheeks, &c., but rarely any salivation. It usually passes almost insensibly into tubercular phthisis.

572. (e) *Mercurial Erethism*.—*Erethismus mercurialis*.—This alarming affection, thus denominated by Mr. PEARSON, has been viewed by DIETERICH as adynamic mercurial fever—*Febri mercurialis adynamica*. Since Dr. DIETERICH wrote, one case of it has come under my observation; and my examination of that case, as well as my recollection of former cases, has not furnished evidence of the accuracy of this view. The symptoms of this affection are, rapid depression of strength, with a sense of sinking and anxiety, referred chiefly to the præcordia; with partial or general tremour, frequent sighing, universal sense of coldness, and diminished temperature of the surface. The pulse is small, quick, and weak; the countenance is pale, collapsed, and expressive of anxiety and alarm. Vomiting sometimes supervenes, and favours reaction and recovery. In the case just alluded to I could detect nothing, by the aid of the stethoscope, beyond absence of the impulse of the heart, and very weak, frequent, and occasionally irregular contraction. A fatal termination has followed muscular exertion. This affection appears to consist of extreme depression of vital power, and of muscular irritability, manifested chiefly by the heart, and of congestion of the lungs; and hence it might be more appropriately called *Asphyxia cardiaca mercurialis*.

573. (f) *Neuroses Mercuriales*.—Various nervous and mental disorders are sometimes produced by mercury, especially when any of its preparations have been long persisted in, owing to the depressing and alterative action on the nervous systems, probably aided also by other influences. *Melancholia*, sometimes attended by delusions, and various states of partial insanity, in which fears of impending or future calamities more or less predominate, and even sway not only the feelings and sentiments, but also the volitions and actions, are not infrequently produced by a frequent recourse to mercurial preparations. Tremours or trem-

blings (*tremor mercurialis*), sometimes passing into palsy (*paralysis mercurialis*), hyponchondriasis, &c., are also not infrequently occasioned by this cause, and are duly considered at other places.

574. (g) *Various affections of the external surface and of other parts of the body are sometimes produced by an excessive use of mercury; yet it is extremely probable that they are not owing to this cause alone, but to peculiarity of constitution, or to some pre-existing taint or local vice. Certain acute and chronic eruptions on the skin sometimes appear as the effects of inercury; but are now more rarely met with since severe courses of this mineral have been much less frequently resorted to. Eczema mercuriale, Erythema mercuriale, Lepra mercurialis, Erysipelas mercurialis, Hydrargyria, are the names which have been given to an acute eruption which has sometimes appeared during a severe mercurial course, and been attended by considerable danger. This affection has been described by PEARSON, ALLEY, MORIARTY, STOKES, SPENS, CULLERIER, LAGNEAU, RAYER, and others. It generally consists of innumerable minute pellucid vesicles, which give a diffused red appearance to the skin, and a sensation of roughness to the touch: it is generally preceded and attended by more or less febrile disturbance. In two or three days the vesicles attain the size of pin's heads, and the contained serum becomes opaque and milky. The eruption soon extends over the body, and is accompanied by swelling, tenderness, and itching. It usually terminates by desquamation; but a copious discharge sometimes takes place from the excoriated surface; and, with the epidermis, forms large flakes. In some instances the hair and nails fall off, and the eyebrows become denuded (PEREIRA). There is also more or less internal disorder, especially tightness and oppression in the chest, dry cough, with indications of congestion of the lungs and bronchial irritation. ALLEY saw forty-three cases of this eruption in the first ten years of this century, and of this number eight were fatal; more recently RAYER met with only three cases; and PEREIRA only with two. I have seen only two cases, and these occurred at an early period of my practice. Other cutaneous eruptions have been said to be sometimes caused by mercury, especially a miliary eruption, Herpes, Impetigo, Psudracia, &c.; but this origin is doubtful, and most probably other causes concur, if not entirely produce them.*

575. h. Congestions and inflammations of various parts, especially of the eyes, or certain tissues of the eye, as the iris, the retina, the conjunctiva, &c.; congestions and inflammations of the periosteum (*mercurial periostitis*), and caries of the bones, especially of the more spongy bones; and similar diseases of the pericranium, bones of the cranium and dura mater, have also been ascribed to mercury, but are often owing more to a venereal taint, to the scrofulous diathesis, or to idiosyncrasy, than to this mineral; although exposure to cold, and vicissitudes of temperature and weather in a cold or variable climate sometimes produce those diseases which assume a peculiar character during the mercurial saturation and action, especially when aided by the constitutional taints just alluded to.

576. 2d. In this way, also, may be explained the several morbid conditions which are comprised under the denomination of *Cachexia syphiloidea—Pseudo-syphilis*. The modes, also, of employing mercury in the cure of venereal or other maladies, and the various grades or states of saturation of the system which these modes induce, may have some influence in producing various affections of a peculiar or anomalous character; for it may be anticipated that the large doses of calomel, given in a warm climate, will affect the constitution much less, and somewhat differently from the large unctions of mercurial ointments, sometimes more or less altered by long keeping, so often employed in this and other cold climates, especially in former times; and that even the blue pill may be so changed by keeping, particularly in hot and humid countries, as to act differently from the recent preparation.

577. E. *Acute poisoning* by excessive or large doses of mercurial compounds—by single or repeated doses—is generally attended by symptoms of acute gastro-enteritis; but these, as well as the more remote effects, vary with the preparation administered. In general they are altogether the same as are described when treating of the *corrosive operation of the salts of mercury* (§ 216–228), or differ merely in severity, and as respects the liability to any of the consecutive effects just described.

578. F. *Intolerance of Mercury.*—The injurious effects now described are usually produced by a prolonged or an excessive use of any of the preparations of mercury, excepting probably the sulphurets; but in some constitutions very small doses may occasion excessive salivation and some of the other slighter effects, and even a single small dose may have the same result. When salivation follows a single dose it usually appears on the second or third day, and rarely sooner, but occasionally later. It may, however, appear much sooner, and with great severity, considering the dose, when the preparation, as calomel, is allowed to remain in the mouth for some time. In an instance mentioned by Dr. BRIGHT, five grains of calomel put on the tongue in apoplexy, and not washed down, excited in three hours most violent salivation. Dr. RAMSBOTHAM states, that fifteen grains of blue pill, taken in three doses, one each night, produced fatal salivation (*Med. Gaz.*, i., 75). Dr. CRAMPTON records a case where two grains of calomel caused pyalism, extensive ulceration of the throat, exfoliation of the lower jaw, and death. (*Trans. of Dub. Col. of Phys.*, iv., 91.) Dr. CHRISTISON says that three drachms of mercurial ointment, applied externally, caused violent pyalism and death in eight days. (*Op. cit.*, p. 379.) I have seen one grain of the bi-chloride divided into twenty doses, of which one was to be taken thrice daily, produce very severe pyalism before more than two thirds of the grain was taken. I have also seen one grain of blue pill cause very serious pyalism; and the same quantity of hydrargyrum cum creta occasion most severe diarrhoea, the smallest doses of any mercurial having this effect with that individual. During the present epidemic influenza (1847), nine grains of blue pill, in three doses, caused sloughing, ulceration of the mouth, and extreme prostration in a case to which I was called.



579. *G.* On the other hand, some constitutions resist the specific effects of mercury most obstinately. But it must not be supposed that, although the specific effects do not appear, the mercurial has no effect. It may produce some one or more of the injurious effects above described, or it may affect the bowels, and be carried off by diarrhoea, or excite organic disease of the colon or rectum, especially the latter, or occasion mental disorder with irritative fever. It has also been erroneously supposed that calomel and other preparations of mercury are not injurious to infants and young children. Because the specific operation very rarely appears in them. But this is not altogether the case, for the constitutional powers and the digestive organs often suffer more or less, although not manifestly, or at the time; and in older children several of the injurious effects which I have mentioned not infrequently occur, especially ulceration, or even sloughing of the cheeks and gums, and irritative or hectic fever, with remarkable pallor, anæmia, or chronic irritation of the bowels, with enlargement of the mesenteric glands.

580. *H.* The diagnosis of mercurial salivation is always difficult, unless the exhibition of some mercurial shortly before the appearance of the discharge be admitted or ascertained. And even when the admission is made, the quantity may be so small as to allow of doubts as to its influence. In certain constitutions, and especially in depressed and debilitated states of such constitutions, after exhausting discharges, and during cold, humid, and northerly winds, with more or less exposure to such weather, a small dose of a mercurial may cause excessive salivation; and, if this discharge be attended by much soreness of throat, it is most difficult to determine whether the salivation is actually the result of the mercurial, or merely symptomatic of the sore throat and cold. If it proceed from the mercurial, there will generally be some tenderness of the gums, a soft and flabby state of the sides of the tongue, and it will generally be more obstinate. A patient under my care took, under the circumstances of general health and exposure just mentioned, five grains of blue pill. In two or three days afterward he was attacked with salivation and sore throat. He possessed, however, no constitutional tendency to be affected by mercury; and yet this dose, in his existing state, and from exposure to cold and humidity, appeared to have occasioned the attack, which probably, also, the sore throat aided to develop. When severe and prolonged salivation has been once produced by a course of mercury, a very slight cause may reproduce it a long period after it has ceased. A common sore throat or cold is sometimes alone sufficient to have this effect. But in this case, as well as in others not caused by mercury, there is no mercurial fœtor; for, although the breath is often very offensive in non-mercurial salivation, the peculiar mercurial fœtor is absent. A very severe or even dangerous effect may be produced on the mouth by a very small dose of mercurial, when conjoined with or given at the same time as tartarized antimony or colicium.

581. *a.* It ought also to be recollected that several medicines and poisons occasionally excite salivation. The preparations of gold pro-

duce this effect as certainly as those of mercury. Those of copper have often a similar operation; and those of iodine and antimony occasionally exert it. Digitalis and prussic acid sometimes occasion the same effect, and even croton oil and opium have increased this secretion; but this operation, as respects these last, has been loosely observed and recorded.

582. *b* An idiopathic or spontaneous form of profuse salivation has sometimes been met with, no medicinal or poisonous cause of it having been detected. Several cases of this form have been recorded, and have continued for months, or even for two or three years, many ounces of saliva having been discharged daily; but in many of these cases the mouth was not affected, and other characteristics of mercurial salivation were wanting. The imagination may excite salivation. Dr. CHRISTISON met with an example of this, which, with other cases of spontaneous chronic salivation, he has noticed in his work. I have seen an instance of profuse salivation follow the contemplation of a disgusting object, but it did not continue longer than a few days. Some of the cases recorded as instances of idiopathic salivation have probably been symptomatic of chronic or structural disease of the pancreas, as noticed in the article upon that organ.

583. *c.* Dr. CHRISTISON very correctly remarks, that, in general, mercurial salivation may be distinguished from all other varieties, if its progress has been traced from the first appearance of brassy taste and fœtor to the formation of ulcers and supervention of pytalism. Its characters are also quite distinct at the time salivation just begins. The factor of the breath and sponginess and ulceration of the gums at this stage distinguish it from every other affection. But if the mouth is not examined until the ulcers have existed several days, the characters of the mercurial action are much more equivocal. They may not, for example, be distinguished from spontaneous ulceration of the mouth, depending upon general cachexia or unsoundness of constitution, and characterized by extensive ulceration, or sloughing, with pytalism and gangrenous fœtor. The diagnosis of mercurial salivation demands in all cases much attention, not only in a medical or practical, but also in a medico-legal point of view; and, in both regards, there are other questions connected with it which require a special attention.

584. *1st.* May salivation not appear until a long period has elapsed after the administration of the mercury has been abandoned? Mercury administered in small doses is a cumulative poison, and often produces no effect upon the salivary glands or gums until a certain amount of saturation is produced, this amount varying with different constitutions, or with the same constitution at different times. Hence it may be inferred that mercury may accumulate in the system without producing its specific effects, and may still remain, in some instances, for a considerable period, being unexcreted, or only partially excreted, but, before its elimination is accomplished, a change in the state of vital power, or of the constitution, takes place, or some new influence comes into operation and develops the specific action of the mercury existing in the frame. Thus may be explained

the occurrences of salivation not until some months after mercury has been relinquished. SWEDIAUR has met with instances where the interval was several months; CULLERIER with an instance where it was three months.

535. 2d. *What is the duration of mercurial ptyalism, or how long may salivation continue after the use of mercury has been abandoned?* Rare instances of very prolonged salivation have been met with by most practitioners—instances of even several months' duration. But cases have been recorded by LINNÆUS, SWEDIAUR, COLSON, and others of its continuance for periods varying from one to five or six years. These, however, are very rare. Most commonly the mouth and salivary glands return to their healthy states in the course of a fortnight or three weeks; but it is not unusual to observe the period protracted to a month, or even longer.

536. 3d. *May ptyalism, and other specific effects of mercury, recur after a complete intermission, or, in other words, reappear after having entirely ceased, mercury having been discontinued?* I have above (§ 530) admitted this occurrence. It has not infrequently been observed by those practitioners who in former days were very conversant with the effects of severe or prolonged courses of mercury. Dr. CHRISTISON believes that the occurrence of salivation after two, or three, or four months have elapsed, without the repetition of mercury, is exceedingly uncommon. It certainly is so at the present day; but it most probably was not so many years ago, when prolonged and severe courses of mercury were often prescribed; and that it was not so formerly, the reasons assigned above (§ 534), as well as the testimony of HAMILTON, MEAD, MALE, FORDYCE, COLSON, and others, sufficiently show.

537. 4th. *In what manner does small or other doses of mercury prove fatal?* Death may ensue from the mildest preparations, and even from comparatively small doses, generally in consequence of severe salivation, or of gangrenous destruction of parts of the mouth and fauces, and the vital depression produced by the mineral and by the local disorganization. The most obvious manner in which death takes place is by extension of sloughing, or gangrene, of the throat, mouth, cheeks, face, and neck. This result is seldom seen at the present day; but cases are met with in consequence of peculiarity of constitution, or of large doses given to children under the belief that they are much less susceptible of the specific effects of this mineral than adults. In general, when gangrene is the cause of death, it begins within the mouth or in the throat, and spreads from thence until it reaches the face. This is most frequently seen in children. But I have seen the ulceration both commence in and extend to the pharynx, and thence to the larynx, producing destruction of this latter part, and death. Sometimes, especially in children, the sloughing begins on the external surface, at a distance from ulceration of the gums and mouth, appearing in the course of a few days after salivation. A small vesicle generally appears on the skin, on one or both sides near the mouth, and is succeeded by a gangrenous or sloughing ulcer, which spreads over the cheek, and proves fatal in a few days. In cases of this nature, both

the local disorganization and dissolution are the results of the depression of vital power produced by the mineral. When salivation is excessive or prolonged, death may ensue from the exhaustion thereby produced. But even in this case the mercury has occasioned a poisonous vital depression, the first manifestations of which have been the salivation caused by it; but with this depression, and the exhaustion consequent upon the discharge, the changes produced by mercury in the constitution, and the physical appearances and the alterations of the blood, should be taken into the account. Mercury may also excite pulmonary and laryngeal phthisis, and cause death, as just mentioned, by the ulceration of the epiglottis and glottis, and the attendant exhaustion and hectic. It may occasion a fatal issue by inducing any one of the several affections I have described above (§ 569, *et seq.*) as contingent upon the administration of mercurial preparations. When the corrosive preparations of mercury have been administered, death is generally the consequence of the local corrosive action, of the disorganization caused by them, when taken in large quantity. If this effect is not produced, or is recovered from, they may still cause death from their consecutive effects now described.

538. I. *Of the Physiological Action of Mercury.*—All the preparations of mercury are more or less readily absorbed and carried into the circulation; but it is not ascertained in what state they are absorbed, or by what particular channel, although the lymphatic and lacteal vessels are most probably the chief media. In whatever state the mercurial may be when it has arrived in the blood, it evidently accumulates there, and in the solids, to some extent, especially in some constitutions or conditions of the frame, producing, among others, the effects above described. Having arrived in the circulation, it is carried out of the system, either without deposition or accumulation in the solids, or after having been for a time thus deposited, by means of the several emunctories, more especially by the salivary glands, the skin, the pancreas and liver, the intestinal canal, and kidneys. When the mercurial, owing to either the modes of administration or inaction of the emunctories, accumulates in the blood, the tissues may be so saturated with it as to give rise to the changes described, or to admit of the detection of it in the excretions, or even in the structures themselves. In whatever state it may exist in the blood, it is so intimately combined with this fluid as to escape detection by the ordinary tests, and destructive distillation is generally required. By this means it has been detected by ZELLER, BUCHNER, SCHUBARTH, COLSON, DIETRICH, and others. In the same way mercury has been found in the *secretions* and *excretions*, in the saliva, the perspiration, the urine, the intestinal secretions, and even in the discharges from ulcers, as shown by CHRISTISON, PEREIRA, and the writers just named. Dr. PEREIRA remarks, that the blackening of the skin mentioned by HARROLD, RIGBY, and others, as having occurred from the use of mercury after the employment of sulphur, shows the presence of mercury in the cutaneous transpiration. The sulphur and the mercury having been thrown out of the system by the skin, and beyond the sphere of the vital power, had en-



tered into union and formed the black sulphuret of mercury, which was deposited on the integument in a pulverulent form. The existence of mercury in the *reguline state*, in the organic solids, has been asserted by some and denied by others. WIDMER, COLSON, DIETERICH, PEIREIRA, and others say that it has been found in this state in the bones, brain, synovial capsules, the pleura, the humours of the eye, the cellular tissue, &c. In what part of the system reduction is effected is not ascertained, or whether it has occurred during life or after death. I have seen the mercury in the fluid state in bones which have been long in contact with the surrounding earth, and have viewed the reduction as a *post-mortem* phenomenon; but it may have been otherwise.

589. Mercurials, having been carried into the circulation, and even to some extent into the tissues and organs, as they undoubtedly are more or less, certainly affect the states of organic nervous and vital power, changing not merely dynamically, but also otherwise *altering* the innervation of the several organs and structures. The *alterative influence* is displayed, and can be estimated only, by its results, by the effects just described. But in addition to the altered state of general innervation, and chiefly as a consequence of it, the *blood* evinces marked changes. If salivation be easily produced, the blood either shows no very material change at the commencement, or it exhibits merely a slight inflammatory crust. But after salivation has continued some time, the blood becomes darker, coagulates less firmly, and the proportion of the coagulum to the serum diminishes. If salivation be protracted, the red globules decrease in number very remarkably, and *anæmia* is often very considerable, and always supervenes when salivation is either excessive or protracted. DIETERICH says that the electrical condition of the blood changes from the negative, the healthy state, to the positive state. With this change in the blood the soft solids are impaired in their vital cohesion, and all the exhalations and secretions from surfaces and mucous follicles are increased. The heart and lungs are also more or less affected, as Sir B. BRODIE has shown, although more as respects their organic nervous energy, or state of innervation, than as regards the structure. The *structural changes* produced by mercury have been chiefly observed after death from acute poisoning by the corrosive preparations, and have been described above (§ 218).

590. *K. Treatment.*—When the symptoms are those of *acute poisoning* (§ 216), then the treatment recommended for that form should be adopted with promptitude and activity (§ 221); but the varieties of *chronic poisoning* by mercurials require very different measures.—*a. Salivation*, when either excessive or prolonged beyond the intentions of the physician, is that variety which most frequently calls for aid, the means most successful in removing it being also the most beneficial in the treatment of the other varieties of chronic mercurial disease. The patient should be removed to a large, airy, dry, and moderately cool apartment, about 60° Fahr., and entirely apart from those who are subjected to a mercurial treatment. All the linen should be frequently changed, and vicissitudes of temperature avoided. Thus circum-

stanced, the remedial means may consist of three classes, which may be distinguished as the *antidotal or constitutional*, the *derivative*, and the *local*, which may be successively or contemporaneously employed, or in such succession and combination as the peculiarities and form of the mercurial disorder will suggest.

591. (*a*) The *constitutional and antidotal means* are limited; but, such as they are, they should not be overlooked; for, as the injurious effects of mercury, in any of the forms noticed above, often depends upon the actual presence of mercury, in some noxious state, in the circulation, and even in the tissues, and not infrequently upon the irritation this mineral causes in the several emunctories concerned in eliminating it from the system, it is important to resort to such means as are the most likely, by combining with it in the blood and tissues, to render it less deleterious, or even inert. There is probably no substance which may be more beneficially employed with this intention than sulphur, inasmuch as it is readily carried into the circulation, and as readily combines with mercury, whose injurious operation it thus prevents, the sulphuret of mercury being either inert, or nearly so. *Sulphur*, therefore, should be given internally, while *sulphur baths*, both warm and fumigating, or as either may suit the peculiarity of the case, may also be called into aid. Formerly the *sulphurets* were given internally for the removal of excessive salivation, but they are very much inferior to the simple precipitated sulphur, and are now employed chiefly in warm medicated baths. Next to the internal use of sulphur may be mentioned the diluted *sulphuric acid*, taken in quantity sufficient to render the drink pleasantly acid; but in cases of very long protracted salivation, or when anæmia has supervened, neither it nor any of the other acids, whether mineral or vegetable, has appeared to me to be of any service, unless combined with an oxide of iron. In these circumstances the sulphate of iron may be taken in small doses, dissolved in the drink acidulated with the sulphuric acid, or the citrate of iron may be given in fluids containing the citric acid. In treating most of the injurious effects of mercury, the local mischief, in whatever form it may appear, attracts the chief notice, and to it chiefly, and not to the states of the blood and of vital power, which are of the greatest importance, are our remedial measures directed. Various other constitutional means have been recommended; but there are comparatively few which deserve adoption. The most serviceable are the preparations of sarsaparilla; those of iodine; the iodide of iron, and some other combinations of iodine with sarza; the decoction of cinchona, or the sulphate of quinine with sulphate of iron, or common alum, or with the citrate of iron, according to circumstances, or to the amount of debility or of anæmia. In most of the remote or consecutive states of poisoning by mercury, and more especially in mercurial cachexia and affections of the skin, and mercurial periostitis, the iodide of potassium and other preparations of iodide, with sarza, &c., will prove most beneficial.

592. (*b*) The *derivative measures* which are most serviceable are purgatives and warm baths, and these are serviceable chiefly when salivation has occurred suddenly or unexpected-

edly; when it is recent, and the patient not much reduced. In these circumstances, the best purgatives are the neutral sulphates dissolved in the compound infusion of roses, to which some additional sulphuric acid, and small doses of the sulphate of iron, may be added; these may be administered at intervals, so as to keep up an action on the bowels, or a full dose of precipitated sulphur may be taken at bedtime, and the saline aperient in the morning and at midday if it be required. Warm medicated baths may likewise be used, or pediluvia. If constipation continue, or become obstinate, other more active purgatives may be required, if a recourse to purgative enemata does not accomplish fully the object entertained.

593. (c) The *local means* should have reference to the state and stage of salivation, and of the other symptoms. If salivation be commencing; if it be acute; if it have occurred unexpectedly, or from a small dose of mercury, and be attended by an inflammatory state of the mouth or salivary glands, the topical remedies ought to be soothing, and the local excitement should be calmed by means of demulcent gargles, containing cooling and anodyne substances, as the nitrate of potash, or the hydrochlorate of ammonia, with extract or tincture of opium; or by gargles containing the acetate of lead and acetic acid, with tincture or wine of opium. If the swelling and tenderness around the salivary glands be considerable at the commencement, a few leeches, followed by fomentations, may be prescribed, and the other means assiduously employed. In the more chronic or atonic stage or state of salivation, the gargles should be astringent and tonic, as the decoction of cinchona, or of oak bark, with alum and sulphuric acid, or with the tincture of krameria. The chlorides, especially the chloride of lime in solution, with creasote; solutions of the chloride of zinc, or of the nitrate of silver; the tincture of myrrh in camphorated demulcents, &c., may severally be employed as gargles. I have seen strong tar-water of great service when used as a gargle, a weaker form of it having been drank as a constitutional remedy.

594. (d) The *other varieties of chronic poisoning* by mercury are benefited most by the constitutional or antidotal means advised above (§ 591). But, in these varieties, the states of the blood and of nervous energy should receive particular attention. In order to remove the existing depression of vital power, to improve the assimilating processes, and to resist the changes in the blood, especially the progressive anæmia, the iodide of iron in sirrup of sarsaparilla, the several preparations of iron, or the mineral chalybeates, in states of combination which the peculiarities of the case will suggest, and many of the usual vegetable or mineral tonics and antispasmodics, will prove of essential service. When the nervous system, or even when the mental manifestations betray disorder, the means just mentioned, preceded or attended by the constitutional treatment above recommended (§ 591), are then also required; change of air and scene, travelling, a dry, bracing air, generous but light diet, aided by occasional recourse to tonics, to chalybeates, to the iodine, and to the natural mineral waters, being also beneficial.\*

595. vi. STRAMONIUM—THORN-APPLE—*Datura Stramonium*.—Poisoning with this plant is not infrequent, and is generally accidental. But the thorn-apple has been used on the Continent for the purposes of aiding the commission of crimes. The whole plant is probably poisonous, but the seeds are the most virulent. It is very slightly irritant, its poisonous action being exerted chiefly on the brain and nerves of sensation. Its operation nearly resembles that of belladonna. The active properties of the plant reside chiefly in an alkaloid principle, described by GEIGER and HESSE, and named *daturia* or *daturium*; and probably partly in an empyrenematic oil which it contains, resembling that of digitalis. It acts chiefly by absorption, and probably also by its local influence or impression on the nervous systems; for the application of the leaves of the plant to burns or sores has occasioned dangerous effects.

593\*. a. The *symptoms* produced by stramonium have been most accurately observed and described by Dr. PEREIRA. In *small and gradually increased doses*, it impairs sensibility, thereby alleviates pain, and hence is *anodyne*. Although it allays pain, it does not usually produce sleep. Dr. PEREIRA remarks that it has no direct tendency to induce sleep, and hence it *cannot be called soporific*; but indirectly, by alleviating pain, it often disposes to sleep. It usually does not affect the pulse: it slightly and temporarily dilates the pupil, and has no tendency to cause constipation, but rather relaxation. In *larger doses* it causes dryness of the throat, thirst, nausea, giddiness, dilatation of the pupil, obscurity of vision, headache, nervous agitation, disturbance of the cerebral functions, perspiration, occasionally relaxation of the bowels, and sometimes diuresis. In *fatal doses* the chief symptoms are flushed countenance, delir-

remedy and as a poison, supersedes additional matter on the subject; yet on a topic so prolific in relation to a mineral remedy, the use of which has for near a century past been so extensive in the hands of the faculty of American physicians, an additional observation or two may be made. In specific febrile disorders, it is well known that OGDEN, of Long Island, and DOUGLASS, of Boston, had recourse to mercury before its use for those purposes was made in Great Britain. In the mercurial practice for yellow fever, as it prevailed in Philadelphia in 1793 and in subsequent years, and in New York in 1795, 1798, and in 1803, as adopted by the medical men of that metropolis, great opportunities occurred of noticing the action of this powerful agent in a disorder of acknowledged specific character; while the abuse of mercury in syphilitic diseases has been the theme of repeated remark and of professional notoriety by American prescribers. The reader will do well, on all these subjects, to peruse the valuable volume on the mercurial practice of the United States by the late Dr. JOHN WARREN, of Boston. See, also, the *Massachusetts Medical Communications*, vol. ii. On this most interesting subject, the use and abuse of mercury, a work of clinical value appeared so long ago as in 1811, entitled a *Dissertation on Mercury*, by JOHN W. FRANCIS, New York. This elaborate essay contains many details of value relative to the medical history and curative action of this heroic prescription. The author considers the several forms of mercurial erethism as more likely to occur from the external applications of the remedy than from its internal use. He notices the loss of memory for years, arising from the too free introduction of mercurial salts into the system; and ingeniously contends that mercury as a curative agent effects its great design by its universally stimulating or exciting action, and its alterative influence in eliminating specific disease by unlocking all the emunctories of the body. The recent doctrines of LIEBIG, now so popular, seem to have been fully broached in this treatise by Dr. FRANCIS. The assimilating principle in elucidation of the action of small-pox, venereal disease, &c., gives unquestionably a comprehensive view both of the action of animal poison as a taint, while a like doctrine of the corrective influence of certain remedies unfolds a lucid theory of their therapeutical action.]

\* [The elaborate exposition which our author has given of the various disordered changes induced by mercury, as a



ium—usually maniacal—dilatation of the pupil, dryness of the throat, loss of voice, difficulty of deglutition, hot, perspiring skin, convulsions, and sometimes palsy. But the symptoms vary in different cases with the dose, and the part or preparation of the plant administered. Of the numerous instances of poisoning by this plant, the following will suffice to illustrate the symptoms :

594\*. In two cases related by VICAT and SWAINE, the chief symptoms were furious delirium and palsy of the extremities. In three instances adduced by ALIBERTO there were delirium, restlessness, constant incoherent talking, dancing, and singing, with fever and flushed face. In a case described by Dr. TRAILL, about eighteen grains of the extract were taken by mistake, and were followed by dryness of the throat, giddiness, dilated pupils, flushed face, glancing of the eyes, incoherence, resembling intoxication, and incessant, unconnected talking, like that of demency. Emetics were given without effect, and little amendment was obtained from blood-letting, cold to head, or purgatives. But after a glass of strong lemonade vomiting took place, and the patient soon recovered. BOERHAAVE states, that a man gave the powder of stramonium in coffee to a female. It occasioned redness of the features, delirium, nymphomania, loss of speech, followed by fixedness of the eyes, tremours, convulsions, and coma; afterward tetanic spasm and slow respiration. She was with difficulty roused by the action of emetics, and recovered. In another dangerous case, adduced, among others, by Dr. CHRISTISON, free blood-letting effected a speedy cure. Of a case well described by Mr. DUFFIN, the symptoms were exactly as above stated (§ 593\*). One hundred of the seeds were swallowed; but, although the treatment was judicious, death took place in twenty-four hours. Of several cases adduced by GÆLIN, six hours were the shortest duration. [It is not uncommon to observe hemiplegia with spasmodic affections of the opposite side in children who have eaten the seeds or flowers. I recently attended a child, a boy twelve years of age, who was poisoned by inhaling the aroma from the leaves that had been bruised in the sun. After exposure to these fumes for a considerable period in a hot sun, he was seized with maniacal, wild, hysterical delirium, contracted pupil, &c., and, in spite of treatment, died in about twelve hours. On dissection, the blood was found fluid, the brain congested, the other organs natural. For many cases of poisoning by this plant, see my edition of GUY'S *Med. Jurisprudence*, p. 697.]

595\*. *b. Diagnosis.*—VOCHE says, that stramonium is distinguished from belladonna by its affecting more the ganglia, spinal cord, and brain; by the circumstance of the pulse being little affected by it, and by slowness more frequently than acceleration of pulse being produced by it; and by its exciting the organic nervous system more strongly, and more directly promoting all the secretions, especially those from the skin. Its operation may be briefly characterized as slightly irritant and energetically alterative as regards sensibility and innervation, while it influences less remarkably the irritability of muscular structures.

596. *c. The morbid appearances* consist chief-

ly of congestion of the brain and sinuses, especially in those cases which terminate early with maniacal excitement and determination to the head. When life has endured for eighteen hours or upward, the congestion within the cranium is less remarkable. In Mr. DUFFIN's case, the brain was healthy, and not congested. The stomach and intestines were natural. There were a slight redness over the pharynx, larynx, and upper third of the gullet, thickening and swelling of the rima glottidis, and a semi-coagulated state of the blood.

597. *d. The treatment* should consist chiefly of vascular depletions; the cold or tepid affusion on the head; emetics or the stomach-pump; lemonade drinks; and the other means advised for *belladonna* (§ 545).

598. CLASS VII. NARCOTICS, OR STUPEFYING POISONS. — HYPNOTICS. — Several substances have been classed as narcotics, although they are not directly or really narcotic or hypnotic, and produce this effect only contingently upon their anodyne or sedative action—not infrequently as a consequence of the vital depression or exhaustion which they occasion in a large dose. This error of arrangement, so intimately allied to inaccurate views as to the operation and effects of both medicines and poisons, has been perpetuated by most writers on juridical medicine. But it is of great importance, in a practical rather than in a theoretical point of view, that substances which are simply *anodyne*—which remove pain or paralyze sensibility—should be distinguished from those which exert a more extensive effect, and are *sedative*—which lower nervous and vascular excitement, and depress vital action; and that those substances which are simply *hypnotic*—which merely procure sleep—should also be distinguished from *narcotics*—which do more than procure sleep, which stupefy the senses and occasion a state of lethargy, into which the patient lapses immediately after having been momentarily and with difficulty roused. There is no doubt that several substances produce effects so complicated as to render classification founded on these effects most difficult; that there are some which are not only anodyne, but also sedative or depressing, and withal both hypnotic and narcotic; and it is hence the more difficult to arrange them. Still the difficulty should be met; and, by careful observation, the more prominent effects of these substances should be recognised and assigned to each. I have had occasion to show that several substances which have been classed as narcotics are not actually such, but occasionally manifest more or less of this effect merely as a consequence of the vital depression they produce when taken in excessive doses.

599. The operation of narcotics was once a source of dispute between the chief supporters of the medical doctrines adopted toward the close of the last century. The term *narcotic*, being applied substantively and adjectively to medicines which have the power of stupefying and impairing the energy of the nervous system, the mode in which this power was excited became the subject of inquiry. As most narcotics have a stimulating influence in small doses, and as the narcotic effect is produced chiefly, or only when they are given in full or large doses, the question was, as to the way in

which this latter effect was developed. CULLEN contended that the stimulating effect is owing to the resistance offered by the *vis medicatrix nature* to the sedative influence of the substance; and hence that a large dose is immediately sedative, because this resistance is overpowered. BROWN, on the contrary, maintained that narcotics are in reality highly diffusible stimuli, which exhaust the excitability by the rapidity of their action. Thus CULLEN regarded them as directly sedative, and indirectly stimulant; and BROWN as directly stimulant, and indirectly sedative. The discussions connected with this subject, which may be viewed as constituting an epoch in the history of medicine, are now nearly forgotten, although the topic is not altogether destitute of practical importance. If both doctrines were closely investigated, neither would be found correct; but it is sufficient that we attend to the effects, and observe them correctly. The exact modes in which they are brought about require too minute an investigation to be entered upon at this place.

600. i. CARBONIC ACID GAS, and *Admixtures of it with other Gases*.—This is the most important of the deleterious gases. It is, as Dr. CHRISTISON remarks, the daily cause of accidents; for it is extricated in great quantity from burning fuel, during the calcination of limestone or chalk, by the fermentation of beer, and in pits, mines, wells, &c. It is generated during respiration by all animals, and is accumulated to a dangerous amount in apartments where due ventilation is neglected. Owing to these and other sources, being such as admit of the accidental and intentional operation of this gas on the human subject, poisoning by it is of frequent occurrence. Some doubts had been entertained whether it is a positive poison, or simply an asphyxiating gas. But, independently of its action, when concentrated or pure, in irritating and constricting the larynx, and thereby producing suffocation, it is positively and energetically poisonous. This is shown by a variety of circumstances: 1st. Poisoning by this gas is more rapid than immersion in hydrogen or azote. Immersion in carbonic acid gas will kill an animal outright in twenty-five seconds, and a small bird in fifteen seconds. 2d. If, instead of the nitrogen gas contained in air, carbonic acid be mixed with oxygen in the same proportion, symptoms of poisoning will appear in two minutes in animals which breathe this admixture. Persons have become apoplectic in an atmosphere containing carbonic acid gas in much less proportion, and which has appeared quite respirable upon first entering it. 3d. Professor ROLANDO (*Archives Gen. de Med.*, t. v., p. 132) found that the land tortoise sustained little injury when the great air-tube of one lung was tied; but instead of tying this tube, he contrived to make the animal breathe carbonic acid gas through it, and death took place in a few hours. 4th. The symptoms caused by inhaling the gas much diluted may be produced by the application of it to the internal surface of the stomach, or even to the skin. It is well known that aerated water not infrequently causes giddiness and a passing intoxication when drank too freely, especially by persons unaccustomed to it. The sparkling wines owe to this gas a portion of

their power of rapid intoxication. M. COLLARD DE MARTIGNY found that, if the human body be enclosed in an atmosphere of this gas while respiration is carried on by the common air, the usual symptoms of poisoning with carbonic acid is produced; and, if the same experiment be made on animals, death will ensue if continued long enough. 5th. It has been shown by Dr. G. BRID that death may follow the inspiration of this gas, although the usual changes are produced by the oxygen in the air on the blood, which even may still retain its florid colour (*Gov's Hosp. Rep.*, vol. iv., p. 79.)

601. A. When a person attempts to inhale pure carbonic acid gas, the throat is irritated so strongly that the glottis closes, and inspiration is impossible. Sir H. DAVY and Dr. CHRISTISON remark, that the gas causes an acid taste in the mouth and throat, and a sense of burning in the uvula; hence, when a person is immersed in this gas, he dies at once of suffocation. The effects, however, are very different when the gas is diluted, the symptoms resembling those of apoplexy or poisoning by opium, but varying somewhat according to the source from which the gas is derived, and the vapours or other gases or admixtures consequently breathed with it. It is of importance to recollect that fatal poisoning by this gas may occur where the quantity present is quite insufficient to produce much effect at first, or for some time, or to extinguish a lighted candle; and, consequently, we are authorized in concluding that a gaseous mixture, capable of extinguishing a lighted taper or candle, will almost inevitably prove fatal to animal life. No odour nor taste, also, is perceived when this gas is much diluted.

602. B. The symptoms experienced by persons exposed to an atmosphere loaded with charcoal fumes, or with carbonic acid emanating from any other source, and mixed with more or less of other gases, are well marked and constant; although, as Dr. GOLDING BRID remarks, they are far from being distinctly characteristic of the existing cause, as they are very similar to the premonitory signs of apoplexy. A person exposed to these fumes at first experiences an intense, penetrating, and throbbing headache, with a sense of weight and heat, especially about the occipital region; pulsation in, and sense of tightness across the temples; giddiness, confusion of ideas, and failure of memory; increased action of the heart, and often violent palpitations, sometimes attended by a disposition to nausea and hysterical sobbing. If the individual be now removed into a current of cool, pure air, with warm applications to the feet, which usually, in such circumstances, become cold, the symptoms gradually vanish. But if he continue exposed to the poisoned atmosphere, a buzzing noise in the ears, partial or total loss of vision, an undefined, vague feeling of intense dread or horror succeed, and are rapidly followed by somnolency or syncope. Subsequently, according to Dr. G. BRID, all power of volition disappears; the pulse, which was previously above one hundred, falls to forty or fifty; respiration becomes slow and laborious; the surface universally cold, and often livid; the lips blue or violet; the eyes retaining, in most cases, their lustre. Gradually these symptoms increase in intensity, frequently with the accession of te



tanic convulsions, and, in a few instances, raging delirium. White or bloody foam appears before the mouth and nostrils, vomiting takes place, and the sufferer sometimes expires in the act; but he as frequently breathes his last without vomiting, and, in this case, the tongue is protruded, or firmly clinched between the teeth. He is usually found in a calm and sleep-like attitude, the countenance always retaining a placid expression, which even the vomiting, that often occurs in the last moments, had not disturbed.

603. Persons who have been exposed to an atmosphere vitiated by carbonic acid gas, "until insensibility, cessation of pulsation in the smaller arterial trunks, and suspension of respiration supervene, frequently exist for a considerable time, if removed from the poisoned atmosphere, appearing partially to survive, exciting hopes too frequently fallacious; as such persons almost always sink, even after living for several days in a state of somnolence." A case, however, is recorded by Dr. BARNESON, in which a singularly judicious treatment was successful; and others have since recovered from this very dangerous state.

604. C. A small quantity of the mixed gases, proceeding from the slow combustion of tallow or oily substances, will produce dangerous symptoms. Dr. BLACKADDER ascertained (*Edin. New Philos. Journ.*, i., 224) that the vapour into which oil is resolved, previously to its forming flame round the wick, excites, even in minute quantity, intense headache. The emanations from the burning snuff of a candle are probably of the same nature, and very poisonous; and an instance of such effect is adduced by Dr. CHRISTISON. A party amused themselves by holding under the nose of a boy asleep the smoke of an extinguished candle. At first he was roused a little each time; but after half an hour, during which this was repeated, he began to breathe laboriously, and was attacked by incessant epileptic convulsions, and died on the third day. The effects of these emanations are probably partly owing to the presence of an empyreumatic volatile oil, which is an active poison (§ 668).

605. D. The admixture of sulphurous acid gas with the carbonic being inhaled in a diluted state, is extremely deleterious. When, however, the sulphurous acid gas is present in any quantity, the irritant effects produced by it, especially on the lungs and air-tubes, will often prevent accidents which might have occurred if carbonic acid gas only had been present. Instances have been recorded where the admixture of these gases have proved fatal, especially in mines. The symptoms produced by these gases, and those caused by the gradual contamination of the air in a confined apartment in which a number of living beings are enclosed, are very nearly the same, although the causes are not identical. It was found in the instances which occurred in mines, that, although the lights continued to burn, the men were poisoned; the symptoms being difficulty of breathing, pain and beating in the head, giddiness and ringing in the ears, palpitation and anxiety followed by vomiting, weakness and pains in the limbs, and, finally, loss of recollection. To these succeeded frantic delirium in some, terror in others, and insensibility in the rest. Many

retched and vomited. In some the pulse was quick, in others it was slow; in many irregular, and in all feeble. (*See Edin. Med. and Surg. Journ.*, xiii., 353; xxxii., 345.)

606. E. *Appearances of the dead Body.*—a. *Externally*, these vary with the circumstances of particular cases; but the surface is generally sprinkled with livid spots, often bluish or reddish brown, passing into violet; and these are most numerous in the most depending parts. The limbs are in some cases very flexible, in others as rigid. The fingers are often irregularly bent, sometimes stiff and extended. The arms are occasionally thrown across the chest, especially if spasms have preceded death. Opposite statements have been made as to the persistence of the animal heat, and as to the rapid or slow development of decomposition. The tongue is found projecting, and often clinched between the teeth, unless vomiting preceded death, and then it is usually in its natural position. The mouth is often covered with a white or bloody foam. The face is in some cases red and bloated, in others pale and placid. The eyes generally retain their vivacious aspect; they are sometimes injected. The pupils are dilated. The features are always in a state of repose. The interior of the nostrils, in some instances, are lined with a black, fuliginous deposit. The abdomen is distended with air. (Dr. G. BIRD.)

607. b. *On dissection*, the coverings of the head are found injected with blood. The vessels of the dura mater, arachnoid, and pia mater, as well as the sinuses, are found turgid with blood; and serous effusion often exists beneath the arachnoid. The surface of the brain is always injected, often reddish; occasionally the cerebral substance is somewhat softened, and presents the appearance of recent inflammation. The lateral ventricles generally contain fluid, sometimes limited to one side; and serous effusion is met with at the base of the brain. In addition to this congested state of the brain and cerebellum, extravasation of blood is found in a few instances; in one case, universal effusion of blood between the arachnoid and pia mater, and extending to the cerebellum; in another, into the lateral ventricles. Dr. G. BIRD states that the blood found in the cerebral vessels is black in some cases, and florid in others; and even black in some vessels, and florid in others, in the same case. Occasionally the blood is fluid, and very thick; in others remarkably thin, and in some coagulated. Effusion of reddish serum into the *pleura* and *pericardium* is frequent. The *lungs* are sometimes expanded, and full of air and blood; in others, collapsed. In many, their tint is blackish violet; in others, red, spotted with black; and in some, quite natural, and presenting merely the usual cadaveric turgescence and blackness posteriorly. The blood in their vessels is often black, sometimes florid, and even both; the vessels are frequently turgid, but occasionally nearly empty. The cavities of the *heart*, and the *blood* found in them, present as opposite appearances, in different cases, as have been described in respect of the lungs. The same remark applies to the larynx and trachea. The pharynx and oesophagus are usually healthy, and sometimes contain food, as if the patient had expired in the act of vomiting; but in the

last moments of life, the contents of the stomach are regurgitated without effort rather than vomited. The *abdominal viscera* are generally healthy, whatever lesion they present being referable to other causes. The veins are most usually congested, and more or less of serous effusion into the peritoneal cavity is sometimes seen. The blood in the abdominal veins is coagulated in some cases, and fluid in others. The *muscles* are stated to be extremely lacerable, owing to the absence of irritability of vital cohesion; but Dr. G. BIRD contends that such is not the case in some.

603. *F. The Modus Operandi of diluted Carbonic Acid Gas.*—This physician, who has paid much attention to the subject, concludes, from his researches, that an atmosphere containing carbonic acid gas will produce death, although it may contain a sufficient amount of oxygen to support life, *per se*, and to allow the arterialization of the blood to proceed. On which account, no dependence can be placed on the dark or florid colour of the blood, as arguments for or against poisoning by carbonic acid gas. He considers that this gas, when diluted, acts primarily upon the nervous system; and secondarily, but by no means essentially, upon the circulating fluid; that death is caused by the accession of apoplexy, often attended by serous effusion into the ventricles, or on the surface of the brain, and sometimes even by the extravasation of blood; and that no importance can be attached to the states of the surface, of the features, of the blood, of the limbs and muscles, and of the thoracic and abdominal muscles, as proofs of poisoning by carbonic acid gas. I need only add to this statement, that during the inhalation of this gas, or of admixtures of it with other gases, the injurious action may be produced not only through the medium of the nerves, but also by the passage of the gas itself into the circulation, where it may act more directly on the ganglionic nerves of the brain, influencing its innervation, its circulation, and vital manifestations, and thereby giving rise to the symptoms and structural lesions above described. These lesions are chiefly congestion of the vessels of the brain, with contingent serous effusion, and, more rarely, sanguineous extravasation. Beyond these, but little structural change, at least of a precise and obvious nature, is met with, either constantly or generally, although various alterations in the colour and states of both the fluids and soft solids are observed; but they are so different, or even opposite, in different cases, that no importance can be attached to them.

609. *G. Treatment.*—This should consist of cupping or general blood-letting, but cupping on the nape of the neck generally, and preferably; of an occasional recourse to cold or tepid affusions on the head and neck; of the application of derivative means to the lower extremities, and of stimulative embrocations to the chest and limbs; and of the administration of enemata, containing camphor, asafetida, with active purgatives, as turpentine, castor oil, &c. The quantity of blood which should be taken by cupping ought to be regulated by the symptoms and the progress of the poisonous effects. When these means are inefficient, owing to the existing torpor and insensibility, artificial inflation of the lungs and even re-

course to electricity, or to electro-galvanism, should not be neglected, more especially as the progress of such cases is not generally so rapid as to preclude the adoption of these means. When the temperature is much depressed, warm baths, with salt, mustard, &c., in the baths, should not be neglected. In Dr. BABINGTON'S case, decided benefit was derived from the inhalation of oxygen gas. But much will depend upon the adaptation of the various means to the states of the nervous system and of the circulation at the time of their administration. As many of the cases of poisoning by this gas are of considerable duration, sufficient time is generally afforded to ascertain the efficacy of remedies.

610. ii. *CARBONIC OXIDE GAS.*—When this gas is thrown slowly into the veins, it gives the arterial blood a brownish tint, and induces, for a short time, a state resembling intoxication (NYSTEN). But it is certainly more deleterious than the experiments of NYSTEN would seem to indicate. An assistant of Mr. HIGGINS, after inhaling this gas two or three times, was seized with giddiness, tremours, and approach to insensibility, succeeded by languor, weakness, and headache. Another assistant, having previously exhausted his lungs, inhaled the pure gas three or four times, and was suddenly deprived of sense and motion, and continued insensible for half an hour, during which time he was apparently lifeless, with the pulse nearly extinct. Various means were tried for rousing him, without success; till, at last, oxygen gas was blown into the lungs. Animation then returned rapidly; but he was affected for the rest of the day with convulsive movements, stupor, violent headache, and quick, irregular pulse; and after his senses were restored, he suffered from giddiness, blindness, nausea, alternate heats and chills, succeeded by feverish, broken, but irresistible sleep.

611. iii. *CARBURETED HYDROGEN GAS—COAL GAS.*—The several species or admixtures of carbureted hydrogen gas are more or less narcotic and injurious, although much less noxious than sulphureted hydrogen.—A. Sir H. DAVY found that, when he breathed a mixture of two parts of air and three of carbureted hydrogen, he was attacked with giddiness, headache, and transient weakness of the limbs. When he breathed this gas in a pure state, the first inspiration caused a sense of numbness in the muscles of the throat; the second, an overpowering sense of oppression in the chest, and insensibility to external objects; during the third, he felt sinking into death, and the mouth-piece dropped from his hand. On recovering his senses, which happened in less than a minute, he continued to suffer for some time from a suffocating feeling, extreme exhaustion, and feebleness of the pulse. Throughout the rest of the day he was affected with weakness, giddiness, and rending headache. Colliers, however, breathe the air of coal-mines without apparent injury, although strongly impregnated with this gas; and NYSTEN found it inert when injected into the veins. Probably the concentration of the gas, or the impregnation of the air with it, requires to be carried up to a certain point before its poisonous operation is produced.

612. *B. Coal gas and oil gas*, which are mixed and variable gases, appear to be inert, or



nearly so, when very much diluted; but since their introduction for the purposes of illumination, many fatal accidents have occurred from the respiration of air contaminated with them. *Coal gas* consists of hydrogen, proto-carbureted hydrogen, bi-carbureted hydrogen, carbonic oxide, nitrogen, and carbonic acid in varying proportions. Several cases of poisoning with this admixture, owing to the contamination of a large proportion of air with it, are recorded. The *symptoms* were vertigo, cephalalgia, confusion of intellect, with loss of consciousness; nausea, with vomiting; general weakness and vital depression; partial paralysis, convulsions, and the usual symptoms of general asphyxia. In illustration of the effects of coal gas, Mr. TAYLOR adduces the following: In January, 1841, a family in Strasburg respired for fourteen hours on air contaminated with coal gas, owing to its escape from a pipe. On discovery of the accident four persons were found dead. The father and mother still breathed; but the father died in twenty-four hours: the mother recovered. An old lady and her granddaughter, who had been annoyed by the escape of coal gas during the day, retired to bed, and were found dead about twelve hours afterward. In the case of the Strasburg family, there was probably not more than 8 or 9 *per cent.* of coal gas contained in the air of the rooms, because, when the proportion is a little greater, the mixture with air becomes explosive; and a candle was burned out, and a fire burning in the stove, showing that no explosion had taken place. In the other cases, a strong snell of coal gas could be perceived when the bodies were found, though the air could be breathed. Coal gas, therefore, like other gaseous poisons, may destroy life if long respired, although it be so much diluted as not to be injurious at first, or for a short time.

613. *C. On dissection*, the appearances have been observed chiefly in the instances just mentioned. Of the five bodies poisoned by this cause in Strasburg, the *post-mortem* examination evinced a great difference in the appearances; but the chief alterations were congestion of the brain and its membranes, remarkable engorgement of the pia mater, and intense redness of the whole surface of the brain. In three of the cases there was an effusion of coagulated blood on the dura mater of the spinal canal. The lining membrane of the air-passages was strongly injected; and there was spread over it a layer of thick, viscid froth, tinged with blood. The substance of the lungs was of a bright-red colour, and the blood was coagulated. In the other cases, recorded by Mr. TEALE (*Guv's Hosp. Rep.*, No. viii.), there was also congestion of the brain and its membranes, with injection of the lining membrane of the air-passages; but in these cases the blood was remarkably liquid.

614. *D. Treatment.*—The odour of this gas will generally lead to the detection of it, and to prevention of its injurious operation; but it may penetrate into dwellings and apartments in a very insidious manner; and if this takes place where persons are asleep, the results may be fatal in a few hours. The exact proportion of this gas to the air respired which will destroy life has not been ascertained; but from 7 to 12 *per cent.* of this gas in air will most like-

ly be sufficient, as this proportion has killed rabbits and dogs in a few minutes. Indeed, a quantity a little below the explosive proportion, or 7 or 8 *per cent.*, may be sufficient. The treatment where poisoning has taken place is the same as I have advised for the effects of carbonic acid gas (§ 609).

615. iv. CHLOROFORM.—*Perchloride of Formyle*—*Chloric Ether*, and *Ether Vapour*.—I have already made mention of *ether vapours* (see § 322, 336–340) in connexion with their effects as an *intoxicating* and *paralyzing* or *anæsthetic agents*. I shall now notice them as powerful *hypnotics* or *narcotics*, their hypnotic operation being the most speedily developed, and the most remarkable of known substances. When the effect of sulphuric ether as an anæsthetic agent was first ascertained, the advantages to be derived from it in surgery and midwifery were certainly over-estimated, and the dangers contingent on a recourse to it were not always admitted or even recognised. It certainly could not have furnished entire satisfaction to Dr. SIMPSON, who was among the most zealous in recommending it in obstetric practice, otherwise he would not have sought for another anæsthetic agent; and he was successful in finding one still more energetic, and probably more safe. [We know not how to reconcile these two qualities. In proportion to the energy of the article is its danger, unless properly used. This is especially the case with chloroform, as experience has fully proved. We cannot, from present experience, therefore, justify its use as an anæsthetic agent, especially in natural labour, which is safer in proportion as it is a *natural* process.] But a few months of trial of the sulphuric ether inhalation was thus followed by the discovery of the advantages of inhaling *chloroform*. In February, 1847, Mr. JACOB BELL first employed chloroform, or perchloride of formyle (*Pharmaceut. Journ.* for February, 1847, p. 357), as a substitute for sulphuric ether, as an anæsthetic or hypnotic agent; and in November, 1847, Dr. SIMPSON, apparently unacquainted with Mr. BELL's recommendation, had recourse to it for the alleviation of the pains of parturition. That chloroform, even in small quantity, poured upon a sponge or handkerchief, and held to the nostrils, produces the most profound sopor and insensibility in a very short period—from a few seconds to a very few minutes—cannot be disputed; and that it may be employed in surgical operations and in midwifery, so as to prevent any painful sensation, has been already shown on numerous occasions. It has likewise been proved that it is more rapid and certain in its effects than sulphuric ether, and even more safe, thus admitting that the latter is not always quite harmless. [We cannot subscribe to the truth of this remark; we believe that facts show directly the reverse. We have now more than twenty fatal cases on record from the use of chloroform, in the short period since its introduction (March, 1848).] I have already pointed out the dangers attendant upon even a prudent recourse to sulphuric ether inhalation, especially in the parturient process (§ 337, 338), and I have no reason to infer that the danger is much reduced by the employment of chloroform. Time and close observation will decide as to the amount of benefit or of mischief which may result from the use of this

latter. That it may be applied to injurious, to poisonous, and even to felonious purposes, may be anticipated from the facility of its administration, and from the communications respecting it which were instantly made to all the daily and weekly papers in the kingdom. All these hypnotic or anæsthetic agents, if breathed for too long a time, without such intermissions in their administration, or without such precautions as a prudent physician will adopt, may be followed by the most dangerous effects, in respect both of the constitution of the blood and of the nervous masses, especially the brain and medulla oblongata. Time and observation have not yet been sufficient to show the results as to chloroform; but a recourse to it should be made with caution, as an effect so potent as it produces cannot be undergone without some risk in certain states and constitutions. At the moment of writing the above, experiments made and published by Mr. T. WAKLEY (*Lancet*, January 1, 1848) demonstrate the poisonous operation of chloroform and the ethers when inhaled by the lower animals, and the following case was published by Dr. GULL.

616. A boy aged eleven, in good health, but his nervous system a little weakened by confinement to bed, his heart and lungs sound, was about to have the flexor tendons of the knee-joint divided in Guy's Hospital, and chloroform inhalation was adopted. "A small quantity of chloroform, not exceeding thirty drops, was put upon a cone of bibulous paper, and placed over his mouth and nose. In less than a minute he was entirely insensible, the pupils becoming widely dilated, and the pulse small and frequent. As the operation was being proceeded with, his consciousness partly returned, and a few drops of the chloroform were put upon a handkerchief and applied to the nose. He was instantly affected, and to such a degree that there was the greatest apprehension of his never rallying. The pulse was very feeble, 56; the breathing so indistinct as hardly to be distinguished; the face pale, lips congested; the symptoms of collapse extreme. Ammonia was employed, and, after about five minutes, he gave two or three deep inspirations: it was, however, more than fifteen minutes before he was out of danger. Subsequently a small quantity of brandy was administered. He complained of headache. For a long time after he recovered his special senses and power of motion, general and perfect anæsthesia of the surface existed. The following day he was quite well." (*London Med. Gaz.*, December 10, 1847, p. 1036.) The above case sufficiently illustrates the injurious action of this substance; and, in the present state of our knowledge and experience of the inhalation of this and other preparations of ether, it is unnecessary to make any farther observation.

617. v. *CICUTA VIROSA*—*Water Hemlock*.—This indigenous plant has sometimes produced accidentally the most noxious effects. The roots and the rest of the plant are poisonous, but the roots especially. Among other instances related by WEFER, eight children ate the roots instead of parsnips. Two of them died. The first symptoms in these two were swelling in the pit of the stomach, vomitings, or efforts to vomit, total insensibility, involuntary discharge of urine, and, lastly, severe spastic convulsions. One died in half an hour, the other

soon after. One who recovered had convulsions, followed by deep coma, from which she could not be roused for twenty-four hours.—*a.* According to GUERSENT (*Dict. des Sciences Méd.*, t. v., p. 205), the first symptoms of poisoning with *cicuta* are dimness of sight, vertigo, acute headache, pain in the stomach, anxiety, dryness of the throat, thirst, and vomiting; followed by enuresis, epileptic convulsions, lethargy, and insensibility, in some cases; and by delirium, unconsciousness, or convulsions, with tumefaction of the face, protrusion of the eyeballs, &c., in others.

618. *b.* On dissection, METZDORF met only with congestion of the blood-vessels of the brain and its membranes. GUERSENT, in addition to congestion of the cerebral vessels, mentions flaccidity of the parietes of the heart's cavities, and congestion of the lungs and liver with a dark fluid blood. The body is sometimes swollen, the abdomen distended with air in the intestines, and the surface covered with livid spots. But the only changes which are constant are the congestions now mentioned. The same treatment as recommended for *belladonna* (§ 545) or *opium* (§ 657) is required for poisoning with this plant.

619. vi. *CONIUM*—*Hemlock*—*Conium Maculatum*—*Conia*.—This plant may certainly be viewed as the *κόνειον* of Greek writers—the celebrated *Athenian state poison*, by which SOCRATES and PHOCION died—the *cicuta* of the Romans. NICANDER states that this plant brings on obliteration of the mental faculties, dimness of sight, giddiness, staggering, stiffening, coldness of the limbs, and death by asphyxia. "A view of its effects," says Dr. CHRISTISON, "which differs little from the modern notions of the poisonous action of the spotted hemlock." Dr. PEREIRA adds, that the ancients regarded *κόνειον* as having the power of discussing tumours—a virtue which has been assigned to hemlock by writers of the present day. The effects of conium upon animals and upon man are somewhat different, the action on the former more closely resembling that of its alkaloid, *conia*.

620. *A. Symptoms.*—*a.* In small doses it produces but slight or hardly manifest effects. But it sometimes causes, when long continued, disorder of the digestive organs or nervous system, dryness of the throat, thirst, and occasionally the reduction of swellings or of tumours, and an eruption on the skin. If the dose be gradually and much increased, the effects are often more severe; delirium, syncope, or coma supervening. The ancients believed that hemlock exerted a specific influence over the mammæ and testicles, preventing the development of the former, and causing wasting of the latter, especially in girls and boys respectively. The Arabians entertained similar ideas. These effects have even been imputed to it in modern times.

621. *b.* In large or poisonous doses the symptoms indicate a dangerous affection of the cerebro-spinal system. In some of the best-recorded cases, coma was the prominent symptom, the effects being similar to those of opium. In other instances, convulsions or violent delirium, or both, were prominent. A soldier had partaken, with others, of a soup containing hemlock leaves, and soon afterward fell asleep. In the course of an hour and a half his comrades



became alarmed on finding themselves affected with giddiness and headache; and the surgeon was sent for. He found the soldier who had fallen asleep in a state of insensibility, from which, however, he could be roused for a few moments. His countenance was bloated, tumid, and bluish; the pulse only thirty, and the extremities cold. The insensibility increased until he died, three hours after taking the soup. Two cases are described by Dr. WATSON, which were fatal in the same short period. Giddiness, coma, and convulsions were the principal symptoms. When the dose is not sufficient to prove fatal, there is occasionally paralysis attended by slight convulsions. Sometimes there is frantic delirium.

622. *B. Conia, conicin, cicutinc*, or the alkaloid of conium, in which the active properties of the plant chiefly reside, exists in it in combination with an acid—the *conicic*? Its effects are known only by experiments on the lower animals. On them it acts as a powerful paralyzing agent; affecting first the muscles of voluntary motion, then the respiratory muscles of the chest and abdomen, lastly the diaphragm, and thus producing death by asphyxia (CHRISTISON). Convulsive tremours and twitches of the limbs are also sometimes observed. Dr. PEREIRA remarks, that “the primary seat of the action of the *conia* is probably the spinal cord (probably also the medulla oblongata and brain).” “In this *conia* and *strychnia* agree; but in the nature of the effect, as Dr. CHRISTISON has observed, they are the opposites of each other. *Conia* exhausts the nervous energy of the cord, and causes muscular paralysis; *strychnia* irritates it, and produces permanent spasm of the respiratory muscles.” These effects of *conia* suggest its employment in convulsive and spasmodic diseases.

623. *C. On dissection*, the chief alterations which are observed are congestion of all the vessels within the cranium, and a very fluid and dark state of the blood. In a case examined by Drs. CHRISTISON and COINDET, the vessels within the head were not particularly turgid, but the blood was everywhere remarkably fluid. Death in this case was produced in an hour, by two ounces of a strong infusion of hemlock leaves with the same quantity of whiskey, which was swallowed in the morning, fasting, at the suggestion of one of those meddling persons who are so very kind in prescribing for their acquaintances that of which they know nothing. The symptoms in this case were coma and slight convulsions. The fluidity and dark hue of the blood are merely the results, as Dr. CHRISTISON suggests, of the asphyxia, which is the proximate cause of death in poisoning by conium. The same treatment as is recommended for *belladonna* (§ 545) or for *opium* (§ 657) is appropriate for the effects of conium.

624. vii. HENBANE—*HYOSCYAMUS NIGER*—*Hyoscyamia*, &c.—All parts of this plant are poisonous, especially the seeds and roots. They produce somewhat different effects upon animals and upon man, being more hypnotic in the former than in the latter.—*A.* In small doses they are calming, sedative, and slightly narcotic. Mr. HOULTON has shown that their effects vary much with the age of the plant, the season at which the several parts of it are gathered and prepared, and the mode of preparation

and preservation. Large doses sometimes procure quietude and sleep, but with no certainty; for they not infrequently occasion dimness of sight with dilatation of the pupil, headache, giddiness, and a state of half-sleeping and half-waking, with a tendency to delirium. In some cases, thirst, nausea, clamminess of the mouth, feverishness, griping and relaxation of the bowels, are induced. Very large doses much more frequently produce delirium than sound sleep. In poisonous doses it causes loss or disturbance of vision, dilatation of the pupil, coma, with muttering delirium, distortion of the features and loss of speech, paralysis, with irregular convulsive movements, and occasionally violent delirium, and irritation of the stomach and bowels, with vomiting, griping, and purging.

625. *B.* The special effects of *hyoscyamia*, the alkaloid in which much of the active properties of the plant are believed to reside, have not been fully shown. Dr. MORRIS has ascertained that, like other narcotic and sedative vegetables, as opium, hemlock, tobacco, stramonium, digitalis, &c., *hyoscyamus* also yields by destructive distillation an *empyreumatic* oil of great activity; its poisonous properties depending upon a volatile principle which is not essential to the oil, and is productive of coma, convulsions, and speedy death.

626. *C. Hyoscyamus*, especially its juice and extract, is most actively poisonous when injected into the blood, less so when applied to the cellular tissue, and still less when taken into the stomach. It is sometimes very active when administered in an enema. It has even produced serious effects when applied to the sound surface in the form of a poultice. WILMER was called to a lady affected with sopor, dilated pupils, flushed face, loss of speech, full pulse, and swelling of the abdomen, and found that these symptoms were caused by a poultice of henbane leaves applied over the abdomen to relieve strangury. It acts chiefly on the brain, and by absorption into the circulation.

627. *D. Diagnosis*.—The effects of *hyoscyamus* differ from those of *opium* in being more sedative in small doses, by the affection of the sight and dilatation of the pupils, by the much less, and more uncertain, soporific operation in large doses, and by the delirium, loss of speech, and paralysis, with irritation of the bowels, in poisonous quantities. *Hyoscyamus* differs from *belladonna* and *stramonium* by the less frequent and less remarkable occurrence of gastro-intestinal irritation from it, and by the more manifest appearance of narcotic or soporific action. It differs also from *hydrocyanic acid* in producing delirium and paralysis, while the acid occasions insensibility and convulsion, and more rapid results.

628. *E.* The other species of *hyoscyamus*, as the *albus*, *aureus*, *physaloides*, and *scopolia*, are said to be equally poisonous with the *H. niger*. Professor FODÉRÉ states, that the *H. albus* was boiled and distributed by mistake among the crew of a French corvette. But in a short time after eating it they were all seized with giddiness, vomiting, convulsions, colic, purging, and violent delirium. They were all relieved by emetics and purgatives. The appearances in fatal cases have not been described. The treatment is the same as in other cases of narcotic poisoning.

629. *Lactuca virosa*, *L. sativa*, and *Humulus lupulus* are not likely to occasion dangerous effects from accident or otherwise.

630. viii. OPIUM AND ITS PREPARATIONS.—MORPHIA AND ITS SALTS.—The operation and effects of opium have been investigated by numerous able inquirers, but most satisfactorily by CHRISTISON, PEREIRA, and CHARVET. Since 1821, when I first resorted to the cold affusion in the treatment of poisoning by opium, I have devoted much attention to the medicinal and poisonous properties of this substance, probably the most valuable of all the articles of the materia medica.

631. A. The local action of opium is exerted chiefly on the nerves of the part, more especially on the sentient nerves, but the irritability of contractile tissues is also affected. When a watery solution, or fluid extract, of opium was applied to a painful part, or to a surface denuded of its cuticle, I found that the morbid sensibility was removed in the one case, and numbness caused in the other; and that the intestinal movements were arrested by the application of the same preparation to the mucous surface of the intestines. This latter result was also remarked by Dr. W. PHILIP. Dr. MUNRO found that opium injected into the cellular tissue caused palsy of the hind legs of a frog. Several physiologists have shown that, when opium is applied to the internal surface of the heart of a frog, this organ ceases to beat.

632. B. The remote effects of opium have been fruitful topics of discussion. It was formerly believed that the impression made by opium upon the nerves of the stomach, or of any other part, is conveyed sympathetically to the brain; but it has been conclusively proved that the poison itself enters the circulation, and acts directly either upon the brain or upon the ganglia and ganglionic nerves supplying the brain and its blood-vessels; this latter alternative appearing to me the most probable. (See § 654, *et seq.*) According to ORFILA's experiments, the action of opium is most energetic when injected into the veins. Opium is more active when applied to a wound than when taken into the stomach; and it often acts, when thrown into the large bowels, with as much energy as when taken by the mouth, and sometimes even more energetically. Much, however, of the effect produced by it, when thus administered, depends upon the state of the large bowels, as respects fecal accumulations, &c., upon the period of its retention, and the mode of its exhibition.

633. a. It has likewise been shown by ORFILA and others, that a large dose of opium affects the lower animals somewhat differently from man, causing in the former accelerated circulation, vertigo, palsy of the hind legs, convulsions, varying from tremors to violent spasms, and a wakeful kind of slumber, attended by convulsions upon the least excitement; while in man simple sopor and coma are most commonly produced, and convulsions much less frequently. According to CHARVET's researches, opium acts as a poison to all animals, when given in a large dose; and on the lower animals it produces congestion of the brain and consequent sopor, irritation of the nervous centres and convulsions, and a directly sedative effect on the muscles.

634. b. The effects of opium in the human sub-

ject are of great importance in a practical as well as in a toxicological point of view. In small doses, opium acts at first as a stimulant of the heart and arteries, causing also a slight exhilarating effect upon the mind, and sense of fullness in the head. A pleasurable state of the whole system is experienced, and a capability of greater exertion. These symptoms are followed, in about two hours, by a diminution of muscular power and of susceptibility to the impression of external objects, and by a desire of repose with tendency to sleep. The mouth and throat generally become dry, thirst is increased, desire of food is impaired, and costiveness produced. These effects are much diminished by frequent repetition, and an increase of the dose is required to produce them in an equal degree.

635. c. In a larger dose, or full medicinal dose, or from two to four grains, the stage of excitement is sooner followed by depression. Dr. CRUMPE (*Inquiry into the Nature and Properties of Opium*, 8vo, 1793, p. 85) took two grains and a half of opium when his pulse was at 70. After a quarter of an hour his pulse rose to 74, and after half an hour to 80. After fifty minutes the pulse had fallen to 64; but in an hour and a half it returned to 70. With the acceleration of the pulse, the skin becomes hot, the mouth and throat dry; thirst is increased, and the appetite diminished. But the symptoms of excitement are soon followed by indisposition to exertion, by sluggishness of the senses, confusion of ideas, and an irresistible desire to sleep, which is generally attended by dreams, sometimes pleasing, at other times frightful. Upon waking, especially if three or four grains have been taken, nausea, or even vomiting, headache, furred tongue, listlessness, and costiveness are complained of; but the accession of these may be prevented by repetitions of the dose, and by even a gradual diminution of it. Dr. BURNES states, that he had made a very fatiguing night march in India with a Coutehee horseman, and assented to his proposal of halting for a few minutes, which he employed in sharing about two drachms of opium between himself and his jaded horse. The effect of the dose was soon evident on both, for the horse finished a journey of forty miles with great apparent facility, and the rider became more active and intelligent.

636. C. The poisonous effects of opium, or the symptoms of poisoning, where opium is given in a single dangerous dose, begin with giddiness and stupor, generally without any previous excitement. The stupor rapidly increases; the person becomes motionless, and insensible to external impression; he breathes slowly, generally lies quite still, with his eyes shut and his pupils contracted, occasionally remarkably contracted; the cornea is dull, or no longer glistening, and the whole expression of the countenance is that of repose. In this stage he may be slightly or momentarily roused by violent excitement, as pinching, &c. As the poisoning advances, the features are ghastly, or slightly livid; the pulse feeble and irregular; respiration shallow, slow, or gentle, and sometimes catching; the muscles exceedingly relaxed; and, lastly, the pulse becomes remarkably slow, unequal, and irregular, and death rapidly ensues, if assistance is not promptly administered.



ed. If recovery takes place, the sopor is succeeded by prolonged sleep, which is followed by headache, giddiness, nausea, and vomiting, loathing of food, distressing languor, and constipation.

637. *D. OPIUM EATING.*—*The excessive use of opium, habitually,* produces a species of slow poisoning, of so long duration as not to be generally viewed as poisoning, although the effects are allowed to be injurious. The habit is usually acquired by persons who have derived advantage from opium in various states of disease, especially painful affections, hysteria, diarrhœa, and numerous other disorders. The habitual opium eater may be instantly recognised by his appearance; by the emaciation of his body; by a withered, yellow, or sallow countenance, and sunken, glossy eyes; and by the bending of the spine and lame gait. His digestive functions are remarkably impaired, his appetite is lost, and he hardly eats. He scarcely has more than one evacuation in the week. As the habit becomes more confirmed, his strength diminishes, and the craving for the stimulus becomes even greater; and to produce the desired effect, the dose must constantly be augmented. The mental and bodily powers are ultimately destroyed, and a universal impotence is the last result.

638. I have met with in practice several instances of opium eating, in which the symptoms were less severe. In these, however, although the quantity taken was excessive, the appetite was not materially, or even at all impaired; and the bowels were often regular, unless when deprived of the usual dose of the opium. The pulse varied from 80 to 100; and the skin was occasionally dry, but more frequently perspirable, or perspired very freely. The effect produced by a desired ordinary dose upon the mental faculties of the opium eater is usually described as that of calmness, comfort, serenity, and happiness; and a capability of supporting mental exertion and bodily fatigue.

639. When deprived of this substance, the opium eater is miserable and distressed; and the whole frame betrays the want of it, by the hollow, dark, and sunken orbits; by the haggard appearance of his features; the general weakness and tremulousness, especially of the hands; by the dry and parched state of the mouth and throat, anxious voice and manner, and by loss of appetite and sleeplessness. Many thus affected are anxious to abandon the practice, and make numerous efforts to accomplish it, but they rarely succeed.

640. If the habit be commenced early in life, the person who is its subject seldom becomes older than forty years; and he may die at an earlier age, if the practice has been excessive. When the quantity of opium taken habitually is comparatively moderate, when it is not increased in quantity or frequency of dose, but little injury to the general health often appears for many years; and even an improvement of the health is often remarked when the practice has originated in the use of opium for painful affections, obstinate diarrhœa, certain states of hysteria, &c. Several persons thus circumstanced have been under my care for various disorders, and they described themselves in better health than before the acquisition of the habit. But in most of these the quantity was

not remarkably large, and was generally not materially augmented. But in others, who take very excessive quantities, either of laudanum or solid opium, and still more remarkably in those who do not confine their indulgence to opium, but have recourse also to other intoxicating beverages to excess, visceral disease slowly and silently supervenes, with its usual consequences; the constitutional powers sink, and death sooner or later takes place. I have thus met with organic diseases of the liver and stomach, of the heart and kidneys, palsy, and tubercular phthisis slowly appear, and ultimately terminate in dropsical effusions, which treatment could not control. I lately attended a gentleman, a graduate of Cambridge, of most Herculean frame, with my friend and former pupil, Mr. PYPER. That gentleman took habitually the largest amount of opium that I have heard of having been taken by one person; but, not content with this, he indulged also in several bottles of wine in the course of the day, and sometimes in strong ale and in spirits. Although scarcely above thirty years of age, his powerful constitution and frame were broken down, his liver was enlarged, and dropsical effusions had supervened.

641. *E. OPIUM SMOKING* is rarely practiced in Europe. But it is not infrequent in numerous countries in the East; and it is the favourite mode of intoxication in China. Dr. PEREIRA has collected most instructive accounts of this practice. MARSDEN states, that the *smokable extract* is made into pills about the size of a pea. One of these being put into the small tube that projects from the side of the opium pipe, that tube is applied to a lamp, and the pill being lighted, is consumed at one whiff or inflation of the lungs, attended by a whistling noise. The smoke is never emitted by the mouth, but by the nostrils, and sometimes, by adepts, through the passage of the ears and eyes. Mr. SMITH, surgeon, of Pulo Penang, states that, although the practice is most destructive to those who live in poverty and distress, or who carry it to excess, yet it does not appear that the Chinese in easy circumstances, and who have the comforts of life about them, are materially affected, in respect of longevity, by the private addiction to this vice. It would appear that, as in *opium eating*, so in *opium smoking*, a moderate addiction to the habit is not attended by remarkable injury to the constitution; and that it is excess in either that is productive of injury.

642. *a.* The *first effect* on opium smokers is to render them more animated and loquacious. "Gradually the conversation drops; laughter is occasionally produced by the most trifling causes, and to these succeed vacancy of countenance, pallor, shrinking of the features, so that the smokers resemble persons convalescing from fever, followed by a deep sleep for half an hour to three or four hours. An inordinate quantity causes headache, vertigo, and nausea. The Malays are rendered outrageous and quarrelsome by the opium-pipe." It is extremely difficult to discontinue this vice; yet there are many instances of its being done. This destructive practice deteriorates the physical constitution and moral character, especially of the lower orders. Its effects on the system are manifested by stupor, forgetfulness,

impairment of the mental powers, emaciation, debility, sallow complexion, lividity of the lips and eyelids, languor and lack-lustre of the eyes, loss of appetite, sweetmeats or sugar-cane being most relished.

643. In the morning the opium smoker has a most wretched appearance, and is unrefreshed by sleep, however profound. He experiences a remarkable dryness and heat in the throat, with depression and restlessness, which incite him to have recourse to the opium pipe; and if it be not resorted to, there is great prostration, torpor, vertigo, discharge of water from the eyes, &c. If the privation be complete, coldness of the body, aching pains in various parts, feelings of bodily and mental misery, and sometimes diarrhœa, are complained of. Total privation has even been followed by death, if the habit has been long continued and excessive. A close resemblance may here be traced between the effects of *opium smoking* and *tobacco smoking* (§ 527). The latter is as injurious as the former, when as excessively practiced; and the one habit, as well as the other, occasions more or less general and sexual impotence, and entails on the offspring a weak, decrepit, and stunted growth, and a delicate and strumous constitution. How weak and debased must be the mind that, by the selfish and excessive indulgence of a petty vice, sacrifices not only his own health, but also the health and constitution of his offspring, and the ability of perpetuating his name and lineage!

644. *F. Diagnosis of Poisoning by Opium.*—The effects of this drug may be mistaken for *apoplexy* or *syncope*, or for the *stupor* consequent upon an attack of *epilepsy*, or upon *suppression of urine*. But the sopor of opium is different from the coma of these, inasmuch as the individual is capable of being momentarily roused from the former, unless death be very near, by means of pinching, tickling, brisk shaking, or loud talking. The state of restored consciousness is, however, frequently imperfect, and is speedily followed by lethargy. When convulsions attend poisoning by opium, the difficulty of distinguishing it from *epilepsy* is greater; but even then the patient may be momentarily roused, which is impossible in the epileptic paroxysm. In all the maladies, moreover, just enumerated, the pupils, in the majority of instances, are dilated or natural; and partial paralysis, or even more complete palsy, attends many cases of them; whereas in opium poisoning the pupils are remarkably contracted. Sopor from *intoxication* may be confounded with opium poisoning, but the redness of the conjunctiva, the ferrety eyes, the full and rapid pulse, and the odour of alcohol in the breath, will generally indicate the nature of the case. Poisoning by opium is not infrequent in *infants* and *children*; and it is in them very generally attended by convulsions. It is with great difficulty distinguished from *infantile convulsions*, proceeding from cerebral or other affections. Contraction of the pupil is almost the only indication of this poison having been given; the history of the case, and other circumstances which his acumen will suggest, will in some measure guide the physician. The diagnosis of poisoning by other narcotics than by opium is noticed where they are treated of.

645. *G. The quantity of opium which may be*

*fatal* will necessarily depend upon the state of the stomach and of the nervous system at the time of taking it.—*a.* During painful or spasmodic disorders, and in states of mental excitement or irritation, very large doses of opium may be taken with comparatively little effect. A lady, in a state of great excitement and irritation, took an ounce of laudanum when going to bed, with a suicidal intention; but she was surprised, on waking in the morning, at finding herself alive, with rending headache, nausea, and feeling of general disorder, from which she soon recovered, no aid having been administered. I have repeatedly prescribed, and once taken, as much as four grains; but I would not advise a larger dose to be given; and even this dose may be followed by unpleasant effects in some constitutions, especially the susceptible and delicate, and when the system is depressed or where there is a tendency to apoplexy; and even a smaller dose may be serious when administered in an enema or in a suppository. Mr. TAYLOR states that a man was killed by ten grains of solid opium; and a woman of middle age by eight grains, given in two doses. Dr. CHRISTISON says that the *smallest dose of solid opium* which has been known to have proved fatal to an adult was four grains and a half, mixed with nine grains of camphor, death having taken place in nine hours. In a case recorded by Dr. SKAE, it is doubtful whether death was caused by two or by four drachms of the tincture. A lady suffered very serious symptoms from twenty drops of the tincture administered in an enema; and Dr. STEINTHAL states that one grain of opium, in a clyster, occasioned alarming effects. Idiosyncrasy may be the cause of the danger produced by small quantities of the drug. On the other hand, recovery has taken place from very large doses, when vomiting has soon occurred or been procured by treatment, or when they have been taken on a full stomach, or in states of nervous excitement. In such circumstances even as much as four ounces of the tincture has failed to produce death, as in a case mentioned by Mr. TAYLOR. [We have attended, in consultation, a lady who died from swallowing four grains of opium in pill; and in another case, a gentleman, who recovered after taking eighteen grains of sulphate of morphia, although it had not been evacuated from the stomach. In this case the treatment was bleeding, cold to head, external revulsives, constant rousing and shaking, stimulating enema, and internal stimulants, &c.]

646. *b. Infants and children* are remarkably susceptible of the influence of opium, and instances of poisoning among them by over-doses of the preparations containing opium are very frequently met with. An instance is reported (*Lancet*, Feb., 1842) of an infant, two days old, having been killed by one minim and a half of the tincture; and that of another by two drops. A child four months old was nearly dead in consequence of having taken one tenth of a grain of opium. Less than half a grain was given to a child four years and a half old: it soon became comatose, and died in seven hours. Dr. MERRIMAN met with an instance of excessive stupor produced in an infant a month old by a single drop of laudanum; and he met with two instances of death caused by a small dose of GODFREY'S Cordial, which contains opium. Even



twelve or fifteen drops of paregoric elixir may prove fatal in an infant. In most fatal instances in children of poisoning by opium, the post-mortem examination affords little or no information; congestion of the brain and of the lungs, with fluidity of the blood, have been the chief appearances which I have remarked.

647. *H. The periods which elapse from the administration of the poison until the commencement of its effects* are various. A large quantity in the form of a tincture, taken on an empty stomach, begins to act in a few minutes. Coma seldom comes on before half an hour has elapsed. The interval is sometimes considerable, even when the tincture has been taken. Dr. CHRISTISON refers to a case where it was considerably more than an hour after two ounces and a half of the tincture and a drachm of the extract had been taken. Opium in the solid form generally requires a longer time to act than the tincture. DESRUELLES, however, records a case where two drachms of solid opium produced sopor in fifteen minutes; and in a case published in America, the largest quantity of it ever known to have been taken at once did not occasion this effect until an hour had elapsed. The interval may doubtless be prolonged if the opium be taken by a person already excited by spirituous liquors, or intoxicated. Mr. SHEARMAN relates the case of a man who, in a state of intoxication, took two ounces of laudanum, and had no material stupor for five hours; but he ultimately died.

648. *I. The period at which death takes place* varies from two hours, the shortest period, to forty-eight hours, the longest period; but most fatal cases terminate between six and twelve hours after the ingestion of the poison. Those who live above twelve hours generally recover, if they be judiciously treated. Instances, however, have occurred where an apparently efficacious treatment has been too soon suspended or relinquished, owing to appearances of rapid recovery, and a relapse has supervened and carried off the patient. In eight fatal cases of poisoning by opium, reported by Dr. BECK, the smallest quantity taken was one drachm, the largest one ounce and a half. The shortest time between the taking of the poison and death was eight hours, the longest twenty hours.

649. *K. Several preparations containing opium* have produced fatal effects, especially when administered by ignorant or careless persons to infants or children.—(a) *Paregoric elixir*, the compound tincture of camphor, which contains somewhat less than one grain of opium in half an ounce, has caused death. A child between five and six years of age was killed by a dose which contained about one grain of opium; and another aged seven months by a dose equal to a quarter of a grain of opium. See *Pharm. Journ.*, April, 1845, p. 464.—(b) *DOVER'S Powder*.—*Pulvis ipecacuanha compositus* has also been fatal to children. In one case, four grains of this powder, equal to two fifths of a grain of opium, caused death; and in another, ten grains caused the death of an infant in twenty-four hours.—(c) *Sirup of poppies* is said to contain one grain of the extract of English opium to one ounce. The common dose of it to an infant of six or seven months is half a drachm. But this should be the largest dose allowed. Owing, however, to this dose, or its equivalent

for other ages, being much exceeded, and owing to a mixture of tincture or infusion of Turkey opium, the strength of which is often variable, being substituted for the true sirup of poppies, poisoning has often occurred from this medicine. Seven children died from this cause in 1837. In a case alluded to by Mr. TAYLOR, half a teaspoonful of this sirup caused the death of an infant six months old. The narcotic symptoms were developed in three quarters of an hour. The sirup in this case was probably prepared with tincture of opium in excessive quantity.—(d) *Decoction of poppies* has not infrequently been fatal to infants. A teaspoonful of it has been fatal to a healthy child. A woman boiled two poppy heads in a quarter of a pint of milk, and gave two small spoonfuls of this decoction to her infant. In an hour the child fell into a deep lethargic sleep, the breathing became stertorous, and in ten hours it died. A maid-servant gave an infant two teaspoonfuls of a decoction of one poppy head in a small pot of water. The child was found dead in the morning. The brain and its membranes were much congested, and the ventricles contained bloody serum.—(e) Several *nostrums*, especially the "*black drop*," and BATTLEY'S "*sedative solution*," which are much stronger than the official tincture, have produced fatal effects. Mr. STREETER states that a drachm and a half of the latter was fatal to a lunatic, and 20 minims killed an old woman. "*GODFREY'S Cordial*" and DALBY'S *Carminative*," which contain a small quantity of opium, have caused, in some instances, the death of infants to whom they had been given in large doses.

650. *L. Morphia and its Salts*.—Poisoning with the salts of morphia has occurred in several instances. The *acetate* and the *muriate* of morphia have been the salts usually employed. The symptoms differ but little from those produced by opium, but spasms or convulsions are more frequently observed after morphia than after opium. The acetate of morphia has been estimated at four times the strength of pure Turkey opium; but I believe that pure morphia, and especially either of the salts just named, is five times the strength of opium. It is difficult to determine the quantity which may be injurious. I have seen one third of a grain given for the first dose produce unpleasant or even distressing effects. It singularly happened, that the lady, whose case was alluded to above (§ 645) as having taken with a suicidal intention, during extreme mental excitement, a large quantity of laudanum, and recovered from it without any assistance, and without any suspicion of the act, had prescribed for her by me, many years afterward, one quarter of a grain of the acetate of morphia, and although she had then recovered from so large a quantity of opium, this dose of the morphia produced very distressing effects, with a sense of sinking and symptoms of vital depression, requiring powerful stimulants to remove. Dr. KELSO (*Lancet*, September, 1839) suffered dangerous symptoms from having taken about half a grain of the muriate; and Mr. TAYLOR was informed that an adult was killed by three grains taken medicinally; and he adds, that there is reason to suppose that half a grain of the acetate caused the death of a lady to whom it had been given medicinally when in a state of ill

health. Dr. CHRISTISON mentions a fatal case from the ingestion of ten grains, death taking place in twelve hours, although the stomach had been completely cleared of the poison within half an hour from the time when it was taken. One fifteenth part of a grain applied *endermically*, produced severe cerebral symptoms in a case alluded to by Mr. TAYLOR.

651. The effects of either of the salts of morphia will depend much upon the state of the person at the time who takes it. A large dose, from half a grain to a grain, may be of service, or at least not injurious, even when given for the first time, in states of nervous or vascular excitement, during excessive pain, and in several spasmodic diseases; but either of these quantities may be dangerous, or even fatal, if it be given to a person morally and physically depressed, or to one possessing weak vital resistance, or in a state of marked debility and ill health. These salts should never be given to children under ten or twelve years of age. I speak generally, some exceptions being admitted among children not much below this age. The observations offered above, as to the operation of opium when administered by the rectum (§ 632), equally apply to the salts of morphia.

652. I am acquainted with seven ladies who have either lately been, or are still occasionally, under my care, and who *habitually take excessive quantities of the acetate of morphia*. The acetate is the salt which they all employ; and they all take it in solution, with the addition of acetic acid, and, in some instances, of an aromatic spirit or tincture. The quantities taken at one dose in these cases vary from two to six or seven grains, which are generally taken thrice daily. In three of these cases, the quantity has not been materially increased for eight or nine years; but during that time sundry efforts have been made gradually to diminish the quantity, but they have never been steadily persevered in, a gradual increase, and return to the larger quantity, having soon followed. The effects have not appeared in these cases materially different from those of laudanum.

653. *M. Appearances after Death by Opium or its Preparations*.—In a case of poisoning by opium in a child four years old, death having taken place in eleven hours, I found the following appearances. There was considerable lividity of the back and more depending parts of the body. The vessels and sinuses of the brain were much congested, with a dark fluid blood; and more serum than usual was found at the base of the skull, and in the ventricles. The vessels of the medulla oblongata and spinal cord, and the vertebral sinuses were remarkably engorged. The lungs were congested with fluid blood. The right cavities of the heart also contained blood. There was slight redness of the villous coat of the stomach and duodenum. In a case referred to by Dr. CHRISTISON nearly similar changes were observed in the brain and lungs; but, although the body had been kept only two days in the month of February, the belly emitted a putrid odour when opened. Congestion within the cranium, with more or less serous effusion, and congestion of the lungs, the blood being dark and fluid, have generally been observed. Dr. BRIGHT and Mr. TAYLOR met with a spot of ecchymosis on the surface of the brain in addition to unusual tur-

gescence of the vessels. Dr. CHRISTISON remarks that congestion and serous effusion are by no means universal, for in a case which proved fatal in seven hours, and which he examined, neither of these changes was very apparent. Extravasation of blood within the cranium is a rare effect of opium. In the case of a female, who died eight hours after taking two ounces of laudanum, Dr. JEWEL found several clots of blood in the substance of the brain, and one, which lay in the anterior right lobe, was an inch long. (*Lond. Med. and Phys. Journal*, February, 1816.) Redness of the stomach is by no means general, and no inflammatory changes are observed. Lividity of the external surface of depending parts is commonly observed, and is owing to the fluid and dark state of the blood. But the blood is not always fluid, at least in all parts of the body. It is chiefly, however, in the cavities of the heart where it has been most frequently found coagulated. In four cases referred to by Dr. CHRISTISON there were clots found in both ventricles. This physician has particularly noticed the rapid passage of the body into putrefaction, both in cases which have come under his own observation, and in those recorded by others. Of a body, which had been kept only thirty hours in a cool place in December, the cuticle easily peeled off, and the joints were flaccid, an acid smell being exhaled. In other cases, the early progress of putrefaction has been observed, but not constantly or even generally. The poison may sometimes be found in the stomach, or its smell may be detected; but as frequently neither can be detected, especially when a considerable time has elapsed before death has taken place, owing to the absorption or partial digestion of it, or to its discharge by vomiting or the stomach-pump. In the latter case, the opium may be detected in the matters evacuated from the stomach.

654. *N. Modus Operandi of Opium*.—That the active and odorous principles of opium are absorbed is proved, 1st, by the opiate odour being often perceived in the breath of persons who take opium, and, according to BARBIER, in the perspiration and urine; 2d, by the narcotic influence of the milk on infants when the nurses have taken opium: this I have observed on several occasions; and, 3d, by the assertion of BARREAU, that he has detected morphia in the blood and urine, after the ingestion of large doses of opium; but this requires farther proof. That the effects of opium upon the frame are due chiefly to the absorption of it, is shown by the following circumstances: The effects produced by the injection of opium into the veins are the same in kind, but more intense in degree, as those which follow the administration of it by the mouth; and the constitutional effects produced by the drug are proportionate to the absorbing powers of the surface to which the drug is applied. The effects of opium are, 1st, *primary and local*; 2d, *secondary and remote*.

655. *a. The direct or local action is on the nerves*, as already shown (§ 631). It most probably excites or stimulates the nerves primarily; but this influence is only temporary and of short duration, and is followed by anæsthesia and paralysis—by a privation of energy or power. The *remote* operation is exerted chiefly on the brain, medulla oblongata, and spinal



cord; or, rather, upon that portion of the ganglial system and nerves supplying the nervous centres, and the blood-vessels of these centres and their membranes, through the medium of the blood, either principally or altogether; or partly, also, by the propagation of the direct or local impression or influence produced by the drug. That the remote effects are produced upon, or by means of, that portion of the ganglial system supplying the large nervous centres, and consecutively upon the brain, rather than upon the brain more immediately and independently of this part of the ganglial system, is indicated by the fact of the structure of the brain being itself as insensible of, and, as far as our senses enable us to judge, as little influenced by irritants applied to it, as is the structure of any other secreting organ—of the liver, kidneys, &c., as well as by various other considerations and analogies, and more especially by what is known or presumed of the functions of the ganglial system.

656. *b.* As to the nature of the effect thus produced upon the nervous system, upon the ganglial and the cerebro-spinal, it may be inferred, with tolerable truth, to be primarily *exciting* when the dose is small or moderate, and consecutively *hypnotic*, *narcotic*, and *alterative*; but that, when the drug is taken in excessive quantity, the exciting operation is not recognised, while the consecutive effects are most prominent and intense; the alterative effect, however, being evinced chiefly in cases of chronic poisoning by opium, by opium eaters and opium smokers, and where opium in any form or dose is taken frequently for a long period. The *proximate cause of death* by opium may be referred partly to the extreme congestion of the brain and medulla oblongata caused by it, and partly to the gradual extinction of the influence exerted by the ganglial system upon the cerebro-spinal centre. Most probably the depression or exhaustion of this influence causes the congestion, which, in its turn, aggravates and ultimately extinguishes the influence of this part of the ganglial system; or, the presence of the poison in the blood of the cerebral vessels may so congest them, by depressing the energy of the ganglial nerves supplying them, as to paralyze the brain, and gradually arrest all the functions more immediately depending upon the cerebro-spinal system. According to either of these views, which differ but little from each other, the paralysis of sensation and motion—the extinction of consciousness and volition—is soon followed by paralysis of the respiratory movements; and asphyxia, with its usual results—congestion of the lungs, and a dark and fluid state of the blood—is the manner in which death takes place.

657. *O. Treatment of Poisoning by Opium, or its Preparations.*—The obvious intentions are, 1st, to remove the poison as promptly as possible; and, 2d, to counteract and remove the effects which have been produced, and prevent the accession of others.—*a.* The stomach-pump should be resorted to as speedily as possible, and the stomach completely emptied and washed out by means of it. When the stomach has power to act, emetics may be employed. The best emetics are the sulphate of zinc, mustard mixed in water, or a strong solution of salt; but, in order to excite the paralyzed stomach

more completely, camphor and capsicum may be given with the sulphate of zinc, this last being administered in a dose of half a drachm or two scruples, which may be repeated in a short time if the first dose fails to act. When the stomach-pump is not at hand, a long tube, or a catheter with a bladder attached to it, as advised by Mr. BRYCE, may be substituted. After the stomach has been filled with warm water from the bladder, the tube is to be turned down so as to act upon the contents of the stomach as a siphon. When emetics are inoperative, and the stomach-pump or its substitute cannot be obtained, then it has been recommended to inject tartar emetic in the veins; but more than a grain should not be ventured on, and care must be taken not to allow the introduction of air. This, however, is a hazardous practice and seldom required, when the means already, and those about to be advised, are duly employed.

658. *(b)* The removal of the lethargy already produced by opium is best accomplished by affusion of cold water on the head and neck, as first recommended, and its effects illustrated, by Mr. WRAY and the author. (*Sec Lond. Med. Rep.*, xviii., 26.) Children may be placed in a warm bath, to which mustard is added, and the cold affusion on the head momentarily adopted. In all cases, the cold affusion should not be continued too long at a time, but employed at intervals, or with the return of the lethargy. It will often be found that, when emetics have been given without effect, owing to the paralyzed state of the stomach produced by the narcotic, the cold affusion will have the effect of rendering them sufficiently operative, especially if the fauces are tickled with a feather at the same time, or soon after the affusion has been employed. Other means of rousing the patient should not be overlooked, and may be resorted to in the intervals between the affusion. Flagellation on the palms of the hands, on the feet, or back; making the patient to walk between two assistants; stinging with nettles, pinching, &c., have severally been found of more or less service. Various internal excitants may be exhibited, as asafetida, ammonia, musk, capsicum, camphor, and may even be administered in enemata; and various exciting odours or vapours, as those of ammonia, aromatic vinegar, may be held at intervals near the nostrils. If these means fail, electricity, galvanism, or electro-galvanism may be adopted. [We have found galvanic magnetism the most important agent in the treatment of narcotic poisoning.] As death is evidently proximately caused by asphyxia (§ 656), artificial respiration should be resorted to in extreme cases, especially if the case is too far advanced to be benefited by cold affusion, or when this latter fails, which, however, will rarely occur, if judiciously employed. Frictions over the chest, with stimulating embrocations, with camphor, ammonia, capsicum, &c., will be found to aid the influence of artificial inflation of the lungs. Instances have been published by Dr. WARE, of Boston, United States, and Mr. WHATELEY, of the good effects of artificial respiration in almost hopeless cases of poisoning by this drug.

659. *c.* The subject of *antidotes against the effects of opium* has been examined by ORFILA, and he has found all those which have been

proposed at various times quite unsuccessful as long as the poison still remains in the stomach, the only exception being the decoction of galls. When the poison has been as completely removed as possible, camphor, green tea, and strong coffee have been found of service in keeping the patient awake, or in reviving him, and are suitable aids to the cold affusion, or even to the tepid affusion, when the coma is not profound.

660. *d.* As to the propriety of prescribing *local* or *general blood-letting* in cases of poisoning by opium and other narcotics, it may be remarked that cases will occasionally present themselves in which, at some period of their progress, either the one or the other may be practiced with advantage. When the patient is plethoric, young, and strong; when there is stertorous breathing, with other symptoms of congestive apoplexy; and when the countenance is bloated, the eyes injected or suffused, then general or local blood-letting, especially the latter, and preferably by cupping on the nape or on the mastoid processes, to a considerable amount, will generally be most beneficial. But before vascular depletions are prescribed, the evacuation of the poison should be attempted or procured. In a case detailed by Dr. YOUNG (*London Med. Gaz.*, vol. xiv., p. 655), of the United States, about thirty ounces of blood were taken from the arm at three bleedings; cold was applied to the head and sinapisms to the legs, and the patient recovered, although an ounce of laudanum, in a teacupful of whiskey, had been taken and remained upon the stomach. In cases which admit of doubt as to the propriety of blood-letting, advantage will be derived from *dry cupping* on the nape. I have prescribed it in one case of poisoning by opium with success. During the coma produced by this drug, or by other narcotics, the loss of a small quantity of blood often produces serious depression. Therefore depletions of every kind should be cautiously employed, and not be attempted unless the breathing is stertorous, puffing, slow, and regular, and the pulse still possesses some degree of power. The effect of either bleeding or dry cupping will be greatly aided, and the necessity of having recourse to either frequently superseded by a due recourse to the *cold affusion*, which generally prevents the distressing headaches, and other cerebral and nervous symptoms, usually experienced for some days after recovery, when it has not been employed.

661. ix. SULPHURETED HYDROGEN GAS.—NYSTEN found that a few cubic inches of this gas caused almost immediate death with convulsions when injected into the veins, although at once absorbed by the blood; and that the same quantity was almost as rapidly fatal when injected into the cavity of the chest. Similar results were obtained when it was injected into the cellular tissue, or even when left for some time in contact with the sound skin. According to THENARD and DUPUYTREN, air impregnated with the 1500th part of this gas kills birds in a short time, and with the 800th part soon kills a dog. CHAUSSIER found that in a moderate quantity it was quickly fatal, whether it was inhaled or injected into the cellular tissue, stomach, or rectum, or simply applied to the skin. Nine quarts of the gas thrown into the

rectum of a horse killed it in one minute; and a rabbit whose skin was exposed to it died in ten minutes. (CHRISTISON and SEDILLON'S *Journ.*, xv., 28.) Dr. CHRISTISON and Dr. TURNER found that it appeared to cause in plants a state analogous to narcotic poisoning in animals.

662. *A.* The *symptoms*, in cases where the vapours, consisting of an admixture of those of ammonia with this gas, such as they exist in the pits of the Parisian necessaries, as described by HALLÉ and others, are those of extreme vital depression and of asphyxia, and often terminate fatally in a very short time. If the person be but slightly affected, he complains of nausea and sickness; his skin is cold, his respiration is regular, the pulse is frequent, and the muscles, especially those of the chest, are affected with spasmodic twitchings. If he be more severely affected, he becomes soon deprived of sense and motion; the surface is cold, the lips and face assume a violet tint, the lips are covered with a sanguineous mucus; the respiration is hurried, laborious, and convulsive; the pulse is small, weak, irregular, and hurried; and the muscles and limbs are relaxed. If still more intensely attacked, death either takes place immediately, or, in addition to these symptoms, there are violent twitchings of the muscles or violent spasms. When the person is sensible after exposure to these vapours, he often complains of severe pains, and the pulse is very frequent and irregular. If the symptoms are very severe, recovery rarely takes place.

663. Instances of poisoning by sulphureted hydrogen unmixed with other vapours or gases, are not of frequent occurrence. Mr. TAYLOR states that the men excavating the Thames tunnel suffered severely from the presence of sulphureted hydrogen, which he found both in the air and in the water. The gas issued in sudden bursts, so as to be at times perceptible by the odour. By respiring this atmosphere, the strongest men were in the course of a few months reduced to a state of extreme exhaustion, and several died. The *symptoms* with which they were first affected were giddiness, sickness, and general debility. They became emaciated, and fell into a state of low fever, accompanied with delirium. (*Op. cit.*, p. 623.)

664. In the more *acute states* of poisoning with this gas, the symptoms vary with the concentration of the poison. When breathed in a moderately diluted state, a sense of weight or oppression is felt at the epigastrium and in the temples, with giddiness, nausea, sudden weakness, and sinking, soon followed by a loss of sensation and motion. If removal to a pure air be effected immediately upon the occurrence of these symptoms, and if stimulants, the cold affusion, a moderate depletion, and other suitable means be employed, life may be restored. If, however, the patient remain but a short time unassisted, and especially if the gas be breathed after insensibility has taken place, recovery is almost hopeless. When the air contains less of this gas, and the respiration of it continues for some time, vital depression, pains through the frame, convulsions or spasms, delirium, coldness of the surface, laborious respiration, a weak and irregular pulse, followed by coma and tetanic spasms or convulsions, are the prominent symptoms. "When the air is only slightly



contaminated with this gas, it may be breathed for a long time without producing any serious symptoms." Sometimes there is nausea or sickness, with pains in the head or in the abdomen: these are often complained of by persons engaged in chemical manipulations with this gas. Sulphureted hydrogen is readily absorbed into the blood, to which it gives a brownish-black colour.

665. The admixture of this gas with other gases and vapours render them remarkably deleterious. Probably a small portion of it exists in the noxious emanations disengaged from cess-pools, privies, drains, &c. The presence of it in all such emanations is well shown by exposing to them a piece of filtering paper moistened with a solution of lead. Dr. CHRISTISON remarks, that the smell alone should not be relied upon, as putrescent animal matter exhales an odour like that of sulphureted hydrogen, though none be present. This gas may be so abundant as to prove quickly fatal where lights burn with unimpaired brilliancy; and in places where it is apt to accumulate, the contamination by it may vary so much as to render the air either unrespirable in a few minutes after it has been respired without risk, or respirable soon after fatal effects by it.

666. *B. The Appearances after Death.*—A highly offensive odour is exhaled from all the cavities of the body, and, if inhaled into the lungs of the persons making the inspection, unpleasant symptoms, chiefly syncope, or even asphyxia, are occasioned by it. The mucous membrane of the nose and fauces is covered by a brownish viscid mucus. The muscles are of a dark colour, have lost their contractility, and are insusceptible of the galvanic stimulus. The lungs, brain, and liver are congested with black fluid blood. The right cavities of the heart are also congested with fluid black blood. The body rapidly undergoes putrefaction. When polished silver, or white-lead, is introduced into the cavities or under the skin, it soon becomes blackened. The treatment of poisoning by sulphureted hydrogen, or by admixtures of it with other gases or vapours, is the same as that recommended for the effects of carbonic acid gas and its admixtures. (See § 609, *et seq.*)

667. CLASS VIII. NARCOTIC AND IRRITANT POISONS—NARCOTICO-ACRID POISONS—ACRO-NARCOTICS.—The designations of this class of poisons indicate their operation. Certain of these substances are injurious in consequence of their irritating rather than of their narcotic action; while others produce a more prominent narcotic than irritant effect. Some, and probably most of them, conjoin with these modes of action more or less of a vitally depressing or exhausting operation. Owing to the effects of these poisons being thus complex, and more especially to either of their effects being more prominent than the others, these poisons have been variously classed, but chiefly as narcotics, or as irritants, or as acro-narcotics; and in this last category I now consider them. I shall, however, notice only those which are most likely to prove poisonous owing to their possession of these properties in a marked degree.

668. i. EMPYREUMATIC OILS.—The empyreumatic oil of tobacco, and of various other *poisonous plants*, are active poisons. Several other empyreumatic oils are used in medicine which

act powerfully as stimulants and antispasmodics, and which are more or less injurious when administered in excessive doses. The chief of these are, oil of amber, oil of wax, beech-oil, DIPPEL's animal oil, the oil procured by the destructive distillation of lard, &c. Dr. CHRISTISON states that this last oil, when freed of adhering acid by rectification from quick-lime, is limpid and very volatile, has an insupportable smell, and diffused in the air it irritates the eyes and nostrils, and occasions giddiness. BUCHNER found it to possess narcotic properties when its vapour was inhaled; but it is less powerful when taken into the stomach, although it then causes symptoms of irritation and insensibility. An instance of poisoning by the oil of DIPPEL, or the rectified empyreumatic oil of hartshorn, is mentioned by CHAUSSIER, who states that the person took a spoonful by mistake, and died almost immediately. No morbid appearances could be detected in the dead body.

669. ii. FOOL'S PARSLEY—*Æthusa cynapium*—has occasioned serious accidents owing to its resemblance to parsley. Professor FICINUS discovered in it an alkaloid soluble in water and alcohol, but not in ether. Mr. STEVENSON (*Lond. Med. and Phys. Journ.*, xiv., 425) has recorded the cases of two ladies who ate of this parsley in a salad, and were soon afterward seized with nausea, vomiting, headache, giddiness, somnolency, pungent heat in the mouth, throat, and stomach, difficulty in swallowing, numbness in the limbs, tremours, and frequent startings. Dr. CHRISTISON mentions the case of a child, recorded by GMELIN, that died in eight hours after having eaten the *æthusa*. The symptoms were spasmodic pain in the stomach, swelling of the belly, lividity of the surface, and difficult breathing. In two children who recovered, complete insensibility, dilated insensible pupils, staring of the eyes, and in one vomiting, in the other convulsions, were the prominent symptoms. The treatment consisted in the administration of milk, sinapisms to the legs, and cold sponging with vinegar.

670. iii. FUNGI, POISONOUS.—POISONOUS MUSHROOMS.—Poisonous mushrooms and the effects produced by them have been fully discussed by FODÉRE, ORFILA, DE CANDOLLE, ROQUES, GREVILLE, CHRISTISON, and others, to whose works I must refer for many interesting details, and for the characters which distinguish the several poisonous species from the edible.—A. The poisonous species enumerated by ORFILA are the *Amanita muscaria*, *alba*, *citrina*, and *viridis*; the *Hypophyllum maculatum*, *albobitrium*, *tricuspidatum*, *sanguineum*, *cruza-melitense*, *pubibundum*, and *pellitum*; the *Agaricus necator*, *acris*, *piperatus*, *pyrogalus*, *stypiteus*, *annularis*, and *urens*; and to these may be added *Agaricus semiglobatus* and *campanulatus*. It is probable that other species are also injurious, or may become injurious owing to season and other causes about to be noticed.

671. Numerous circumstances influence the properties not only of those which are ascertained to be injurious, but also of those which are esculent. Climate, season, soil, and manure, age, or period of the year when they are gathered, cooking and drying, severally change the properties of both the poisonous and esculent species; and in certain constitutions and idiosyncrasies even the latter class disagree

and are more or less injurious, causing diarrhœa, nausea or vomiting, colic, somnolency, &c. It is even believed that the best mushroom, when taken in too large a quantity, or too frequently, or for too long a time, are deleterious. The writers mentioned above (§ 670) have given general directions for distinguishing the wholesome from the poisonous species; but these cannot be relied on, for the former may become injurious owing to the circumstances just stated, and to others not fully recognised or explained, if their appearances be not duly observed. Much of the unpleasant effects produced by them has been owing to the carelessness of the collectors who have gathered some of the poisonous species, as well as of the esculent species, when they have become old or sickly, and mixed them with those which are wholesome. This is not infrequently the case when mushrooms are gathered from the fields for the manufacture of catsup. The surest tests of deleterious fungi are, an astringent, styptic, hot, or pungent taste, and a disagreeable pungent odour, an orange or rose-red colour, or a blue tint soon after being cut; and the circumstances of their growing in tufts or clusters from the stumps or trunks of trees. The poisonous properties of fungi have been supposed to reside in a certain principle which has been called *fungin*, but its nature and physical properties are imperfectly known.

672. *B.* The symptoms produced by poisonous fungi vary from those of extreme irritation of the gastro-intestinal mucous surface to those of fully-developed narcotism; but generally they are an association of both classes, either predominating in different cases. A man ate by mistake several of the *Agaricus campanulatus*, but, before ending his repast, and not above ten minutes after he began it, he was attacked with dimness of vision, debility, giddiness, trembling, and loss of recollection. On obtaining assistance his countenance expressed anxiety; he reeled about, and could hardly articulate; his pulse was slow and feeble. He soon became so drowsy that he could hardly be kept awake. Vomiting was produced by sulphate of zinc, and he gradually recovered. (*Lond. Med. and Phys. Journ.*, xxxvi., 451.)

673. Several soldiers ate a quantity of the *Amanita muscaria*. In the evening, some hours afterward, they began to complain of anxiety, a sense of suffocation, frequent fainting, burning thirst, and severe gripes. The pulse became small and irregular, the body bedewed by a cold sweat, the features changed, and the nose and lips of a violet tint. To these supervened tremblings, tumefaction of the abdomen, and a profuse fetid diarrhœa. The extremities became cold and livid, the pain of the abdomen intense, delirium and coma took place, and death followed. In the former case, the symptoms were those of narcotic poisoning; in the latter, those of irritation and vital depression. In other instances the symptoms are those of gastro-intestinal irritation, conjoined with narcotism, or with narcotism and extreme vital depression.

674. Six persons ate carp stewed by mistake with the *Amanita citrina*. Three of these had vomiting, followed by deep sopor, but recovered. One had violent cholera, but recovered also. Two (children) became profoundly le-

thargic and comatose; emetics had no effect, and death soon ensued. Six persons ate a quantity of the *Hypophyllum sanguineum*, and from twelve to thirty hours after the poisonous meal they experienced pain in the stomach, a sense of impending suffocation, and violent efforts to vomit. To these were added sopor, and several hours afterward tetanic spasms and convulsions; other severe symptoms, varying in character with the quantity which had been taken, also supervening in the progress of the cases. In one, profound lethargy and general coldness of the surface; in another, vomiting, bloody stools, and yellowness of the skin; in a third, delirium, tremblings, coma, and convulsions; in a fourth, loss of speech and severe dysentery; and in a fifth, colic and inflammation of the bowels, without diarrhœa. Those who recovered remained long in a state of delicate health.

675. Dr. CHRISTISON ascribes the tardiness of the approach of the symptoms in some cases to the indigestibility of most of the fungi, which in some instances is so great, that portions of them have been discharged by vomiting as late as fifty-two hours after they were swallowed. But this slowness of operation is not generally observed, for the effects sometimes appear in a few minutes. The most immediate effect produced by poisonous fungi is paralysis of the vital actions of the stomach, the symptoms afterward appearing with a rapidity in proportion to the development of the morbid action. An important characteristic of poisoning by mushrooms, as this physician has remarked, is the great durability of the symptoms. Even the narcotic effects of some fungi have lasted above two days; and ORFILA has adduced instances in which the gastro-intestinal irritation has continued from a fortnight to three weeks after the more acute symptoms had subsided.

676. When wholesome mushrooms disagree, owing to idiosyncrasy, the symptoms are chiefly those of severe indigestion, following upon, and often continuing a considerable time after, an attack of vomiting and purging. "There is some reason for suspecting that even the best mushrooms, when taken as a principal article of food for a long time, will prove injurious," and induce a peculiar depraved habit of body, leading to external suppuration and gangrene. Dr. CHRISTISON adduces from Rust's *Magazine* an instance of a family who were seized with an intermittent fever, and an eruption on various parts of the body, of abscesses which discharged a thin, ill-conditioned pus, passed rapidly into spreading gangrene, and proved fatal to two persons. No other cause could be assigned for the concurrence of these symptoms in six persons in one family, than the circumstance of their having lived for two months almost entirely on mushrooms, the only person who escaped having merely slept in the house, but had his food where he worked.

677. Dr. CHRISTISON has directed attention to a fact, of which medical men should be aware, that poisoning may be, and actually has been, perpetrated by the intentional admixture of vegetable or mineral poisons with wholesome mushrooms; and that when the murderer is dexterous in the choice and mode of administering the poison, such cases may readily escape suspicion, and, even when suspected, might not



cleared up without difficulty. But in these cases the only decided proof of poisoning by some other substance mixed with mushrooms, or with preparations of them, is the actual discovery of another poison.

678. *C. The Appearances in fatal Cases.*—The surface of the body is generally stated to be livid, and the blood to be fluid; and exudations of blood are observed from the natural openings. The digestive canal is distended by fetid air, and in some cases presents inflammatory appearances, passing in places to gangrene. The stomach, unless there has been vomiting or diarrhœa, often contains fragments of the poison; and these fragments may be found as late as the second or third day, either in the stomach or in the intestines. The liver is often congested. The lungs are generally gorged. The vessels of the brain and its membranes are commonly turgid. In a case referred to by Dr. CHRISTISON, the arteries, as well as the sinuses, were distended with blood; the pia mater and arachnoid were of a scarlet colour, and the substance of the brain was red. The choroid plexuses were excessively gorged; and a clot of blood as large as a bean was found in the cerebellum.

679. *D. Treatment.*—Dr. CLENDINNING, in a learned and interesting lecture on poisonous fungi (*Lond. Med. and Surg. Journ.*, vol. vi., p. 168), remarks, that the remedies recommended by NICANDER consist chiefly of emetics and wine. Horseradish and mustard are among his vegetable means. White vitriol is also advised by him; and for drink or vehicles for solid medicines, oxyerate and wine. The first object is to effect the expulsion of the poison; and as there are no poisonous substances of equal power that take so long a time in developing their action as fungi, so there is none against which emetics may be administered with equal prospects of advantage at advanced stages, or after so long a period from the ingestion of the poison. There is no antidote to the poison of fungi known, and hence the expulsion of them should be the chief intention. After this end is attained, the inflammatory irritation, and the narcotic and other nervous symptoms should be allayed by means appropriate to the prominent features of the affection; by the means required for gastro-intestinal irritation and inflammation, when these predominate; and by the measures recommended for narcotic poisoning when this is the prominent character, more especially by cold affusions, external derivatives, and other means suggested when treating of opium poisoning (§ 658, *et seq.*).

680. *iv. HEMLOCK-DROPWORT—Eranthe Crocata.*—ORFILA states that this plant may be mistaken for hemlock, and that a single medicinal dose of the extract taken instead of the extract of hemlock might prove fatal. The symptoms are heat in the throat and stomach, delirium, stupor, and convulsions. Dr. PICKELLS has collected thirty cases of death from eating the root. The symptoms were insensibility, delirium, and tetanic convulsions. Mr. HOWELL has mentioned eleven cases, of which two were fatal. The symptoms were chiefly convulsive, both in these and in eight others detailed by Mr. RAY. In a case described by Mr. HOUTSTON, they were at first giddiness, rapidly followed by coma and violent convulsions. In

none of the fatal cases was life prolonged beyond four hours; and in several death took place within an hour. The *post-mortem* appearances are generally slight, consisting of inflammatory redness of the internal surface of the digestive canal and congestion of the brain. Portions of the roots are sometimes found in the stomach, as in the cases of four persons who were lately killed by this poison, out of fourteen who had eaten it by mistake. (See *Lond. Med. Gaz.*, May, 1844.) The treatment is the same as in cases of poisoning by fungi (§ 679).

681. *v. GRAIN, OF VARIOUS KINDS*, is sometimes poisonous, owing to disease.—*a. Spurred rye—Secale cornutum, or ergot*—is most commonly a cause of slow poisoning, in the form of a disease which is described, according to the form it assumes, under the articles GANGRENE and SPASM. (See, also, ERGOTISM.)—*Unripe grain, spoiled grain, mouldy bread or biscuits, or grain or bread of any kind*, which has become injured from keeping too long, or otherwise, will produce disease of a chronic or slowly developed form—a true state of slow poisoning—when made a principal article of diet, or when partaken of for too long a period; and if the grain, either before or after its preparation as food, be much injured, severe symptoms may appear from having taken it at a single meal.

682. *b. The symptoms* usually produced by spoiled grain or bread are generally those of gastro-intestinal irritation, and but slightly or contingently those of narcotism; and, according to the nature and state of these articles, the symptoms may assume the form of *acute or chronic diarrhœa, or dysentery, or of scurey, or scorbutic dysentery*, under which diseases the subject is fully entertained. Grain, however, may be injurious from other causes: from the presence of the ova of insects, or of a variety of minute insects; and from the admixture of some vegetable poison, as the *darnel-grass*, or some *poisonous leguminous seeds*.

683. *vi. LABURNUM—Cytisus Laburnum.*—The bark and seeds of the common laburnum contain an active poison called *cytisin*. Dr. TRAILL met with two cases of poisoning by the seeds; and Dr. CHRISTISON has reported an instance of chronic poisoning caused by the bark, the symptoms being chiefly those of gastro-intestinal irritation, of which the patient did not recover for some months. The symptoms in Dr. TRAILL's cases were coldness of the whole surface, lividity of the face, and complete insensibility. MM. CHEVALLIER and LASSAIGNE, who discovered the active principle, *cytisin*, in the seeds, gave eight grains in four doses to a man, which occasioned giddiness, violent spasms, frequency of the pulse, and consequent exhaustion. (CHRISTISON.)

684. *vii. LEGUMINOUS SEEDS*, especially the *Lathyrus cicera* and the *Erum criliu*, or bitter vetch, have been found in France productive of chronic poisoning, chiefly in consequence of the accidental adulteration of flour with them. The symptoms have been usually weakness of the limbs, partial or complete palsy, or stiffness of the joints, and weakness and tremours of the lower extremities. They more properly belong to the class of *depressing and paralyzing poisons* (§ 261).

685. viii. *LOLIUM TEMULENTUM*, or *darnel-grass*.—The seeds of this plant are irritant and acrid, and powerfully narcotic. They have proved deleterious, and even fatal, owing to accidental adulteration of flour or grain with them. Dr. CHRISTISON states, that when mixed in bread, darnel-grass has caused headache, giddiness, somnolency, delirium, convulsions, paralysis, and even death. M. CORDIER found, by experiment on himself, that very soon after eating bread containing the flour of darnel-grass, he felt confusion of sight and ideas, languor, heaviness, and alternate attacks of somnolency and vomiting. The bread was commonly vomited soon after he ate it. SEEGER has related cases in which the somnolency was more deep, and general tremours also present. Many years ago, the inhabitants of the poor's house at Sheffield were attacked with symptoms of poisoning by porridge, which was supposed to have been made of meal accidentally adulterated by the darnel. The chief symptoms were a piercing stare, quivering of the lips, frontal headache, dilated pupil, and confusion of sight, small tremulous pulse, violent agitation of the limbs, twitches of the muscles, and palpitation. In twelve hours all those attacked were well but two, who had strong convulsions in the subsequent night; they also eventually recovered. (*Lond. Med. and Phys. Journ.*, xxviii., 182.) In some instances loss of speech and somnolency are the most prominent symptoms; while in others gastro-intestinal irritation predominates, occasioning vomiting and purging.

686. ix. *YEW-TREE*—*Taxus Baccata*.—The berries and leaves of the yew-tree are extremely poisonous, and sometimes act without either vomiting or purging. Dr. PERCIVAL states, that a table-spoonful of the *fresh leaves* was administered to three children, of five, four, and three years of age, as a vermifuge. Yawning and listlessness followed. The eldest complained of pain in the abdomen, and vomited a little; but the other two suffered no pain. They all died within a few hours of each other. Mr. TAYLOR adduces a case by Mr. HURT of poisoning by the berries of this tree. A child, aged three and a half years, ate some yew-berries, and about an hour afterward appeared ill, but did not complain of pain. It vomited part of its dinner, mixed with some of the berries. A medical man was sent for; but the child died of convulsions before he arrived. On inspection, the stomach was found to contain mucus and half-digested pulp of the berries and seeds. The mucous membrane of the organ was reddened and softened. Other instances of death by this poison are recorded, but they furnish no additional information. I believe that this poison acts as an *acro-sedative*, rather than as an *acro-narcotic*; but its effects have been very imperfectly observed.\*

687. CLASS IX. SEPTIC POISONS.—This class of poisons has been doubted, or, rather, the op-

eration of certain poisons in rapidly dissolving the vital cohesion of the tissues, to and near which they may be applied, has been disputed; and, certainly, if any one were inclined to surrender the reports of more than one of his senses to the inferences of hypothesis, to such a one may doubts of the existence of this particular action appear reasonable. It is true that the poisonous agents which are thus capable of loosening, with more or less rapidity, the cohesion of living tissues, and of disposing them to enter into different physical conditions, are few; although many possess this power indirectly, or by giving rise to a succession of morbid actions, of which a septic condition, or a state of loosened or almost entirely dissolved vital and physical cohesion, is the most advanced. These latter, however, fall not under the present category; although the rapidity with which this ultimate result is produced, as respects some of them, might countenance such an arrangement. I may, nevertheless, allude to some of these incidentally. Dr. CHRISTISON observes, when noticing this topic, that "if we were to trust the impressions the vulgar entertain of the effects of the bites of serpents, the poisons now mentioned would be considered true *septics* or putrefiants, for they were once universally believed, and are still thought by many to cause putrefaction of the living body. This property has been assigned them, probably on no other grounds than that they are apt to bring on diffuse subcutaneous inflammation, which frequently runs on to gangrene." (*Op. cit.*, p. 575.) I confess myself possessed of the vulgar belief that the local effects of the bites of serpents are not inflammatory, however this much used and abused appellation may be qualified by certain adjuncts as diffusive or diffuse, gangrenous, destructive, sloughing, phlogistic, sthenic, asthenic, dynamic, adynamic, and twenty others, employed to convey certain ideas of morbid conditions, as they may suit a theory or subserve an hypothesis. But any one who has witnessed the bite of a poisonous snake, who has seen the swelling, infiltration of the tissues, the coldness, the arrest of capillary circulation, the softening and almost dissolution of the textures, and the subsequent rapid decomposition of the part and of those in its vicinity—all which takes place in a few minutes, and is consummated in an hour or two in some instances—may not consider the word *septic* as altogether misapplied, at least until a better one is supplied, or unless we submit to a periphrasis. But the more local alterations are not the only phenomena, for the remote effects, the extreme depression of organic nervous influence, and of the vital manifestations generally, are equally rapid and remarkable.

688. The poisons which most undoubtedly belong to this class are chiefly the secretions of snakes and other reptiles, although there is reason to believe that several other secretions or morbid matters will produce analogous changes in the healthy body when inoculated with them; that the secretions from smallpox, from plague, from gangrenous sores, from glands and farcy, from erysipelatous parts, and from sloughing, gangrenous or putrid animal substances, will so contaminate the parts into which they are inserted or inoculated, as to produce either a constitutional disorder specifically the

[\* According to Liebig, no agent which does not contain nitrogen possesses a poisonous action in a small dose, and the medicinal or poisonous action of the nitrogenized vegetable principles has a fixed relation to their composition. It is evident, however, that the poisonous action is not owing to the nitrogen they contain, for *solanine* and *pirotozine*, which contain least nitrogen, are powerful poisons. *Quinine* contains more nitrogen than *morphia* and *caffeine*; and *theo-bromine*, the most highly nitrogenized of all vegetable principles, are not poisonous.]



same as that of which it is the product, or a state of local disorganization rapidly passing into vital destruction, accompanied by dangerous, and often fatal, constitutional disturbance. The inoculation of smallpox in the Negro constitution produces, in many instances, on some occasions—in the majority of cases in certain circumstances, as I have myself witnessed, a putrid or septic condition, the confluent eruption consisting of a black sanies contained in the softened dermis, which, with the circulating fluids and soft solids, rapidly deliquesce, as it were, into dissolution, before even respiration had ceased, and without any indication of antecedent excitement or unusual reaction.

689. I have seen the foul secretion from the throat of a patient about to die of scarlet fever produce sloughing of that portion of the integuments of another person with which it had remained for some time in contact, although the cuticle was stated to have been unabraded before the morbid secretion came in contact with it. The experiments of the French pathologists already referred to sufficiently prove the septic and disorganizing effects of putrid animal and vegetable matters when introduced into the healthy textures. It is supposed that, when a morbid secretion, or putrid animal secretion, occasions more or less of vascular injection of the part with which it comes in contact, or pain in connection with vascular injection or tumefaction, before disorganization ensues, this ultimate result is then the consequence merely of the morbid action more immediately preceding it, and that this action, more properly want of action, is inflammatory. But the truth is, that the septic agent, applied to the living part, deprived of its natural protection, or otherwise exposed, depresses the vital or the organic nervous endowment of that part, diminishes the tone of its capillaries, and weakens the vital cohesions of its tissues. As these changes proceed, the vessels are congested, the circulation through them is impeded, and ultimately ceases, and the part dies; although, in many instances, where the contaminating or poisonous agent is not sufficiently active thus to overpower or to annihilate the vitality of the part, and of the whole body, various attempts are made, by means of the vital resistance of the body, to oppose these changes, and to develop vascular reaction, whereby they may be the more successfully resisted. According to the intensity of the cause, relatively to the state of vital power and resistance, either of the part or of the body generally, or of both, will the effects, both local and general, thus vary; the more virulent or intensely contaminating or septic agents, destroying not only the part, but also the whole frame, and even hastening the physical dissolution of the body, without either vital resistance or vascular reaction being manifested, the less intense agents admitting of the development of both, in more or less efficient forms. In this latter case the septic tendency may be hardly apparent; and during the procession of morbid changes which the septic agent produces, congestion of, serous effusion into, and destruction of, the cellular tissue, and spreading inflammation and disorganization of the adjoining tissues are the most prominent organic lesions. My limits will not permit me to pursue the consideration of this

subject, which, however, is discussed at length under other heads, especially under CELLULAR TISSUE (§ 9, *et seq.*), DISEASE (§ 87, *et seq.*), ERYSIPELAS (§ 26, *et seq.*), INFECTION (§ 11, *et seq.*), and INFLAMMATION (§ 54, *et seq.*), while various specific maladies furnish illustrations, not only of the subject, but also of the principles for which I have contended, more particularly the HÆMAGASTRIC, AND THE SEPTIC OR GLANDULAR PESTILENCES, SCARLET FEVER, AND SMALLPOX. I therefore conclude with a brief notice of the effects produced by the poison of serpents, &c.

[In this connexion the reader will call to mind the remarks of LIEBIG relative to the modus operandi of poisons, which he illustrates by the fact that a body in the act of decomposition or change, added to a mixed fluid in which its constituents are contained, can reproduce itself in that fluid exactly in the same manner as new yeast is produced when yeast is added to liquids containing gluten. Thus, when blood, pus, gall, or cerebral substance is laid upon fresh wounds, vomiting, debility, and even death may be occasioned, as in dissection wounds, and poisoning by bad sausages, &c., the poisonous properties of which are destroyed by alcohol and boiling water.

There is certainly great plausibility in the doctrine that these substances communicate their own state of putrefaction to the same blood from which they were produced, exactly in the same way as gluten, in a state of decay or putrefaction, causes a similar transformation in a solution of sugar. So, also, poisons are generated by the body itself in particular diseases, as smallpox, plague, and syphilis, which have the property of reproducing themselves in like manner, or as seeds reproduce seeds. The peculiar power thus of animal poisons, at least, is probably owing to an active condition, recognizable by our senses, only through the phenomena which it produces.]

690. i. POISONOUS SERPENTS.—Many of this class of reptiles are more or less poisonous. The *viper*, or *Coluber berus*—*Vipera berus*—is the most common poisonous serpent in Europe; the *Cobra de Capello*, or *Coluber naja*, in the East Indies, and the several species of the *rattle-snake*, or *crotalus*, in America. But our information as to the genera and species of serpents or snakes which are actually poisonous is limited, notwithstanding what has been adduced by FONTANA, REDI, ATWELL, HORNER, ORFILA, and others. The bite of the *viper*, which is the only poisonous snake in Britain, seldom occasions death, although in other countries of Europe its poison is often much more virulent than in this; but the season of the year varies the intensity of the poison, which is greatest in summer and autumn.

691. A. The symptoms are acute or lancinating pain in the part wounded, commencing either instantly, or not for several minutes after the infliction of the injury, according to the intensity of the poison. The pain extends rapidly towards the trunk or centre of the body; and swelling, with redness or discoloration, passing to a livid hue, supervenes. These local changes are followed by faintness, or full syncope, bilious or convulsive vomitings, difficulty of breathing, copious cold sweats, dimness of vision; a small, quick, weak, and irregular pulse; yellowness of the skin; disturb-

ance of the mental faculties, and, in the most dangerous or fatal cases, the rapid progress of these symptoms and gangrene of the wounded part. Death may ensue, either rapidly or slowly; or recovery may take place, according to the virulence or activity of the poison relatively to the powers of the individual, or the aid and treatment he has received. Dr. WAGNER mentions two cases where the injury was on the toes, and death took place before assistance could be procured. In a case referred to by Dr. CHRISTISON, a burning pain was felt in the bitten foot, followed by intense pain in the belly, vomiting, incessant thirst, and death in three hours. Dr. BRAUN (*Rust's Magazine*, b. xxxii., p. 361) states, that a man who professed to be a snake-charmer, put the head of the *Coluber chersa* into his mouth, but suddenly threw the reptile from him, finding that he had been bitten near the root of the tongue. In a few minutes he became so faint that he could not stand. The tongue swelled a little, the eyes became dim, some saliva issued from his mouth, rattling respiration succeeded, and he died within fifty minutes after he was bitten. On the other hand, death may not take place until one, two, or even three days after the inoculation of the poison. The poison of the common viper is said not to be so dangerous in France as that of the *red viper*, which may cause death in a very few hours.

692. The activity of the poison of the viper, and indeed of all serpents, depends upon a variety of circumstances. When long confined, or after the animal has bitten frequently in rapid succession, and during cold seasons, when it loses its activity, the poison also loses its virulence more or less, owing either to a scantier, or a weaker, or an exhausted secretion. Serpents are most poisonous in warm, humid, and malarious climates, and are there most numerous. In those parts of Africa, which were chiefly of this description, that I visited, accidents from them were very frequent; but, owing to my residence at any place being short, I did not succeed in obtaining any of the poisonous species. The most dangerous bites are inflicted on naked or imperfectly-covered parts, particularly the extremities; and the more severe and virulent, the more rapidly are the symptoms developed. The poisonous properties of the fluid contained in the reservoir do not cease with the animal's life, but may continue, like some other poisonous fluids, as that of smallpox, &c., even when the fluid is dried and kept for some time. Professor MANGILI has demonstrated that it may be swallowed without injury. The *Fetish-men*, or native doctors in Africa, have in my presence, when sucking the wounds made by a poisonous serpent, swallowed the fluids thus drawn from the wound to show their powers and invulnerability.

693. The *Crotalus horridus*, or rattlesnake, produces effects which vary with the circumstances noticed above. Sir E. HOME states, that when the poison of this reptile is active, its local operation is so sudden and violent, and its effects upon the frame so great, that death soon takes place; and that, on examination after death, the only alteration of structure is in the parts close to the bite, where the cellular membrane is completely destroyed, "and the neighbouring muscles are very considerably

inflamed." But I can add, that the appearances of the muscles which are assumed as inflammatory are not actually such, but those of congestion and softening from loss of the vital and physical cohesion of the tissues.

694. When the poison is less virulent, the shock to the frame is rarely fatal. The pain in the part bitten is very severe, and in about half an hour swelling takes place from the effusion of serum into the cellular tissue, and continues to increase more or less rapidly for about ten or twelve hours, extending during that period to a greater distance from the wound. The blood afterward ceases to circulate in the smaller vessels of the swollen parts; the skin over them becomes quite cold; the action of the heart is so weak that the pulse is scarcely perceptible; a slight delirium is present, and the stomach is so irritable that nothing is retained on it. If the patient does not sink, these symptoms disappear in about sixty hours, and inflammation and suppuration take place in the injured parts, and when these are great the result is often fatal. The symptoms of those who recover go off more readily and completely than the symptoms produced by a morbid poison which has been received into the system. When the bite is in the fingers or toes, the part often immediately mortifies; and when death takes place in these cases, the absorbent vessels and glands present no change, nor has any part lost its natural appearance excepting those in the vicinity of the wound. The following cases illustrate the symptoms and morbid changes produced by this poison.

695. A person who took rattlesnakes from America to Europe for exhibition was bitten by one in Paris, and died in nine hours. On dissection, all the internal organs were found healthy, "excepting that the membranes covering the brain and spinal cord had a reddish tinge, and the venous blood on the affected side was curdled or clotted." (*Edin. Journ. of Science*, vii., 86.) Dr. HORNER states that a patient, whom he saw some hours after having been bitten in the arm by a rattlesnake, had the arm from the thorax to the fingers swollen to twice its natural size, and it was very painful when moved. The pulse was almost imperceptible; the extremities were cold; the eyes were muddy and heavy; the face bloated. Death took place twenty-four hours after the receipt of the injury, and five hours after death the body was examined. The face was then much bloated; the neck tumid and purple; the bitten arm was still swollen and purplish. The internal organs presented no lesion beyond congestion, which was most apparent in the vessels within the cranium and spinal canal. The cellular and adipose tissues of the injured arm were infiltrated with serum. The blood was fluid, and of a very dark colour. (*American Journ. of Med. Sciences*, vol. viii., p. 397.)

696. A man was bitten in London by a rattlesnake which was being exhibited. In less than half an hour the injured hand began to swell, and pain and swelling extended rapidly along the arm to the axilla. In two hours afterward the man's answers were incoherent, his skin cold, his pulse 100 in a minute, and he was sick at stomach. In eight hours the pain was extremely violent, the swelling very great, and he had frequent attacks of faintness.



The following morning his pulse was remarkably feeble, 132 in a minute, and slight swelling had extended from the arm along that side to the loins, with a mottled appearance from the exudation of blood under the skin. His whole arm was very cold and painful, presented several vesications, and "had a livid appearance, similar to what is met with in the dead body after putrefaction has commenced." On the third day his pulse was scarcely perceptible; the extremities were cold, and the vesications were larger. He rallied for a few days, but gangrene of the arm took place, and he died on the eighteenth day. Sir E. HOME, who records this case, adds, that Dr. RUSSELL communicated to him the details of a case of a man who had been bitten by the *Cobra di Capello*, and the symptoms were nearly the same as now stated. He also refers to two experiments he made on a couple of rats, which he caused to be bitten by a venomous serpent. The one first bitten died in one minute after the bite; and upon dissection, he found the cellular tissue under the skin of the side bitten entirely destroyed. The second rat was not so rapidly nor so severely affected, but it died in six hours.—(*Philosoph. Trans.*, 1810.)

[The *moscheto* and the *small black fly* deserve mention among insects whose bites are to some extent poisonous, and in a great degree annoying. A lotion of *vol. alkali*, properly diluted, is one of the best applications, and, as a preventive, smearing the parts exposed with camphorated volatile oil is generally pretty successful. We have found the bites of these insects so poisonous in the woods bordering on Lake Superior and our other northwestern lakes, as to cause such excessive inflammation and swelling of the skin as to obstruct the sight and cause general fever. Smoke, and every other means of defence, sometimes proved unavailable.\*]

[\* Dr. A. F. WAINWRIGHT of this city was recently bitten by a rattlesnake in the last phalanx of the middle finger of the left hand, near its articulation with the metacarpal bone, which was followed by a small jet of blood. The wound was immediately sucked, and in about half an hour after the bitten part was excised, and a ligature applied above the seat of injury. The limb, however, swelled rapidly, becoming mottled and œdematous. The tumefaction extended to the parietes of the chest, and he died in a state of collapse in five hours and a quarter after the receipt of the injury.

The particulars of the case, as detailed by Dr. A. C. POST (*N. Y. Annalist*, Feb. 1, 1848, p. 163), are as follows: From the nature of the parts involved in the wound, the incision must have been imperfect, but the excised surface was immediately cauterized. The ligature was tied firmly about the wrist, and ten grains *carbonate of ammonia* and half a grain of *sulphate of morphia* were administered; about seven and a half P.M., the ligature, after it had been on half an hour, was removed. Previous to this time the hand had been very much swollen, but no swelling had occurred above the ligature. It now began to extend up the arm. At nine and a half the patient was seen by Dr. P., when the swelling had extended to a point half way between the elbow and shoulder joint; it was very considerable, hard, and terminated abruptly; the finger, when passed along the arm, dropping suddenly from the swollen part to that in its natural condition. The hand was of a dark greenish colour; the lower part of the arm was mottled blue and greenish yellow; the discoloration did not extend as far as the swelling, and seemed to follow the swelling at about half an hour's interval. When first seen by Dr. P. the pulse was eighty, of medium fullness and strength, face flushed, and manner excited. Half an hour after the pulse began to flag, becoming less full and forcible, but increased to one hundred; it afterward reached one hundred and twenty beats in the minute, but became constantly more and more feeble. By eleven o'clock the pulse was extinct at the wrist, but could still be felt at the groin. Between ten and eleven he became stupid, taking

697. The *Coluber fulvus Australicus*, or "copper-coloured snake," has sometimes caused death or dangerous effects in Australia, where it and other allied species abound. In a case detailed by Mr. BLAND (*Lancet*, Jan., 1848), the bite nearly proved fatal, although ligatures were instantly placed upon the limb above the injury. The symptoms were pain in the region of the heart, with a feeling of constriction in the chest; acceleration of pulse; giddiness, jaetitation, dimness of sight, and general distress, which continued for some time, but were ultimately removed by the very judicious and active treatment adopted.

698. *B. Treatment.*—When the situation of the bite allows of the application of a ligature above it, then this practice should be instantly adopted; and even two ligatures ought to be applied, especially if a considerable time is likely to elapse before professional aid can be obtained. When the situation of the injury admits not of the application of a ligature above it, then a cupping-glass, or any vessel or eup which may be applied with sufficient exhaustion of the contained air to produce pressure around the bite, as well as to draw the fluids through it, should be resorted to and kept applied, or reapplied as efficiently as possible. When medical or surgical aid is obtained, *excision* of the bitten part, if the situation admit of its performance, should be adopted, especially if the symptoms are urgent and the local contamination manifest. But when these means cannot be resorted to, and even when they have been already employed, *suction* of the wound should be as instantly instituted as possible, and continued without intermission for a considerable time.\* The moderns have certainly not materially improved upon the treatment recommended by the ancients for the bites of serpents and other reptiles. If we refer to NIXON, DIOSCORIDES, CELSUS, and other Greek and Roman writers, as well as to the Arabians,

no notice of what was passing about him. This lapsed into complete coma, and he died a little past twelve. By this time the swelling had extended under the pectoral muscle, and the discoloration had reached the axilla.

The treatment consisted in the administration of stimulants, brandy and carbonate of ammonia, in as large doses as the patient could be prevailed on to swallow. When they could no longer be given by the mouth they were administered by the rectum, after the pulse had ceased at the wrist, and the surface covered with a cold perspiration. A sinapism applied to the epigastrium produced full redness in twenty-five minutes.

A fatal result from the bite of the rattlesnake is very rare in the United States, though bites are not infrequent. Dr. A. CLARK informs us that a man who kept these animals for exhibition stated that he had often been bitten, but that he possessed a remedy which always cured him. He was, however, at last bitten by a large one, and died in four hours. Cauterizing, with ammonia, immediately after animals, as cats and rabbits, are bitten, does not prevent a fatal result. In man the poison seems to attack especially the subcutaneous cellular tissue; the sloughing, when patients recover, being superficial. The phenomena bear no resemblance to those of ordinary inflammation, especially when death speedily results.]

[\* In nearly, if not all, cases of bite from a poisonous reptile, *suction* should be the first measure resorted to. In many cases it will alone suffice to ensure a safe result. Ligature, caustic, and excision are important adjuncts. The free use of alcohol alone, or mixed with oil of turpentine, has been found very successful in our Western States, where rattlesnakes are said to abound. Hunters not infrequently carry a bottle, containing equal parts of these articles, as a specific in case they are bitten. We know of no plant possessing specific curative virtues in such cases as claimed by the Indians, and believed by some writers. Of these pretended specifics, more than a score are already known and described in our books.]

we shall find them all recommending the means now advised, with several others. Mr. ADAMS, in his most valuable translation of PAULUS ÆGINETA, has given an excellent epitome of the treatment prescribed by the ancients for poisonous bites and wounds. They all recommend ligatures, cupping, suction, and, in urgent cases, excision or amputation. After sucking and cupping the wound, they advise stimulating dressings, and the application of the flesh of fowls, while still warm, to the part. They also recommend bleeding, "when the poison is distributed over the body," but at the same time they give wine and stimulants, emetics, and sudorifics, and agree in GALEN's eulogy upon the virtues of the theriaca. I must, however, refer the reader to Mr. ADAMS's work for a very full account of the practice of the ancients in these and in all other cases of poisoning.

698\*. In Mr. BLAND's case (§ 697), bleeding from the arm to the extent of sixteen ounces was adopted, "in conformity with his experience in these cases, and was followed almost immediately by the entire removal of both the pain and constriction." At ten the same evening the patient was again bled to ten ounces, some pain and constriction in the chest having returned. Besides the means already mentioned, Mr. BLAND advises "the exhibition of stimulants, as oil of turpentine, aromatic spirit of ammonia, brandy or other spirits, eau-de-luce, port, sherry, Champagne, or other wines." In addition to these, the head and face should be frequently sponged with cold fluids, as vinegar, rose-water, &c. I have seen, in Africa, where accidents from poisonous serpents are not infrequent, the juice of the citron, with capsicum, added to the other stimulants which were taken, and applied to the wound after suction had been continued for some time. The bowels were opened by means of olive oil, taken by the mouth with stimulants, or administered as enemata, with capsicum and salt. In the more intense states of poisoning by venomous snakes, bleeding can hardly be resorted to, owing to the extreme depression of the powers of life; and it is only when reaction is being developed by the aid of powerful stimulants that the loss of blood tends to relieve the vascular congestion produced by the poison, especially of the lungs and large vessels, and, by reducing the mass to the low amount of moving power, thereby to restore and equalize the circulation.

699. Various substances have been recommended as *antidotes* to the poison of serpents. HUMBOLDT and BONPLAND mention a New Granada plant, the *guaco*, *Mikiana guaco*, the juice of which is said to deter snakes from biting persons on whom it is applied; the leaves being also applied to the wound to prevent the usual effects when a person is bitten. (ORFILA, *Toxicologie*, t. ii., p. 441.) *Arsenite of potash*, and other preparations of arsenic, as the Pill of Tanjore, have been used in the East as an antidote to this poison. Dr. RUSSEL states that it was taken sometimes with success, but that it failed in other cases. Mr. IRELAND (*Trans. of Med. and Chirurg. Society*, vol. ii., p. 397) and Dr. PHILLIPS (*American Journ. of Med. Sciences*, vol. viii., p. 540) have furnished satisfactory evidence of the efficacy of arsenic, even in the worst cases of poisoning by the bites of serpents. Mr. IRELAND relates five cases in

which he prescribed the arsenic in very large doses. He states, that upon his arrival at St. Lucia, where venomous serpents are numerous, chiefly the *Coluber carinatus*, an officer and several men of the 68th regiment had died within a few months from bites of these reptiles; and notwithstanding the treatment, the patients had sunk in six to twelve hours from the time of their receiving the wound. The following case will show the symptoms and treatment of it and all the others.

700. A soldier was bitten in the hand, the middle finger being much lacerated, and it was immediately amputated at the joint with the metacarpal bone. He was seen ten minutes after he received the wound. He was then so torpid and senseless as to feel little or no pain during the operation. The hand, arm, and breast of the same side were much swollen, mottled, and of a dark purple and livid colour. He was vomiting, and appeared as if intoxicated. Pulse quick and hard. The wound being dressed, a cathartic clyster and the following were administered immediately: "℞. Liq. Arsenicalis, ℥ii.; Tinct. Opii, gtt. x.; Aquæ Menthæ pip., ℥iss." This medicine was added to half an ounce of lime juice, and taken immediately. It remained on his stomach, "and was repeated every half hour for four successive hours. In the mean time the parts were frequently fomented with common fomentation, and rubbed with a liniment composed of Ol. Terebinth., ℥ss.; Liq. Ammon., ℥ss.; and Olei Olivæ, ℥iss. The cathartic clyster was repeated twice, when the patient began to be purged; the arsenical medicine was now discontinued." From that time he gradually recovered. The next day he appeared very weak and fatigued; the swelling gradually diminished, and he soon recovered and returned to his duty.

701. The administration of large doses of ammonia and eau-du-luce has been advocated by many, and numerous instances of their success have been recorded, while HOME and ORFILA doubt their virtues. They are, however, useful in rallying the powers of life and in promoting perspiration. And in this way other stimulants, as alcoholic fluids in large doses, have also been of use. Many plants have likewise been much praised as antidotes to the bites of serpents, especially the *Aristolochia serpentaria*, the *Prenanthes alba* and *altissima*, the *Polygala senega*, the *Eupatorium ayaparia*, the *Ophioxylon serpentinum*, *Nux vomica*, &c.; but probably they possess no farther specific influence than in enabling, by their stimulating action, the vital powers to resist the injurious influence of the poison.

702. ii. VARIOUS INSECTS AND REPTILES, especially the *scorpion*, the *tarentula*, the *hornet*, the *spider*, the *wasp*, and the *bee*, produce serious effects in some constitutions by their stings. The effects of these, however, vary much. In some they resemble those produced by the bite of a viper; in others they are more slight, and are merely irritant locally, while they occasion more or less severe nervous symptoms.—A. The sting of the *scorpion* has, in some instances, produced severe diffusive local inflammation, with pain, fever, tremor, and depression. Dr. GRAFERN saw two cases in which the sting of the *tarentula* proved fatal in the Crimea—one in forty-eight hours, the other in six days. The sting, which was inflicted in the patient's neck,



was very painful, and had left a brownish violet mark. The neck, head, and shoulders were swollen; the thorax, from the clavicle to the false ribs, was of a bluish colour; and respiration became difficult forty-four hours after the injury. Searifications, the actual cautery, oil externally and internally, and ammonia, were all employed in vain. (*Quart. Journ. of For. Med.*, i., p. 215.)

703. B. Dr. Beck refers to a ease in which the sting of a *bee* caused vomiting, fainting, sweating, trembling, and great difficulty of breathing; and the sting of the *wasp* has caused similar effects, and sometimes even insensibility, with spasmodic twitches. Dr. Beck refers in a note to a statement that Dr. King, of Stratford-on-Avon, died on the 14th of June, 1833, in consequence of a sting which he received on the 8th of the same month from a *hornet*.

704. C. The treatment of the stings of these insects should be the same in principle as that advised for the bites of venomous reptiles; which is similar to that prescribed by the ancients, an epitome of which will be found in Mr. Adams's work, already referred to. In the less severe cases, emollient and anodyne applications to the wound are of use, after the sting is extracted; and the volatile alkali, or the other stimulants and restoratives mentioned above, should be given internally in large and repeated doses, when vital depression is alarming, or the other general symptoms are severe.

¶ In this article it will be seen that I have ventured upon a different CLASSIFICATION of poisons than has hitherto been proposed; and that I have based this classification upon what I believe to be the operation of such substances as have been found to be more or less injurious to the living human body. It may be some reason for this arrangement, that there is scarcely a poison which is not, or has not been, employed as a medicine, and therefore some reference should be had, in our consideration of the *modus operandi* of poisons, to the nature and effect of these substances when employed medicinally; and, in fact, it is upon what is known, and upon what I believe, to be the influence and action of these substances that I have founded my arrangement. I offer it to the examination of the closely observing and profound pathologist, therapist, and medical jurist; and to several such I have been much indebted in the preceding pages. There are numerous substances, both medicinal and poisonous, which are arranged with great difficulty according to their operation and more prominent effects, owing to the circumstance of their operation taking place through different media and channels; and to the fact that the effects upon the different vital organs vary in different persons, from causes already stated, and even in the same person at different times, seasons, and states of the digestive organs, and of the economy. Hence substances which may appear to some to belong to a certain class, may seem, with equal justice to others, to belong to a different class. But this objection is one to which all arrangements are liable, where the objects to be arranged present not sufficiently distinctive characters on which specific differences may be based. There may be some imperfections in my views, and I may have to modify certain of them, especially as respects those substances the nature of which has been insufficiently investigated; but I have endeavoured to be as precise and correct as the extensive range of the subject and my limited powers allowed me to be; and I have endeavoured to do justice to all who have furnished me with information in their able and classical productions.

The reasons for my excluding chemical and juridical disquisitions from my treatise have already been given; but I may again state that they are not comprised by the scope of my work, or by its limits; and I am desirous that they should be referred to in the practical and able sources which I have already indicated. My object—and, indeed, my duty—was to describe the operation, the effects, the diagnosis, and the treatment of poisons, as a most important part of Practical Medicine—as, in truth, states of disease, although produced by art, or with the intention of destroying life—as no mean or small part of medical practice and usefulness—and as contributing in no small degree to the medical practitioner's knowledge, not only of the sources and course of the most intense and rapid states of morbid action and of

their results, but also of the operation and effects of our chief medicinal agents in alleviating and in removing spontaneous or natural maladies.

In order to facilitate reference to the PRINCIPAL TOPICS and to the INDIVIDUAL SUBSTANCES comprised in the article POISONS, I add the following synopsis, with the number of the paragraph at which the consideration of them commences.

- I. THE MODES IN WHICH POISONS ARE ADMINISTERED, &c., § 2.
- II. THE ACTION OF POISONS CONSIDERED, § 11.
- III. THE MEDIA OR CHANNELS BY WHICH POISONS ACT, § 18.
- IV. THE GENERAL EFFECTS OF POISONS, § 28.
- V. THE SPECIAL OPERATION OF POISONS, § 34.
- VI. THE CIRCUMSTANCES WHICH MODIFY THE EFFECTS OF POISONS, § 51.
- VII. A GENERAL VIEW OF THE SYMPTOMS OF POISONING, § 67.
- VIII. THE GENERAL DIAGNOSIS OF POISONING, § 73.
- IX. OF THE DIAGNOSIS OF POISONING DURING DISEASE, § 91.
- X. THE GENERAL PRINCIPLES OF TREATMENT IN CASES OF POISONING, § 98.
- XI. CLASSIFICATION OF POISONS, § 106.
- XII. OF THE SPECIAL EFFECTS AND TREATMENT OF POISONS, § 108.

#### CLASS I. ACRID AND CORROSIVE POISONS, § 109.

- i. Symptoms and Diagnosis of corrosive poisoning, § 109.
- ii. Acids.—A. Acetic acid, concentrated, § 125.  
B. The mineral acids, the hydrochloric, the nitric and sulphuric acids, § 132.  
C. Oxalic acid, § 159.
- iii. Alkalies and their carbonates, § 167.
- iv. Antimony, chloride of, § 175.
- v. Iodine and bromine, § 179.
- vi. Lime, unslacked, § 189.
- vii. Phosphorus, § 192.
- viii. Salts.—Alkaline corrosive, § 196.  
A. Bichromate of potash, § 197.  
B. Binoxalate of potash, § 198.
- ix. Salts—Metallic corrosive, § 199.  
A. Of Antimony, § 200.  
B. Bismuth, trisnitrate of, § 201.  
C. Copper, preparations of, § 205.  
D. Gold, chloride and iodide of, § 211.  
E. Mercury, bi-chloride of, § 216.  
Nitrates, bi-cyanide, and some other preparations of, § 226.

F. Silver, nitrate of, § 229.

G. Tin, the chlorides of, § 231.

H. Zinc, chloride and sulphate of, § 232.

#### x. Vegetable acids, § 234.

- a. Anemone, the poisonous species of, § 235.
- b. Arum maculatum and A. dracunculus, § 236.
- c. Brionia dioica, § 237.
- d. Caltha palustris, § 238.
- e. Chelidonium majus, and other species, § 239.
- f. Croton tiglium, § 240.
- g. Cucumis colocynthis, § 242.
- h. Cyclamen Europeum, § 244.
- i. Daphne gnidium and D. mezereum, § 245.
- k. Delphinium staphysagria, § 246.
- l. Euphorbia officinarum, and other species, § 247.
- m. Gratiola officinalis, § 249.
- n. Hippomane mancinella, § 250.
- o. Iotropa curcas, § 251.
- p. Juniperus Sabina, § 252.
- q. Monardica elaterium, § 253.
- r. Narcissus pseudo-narcissus, § 254.
- s. Ranunculus, several species of, § 255.
- t. Rhus toxicodendron, § 256.
- u. Stalagmitis cambogioides, § 257.
- v. Other acrid and corrosive plants, § 258.

#### CLASS II. DEPRESSING AND PARALYZING POISONS—SEDATIVE POISONS, § 261.

- A. Acetic acid, in frequent doses, and diluted, § 262.
- B. Acids, the mineral, frequent doses of the dilute, § 263.
- C. Alkalies and their carbonates, prolonged use of, § 264.
- D. Cold or abstraction of animal heat, § 265.
- E. Digitalis purpurea, § 266.
- F. Lead, preparations of, § 275.
- G. Prussic or hydrocyanic acid, and its compounds, § 289.
- H. Zinc, oxide of, § 321.
- I. Vapours of ether and alcohol, § 322.

#### CLASS III. EXCITANTS—STIMULANTS—EXCITING AND EXHAUSTING POISONS, § 323.

- i. Alcohol, § 324.
- ii. Ethers, § 336.
- iii. Camphor, § 341.
- iv. Chelidonium majus and C. glaucium, § 352.
- v. Heat, in various forms, § 353.

vi. *Ipecacuanha*, § 358.

CLASS IV. EXCITING AND CONSTRICTING POISONS—NERVOUS AND MUSCULAR EXCITANTS, § 361.

i. *Alum*, § 363.

ii. *Nux vomica* and *Strychnia*, § 364.

Various plants containing *Strychnia*, § 370.

iii. *Bacca antidyssenterica*, &c., § 378.

iv. *Cocculus Indicus*, § 379.

v. *Conaria Myrtifolia*, § 381.

CLASS V. IRRITATING AND DEPRESSING POISONS—IRRITATING AND PARALYZING POISONS—ACRO-SEDATIVES, § 382.

i. *Aconite*: varieties of *A. napellus*, § 383

ii. *Arsenic* and its compounds, § 393.

iii. *Colchicum autumnale*, § 419.

iv. *Hellebore* and its species, § 423

v. Food poisons, § 427.

A. Poisonous fish, § 428.

B. Poisonous meats, § 434.

C. Diseased animal substances, fluids, secretions, &c., § 444.

vi. Mineral and saline acro-sedatives, § 451.

A. The antimonial compounds—*Tartar emetic*, &c., § 452.

B. *Baryta* and its salts, § 458.

C. Cupreous preparations and compounds, § 464.

D. Salts of potash, § 475.

E. Sulphurets, § 481.

F. *Tartaric acid*, § 485.

vii. The necroscopic poison—Poison imbibed from recently dead bodies, § 487.

viii. Putrid animal matters, § 519.

ix. Tobacco—Indian and Virginian, § 523.

A. Tobacco smoking, § 527.

B. Tobacco chewing, § 528.

x. Other vegetable acro-sedatives, § 534.

A. Castor seeds, § 534.

B. *Atropa* *manihot*, § 535.

CLASS VI. IRRITANT AND ALTERANT POISONS—ACRO-ALTERANT POISONS, § 536.

i. *Belladonna*, § 537.

ii. *Cantharides*, § 546.

iii. Chlorine and the chlorides, § 553.

A. Chlorine gas, § 553.

B. Chlorate of potash, § 556.

C. The chlorides and the hypo-chlorides, § 557.

iv. Iodine and its compounds, § 558.

v. Mercury, the preparations of, § 562

A. Mercurial vapours, § 564.

B. Mercurial salivations, &c., § 568.

C. Mercurial diseases, § 570.

vi. Thorn-apple, § 592.

CLASS VII. NARCOTICS OR STUPEFYING POISONS—HYPNOTICS, § 598.

i. Carbonic acid gas, § 600.

ii. Carbonic oxide gas, § 610.

iii. Carburetted hydrogen gas—Coal gas, &c., § 611.

iv. Chloroform and the ethers, § 615.

v. *Cicuta virgata*—Water-hemlock, § 617.

vi. *Conium*—Hemlock, § 619.

vii. *Henbane*—*Hyoscyamus*, § 624.

viii. *Opium*, and its preparations, § 630

a. *Opium* eating, § 637.

b. *Opium* smoking, § 641.

c. *Morphia* and its salts, § 650.

ix. Sulphuretted hydrogen gas, § 661.

CLASS VIII. NARCOTIC AND IRRITANT POISONS—ACRO-NARCOTICS—NARCOTICO-ACRID POISONS, § 667.

i. *Empyematic* oils, § 668.

ii. *Fool's-parsley*, § 689.

iii. *Fungi*—Poisonous mushrooms, § 670.

iv. *Hemlock* dropwort, § 680.

v. Grain, diseased, § 681.

vi. *Laburnum*, § 683.

vii. Leguminous seeds, § 684.

viii. *Lolium Temulentum*, § 685.

ix. *Yew-tree*, § 686.

CLASS IX. SEPTIC AND DISORGANIZING POISONS, § 687.

i. Remarks on various septic poisons, § 688.

ii. The bites of various poisonous serpents, § 690.

iii. The stings of insects, &c., § 702.

BIBLIOG. AND REFER.—*Nicander*, *Alexipharmaca*, vo.

IIal., 1792; *Theriaca*, 4to. Colon, 1530.—*Dioscorides*, *De*

*Ver.*—*Celsus*, l. v. c. 27.—*Galen*, *De Locis Affect.*, l. vi.

c. 5; *De Remed. Empir.*, c. 27; *De Antidotis*, l. ii.—*Pliny*,

*Hist. Nat.*, plurcs.—*Aëtius*, *Tetrab.*, l. iv., s. i., c. 48.—

*Oribasius*, *De Morb. Curat.*, l. iii.—*Acturius*, *Meth. Med.*,

l. v.—*Paulus Ægineta*, *Transl.* by *F. Adams*, l. v.—*Avicenna*,

*Canon*, l. iv., fen. 6.—*Italy Abas*, *Pract.*, l. iv.; *Theor.*,

l. viii.—*Alsharavius*, *Pract.*, l. xxx., 2, 31.—*P. de Abano*,

*De Venenis*, &c.; in *Halleri Bibl. Med. Pract.*, vol. i.—*F.*

*Ponzetti*, *De Venenis* *Comment.*, l. iii., fol. *Venet.*, 1492.

—*A. Guainerius*, *Liber de Venenis*, 4to. *Papia*, 1518.—

*Gorraeus*, *Prof. in Nicandri Alexipharmaca*, *Paris*, 1557.

—*P. Carrius*, *Quæstio de Venenis*, fol. *Venet.*, 1548.—

*J. F. Arma*, *De Venenis*, 8vo. *Turin*, 1557.—*S. Ardoynus*,

*Opus de Venenis*, fol. *Basil.*, 1562.—*H. Cardanus*, *De*

*Venenis*, l. iii., fol. *Basil.*, 1564.—*J. Mobanus*, *Giftgäßer*, *sive*

*Antidotus*, 8vo. *Aug. Vind.*, 1567.—*J. Grevin*, *Deux Livres*

*des Venenis*, 4to. *Anvers*, 1568.—*J. Ewich*, *De Sagaram*

(*quas vulgo veneficas appellant*) *Natura*, *Arte*, &c., 8vo.

*Brenæ*, 1584.—*H. Mercurialis*, *De Venenis*, et *Morbis vene-*

*noxis*, l. iii., 8vo. *Francof.*, 1584.—*A. Baccius*, *De Ven.* et

*Antidotis*, 4to. *Rom.*, 1586.—*R. à Fonseca*, *De Ven.* eorumque

*Curatio*, 4to. *Rom.*, 1587.—*P. de Uffenbach*, *De Ven.*

et *morbiferis Medicamentis*, 4to. *Bas.*, 1597.—*H. à Bra*,

*De curandis Ven.* per *Medicamenta*, &c., lib. ii., 8vo. *Arnh.*,

1603.—*E. Rudius*, *De Morbis oculis et venenatis*, l. v.

*Venet.*, 1610.—*J. E. Burggrav*, *Alexipharmacum omnium*

*Venen.* *Lugd. Bat.*, 8vo. 1610.—*M. Zuccarius*, *Methodus*

*occurrandi Ven. Corporibus*, 4to. *Neap.*, 1611.—*J. Burser*,

*Paradoxum de Venenis*, 4to. *Basil.*, 1615.—*F. Pona*, *Antidotus*

*Bezoardica adversus omnia Ven.*, 12mo. *Verone*,

1622.—*Amatus Lusitanus*, cent. i., 39, 64; cent. iv., 41, 52;

cent. v., 91; cent. vi., 88.—*Severinus*, *De Vipere Natura*,

*Veneno*, *Medicina*, 4to. *Patav.*, 1630.—*J. Pons*, *Avertissement*

pour la *Préservat.* et *Cure contre les Pois.*, 8vo. *Lion.*,

1634.—*R. à Castro*, *De Vcn.* cum eorum *Signis* et *Remediis*,

lib. iii., 4to. *Tolos.*, 1636.—*Zwinger*, *Theatrum Vitæ hu-*

*mane*, p. 327, et *seq.*—*A. Bulgetius*, *De Morbis venenatis*,

*Venenisque*; *Appendix ad Librum de Affectionibus Cordis*,

4to. *Patav.*, 1657.—*Zachias*, *Quæst. Med. Legal.*, l. ii., t.

2.—*W. Ramsay*, *Tract on Poisons*, 8vo. *Lond.*, 1661.—*J.*

*B. Battallar*, *Discriptio de Signis Veneni sumpti*, 8vo.

*Orig.*, 1661.—*R. Moray*, in *Philos. Trans.*, 1663.—*F. B.*

*Sauvages*, *De Venenatis Gallie Animalibus*, 4to. *Mont.*,

1764.—*W. Ramsay*, *Life Security*, or the *Names*, *Natures*,

and *Virtues* of all *Sorts* of *Venomes* and *venomous Things*,

12mo. *Lond.*, 1665.—*V. Löber*, *Anchora Sanitatis*, cui *annexa*

*est Mantissa de Venenis et eorum Antidotis*, 8vo.

*Frank.*, 1671.—*Goeckel*, *De Ven.* eorum *Causis* et *Antido-*

*tis*, 12mo. *Aug. Vind.*, 1669.—*T. Platt*, *Experiments on*

*the Poison of Vipers*: in *Philos. Trans.* *Lond.*, 1672.—*B.*

*Scharff*, *Toizkologia*, seu *de Natura Ven.*, 8vo. *Jenæ*, 1678.

—*Newton*, in *Philos. Trans.* *No. 242.*—*Del Papa*, in *ibid.*,

*No. 234.*—*Sloane*, in *ibid.*, *No. 238.*—*Zacutus Lusitanus*,

*Med. Pract. Hist.*, l. i., v., et vi.—*G. Bagliuvi*, *Opera*, 4to.

*Romæ*, 1696.—*J. Marshall*, *Remarks on Arsenic* considered

as a *Poison* and as a *Medicine*, 8vo. *Lond.*, 1715.—*F. Hoff-*

*mann*, *Opera*, suppl. ii., p. 737.—*Camerarius*, *Memorab.*,

cent. iii.—*N. E. Etmüller*, *De Ven.* *Signis* et *Indiciis*, 4to.

*Lips.*, 1727.—*T. Madden*, on *Laurel Water* as a *Poison*:

*Philos. Trans.* *Lond.*, 1731.—*J. Ruffy*, on *Laurel Water*,

&c.; in *ibid.* 1739.—*E. Milward*, Of an *Antidote to the*

*Indian Poison*: in *ibid.* 1742.—*R. Mead*, *Mechanical Ac-*

*count of Poisons*, 8vo. *Lond.*, 1743.—*Kæmper*, *Amenitat.*

*Exot. fasc.*, iii., p. 575.—*B. Langrish*, *Physical Experiments*

on *Brutes*, &c., 8vo. *Lond.*, 1746.—*F. D. Herissant*, *Ex-*

*perim.* with the *Poison of Lamas* and *Ticunas*: *Philos.*

*Trans.*, vol. xlvii. *Lond.*, 1751.—*Morgagni*, *De Sed* et

*Caus. Morb.*, epist. lix.—*Sprægel*, in *Halleri Dissert.* ad

*Med.*, vol. vi.—*Amoreux*, *De Noxa Animalium*. *Avig.*, 1762.

—*P. Rossi*, *De nonnullis Plantis* que pro *venenatis* habentur,

4to. *Pis.*, 1762.—*J. Auster*, *Essay on the Effects of*

*Opium* as a *Poison*, 8vo. *Lond.*, 1763.—*C. Krapf*, *Experi-*

*menta de nonnullorum Ranunculorum venenata Qualitate*.

*Vien.*, 1766.—*J. N. Laurenti*, *Synopsis Reptilium emendata*,

cum *Experimentis circa Venena et Antidota Reptilium Aus-*

*triacorum*, 8vo. *Vienna*, 1768.—*John Cooke*, *Treatise of*

*Poisons*, with their *Cure*, 12mo. *Lond.*, 1770.—*T. P. Cels*,

de *Belgi*, *Plantis venenatis*, 4to. *Bru.*, 1774.—*Clark*, in

*Medical Facts and Observat.*, vol. vii., art. 25.—*Graves*, in

*ibid.*, vol. vii., art. 27.—*W. Falconer*, *Observations and Ex-*

*periments on the Poison of Copper*, 8vo. *Lond.*, 1774.—

*Bosc*, *De Diagnosi*, *Ven. ingesti et in Corpore geniti*. *Lips.*,

1774; in *Schlegel's Coll.*, t. iv.—*John Prestwich*, *Disserta-*

*tion on Poisons*, &c., 8vo. *Lond.*, 1775.—*J. F. Gmelin*, *All-*

*gemeine Geschichte der Gifte*, 8vo. *Leips.*, 1776.—*B. Car-*

*minati*, *De Animalium ex nephriticis tralibus Interitu*, 4to.

*P. Land.*, 1777.—*J. F. Gmelin*, *Geschichte der Pflanzen-*

*gifte*, 8vo. *Leips.*, 1777.—*J. F. Gmelin*, *Geschichte der*

*Mineralischen Gifte*, 8vo. *Leips.*, 1777. *D. Ingram*, *An*

*Inquiry into the Cause of the Death of W. Scaven*, Esq.,

8vo. *Lond.*, 1777.—*P. T. Navier*, *Contrepoisons de l'Ar-*

*senic*, du *Sublimé corrosif*, &c., 2 vols. 12mo. *Paris*, 1777.

*Anon.*, *An Essay on Culinary Poisons*, 8vo. *Lond.*, 1781.—

*Fel. Fontana*, *Sur les Poisons et sur le Corps animal*, 2 vols.

4to. *Flor.*, 1781; and in *Philos. Trans.*, 1780, p. 163.—

*Foster*, in *Philos. Trans.*, vol. lii., p. 2.—*Reisseisen*, *Dissert-*

*atio de Veneficio doloso* (*Doering*), i., 1781.—*B. Wilmer*,

*Observations on the poisonous Vegetables indigenous in*

*Great Britain*, 8vo. *Lond.*, 1781.—*Mangor*, in *Acta Reg.*

*Soc. Med. Haun.*, vol. iii., No. 13. (*Poisoning per Vagi-*

*nam*).—*G. Logan*, *Versuch ueber die Gifte*, 8vo. *Petersb.*,

1783.—*P. Billiard*, *Histoire des Plantes vénéneuses de la*

*France*, fol. *Par.*, 1784-98.—*Fr. Chaussier*, *Consultations*

*médico-légales sur une Accusation d'empoisonnement*, 8vo.

*Paris*, 1784.—*T. Houlston*, *Observations on Poisons*, 8vo.

*Lond.*, 1784.—*Thomas Percival*, *Observations and Experi-*

*ments on the Poison of Lead*, 8vo. *Lond.*, 1784; and *Prac-*

*tical Essays*, vol. i., p. 5.—*A. J. Retz*, *Recherches sur*

*Signes de l'empoisonnement*, 8vo. *Par.*, 1784.—*P. J. Bu*



chas, Dissertations sur l'ipo, espèce du Poison dont se servent les Sauvages, fol. Par., 1785.—*J. C. Puihn*, *Materia venenaria Regni vegetabilis*, 8vo. Dresd., 1785.—*J. J. Plenck*, *Toxicologia*, seu Doctrina de Venenis, 8vo. Vien., 1785.—*Longmare*, in *Duncan's Annals of Medicine*, vol. iii., 7.—*S. Hahnemann*, Ueber den Arsenik Vergiftung, ihre Hölfe, &c., 8vo. Lips., 1786.—*J. S. Halle*, Gifthistorie des Thier, Pflanzen, und Mineralreichs, 8vo. Berl., 1786.—*Jos. Skinner*, A Treatise on the Venom of the Viper, Cherry-Laurel, &c.: Transl. from Fontana, 2 vols. 8vo. Lond., 1787.—*G. W. C. von Wilke*, Ueber die Giftpflanzen der Kräutergärten, 8vo. Hal., 1787.—*B. Moseley*, On Tropical Diseases (Poisons of Serpents, &c.), 8vo. Lond., 1788.—*J. E. F. Schulze*, *Toxicologia Veterum* (Doering, i.), 4to. Hal., 1788.—*Thomas*, in *Memoirs of Med. Society of London*, vol. v., 10.—*Boenninger*, De Plantis venenatis (Doering, i.), 4to. Duisb., 1790.—*A. Fothergill*, Cautions on the Poisons of Lead and Copper, 8vo. Bath, 1790.—*R. Humilton*, Practical Hints on Opium considered as a Poison, 8vo. Ipsw., 1791.—*J. C. Doelz*, Neue Versuche ueber Pflanzengifte, 8vo. Nürnberg, 1792.—*P. Kolbani*, Abhandlung ueber die Herrschenden Gifte in der Köchen, 8vo. Presb., 1792.—*L. P. Schroeter*, Bemerkungen über das Mutterkorn, 8vo. Rinteln., 1792.—*J. Johnstone*, Medical Essays and Observations, and an Essay on Mineral Poisons, 8vo. Birmingham, 1795.—*C. C. H. Marc*, Allgemeine Bemerkungen über die Gifte, 8vo. Erl., 1795.—*J. H. A. Dunker*, Kurze Beschreibung der Gefährlichsten Giftpflanzen, 8vo. Brand, 1796.—*C. A. Frege*, Anleitung zur Kenntniss der Schädlichen und Giftpflanzen, 8vo. Kopeuh., 1796.—*P. Russel*, An Account of the Indian Serpents and their Poisons, fol. Lond., 1796.—*J. Clark*, On the Poison of the Cassada Root (Med. Facts, viii.), 8vo. Lond., 1797.—*Th. Horsfield*, Experimental Dissertation on the Rhus Verrux, &c., 8vo. Philad., 1798.—*P. Kolbani*, Giftgeschichte des Thierpflanzen und Mineralreichs, 8vo. Vien., 1798.—*Bulliard*, Hist. des Plantes vénéneuses et suspectes de la France, 8vo. Paris, 1798.—*J. C. A. Mayer*, Ein Heimische Giftenächse, fol. Berl., 1798.—*E. Thomas*, On the Poison of Fish: in *Mem. Med. Soc. of Lond.*, vol. v., p. 19.—*Jos. Frank*, *Handbuch der Toxicologie*, 8vo. Vien., 1800.—*J. P. J. Kircheisen*, Beobachtungen über das Mutterkorn, 8vo. Altenb., 1800.—*Anon.*, Giftpflanzenbuch, oder Die Schädlichsten Giftgewächse Deutschlands, 8vo. Berl., 1801.—*A. E. Tartra*, Traité de l'Empoisonnement par l'Acide nitrique, 8vo. Par., 1802.—*Jos. Frank*, *Manuel de Toxicologie* (Translat.), 8vo. Anvers, 1803.—*Consrubch*, in *Hufeland's Journ. der Pract. Arzneyk*, b. iv., p. 442.—*J. T. Halle*, Die Deutsche Giftpflanzen, zur Verhütung Transiger Vorfälle, 8vo. Berl., 1803.—*Thomasian*, *Thuesnick*, De Atropa Belladonna, Groen., 1803.—*V. H. L. Paldamus*, Versuch einer Toxicologie, 8vo. Hal., 1803.—*Renault*, Expériences sur les Contrepoisons de l'Arsonic, 8vo. Par., 1803.—*T. J. Kohlhaas*, Giftpflanzen aufst in Abdruck, 4to. Regensb., 1805.—*Chansarel*, Observations sur diverses Substances vénéneuses, &c., 8vo. Bordeaux, 1807.—*Budd*, in *Lond. Med. and Phys. Journ.*, Oct., 1807.—*W. C. Orphal*, Musterung aller für Giftig Gehaltenen Thiere Deutschlands, 8vo. Leips., 1807.—*J. Adams*, Observations on Morbid Poisons, chronic and acute, &c., 4to. Lond., 1807.—*G. F. Jager*, De Effectibus Arsonici in varios Organismos, 8vo. Tub., 1808.—*C. G. Ackermann*, De Plumbi Viribus, speciatim ejus Nociva quae Sterilitatem inferat, 12mo. Norimb., 1809.—*Reeve*, in *Edinburgh Medical and Surgical Journal*, 1809.—*E. Home*, On the Poison of the Rattlesnake, in *Philos. Trans.*, 4to. Lond., 1810.—*B. C. Brodie*, Experiments on Poisons, in *Philos. Trans.*, 4to. Lond., 1811.—*Scherf*, Beyträge, b. iv., p. 61. (*Poisoning with colchicum*).—*J. P. Ireland*, On Arsenic as an Antidote to the Poison of Serpents, in *Med. Chirurg. Trans.*, ii., 396, 8vo. Lond., 1811.—*B. G. Sage*, Moyens de remédier aux Poisons végétaux, &c., 8vo. Paris, 1811.—*B. W. Seiler*, De nonnullorum Venenorum in Corpore humano Effectibus, 4to. Wittemb., 1811.—*C. L. Donner*, Abhandlung über die höchst verderblichen Folgen des innern Gebrauchs des Arsens in der Wechselieber, &c., 12mo. Berl., 1812.—*J. G. Puihn*, Die Gifte des Mineralreichs, 8vo. Leips., 1813.—*J. M. Murat*, De l'Empoisonnement par les Substances végétales, 8vo. Strash., 1814.—*M. P. Orfila*, Traité des Poisons, ou Toxicologie générale, 2 vols. 8vo. Paris, 1814–1826.—*C. Salt*, An Essay on Constitutional Disease from Morbid Poisons, 8vo. Lond., 1817.—*M. P. Orfila*, A general System of Toxicology, 2 vols. and supp. Transl. by *Waller*, 8vo. Lond., 1815–17–21.—*A. Schnobcl*, De Effectibus Radicis Veratri albi et Hellebori nigri, Tub., 1817.—*C. A. H. A. Bertrand*, Manuel médico-légal des Poisons, 8vo. Paris, 1818.—*F. Chaussier*, Contrepoisons, ou Moyens reconnus les plus efficaces, &c., 8vo. Paris, 1818.—*Burrows*, in *Lond. Med. Repository*, vol. iii., 445, 476.—*J. C. F. Meister*, Leitfaden zu vorlesenen ueber Gifte, &c., 8vo. Bresl., 1818.—*T. H. de Montigny*, Essai de Toxicologie, 8vo. Paris, 1818.—*M. P. Orfila*, Secours à donner aux Personnes empoisonnées, &c., 12mo. Paris, 1818.—*M. P. Orfila*, Directions for the Treatment of Persons who have taken Poisons. Transl. by *Black*, 12mo. Lond., 1818.—*L. F. Schaffner*, Versuch einer Darstellung der Arsenik vergiftung, 8vo. Berl., 1818.—*J. Wendt*, Die

Hülfe bey Vergiftungen, &c., 8vo. Bresl., 1818.—*F. Runge*, De novo Methodo Venosum Belladonnae, &c., explorandi, 8vo. Jena, 1819.—*C. R. C. Billard*, Considérations sur l'Empoisonnement par les Irritants, 4to. Paris, 1820.—*Cloquet*, Dict. des Sc. Méd., art. *Poison*, t. xliii. Paris, 1820.—*S. Wray*, in *Lond. Med. Repository*, vol. xviii., p. 26.—*J. Copland*, in *ibid.*, vol. xviii., p. 29. (*Recommend the cold Affusion in Cases of poisoning by Opium*).—*J. A. Puris* and *J. S. M. Fonblaque*, Medical Jurisprudence, 3 vols. 8vo. Lond., 1823, vol. ii., p. 130, et seq.—*G. Hinck*, Ueber Arsenik in Medicinisch-gerichtlicher, &c., Insicht, 8vo. Vienna, 1820.—*J. Kerner*, Neue Beobachtungen ueber die Vergiftungen durch den Genuss Geräucherter Würste, 8vo. Tub., 1820.—*Podère*, Dict. des Sc. Méd., art. *Toxicologie*, t. iv. Paris, 1821.—*P. J. Schneider*, Ueber die Gifte in Medicinisch-gerichtlicher Beziehung, 8vo. Tub., 1821.—*Podère*, Traité de Méd. légale et d'Hygiène publique, &c., 6 vols. 8vo. Paris, 1818.—*R. Christison*, *C. Coindet*, Experimental Inquiry on Poisoning by Oxalic Acid, 8vo. Edinb., 1823.—*J. Taddei*, Rech. Chim. et Méd. sur un nouvel Antidote contre le Sublimé corros., par *G. Odier*, 8vo. Paris, 1824.—*E. S. de Montmahon*, Considérations médico-légales sur une Accusation d'Empoisonnement par l'Acétate de Morphine, 8vo. Paris, 1823.—*J. Rankine*, in *Edin. Med. and Surg. Journ.*, vol. xviii., p. 231. (*Of the Poison of the Cobra de Capello*).—*Chansarel*, Nouvelle Doctrine chimique, suivie d'une Dissertation sur les Poisons et les Contrepoisons, &c., 8vo. Paris, 1824.—*H. S. Heller*, De la Nécessité de ne point trop insister sur l'Usage des Excitants dans l'Empoisonnement par l'Acide hydro-cyanique, 8vo. Paris, 1824.—*W. Krimer*, Anleitung zu einer Hülfeleistung bei Vergiftungen, 8vo. Aachen, 1824.—*J. Copland*, in *Lond. Med. Repository*, vol. xxv., July, 1825. (*First to recommend the cold Affusion in Cases of poisoning by Prussic Acid*).—*Burton*, *American Medical Botany*, &c., 2 vols. 4to. Philad., 1818.—*Bigelow*, *American Medical Botany*, &c., 2 vols. 8vo. Boston, 1819.—*B. Trauers*, An Inquiry concerning that State of the Vital Functions denominated Constitutional Irritation, 8vo. Lond., 1827, p. 258.—*Causes Criminelles célèbres du dix-neuvième Siècle*, &c., 4 vols. 8vo. Paris, 1828.—*J. A. Paris*, *Pharmacologia*.—*J. Stephenson* and *J. M. Churchill*, *Medical Botany*, or Illustrations and Descriptions of Medicinal Plants, of Poisonous Vegetables, &c. New ed. by *Burnett*, 2 vols. 8vo. Lond., 1835, *pluries*.—*E. S. de Montmahon*, Manuel médico-légal des Poisons, 12mo. Paris, 1824.—*M. Mohner*, Rapport médico-légal contre un Soupçon d'Empoisonnement, 8vo. Car., 1825.—*Segalas*, *Rev. Méd.*, t. i., 1826, p. 507. (*The Rationale of poisoning*).—*H. Guerin de Marnes*, *Toxicologie Nouvelle*, ou Traité des Poisons, 8vo. Paris, 1826.—*Orfila*, Dict. de Méd., art. *Poison*, t. xvii. Paris, 1827.—*Coley*, Treat. on Med. Jurisprudence, part i., comprising the Consideration of Poisons, &c. New-York, 8vo., 1828.—*T. Addison*, *J. Morgan*, An Essay on the Operation of Poisonous Agents, 8vo. Lond., 1829.—*R. Christison*, A Treatise on Poisons, 8vo. Edin., 3d edit., 1836, *pluries*.—*J. Wilson*, in *Trans. of Lond. Med. and Chirurg. Soc.*, vol. xxi., p. 272.—*Mutcl*, Des Poisons considérés sous le Rapport de la Médecine, 8vo. Paris, 1830.—*Devergie*, Dict. de Méd. et de Chir. Prat., art. *Empoisonnement*, t. vii. Paris, 1831.—*Philips*, in *American Journ. of Med. Sciences*, vol. viii., p. 540.—*Apjohn*, *Cyc. of Prac. Med.*, art. *Toxicology*, vol. iv. Lond., 1834.—*Gmelin*, in *Archives gén. de Médecine*, t. xviii., p. 266.—*Ollivier*, in *ibid.*, t. ix., p. 99.—*Orfila et Lesueur*, in *ibid.*, t. xvii., p. 3, et t. xix., p. 325.—*Nally*, in *ibid.*, t. xviii., p. 445.—*Lancet*, No. 338, p. 705.—*Schumann*, *Journ. Hebdom. de Méd.*, t. iv., p. 436.—*Praveze*, in *ibid.*, t. i., p. 395. (*On the Means of preventing the Absorption of Poisonous Virus*, &c.).—*Fournier*, in *ibid.*, t. ii., p. 424.—*Horn* and *Arrowsmith*, in *Edin. Med. and Surg. Journ.*, No. cii., p. 28.—*Christison*, in *ibid.*, No. cii., p. 66 and 219.—*Ward*, in *ibid.*, No. cii., p. 61.—*Combe*, in *ibid.*, vol. xxix., p. 86. See, also, *Edin. Med. and Surg. Journ.*, No. civ., p. 212.—*Hicks*, in *Med. Gaz.*, vol. xxv., p. 895.—*Pooley*, in *ibid.*, p. 859. (*By Prussic Acid*).—*T. Taylor*, in *ibid.*, vol. xxvi., p. 104. (*Prussic Acid*).—*Lonsdale*, in *Edin. Med. and Surg. Journ.*, vol. li., p. 49. (*By Prussic Acid*).—*Geoghegan*, in *Dublin Journ. of Med. Sciences*, vol. viii., p. 308.—*T. Nunneley*, Experimental Inquiry into the Effects of Hydrocyanic Acid: in *Trans. of the Provincial Med. and Surg. Association*, N. S., vol. iii., p. 70.—*Devergie*, *Marc*, *Orfila*, &c., in *Annales d'Hygiène publique et de Médecine légale*, 8vo. Paris, 1829–1835, *pluries*.—*Deguise*, *Dupuy*, et *Leuret*, Recherches et Expériences sur les Effets de l'Acétate de Morphine, 8vo. Paris, 1834.—*Ducatel*, *Manual of Toxicology*, &c., 12mo. Baltimore, 1833.—*R. Duglison*, A New Dictionary of Medical Science and Literature, &c., 2 vols. 8vo. Boston, 1833, *pluries*; and *General Therapeutics*, 8vo. Philad., 1836, p. 537.—*G. L. Roupell* and *A. M. Whinnie*, Illustrations of the Effects of Poisons, &c., fol. Lond., 1834.—*A. Devergie*, *Médecine Légale*, Théorique, et Pratique, 2 toms. 8vo. 1837.—*T. R. Beck* and *J. B. Beck*, Elements of Medical Jurisprudence, &c., 6th Lond. edit., 8vo., 1840, p. 658, et seq., on Poisons.—*J. Pereira*, The Elements of Materia Medica and Therapeutics, 2d. ed., 2 vols. 8vo. Lond., 1842, *pluries*.—

*A. Fleming*, Inquiry into the Physiol. and Medicinal Properties of Aconitum Napellus, &c., 8vo. Lond., 1845.—*A. S. Taylor*, A Manual of Medical Jurisprudence, 8vo. Lond., 1846. (The reader may consult, for numerous other references, PLOUQUET's *Medicina Digesta*, art. *Venera*; and for references to the Histories of Cases, &c., Dr. BECK's *Medical Jurisprudence*, Dr. CHRISTISON's *Treatise on Poisons*, and the works of ORFILA and DEVERGIE.)

(Numerous cases of poisoning will be found scattered through the various American medical journals, so often referred to in our Am. Bib., viz.: Medical Repository, New-York Medical and Philosophical Register, American Medical Recorder, American Journal of Medical Sciences, Boston Medical and Surgical Journal, New-York Journal of Medical and Collateral Sciences, New-York Medical Gazette, New-York Annalist, Philadelphia Medical Examiner, &c., &c.)

**POLLUTION.**—**SYNON.** *Pollutions* (Pollution—the act of polluting or defiling, corrupting or tainting); *Spermatorrhæa*; *Gonorrhæa vera*, *G. libidinosa*; *Anaplasmus*, *Manustupratio*, *Masturbatio*; *Onanismus*; *Tabes dorsalis*, *Proflutium seminis*, Auct. Var. *Samcnfluss*, *Onanie*, *Selbstbefleckung*, Germ. *Incontinence de Sperme*, *peries seminales*, *Onanisme*, *Spermatorrhée*, Fr. *Pollutions*, voluntary and involuntary; *Self-pollutions*.

**CLASSIF.**—GENERAL PATHOLOGY—*Ætiology*.—SPECIAL PATHOLOGY.

1. **DEFIN.**—*Voluntary and solitary excitement of the sexual organs, occasioning emissions or the venereal orgasm* (self-pollution—voluntary pollution). *Discharge of the seminal fluid, with or without the venereal orgasm, involuntarily or during sleep* (involuntary pollutions).

2. Under the designations, *voluntary and involuntary pollutions*, I propose briefly to consider those moral and physical disorders which have been variously denominated according to the forms in which they have been presented to the medical adviser, or which they have assumed in the progress of moral depravity; not infrequently in connection with outward moral observances and hypocritical sanctity. That form of pollution, in either sex, which was at first voluntary, generally becomes involuntary when the evil habit is persisted in, although the latter, in certain circumstances, may occur primarily. It becomes, therefore, necessary to consider the different states of this important disorder in succession, inasmuch as the moral vice is generally the cause of the physical disease. Both states of the disorder should be viewed with a due regard to their special relations and consequences; for so remarkably important are these consequences—so numerous are the ills, both of body and mind, which this disorder induces—and so certainly are those ills entailed upon the subsequent life of the person who is its subject, and upon his offspring to the third and fourth generation, if, indeed, he possess the power of propagating his species, even in the most imbecile forms, that it becomes the duty of the medical instructor to point out its forms, relations, and consequences. The subject has been improperly neglected by both instructed writers and scientific physicians, because it is one frequently involving delicate ideas, and requiring unpleasant revelations—as the due consideration of it unveils the innate and concealed depravity of our nature. But the vice, the moral depravity, of which the disorder at first consists, soon creates for itself, in actual and often incurable physical disease, a necessity for disclosure—a necessity which is not confined to the person concerned, but extended to his family and his

offspring. This being the case with disorders and their usual consequences, which involve so extensive and important considerations, should they be relinquished by the only persons who are able to investigate them aright, and to restore the mental and the physical imperfections upon which they depend, and be handed over to ignorant harpies, who prey upon the wretched sufferers, who take the utmost advantage of the fears which torment them, of the moral and physical debility which sinks them, and of the circumstances in which they are involved, to deceive, to plunder, and to swindle them, and who have neither the knowledge, nor the ability, nor even the intention, to render them any aid!

**I. SELF-POLLUTION—VOLUNTARY POLLUTION.**—**SYN.** *Masturbation*—*Manustupration*—*Onanism*, &c.

**CLASSIF.**—GENERAL PATHOLOGY—*Ætiology*—*Pathogeny*.

**SPECIAL PATHOLOGY.**

**I. CLASS. II. ORDER** (*Author*).

3. i. **OCCASIONS, CAUSES, &c.**—I have already noticed, in a few sentences, the consequences of the too early and inordinate excitement of the genital organs in both sexes (*see art. Disease*, § 53); but the real importance of the subject induced me to mention merely certain prominent matters, and to reserve the fuller consideration of it to a more appropriate place. Self-pollution is generally a vice of *puberty*, but it frequently is often practiced at the earliest appearance of this epoch; and in females even long before the usual accession of this change. In both sexes, the habit is not infrequently continued through a considerable portion of after life. Several writers whose works I have perused have stated that they have known instances where this vice had commenced in females as early as three or four years of age; and cases of it have come before me when this age was hardly passed. At this early age, the practice has generally been acquired from the girls to whom the care of children has been committed. In a case of nymphomania, in a patient to whom I was called in consultation, and who was sixteen years of age, the intelligent mother, the wife of an eminent physician in India, stated that the disease originated in manustupration acquired from a native Indian nurse, when the child was only four years old. It is difficult to determine how early in life this vice may commence in the *male sex*. A patient who lately consulted me respecting his presumed impotence, stated that he commenced this vicious practice as early as eleven years of age; and I find, upon referring to my African memoranda, that it is common among negro boys of nine and ten years of age. But in this country, from thirteen years of age to twenty-five, and even upward, is the period in which it is commonly indulged, although its evil consequences are often found out before or soon after this latter age. At whatever period commenced, the habit is carefully concealed from parents and others; and is often not detected, nor even suspected, although both mind and body are reduced by it to the lowest state of imbecility.

4. It is requisite to be aware of the early age at which this vice may commence, as well as of the *circumstances* in which it commonly origi-



nates. One chief occasion of its early appearance has already been noticed; and this should suggest precautions, especially as respects the persons with whom children are allowed to sleep or to associate. Boarding-schools and other seminaries or institutions, where a number of children or young persons are brought together, and especially where several sleep in the same apartment, or more than one in the same bed, are the places where this vice is most frequently acquired, by both sexes; but it is not infrequently practiced by those who have never entered these places, it being either suggested by the local irritation and physical excitement often present during early puberty, or soon after this epoch, or acquired from tutors and governesses. The neglect of *circumcision* in Christian countries is certainly no mean physical cause of the prevalence of this vice, and of many of the consequences which follow. The institution of this rite for the descendants of Abraham, and the faithful observance of it to the present day not only by them, but also by the followers of Mohammed, have tended, amid numerous countervailing influences and persecutions, to perpetuate an enduring and healthy race; the beneficial results of circumcision being experienced not only by the individual himself, but also by his offspring, and even indirectly by the female sex, as may be inferred from various physiological considerations.

5. Although this vice is most prevalent among young persons, its ill effects generally becoming apparent to them with riper years, yet it is not infrequently indulged in, by persons of both sexes, during advancing years; and is generally the cause of most of the complaints observed in unmarried persons after the age of twenty-five years, as well as sometimes before that period. It is certainly the chief cause of the lives of this class of persons being of much less mean duration than those of the married.

6. There are few causes of this disorder more influential than idleness—than the want of such occupations for youth as require early rising. A full and active occupation of the mind generally shuts out all ideas which suggest this mischief, while the pleasures in which idleness favours the indulgence tend to encourage those ideas. Lying in bed after being awake is another occasion of no small importance—of much greater than is generally attached to it. Although this and several others of the foregoing causes may not have first occasioned this vice, still they remarkably favour a frequent recurrence to it, and often render the morbid impulse to it too strong for the self-control of the person who has fallen into the habit.

7. ii. THE SYMPTOMS AND SIGNS OF Masturbation are in some cases obvious almost on the first glance; in others, they require close observation, aided by experience of the several phases they assume. When the mischief has not been long indulged in, then the injury sustained by the organization is seldom such as to be manifest. But when it is commenced at an early period of puberty, or with the first indications of puberty, then its injurious effects show themselves much sooner than when the frame has previously been fully developed; and are much greater, especially at this early age, than the due congress of the opposite sexes. That

the injury done to the constitution by this vice is always much greater than that caused by sexual intercourse is certainly the case, although the act may not be oftener repeated in the former than in the natural way. As respects the female sex, this result may be easily accounted for; but it also obtains, and may be explained, as respects the male sex; for, independently of its being an act opposed to the dictates of nature and religion, it is one which exhausts the nervous powers more completely than the orgasm consequent upon reciprocal enjoyment, and the interchange of nervous emanations. But it should be recollected that self-pollution is often commenced at an earlier or more immature age than that at which the intercourse of the sexes can take place in the usual states of civilized society; and that hence it is the more injurious, because it impairs or interrupts the due development of both mind and body, at a period when such development receives, in the healthy frame, its chief impetus and full consummation from the genital organs and secretions. There can be no doubt, however, that the individual who has once devoted himself to this Moloch of the species becomes but too frequently its slave to an almost incredible degree. A patient who was sent to London for my advice confessed that he had practiced this vice seven or eight times daily from the age of thirteen until twenty-four; and he was then reduced to the lowest state of mental weakness, associated with various bodily infirmities; indeed, both mental power and physical existence were nearly extinguished.

8. a. The more prominent symptoms of self-pollution are readily recognized; but those which indicate an early stage of the habit are less manifest. In females, who often commence it long before, or with the earliest appearance of puberty, it is indicated chiefly by pallor or loss of colour, a desire to be alone, a somewhat dejected manner, listlessness and indolence, a desire to go soon to bed, and to lie long after having been awake; a darker mark than usual under the eyes, or of the lower eyelids; a near or weak sight; slight emaciation, although the appetite is good or even ravenous; the habit of biting the nails, which are generally very short; warts on the first or second fingers, slight sores about the roots of the nails, &c., are signs often observed; and when several of them exist in the same case, suspicion of self-pollution may be entertained; and may be viewed as confirmed, if slight leucorrhœa, with redness and considerable development of the clitoris and nymphæ be present, and especially if the linen or sheets betray any marks or stains. Several of these symptoms may be observed in males; but the night-linens most commonly demonstrate this vice in them. They, however, often prevent it from being thus detected, and completely conceal it until their appearance sufficiently betrays them.

9. When self-pollution is not frequently practiced, it may be very long before it is detected—if detected at all; but when it is a frequent habit, the above symptoms then are not of long duration without being followed by others, which more decidedly indicate the mischief. The signs, however, vary with the age. When early practiced, or before the frame is developed, or while the frame is in course of devel-

opment, this process is more or less impaired, or even interrupted. The organic nervous influence and vital power are determined chiefly to the immature sexual organs, and all the other vital manifestations languish more or less. The functions of digestion and assimilation are weakened, the blood is poor and deficient in red globules and hæmotosin, and a state of anæmia is more or less completely produced. The muscles become flaccid, and the tendons, ligaments, and capsules relaxed and easily stretched. The nervous systems are weak, susceptible, readily excited or depressed, and ultimately betray farther disorder. Hence arise weakness of the joints, flexures of the spinal column, chlorosis, chorea, epilepsy, rheumatic or neuralgic pains, nervous headaches, and a general blight of the constitution, often associated with worms in the intestinal canal, and always attended by mental and bodily indolence, chilliness, and susceptibility of cold, and by incapability of intellectual and physical occupation. At this early age, or when puberty is either not commenced or is just appearing, the patient is often stunted in growth by this habit, or is rendered decrepit and imbecile, the ovaria and the testes are imperfectly developed, and even waste more or less, and the beard in males hardly appears. I was first consulted by the parents of a young lady when she was about twelve years of age. She was then suffering from debility and slight anæmia; and subsequently she was the subject of chlorosis and tubercular consumption, of which she died about the age of twenty. She had never menstruated. When the body was examined after death, the ovaria were remarkably small, and changed to a dense fibro-cartilaginous state. It was ascertained during my attendance that she had become early addicted to masturbation; she ceased to grow at an early age, and was of a small and weak conformation, although her parents were large and strong persons. Most of those who thus early become addicted to self-pollution are soon afterward the subjects, not merely of one or more of the ailments already noticed, but also of enlargements of the lymphatic and other glands, ultimately of tubercular deposits in the lungs and other viscera, or of scrofulous disease of the vertebrae or bones, or of other structures, more especially of the joints.

10. *b.* When self-pollution is commenced at a more mature age, or when puberty is advanced or completed, the mischief which the constitution sustains is not so remarkable, nor so rapid in its progress as when practiced earlier; for the frame is then farther developed and more consolidated, and the powers of life furnish a greater resistance to the evil. Nevertheless, the consequences are generally most serious, especially when the vice is often indulged in; and, in some respects, are similar to those already mentioned, while those most frequently observed at this more mature age are not unfrequently seen also in younger persons. Stooping and roundness of the shoulders, with a falling inward of the thorax below the clavicles; emaciation and weakness of the joints; pallor of the countenance, with sunk orbits, the eyes being surrounded by a darker circle; a weak or dim sight, or nearness of the sight, weakness and pains in the eyes often preceding the

change in the focus of distinct vision; eruptions on the face; a falling out of the hair, and baldness of the crown and forehead; pains in the head, lowness of spirits, and aching of the back and loins, with inability of sustaining long an erect or even a sitting posture without support; marked aversion from leaving bed in the morning, and indisposition to enter upon any mental or bodily occupation, are the earliest indications of self-pollution at the more mature periods of life. To these succeed, sooner or later, loss of colour, a pallid state of the gums, tongue, and prolabia; sometimes a dusky hue of the countenance, with sores of the face, which are frequently picked and irritated by the patient; leucorrhœa, and delayed, or suppressed, or interrupted, or painful and difficult, or scanty menstruation; in some females, protracted or frequently-recurring catamenia; numerous hysterical symptoms, often irregular or anomalous, and attended by painful, or spasmodic, or slightly paralytic symptoms, and with all the phenomena noticed when treating of HYSTERIA and SPINAL IRRITATION. Ultimately, all the bodily functions betray increasing disorder, and special forms of disease succeed, particularly epilepsy, glandular and tubercular maladies, phthisis; palpitations of the heart from the slightest mental and physical causes, often protracted and excessive, and not unfrequently followed by organic changes of the parietes of the cavities, or of the orifices and valves of the heart; morbid states of the urinary functions and passages; hypochondriasis, and a morbid concentration of the attention upon the various changes and states of sensibility or of disorder, thereby aggravating these forms; melancholia, attended by various delusions, by unfounded fears, and a state of mental misery; and, at last, complete prostration of the powers of both mind and body, in various forms of partial or general insanity, or of incomplete or complete palsy; this latter affection often commencing as partial paraplegia, and advancing to incomplete general palsy of motion, the movements resembling those of chorea, and ultimately terminating in complete general palsy, with marked disorder of the urinary secretion and excretion.

11. *c.* During the progress of the ills which self-pollution entails, the digestive and the assimilating functions suffer more or less; the amount of disorder which these betray varying with the advantages enjoyed as respects food, air, exercise, and sleeping arrangements. But, generally, these functions and nutrition languish remarkably, and the bowels become habitually, sometimes obstinately, costive. Among the most certain signs of self-pollution, especially in males, is premature baldness; but it should be admitted that it not unfrequently is also produced by low fevers as well as by venereal excesses. Abuses of the sexual organs are soon followed, not only by one or more of the maladies enumerated and by constitutional exhaustion, but also by more or less disorder and debility of these organs themselves, frequently amounting to temporary impotence and sterility. The frequent and unnatural excitement of these organs occasions an increased secretion of the prostatic fluid, and often, also, acute or chronic inflammation and enlargement of the prostate gland, and all the usual consequences; increased susceptibility and impaired



or exhausted function of the virile organs; irritation of the seminal passages, and ultimately involuntary emissions, and wasting of the testes.

12. *d.* The mischief is seldom so rapidly manifested in the female as in the male, unless the practice commence before the full evolution of puberty. After this period, however, the evils which result depend much upon the frequency of the habit; but these vary accordingly, the state of the constitution, temperament, and predisposition, also, modifying the effects. These effects have already been enumerated; but they either cause, or are connected with sterility, which is generally owing to the changes produced in the ovaria by excessive, frequent, and unnatural excitement, and sometimes, also, in the uterus and Fallopian tubes. Independently of changes in the ovaria and tubes, and often antecedent to these, leucorrhœa is frequently present, and is sometimes followed by ulcerations of the os uteri, and numerous sympathetic ills which this state, in connexion with irritation of the ovaria and uterus, generally entails. The occurrence of ulceration, and the aggravation of it, are remarkably favoured by the means too frequently and officiously resorted to in ascertaining the nature of the uterine disorder; for by these means the access of air to the seat of irritation oftener increases the mischief than the remedies prescribed tend to allay it.

13. *c.* The *evil consequences* of self-pollution are, however, not confined to the individual; but, as already stated, *are transmitted to the offspring*, when the effects have not been such, as to kind and degree, as to prevent procreation. But when the constitutional powers, and more especially the sexual organs, of either sex are much weakened by this vice, either sterility is the consequence, or the offspring is delicate, puny, decrepit, or the subject of various congenital maladies, especially of the nervous system: to idiocy from deficient development of the brain, to hydrocephalus, to epilepsy, convulsions, palsy. The scrofulous diathesis, tubercular and glandular maladies, diseases of the vertebræ and of the joints, hydrocephalus, softening of the central portions of the brain, and tubercular formations in the membranes, palsy and convulsions, chorea, inflammations of the membranes or substance of the brain or of the spinal cord, and numerous other affections to which delicate infants and children are liable, very commonly result from self-pollution having been practiced by either of the parents previously to the married state. But the evil does not always stop at this epoch of existence; it often extends throughout the life of the offspring; or it appears only with puberty and mature age. The several diseases actually proceeding from tubercular deposits; insanity, or mental weakness, or imbecility; pulmonary consumption, chronic debility, or faulty or impaired development of the frame; diseases of the spine and joints; hysterical and neuralgic affections, epilepsy, and irregular forms of convulsion, partial or complete states of palsy, and various other affections not unfrequently appear, in consequence of the constitutional predisposition arising from the vice of the parent, and the faulty development and impaired nervous energy of the offspring.

II. INVOLUNTARY POLLUTIONS.—SYNON. *Invol-*

*untary discharges of spermatic fluid.—Spermatorrhœa.—Involuntary seminal discharges.*

14. *A.* This form of pollution is of very frequent occurrence, and generally follows the foregoing. When self-pollution has been practiced at an early age, or so frequently as to induce debility, or an irritable state of the sexual organs, involuntary discharges of spermatic fluid are often—indeed generally—the consequences of the relinquishment, or even of a temporary cessation of the voluntary acts. It has been believed, since the appearance of M. LALLENAND's work on this disease, and of Mr. B. PHILLIPS's excellent papers on the same subject, that these discharges “are for the most part, if not altogether, caused by irritation set up in or about the ducts connected with the testicle,” especially at the termination of the seminal ducts in the urethra. Such is, doubtless, the case in many instances; but it is much more generally only a part of the mischief; the whole genital apparatus, more particularly the seminal ducts and vesicles, the ejaculator muscles, and the prostate gland having acquired, from the *vicious practice* above exposed, an irritability and susceptibility beyond the control of the individual. *This practice is the chief cause* of this morbid condition—of this often serious disease, which, if not corrected, generally induces other maladies, although, when it is only of occasional occurrence in robust persons, it is sometimes productive of little injury. Yet self-pollution is not the only cause. The next to it in importance are excesses in sexual intercourse, the constant excitement of the sexual organs ending in a morbid susceptibility, debility, and irritability of the whole sexual apparatus, manifested especially by the parts just named. Gonorrhœa, gleets, discharges, and strictures of the urethra are also, although much more rarely, concerned in the production of this disorder. The irritation of ascarides in the rectum, of hæmorrhoids, of fissures of the anus, &c., has also been considered as one of the causes of these discharges; but I suspect that these morbid states are more frequently associated effects of the same causes—of masturbation and sexual excesses—than the actual occasion of the seminal emissions, even in those cases in which they coexist. However, whether the irritation of the rectum be a cause or a complication of the disorder now being considered, is practically of the less importance, that in either case it equally requires to be removed by suitable treatment.

15. *B.* The *evidence of involuntary spermatic discharges* is, as Mr. PHILLIPS correctly remarks, sufficiently clear; but ultimately, and as the weakness of the organs increases, the ejaculation is unattended by the usual sensations, and the patient may then be unaware of the extent of the evil. It is not unusual, in such far-advanced cases, to find the spermatic fluid passed with the urine, or during efforts at stool, especially when the bowels are costive. In the latter circumstances, the fluid is squeezed out by the pressure on the seminal vesicles. The patient is, however, generally aware of the evil when the fluid is passed with the urine, because it almost always passes with the last drops, and can then be detected, and is attended by a certain sensation about the neck of the bladder. When the urine is examined soon after

it is passed, small granular diaphanous particles are found floating in it, or at the bottom of the vessel. Mr. PHILLIPS states, that when the evil is far advanced, no peculiar sensation is experienced, and the granular matter may be undetected, or may assume a more uniform cloudy appearance. The microscope most certainly detects the seminal fluid in the urine, for by its means the spermatic animalcules may be perceived in the deposite or cloudy portion of the urine. As debility of the constitution or of the sexual organs increases, owing to the great frequency of the discharges, or to other causes, "the fluid becomes thinner, and the animalcules much less numerous, and they may be almost, if not altogether, wanting."

16. *C. The general symptoms or consequences of involuntary pollutions are necessarily, in most respects, the same as I have above stated with reference to self-pollution; for as the involuntary is generally caused by, or is a sequela of, the voluntary discharges, the results, as respect both mind and body, will generally be the same.* One of the most distressing of these to the mind of the patient, is a state approaching, if not actually amounting to, impotency. In some cases, the impotency is owing more to the fears and anxieties of the sufferer than to the physical state of the organs. Mr. PHILLIPS has described this complaint so well, that I shall adopt nearly his own words. It is not that the seminal fluid is deteriorated, or incapable of determining fecundation, but it is that the organs are wanting in the energy necessary for projecting the fluid into the vagina; erection, if it exists at all, being momentary. The digestive functions become deranged, the bowels constipated, nutrition languishes, respiration is troubled, the voice fails, the heart's action is interfered with, even to such an extent as to induce helief of actual disease of that organ, and hypochondriasis becomes complete. These symptoms do not advance far without causing disorder of the nervous system, especially weakness, or failure of one or more of the senses; headache, with a sense of weight or pressure, loss of memory, timidity, apprehension, and various other affections and diseases, either similar to, or identical with, those already mentioned (§ 9, *et seq.*).

17. But the impotency which distresses the patient is not so often imaginary as it is real. The frequent seminal emissions are followed by a thinner and less fully elaborated secretion with a morbidly increased prostatic fluid; and the imperfect and momentary erections, and the rapid emissions, are insufficient to excite the female orgasm requisite to procreation in most cases, or at least to a healthy impregnation and offspring. The impotency, however, is not the only evil; for it soon becomes associated with others if the seminal discharges continue, most generally with epileptic or convulsive affections, with palsy, with pulmonary consumption, with mental delusions, or general insanity, with distaste of life, and thoughts of, or attempts at suicide, or with some other of the various maladies which I have already shown to follow frequent self-pollutions (§ 9, *et seq.*).

18. III. TREATMENT.—i. *Of Self-pollution.*—It is obvious that treatment must necessarily fail, or at best only lessen the ill consequences,

as long as this vice continues to be practiced. It should, however, be recollected that it is not only most necessary that this vice, in all its moral and physical consequences, ought to be exposed to the patient, and the entire relinquishment of it insisted upon, but that those who have, or ought to have, control over him or her should ascertain whether or not the prohibition be strictly observed; for the control of reason generally becomes so weak in these persons as to be quite insufficient to restrain those impulses which the occasions mentioned above (§4-6) too frequently favour or excite. It should not be overlooked that physical conditions and local irritations are often the causes of many of our most uncontrollable desires and passions; and that professional inquiries ought to be directed to the state of those organs which not only are influenced by these desires, but which instinctively excite the desires themselves, independently of reason and volition. There can be no doubt, as I have above stated (§ 4), that the occurrence of this vice is remarkably favored by the physical condition of the male genitals, especially as regards the neglect of circumcision. I am convinced that the abrogation of this rite among Christians has been injurious to them, in religious, in moral, in physical, and in sanitary and constitutional points of view; that circumcision is a most salutary rite, as respects not only the individual, but also the female whom he marries, and his offspring. He who devotes himself to self-pollution—to this modern Moloch of the species—should duly consider the severe denunciations and punishments which it provoked from the Jewish legislator, and observe its enervating effects upon himself, both mentally and bodily.

19. It is necessary, not only to procure a complete relinquishment of this vice, but also to restore the several functions—sexual, digestive and assimilative, nervous and mental—to their healthy conditions. As the manifestations of these several functions are more or less debilitated by this vice, the advice which I have given at full length in the article DEBILITY (§ 29, *et seq.*) should be adopted and strictly followed in all its various details. Tonics, suited to the peculiarities of the case, ought to be prescribed, especially the chalybeate tonics, and mineral waters; and these should be aided by residence in a healthy air, by regular exercise, by full occupation, and by early rising. The patient should get out of bed instantly upon awaking in the morning, and have recourse, either to a shower-bath, or to the cold douche, or to the affusion on the loins and genitals of seawater, or water in which salt has been dissolved being preferred. He should sleep on a hair mattress, and not be allowed a longer period than seven hours for repose. If he or she be much weakened, two or three hours rest on a sofa may be allowed in the middle of the day, but sleep ought not to be permitted, as it must be reserved until bedtime. The diet should be sufficiently nourishing without being heating or stimulating, and the amusements and the reading be such as will not excite sensual desires. The mind, as well as the body, ought to be fully, agreeably, and profitably occupied, without inducing more fatigue than will favour sound sleep during the hours devoted to repose.

20. During the course of this treatment, the



digestive functions should be duly promoted and the bowels regulated. Costiveness will be best prevented by means of stomachic aperients, as the compound infusions of gentian and senna conjoined, taken either early in the morning or at bedtime; and the impaired tone of the sexual organs and nervous system will be the most certainly remedied by the tincture of the sesquichloride of iron, with tincture or infusion of calumba, &c.; or by the sulphates of iron and quinine with the compound galbanum pill, or a vegetable extract; or by the iodide of iron in the sirup of sarsaparilla, or by such other preparations of iron and their combinations as the peculiarities and complications of the case will suggest. In many instances, and more especially in those which manifest a tendency to pulmonary disease, to disordered action of the heart, or to nervous headaches and affections, the *mistura ferri composita* will prove an excellent remedy; and, if there be any tendency to glandular or tubercular disease, the liquor potassæ and tincture or extract of conium may be added, or the iodide of iron or the iodide of potassium may be substituted. When self-pollution has been early or long practiced, the consequent states of anæmia and of nervous exhaustion require either an immediate recourse to chalybeates, or the adoption of them after vegetable bitters and tonics have been taken for a few days with alkaline carbonates, or with the mineral acids, according to the peculiarities of the case.—(See further the treatment advised in the article DEBILITY, § 29, *et seq.*)

21. *B. Involuntary Pollutions, or Spermatorrhœa*, generally originating in self-pollution, or in venereal excesses, require the same means as have been just advised. But these may not suffice to prevent the occasional or even the frequent recurrence of involuntary pollutions; for, although the *voluntary* emissions are discontinued, the *involuntary* may replace them in some form or other. LALLEMAND, PHILLIPS, and others have shown that the passage of a bougie, armed with lunar caustic, down to the seat of irritation, at or about the mouths of the seminal ducts, will remove this often distressing complaint. The application of the caustic is made by means of LALLEMAND's instrument, which conceals the caustic until it has arrived at the seat of pain, which is usually a little in front of the prostate, and a little more than six inches from the orifice of the urethra. When the instrument has reached this point, then the caustic is uncovered, and that portion of the urethra brushed over with it. As soon as this has been done, the caustic is again covered and the instrument is withdrawn. This application occasions little uneasiness; with slight smarting upon passing the urine, and a discharge, which is sometimes considerable, and at first is thin and watery, but gradually becomes thicker, and in the course of a few days ceases. A feeling of improvement is stated by Mr. PHILLIPS to be early manifest in most instances, but the effect of the remedy cannot be estimated until the irritation has subsided. If by the end of six weeks, he remarks, from the application, a very decided amendment, or a cure, be not produced, it may be concluded either that an insufficient application of the caustic has been made or that the fatal habit of self-pollution is still persisted in. He has more than once ap-

plied too little, but he has never had to accuse himself of having applied too much. In any case a second application is indicated when the desired effect is not obtained from the first. He has never had occasion to make more than two applications, but circumstances might render a farther recourse to the remedy proper.

22. If the affection have been caused by inflammation of the urethra—by gonorrhœa or by gleet, or if it be consequent upon stricture, it may cease upon the removal of the primary disease. But if this result be not procured, then LALLEMAND's treatment ought to be tried. When there is stricture, then the mechanical obstacle ought to be removed before this treatment is employed; but the existence of gleet need not prevent its immediate adoption. Mr. PHILLIPS states, that he has scarcely ever had recourse to a second application until five or six weeks have passed and given the assurance that the first has been insufficient. Of 109 cases, 84 were under 22 years of age; 97 admitted that they had practiced masturbation, and they referred this complaint to that cause. Every one, however, asserted that the habit had been discontinued—by some for a few months, by others for years; but in many cases he suspected the accuracy of the assertion.

23. I have been consulted by a number of persons of various ages, from seventeen or eighteen up to between fifty and sixty, who have been subject to this complaint. The most common age was from twenty to thirty-five; but almost in every case abuse of the sexual organs was confessed. In several instances the patient was married, and, in the majority of these, there was no family. Some of the patients were widowers. One gentleman, aged about fifty, married for ten or twelve years to a young and healthy woman, and has had no family, was addicted to self-pollution when young; but being of a robust constitution, and indulging in field-sports, he did not appear to have suffered. When he consulted me, he was liable to frequent involuntary discharges, and sometimes to two in one night, even although he may have had intercourse with his wife soon after going to bed. This, and similar cases, have shown that marriage, which will prove a cure of the complaint in many instances, will not always prevent its occurrence, or remove it when it depends upon chronic irritation of the mouths of the seminal ducts, and upon congestion and enlargement of the prostate gland, these morbid conditions co-existing in that case, but that it may even induce this disorder, and associated disease of the prostate, if sexual intercourse be too frequently indulged in.

24. In young and otherwise healthy persons, when the complaint has not occasioned complete impotency, although the patient may fear the existence of this state, or dread the accession of the loss of all sexual power, marriage will generally bring about the healthy state of the sexual organs, if they be very moderately and regularly exercised at the promptings of sincere affection in connexion with sexual desire. But it is always preferable that the complaint should be removed before the married life is commenced; and it should be imperative, when impotency more or less complete exists in consequence of voluntary, and its sequent, involuntary pollutions, that this state should not be

entered upon until the sexual powers are restored. When involuntary pollutions are complicated with enlargement, congestion, or inflammations of the prostate gland, or with gleet, strictures, or affections of the rectum, these must be altogether removed before marriage is advised; and in no case ought it to take place where the testes are soft and wasted, and the spermatic veins varicose, these lesions being often consequent upon, and associated with, the impotency following voluntary or involuntary pollutions.

25. Although LALLEMAND's treatment is very frequently successful, especially in the cases where irritation exists about the mouths of the seminal ducts, and in such as the one now mentioned, when it occurs in the married state, or is caused by venereal excesses, yet several cases have come under my care in which it had failed in the hands of expert surgeons; and the difficult task was imposed of removing, by strictly medical treatment, what surgical means, aided by medicine, had failed to remove. In most of such obstinate cases, the cure or alleviation of the complaint depends much upon the patient himself; for it is not alone sufficient that he has relinquished the vice in which the evil originated, but it is also requisite that he should so regulate the state of his feelings and passions—so direct his mind, as not to encourage sexual desires, and not to contemplate its disgusting consequences, as either kind of mental rumination will only increase the evil. It will generally be far preferable for the patient to promote his general health and strength by regular living, and by regular and sufficient occupation, mental and bodily, avoiding fatigue and *ennui*; to regulate and promote the several digestive and assimilating processes; to increase the tone of the sexual organs by the means suggested above (§ 19, 20), and to proceed patiently for a time in this course, without injuriously exciting his imagination and desires, and as injuriously directing his attention to the disorder. During a life of celibacy, the discharge may occasionally occur without material injury; and as long as it is not productive of debility, of pains in the back and loins, or weakness of the limbs and joints, or other disorder, and does not recur often, or more frequently than once in ten days or a fortnight, the injury done to the constitution will not be great.

26. It has been supposed by some physicians that the occasional occurrence of involuntary emissions must necessarily occur to a man who is perfectly continent. This is certainly the case very generally if the individual have devoted himself to self-pollution in early life, or been married, or been addicted to sexual intercourse, and has afterward become continent; but a person who has lived chastely during puberty and subsequent manhood, and occupied his mind and body rationally and usefully, without indulging prurient ideas, may pass these, the most likely epochs of life to be subject to this complaint, without experiencing it. The seminal fluid is secreted, nevertheless, and collects in the seminal vesicles; but as the susceptibility of these parts and of their associated organs is neither weakened by abuse, nor inordinately increased, nor unnaturally excited so as to produce the venereal orgasm, no abnormal discharge of it takes place, although the vesicles

continue charged, absorption of the secretion taking place co-ordinately with its elaboration; and thus, instead of proving *excrementitious* and weakening the frame by its absence or loss, it is actually *recrementitious*, and promotes nervous power, the cerebral manifestations, and all the organic and assimilative functions.

27. In young persons, especially those who indulge prurient ideas, or have devoted themselves to weakening self-pollutions or venereal excesses, the constant or frequent desire excites the sexual organs, distends the seminal vesicles, and augments the prostatic secretion, so that the simple contractions of the sphincters after fæcal or urinary evacuations, or the passage of hardened fæces, press out a portion of the contained fluids, which is partly, at least, seminal, as shown by the presence of spermatozoa, and partly prostatic, mixed with the last drops of urine from the membranous part of the urethra, when passed after micturition. In this class of cases the disorder ceases upon a due regulation of the mind, of the feelings, emotions, &c., and after the mind and body are duly and healthily employed. For these, especially when no disease of the prostate gland is present and the testes are quite natural, marriage may be safely advised. Although the patient may suppose himself almost impotent, owing to the prevalence of the discharge, and may actually be so for a time from his fears, or the impression on his mind that he will be found incapable, yet after marriage his fears subside, his powers return, and no longer is any sexual deficiency or disorder complained of.

28. It is often necessary, both as respects the mind of the patient and as to his scruples respecting marriage in his existing state, that medical treatment should be adopted, and some amendment procured before this state is entered upon, or even without reference to this state. If the means and regimen above advised (§ 19, *et seq.*) fail after a due trial, other remedies should be prescribed. The muriated tincture of iron is usually recommended with the *tinctura cythæ*, but they often fail; and in many cases the latter tincture is not appropriate. I have often given the former with the compound tincture of camphor and the infusion or tincture of *calumba*, and sometimes with decided benefit. When, however, there is pain or heat about the anus, with uneasiness or fulness in the perinæum, or any indication furnished by the excretion of urine or of fæces, of irritation about the seminal ducts or prostate gland, or congestion of the latter, or any affection of the rectum, then local depletions from the perinæum and anus, soothing and gently aperient clysters, and much of the treatment I have advised for inflammation of the PROSTATE GLAND, should be adopted. I some time ago attended a case of successive self-pollution, involuntary seminal discharges and retention of urine, in which I had the excellent aid of Mr. FEROUSSON. In this case there was superinduced, at an early age, enlargement of the prostate, spasmodic stricture of the urethra, mental weakness, and, as often seen in similar cases, the most cowardly fears of the introduction of a bougie. The nature of the complications, the habits of the patient, and his defective self-control, rendered both medical and surgical treatment only partially successful. In the simpler



cases, and where debility and susceptibility of the parts are the chief causes of the complaint, the tonics and stimulants already mentioned, the tincture of iodine in small and very gradually increased doses, the iodide of iron; a cautious trial of powdered nuxvomica or its extract or tincture, or of strychnia, or of stramonium; a recourse to blisters over the perinæum or over the sacrum; the application of the emplastrum thuris compositum over the loins; and various other restorative remedies, may be severally advised.

[We have found *ergot*, given in the form of powder and pill, very efficient in checking and controlling these discharges; nor is it less efficacious in relieving irritation of the urethra and prostate, on which these involuntary emissions so generally depend. Dr. C. L. MITCHELL, of Brooklyn, New York, has reported to us two very striking instances in which spermatorrhœa was cured by this agent after the other usual remedies had entirely failed. Its *modus operandi* is doubtless through the mediums of the lower portion of the spinal cord and the lumbar and sacral nerves thence proceeding; hence its efficacy in all diseases of irritation, congestion, and perverted secretion of the organs seated in the pelvic cavity.]

29. If the complaint be associated with ascariæ in the rectum, or with hemorrhoids or other disorders of the rectum, these complications should be removed by the treatment appropriate to them. Pills containing the sulphate of iron, camphor, and asafetida may be taken, and afterward oleaginous clysters, with salt, camphor, and asafetida, may be occasionally administered for the removal of worms; and associated disease of the *prostate gland* and *hemorrhoids* should be treated as recommended under these heads.

[The remarks of Mr. PHILLIPS, referred to by our author, are so important, and the disease of which he treats is becoming so prevalent, that no apology will be needed for presenting the substance of his essay.—Ed.]

"Involuntary discharges are for the most part, if not altogether, caused by irritation set up in or about the ducts connected with the testicle. In some cases it may be doubtful whether the irritation by which they are excited may not have its seat in the rectum; primarily there is no doubt it may, but other cases would lead to the supposition that secondarily the mucous membrane of the urethra itself may suffer, and that, when the irritation in the rectum has ceased, that of the urethra may still keep up the mischief.

"There are particular modes in which the urethra irritation is commonly excited; among these, masturbation holds a prominent place; by this practice the constant excitement of the seminal ducts ends by establishing a permanent irritation there; it may likewise happen from excess in sexual intercourse. Next to this cause we arrange gonorrhœa or gleet discharges, which, from time to time, establish chronic inflammation in the vicinity of the orifices of the ejaculatory ducts. Then follows stricture, which, by opposing an obstacle to the free passage of urine, ultimately causes the development of a morbid condition of the mucous membrane between the stricture and the bladder. The same state of these organs may re-

sult from irritation within the rectum; that irritation may be caused by fissures or piles, or by the presence of ascarides.

"It is said that other causes are capable of inducing the same disordered action of the sexual organs, but as I profess in this place merely to point out such as have come within my own observation, I do not propose to consider others.

"The mode in which the irritation, once set up around the orifices of the ejaculatory ducts, acts, is very much the same as obtains upon the application of irritation to the mouths of other ducts; it solicits increased action in the organ with which they communicate. Irritate the bladder, and the kidneys are stimulated to increased action; irritate the conjunctiva, and the lachrymal secretion increases; irritate the duodenum, and it is said bile will be supplied in increased quantity: it is unnecessary to carry the illustration farther.

"How does masturbation induce this irritation? Within moderate limits it would not do so; but if you give any canal too much to do, you will ultimately develop irritation in it, more especially at its orifice. If urine be passed too often, in cystitis for instance, the orifice of the urethra becomes red, and the same thing happens to other conduits: it is in this way that masturbation or sexual excesses may develop irritation at the mouths of the ejaculatory ducts; it is in that way increased secretion is determined in the testicle; and thus involuntary discharges, consequences of masturbation or excesses, is explained.

"It is easy to explain how gonorrhœal discharges may induce a similar state of things; in many cases, and especially when the discharge is obstinate, the inflammation upon which it depends is extended backward until it reaches the neighbourhood of the prostate; where it may excite, on the one hand, the kidneys, on the other the prostate, and on the third the testicle, inducing each of those organs to furnish more than its accustomed supply. That the inflammatory action, under these circumstances, is likely to fix itself there, is shown in two ways: the existence of stricture so commonly near that region, and the acute pain experienced beyond the curvature when a bougie is passed. Often the inflammation may extend to the bladder itself. Often it passes along the spermatic ducts to the testicle.

"When the involuntary spermatic discharges are caused by stricture of the urethra, the immediate exciting cause is the same as when they are consequences of other circumstances; irritation of the mouths of the ejaculatory ducts. The irritation is then caused by the obstacle to the passage of the urine, and a state of chronic inflammation may be developed along the mucous membrane from the stricture to the neck of the bladder, and may even extend into that organ, or along the ejaculatory ducts. Irritation within the rectum, when long continued, may extend to the sexual organs, and occasion the discharges which we are considering. In some cases the source of irritation of the sexual organs may continue to be confined to the rectum, and when that ceases the spermatic trouble may also cease; but in other instances the spermatic disturbance may persist after the irritation of the rectum is cured. There is no

difficulty in accounting for this circumstance; the irritation, originally anal, has ultimately become urethral also, and will only yield to treatment directly applied to that part. Every experienced surgeon has had ample opportunities of observing the intimate sympathy which exists between the bladder, and the urethra, and the rectum. How an irritable bladder may make an irritable rectum; how piles, or other affections of the rectum, will occasion trouble in the bladder; how the application of caustic within the urethra will now and then induce spasm of the rectum; how, in the efforts made to empty the bladder, in many cases of stricture, a corresponding effort will be made by the rectum; it may not always be easy to explain, but they are facts commonly observed. In most cases the evidence of involuntary spermatic discharges is clear enough, but the time comes when the ejaculation is unaccompanied by the ordinary sensations, and the patient may then be unaware of the extent of the evil. I have again and again known cases where the spermatic fluid passed out with the urine; others, in which the efforts at stool caused a pressure to be made upon the distended seminal vesicles, and thus their contents were squeezed out; but the fluid may not pass until the process of buttoning up is going on, and the evil may be undiscovered. Still, unless the disorder be very advanced, in most cases the person himself is aware of it when it passes with the urine, because it almost always passes with the last drops, and can then be detected, and because a certain sensation is experienced about the neck of the bladder. But when the medical man is consulted, he calls for the recently passed urine, or requests that it may be passed in his presence, and at the bottom of the vessel he perceives small granular diaphanous particles; and they are seen floating even before the urine cools; if the evil be, however, very advanced, no peculiar sensation is experienced, and the granular matter may be undetected, and may assume a more uniform cloudy appearance. In cases where uncertainty remains with regard to the deposit, we may advantageously have recourse to the microscope, by means of which the little long-tailed animalcules of the spermatic fluid can readily be perceived. Under any debilitating causes, whether those causes be found in frequent spermatic discharges, disease, or old age, the fluid becomes much thinner, and the animalcules much less numerous, and they may be almost, if not altogether wanting.

"One of the general symptoms resulting from too frequent spermatic discharges, which is most distressing to the sufferer, is a state approaching to, if not at the time, actual impotency. It is not that the seminal fluid, though deteriorated, is incapable of determining fecundation, but it is that the organs are wanting in the energy necessary for projecting the fluid into the uterus; the erection of the penis, if it exist at all, being only momentary. The digestive functions become deranged; the bowels constipated; nutrition languishes; respiration is troubled; the voice fails; the heart's action is interfered with, even to such an extent as to induce the belief of actual disease in that organ, and hypochondriasis becomes complete. These things do not advance far without caus-

ing trouble in the nervous system, manifested by some perturbation of the senses, by headache, with great sense of weight or pressure, and they are accompanied by loss of memory; a timidity and apprehension which are very painful.

"It must be evident to every one who takes the trouble to reflect on these things, that as the causes of these discharges are many, the treatment must also be variable. When the irritation is in the rectum, the case will require a very different course of treatment to one proceeding from stricture of the urethra. We will, therefore, make such general remarks as are proper with reference to the treatment of the several varieties of the affection which we have considered. First, when the cause is masturbation or sexual excess: The causes here are voluntary; the cure must also be voluntary. Lunar caustic will be powerless unless the patient has sufficient determination to abstain from the practice. But in many cases perfect abstinence will not suffice to put an end to the mischief; the *voluntary* discharges are got rid of, but they were persisted in so long that permanent irritation has been set up in the verumontanum, and that irritation may, as we have already explained, excite equally injurious *involuntary* discharges; and here a remedy must be found by the surgeon. The first thing we have to do is to introduce cautiously a bougie, to pass it down towards the bladder; but before it arrives there, the patient will complain of pain, which is sometimes very acute; and the point at which the bougie has then arrived is usually a little in front of the prostate. The surgeon must then carefully observe how far the penis has been extended, and a mark must be made upon the bougie to indicate the depth to which the instrument has penetrated, because that is the point upon which the lunar caustic must be applied. The depth to which we must penetrate must be marked upon the caustic instrument, which is then introduced and gently passed to the proper point, when the caustic is uncovered and the membrane brushed over; as soon as that has been done, the caustic is again covered, and the instrument is withdrawn. In some cases the patient complains of a little heat when the caustic is applied; in others, the sensation spoken of is a coldness. I have more than once known some discomfort, almost amounting to spasm, at the anus, but altogether it is astonishing how rarely any complaint is made. At the next time of passing the urine, more smarting is usually experienced; it may continue through the day, but it is very bearable. In all cases it occasions a discharge, which is sometimes considerable, and at first is thin and watery, but gradually becomes thicker, and in the course of a few days ceases. In a few cases the discharge is at first streaked with blood; and in a few rare instances there may be trifling hemorrhage.

"In most instances a feeling of improvement is early manifest, but the complete effect of the remedy cannot be estimated until the irritation has entirely subsided. Indeed, the amendment is almost always progressive, and frequently it happens that when, by the end of the second or third week, not much benefit has been apparently derived, we are astonished by the change which has been brought about in another fort



night. If by the end of six weeks from the first application a very decided amendment or a cure be not produced, we may conclude either that an insufficient application of caustic has been made, or that the fatal habit is still persisted in. It has more than once happened to me to apply too little, but I have never had to accuse myself of applying too much. In any case a second application is indicated when the desired effect is not obtained from the first. More than two applications I have never had occasion to make; but I can easily conceive that circumstances might render a farther recourse to the remedy proper. How the lunar caustic acts in extinguishing the morbid sensibility of mucous surfaces I cannot tell, but of its virtues in this respect few surgeons can be ignorant. Every day we apply it to modify the painful irritability of ulcers, as well as that of certain affections of mucous membranes. If the affection has been caused by a gonorrhœal or gleet discharge, the treatment must be the same as in the former instance.

"If it has been caused by stricture, we must first restore the canal to its natural diameter; and it may be that the morbid state of the mucous membrane behind the stricture will gradually improve when the obstacle to the passage of the urine is removed, and that with the cessation of that morbid state may also cease those spermatic discharges which have been caused by it. But this conclusion is not inevitable; the obstacle to the passage of the urine may be removed, but the morbid condition of the posterior part of the canal, which has resulted from it, may persist; so may the specific discharges. Then the efficacy of the lunar caustic can be at once demonstrated; and a single proper and sufficient application of the remedy, with the precautions already indicated, will, in most cases, promptly cure the disease of the urethra, as well as that of the spermatic organs.

"If the discharges be determined by irritation of the anus or the rectum, appropriate means must be used to cure the intestinal disorder; and it may be that when that has ceased, the spermatic disorder will also cease. But it may persist, because a distinct irritation may have been determined in the urethra by the long-continued action of that of the intestinal canal; and to dissipate that, recourse must be had to the lunar caustic, under the same restrictions as have been already pointed out." *Medical Gazette*, Dec. 23, 1842, p. 452.

"Case 1 was a young man, aged 22, addicted to excessive masturbation, often twice a day, with frequent involuntary seminal discharges. The consequence was, complete derangement of the whole system; the sexual organs were extremely lax, the structure of the penis offering no feeling of elasticity when pressed between the fingers, and the scrotum almost as thin as a piece of linen cloth, the testicles hanging very low. On passing a bougie beyond the curvature, he screamed out, and this being the seat of sensibility, the lunar caustic was applied, as above directed, with the happiest effects. It was necessary to apply the caustic only once. Case 2 was a gentleman, aged 35, who formed an intimacy with a lady of rank in Russia, whose propensities were still stronger than his own. The consequence was, the most unbridled excess in sexual indulgences. On his return to

England he formed a similar connexion, which he only gave up when he found his health giving way. The seminal discharges were constant. On passing a bougie along the urethra, it was sensitive throughout, but especially so at a point in the neighbourhood of the prostate. In two days a bougie was introduced, in order to accustom the passage to the presence of a foreign body. The caustic was then cautiously applied without much inconvenience. In the succeeding three weeks the discharge only occurred twice, once in the first week, and once in the next fortnight. The case went on well in this respect, but he died of phthisis afterward.

"Cases 3, 4, 5, and 6 were nearly of the same character, with variation as to the cause; in all, however, the involuntary seminal discharges formed the chief feature in the disease with some tender part of the urethra. The caustic was invariably beneficial. Mr. PHILLIPS ends his valuable paper with the following remarks:

"1st. It is necessary that the habits which have led to those discharges should be discontinued; any means will be powerless if the practice be persevered in. 2dly. When the primary cause of the affection has ceased, it is necessary to examine the urethra with an exploring instrument; and for the purpose I prefer an elastic catheter. The point where the pain is most acute must be accurately noted. The instrument must then be passed on carefully until urine passes along it. Observe how far it has penetrated, and having noted this, you must arrange your caustic apparatus so that it shall not reach so far by an inch, because the prostatic portion of the canal is not commonly implicated in the irritation. The point upon which the caustic is to be applied is, as near as practicable, about the region of the orifices of the ejaculatory ducts.

"It may be asked, why pass the instrument on to the neck of the bladder at all, and why state that an inch in front of the neck of the bladder is the point beyond which the caustic instrument shall not penetrate? Why, again, the spot where acute pain is indicated, during the passage of the bougie, may not be regarded as the proper place for applying the caustic? In many persons the urethra is very sensitive, and the patient complains so frequently, that a little difficulty is experienced in deciding with that test; but when you have ascertained that from the orifice of the urethra to the neck of the bladder is seven inches and a half, and when you farther find that in the passage of the bougie the most acute pain was experienced at a little more than six inches from the orifice, you can then, with much confidence, cauterize the space between the sixth and seventh inches, satisfied that the orifices of the ejaculatory ducts will not escape. It may be thought by some persons that all these precautions are unnecessary; this may be true; but off-hand surgery I dislike; and if in one case, by the neglect of such attention, I cauterized the neck of the bladder, and in another case applied the caustic entirely in front of the seat of mischief, my conscience would not acquit me of blame.

"The foregoing precautions having been taken, the caustic must be exposed, and slightly revolved along the floor of the urethra for half a minute, without fear of harm, and rarely does it excite much pain; very rarely, indeed, does

the patient complain of it. A few days ago I passed a bougie very gently along the urethra of a young man, but it produced syncope. When the caustic was applied a few days afterward, the morbid sensibility was immediately blunted. Usually a smarting is experienced when the urine passes along the urethra after the caustic is used, but it rarely continues troublesome over twenty-four hours.

"Before that time usually a thinnish discharge comes on, which may be profuse, and may be, though very infrequently, streaked with blood. After a few days it begins to abate, and by the time it has ceased the change for the better in the patient's condition seems strikingly manifest. It is always necessary to guard the patient against impatience, because four or five weeks will, in some cases, pass before the beneficial effects of the remedy become clearly evident; and this is the more necessary, because he looks with intense anxiety to the result; and sometimes it happens that a single discharge, after the application of the caustic, will dash the eup of hope from his lips, and induce the most gloomy forebodings. I may again repeat what I have said before, that I have never applied too much caustic, but I have more than once failed by using too little; and much experience is necessary to apply the proper dose. However, it is better to err on the safe side, until experience shall have given confidence in the use of the remedy. I have scarcely ever had recourse to a second application until five or six weeks have passed, and given the assurance that the first has been insufficient."—*Medical Gazette*, Dec. 23, 1842, p. 452, and Jan. 20, 1843, p. 586.

"Since the publication of these remarks by Mr. PHILLIPS, the treatise of M. LALLEMAND 'On Involuntary Seminal Discharges' has been reviewed in the British and Foreign Medical Review, but as the treatment therein recommended is very similar to that adopted by Mr. PHILLIPS, we need not again dwell upon it. The reviewer remarks, that M. LALLEMAND may possibly be surprised that the armed bougie was adopted in similar, if not identical cases by Sir EVERARD HOME more than forty years ago. The following is the experience of three British surgeons on this subject, communicated to the reviewer by letter. One gentleman writes as follows:

"I can recollect eleven cases in which I have found LALLEMAND's treatment successful, and one in which I did not completely succeed. In seven of the eleven cases a single application of the caustic was enough; in four it was necessary to apply it a second time; in a single case two applications were insufficient to cure the disease, although the improvement was very great. The effects are immediate. A person in whom the discharge has continued for some months, will have none for some days after the use of the caustic; but in some cases, as the irritation subsides, it will come again."

"I have carefully noted," writes another gentleman, "twenty-seven cases treated by the nitrate of silver, either applied in the solid form to the prostatic portion of the urethra, or used in the form of injection. Of these cases, thirteen were completely cured; eight so much benefited that the emissions only returned occasionally, and produced but little effect on the

system; and the remaining five benefited by the period between the emissions being lengthened, though not to the same extent as the cases in the second series. The application of the solid nitrate, in many cases, produces very great irritation, sometimes complete retention of urine for a short period; in others, inflammatory irritation with bloody urine, lasting from eight to ten days, and even longer. These circumstances lead me to use solutions of the salt, one or two grains to the ounce, advising the patient to inject several times, at intervals of three and four hours, till a marked irritation was brought on; then to discontinue the remedy for a time, and to have recourse to it again, if the cure was not effected, when the irritation has subsided. The injections used in this way produce often great irritation and bloody urine, which continue sometimes many days. They have, however, in almost every instance, a beneficial effect upon the emissions."

"A well-known and experienced Scottish surgeon observes, 'With regard to LALLEMAND's method of eauterizing the urethra, I have tried it in above a dozen cases, and in the majority of them with decidedly good effects. In those distressing cases of irritability of the bladder where the prostatic portion of the urethra is chiefly affected; in certain cases of chronic disease of the mucous membrane of the bladder, and in that very prevalent and debilitating complaint to which young men are subject, nocturnal emissions, the efficacy of the practice is sometimes very striking. In the latter case, when the eauterization of the prostatic portion of the urethra fails, I have been lately in the habit, from a knowledge of the very intimate sympathy subsisting between the parts, of applying the cautery to the external orifice of the canal, and for about an inch down, and I think, in some cases, with more decided advantage.'

"The last communication we shall quote is the following: 'I have employed the caustic in several cases in private and at the hospital, and I entertain a very favourable opinion of its efficacy; indeed, in some instances, its good effects have been quite remarkable. I have used it successfully in cases of seminal emissions from self-abuse, sexual excesses, or in case of obstinate onanism, which affections appear to be attended with, and partly kept up by a morbid state of the prostatic part of the urethra. After using the caustic, I have found benefit from small doses of cubeb powder (gr. x-xxx.) combined with the tincture of hyoseyamus, and also from steel medicines; the patient practicing, of course, the most rigid self-denial in respect to the cause of the complaint. The patients upon whom I have employed the caustic have not experienced the severe effects described by LALLEMAND as 'occasionally' resulting from it. The application which I make is always slight and transient, and the effects of it subside in a day or two. I have never had occasion to apply leeches to the perineum afterward, and in no case has swelling of the testicles been produced by it. The hip-bath and rest is all the treatment usually required; but I am generally obliged to make two or three applications of the nitrate of silver, and sometimes more, before the complaint is wholly removed."

"In regard to caustic injections, as practiced



by the gentlemen whose notes we have quoted second and third, we have ourselves had no experience in *this* complaint, though, of course, in common with every practitioner, we have, times without number, ordered them in gonorrhœal and blenorrhagic discharges. We are disposed to think that the former of these two gentlemen considerably overstates the effects of cauterization as they usually manifest themselves, and we are also disposed to believe that the application of the solid caustic to the deep part of the urethra is less irritating and more effectual than the application of it in solution, and to the outer part of the urethra.

"The space which M. LALLEMAND usually cauterizes is from the neck of the bladder to the membranous part of the urethra; but sometimes he brushes over the internal surface of the bladder itself to a greater or less extent. He cautions us strongly against repeating the operation too soon; and advises us to wait two or three weeks before we reapply the caustic. Many of his cases appear to have been cured by a single application. Pain, and a slight discharge of blood, but never amounting to hemorrhage, seem to have followed some of his operations; but these consequences disappeared at the end of from twelve to forty-eight hours. In one case they are described as lasting three weeks, but this is mentioned as a rare exception. When the emissions have been diurnal, M. LALLEMAND regards the conversion of them into nocturnal, and the fact of the emissions being once more accompanied with erections and with pleasurable sensations, as a sign of the favourable effects of treatment and prospect of cure.

"We shall now, with great brevity, advert to other modes than cauterization, of treating involuntary seminal discharges, depending solely on chronic inflammation of the prostatic portion of the urethra and of the vesiculæ seminales. The daily introduction of a bougie, and the retaining it for a longer or shorter time in the urethra, may first be mentioned. This, as our own observation enables us to testify, is often useful. Leeching of and blisters to the perineum are by no means of slight efficacy, especially where the prostate is tender and enlarged. We have also prescribed tartar-emetic frictions of the perineum with excellent effects. A total abandonment of masturbation, and a moderate use, or even an entire though temporary disuse of coition, are, of course, indispensable measures. One of our correspondents states, that he has found opiates extremely useful. They are so in most cases, though not in all, since they sometimes seem to augment the disease. Conium is safer; and both it and opium may be used both constitutionally and as a suppository. Cold clysters are often of benefit. As regards general means, alcoholic and malt liquors must be abandoned. M. LALLEMAND's opinion of these is exceedingly hostile; and we believe he is right in this. The food should be nourishing, light, and unstimulant; the bowels should be, of course, attended to, and, as a general rule, country air and exercise prescribed. Among medicines and articles of diet, tea and coffee in excess, tobacco, camphor, nitrate of potash, aloes, must be abstained from."—*British and Foreign Medical Review*, April, 1843, p. 357.

We have been politely favoured with the

following letter, on the treatment of spermatorrhœa, from our friend, Dr. F. CAMPBELL STEWART, of this city, whose very extensive experience and success in the treatment of the disease is generally known to the profession, and our limited experience in its management leads us to the same conclusions as expressed by Dr. S.—ED.

"I have used LALLEMAND's instrument, and pursued his method of treatment for involuntary emissions for several years, and I am decidedly of opinion that it is preferable to any other that I know of. My own modification of the original *porte caustique* (described with a wood-cut in the xxiii. No. of HAY's *American Journal*, &c., July, 1846, p. 265) I have used exclusively for three years past, and I think it possesses several advantages over that of LALLEMAND.

"The number of cases of this disease in which I have cauterized exceeds fifty, and the result has been almost uniformly successful. I allow the caustic to remain in contact with the prostatic portion of the urethra for from thirty seconds to one minute, and never for a longer period. My patients are always prepared for the operation by the frequent introduction of wax bougies, and they are kept quiet for a day or so after each application of the nitrate of silver. I have very rarely had to repeat the operation more than three times, and always allow an interval of from one to three weeks between each application.

"The result of my experience is entirely satisfactory, and the caustic has failed in three or four cases only, and these were aggravated. Accidents have ensued once or twice. I have had one troublesome hemorrhage (within six hours after operation), and abscesses have formed in two cases at the margin of the anus, which were very painful and tedious of cure. The patients ultimately recovered, however, without fistulæ or any other unpleasant consequences ensuing.

"I have tried most of the other means recommended in this complaint—pressure, leeching, camphor, potassa, &c., &c.—but without any marked benefit; and, with the exception of a combination of camphor and extract of lettuce, which I generally give my patients in small doses, and at night, when they are undergoing the caustic treatment, I consider them as almost wholly useless.

"I find the disease to be very common among the middle-aged and young men of our country, particularly those belonging to cities; and I have more than once treated married men for it.

"As to regimen, clothing, exercise, dancing, &c., I always advise my patients to pursue the course that is universally recommended as preventive of the unfortunate habit of onanism, which is undoubtedly the most fruitful of all the causes of spermatorrhœa. A Dr. KAULA, of Paris, who was formerly a pupil of LALLEMAND, has recently published a quarto volume on the subject of this disease, accompanied with the details of a vast number of cases. His experience confirms all that I have said of the caustic treatment, which he considers the only means by which a radical cure can be obtained. We also agree in our views in regard to the serious and distressing nature of the malady, the anxiety and misery occasioned by which can scarcely be exaggerated."]

BIBLIOG. AND REFER.—*Hippocrates*, Littré's edit., t. iv., p. 9; et De Morbis, l. ii., c. 19.—*Galen*, De Fac. Aliment., l. ii.; et De Sanitate tuenda, vi., 14.—*Pliny*, Hist. Natur., xix., 8.—*Juvenal*, Sat., ix., 134.—*Plautus*, Casina, act ii., sc. 2.—*Ovid*, Remed. Amor., l. 799. (*Herba Salaz—Eruca—Rocket*).—*Aretæus*, De Morb. Chron., l. ii., c. 5.—*Rhases*, Ad Mansor., v., 62.—*Avicenna*, Canon., iii., 20, 21.—*Alsa-haravius*, Pract., xxii., 11.—*Oribasius*, Synopsis, v., 35.—*Paulus Agineta*, l. 1, 36, 37, 38.—*Levis*, A Practical Essay upon the Tabes Dorsalis, 8vo. Lond., 1748, 3d edit., 1758.—*S. A. Tissot*, De Morbis ex Manusturbatione ortis, 8vo. Louv., 1760; et Œuvres complètes, 8vo. Paris, 1809, t. vi.—*J. E. Wichman*, De Pollutione Diuturna frequentiori, sed rarius observata, Tubercientiæ Causa, 8vo. Gotting., 1782.—*J. P. Frank*, De curandis Hominum Morbis, Epit., v. (Applies the term Gonorrhæa as do the Ancients to Spermatorrhæa).—*C. F. Boerner*, Praktisches Werk von der Onanie, 8vo. Leips., 1780.—*E. Sainte-Marie*, Sur la Pollution Diurne involontaire, 4to. Lyon, 1814.—*P. A. Petit*, Onan, ou le Tombeau du Mont Cindre; Fait historique. (Poème avec Notes.) 8vo. Lyon et Paris, 1809.—*Journ. des Progrès des Sciences Médicales*, t. i., p. 278. (*Lactucarium recommended for Pollutions*).—*B. C. Brodie*, in Lond. Med. and Phys. Journ., Oct., 1826. (*Softness and Atrophy of the Testes from Masturbation*).—*Rozier*, Des Habitudes Secrètes, ou De l'Onanisme chez la Femme, 2d edit., 8vo. Paris, 1825.—*Lallemand*, Des Maladies des Organes Génito-Urinaires, 8vo. Paris, 1825; et Des Pertes Sémiales involontaires. Paris et Montp., 3 vols. 8vo., 1837–41.—*L. Deslandes*, De l'Onanisme et des autres Abus Vénériens considérés dans leurs Rapports avec la Santé, 8vo. Paris, 1835; et dans Dict. de Méd. et Chirurg. Pratiques, art. Masturbation.—*Civiale*, Traité Prat. sur les Maladies des Organes Génito-Urinaires, 2de partie, 8vo. Paris, 1841.—*Raige-Delorme*, in Dict. de Médecine, 2do éd., art. Spermatorrhée, 8vo. Paris, 1846.—*B. Philips*, Observations on Seminal and other Discharges from the Urethra; in Lond. Med. Gazette, vol. xxxi., p. 451, 584, and vol. xxxiv., p. 17.

[The American reader will find the Essay of Mr. Philips in *Brathwaite's Retrospect*, No. vii., 1843, p. 119, 120, 121, &c. See, also, Review of *Lallemand* in British and For. Med. Review, and Amer. Journ. of Med. Sciences.]

POMPHOLYX.—See PEMPHIGUS.

PORRIGO.—See TINEA.

PREGNANCY.—THE PATHOLOGICAL AND THERAPEUTICAL RELATIONS OF.—DISORDERS INCIDENTAL TO PREGNANCY.

CLASSIF.—GENERAL PATHOLOGY.—*Semciology*.—GENERAL THERAPEUTICS.

1. A change is produced in the uterine organs by impregnation, which affects, sympathetically, the female constitution variously, according to temperament, diathesis, habit of body, predisposition, and age. The more constant and slight changes may be viewed as *physiological*, or as the natural and healthy consequences of the new action imparted to the uterine organs; those which are characterized by more or less derangement of function may be, with equal justice, considered as *pathological*. But there are other considerations besides these which relate to the physiological and pathological relations of pregnancy that will engage the mind of the physician when he is required to treat these disorders, to which pregnancy may predispose, or which it may more directly occasion; and these considerations have strict reference, not only to the treatment required in the particular circumstances of the case, but also to the effects which such treatment may produce upon the state and progress of utero-gestation. Moreover, the pregnant female is not only liable to certain disorders incident to this state, but also to others, in common with the species—to other maladies which attack all who are exposed to their causes. Even in the course of several chronic diseases pregnancy may take place, with or without modification or change of that progress and termination; and thus the pregnant state is most important in respect of the course, termination, and treatment of diseases which occur

during its course, as well as of those which had previously existed. The propriety, therefore, of devoting due consideration to the subject cannot be disputed. I have, however, to regret that my limits admit only of a very succinct account of the several topics which the subject comprises.

2. I. THE LOCAL AND SYMPATHETIC CHANGES CONSEQUENT UPON PREGNANCY.—Impregnation induces a remarkable change in the state of the uterine organs. The nerves with which these organs are supplied experience a more continued state of excitement, and probably even an increased development. The blood-vessels and lymphatics increase in size, and their actions are augmented; and while these organs become generally more vascular and more excitable, the uterus itself augments in volume with the progress of the contained embryo. The ganglia and plexuses supplying the sexual organs are intimately associated, as I have shown in the article SYMPATHY, and in the CROONIAN LECTURES (*published in the Medical Gazette*, vol. xl.) by means of communicating branches of nerves, with the other ganglial and sympathetic nerves, and with the spinal cord and its nerves, both sensory and motory, with, in fact, the ganglial and the cerebro-spinal nervous systems, from both which these organs derive their energies, and upon, as well as through the media of, these systems, they produce their numerous and varied sympathies. That the uterine nerves, plexuses, and ganglia experience, with the development of the ovum of the uterus and of the uterine vessels, an augmentation of their size, was an opinion entertained by W. HUNTER, and subsequently confirmed by TRIEDEMANN and R. LEE. With this remarkable increase of vital action, and of material or structural development of all the constituent tissues of the organ, a more exalted degree of sensibility is imparted, through the media of the organic and cerebro-spinal nervous systems, to the whole frame, which thus participates, more or less, in the excitement and vital activity of the uterus.

3. When it is considered that during pregnancy the uterus, and, consequently, its constituent tissues, are undergoing a process of development, which Dr. MONTGOMERY has shown to amount, at the full period of utero-gestation, to 519 times its virgin capacity, and to twelve times its solid substance, it cannot be a matter of surprise that so remarkable a change should be attended by numerous sympathetic phenomena, and that this organ, having become the centre of most important vital actions, should also be the source of various influences and derangements, manifested both by adjoining and by remote parts, during the progress of that change and of the development of the embryo with which it is associated. The remarkable increase of the functions of assimilation, circulation, and nutrition observed to follow the appearance of puberty is often exceeded during pregnancy; the excitement of the uterine functions, tending more remarkably, than the first evolution of these functions, to develop all the vital actions and manifestations—to increase the general sensibility and susceptibility, to augment vascular fulness and plethora, and to promote the several secretions and excretions, excepting that excretion furnished by the uterus itself. As consequences of these sym-



pathetic changes, and of various predispositions depending upon temperament, diathesis, habit of body, and previous disorder, numerous ailments arise in the course of pregnancy, as well as others which this state is not concerned in producing.

4. Other disorders also occur in the progress of pregnancy, which depend, more or less, upon the mechanical influence which the increased size of the uterus exercises upon the adjoining viscera, and probably also upon sympathetic excitement, or upon irritation, caused by vascular determination to this organ. As the uterus enlarges within the pelvis, the rectum, neck of the bladder, and urethra experience increased pressure, and some disorder of the functions of excretion is often thereby produced, with pain in the back, and various sympathetic affections of a transient or varying character. As the uterus enlarges farther and rises above the brim of the pelvis, the urinary bladder is often pressed upon so as to diminish its capacity, and to occasion frequent calls to pass urine, or even some degree of incontinence of urine. When the womb has nearly or altogether acquired its utmost size, the mechanical effects produced by it may not be limited to the abdominal viscera, but may extend to the thoracic cavity, occasioning thus disorder of the functions of one, or of several organs. The stomach, duodenum, biliary organs, kidneys, and colon have their functions impeded or disordered; and indigestion, jaundice, constipation, and pains in the back and loins, and changes in the state of the urine are often complained of. The mechanical disturbance extends upward, the diaphragm being pressed so high as to diminish the thoracic cavities, and to disturb the functions of the lungs, and sometimes also of the heart, occasioning dyspnoea, short breathing on slight exertion, and embarrassed circulation through the cavities of the heart. The pressure, also, upon the veins and absorbents within the pelvis occasions a varicose state of these vessels, oedema, pains of the limbs, numbness, or neuralgic affections. In some cases, especially in females having a small pelvis or abdomen, or who have borne several children, the muscular and integumental parietes become relaxed or pendulous, admitting of malpositions of the uterus.

5. II. AFFECTIONS OF THE UTERINE AND GENITAL ORGANS AND OF THE MAMMÆ, CAUSED BY PREGNANCY.—DISORDERS OF RELATED PARTS.—i. **ŒDEMA OF THE LABIA VULVÆ** occurs chiefly in females far advanced in pregnancy—during the 7th, 8th, and 9th months. It disappears immediately after delivery, and is caused chiefly by the pressure of the gravid uterus, especially when descending into a large pelvis. It is much augmented by a sitting or standing posture, and is characterized by a tense, colourless swelling, of equable density, often pitting on pressure, and by absence of throbbing and of increased heat. The œdematous labia may be attacked with erysipelas shortly before or after delivery, and the utmost danger, or even death, may result; or they may be the seat of simple excoriations.

6. *Treatment.*—A mild aperient, repeated occasionally, the recumbent position, and bathing the parts with a suitable lotion, will generally remove the affection. In some instances, diu-

retics may be necessary; or even puncturing the œdematous parts, so as to allow the discharge of the fluid. If inflammation or erysipelas occur, the treatment should depend upon the peculiar features and circumstances of the case.

7. ii. **PRURITUS OF THE VULVÆ.**—This is often a very troublesome affection, and frequently connected with a leucorrhœal discharge [ascariides in the rectum], or with an aphthous state of the vulva and lower part of the vagina, or with a state resembling an eruption of small papulæ. It is generally referable to the active vascular determination to the sexual organs, consequent upon impregnation.

8. *Treatment.*—Lotions of acetate of lead, [hydrocyanic acid], or of nitrate of silver have usually been prescribed for this affection. I have generally added a little vinum opii to these. Lotions consisting only of tar-water will generally prove efficacious. In the summer of 1826 I was consulted by a surgeon in an obstinate case, for which the usual means had been employed. I advised a saturated solution of borax in rose-water; and this proved successful. Since that time I have generally prescribed this substance for similar cases. Dr. CHURCHILL states, that a decidedly antiphlogistic treatment may sometimes be required; as venesection, leeches applied to the vulva, and one or two smart purgatives. [Sometimes the stramonium, belladonna, or creasote ointment will succeed in affording relief.]

9. iii. **LEUCORRHEA** is generally caused by the increased determination of blood to the uterine organs during pregnancy, and probably, also, in part, by the pressure of the gravid uterus. It sometimes occasions great debility, and increases the aching of the back often complained of during pregnancy. It may, when excessive in the early months, cause abortion; but at an advanced period it is not very injurious, otherwise than by producing or increasing debility.

10. *Treatment.*—The propriety of removing or suppressing this discharge ought to be considered before any treatment is ordered for it. In many cases, the inconvenience is not so great as to require treatment. But in some instances the discharge is so exhausting as to require to be moderated, if not altogether arrested. To strong, plethoric females, and where the disorder proceeds from active determination of blood to the uterine organs, a moderate venesection and cooling aperients will prove beneficial. In weak or delicate females, and when the digestive organs are disordered, the bitter infusions, as those of cheyreira or of calumba, with small doses of the muriated tincture of iron, or with a mineral acid, will be of service. If the discharge occur in connexion with any pulmonary affection, it may be moderated by internal remedies; but it should not be arrested by powerful astringents. (See art. **LEUCORRHEA.**)

11. iv. **MENSTRUATION DURING PREGNANCY**, or, rather, a periodical discharge of a sanguineous fluid from the vagina, have been occasionally observed. This discharge may occur once or oftener during utero-gestation, and after irregular intervals, but it most frequently takes place at the menstrual periods, and in some instances it returns for three, four, five, or six months, or even for the whole period of pregnancy.

DRS. DENMAN and HAMILTON have doubted the occurrence of these discharges, a skepticism the more remarkable considering the great experience of these physicians, and the frequency of the phenomenon according to the observation of very eminent practitioners. Although I have never been engaged in the practice of midwifery, yet I have been consulted in two cases in which this discharge was stated to have occurred regularly during four or five successive menstrual periods; and not in one pregnancy only, but in each of several occasions of utero-gestation. Neither of these patients had ever had an abortion. The discharge was represented to have continued from three to four days, to have become paler than usual after the second day, and to have passed into a moderate leucorrhœa. It does not appear to be attended with any inconvenience to the patient beyond increased aching of the back and loins. The growth of the child is not affected by it; although, judging from the instances which I have seen, the constitution is rendered more delicate; so that the aphorism of HIPPOCRATES, "that the children of women who menstruate during pregnancy cannot be healthy," appears partly true. The discharge probably proceeds from the vessels of the cervix uteri and vagina, in consequence of the more than usual vascular determination to the uterine organs during pregnancy, the periodic recurrence being the consequence either of ovarian excitement and influence, or of habit.

12. *Treatment*, in most instances, is unnecessary, or nearly so. In one of the two cases which I have alluded to, the lady who was its subject had four children, and this discharge occurred during each pregnancy. Nothing beyond the recumbent posture, and quietude as long as the discharge continued, was prescribed. Three of the four children are living and well, but are of delicate constitutions. HIPPOCRATES advises cupping over the mammae, and MAURICEAU bleeding from the arm. Neither of the cases which I saw required any depletion.

13. V. *WATERY DISCHARGES FROM THE VAGINA* have caused some discussion as to their source or sources. The fluid has been referred to the glands of the cervix uteri, but they cannot be supposed capable of furnishing so abundant and so clear a fluid; although these glands and those of the vagina often furnish a copious mucous secretion. The fluid is more probably collected between the amnion and chorion, or between the chorion and decidua, and evacuated during the advanced stage of pregnancy, or some time before the commencement of labour. In rare instances, the fluid may be actually the liquor amnii. Dr. BURNS remarks, that he has known cases where a considerable discharge of water has taken place after fright or exertion, with subsidence of the abdominal tumour, a feeling of slackness, and irregular pains, and yet the woman has gone to the full time. Other writers have made the same observation. Dr. DAVIS mentions these discharges, especially when they occur "in dribbling quantities weeks and months before labour," as indicative of great consequent danger. But in this other authors do not quite agree with him. The source of the fluid can be inferred only from the quantity and the recurrence of the discharge, and the effect produced upon the

abdominal tumour. If the discharge be great, sudden, and affecting the tumour, it may be referred to the escape of the liquor amnii. If it be gradual, small in quantity, and does not affect the abdominal tumour, it may proceed from the other sources pointed out.

14. The *treatment* consists in keeping the patient dry, clean, and perfectly quiet. An anodyne may be given as circumstances may suggest a recourse to it, and the bowels kept gently open by cooling aperients. Injections *per vaginam*, similar to those advised for *leucorrhœa*, have been recommended, but they are of doubtful efficacy; all perturbations, whether mental, physical, or medical, being much more injurious than beneficial.

15. vi. *DROPSY OF THE AMNION*.—See art. DROPSY, § 113, *et seq.*

16. vii. *RHEUMATISM AND SPASM OF THE UTERUS* have been described chiefly by German and French pathologists. Rheumatism may attack the uterus, as well as other fibrous structures, although much less frequently than those of more superficial or external parts. It is characterized by severe pain, increased on motion and the contraction of the abdominal muscles; by augmented sensibility and tenderness; and by symptomatic fever and restlessness.—*a.* It is caused by cold, currents of cold air, and the usual causes of rheumatism acting upon a rheumatic diathesis. VELTEN states that it was observed during an epidemic of rheumatism; and WIGAND, JOERG, and others, that it was caused by the projection of the clothes, during advanced pregnancy, by the enlarged abdomen, producing exposure of the lower part of the body. It may occur at any period of gestation, but is much more frequent in the latter months. The slighter states of it are very probably, as Dr. CHURCHILL suggests, what have commonly been called "false pains."

17. *b. Symptoms*.—The milder attacks consist chiefly of shooting pains in the region of the uterus, occurring at intervals, and either limited to a small space, or affecting the organ more generally. The severer attacks occur often suddenly, and without any apparent cause; are attended by violent pain in the region of the uterus, the duration and the character of the suffering distinguishing them from the commencement of labour, even although there may be distinct contractions of the uterus, and slight dilatation of the os uteri. In the milder forms there is little or no constitutional disturbance; but the more severe are attended by quickened pulse, hot skin, sleeplessness, and restlessness. Rheumatism of the uterus is generally accompanied with spasm, or irregular contraction of the organ, which is sometimes extended to the lower limbs. The irritation is occasionally, also, propagated to the bladder, causing frequent and painful micturition, and to the bowels, occasioning colic, tenesmus, or diarrhœa. "The motions of the child are a source of great torment, owing to the increased sensibility of the womb; and from some sympathy with the mother, it not infrequently happens that these motions are peculiarly lively."

18. When the affection occurs during parturition, WIGAND, DEZEIMERIS, and CHURCHILL state that the natural pains are arrested, or become tedious, ineffective, sudden or interrupted, and more distressing than usual. The pa-



tient is hot, thirsty, and irritable or restless; the pulse being quick, and either full, soft, and undulating, or small and hard. The uterus is very tender, the weight of the bedclothes occasioning much pain; and the cervix and os uteri are often tender and painful on examination. If the case be left to itself, the pains become weaker, or suspended for hours. If the patient falls into perspiration and sleep, the natural pains recur, and delivery is favourably terminated.—(CHURCHILL.)

19. *c.* The *diagnosis* between rheumatism and inflammation of the uterus consists in the more limited and continued pain of inflammation, and in the more sudden, spasmodic, and paroxysmal character of the pain of rheumatism. It is not improbable that some cases, occurring in the eighth or ninth months of pregnancy, are merely spasmodic paroxysms, or irregular contractions of the body of the organ, and not truly rheumatism affecting its structure.

20. *d.* The *prognosis* is generally favourable, when the patient comes early under treatment; but if she be neglected, abortion or premature labour may follow the continuance of the attack, and the repeated contractions of the uterus and spasm attending the complaint. Slight dilatation of the os uteri usually attends the period of severe suffering; but this part regains its natural state upon the subsidence of the attack. JOERG states that the child is less frequently injured by rheumatism than by inflammation of the uterus.

21. *e.* The *treatment* consists of venesection varying in amount from six to twelve or sixteen ounces, when the patient is young, strong or plethoric, and when there is fever with a hard or full pulse; of sedatives and diaphoretics; and of anodyne enemata. Opium with ipecacuanha may be given at bedtime, or DOVER'S powder; and, after opening the bowels by a suitable aperient, an emollient and anodyne clyster should be administered. An opium or belladonna plaster may be applied over the abdomen or loins; and diaphoretics should be administered at intervals, conjoined with an opiate or some other narcotic. The warm embrocation containing spirits of turpentine, with a considerable proportion of the wine or tincture of opium, may be applied over the abdomen. If the attack occur at the commencement of parturition, this embrocation, without the opium, will generally prove efficacious. The bowels ought to be kept quietly open, so as to prevent fecal accumulations; and the diet duly regulated.

22. viii. INFLAMMATION OF THE PREGNANT UTERUS.—Inflammations of the womb in the unimpregnated state, and after delivery, are described in the articles UTERUS and PUERPERAL DISEASES. I have merely to notice such peculiarities as hysteritis presents during gestation. As may be anticipated from the physiological conditions of the uterus, inflammation attacks the impregnated organ more frequently than the unimpregnated, although less so than after delivery.—*a.* It is *caused* by exposures to cold, by injury, by concussions of the trunk, by the abuse of spirituous liquors, and by the extension of inflammation from adjoining parts. Hysteritis during pregnancy and after delivery, as observed in the metropolis, is chiefly caused by the abuse of spirituous liquors, more espe-

cially of gin. It is said to be most frequently observed in the sanguine and irritable temperaments, and scrofulous diathesis, and seldom to occupy the entire uterus, unless in the very early months. In the latter months of pregnancy, it is more limited, affecting chiefly the lower portions or cervix. At earlier periods it is commonly seated in that part to which the placenta is attached. The inflammation is seated in the muscular structure, but the peritoneal coat may also be implicated; in which case partial or limited adhesions may form between the fundus or body of the uterus and adjoining parts, as I have observed in several instances.

23. *b.* The *symptoms* are a severe, constant, or aching pain in some part of the abdominal tumour, increased upon pressure, upon sudden motion, walking or descending stairs quickly, and by the movements of the child. It often extends to the back and groins. Sometimes dysuria, or a frequent desire to pass urine, or tenesmus, or pain on going to stool, is complained of. More or less sympathetic disturbance is produced, especially heat of skin, quickened pulse, thirst, nausea, or vomiting. "If the disease be very limited, the child may escape injury, and gestation be completed; but if more extended, the fœtus will probably perish in utero, or be prematurely expelled." Unless the disease be completely removed, and the womb restored to a healthy condition, the consequences during parturition may be very serious. Dr. GASON informed Dr. CHURCHILL that, in three cases of inflammation of the womb during pregnancy, rupture took place during labour in the exact spot previously diseased. Dr. E. MURPHY states that most instances of rupture of the uterus may be traced to lesions either previously existing or produced by inflammation. The wife of a respectable tradesman, for whose family I was often consulted, complained of hysteritis at an advanced period of pregnancy. She had had several children, and her constitution was much injured by gin-drinking. She sunk almost instantly upon delivery from sudden and profuse flooding. Inspection of the body was not allowed.

24. *c.* Hysteritis during pregnancy may *terminate*, 1st. In resolution, the patient going her full time and being safely delivered; 2d. In effusion of lymph and the firm adhesion of the placenta to the uterus; 3d. In softening of the structure of the organ, favouring rupture or dangerous or fatal hemorrhage; 4th. In the production of an abscess or small abscesses in the inflamed portion of the uterine parietes; and, 5th. Even in gangrene, as described chiefly by the German writers on diseases of the uterus.

25. *d.* The *prognosis*, as shown by these terminations, ought to be guarded, especially when the disease occurs in females addicted to the use of spirits, to whom it is frequently fatal in one of the ways now indicated.

26. *e.* The *treatment* should depend upon the habit of body, strength, and habits of the patient, and upon the extent and severity of the local symptoms and of the constitutional affection. Although the local suffering is generally less severe than in rheumatism of the womb, the constitutional disturbance is greater, and a more decided and prompt treatment is often required. In other respects the treatment is much the same as recommended for rheuma-

tism of the organ. Local vascular depletions are generally beneficial; and calomel, camphor, and opium are also of service. In other respects the treatment should be the same as advised for inflammation of the womb in the other articles comprising it. (*See* UTERUS and PUERPERAL FEVERS.)

27. III. AFFECTIONS OCCURRING SYMPATHETICALLY DURING PREGNANCY.—The general systems and the more remote organs may experience more or less disorder in the course of pregnancy, arising either directly from the altered state of the uterus; or indirectly, as from fecal accumulations in the large bowels, that are apt to form during the earlier periods of gestation.—i. THE DIGESTIVE ORGANS often experience more or less disorder. The slighter or less important of them may be only mentioned.—A. TOOTHACHE is frequently complained of, but is owing to the common causes of the affection; for it is not usually felt when these causes have not existed before conception; pregnancy, either directly or indirectly, aggravating merely a pre-existing evil. The bowels generally require moderate but repeated doses of stomachic aperients, and afterward anodynes, locally and internally, preparations of iron, narcotics, and antispasmodics, &c. The question as to the propriety of extraction, or of other painful operations for this complaint during pregnancy, may be considered as set at rest by having recourse to ether or chloroform inhalation.

28. B. SALIVATION is sometimes troublesome; but it is rarely of great importance. It will generally be moderated or removed by a judicious use of stomachic or cooling aperients, by cooling and astringent gargles, and attention to the states of the gums and teeth. Rinsing the mouth often with tar-water, or with mucilaginous fluids containing creasote or spirits of turpentine, will generally be useful, and also benefit the teeth and gums. *Capricious or morbid appetite* is not infrequent during pregnancy; but this topic suggests nothing of any importance in addition to what I have stated in the article APPETITE. If, however, carried to an extreme, it may, as well as frights and violent mental perturbations, affect the development of the fœtus.

29. C. NAUSEA AND VOMITING generally occur at some period of gestation—most frequently from the third to the sixth week after conception, although occasionally only a few days after this act; and sometimes not until the seventh or eighth month of gestation. At the earlier periods these symptoms are merely sympathetic. In the latter months they may, in some measure, be caused by the pressure of the uterus.—a. The patient usually finds her stomach uncomfortable on rising in the morning, and the discomfort soon amounts to nausea or vomiting. Whether the stomach be evacuated or not, the nausea ceases after a few minutes or within an hour; and, after some delay, breakfast is taken with the usual or good appetite, and without subsequent inconvenience. These attacks are renewed every morning for six weeks or two months, when they gradually subside. In some cases, vomiting does not occur until a full meal is taken. It may also take place at any time of the day, or in the evening. Instead of gradually ceasing about the third or fourth month, or after quickening,

it occasionally continues during pregnancy, causing great distress and some risk. If carried beyond certain limits, it may occasion miscarriage. When vomiting follows a meal the constitution of the patient languishes from a want of due nourishment as well as from the continued irritation, the patient even sinking from inanition or exhaustion. Several instances of this issue are recorded in the works referred to in the *bibliography*. When the progress of pregnancy is arrested by the death of the fœtus, then the vomiting ceases spontaneously. Instances have occurred of an internal organ, the uterus, stomach, &c., having been ruptured by the violence of the vomiting. The matters thrown off the stomach may be thin, watery, glairy, colourless; or consist partly of bile, or of blood. In severe cases they are greenish or blackish, owing to an admixture of bile or an exudation of blood. The vomiting is generally attended by tenderness at the epigastrium, prostration of strength, a weak, small, quick pulse, constipated bowels, and sometimes a loaded tongue.

30. b. *The causes* of the serious cases of vomiting during pregnancy have not been duly investigated even by those physicians who believe themselves the sole depositories of the knowledge of female maladies. Writers on these maladies have not even shown whether or not this vomiting may not result from disease of the uterus or of the ovum; and they have not always attended to the existence of disease of the liver and biliary apparatus, or of the duodenum and pancreas, or of the stomach itself; or to the presence of scybala, or of irritating substances locked up in the cells of the colon. They even furnish no information as to the states of the kidneys or of the ovaria—so little has a division of labour hitherto tended to advance this department of medical science. Cases, however, have occurred when dangerous or fatal vomiting has been caused chiefly by lesions seated as just stated, or by retained irritating matters, pregnancy merely developing and perpetuating a sympathetic disease, which in most of its morbid relations had previously existed, but had been latent, until it became aggravated or excited by the change in the uterine organs.

31. c. *The diagnosis* of vomiting should not be overlooked, with reference to its dependence or non-dependence on pregnancy. The chief circumstances indicative of its dependence on this cause are its occurrence and daily recurrence in connexion with the disappearance of the catamenia, the speedy return of appetite and of the appearance of good health in the intervals, the changes apparent in the nipple, areolæ, and in the mammæ, and the absence of any sign of disease of the stomach itself, or of any other organ.

32. d. *Treatment*.—In slight cases, and especially during the early months, little or no treatment is necessary: time will remove the disorder. But the bowels should always be kept gently open, as any accumulation in the large bowels aggravates the complaint. If nausea be distressing, and unaccompanied with vomiting, an ipecacuanha emetic will often be of use at an early period of gestation; and, after having evacuated the bowels, the infusion of calumba or of cheyreita may be given. If the patient



be very robust or plethoric, a moderate bleeding will be serviceable at the commencement; but at a later period, or when she is reduced by the duration of the disorder, it is inappropriate. Gentle stomachic or cooling aperients, suited to the circumstances of the case, are generally beneficial. The most useful are, the confection of senna with magnesia, [lemon-juice], the infusions of calumba and of senna with tartrate of potash, with an aromatic spirit; the compound infusion of roses with sulphate of magnesia, a little dilute sulphuric acid, and tincture of orange-peel; and, if the bowels are not much confined and the sickness more urgent, from a scruple to half a drachm of sulphate of magnesia with fifteen grains or a scruple of magnesia, and four or five drops of tincture of opium, in spear-mint water, taken once, twice, or thrice daily. In several cases, the nausea or the vomiting is aggravated or perpetuated by acidity, especially if flatulency is complained of. The infusion of calumba, with magnesia and ammonia, is then very beneficial. Small morsels of ice are sometimes of use.

33. In more severe cases, the application of embrocations over the stomach, or mustard poultices, or terebinthinate epithems, or blisters may be resorted to. When the matters thrown-off are acid, acrid, or attended by flatulent eructations, powdered charcoal, magnesia, ammonia, or other alkalies are severally of use. The hydrocyanic acid may also be given; or creasote, either in pills or in mucilaginous mixtures. The several preparations of opium or of morphia, conjoined with other medicines—either those already enumerated, or warm aromatics and spices, as capsicum, aromatic confection, &c.—are sometimes of service; and embrocations or epithems with laudanum over the stomach afford relief in the more urgent circumstances of the case. During the use of these means, the bowels ought to be preserved in an open state, either by such aperients as are most likely to be retained on the stomach, or by laxative and anodyne clysters. When the bowels are sufficiently evacuated, starch enemata, containing sirup of poppies or the compound tincture of camphor, will then be of service. In all circumstances the horizontal posture ought to be adopted, and strict attention paid to diet, the patient's desire for articles of food being indulged, if there be no reason to the contrary. When all other means fail, and the case admits of the measure, the induction of premature labour may be contemplated, or even attempted.\*

34. *D. HEARTBURN, PYROSIS, SPASMODIC AND COLICKY PAINS* are often complained of during pregnancy, and are severally relieved by antacids, conjoined with tonics, antispasmodics, and anodynes, and by a due promotion of the intestinal secretions and excretions, as just advised for *nausea* or *vomiting*, or as they are more fully directed in the articles *INDIGESTION, COLIC, PYROSIS, AND STOMACH*.

35. *E. CONSTIPATION OF THE BOWELS* is very common during pregnancy, and always aggravates the disorders of the stomach, which have been noticed above.—*a.* It is *caused* in some instances by the pressure of the gravid uterus

on the rectum and sigmoid flexure of the colon; by impaired action of the bowels in others, owing to vital and vascular determination to the uterus; and not infrequently it is increased by the impaction of hardened feces in the cells of the colon. Fæcal accumulations in the cells may exist, and may even endure for weeks or months without the constipation being remarkable; and in this way many of the disorders of pregnancy may be produced or aggravated; not merely those already mentioned, but also headaches, restlessness, watchfulness, colicky pains in the abdomen; weight, flatulence, and distention in this cavity; hemorrhoids, and sometimes diarrhœa or tenesmus. If these ailments continue or increase, owing to the retention of fæcal collections, inflammation of the bowels or dysentery, or abortion may supervene. If constipation, and the collections of fæcal matters in the bowels consequent upon it take place during the latter months of gestation, or be retained until the period of delivery, the diseases incidental to that period are very readily produced.

36. *b.* The *treatment* consists of the occasional recourse to the aperients already mentioned; to rhubarb and magnesia; to the infusions of gentian and senna, with such adjuncts as may suggest themselves; to confection of senna with sulphur and magnesia; to castor oil or olive oil taken in small and frequent doses: to the compound rhubarb pill, with extract of henbane and Castile soap, and sometimes, also, a little ipecacuanha; to emollient and laxative enemata; or to soap or oleaginous clysters. In obstinate cases more active means may be employed, with due reference to the situation of the patient; and for these I must refer the reader to the article *CONSTIPATION AND COSTIVENESS*.

37. *F. DIARRHŒA* is often met with during pregnancy as a consequence of improper food, &c., and of neglect of the bowels, or of constipation. It may be kept up by the presence of hardened feces in the cells of the colon.—*a.* It may occur at any period of pregnancy, and may arise from cold, from mental perturbation, from the state of the secretions and excretions, and without any assignable cause. The acidity consequent upon imperfect digestion often occasions it. Very recently I was consulted respecting a case which resisted absorbents, astringents, tonics, opiates, &c. The patient accidentally mentioned her addiction to the use of immoderate quantities of sugar. This substance was interdicted, unless in small quantity; and within three or four days afterward the same medicines as were previously taken without benefit removed the complaint.

38. *b.* The *treatment* consists of small doses of hydrarg. cum creta with DOVER's powder; or of small quantities of rhubarb with ipecacuanha and dried sub-carbonate of soda; of ipecacuanha with the extract of hop, or with the compound soap pill; of cretaceous mixture with compound tincture of camphor, or tincture of hop; and of flannel clothing worn next the skin, and suitable diet. (*See, also, art. DIARRHŒA.*)

39. *G. JAUNDICE* is not of frequent occurrence during pregnancy. It may appear at any period of gestation, but more frequently during the latter months, and in females who have had

\* We have known two cases where it was necessary to resort to this measure, and where it proved successful, saving, beyond doubt, the life of the patient.]

several children, or are advancing in life. It generally continues until after delivery. It may be caused by the pressure of the gravid uterus, but more frequently by some one of the several pathological conditions assigned in the article JAUNDICE. The symptoms vary with these conditions; and the treatment should have strict reference to them, as well as to the stage of pregnancy and other peculiarities of the case. Although laxatives, or even chologogue purgatives, may be cautiously employed and repeated more or less frequently, yet active cathartic or other heroic measures should not be prescribed. If nausea or vomiting occur, or diarrhœa, the remedies advised above for these may be employed; and the more urgent symptoms, as pain and spasm, should be palliated by means of narcotics, &c. If the symptoms indicate active congestion or inflammation of the liver, bleeding and other antiphlogistic means must be adopted.

40. ii. VARIOUS DISORDERS OF THE HEART AND RESPIRATORY ORGANS sometimes occur during pregnancy. These are apt to appear in hysterical or nervous females, and during a first pregnancy.—A. FAINTNESS, FAINTING, or full syncope, is most apt to occur at the period of quickening, but it may take place at any period, or may recur occasionally or frequently. Delicate and weak females are most liable to it. "Towards the end of pregnancy, fainting is regarded with much suspicion, not so much for the immediate consequences as for its effect upon convalescence after parturition." (CHURCHILL.) It may prove a serious affection if it depend upon passive dilatation of any of the cavities or orifices, or other organic disease of the heart: lesions which consultation will detect.

41. B. PALPITATIONS OF THE HEART are often connected with faintness or syncope, either of these preceding or following the other; and both affections often depending upon the pressure of the gravid uterus upon the digestive organs, and of these latter upon the diaphragm. The embarrassment thus occasioned to the circulation through the heart is often increased by collections of flatus in the stomach, and even in the œsophagus, as well as in other parts of the digestive canal, these collections being often retained by spasm of adjoining parts of the canal. These symptomatic affections are usually caused, developed, or aggravated by mental emotions and perturbations, by errors in diet, by startling noises or occurrences, by disordered states of the stomach and bowels, and by a susceptible and hysterical diathesis. The treatment is nearly the same for both affections. During the paroxysm of faintness the patient should assume the horizontal position; during that of palpitation, the sitting. Antispasmodics and stimulants are beneficial for both, especially those which are prescribed for HYSTERIA. Between the attacks, tonics, restoratives, quinine or cinchona, the bitter infusions or decoctions, stomachic aperients, with due attention to diet and regimen, will generally prevent a return of disorder.

42. C. COUGH AND DYSPNŒA may occur in the early months from sympathy. Either of these may then assume an hysterical character, the cough depending chiefly on sympathetic irritation of the larynx or trachea, and dyspnœa

arising either from the same cause or from affection of the bronchi or respiratory nerves. In these circumstances, both cough and dyspnœa are nervous, spasmodic, or hysterical. But in the advanced stage of gestation, both affections may be caused and continued by the pressure of the gravid uterus, and aggravated by flatulence, indigestion, and costiveness. The diagnosis should, however, be established by means of the stethoscope and percussion, and by an attentive consideration of the several rational symptoms, lest these symptoms proceed from pneumonia, bronchitis, tubercular disease, or some other malady that has supervened or been developed in the course of pregnancy. When these affections are merely nervous and sympathetic, the treatment should be antispasmodic and anodyne. The bowels ought to be freely evacuated, and kept duly open; and acidity of stomach and flatulence prevented by means of tonics, antacids, and carminatives, as already advised, the diet and regimen being duly regulated. If these affections occur in full and robust females, they may be connected with pulmonary congestion, and then blood-letting is requisite. When the cough is severe, the use of narcotics and anodynes is of service, in order to moderate it and to diminish the risk to the fœtus. If it be attended by dyspnœa, pain, or fever, or by adhesive or glairy expectoration, blood-letting is also proper, with antimonial and other diaphoretics.

43. D. HÆMOPTYSIS may occur with or without either or both of the affections just noticed. It is not often observed, for pregnancy more frequently removes than induces this complaint. When, therefore, it is met with during pregnancy, it should be viewed as a most serious evil, and the means advised for hemorrhages promptly employed, according to the state of the case, especially blood-letting, cupping over the back or thorax, acetate of lead with opium, digitalis, acids, antimonial diaphoretics, turpentine epithems applied over the chest, &c.

44. iii. DISORDERS OF THE NERVOUS SYSTEM DURING PREGNANCY.—A. HEADACHES are frequently experienced during utero-gestation; and chiefly by two classes of constitution: 1st, by the delicate, nervous, hysterical, and those deficient in blood; 2d, by the plethoric and robust. In the earlier months the nervous character of headache is most pronounced, in the later months the congestive or plethoric. This latter form is often connected with impeded circulation through the heart and lungs, in consequence of the pressure of the gravid uterus, and in this case more particularly it is aggravated by indigestion, flatulency, and costiveness. The nervous form of headache is often limited, as to the vertex—the *clavus hystericus*—or to one side—*hemicrania*. It is oftener felt in paroxysms than without intermissions; and it is unattended by flushings of the face, heat of scalp, or injection of the conjunctivæ. Congestive or plethoric headache is attended by flushing, increased heat of scalp, injected eyes, a sense of throbbing, distention or fullness, by intolerance of light and sound, and it usually commences in the forehead, and extends equally to both sides; it is also continued and sometimes increased by a meal; while the nervous variety is relieved by a meal and by stimuli.



45. The *treatment* is different in either case. The *nervous form* requires stimulants, antispasmodics, and tonics; as ammonia, camphor, valerian, cascarrilla, &c.; the *congestive*, moderate blood-letting, general, or local, according to circumstances, purgatives, diaphoretics, &c. In all cases, the diet and regimen ought to be suited to the form of headache which is complained of, and the uses of all stimulating or restorative beverages either allowed or disallowed accordingly.

46. *B. SLEEPLESSNESS* is sometimes a distressing complaint of nervous, hysterical, and delicate females, especially as pregnancy advances. It is most liable to affect those who shut themselves in-doors, and deprive themselves of exercise in the open air, and who sleep in too warm and ill-ventilated chambers, or with too much bed-clothes. It is often attended by restlessness, by anxiety respecting trifling matters, and ultimately by despondency, and even by hypochondriasis. It is also intimately allied, and often associated with, *nervous headaches*. It is much more rarely associated with plethoric headache.

47. *Treatment*.—Besides the means already advised for *nervous* and hysterical headaches (§ 45), I have seen decided benefit result from a draught at bedtime, containing a drachm of the tincture of hop, with five or six of the carbonate of ammonia, or from twelve to twenty grains of the carbonate of potash, or soda, or magnesia. When the sleeplessness is attended by indications of *plethora* and active determination of blood to the head, and with the usual indications of *congestive* headache (§ 44), then vascular depletions, purgatives, and other antiphlogistic means, and low diet, are required.

48. *C. DESPONDENCY AND HYPOCHONDRIASIS* are not infrequent in hysterical females, especially during a first pregnancy, and more especially in unmarried females. In married females, these moral affections are most commonly seen in the delicate constitution and hysterical diathesis, and are often attributable to no other exciting cause than the contemplation of the future pains and contingencies of child-birth, or the private contrarieties and anxieties of married life. In the unmarried, numerous and painful reflections serve to develop these mental conditions, and even to carry them on to a state verging on insanity, and subversive of due control. In many such cases, the sentiments and emotions excite the cerebral circulation, and this in its turn augments the despondency, or carries it beyond the limits of sane judgment and conduct.

49. The *treatment* depends upon the peculiar circumstances, moral and physical, of each case. If the despondency proceed from fears of the dangers of child-birth—a cause which seldom exists alone—a true statement of the small amount of that risk will generally allay such fears; for there are very few females, however inexperienced, who indulge such fears after knowing the truth, especially when their hopes are excited and promoted by affection. If the disorder of the mind is truly nervous or hysterical, agreeable society, change of scene and of air, gentle exercise, mental occupation of a pleasant kind, healthy air, and restorative treatment will generally remove it. If the temperature of the scalp, the appearance of the eyes

and countenance, and the action of the earotids, indicate increased determination of blood to the head, then moderate bleeding, especially if the patient be strong or plethoric, cold sponging the head frequently, mild purgatives, derivatives, warm clothing on the lower parts of the body, and light, digestible food, will be requisite, with such other means as the peculiarities of the case may suggest.

50. *D. CONVULSIONS* during pregnancy assume one or other of these forms—the *hysterical*, the *epileptic*, or the *apoplectic*. The first of these is confined to utero-gestation, and is much more frequent during the early months than at an advanced stage. It is chiefly dependent upon the vital excitement and vascular determination to the sexual organs, and affects chiefly the weak, delicate, and hysterical constitution. The character and treatment are in all respects the same as described in the article *HYSTERIA*. *Epileptic convulsions* are the most frequent forms of convulsions at an advanced period of pregnancy, and the *apoplectic* during or after parturition. They are fully discussed in the articles *CONVULSION* (§ 27–88) and *EPILEPSY*.

51. *E. PAINFUL AFFECTIONS OF THE MAMMÆ—Mastodynia*—often commence during pregnancy, with pricking or tingling sensations in them, followed by shooting pains, with slight soreness of the nipples and increased size of the mammæ themselves, and especially of the glandular structure. The pains may be either of a neuralgic character, and owing to sympathy with the increased excitement of the uterus, or altogether consequent upon the stretching of the fibrous envelope by increased development of the glandular structure. In the latter months the pain is often dependent upon active vascular determination, which may go on to inflammation and abscess.

52. The *treatment* consists of fomentations, or frictions with oleaginous and anodyne liniments, or emollient poultices. In many cases no treatment is necessary. In the severer attacks, if these means fail, anodynes, cooling aperients, and antimonial diaphoretics may be prescribed: blood-letting, general or local, is seldom required, unless great tension, enlargement, or increased heat exist, and then the application of a number of leeches, or even venesection, should not be delayed, especially in plethoric females, lest active determination and congestion should go on to inflammation and its usual consequence, abscess. (*See art. MAMMÆ.*)

53. *F. VARIOUS OTHER SYMPTOMATIC DISORDERS, AND EVEN STRUCTURAL DISEASES*, occasionally supervene in the course of pregnancy, owing either to the sympathy existing between the parts affected or to the pressure of the gravid uterus. To the former of these states anomalous affections of the organs of sense, especially of sight and hearing, altered sensibility of various parts, occasional spasms, slight attacks of singultus, eccentricities of conduct or of sentiment, &c., are chiefly owing. To the latter cause, hemorrhoids, incontinence, or retention of urine, varicose veins, cramps or spasms of the lower limbs, œdema, anasarca, ascites, &c., are chiefly to be referred, and are noticed in their relations to the pregnant state in the articles in which these several maladies are described.

54. III. INFLUENCE OF PREGNANCY UPON THE COURSE, TERMINATION, AND TREATMENT OF CHRONIC OR PRE-EXISTENT DISEASES.—A. Various pre-existent maladies have no influence in preventing conception; a very few have even the effect of favouring the act, especially tubercular and scrofulous diseases, when not very far advanced; glandular enlargements, slight hæmorrhages, hysteria, &c. Several of these maladies, indeed most of them, and especially those now named, are either altogether arrested in their progress, or impeded or rendered latent, owing to the vital determination to, and increased vascular action developed in, the sexual organs, and to the salutary influence exerted thereby throughout the economy. Pulmonary affections, especially tubercles in the lungs and hæmoptysis, are generally arrested, if not too far advanced; the pulmonary symptoms often almost disappearing during the continuance of pregnancy; but, soon after parturition, they often re-appear with much greater severity, and sometimes with various associations. When pregnancy occurs at an advanced stage of phthisis, the disease is only partially abated, or rendered somewhat more latent; and in this case, not only is the child born with tubercles already formed, as I have ascertained by inspection in three instances, but the mother sinks in a short time after delivery, with remarkable increase of the pulmonary symptoms, either granular degeneration of the kidneys, with anasarca, ascites, &c., or delirium, or some other complication, besides the more common one of colliquative diarrhœa, rapidly appearing, and accelerating a fatal issue. When the pulmonary symptoms are only slight, the tubercles not having gone on to softening, then not only may pregnancy arrest the farther progress of the malady, but also may subsequent lactation, if duly managed so as not to impair the strength, exert a similar preservative influence, until pregnancy again recurs; and thus the disease, which had appeared before marriage, and had even been attended by hæmoptysis, be kept at bay for several pregnancies, or until the cessation of child-bearing, when it generally reappears and runs its usual course. I have seen a lady who had experienced an attack of hæmoptysis before marriage, have nine children, and enjoyed tolerably good health, and, having ceased to become pregnant, die of consumption two or three years after the birth of her last child.

55. Although pregnancy thus arrests the progress of chronic maladies in most instances, yet, if these maladies are of so severe a character as not to be removed altogether, as some of them are, by this state, and by the changes induced by it in the frame, they may be very remarkably aggravated after parturition, or during the last stage of gestation. Epileptic seizures may be rendered fewer or slighter during pregnancy, especially in the earlier periods; but they may be more severe at an advanced period, or even fatal during parturition. Paralytic affections, even hemiplegia or paraplegia, may be complete, and yet the patient become pregnant, bear a child at the usual period, and even become pregnant several times; but there is an increased risk of apoplectic seizures or convulsions during advanced pregnancy and during parturition. Pregnancy has generally a beneficial effect upon hysteria, leucorrhœa, and

dysmenorrhœa, but there are not infrequent exceptions; and in several other diseases so many circumstances tend to vary the results, provided pregnancy actually occur in their course, that nothing precise can be advanced respecting them. During chlorosis and anæmia, particularly the former, pregnancy may not take place; but if it occur in either, a very beneficial change generally results.

56. B. As to the management or treatment of pregnancy thus occurring during chronic maladies but little can be said. The suggestions of good sense, guided by pathological knowledge, will point out what ought to be done and what avoided, in the different and ever-varying circumstances in which medical advice will be required. In most instances, officious interference will be more prejudicial than beneficial; and the operations of nature, aided by suitable diet, pure, temperate, and dry air, and a gentle promotion of the several vital and excreting functions, will do more than any plan that can be laid down. Heroic or even active remedies should be avoided. They are out of place in these cases, and are only employed by charlatans and pretenders in and out of the pale of the profession. In these, as well as in other circumstances, it is not only the probable good which may be done, but the possible evil also which may follow, that should engage our minds and guide our determinations as to the use of any remedy and the adoption of a particular plan of cure.

57. IV. INFLUENCE EXERTED BY PREGNANCY ON THE PRODUCTION, COURSE, AND TREATMENT OF ACUTE MALADIES.—A. During pregnancy, the increased manifestations of vital action throughout the frame tend to ward off many of the slighter causes of disease, and even others of a more energetic kind, which would have, in other circumstances, been productive of disease, fail of causing it, or cause it in a less degree, during this state. Various epidemics have been observed to affect a smaller proportion of pregnant women than of others, and even endemic diseases have been less frequent among them. Epidemic diseases of a malignant character, or those which often assume a malignant form, as smallpox, scarlet fever, measles, erysipelas, typhous and adynamic fevers, are liable to become not only malignant, but rapidly fatal when they attack pregnant females, although this class of females are less predisposed to them than others. If these maladies appear at an early stage of gestation, abortion is likely to occur, and the danger is thereby increased; if they appear at an advanced period, or shortly before parturition, premature labour often takes place, and a fatal issue very frequently results soon after delivery. Other acute diseases, as inflammations of any of the viscera, although occurring less frequently in pregnant than in other females, are also attended by much increased risk, not only of abortion, but even of dissolution; although the danger is, upon the whole, not so great from these attacks as from exanthematous and malignant fevers. HIPPOCRATES (*Aphorism.*, L. v., 30) says, that "pregnant females seized with an acute disease never recover." This inference, however, is too general, for recoveries take place, in some instances, from most of the acute maladies which have been now enumerated, but



the danger is always great, even in cases of inflammation of the respiratory organs or pleura; and it is not less so, if not even greater, when inflammation of other important or vital organs takes place during pregnancy.

58. *B. The treatment of acute maladies attacking pregnant females should be appropriate to the nature of the disease, to the pathological conditions of the case, to the progress it has made, and to the circumstances of the patient and the stage of her pregnancy.* In most epidemic, or exanthematous, or febrile maladies which are not truly inflammatory, violent or perturbing remedies should be avoided; vascular depletions, the promotion of the abdominal and cutaneous excretions, and due support of the vital powers being severally prescribed, as the nature of the disease and the circumstances of the case may require. In every instance the malady should be carefully watched, remedies cautiously administered, and the various offices of the nurse assiduously performed. The numerous details which a due discussion of this subject might involve are beyond my limits. They will readily suggest themselves in practice to the observing physician, who will act in all things appropriately to the peculiar circumstances both of the disease and of the patient.

**BIBLIOG. AND REFER.**—Hippocrates, *Εντακτωρ*, Op., p. 600.—*Galen*, De Causis Symp., i. 7.—*Pliny*, Hist. Nat., xxiii., 56.—*Aetius*, xvi., 10.—*Paulus Aegineta*, l. i., c. 1.—*Sydenham Edit.*, p. 4. Mr. ADAMS has given references to several of the ancients, and has added the following directions, given by ASPASIA (apud *Aetium*, xvi., 12) for the management of pregnant females: "Women who have conceived are to be guarded from frights, sorrow, and all violent mental perturbation. They are to avoid gestation in carriages, severe exercise, inordinate breathing, and blows about the loins; also the lifting of heavy loads, dancing, and sitting on hard seats. Likewise all acrid and flatulent food and drink are to be avoided. All discharges of blood, from the nose or hemorrhoids, are dangerous in the pregnant state. Moderate and wholesome food, gestation in a sedan, gentle walking, soft friction, and the exercise of spinning are proper. About the eighth month, which is the most critical period, the diet is to be more contracted, and the exercise increased. If the bowels are constipated, owing to the compression of the rectum by the enlarged uterus, laxative food is to be given, such as pisan and malwols. In the ninth month the regimen is to be of a relaxing nature, and for this purpose the tepid bath is to be frequently taken, for it has great effect in rendering parturition easy."—*Avicenna*, Canon., l. iii., 21, 2, 2.—*Haly Abbas*, Pract., l. i., c. 19.—*Primeriosius*, De Morbis Mulierum, l. iv., c. 2.—*F. Rauchinus*, Tract. duo de Morbis ante Partum, in Partu et post Partum, &c. Lugd. Bat., 8vo, 1644.—*Herlitz*, in *Haller's Biblioth. Med. Pract.*, vol. ii., p. 237.—*R. y Castro*, De Universa Mulierum Morborum Medicina, &c., 3tia. ed. 4to. Hamb., 1688.—*Mauriceau*, Des Maladies des Femmes Grosses. Paris, 1824, vol. i., p. 178.—*Manning*, On Diseases of Women, p. 328, et *pluries*.—*R. Manningham*, Aphorismi. Medici; quibus tam bona quam mala valetudo Mul. præcipue Utero-gerentium depingitur, 12mo. Lond., 1756.—*Triller*, De Régimine Gravidarum et Puerperarum. Vitell., 1757.—*Astruc*, Maladies des Femmes, t. v.—*C. White*, Treatise on the Management of Pregnant and Lying-in Women, 8vo. Lond., 1773.—*L. Leake*, Practical Observations on Child-bed Fever, Uterine Hemorrhages, Convulsions, and such other acute Diseases as are most fatal to Women during Pregnancy, 8vo. Lond., 1774.—*C. L. Mursinna*, Abhandlung von den Krankheiten der Schwangeren, &c. Berlin, 1784.—*Chambon de Montauze*, Des Mal. de la Grossesse. Paris, 1785.—*Jacobi*, Dissert. Systemat. Morbor. in Gravidis Expositio.—*Doering*, Tract., b. i., p. 90.—*J. Clarke*, Practical Essays on the Management of Pregnancy, &c., 8vo. Lond., 1793.—*W. Moss*, Essay on Dis. of Children, and on the Dis. and Treatment of Pregnant and Lying-in Women, 8vo. Lond., 1794.—*Baigneres et Ferrol*, Traité des Mal. de Femmes Enceintes, de Femmes en Couche, &c., 8vo. Paris, ann. vii.—*F. Plessmann*, La Médecine Puerpérale, ou des Accidens de la Maternité, 12mo. Paris, 1797.—*Imbert*, Mal. des Femmes, t. i., 394.—*J. Denman*, Introduction to Midwifery, &c., i., p. 145.—*De la Motte*, Traité des Accouchemens, p. 62. Paris, 1766.—*M. Stoll*, Rat. Medendi, &c., iv., 515.—*Serriere*, Consider.

Med. sur la Femme Enciente, &c., 8vo. Paris, 1808.—*R. Rush*, in Med. and Chirurg. Review, vol. x., p. 61.—*Ostian der*, Denkwürdigkeiten, b. ii., p. 394.—*J. Gregg*, Advice to the Female Sex, particularly those in a State of Pregnancy and Lying-in, 8vo. Bath, 1793.—*Stebold*, Lucina, b. iv., st. 3, n. 3, and b. v., p. 1, and Frauenzimmer Krankheiten, h. ii., p. 73.—*Joerg*, Handbuch der Krankheiten der Weibes, p. 460.—*Roy*, Abrégé sur les Mal des Femmes Grosses, 8vo. Paris, 1788.—*J. Burns*, Principles of Midwifery, 9th ed., p. 248.—*Gardien*, Traité complet des Accouchemens, &c., t. i., p. 159; t. ii., p. 16.—*M. Nauche*, Des Maladies propres aux Femmes, 8vo. Paris, 1829, 2d part, p. 691.—*W. P. Dewees*, Compendious System of Midwifery, 8vo. Lond., 1825, p. 123; and a Treatise on the Diseases of Females, 2d edit., 8vo. Phil., 1828, p. 151, et seq.—*Schmidt-müller*, Die Krankheiten der Schwangeren, &c., 8vo. Frank., 1809.—*J. M. J. Vigarous*, Cours Élémentaire de Maladies des Femmes, &c., 2 vols. 8vo. Paris, 1802, vol. ii., p. 119, et seq.—*Montgomery*, On the Signs and Symptoms of Pregnancy, 8vo. Dublin, p. 151.—*Capuron*, Mal. des Femmes, p. 306.—*A. Hamilton*, Treatise on the Management of Female Complaints, 9th ed., 8vo. Edin., 1824.—*Carus*, Lehrbuch der Gynäkologie, &c., &c., 8vo. Leips., 1828.—*Martin*, Mémoires de Med. et de Chirurg. Pratique, sur plusieurs Maladies et Accidens graves qui peuvent compliquer la Grossesse, la Parturition, &c., 8vo. Paris, 1835.—*Dance*, Medico-Chirurg. Review, vol. viii., p. 149.—*Blundell*, Principles and Practice of Obstetrics, p. 180.—*D. Davis*, The Principles and Practice of Obstetric Medicine, &c., 4to. Lond., 1832, p. 871, et *pluries*.—*J. Hamilton*, Pract. Observations on various Subjects relating to Midwifery, 2 vols. 8vo. Edin., 1836.—*T. Radford*, Essays on various Subjects connected with Midwifery, 8vo. Manch., 1839.—*S. Ashwell*, A Practical Treatise on Parturition, comprising the Diseases of the Pregnant and Puerperal States, &c., 8vo. Lond., 1828.—*T. Churchill*, Observations on the Dis. of Pregnancy and Child-bed, 8vo. Dublin, 1840.—(See, also, the **BIBLIOG. AND REFER.** to art. PUERPERAL DISEASES.) [Females and their Diseases, by Charles D. Meigs, M.D. Philad., 1848.]

**PROSTATE GLAND.—DISEASES OF.**—This gland is seldom diseased in young persons; but it is much more frequently affected after puberty, and with advancing age. It is very often diseased in old persons; and generally at this period of life its diseases are associated with those of the bladder, often also with those of the kidneys and urethra; and sometimes gravel or urinary calculi are superadded. The diseases of this gland are, 1st. Inflammatory; and, 2d. Organic or structural; certain of these latter being independent of inflammatory action, and frequently associated with other diseases of the urinary organs.

**INFLAMMATIONS OF THE PROSTATE GLAND.**—**SYNON.** PROSTATITIS; *Inflammation de la prostate*, *Prostatite*, Fr. *Entzündung der Vorstehdrüse*, Germ.

**CLASSIF.**—III. CLASS, I. ORDER. (*Author in Preface.*)

1. **DEFIN.**—*Pain and heat in the perinaeum extending to the anus; frequent micturition, with a scalding sensation on voiding urine; tenesmus; and sensible enlargement and heat of the gland upon examination per rectum, with symptomatic fever, and sometimes retention of urine.*

2. Inflammation of this gland may be either *acute* or *chronic*, and each may occur primarily; but the chronic is often consequent upon the acute, owing as frequently to the constitution and age of the patient, and the complications of the disease, as to any fault in the treatment. Either of these states of the disease may arise from causes common to both, and be followed by nearly the same, or the very same organic lesions. Prostatitis, whether acute or chronic, may be the *primary* malady, and occasion diseases of other associated parts; or it may be *secondary*, or consecutive of these diseases, or of urinary deposits or calculi.

3. i. **THE CAUSES OF PROSTATITIS** are chiefly premature or excessive excitement of the sex-

ual organs, especially manustupration; riding much on horseback or in a carriage; sitting habitually on warm cushions, or accidentally on wet or damp cushions; a frequent or habitual neglect of due evacuations of the urine or of the bowels; the abuse of such purgatives as irritate the rectum, as calomel, blue-pill, aloëtic preparations, &c.; frequent costiveness or constipation; dysenteric attacks; inflammations of the urethra, especially gonorrhœa, gleet, &c.; strictures of the urethra; the use of various substances recommended for the cure of gonorrhœa or glects, especially irritating or astringent injections, and stimulating gum-resins and balsams; nutritious and highly-seasoned viands; excessive use of spirituous and vinous liquors, or of strong coffee; aphrodisiac substances, especially cantharides taken internally or applied externally; exposure of the lower extremities to cold or wet, especially if the individual be of the gouty, gravelly, or rheumatic diathesis; catarrh or inflammation of the urinary bladder; morbid secretions from diseased kidneys; the irritation or pressure of calculi in the bladder; the irritation of worms in the rectum; and injuries sustained in or near the perinæum and anus. Either of these causes may develop the disease, especially during advancing age, and in persons who are addicted to venereal excesses.

4. ii. SYMPTOMS.—A. *Acute Prostatitis* is attended by increasing heat and pain in the perinæum that extend to the anus. Micturition is frequent, and accompanied with pain and scalding upon passing the urine, these sensations being increased "as the *accelerators urinae* contract to expel the last drops of urine." Mr. Coulson accurately observes, that evacuations from the bowels cause great uneasiness; and there often remains a sensation as if the rectum was not completely emptied, giving rise to distressing tenesmus. Upon making an examination *per rectum*, "the prostate is felt as a smooth, round, and hard body, projecting downward on the bowel," which feels hot; and pressure on the gland is exceedingly painful. If a catheter or sound be attempted to be introduced, it passes without difficulty as far as the membranous part of the urethra; but its passage onward is attended by acute pain and severe spasmodic contractions. The above symptoms are aggravated by sitting, standing, or riding on horseback or in a carriage, or by exercise or exertion of any kind, and by the use of heating or stimulating beverages.

5. When resolution takes place, the above symptoms subside; but if the inflammatory action continues unchecked, the inflammation extends to the neck of the bladder, or even farther, and, with the tumefaction of the gland, gives rise to *retention of urine*. In this case the febrile symptoms are remarkably exacerbated; and if retention be prolonged, delirium, followed by coma, owing to excrementitious plethora, may result, if the inflammation be not subdued or the bladder emptied.

6. When rigours occur, with increase of the febrile symptoms, quickened pulse, hot skin, and furred tongue, especially toward the evening; with a sense of fullness, tension, or throbbing in the perinæum; and with more frequent calls and increased difficulty of micturition, the existence of suppuration may be inferred. Mr.

Coulson states, that if the prostate be now examined through the rectum, it will no longer be found hard and resisting, but resembling a distended bladder. The examination, as well as the discharge of feces, causes great pain, and there is constant tenesmus with a sense of burning. The fibrous investment of the gland, softened by inflammation and distended by pus, sometimes exudes a creamy and sanguineous matter into the urethra, the rectum, or the bladder; and then the tumour subsides, the urethra becoming freer, the bladder emptying itself, and the symptoms abating. If the abscess opens into the urethra, the evacuation of urine is preceded or followed by a copious discharge of purulent matter by this passage. Mr. Coulson remarks, that in some cases more or less blood is mixed with the discharge, and that he has known a considerable hemorrhage to take place. After the last drops of urine are voided, there is a stinging pain which lasts for a few minutes, or for a longer period; and there is also a burning pain in the glans penis.

7. B. *Chronic inflammation of the prostate gland* is sometimes a consequence of the acute state of prostatitis, especially when the inflammatory action is only partially subdued and not entirely removed. It is occasionally, also, a reproduction of the morbid action in a milder and slower form, in consequence of the influence of one or more of the causes during or soon after the subsidence of the acute attack. The prolongation of the inflammation in a chronic form, after the acute symptoms are subdued, is often owing to the gouty or rheumatic, or scrofulous diathesis, to gravelly or calculous formations, to the use of stimulating beverages, and to venereal indulgences. Mr. Coulson remarks, that sometimes, in feeble subjects, the antiphlogistic treatment stops the progress of the inflammation at a period of the disease when pus has already formed in the prostate, but has not effected its discharge. Infiltrating the cellular tissue connecting the lobes of the gland and surrounding parts, or contained in small abscesses, this purulent matter becomes more consistent by the absorption of its more fluid parts, and gives rise to cheese-like or tubercular formations, which excite slight attacks of inflammation, with increased deposition and bulk of the gland.

8. More frequently, however, chronic prostatitis commences primarily, and the gland assumes an enlarged, and sometimes an indurated state, owing to the absorption of the more fluid portions of the serum and lymph deposited by inflammatory action into the cells of the connecting cellular tissue. Each exacerbation of the morbid action is thus followed by increased symptoms and size of the gland.

9. The symptoms of chronic prostatitis thus vary with the mode in which the disease commences and proceeds. In the *consecutive form* (§ 7) they are merely the protracted continuance of a milder state of the symptoms than existed during the acute stage, either after intermissions or without, or with remissions of varying duration. When chronic prostatitis is *primary*, it is often long neglected, owing to the gradual increase of the inconvenience, and to the symptoms being mistaken for those of internal piles, until difficulty of micturition suggests the origin of the evil. When the gland



becomes enlarged from the continuance of inflammatory irritation, the patient has a sense of weight and bearing down, and a desire to go to stool, although the rectum is empty. The urine is voided every hour, or oftener, although but little has collected, and so slowly that it drops or dribbles merely from the orifice of the urethra; slight pain being felt in the glans penis and course of the urethra. The symptoms are increased by riding, walking, or standing, and are attended by symptomatic pains in the loins or down the thighs. There are generally, also, constipation and dyspepsia; sometimes headache or scaly eruptions on the skin; and occasionally slight hemorrhage from the urethra. The increased size of the prostate always interferes more or less with the exercise of the functions of the urinary bladder. The inability to discharge readily the contents of the bladder, owing to the impediment produced by the increased size of the gland, and by the associated changes in or near the neck of the viscus, is the chief and the most serious effect of this disease. If, after exertions to empty the bladder, an ounce or two of urine are left in it, the desire to micturate quickly returns, and renewed efforts are made in vain to expel it. This distressing symptom is much increased by exposure to cold or wet, by irregularity of diet, by stimulating liquors, and by constipation of the bowels. Sometimes, instead of retention, there is incontinence of urine; or, during sleep, the urine passes involuntarily.

10. Chronic inflammation, or *enlargement* of the prostate, with or without *induration*, is generally a disease of middle life or aged persons; but has also been met with in the young, chiefly in those who have been addicted to self-pollution. In these, as well as in other circumstances, the mucous follicles increase in size, and the surrounding cellular tissue becomes thickened, the prostate being thereby considerably enlarged, and the desire and difficulty of passing urine proportionably augmented. When the gland becomes so far enlarged as to prevent the entire evacuation of the urine, the retained portion becomes ammoniacal; pain and numbness are felt in the *glans penis*; sense of weight or uneasiness in the perineum; pain in the back of one or both thighs, in the loins, and in the sciatic nerves; and the feces are flattened. In aged or middle-aged persons, the enlargement is often *complicated* with *hemorrhoids*, or *prolapsus ani*, and sometimes with both. The ammoniacal smell of the urine becomes more offensive as the disease advances; and the urine, occasionally, is white and milky, owing, in some measure, to the extension of inflammation to the internal surface of the bladder. If, however, the urine be retained, it presents the appearance of coffee, occasioned by the admixture of blood with it.

11. Sir B. BRODIE remarks that, with far-advanced age, "the prostate usually, perhaps invariably, becomes enlarged." This change takes place slowly and at first imperceptibly; and the term chronic enlargement is not improperly employed to distinguish it from the inflammatory attacks to which the prostate is liable in early life. It may in some respects be compared with the chronic enlargement of the thyroid gland, known by the name of bronchocele. Like the latter, it is generally slow in its progress, and

often, after having reached a certain point, it remains stationary for many years, if proper treatment be adopted. It rarely terminates in ulceration or in abscess.

12. Upon *dissection*, the prostate is found enlarged sometimes laterally, but most frequently in the middle or third lobe. Enlargement of the lateral lobes has existed to a very great extent without having occasioned retention of urine; but even moderate enlargement of the third or middle lobe may occasion retention; for, being situated immediately behind the orifice of the urethra, the urine behind the tumour formed by it presses it against the orifice, and it thus obstructs the passage. Sir B. BRODIE remarks, that the tumour of the third lobe varies in size from a horse-bean to an orange. When small, it is of a conical shape, with the apex projecting into the bladder, and the base continued into the gland; but when large, the base is often the narrowest part. In some instances there is another tumour also projecting into the bladder, formed by one of the lateral portions. The canal of the urethra where it passes through the enlarged prostate is generally flattened. Not infrequently the enlargement so alters the direction of the urethra, that, instead of pursuing a straight course through the gland, it is inclined first to one side and then to the other. The urethra is, in some cases, narrowed by the enlarged gland; but in others it is wider, and even dilated into a kind of sinus, where it lies in the centre of the prostate.

13. iii. THE DIAGNOSIS of enlargement of the prostate is determined by examination per rectum and by the introduction of a bougie or catheter into the urethra. The former mode, however, although it will furnish evidence of the existence of enlargement, may not determine the presence of enlargement of the middle lobe. The introduction of the catheter will, however, soon settle the question as to disease of this lobe. The symptoms of retention of urine from enlarged prostate are not very different from those caused by stricture, but Sir B. BRODIE remarks that the terminations are different. He has never seen a case in which the bladder has given way in the former, as sometimes happens in the latter state of retention.

14. iv. THE PROGNOSIS—A. Of *acute Prostatitis* depends upon the progress of the disease, and the age and other circumstances of the patient. At an early stage of the disease, and before the symptoms of suppuration have appeared, if the health of the patient be not otherwise bad, a favourable prognosis may be given; but in the aged, in a constitution exhausted by excesses, and especially if symptoms of abscess be present, a guarded or an unfavourable opinion should be entertained of the result. When the pain is throbbing, is attended by shivering, and the disease has passed eight days either unsubsided by treatment or neglected, then suppuration has generally commenced, and probably advanced through the connecting cellular tissue; and in this case the patient often ultimately sinks, either one or several abscesses being formed, which may open into the urethra, or into the rectum, or through the fascia, cellular tissue, and perineum. But the abscesses may burrow and form fistulous passages, and cause wasting suppuration. An unfavourable

issue may occur before the abscess makes for itself an exit, owing to the retention of urine produced by it, and to consequent excrementitious plethora, causing fatal coma or apoplexy. This, however, will rarely occur when the patient receives medical aid. If the abscess opens into the urethra or rectum, the infiltration of excrementitious fluids through the orifice will rapidly aggravate the symptoms and accelerate the result. When the matter is early evacuated per perinæum, recovery may be expected, if other circumstances be favourable or the disease be uncomplicated, no serious disease of the kidneys or bladder being associated with it.

15. *B. The Prognosis of Chronic inflammation and enlargement of the prostate gland* is always unfavourable. When the patient is not very far advanced in age, and the constitution is otherwise not materially impaired, then the enlargement and hardening may sometimes be reduced, especially when the disease has not been of very long duration. But in advanced age, in weakened constitutions, and when the disease is associated with inflammation or structural lesions of the bladder or of the kidneys, little hope of recovery can be entertained, although life may be prolonged for a considerable time, if the complication be not of a very severe and dangerous nature, by careful treatment and regimen. Mr. COULSON observes, that "tumefactions of the prostate which are brought on by strictures, disappear when these are cured; it is necessary, therefore, to distinguish them from more permanent disease."

16. *v. COMPLICATIONS.*—Acute as well as chronic prostatitis, with more or less enlargement of the gland, is not infrequently associated with one or other of the following affections: with the gravelly, especially the phosphatic diathesis; with calculous concretions in the bladder or kidneys; with irritable, inflammatory, and thickened states of the bladder; with hemorrhoids or prolapsus ani; with gonorrhœa or gleet; or with stricture of the urethra. In the more chronic states of inflammatory action of this gland, and especially when the enlargement and induration are considerable, one or other, or even more than one of these complications, is often observed.

17. *vi. TREATMENT.*—*A.* In *acute prostatitis*, before symptoms of suppuration appear, the treatment should be strictly antiphlogistic, and consist of the application of leeches, or of cupping over the perinæum; of cooling diaphoretics, especially the liquor antimonii tartarizati, with liquor ammoniæ acetatis and spiritus ætheris nitrici, in camphor water; of DOVER'S powder at bedtime; of cooling saline aperients, and cooling lavement in the morning; and of farinaceous or vegetable diet. If there be much heat about the anus, a frequent injection of a cold fluid and cooling lotions to the perinæum and anus will be of use. And, in such cases more especially, the patient should recline on a horse-hair sofa, or sit upon an open cane-bottomed chair. The patient's beverages should be diluent and demulcent, and all stimulating and heating food and drink ought to be avoided. If retention of urine be threatened, owing to the swelling of the gland or of the middle lobe, and if cold enemata and cold lotions have failed, the hip-bath, demulcent and soothing clysters,

and fomentations or poultices to the perinæum may be resorted to. But, until these and the foregoing means fail, the introduction of instruments should not be attempted. When recourse to these is required, the able advice given by the surgical writers referred to in the *Bibliography* should be adopted.

18. *B.* If *suppuration* has commenced, Sir B. BRODIE and Mr. COULSON advise an early external discharge for the matter, in order to prevent it bursting into the urethra. The early and free puncture of the perinæum down to the gland, save where little or no matter has yet formed, is generally useful, by the loss of blood, and the removal of the tension of the parts. If the disease have anticipated the operator, and the abscess have opened into the rectum or urethra, then the general health should be maintained. If it have burst into the latter canal, then a flexible catheter ought to be retained in the bladder, and such other means as the peculiarities of the case may require, aided by surgical assistance, ought to be adopted.

19. *C. Chronic inflammation and enlargement of the prostate* require at first small but repeated local depletions from the perinæum; abstinence from venereal indulgences; rest in the horizontal posture, and sleeping on a hair mattress; a farinaceous and vegetable diet, with cooling and demulcent diluents, and a gently open state of the bowels, procured by means of cooling aperients, as the confection of senna with magnesia, or bi-tartrate of potash, or with sulphur. These means will be often of service, if persevered in for some time. If these fail, emollient injections, with henbane or sirup of poppies; or suppositories with henbane or hemlock; or the local applications of ointments containing the iodide of potassium, as advised by Mr. STAFFORD; and the internal administration of the iodide of potassium with liquor potassæ in camphor-water, or in mucilaginous or demulcent fluids, or with sarsaparilla; or the tincture of the sesquichloride of iron, taken in the infusion of calumba or of quassia, when the disease is associated with the phosphatic diathesis, or the hydrochlorate of ammonia in gradually increased doses, may severally prove of some service. Blisters and issues to the perinæum, mercurial ointments, camphorated and volatile liniments, anodyne, and narcotic suppositories, have likewise been recommended. The judicious employment of these may either prevent the accession of, or relieve, or even remove, retention of urine. But when these fail, recourse to surgical aid ought not to be delayed; and for opinions as to the employment of surgical means, I refer the reader to the works enumerated below.

## II. ORGANIC LESIONS OF THE PROSTATE GLAND. CLASSIF.—IV. CLASS, IV. ORDER. (See Preface.)

DEFIN.—*Changes of structure of the prostate gland, of various kinds, resulting generally from prolonged vascular excitement, or functional or nervous irritation, causing disorder of, or obstruction to, the urinary excretion, and often associated with other affections of the urinary organs and rectum.*

20. *i.* The most frequent ORGANIC LESIONS of this gland are ENLARGEMENT and INDURATION, consequent upon chronic inflammation.—*a.* But these changes may take place independently of any actual inflammatory action, frequent func-



tional excitement consequent upon entertaining prurient ideas, or upon frequently practiced self-pollutions or other venereal excesses, often occasioning these lesions independently, as well as in consequence of inflammatory action, either acute or chronic. There is every reason, moreover, to infer that sexual desires and frequent excitement of the genitals are attended by more or less active congestion of the prostate, with or without increased prostatic secretion, which, if continued habitually for a long period, will pass into enlargement and induration, and often occasion obstruction to the excretion of urine. M. VELPEAU notices, by the appellation of "*Catarrh of the prostate*," an increased flow of the prostatic secretion, arising from prolonged gonorrhœa or gleet, or frequent attacks of these, and appearing chiefly when the patient has been to stool or has passed his urine. Although sometimes supervening upon inflammatory states of the urethra, this morbidly increased secretion is more frequent after habitual self-pollutions and sexual excitement, and is attended by congestion or active determination of blood to the gland with more or less enlargement, and with several of the symptoms of prostatitis in a slight degree.

21. *b.* Swelling or enlargement of the gland from a varicose state of the vessels, mentioned by CHELUS, is merely a form of congestive or non-inflammatory enlargement. It generally occurs slowly in old persons, after venereal excesses, after repeated attacks of gonorrhœa or gleet, after hemorrhoidal complaints and constipated bowels, and after abuses of stimulating liquors. It is met with most commonly in the sedentary and those who live richly; the difficulty of emptying the bladder increasing, and becoming great, especially after violent exertion, and after heating food and drink. The swollen prostate is felt *per rectum*, but it is free from pain, and there is no pain in the passage of urine through the urethra. "The varicosity is situated rather in the coverings of the prostate. The substance of the gland itself is sometimes soft and spongy, sometimes tense and hard."

22. *c.* The treatment of these states of enlargement of the prostate depends much upon the evidence of their source. If they be consequent upon congestion or active determination to the organ, and if the constitution be not remarkably impaired, local depletions should be prescribed. Clysters of cold water, or of the decoction of oak-bark, with alum; attentive regulation of the bowels; and a cautious use of the catheter, with the other means suggested for the removal of the chronic states of prostatitis, are generally of service (§ 19).

23. *ii.* TUBERCULAR DEPOSITES IN THE PROSTATE, and small puriform collections disseminated through the gland, are mentioned by M. VELPEAU as having been, in rare instances, observed by him, and attended by more or less swelling. They may go on to ulceration or abscess, and terminate in fistulous communications with the urethra or rectum.—*a.* Dr. BAILEY has also observed *scrofulous disease* of this gland, as, upon dividing it, a white curdy matter has been found in it; and scrofulous pus has been forced out of its ducts. Mr. WILSON states that he has seen the prostate enlarged and changed into a white curdy matter, precisely the same in quality as that formed in a

scrofulous absorbent gland. Mr. GUTHRIE has met with a case in which the enlargement caused by scrofulous deposits or suppuration of the prostate was remarkably great. It is probable that these scrofulous changes are merely the results of sub-acute or chronic inflammation of the gland, occurring in scrofulous subjects, and giving rise to the formation of scrofulous pus, in the form either of small deposits or of larger collections, which become more or less altered by the absorption of their more watery parts, or by the occurrence of consecutive irritation and softening.

24. Mr. WILSON states that scrofulous swellings of the prostate are usually found in persons not advanced beyond the middle period of life; that they are slow in their progress, and not attended by much pain; that they may be felt *per anum*; and that their effects upon the excretion of urine depend upon the size and form they assume.

25. *b.* The treatment of scrofulous enlargements of the prostate consists chiefly in the use of the iodide of potassium with liquor potassæ and sarsaparilla; of sea-water, or of cold water with salt dissolved in it, topically, and occasionally as a clyster; of sea-bathing and sea-air; and of the application of an ointment of the iodide of potassium to the gland in the manner recommended and explained by Mr. STAFFORD.

26. *iii.* ULCERATION OF THE PROSTATE is sometimes observed.—*a.* It rarely occurs in the anal aspect or surface of the gland, unless as a consequence of the extension of ulceration, or of cancer of the rectum. It is not infrequently seen in the urethral surface of the gland, sometimes near the bladder, but oftener near to or on the *verumontanum* itself. Ulceration is a consequence generally of scrofulous disease of the prostate, or of purulent formations, or of injuries occasioned by bougies or catheters.

27. *b.* The diagnosis of ulceration of the prostate is very obscure. The appearance of blood on a bougie, or after micturition; the existence of pain in the situation of the gland, and the acute exacerbation of pain upon the passage of a bougie, and upon micturition, will suggest the probable existence of ulceration, but by no means prove it; inasmuch as these symptoms attend inflammation of either the prostate itself, or of the prostatic portion of the urethra.

28. *c.* The treatment which these symptoms suggest will depend upon, and vary with the circumstances of the case, but it will not be materially different from what has been recommended above for the consequences of *prostatitis* (§ 18, 19).

29. *iv.* HEMORRHAGE FROM THE PROSTATE may occur from ulceration, from the opening made by an abscess, from the accidental rupture of vessels, or from injury by a catheter. In these the hemorrhage is rarely very great, and the blood passes by the urethra; but when it is excessive, it may flow into the bladder, where its presence, especially its coagula, always occasions distress. In a case published by Mr. CORLAND HUTCHISON, the bladder was suddenly filled with blood, which proceeded from "two fungoid tumours which projected into this viscus from the prostate gland." The bladder was perfectly healthy. The entrance of the urethra was situated between the two tumours; the left being about the size of a hen's egg, and

the other that of a walnut. (*Lond. Med. Repos.*, vol. xxii., p. 130.) The treatment of hemorrhage from the prostate does not differ from that advised for hemorrhage from the urinary passages. (See art. HEMORRHAGE, § 215.)

30. v. FUNGO-ENCEPHALOID DISEASE AND CANCER have been met with in the prostate.—A. In the former, either the fungoid or the encephaloid structure may predominate. This form of malignant disease may be primary and solitary, as in an interesting case recorded by Mr. STAFFORD; or it may be a part only of a more general manifestation of this malady.

31. B. *Carcinoma*, or scirrhus-cancer, of this gland is rarely seen; but the prostate may be implicated in scirrhus, or cancer of the rectum. It is rare that scirrhus of the prostate occurs primarily, or in an uncomplicated form. Sir B. BRODIE, however, has adduced cases in which scirrhus appears to have affected this gland primarily.

32. C. When fungo-encephaloid malignant disease is seated in the prostate, there is not only great enlargement and retention of urine, but also an elastic or soft tumour felt *per anum*, sometimes with hemorrhage from the urethra, following efforts to pass urine. A scirrhus state of the gland is indicated by acute intermitting pains in the prostatic region, unconnected with the excretion of urine, and enlargement with a stony hardness of the prostate felt *per anum*, in addition to the usual symptoms of chronic enlargement.

33. vi. CALCULI IN THE PROSTATE.—The calculi found in the cavities of the prostate have been too generally viewed as quite different from those formed in the bladder, and as being altogether similar to those concretions sometimes found in the salivary ducts and elsewhere. It is not improbable that, while there are some which thus originate, there are others which are formed chiefly from urinary deposits; or which, originating in the gland itself, become greatly enlarged by urinary deposits, the prostatic calculi being only the nuclei around which these deposits are formed. It should be recollected that, when there is obstruction to the passage of urine through the urethra, owing to stricture, the prostate gland is then sometimes seen with its follicular cavities very much widened, and its ducts dilated; the latter being even as much enlarged as to admit of the introduction of a crow-quill. When, therefore, the urine is prevented from passing by stricture, or passes only in small quantity, some of it is forced into the ducts and cavities of the gland, which thereby become enlarged, the muscular coat of the bladder being also gradually thickened. In these circumstances, if prostatic calculi exist, they will readily increase, owing to the passage of urine over them, or the stagnation of it around them; but when the ducts and cavity become thus dilated, and admit the urine during efforts to expel it, the calculi may actually form in the prostate from the urine thus propelled into and accumulated in the cavities of the gland. I consider that calculi may form in the prostate, or be found either altogether or partly in it, as follows: 1st. They may form in the gland, or in its ducts, independently of any access of the urine, or deposit from this excretion; and in this case they are small and numerous, consisting chiefly of the

carbonate or the phosphate of lime, with a large proportion of animal matter. 2d. Calculi may form in the ducts and cavities of the gland consecutively of stricture of the urethra, owing to the passage into and stagnation of urine within these parts, as shown above; and may afterward increase so as to be partially external to the gland; in this case they may be similar, in chemical constitution, to other urinary calculi, according to the existing calculous diathesis, and may reach a large size. 3d. They may originate in the first of these modes, and subsequently increase greatly in size, owing to urinary deposit, as in the second mode. 4th. Fragments of calculi may escape into dilated prostatic ducts or cavities after lithotomy, or small gravelly calculi may pass into the ducts independently of this operation, where they may increase, as in the second mode of formation.

34. The first or true prostatic calculi vary in size from that of a pin's head to that of a pea, and in number from eight, ten, or twelve to forty or fifty. They are often attended by little inconvenience until they obstruct the excretion of urine; but, in rare instances, they occasion distressing irritation and excitement. Two remarkable cases of prostatic calculi are reported by Dr. HERBERT BARKER (*Trans. of Provin. Med. and Surg. Assoc., N. S.*, vol. ii.), and by Professor FERGUSSON (*Lond. Med. Gaz.*, Jan. 7, 1848). The calculous deposit was most probably formed, in these cases, in the second of the modes now pointed out. Indeed, Professor FERGUSSON mentioned to me, that this was the probable mode of their formation in the case operated upon by him, as they were preceded by stricture of the urethra. Dr. PROUT believes that the larger calculi, which are smooth and polished, and have a porcelain-like appearance, always originate in abscess of the prostate, but it will be found that they are formed in the cavities of the prostate consecutively of stricture of the urethra, as shown above.

35. Dr. CROSSE, of Norwich, remarks, that "it is only when large or numerous in one large cyst, or projecting into the urethra, that prostatic concretions give rise to the symptoms of stone; frequent painful micturition, and discharge of mucus from inflammation of the urethra and neck of the bladder. They seem to be sufficiently often combined with stone in the bladder to lead us to suspect that the one disease contributes to the production of the other; and, indeed, I consider that urinary calculi, stricture of the urethra, or whatever other diseases here situated, causing inflammation of the prostatic part of the urethra, and interrupting the free exit of the excretion of the prostatic ducts, dispose to the formation of calculi of this description." These observations, by so learned and experienced a surgeon, show the connexion I have contended for; while his subsequent remarks indicate that the third mode in which I have viewed the formation of those calculi (§ 33) is one to which he most justly attaches great importance, although he generalizes more in respect of them than agrees with my views. "A distinction to be kept in mind in respect of prostatic calculi is," Dr. CROSSE observes, "that they are not urinary concretions, but are formed and may increase without the urine having access to them; they may,



notwithstanding, rise to the orifice of the prostatic ducts, or get into, or be detained in the urethra, or pass retrograde into the bladder, becoming the nuclei around which deposits from the urine take place." This is one of the modes of formation which I have enumerated, and I could not have an abler authority upon which I might found my views.

36. *B. The Diagnosis of prostatic calculi* is seldom very clear, unless the calculi are large or numerous, or project into the urethra or bladder. Mr. COULSON justly observes, that "a retention of urine or pain about the neck of the bladder, and frequent desire to make water, are sometimes the only symptoms; and these are common to several other affections of the prostatic gland urethra." *Per anum* the gland may be felt to be enlarged; and, in some instances, the calculi may, by their number, form, or size, furnish sufficient evidence of their presence, as in a case mentioned by Dr. MARCET, where they could be plainly felt through the coats of the rectum. When the calculi project from the gland into the urethra, the sound will strike against it; but it will still be a question whether or no the calculus be one which has passed out of the bladder into the urethra. The history of the case, and the existence previously and at the time of symptoms referable to the prostate, will be the chief guides to a diagnosis.

When they strike or grate against an instrument, they will occasion sensations in both the prostate and perinæum, and in the *glans penis*, which will indicate their nature. When very large or numerous, they may be felt, as if in a cyst, *per anum*, or they may protrude so as to be felt in the perinæum.

37. *C. Treatment.*—When severe symptoms are produced by prostatic calculi, then dysuria, stricture, sacculi, inflammation, and thickening of the coats of the bladder all ensue; and in extreme cases, and when it is fully ascertained, upon the requisite examinations, that large or numerous prostatic calculi are present, it will be right, as advised by Dr. CROSSE, to cut down to the prostatic gland from the perinæum, as in the lateral method of litho-cystotomy, and to remove the concretions. An interesting case, recorded by Mr. COULSON (*Op. cit.*, p. 273), will farther illustrate the treatment, which is entirely surgical; and to this, as well as to the remarks of other eminent writers noticed in the *Bibliography*, I must refer the reader.

38. vii. CONCRETIONS FORMED IN THE VEINS, about the prostate gland and neck of the bladder, have been noticed by MECKEL, TIEDEMANN, OTTO, LEBSTEIN, and CROSSE. The last-named author states, that "in aged persons, particularly with hypertrophy of the prostate, a bladder diseased, and the veins about it and the rectum varicose, concretions of phosphate of lime or carbonate of lime, varying in size from a pin's-head to a kidney-bean, are often found in the veins." Sometimes they present the appearance of a white pea, and an inequality or projection answering to the part by which they adhered to the vessel. These concretions have no connection with urinary or other excretions, and are merely growths or concretions which had been adherent to the coats of the vein. They approach nearer to ossific than to calculous concretions. (CROSSE, *Op. cit.*, *passim*.)

39. viii. THE COMPLICATIONS of organic le-

sions of the prostatic gland are those already noticed (§ 16), especially inflammation and thickening of the coats of the bladder; structural lesions of the kidneys, strictures of the urethra, gleet, and gonorrhœa; involuntary pollutions; the several diseases of the rectum, particularly hemorrhoids, prolapsus ani, stricture, or scirrhus; constipation and various affections of the colon, hemorrhage from the urinary bladder, or from the urethra, or from the rectum, and intestinal worms.

BIBLIOG. AND REFER.—P. J. Desault, *Œuvres Chirurg.*, 8vo. Paris, 1803, t. iii., p. 220.—E. Home, *On Dis. of the Prostate Gland*, 2 vols. 8vo. Lond., 1811-18.—J. Howship, *Observ. on Dis. of the Urinary Organs*, 8vo. Lond., 1816.—J. Shaw, *On Structure of Prost. Gland*, in C. Bell's *Surg. Observ.*, vol. i., 8vo. Lond., 1816.—E. A. Lloyd, *On Scrofula*, 8vo. Lond., 1821, p. 107.—J. Howship, *On Complaints affecting the Secretion and Excretion of Urine*, 8vo. Lond., 1823.—J. Wilson, *On the Male Urinary and Genital Organs*, 8vo. Lond., 1821.—T. F. Meckel, *Tabule Anatomico-Pathologicae*, fasc. ii., tab. 13.—A. Cooper, *Lectures in Lancet*, 1823 and 1824.—W. Lawrence, *Lectures in ibid.*, 1829 and 1830.—Amussat, *Leçons sur les Rétentions d'Urine et sur les Mal. de la Glande Prostate*, 8vo. Paris, 1838.—Cruveilhier, *Anatomie Pathologique*, t. i., fol. Paris, 1835, liv. xviii.—B. C. Brodie, *On the Diseases of the Urinary Organs*, 3d ed., 8vo. Lond., 1842, p. 143.—J. G. Crosse, *On the Formation, Constituents, and Extraction of Urinary Calculus*, 4to. Lond., 1835, *passim*.—S. Cooper, *Dict. of Practical Surgery*, 7th ed., p. 1117.—J. A. Mercier, in *Archives générales de Méd.*, 3d series, t. v., p. 209.—G. E. Verdier, *Observat. et Réflex. sur les Phlegmasies de la Prostate*, 8vo. Paris, 1833.—Leroy d'Etiolles, *Considérations Anatom. et Chirurg. sur la Prostate*, 8vo. Paris, 1840.—Vidal, *Ann. de Chirurg. Franc.* 1841, t. ii., p. 31.—Velpeau, *Dict. de Médecine*, art. *Prostate*.—W. Coulson, *On the Diseases of the Bladder and Prostate Gland*, 3d ed., 8vo. Lond., 1842, p. 239.—R. A. Stafford, *An Essay on the Treatment of some Diseases of the Prostate Gland*, 8vo. Lond., 1845.—J. M. Cheilus, *A System of Surgery*. Transl. by J. F. South, 8vo. Lond., 1847, vol. ii., p. 421.

PRURIGO.—SYNON. *Cnesmos* (χνησμός, Galen); *Pruritus*, *Scabies papuliformis*, Auct. *Exormia Prurigo*, Good. *Das Jucken*, *jeukte*, Germ.

CLASSIF.—6th Class, 3d Order (Good). 1st Order, 3d Genus (Willan). III. CLASS, I. ORDER (Author in Preface).

1. DEFIN.—An eruption of papulæ, larger than those of lichen, not materially differing from the colour of the skin; attended by excessive heat and pungent itching; becoming covered with small black scabs when scratched or abraded; leaving behind them yellowish stains; very chronic in duration, but not contagious, and generally unattended by fever.

2. This eruption generally appears about the neck and shoulders, and sometimes extends to the face, trunk, and limbs, more especially to the back; and to the outer sides of the arms and thighs, in the line of extension, and assumes a severe character. It is occasionally confined to a single spot. Its mildest forms may decline in the course of three or four weeks; but much more frequently it continues several months, or even years, and is attended by a burning and intolerable itching. WILLAN has distinguished three varieties, which may be modified in certain localities, or be limited to these localities, thus assuming three local forms. The varieties, according to WILLAN and other writers, are *Prurigo mitis*, *P. formicans*, and *P. senilis*. The first and second differ from each other merely in degree, there being no fundamental distinction between them. The third variety has some peculiar characters.

3. I. DESCRIPTION.—i. *Prurigo mitis* appears in the form of small and slightly prominent papulæ, broader than those of lichen, soft and

smooth to the touch, and of the same colour as the skin. They are attended by incessant itching, which is greatly increased upon the removal of the clothes, by changes of temperature, by the warmth of bed, and by exercise. When left to themselves, or not aggravated by scratching, or by a heating regimen, they subside, with a slight exfoliation of the epidermis; but more commonly the relief of the pruritus attempted by scratching causes the removal of the tops of the papulæ, which then become covered by a small characteristic black scab, formed by the drying of a minute exudation of blood on the abraded spot. If the papulæ be much irritated, oethymatous pustules are sometimes developed. This form of the eruption is most frequent in the spring and summer months in the situations above mentioned (§ 2). It is often preceded by slight disorder of the digestive and excreting functions, especially of the latter, and occasionally by slight acceleration of pulse; but these are usually overlooked. The mildest cases may terminate in about three weeks; but more frequently fresh papulæ appear as the preceding vanish, and the eruption may thus be prolonged for several months.

4. ii. *Prurigo formicans* is merely a severer form of the preceding. The papulæ are, however, generally larger—broader and more prominent, yet flat. They are distinct, nearly of the colour of the skin, if not torn by the nails, and commonly seated on the neck, back, loins, and external aspect of the limbs, although they may appear also on other parts. They are sometimes very numerous in young subjects. The itching is more severe and pungent than in the first variety, resembles the gnawing of innumerable ants or the pricking of hot needles, and is increased towards evening by the heat of bed, and by the circumstances already noticed. RAYER remarks, that patients describing their feelings liken them to burning fires and maddening itchings. ALIBERT says that PLATO, CHARLES V., CHARLES IX., and other great men, were afflicted with this eruption; and that the Abbé MORELLET, at the age of eighty, expressed himself as writhing on "St. LAWRENCE's gridiron" when suffering from it. The warmth of bed sometimes increases the itching to such a pitch as to cause the patients to scratch themselves until they bleed, and as to prevent sleep until morning, or until exhaustion sinks them into it; when they often soon awake to be similarly tormented. The black scabs following the scratching are frequently the chief appearance of eruption, although redness of the skin is often produced for a short time by the scratching. The affection continues for months, and, with varying remissions or intermissions, often for years, especially in weak children and adults, and in old persons. After the subsidence of the eruption the skin remains dry and thickened, and the epidermis exfoliates. This form of the complaint is generally preceded by disorder of the abdominal organs, and by slight fever, which tend to complicate and perpetuate it. Like numerous other cutaneous affections, it should be viewed as a local manifestation of disorder implicating the excreting functions and the state of the circulating fluids, and requiring a treatment directed accordingly. It may occur in both children and adults at any period of the year.

5. iii. *Prurigo senilis*, or *Senile prurigo*, closely resemble prurigo formicans; but the papulæ are harder, larger, and more confluent. It is attended by incessant and insupportable itching, and may endure for years, with varying severity. The papulæ are intermingled with small black scabs and numerous scratches, caused by attempts to relieve the pruritus. In more prolonged cases the skin becomes swollen, inflamed, and as if thickened; and the affection is sometimes complicated with eruptions of vesicles, pustules, or boils, according to the constitution and regimen of the patient. Abscesses are even occasionally formed. But these external associations generally proceed from more or less marked disorder of the assimilating and excreting functions, more especially of the liver, bowels, and kidneys, with or without gastro-intestinal irritation or febrile excitement.

6. In a severe case of senile prurigo, WILLAN found a number of minute *pulices* upon the skin, and he remarked the frequent association of the *pediculus vestimentorum* with this eruption. In very old persons, or in the debilitated, when the eruption follows febrile diseases, and in those who live on poor, unwholesome food, but especially in debilitated persons in the decline of life, swarms of *pediculi* not infrequently complicate this affection. There is, however, also more or less disorder of the abdominal functions, with either a poor or impure state of the circulating fluids.

7. iv. *Local Forms*.—These are merely the occurrence or limitation of prurigo—of its characteristic eruption, to certain localities, where it usually becomes severe and prolonged, and occasionally produces additional annoyance or distress. In the several localities constituting these forms, the eruption is similar to some one of the varieties already described; the locality favouring no one variety more than another.—*A. Prurigo podicis* is generally an eruption of papulæ similar to those of *P. mitis*, but more frequently to those of *P. formicans* around the anus, sometimes extending to the perinæum, between the nates and thighs. The symptoms and duration of the eruption are the same as stated above. After its long continuance the skin around the anus becomes rough, thickened, and otherwise altered.—*B. Prurigo scroti* is merely the extension of the eruption to the scrotum, and is not farther peculiar in any respect, the symptoms and sufferings being the same as in the several varieties.—*C. Prurigo pudendalis* is seated chiefly in the *labia majora* and mucous surface of the *vulva*. It is attended by constant but varying pruritus, occasioning swelling or inflammation of the parts, sometimes with a serous exudation; and it induces sexual excitement and self-pollution, amounting in some instances to nymphomania. This form sometimes occurs during pregnancy, and occasions much misery.

8. II. *DIAGNOSIS*.—Prurigo is distinguished by the absence of colour from the papulæ, and by the stinging or burning pruritus. It may, however, be confounded with *lichen* and some of the *vesicular eruptions*.—(a) It is distinguished from *lichen* by the larger size of the papulæ, by the small black scabs, and by the intense burning itching.—(b) Prurigo is most likely to be confounded with *scabies*, but the papulæ of



prurigo are flattish and of the same colour as the skin, while the vesicles are acuminated and rose-coloured. The vesicles of the latter terminate in yellow scabs, and occur in exactly opposite situations to those in which prurigo appears, namely, in the internal surfaces of the limbs and in the line of flexion. The pruritus of scabies is also much more supportable than that of prurigo.—(c) Prurigo may co-exist with lichen, scabies, and eczema, and with the pustules of impetigo and ecthyma. It terminates by resolution or by furfuraceous desquamation.

9. III. PROGNOSIS.—Prurigo is not attended by danger in the young, robust, or otherwise healthy, although it may prove very obstinate and harassing to the patient. In debilitated, cachectic constitutions; in old and ill-fed persons; and where cleanly habits are not duly observed, it is often incurable; and if it be associated in these with visceral disease, it may tend to shorten life. In the complications especially, and particularly in those with disorder of the abdominal organs, either the suppression of the external eruption, or the development of acute disease of these organs, may be attended by severe or dangerous symptoms, especially if the eruption disappear rapidly.

10. IV. CAUSES.—The first and second varieties of prurigo occur chiefly in children and adults, and at all seasons, but more frequently in spring and summer. Senile prurigo is most common in the old, ill-fed, and in connexion with an impoverished or impure state of the blood. Low and damp situations; poverty, and the want of cleanliness; unwholesome, deficient, or poor diet; the use of salt, stale, or dried, or otherwise preserved fish, or of shell-fish; heating and stimulating liquors and condiments; impaired excreting functions, especially by the liver, bowels, kidneys, and skin; the neglect of aperient or chologogue medicines, and of due evacuations; visceral disorders occasioning, or even consequent upon, the accumulation of effete materials in the circulation; the suppression or interruption of various depurative functions, as amenorrhœa, &c.; the use of dirty clothes, or of foul woollen bed-clothes, and of foul or impure beds, stuffed with animal productions, as wool or feathers which have become contaminated by the perspiration of many years of occupation; the influence of mental emotions, and interruptions of the excreting functions, severally and in various states and forms of association and succession, occasion this and various other chronic eruptions.

11. V. TREATMENT.—In all cases, especially the more protracted, of this complaint, the state of the abdominal viscera, and of the several excretions should be closely examined, and existing disorder of these corrected or removed.

—A. If abdominal plethora or congestion of any of the abdominal viscera be present, a moderate vascular depletion may be prescribed; and PLUMMER'S pill with soap be given at bedtime, and an aperient in the morning, consisting of the electuary of senna with magnesia and milk of sulphur. A dose of a bitter infusion, as calumba or chereita, may be taken once or twice daily, with the sesquicarbonates of potash and ammonia. Having removed accumulated or morbid excretions, and promoted the discharge of effete materials from the blood, the healthy

functions of the skin should be restored by a frequent use of warm alkaline, or of soap, or of sulphur baths; and by the internal administration of sulphur with magnesia, or with an alkaline carbonate, every night, or both night and morning. When the skin is dry and rough, these baths may be alternated with vapour baths, or with baths containing the bi-borate of soda, and followed by warm baths with gelatin or mucilaginous substances, as tragacanth, two or three days being allowed to elapse after the mucilaginous baths in order to observe their effects. These last baths may likewise contain either of the alkaline sub-carbonates, from one to four ounces to each bath, according to the size and age of the patient. Where the skin is delicate and irritable, then irritating baths and applications ought to be avoided; simple warm or soap baths, or gelatinous, emollient, or mucilaginous baths being most serviceable. If these fail, the state of the assimilative and excreting viscera should be strictly examined, in order to detect lurking disorder; for generally to this cause is the obstinacy of the complaint owing, and to it, also, are to be imputed the injurious and often dangerous consequences of suppressing the eruption before, or without, attending sufficiently to the states of the abdominal functions and organs.

12. Various ointments and greasy or oily applications have been recommended for this eruption, especially those containing sulphur, the iodide of potassium, and muriate of ammonia; but independently of the unpleasantness of such applications to an extensive surface, they soon become, owing to the action of the air upon them, more or less irritating, although they may at first have afforded a little ease. If they be at all prescribed, they ought to be followed, in eight or ten hours, by a warm saponaceous or emollient bath. Instead of these I have generally employed a lotion with the hydrochlorate of ammonia; or a very weak solution of the bi-chloride of mercury, with or without the vinum opii, or watery extract of opium; or a solution of the sulphuret of potash; or a solution of the bi-borate of soda, or chlorate of soda or potash, or of the alkaline sub-carbonates, or diluted pyroligneous acetic acid, with the addition of creasote. These are severally beneficial; and while camphor-water, rose-water, or elder-flower water may be used as the vehicles of the active agents, opium, or hydrocyanic acid may be added, according to the circumstances of the case. In the more obstinate cases, I have prescribed, after due attention to the abdominal functions and organs, a weak solution of the iodide of potassium, with a watery solution of opium, as a lotion, and sometimes also this iodide or the iodide of iron internally, with sarsaparilla or with taraxacum, and have observed much benefit accrue from the treatment.

13. B. The senile variety of prurigo will generally be removed, if it be capable of removal, by the means above recommended, especially if due attention be paid to the states of the several excreting viscera, and to diet and regimen. The utmost cleanliness should be observed, and as there is often not only debility, but also anæmia, or an impoverished state of the blood, in these cases, tonics and chalybeates should be associated with carbonate of ammonia, or

with either of the other alkaline carbonates in the treatment. The patient should sleep on a hair mattress; and the bowels ought to be duly regulated by means of sulphur with magnesia, or of any stomachic aperient which may be found to agree the best, as the infusions of gentian and senna with the sesquicarbonates of ammonia and of soda.

14. When the eruption is associated with the production of *pediculi*, a tonic treatment is more especially required, aided by cinnabar fumigations, or by frequent sulphur baths, or by lotions with the bi-chloride of mercury. A trial, in the most obstinate cases, may be given to mineral waters, especially when the excreting organs are torpid. The waters of *Cauterets*, or of *Bonnes*, or of *Bareges*, or of *Carlsbad* may be taken. Of these the *Bareges* water may be preferred; but I believe the sulphureous waters of *Harrogate*, or of *Gilsland Spa*, or of *Moffat* to be equally, if not more beneficial in this complaint, aided by warm bathing, due exercise, and appropriate diet. While the diet is sufficiently nutritious, it ought to be digestible; and fish, shell-fish; pork, veal, ham, bacon; heating condiments and rich sauces, coffee, and stimulating beverages should be avoided.

15. *C. The local varieties* require chiefly the means already noticed.—(a) *Prurigo podicis* and *P. scroti* are often connected with chronic irritation of the rectum and of its mucous follicles, owing either to the presence of *ascarides* or to *hemorrhoidal affection*. In these cases, small injections of some of the lotions above mentioned into the rectum; great attention to cleanliness; the treatment, local and general, advised for these diseases; the application, by means of a sponge, of the lotions already enumerated (§ 12), or of a weak solution of the acetate of lead with vinum opii, especially immediately after each stool; local fumigations with sulphur or cinnabar, and an occasional application of leeches in plethoric persons, will seldom fail to remove the complaint, which, however, is very prone to recur, after neglect or errors of diet and regimen.

16. (b) *Prurigo pudendalis* being sometimes occasioned by disordered catamenial functions, or by leucorrhœa, or by pregnancy, and complicated with either of these, requires an especial reference to the existence or non-existence of either. In these cases, the internal, external, and dietetic means already specified are of more or less service; but in these complications they may all fail, and the patient be reduced to a state of great misery. Treatment often fails during pregnancy, although the complaint will generally disappear after delivery. In some cases it has recurred in each pregnancy, and has even reappeared after the change of life. The application of leeches to the vulva; cooling aperients and enemata, and cooling and detergent injections *per vaginam*, or similar lotions to the *vulva*, are commonly of use. It is not rare to find this variety associated with one or more small boils of the labia majora, and in these cases the lead lotion with vinum opii will remove the affection at any early stage, and poultices or warm fomentations afford relief at a more advanced state. *Prurigo vulvæ* has generally disappeared, after the use of a lotion consisting of a saturated solution of the bi-borate of soda in rose or elder-

flower water, either with or without the addition of the vinum opii, or of the pure acetic acid, or of both.

BIBLIOG. AND REFER.—*Hippocrates*, Aphorism., sec. iii., aph. 31; Epidem., l. v.—*Mercuriali*, De Morbis Cutaneis Libri duo; et De omnibus Corporis Humani Excrementis Libri tres, l. ii., cap. 3, p. 62.—*Hafenreffer*, De Cutis Affectibus, l. i., cap. 14. (First distinguished Pruritus into general and local).—*Willan*, Description and Treatment of Cutaneous Diseases, 4to. Lond., 1798, art. Prurigo.—*Sommer*, De Affectibus Pruriginosis Senum. Aldt., 1727.—*Loescher*, De Pruritu Senili. Wittenb., 1828.—*Alibert*, in Nouvelle Biblioth. Médicale. Mai, 1825.—*Wilkinson*, Remarks on Cutaneous Diseases, 8vo. Lond., 1832. (Adduces a remarkable Case of).—*Mourouval*, Recherches et Observations sur le Prurigo, 8vo. Paris, 1825.—*Elliotson*, in London Medical Gazette, vol. xi. p. 34.—*Alibert*, in Medico-Chirurg. Review, vol. iii., p. 779.—*Ruan*, in North American Medical and Surg. Journal, 1828; and in Journal des Progrès des Sc. Méd., t. xiii., p. 264. (Balsam of Copaiba and Bi-borate of Soda for Prurigo Vulvæ.) See, also, the works of *Bateman*, of *Alibert*, of *Green*, of *Plumbe*, of *Dendy*, of *Rayer*, of *Willis*, of *Cazenave* and *Schedel*, and of *Wilson*, on the Diseases of the Skin.

PRURITUS.—SYNON. *Hyperæsthesia cutis*—*Itching*, morbid sensibility of the skin—*Prurit*, *Démangeaison*, Fr. *Das Jucken*, die *Reitzbarkheit*, Germ.

CLASSIF.—III. CLASS, I. ORDER. (Author in Preface.)

1. DEFIN.—*Itching over a greater or less extent of the cutaneous surface, or limited to a particular part without any perceptible eruption, and generally symptomatic of some internal disorder.*

2. Pruritus, more or less general, is usually symptomatic of disorders of the digestive organs, or of some irritation of the digestive canal, especially intestinal worms. In these cases, the irritation of the mucous surface is propagated to, or reflected upon, the extremities of the nerves supplying the skin. The itching is often annoying, and is generally remittent; but it often continues in this form for many months. It is exacerbated by the same causes as those which increase prurigo, especially by changes of temperature, by stimulants and heating condiments, by hot spices, by opium, and by directing the attention to it. In some idiosyncrasies, various articles of diet or of medicine occasion it; and then it usually continues only for a short time. Shell-fish, or fish of any kind; smoked, dried, or preserved meats, &c., sometimes cause it. It is not infrequently a symptom of disorder of the uterine discharge of hysteria; of the slighter states of irritation of the spinal chord or membranes, and of several eruptions.

3. i. *The local or limited states* of pruritus or itching may arise from the same causes as those now mentioned, but they much more frequently proceed from others more immediately connected with the seat of itching. In most instances, however, of local pruritus there is more or less functional disorder of the digestive organs, or accumulation of fecal or excrementitious matters.—(a) *Pruritus nasi* is often sympathetic of intestinal worms, and even of ascarides in the rectum, or of fecal collections in the large bowels, or of dyspeptic disorders.—(b) *Pruritus urethræ* is often a very troublesome affection. Itching of the extremity or course of the male urethra is most frequently caused by calculus or gravel in the bladder, or by irritation of the prostate gland or stricture of the urethra. In females it is connected either with calculus in the bladder, or with leucorrhœa or uterine disorder.—(c) *Pru-*



*ritus vulvæ* is often a most distressing affection. It is seated chiefly in the labia majora, but it frequently implicates the clitoris and nymphae, or even extends up the vagina. It is usually caused by ascarides in the rectum, by disorder of the catamenia, by leucorrhœa, by self-pollution, and by hemorrhoids. It is not uncommon during the periods of puberty and the cessation of the menses, and especially during pregnancy.—(d) *Pruritus ani* is often a very troublesome and obstinate complaint, and is most annoying soon after retiring to rest. It is usually caused by ascarides in the rectum, by hemorrhoids, by fistula ani, by neglect of cleanly habits, by morbid states of the intestinal secretions, especially of the mucous follicles of the rectum, and by irritation or congestions of the prostate gland and vesiculæ seminales. It is often complained of by persons of sedentary occupations and habits, and by those who sit on soft and warm cushions. The itching, although occurring independently of any visible eruption, when repeated or protracted, often occasions slight excoriations and thickening around the margin of the anus.

4. ii. *Diagnosis*.—*Pruritus* can be confounded only with *prurigo*, from which it is distinguished by the absence of any visible eruption, unless such redness, or excoriation as may result from scratching, and the mechanical irritation employed to remove or relieve this annoying sensation.

5. iii. *Treatment*.—This should be directed to the removal of the morbid condition of the viscera, upon which the pruritus depends. This is most effectually accomplished by occasional doses of spirits of turpentine and castor oil, and by enemata of the same, so as fully to evacuate all accumulated or morbid matters from the bowels. Afterward the lotions I have prescribed for *PRURIGO* (§ 12), especially the lead lotion with opium; diluted vinegar or lemon-juice with creasote; a weak solution of bichloride of mercury with some hydro-chlorate of ammonia; or the solution of the biborate of soda. Attention should be directed, in the treatment of the pruritus of females, to the state of the uterine functions, which ought to be duly promoted; and when congestion of the uterine organs, or of any of the abdominal viscera, is present, especially if the patient be young and plethoric, or if the parts become hot or excoriated, then local depletions, followed by hot fomentations, are required. The diet, regimen, and treatment are in most respects the same as advised for *PRURIGO*.

BIBLIOG. AND REFER.—*Oribasius*, *Morb. Curat.*, iii., 22.—*Alscharavius*, *Pract.*, xxxi., 8.—*Avicenna*, *Canon*, iv., 7, 3, 6.—*Paulus Aegineta*, by Adams, l. iv., sect. 4.—*Thilenius*, *Medic. und Chirurg. Bemerkungen*, b. i., p. 287.—*Schneider*, in *Annalen der Heilkunst*. Jun., 1811, p. 490.—*Cheze*, in *Bulletin de la Faculté de Médecine*. Paris, 1812, p. 157.—*Journ. des Progrès des Sc. Méd.*, t. xiii., p. 264.—*E. Wilson*, *Practical and Theoretical Treatise on the Pathology and Treatment of Diseases of the Skin*, 8vo. Lond., 1842, p. 272.

PSOÆ MUSCLES—INFLAMMATION AND SUPPURATION OF.—SYNON. *Psoitis*, Auct. Lat. *Psoite*, *Inflammation des Museles lombaires*, Fr. *Entzündung der Lendenmuskeln*, Germ. *Psoas abscess*; *Lumbar abscess*.

CLASSIF.—III. CLASS, I. ORDER. (See Pref. acc.)

1. DEFIN.—i. NOSOLOG.—*Pain in the loins, generally on one side, commencing and existing insidi-*

*ously, but often becoming severe, and extending to the hip, thigh, and knee-joint, caused by inflammation and suppuration, the pus collecting around the muscles, and descending with more or less tumour, either under POUPART'S ligament or in some other direction.*

2. ii. PATHOLOG.—*Inflammation of the cellular tissues surrounding the psoæ lumbar and adjoining muscles, generally originating in caries of the bodies of the vertebræ, or in inflammation of the intervertebral substance, the muscles themselves ultimately becoming disorganized, and the purulent collection gravitating in the course of the cellular tissue, and opening or forming a tumour as above and as hereafter stated.*

3. I. THE CAUSES OF *Psoas* or *lumbar abscess* are, the scrofulous, the rheumatic, and the gouty diathesis; a cachectic habit of body, tubercular changes or deposits in the bodies of the vertebræ; caries of the vertebræ, especially the lumbar; inflammation of the intervertebral substance; violent exertion of the lumbar muscles, external violence, severe strains, or sudden jerks or twists of the loins; currents of cold air on the back or loins; and ulcerations of the cæcum extending to the peri-cæcal cellular tissue. Caries of the dorsal or lumbar vertebræ, or inflammation of the intervertebral spaces are the most common causes of psoitis and lumbar abscess. Of nineteen cases detailed by ABERNETHY, only two were independent of disease of the spine. He observes, that the general opinion of surgeons, in which he entirely concurs, is, that lumbar abscesses most frequently arise from diseases of the vertebræ; and they should certainly all be treated as if such were their origin.

4. II. SYMPTOMS.—*Psoitis* sometimes occurs suddenly, and the patient complains of pain in the loins, especially on one side. Walking becomes troublesome; the thighs can be neither raised nor extended without pain. The disease sometimes commences gradually, with pricking pains, which, becoming more severe, extend to the hip, and to the thigh, and even to the knee-joint. Sometimes the progress of inflammation is so insidious as hardly to be noticed, until the mischief appears in the form of a purulent collection. According to the extent of vertebral disease and the degree of inflammation does suppuration appear early or late; but the abscess which is formed generally assumes a chronic state, and is of a symptomatic character, as it is consecutive of inflammation and caries of the vertebræ. The chronic abscess, termed *psoas* or *lumbar abscess*, commonly forms in consequence of disease of the vertebræ of the back or loins. Matter is secreted around the diseased vertebræ, and then descends through the loose cellular tissue covering the muscles along the side of the pelvis into the thigh. It may take a course towards the back, or may go in various directions either within or without the pelvis. The pus formed about the seat of caries remains there for a longer or shorter time, especially in the cellular tissue. As the pus collects and increases it forms a cyst, which descends, and lengthens as it inclines to either or to both sides of the vertebral column. As the pus accumulates it pushes onward the lower end of the cyst, which, if it meet with any obstacle, spreads out, but contracts when pressed on by the adjoining parts, and dilates again

when relieved from pressure, until it at last arrives at the place, when it projects or breaks. In the route which the purulent matter thus takes, the psoæ and other lumbar muscles are inflamed, pressed upon, partially absorbed and disorganized, owing to the extension of the inflammation and purulent infiltrations to them and their connecting cellular tissue.

5. The abscess most frequently protrudes below POUPART'S ligament, and it generally extends or opens at a greater or less distance from the original seat of disease. It may, however, point or open into the cæcum, into the colon, or the rectum, or in some part of the back, or in the loins just above the sacrum; or it may make its way to the hip, or the groin, and proceed even down the thigh in the direction of the large vessels. As the matter is seated behind the peritonæum, and as it generally gravitates according to the position of the body, it very rarely perforates this membrane and becomes effused into the abdominal cavity. As the purulent matter increases and presses upon, or otherwise implicates, or even inflames the larger veins, nerves, or arteries, so are the symptoms either of phlebitis, or of neuritis, or of arteritis, according to the situation and extent of the abscess, not infrequently superinduced, and complicated with the advanced progress of the disease, in addition to the primary lesion of the spine. I have repeatedly met with these complications, which have greatly aggravated the sufferings of the patient. If, during its increase, the abscess breaks externally, or is opened so as to admit the air, pus is discharged, at first without smell; but it subsequently becomes offensive, and the hectic symptoms more marked. The powers of the patient sink, and the stomach becomes irritable. In some cases the aperture either closes, and matter again collects, or it contracts, and remains fistulous for a considerable time.

6. III. DIAGNOSIS.—(a) During the formation of matter the patient suffers pain in the loins, and walking is painful. When the abscess is not large, the usual symptoms of suppuration may be absent, or so slight as to escape observation. Night or morning sweats, emaciation, and other hectic symptoms, however, generally appear or increase with the progress of the complaint. When the purulent collection has increased so as to form an external tumour either in the groin or in the loins, or near the anus, a movement may be perceived in it upon coughing. When the matter has gravitated towards the thigh or anus, the tumour is lessened by the recumbent posture. If the patient has suffered continued pain in the loins for four, five, or six months; if he has difficulty in extending the thigh, especially when putting his legs together; if he feels pain and tightness in the groin, and increase of pain on attempting to exert the limb, or when the psoas muscle is either put on the stretch or exerted, then this disease should be suspected, even although no external tumour has yet appeared; but if such tumour is present, there can be little doubt of its nature.

7. (b) Psoas abscess, when protruding under POUPART'S ligament, may, as Mr. SOUTH observes, be mistaken for femoral hernia, especially as it dilates on coughing, and partly subsides when the patient lies down. But it is generally

of larger size than femoral rupture, and the fingers cannot be at all thrust around it, as they partially may behind the hernial sac. The chief distinctions, however, are the long continuance of pain in the loins previously to its appearance, the persistence of that pain, and the remarkable increase of pain produced by attempting to extend the thigh, especially backward, or the entire inability to do so. "When the abscess appears in the loins, there is no difficulty in determining its character by its history, and by its dilatation on coughing. Pulsation may sometimes be communicated to it from the adjoining large vessels;" and thus it may be mistaken for aneurism, if the history of the case and the existing symptoms be not attentively investigated.

8. (c) The diagnosis between psoas abscess and disease of the hip-joint is not always, although it is frequently, easy. It has been well pointed out by Mr. COULSON (*On Disease of the Hip-joint*, 4to, Lond., 1837, p. 72), and nearly as follows: 1st. In psoas disease, the patient generally complains of dull or of severe pain in the loins, which is increased by the upright posture, and by every motion of the limb, particularly on extending it: in diseased hip there is no fixed pain in the loins; it is felt more in the vicinity of the hip, and especially in the knee. 2d. In the whole course of psoas disease there is no deviation in the natural situation of the trochanter, and no difference in the length of both limbs; in diseased hip, on the contrary, this is always the case. 3d. In psoitis and lumbar abscess the patient cannot turn the foot of the affected side outward without increasing the pain; in diseased hip the foot is generally turned outward. 4th. On taking a deep inspiration, on coughing, crying, and in the erect posture, the fluctuating swelling either in front of the thigh or on the nates increases, and exit of matter, if the abscess be open, is facilitated; but in abscess of the hip-joint neither phenomenon is observed.

9. IV. PROGNOSIS.—The prognosis of psoitis, especially when the inflammation has gone on to abscess, is extremely unfavourable. Professor COLLES states, that not one patient out of fifty recovers from it; and that, in the course of his practice, he has not known five cases in all recover. He never knew a case get well where a surgeon interfered at all with it. In my own practice, I know only of two recoveries. For these no surgical aid was required beyond the formation of an issue in the back or loins. When psoas abscess is complicated with tubercles in the lungs, or with paraplegia, or with phlebitis or neuritis, instances of such complications having occurred in my practice, the case is then hopeless. I may, however, add, that psoas abscess may become complicated with hip-disease, a case of this association—the latter supervening on the former—having been under my care; or hip-disease may give rise to psoas abscess, as shown by Dr M'DOWELL.

10. V. TREATMENT.—This disease usually appears so insidiously, and advances so slowly, that it has proceeded in most cases beyond the influence of treatment before medical aid is required. When it is recognised at an early stage, and especially when the lesions of the vertebræ are not far advanced, or the inflamma-



tion consequent upon them has not given rise to much suppuration, then reasonable hopes may be entertained from the use of appropriate means. If the powers of the patient be not reduced, if there be no sign of anæmia, or of impaired vascular action and tone, the application of leeches, or cupping in the vicinity of the vertebral lesion, according to the state of the case, should be prescribed, and aided by stomachic aperients and cooling diaphoretics, with suitable attention to diet and perfect quietude. After sufficient local depletion, I have generally directed either of the following embrocations to be applied to the back or loins by means of flannel, and renewed once in the twenty-four hours if it be found to agree; the sensations of the patient, the state of the pulse, and a careful observation of all the symptoms guiding the physician:

No. 325. R. Linimenti camphoræ comp.; Linimenti terebinthinæ; Linim. saponis cum opio, ʒā, ʒj.; Olei cajuputi, ʒj. M. Fiat embrocatio.

No. 326. R. Linimenti terebinthinæ; Linimenti camphoræ comp., ʒā, ʒjss.; Olei olivæ, ʒiij.; Olei cajuputi, ʒj. M. Fiat embrocatio.

11. If these embrocations fail, after local depletions and other constitutional or suitable means, to arrest the progress of the disease, open blisters in the vicinity of the part or issues ought to be ordered, and kept freely discharging; while an alterative and restorative influence should be exerted on the constitution by a course either of the iodide of iron with sarsaparilla, or of the iodide of potassium and liquor potassæ, with compound tincture of bark and fluid extract of sarsa; or of the bichloride of mercury, in either the compound tincture or decoction of cinchona. I have alternated short courses of these, varying them according to circumstances, during the operation of the applications, issues, &c., advised to be applied near the diseased vertebræ, and often with marked benefit. I have prescribed iodine for this disease since 1822.

12. Several surgical writers, even ABERNETHY, COOPER, DUPUYTREN, LAWRENCE, PEARSON, CHELIUS, SOUTH, and others, have directed their attention and their treatment chiefly to the consecutive abscess. But if the abscess be not large, if it be not complicated with paraplegia, or if it occasion no distressing symptoms, as it sometimes does, by its pressure on nervous, venous, or arterial trunks, or large branches, it should not be officiously interfered with; the external drains, &c., placed near the diseased vertebræ, the constitutional means prescribed above (§ 11), and such other aids as stomachic aperients, &c., as the peculiarities of the case may require, being the remedies most deserving of confidence. If these means succeed in even partially removing the spinal disease, the consecutive abscess, if not large, will either diminish or become absorbed, at least in some instances, as in two of those which have come under my care, and for which the above treatment, without opening the abscess, was pursued. In one of these cases the treatment sometimes consisted, during the intervals between courses of the above medicines (§ 11), chiefly of full and regular doses of either morphia or opium, which also were occasionally given with these medicines.

13. When the inflammation terminates in suppuration, and an abscess is formed, CHE-

LIUS remarks, that the absorption of the matter may be procured in some cases, although rarely, by issues or perpetual blisters in the loins, and by general treatment, which promotes the abdominal functions and the patient's strength. DUPUYTREN observes, that these abscesses may remain for years, and the pus either be absorbed, no trace of them remaining, or, after a time, they may increase, the skin covering them becoming inflamed and giving way. In rare instances, the pus may drain away and not be reproduced, or, after a longer or shorter time, it may be converted into adipocercous matter. These, however, are favourable terminations of rare occurrence. Much more frequently the abscess goes on increasing, either until it inflames and bursts the skin at the most prominent point, or until it opens into one of the hollow viscera, or until the distressing effects produced by it, as already adverted to, create a necessity for opening it.

14. Mr. SOUTH observes, that issues are most important aids in the treatment of psoas abscess, either before or after it has opened of itself or been punctured, and that no circumstance should prevent a recourse to them. He advises the issue to be made on the side of the spine opposite to that where the abscess is seated. If presenting in one of the lumbar regions, the issue should be made at the outer margin of the quadratus lumborum of the opposite side; but if there be abscess in both lumbar regions, issues ought to be placed above and below them. If the swelling appear at the top of the thigh, an issue may be made on the same side, or in both sides of the spine, but never over the spine, nor over the abscess itself, for very obvious reasons. The issue should be made the size of a sixpence, with caustic potash, and it will generally enlarge to that of a shilling: one, or both, should be kept freely open and discharging, as just advised, while the constitutional and restorative powers ought to be promoted by the means recommended above.

15. Much difference of opinion exists as to the propriety of opening psoas or lumbar abscess, or of waiting for the self-evacuation of it. My own observation leads me to state, that there are cases for which surgical interference is either unnecessary or injurious; while there are others for which it may be most beneficially employed, if not for a cure, at least for the alleviation of the sufferings of the patient, and prolongation of life. When required, the opening should be made, as advised by Mr. ABERNETHY, so as entirely to prevent the entrance of air through the aperture, otherwise inflammation of the sac, increased hectic, offensive discharge, and sinking of the powers of life will ensue. An opening thus carefully made, and subsequently managed as carefully, will often prevent those painful complications observed in the advanced course of the malady, and to which surgeons have not sufficiently adverted. The occasional inflammation and erosion of vessels adjoining the purulent collection, and the distressing symptoms which result, as well as the not unusual implication of a nervous trunk, or of some other important part, may be prevented, or even alleviated after their appearance, by opening the abscess before it has become so greatly distended as to complicate the case and increase the sufferings

of the patient. Mr. South has given a good digest of surgical opinions on this topic, with his own advice, and to his translation of Celsus's system of surgery I refer the reader respecting it. I should, however, add that, whether the abscess be opened or not, the issues and constitutional treatment I have recommended, with opium and other aids, and alternated, modified, or changed, as circumstances may require, ought to be persisted in throughout the disease.

**BIBLIOG. AND REFER.**—Ludwig, *De Abscessu Latente*. Lips., 1758, v.—Haller, *Biblioth. Chirurg.*, ii., p. 629.—De Haen, *Rat. Med.*, part iv., p. 135.—P. Polt, *Chirurgical Works*, 8vo. Lond., 1783, vol. iii.—Smith, in *Med. Facts and Observat.*, vol. iv.—Plenciz, *Acta et Observat. Med.*, p. 159.—T. Kirkland, *An Inquiry into the present State of Medical Surgery*, 2 vols. 8vo. Lond., 1783, vol. ii.—J. Pearson, *Principles of Surgery*, 8vo. Lond., 1788.—Latta, *Practical System of Surgery*, vol. i. and iii., ch. 3.—Meckel, *De Psoride*. Halle, 1796.—Salzb. *Med. und Chirurg. Zeitung*, 1801, b. ii., p. 210.—A. F. Vogel, *Chirurgische Wahrnehmungen*, b. ii., p. 9.—Tomlinson, in *Med. Observ. and Inquiries*, vol. v., p. 163.—Wilson, in *Lond. Med. and Phys. Journ.*, July, 1802.—Ricardo, in *ibid.* Sept., 1802.—J. Abernethy, *Surgical Works*, 2d ed. Lond., 1815, vol. ii., p. 137.—A. Cooper, *Lectures in Lancet*, vol. ii. Lond., 1824.—W. Lawrence, in *ibid.*, vol. i., 1830.—Dupuytren, *Leçons Orales*, t. i.—S. Cooper, *Surgical Dictionary, Lumbar Abscess*.—M'Dowell, in *Dublin Journ. of Med. Sciences*, vol. iv., p. 9, et seq. (*Abscess communicating with the Ilium, and opening externally near the Spine of the Ilium; also, Cases of associated Hip Disease and Psos Abscess.*)—W. Coulson, *On Dis. of the Hip-joint*, 4to. Lond., 1837, p. 71.—W. O. Chalk, in *Lond. Med. Gazette*, vol. xviii., p. 103, 146.—J. M. Chelius, *A System of Surgery*. Translated, with Additions, &c., by J. F. South, 2 vols. 8vo. Lond., 1845, vol. i., p. 185.

[AM. BIBLIOG. AND REFER.—See Mott and Townsend's Velpéau, Am. ed. of South's and Chelius's Surgery, Reese's Cooper, Gibbon's Surgery, McClellen's Surgery, and Am. Med. Journals.]

**PSORIASIS AND LEPRIASIS.**—SYNON.

PSORIASIS, Ψωριασις (from ψωρα, scabies, itch); *Impetigo*, *Scabies*, Celsus. *Impetigo*, Sennert, Plenck. *Scabies sicca*, Plater, Hoffman. *Psoriasis*, Vogel, Swediaur, Willan, Bateman. *Lepidosis psoriasis*, Young, Good. *Dartre*, *Dartre furfuracee*, Fr. Kleinaussatz, Germ. *Dry Tetter*, *Dry Scall*.

LEPRIASIS, *Lepra*, Λέπρα (from λεπρός, scaly, rough). *Leuce*, *Alphos*, *Impetigo*, *Vitiligo*, Celsus. *Impetigo excoriativa*, Avicenna. *Lepra*, Sauvages, Sagar, Cullen, Willan, Young, &c. *Leprosia lepriasis*, Good. *Lêpre*, Fr. *Dartre squameuse*, Alibert. *Aussatz*, Germ. *Scaly Leprosy*, *Leprous Scall*.

**CLASSIF.**—4. Class, 8. Order (Cullen).

6. Class, 3. Order (Good). ii. Order,

2. Genus (Willan and Bateman). III.

Class, I. Order (Author).

1. DEFIN.—A chronic inflammation of the skin, either limited to a particular region or extended more or less over the surface, appearing first with slight elevations, which change into scaly patches; the patches of psoriasis being of different sizes, not depressed in the centres, but with irregular and very slightly raised edges; those of Lepriasis being generally rounded, slightly depressed in the centres, and surrounded by slightly raised and reddish circles.

2. Both *Psoriasis* and *Lepriasis* or *Lepra* were considered as modifications of the same disease by most of the ancients, and they are treated of by PAULUS ÆGINETA by the terms "*Leprosy and Psora*." He states that "both these affections consist of an asperity of the skin, with pruritus or wasting of the body, having their origin from a melancholic humour. But leprosy spreads over the skin more deeply in a chronic form, throwing out scales which

resemble those of fishes; but psora is more superficial and variously figured, and throws out furfuraceous bodies." (Translated by ADAMS, vol. ii., p. 15.) Mr. ADAMS concludes his remarks respecting the views of the ancients as to these affections as follows: "It will be remarked that the Leuce of the Greeks, the leuce and fourth species of impetigo of CELSUS, and the albaras of most of the Arabians, are the same as the *lepra vulgaris* of Drs. WILLAN and BATEMAN; that the alphos of most of the Greek authorities and of CELSUS, and the morphia alba of most of the Arabians, correspond with the *lepra alphoides* of our English nosologists; that the melas, alphos niger, and common lepra of the Greeks, CELSUS's third species of impetigo and his melas, and the morphia nigra and impetigo of most of the Arabian translators, apply to the *lepra nigricans* of our modern arrangement; and that the psora of the Greeks, CELSUS's second species of impetigo, and the scabies of OCTAVIUS HORATIUS, and of most of the Arabian translators, comprehend both the *psoriasis* and *scabies* of WILLAN and BATEMAN. Since many of the ancient authorities speak of scabies as being infectious, they must have applied the term to the true itch, with which it is not likely, as RAYER maintains, that they were wholly unacquainted. The earlier modern writers, as those of the Schola Salernitana, PLATERIUS, GUY OF CAULIAC, and LANFRANCUS, jumble together the Latin and Arabian names, so as to produce no ordinary degree of confusion." (*Op. cit.*, vol. ii., p. 21.)

3. I. CAUSES.—The causes of the several varieties of both *Psoriasis* and *Lepriasis* are the same, or the same causes are common to both these species.—A. The predisposing causes are chiefly hereditary conformation, the melancholic temperament, and an habitual languor and weakness of the circulation in the integuments, with dryness of the skin. These affections occur at all ages and in both sexes, but somewhat more frequently in adults and in those advanced in life. The influence of sex is not great, some writers stating that they are more frequent in females, others in males. They are both constitutional maladies, and are often connected with disordered abdominal functions, both at their origin and in their course. They are sometimes connected with the gouty and rheumatic diathesis, and they may appear at any season, but more frequently in spring and autumn: lepriasis oftener in autumn. Prolonged or neglected dyspepsia; inattention to the states of the bowels and of the intestinal secretions and excretions; the habitual retention or accumulation of fecal matters, improper and insufficient food; mental anxieties, and sexual excesses also predispose to these eruptions.

4. B. The occasional exciting causes are the use of salted, dried, smoked, or otherwise preserved meats and fish; the frequent use of shell-fish; irregularities and improprieties of diet, the use of pork or the flesh of the wild boar, bacon, hams, &c.; drinking cold fluids when the body is perspiring; vicissitudes of temperature and weather; poor, innutritious, or unwholesome food; exposure to cold or moisture, and living in low, damp cellars or localities; prolonged anxiety of mind; the frequent use of heating and stimulating food, sau-



ces, spices, condiments, pickles, preserves, acids, or spirituous liquors; debaucheries or excesses of any kind; the want of sufficient personal cleanliness; and the irritation produced by various substances employed in several of the useful arts.

5. The *contagious or non-contagious nature* of these eruptions has long been a topic of dispute, especially as they appear in countries bordering upon the Mediterranean Sea. My friend and colleague, Mr. DENDY, has considered the subject very fully in his unpublished work on these maladies, which he kindly allowed me to peruse; and concludes that in this country they are not contagious. WILLAN has observed that *psoriasis guttata* and *annulata* affect several children about the same time in large families and schools, especially those who sleep together; and the same remark is made by Mr. E. WILSON and others. The simulation of contagion must, however, arise from the constitutional predisposition to these eruptions undoubtedly existing in some families, and from the simultaneous operation of the same exciting causes. The topic, however, deserves farther investigation.

6. I have observed these eruptions more frequently in unmarried than in married females. They are often dependent upon impaired digestion and assimilation, and upon equally impaired function of the skin, kidneys, and intestinal canal, the blood thereby abounding in imperfectly assimilated chyle and in effete materials. I have seldom observed them in females whose catamenial discharges were quite regular and sufficient, these discharges, when healthy, being manifestly depurative as respects the circulation, and no mean preventive of chronic cutaneous eruptions. Many modern pathologists have viewed both *psoriasis* and *lepriasis* as symptomatic of gastro-intestinal irritation. That there is more or less disorder of the digestive canal in most cases of both these eruptions must be admitted; but it does not strictly follow that this disorder consists of inflammatory irritation. It is generally functional merely—a defect of function as much as disorder of function, the digestive and assimilative derangement and the cutaneous affection proceeding from the same source, viz., impaired organic nervous power, the cutaneous disorder only being the last of the series of functional and morbid changes.

7. Every arrangement of the scaly eruptions must necessarily be, to a certain extent, conventional, and be based on the more prominent phenomena and differences which they present. The chief points of difference have thus become the most familiar, as being the most commonly noted and represented, while the gradations by which the one variety and species pass into the other are so far kept out of view as to be either overlooked or unacknowledged. That this is the case more especially with the three species of scaly eruptions to which the terms of *pitryiasis*, *psoriasis*, and *lepra* have been applied is not to be doubted by any one whose knowledge of them has been acquired from observation, and not from writers who have been more anxious to create distinctions than to trace resemblances. That these three species of eruption do not merely present points of resemblance in most cases, and even of identity

in others, but also originate in the same or similar causes, will be farther admitted. Nor are their causes only the same, their constitutional nature, their associations, and their tendencies are also the same or closely similar. Still, it becomes necessary to describe those differences which may be remarked in their external characters, and which enable us to recognise as well as to classify them. The intimate connexion subsisting between these eruptions is shown by the circumstance of their presenting, in some cases, the distinct features of *psoriasis* in one part, and in another part those of *lepriasis*; and it occasionally happens that *pitryiasis* of very long duration, or the acute or inflammatory form of that species, when it becomes very chronic, assumes the form either of *psoriasis* or of *lepra*, while *lepra* of long duration often passes into the form of *psoriasis inveterata*. The three species of eruption, moreover, require the same constitutional and local treatment. For these and other reasons mentioned when treating of *tubercular leprosy*, or the *leprosy* of the Arabians and Middle Ages (*see art. LEPROSY*), I have viewed *lepra* as merely a species belonging to the same genus as *psoriasis* and *pitryiasis*; and have treated of *psoriasis* and *lepra* in connexion, their causes, pathology, and treatment being the same.\*

\* My colleague, Mr. DENDY, whose experience in the treatment of these eruptions is very great, has endeavoured to clear up the confusion, existing even down to the present day, respecting squamous diseases. He has arranged *psoriasis*, *lepra*, and the inflammatory form of *pitryiasis* as species constituting one genus, "*Lepriasis*," and has assigned to each species what he considers its synonyme in ancient and modern authorities. His views, as well as his descriptions, are most deserving attention. I give his arrangement, but I take the liberty of placing his species, "*Lepriasis furfurans*," or acute *pitryiasis*, before the other more chronic and severe species, consisting of *psoriasis* and *lepra*.

LEPRIASIS.—SYNON. Zazaab, II.—Kouba, Kuba, Alkauba, Ar.—Αεραυ, Gr.—Lepra, W.—Lepidosis lepriasis, G.—Scale-skin, Leprosy, Scaly Leprosy.

SPECIES I. LEPRIASIS FURFURANS.—SYNON. Alvarati, Ar.—Tinea, Porrijo, Dartre furfuracée, Al.—Teigne amiantacée; Pitryiasis, W.—Pityriasis acuta, R.

SPEC. II. LEPRIASIS GUTTATA.—SYNON. Αλφος, Gr.—Alphos, C.—Lepra alphoides; Psoriasis guttata, W.—Dartre squameuse orbiculaire, Al.—Lepriasis albidia, G.—Psoriasis discreta, R.—Guttated dry scall. Spotted leprosy.

SPEC. III. LEPRIASIS ANNULATA.—SYNON. Boak; Behag, H.—Bohak, Bothor, Ar. (Translated pearly or dull white leprosy.)—Αεραυ, Gr.—Lepra Græcorum, vitiligio, C.—Lepra Vulgaris, W.—Dartre squameuse arrondie, Al.—Psoriasis circinnatus; Lepidosis lepriasis, G.—Lepra; Leprosy; Greek leprosy.

VAR.—Centrifugal; Crescentic; Gyrate.

SPEC. IV.—LEPRIASIS DIFFUSA.—SYNON. Saphat, H. (Translated spreading dry scall.)—Sahafati, Ar.—Ψορα λεπιδωδης, Gr.—Scabies, sicca, s. Crassa, Itch.—Psoriasis diffusa, W.—Psoriasis confusus, R.—Lepidosis Psoriasis, G.—Dry scall; Scaly teller.

VAR.—Confluent, &c.

SPEC. V. LEPRIASIS INVETERATA.—SYNON. Bahereth le-bena, II. (Translated plague of leprosy.)—Βερας begas, Ar.—Αευκη, Gr.—Agria.—Bright white leprosy.—Lichen agrius.—Pellagra.—Acrodynia.—Psoriasis inveterata, W.—Dartre squameuse invétéré; Lichenoidé, Al.—Lepriasis Canida, G.—Inveterate dry scall.

VAR.—Scabida; Indurata; Prominens.

SPEC. VI. LEPRIASIS LIVIDA.—SYNON. Bahereth ceelia, II.—ροαρη, Gr.—Beras asved, Ar.—Mclac, C.—Lepra nigricans, W.—Lepriasis nigricans, G.—Black albaras—Black morphia.—Dusky or black leprosy.

SPEC. VII. LEPRIASIS SYPHILITICA. SYNON.—Lepra Syphilitica, Psoriasis Syphilitica, W.—Syphilitide pustuleuse, Al.—Syphitides, R.—Syphilitic lepra and psoriasis.—Scaly syphilis.

<sup>1</sup> The capital letters following the synonyms represent the authorities. Al. Alibert.—Ar. Arabians.—C. Celsus.—G. Good.—Gr. Greeks.—II. Hebrews.—R. Rayer.—W. Willan.

## 8. II. DESCRIPTION.—i. PSORIASIS GUTTATA.

—SYNON. *Lepra alphoides*; *Lepriasis albida*, Good. *Psoriasis discreta*, Rayer. *Dartre squameuse orbiculaire*, Alibert. *Lepriasis guttata*, Dendy. *Guttated dry scall*.—Psoriasis, even in this the mildest of its forms, is often preceded or attended by symptoms of indigestion, lassitude, and inaptitude for physical or mental exertion; but these are often so slight as to be overlooked. In this variety numbers of small, distinct elevations or papulæ occur, sometimes appearing at first of the size of a pin's head, their summits soon becoming covered with a minute scale of a dull white colour. These elevations are generally, at first, from two to three or four lines in diameter, irregularly circumscribed, and generally rounded. They increase somewhat in size, but always remain distinct, with the skin sound between them. When freed from the squamæ on their surfaces, they appear red and irritable, forming rounded spots or patches, from two to four or five lines across; and are slightly prominent, and of a brownish red hue. These patches occasionally heal, like those of lepra, from the centre to the circumference; and in this case they present slight depressions in the centres, and acquire a yellowish dusky tint. The scales formed on their surface are reproduced as soon as they are removed. As they decline, the patches often are transformed into segments or arcs of circles; and when quite removed the skin presents small stains of a grayish brown or yellowish hue in the spots occupied by them.

9. This variety is seldom accompanied with much pruritus, unless when the body is heated by exercise, or by stimulating or heating food and drink. It may be confined to the hairy scalp, face, trunk, or extremities; or be disseminated over these regions, appearing either at once upon all of them, or upon each in succession. The patches or spots are generally irregularly disseminated, being crowded in one situation, and thinly scattered in others; but they are more numerous in the line of extension in the extremities than in that of flexion. Guttated psoriasis appears most frequently in spring and autumn, and often disappears in summer or in winter. It may thus recur for many successive years. It is not infrequent in children, and is more quickly evolved in them, often with slight fever. It is more prevalent in adults than in children and old persons. It often presents characters intermediate between psoriasis and lepra. It sometimes coexists with one of the other forms of psoriasis, and I have seen it associated with pityriasis. When it affects the fingers, it often implicates the nails.

10. ii. PSORIASIS DIFFUSA. —SYNON. *Psoriasis confusus*, Rayer. *Lepidosis psoriasis*, Good. *Lepriasis diffusa*, Dendy. *Spreading dry scall*; *scally tetter*.—a. In this variety the patches are of large size, of variable extent, and irregular form. They are developed either by a number of small elevations, like the preceding variety, which run together and form one continuous patch, or by a papular roughness of a patch of the epidermis and congestion of the subjacent dermis, or by several patches, which speedily increase in size and coalesce. In each of these modes the patches may require two or three weeks to be fully formed. The surface of each is usually then of a dull red colour, rough, and

slightly elevated above the surrounding skin, intersected by furrows which correspond with those of the epidermis, and often fissured by several deep chaps. The patches are covered by numerous thin epidermic scales, the removal of which is rarely followed by any fluid exudation. The eruption often assumes the characters of the guttated or discrete variety over different parts of the body, and the diffused form around the joints and extremities.

11. Diffuse psoriasis may occur in a single patch, of various sizes, or in several and upon any part of the body; but most frequently on the fore-arm, or about the elbow and wrist, and, unlike lepra, chiefly the fleshy parts of the limbs. Its duration is always chronic; even its mildest states may continue for weeks or months, and the severest forms may remain for months or years.

12. Diffuse psoriasis, when extensive, is often preceded by symptoms of constitutional disorder; especially indigestion, costiveness, languor, and debility, which frequently subside as the eruption is developed, but which often recur. The eruption is generally attended by slight pruritus, and by pain and tenderness after the removal of the scales, or when the patches are fissured or chapped. It occurs chiefly in adults and the middle-aged.

13. b. This variety has, in rare instances, assumed a *gyrated form*—*Psoriasis gyrata*, or that of narrow bands, or curved or tortuous lines. Biett describes it as long, narrow, tortuous stripes, resembling worms; and sometimes bending into rings, occurring generally on the back, or trunk of the body. These stripes are covered, by very delicate epidermic scales, which exfoliate, and are reproduced as in the other forms of this variety. They are attended by a slight pruritus, and but little inconvenience. In very rare cases the eruption assumes an *annular form*, especially about the neck and face of delicate persons, and is very slight.

14. c. In children, diffuse psoriasis is occasionally seen in a sub-acute form—*Psoriasis infantilis*, WILLAN. It appears from two or three months to two or three years of age. It is more acute, is attended by more pruritus and smarting, and is much more rapid in its progress than in adults. The surface of the patches, which are often large, is intersected by numerous fissures or chaps, and often excoriated by friction; the excoriations exuding an ichorous fluid, which dries into hard scabs of considerable size. In infants and children this eruption may be attended by phlyzacious pustules, by a morbid secretion from the nostrils, by loss of the hair of the eyebrows and the eyelashes when the forehead is affected, and by hardened elevations of a reddish hue.

15. iii. PSORIASIS INVETERATA.—SYNON. *Lepriasis candida*, Good. *Dartre Squameuse lichenoïde*, Alibert. *Lepriasis inveterata*, Dendy. *Inveterate dry scall*.—When either discrete or confluent psoriasis has continued months, or years, or sometimes after the more inflammatory form of pityriasis has persisted long, especially when the eruption is hereditary, or occurs at an advanced age, or attacks a debilitated or shattered constitution, or is consequent upon protracted functional disorder of the digestive organs, then the eruption assumes the



form thus named. It may be regarded as an aggravated form of psoriasis diffusa. Inveterate psoriasis usually extends over a large surface, occupying the most of the limbs, and of the trunk; the face, the palms of the hands, and the soles of the feet being free. The skin is thickened, congested, hot, dry, and harsh. It is stiff, fissured by deep cracks, and covered by epidermic scales and scabs, which are thrown off in great abundance. Pruritus is very troublesome in this variety, and is increased by the heat of bed and by a heating regimen. The thickening of the integuments restrains the motions of the limbs and flexions of the joints. When the surface is abraded or excoriated by friction or otherwise, a fluid exudes which concretes into scabs. When this eruption affects the scalp, the scales collect in numbers; and when they are removed, an ichorous fetid exudation takes place from the reddened surface. When it extends to the hands, the nails are remarkably affected; but in some cases I have observed the affection of the nails without the fingers being otherwise implicated, and have imputed the disease of the nails to the infection of the fluid exuded from the surface scratched by them. The constitutional disturbance may be but slight even in the severest cases, particularly in respect of febrile symptoms. But the functions of the stomach, liver, and bowels are often languid and torpid, and the several depurating actions impaired. The duration of this variety is always prolonged and indeterminate. In old persons it continues for the rest of life.

16. LOCAL STATES OF PSORIASIS.—(a) Psoriasis may occur primarily on the *hairy scalp*; but it is more frequently consequent upon the eruption in some other part, or upon neglected pityriasis. It is oftener seen in the *distinct* form; much more rarely in the *confluent*. In rare instances it has extended over nearly all the scalp, extending to the forehead in a line parallel with that of the hair. The inflammation sometimes attacks the bulbs of the hair, which become detached in the patches affected.

17. (b) *The face* is rarely affected alone, the eruption generally appearing also in some other part. The patches on the face are usually red and furfuraceous, the scales being light and thin. On the *eyebrows* and *eyelids* it appears, as everywhere else, by the formation of papulæ. The eyelids become stiff, and slightly fissured or chapped, and these changes are followed in children by the loss of the ciliæ and the hair of the eyebrows. It rarely affects the *lips*, as true psoriasis, but generally in a form that more strictly belongs to *pityriasis*.

18. (c) *Psoriasis genitalium* is not infrequent, and either the *prepuce*, or the *scrotum*, or the *labia majora vulvæ* may be the seat of the eruption. In either of these situations it presents the characters already described. It seldom appears in any of these primarily, but generally in connexion with its occurrence in other situations. It may, however, be consequent upon prurigo or pruritus of these parts. In the *prepuce* this eruption is often obstinate and severe, and is sometimes attended by thickening, painful exudations of blood and fissures, and phymosis. Psoriasis in this situation may be associated with psoriasis of the *scrotum*, which is often most obstinate, and assumes the invet-

erate form, or with *psoriasis palmaris*. As respects the characters of the eruption, there are no differences produced by these localities. But swellings of the inguinal glands are often caused by the appearance of the eruption in these situations; and care should be taken not to confound it with venereal affections.

19. (d) *Palmar psoriasis*—*Psoriasis palmaris*—may be either distinct or confluent; but in either form the elevations are generally broad, of a pale reddish hue, and the seat of much heat and itching. If the elevations are numerous they become painful, and interfere with the patient's occupations. In the confluent form the palm of the hand swells, and presents a uniform brownish red colour. As the eruption becomes more chronic, the heat and itching are less troublesome, the cuticle covering the elevations grows thicker, acquires a yellowish hue, dries up and becomes friable, and at last of a dead white on the surface of the patches. The epidermis then cracks, and is detached either spontaneously or by the nails of the patient, and leaves a new epidermis, through which the corion appears red and vascular. The epidermis surrounding the diseased patch also undergoes a change, being thicker than usual, of a dirty yellow tint, and subsequently becoming dry or mealy on the surface. It finally exfoliates irregularly, at first adjoining the older patches, and then in the flexures of the joints and natural folds of the palm. The desquamation is always *irregular*, and very different in appearance from that of the next variety, the *psoriasis palmaris centrifuga*; but, like it, and even more constantly, is attended by linear fissures, which penetrate to the quick in the lines of the palms, and by smaller cracks or fissures which extend less deeply.

20. (e) *Centrifugal palmar psoriasis* is less common than the preceding. It begins in the palm by a single elevated spot, solid, and of small size, upon which a small white scale is formed. Around this elevation a series of red eccentric circles are produced, each in succession, and are covered by epidermic scales, which exfoliate. As these circles appear, each successive one is more eccentric, until the whole palm is implicated, and each undergoes desquamation. Squamous patches also appear on the palmar aspects of the fingers. The palmar integument is reddish where the exfoliation of the scales has taken place, is thickened, and fissured by numerous claps, some of which, upon opening the hand, which is painful and stiff, sometimes exude a little blood.

21. Both these forms of palmar psoriasis are of long duration, they seldom continuing for a shorter time than several months, and often persisting for years. They often decline in summer and autumn, and are exacerbated in winter and spring, for a number of years. Palmar psoriasis is sometimes complicated with *psoriasis genitalium* in either sex. A modification of it sometimes affects, although much less frequently, the soles of the feet—*psoriasis plantaris*; but the severity of the symptoms is less in this situation, owing probably to the structure of the plantar integument, and to the protective coverings of the part. Fissures in this situation are much less apt to occur, and are smaller when they occur.

22. (f) A variety of psoriasis diffusa occa-

sionally affects the backs of the hands, and is called *grocers' itch*, because it is often seen in persons engaged in this trade; but it also often attacks bakers, laundresses, and others. It begins with two or three squamous elevations, which often spread until the whole back of the hand is covered. The integument at length presents numerous dry and painful fissures over or near the wrist and the articulations of the metacarpal bones and first phalanges of the fingers. This variety is distinguished from confluent and chronic *lichen* of this part by the circumstance of the latter always commencing in an eruption of small papulæ.

23. (g) *Psoriasis of the Nails*—*Psoriasis Unguium*.—When the disease affects either the upper or the lower extremities, the nails are often attacked, even although neither the fingers nor the toes may be affected. But the affection of the nails never occurs without some other part being attacked. It is most frequently associated with *psoriasis guttata* of the hands or arms. The nails, when diseased, become yellowish or tawny; thickened and irregular in their structure; rough, ragged, and brittle, and often bent over the ends of the fingers. A cheesy-like matter is sometimes formed at the roots of the nails, or between the roots and the matrix, as at the extremity of the papillary surface, these parts sometimes becoming unusually vascular, and giving rise to thickening, &c.

24. (h) *Psoriasis* is often complicated with visceral disorder, as already noticed, and sometimes with *lepra* or  *pityriasis*. It has also been seen associated, especially in children, with *eczema impetiginodes*, vesicles and purulent points appearing amid the thin squamæ covering the patches of *psoriasis*. At a later period these patches become excoriated, and form thin, lamellar, yellowish scabs like those of *eczema*. This association is not infrequent in children during the period of teething, and occasionally at a more advanced period.

25. iv. PSORIASIS LEPRÆFORMIS. — SYNON. *Lepra*; *Lepriasis*. *Lepra Græcorum*, Auct. *Lepra vulgaris*, Willan. *Psoriasis circumnatus*; *Lepidosis lepriasis*, Good. *Lepriasis annulata*, Dendy. *Psoriasis orbicularis*; *Dartre Squameuse arrondie*, Alibert. *Scaly leprosy*; *Greek leprosy*.—This chronic squamous eruption is characterized chiefly by its consisting of circular and slightly-raised patches, which are speedily covered by thin, semi-transparent, epidermic scales, the patches being prominent at their edges, and somewhat depressed in their centres, and the scales being thrown off and replaced by successive formations. *Lepra* is occasionally confined to the knees and elbows, and it generally appears first in these situations, or, rather, immediately below them. In most cases it affects both legs or both arms at the same time. It is apt to extend by the successive formation of new scaly patches along the arms and thighs, to the breast and shoulders, and to the lumbar and lateral regions of the abdomen. The patches are sometimes more numerous, large, and prominent on the lower part of the trunk. The disease rarely extends to the hands or hairy scalp. The patches which appear on the head are usually of a small size. They are seen near the outer angles of the orbits, whence they spread along the eyebrows to the forehead and temples. When *lepra* extends

to the hands or fingers, the nails and the matrices of the nails are often affected in a similar manner to that described above (§ 23). Everywhere the patches are apt to coalesce by their corresponding edges; but the originally orbicular form of the aggregate patches is partially preserved in the arcs of circles which are seen in the circumference.

26. *A. Lepra vulgaris* commences with small, smooth, solid elevations of a dull red hue, around which numbers of other reddish, prominent spots, about a line in diameter, are evolved. The surface of the elevations become covered in two or three days with thin whitish scales. In four or five days the elevations spread, having thrown off the small spangle-like scale from their summits, and are attended by a sense of heat, tingling, or pruritus. They then enlarge rapidly by the extension of their circumference, which is raised and red; while the centres become depressed and paler than the margins. As the scales exfoliate others are produced, and are of a glistening or opalescent, or of a pearl-gray or pale yellow tint. The squamæ are not evenly spread over the surface of the patches, and they are detached partially and irregularly. After their fall, the skin which they covered looks red, shining, and somewhat raised. They are superposed, especially in the circumference of the patches, and thus become thicker and thicker, so as to form prominent layers. Even when small, the patches are never covered by a single scale. When they are recent, the corion does not present lines corresponding to those of the cuticle, but when they are older such lines are observed, and are often increased to wrinkles, which correspond with small indentations or ridges in the inner surfaces of the scales. However detached from the inflamed surface, a fresh formation of scales takes place.

27. The cure of the orbicular patches of *lepra* begins in the centres, and extends to the circumference. After the detachment of the squamæ the skin acquires, when they are not renewed, a grayish tint, with a shade of yellow. At a later period, the ring bounding the patches is narrowed progressively from within outward; the circle at last is broken in one or more places, and the spot ultimately disappears entirely. (RAYER.)

28. *Lepra* is seldom attended by any febrile disturbance, or other disorder than impaired digestion, assimilation, and excretion. The appetite is usually good, and generally greater than the powers of digestion. It occasions no farther inconvenience than slight itching upon getting into bed, or upon changes of temperature. But when the patches are extensive or numerous, or when the inflammation of them is increased by a heating regimen, the patient feels so much burning or stinging pruritus as often to disturb repose. When the patches surround the joints they cause stiffness, and occasionally are attended by small painful fissures. The disease is always of considerable duration; it often continues for years, sometimes for life. I am now attending a lady who has been afflicted with it extensively for upward of forty years, although she has always had the advantage of the best medical advice.

29. *B.* The variety denominated *Lepra alphoides* by WILLAN is merely a milder form



than the preceding, the squamous patches remaining of small size, and seldom exceeding a few lines in diameter. The spots increase slowly, are slightly prominent, and rarely run into one another. They form almost exclusively on the joints and extremities, and differ from the patches of *lepra vulgaris* chiefly in the small size and whiteness of the scales which are formed. They are commonly met with in children and delicate persons, and are not easily distinguished from *psoriasis guttata*. Several other modifications are sometimes observed in the form, disposition, and extension of the patches, depending upon their seat and the constitution of the patient; but these are too numerous to describe. Some of them so closely resemble *psoriasis* as hardly to be distinguished from it. When this variety affects the scalp or pubic region, it often occasions much pruritus or inconvenience; but it rarely affects these situations exclusively. The squamæ in these situations are generally yellow and furfuraceous, and are without the glistening micaceous hue they present on the knees or elbows.

30. *C. Lepra nigricans* is a comparatively rare form of *lepra*, and is met with only in cachectic and broken-down constitutions. The form and distribution of the patches are the same as described; but the patches are not so large, and are generally without the central depression. Instead of being of dull red or rose-colour, they are of a livid or bluish brown hue. Mr. E. WILSON states that the scales are so thin as to allow the lividity of the surface to be seen through them, are easily detached, and leave behind a tender and frequently an excoriated surface, from which a morbid serous fluid, often mixed with blood, is poured out. This exudation hardens into an irregular and friable crust. This variety is particularly annoying when it affects the scalp. It occurs chiefly in persons whose occupations expose them to the vicissitudes of the weather, and to a precarious diet, with fatigue and watching, and excesses in spirituous liquors, &c.

31. V. PSORIASIS ET LEPRIASIS SYPHILITICA.—SYNON. *Squamæ Syphiliticæ*.—*Lepra Syphilitica*, *Psoriasis Syphilitica*, Willan. *Syphilitide pustuleuse*, Alibert. *Syphilides Squamæuses*, Rayer. *Lepriasis Syphilitica*, Dendy. *Scaly Syphilis*.—Secondary syphilis assumes every species and variety of cutaneous eruption; and no species more frequently than *psoriasis* and *lepriasis* in all their forms. Mr. DENDY states, that the most common form of scaly syphilis is that of irregularly scattered spots, which, however, become occasionally confluent, and sometimes three or four forms or distributions of scale are seen in the same subject, viz.: *foliaceous laminae* on the scalp, *guttated* and *diffused psoriasis* with indurated scales on parts subject to pressure, heat, or friction, as the palms, soles, axillæ, serotum, and labia vulvæ; *psoriasis lepraformis*, or *lepra*, on the breast, abdomen, and thighs; and very rarely an extensive *psoriasis diffusa*, as a syphilitic eruption.

32. *A. Psoriasis guttata syphilitica* commences in a copper-coloured, livid, or violet spot, at first extremely small, usually becoming from six to eight lines in diameter, and, when extending to the scalp, assuming a greenish olive or dull yellowish hue. The spot is flatter, softer, and

smoother than the incipient papulæ of common *psoriasis*, and less squamous, having little or no defined edge; or it may be sometimes larger or redder, more defined, and less squamous. The spots or patches are often more ovoid than circular; the diseased cuticle on their surface is usually more furfuraceous, still adhering tenaciously, and it is of a dull violet or yellowish hue, rather than white. When the scales are detached they are of dirty pearl gray, the livid colour being imparted by the subjacent tissue. After one or two exfoliations the squamous character often diminishes, and, under mercurial influence, disappears in three or four months. If a syphilitic treatment fail, they will degenerate, the squamous character changing to that of a blotch, or even to superficial ulceration. In some cases, Mr. DENDY remarks, that in the centre of the scale a sort of pustular or ulcerated character is observable, even in an early stage, very similar to the moist crusts of *eczema*. This is never seen in the common forms of the non-syphilitic eruption.

33. *B.* Another form of scaly syphilis is that of a *dusky or brownish, livid, circular spot*, the centre slightly fissured and foliaceous, the cuticle detached, as it were, around the disk, and thus forming a white margin. This form nearly resembles *ecthyma syphilitica*. (See art. *Еcthyma*, § 6.) In both these forms of syphilitic scales, ulceration of the throat is often also observed.

34. *C. The annular syphilitic scale*, or syphilitic *lepra*, is less defined than the common circular *lepriasis*; the margins are slightly raised, the scales are dusky rather than white, and more annular. "In some cases the guttated and annular forms become one elevated, brownish, red mass, here and there spotted with scales."—(DENDY.)

35. *D.* Syphilitic scaly spots usually appear from five to ten weeks after the subsidence of a chancre. "Mr. CARMICHAEL believed it to be the sequence only of that ulcer which was marked by indurated edges—the true Hunterian chancre." Mr. DENDY does not think that it is thus limited, for he has seen it consequent upon primary pustules which had speedily subsided, and both consequent upon and coexistent with almost every primary form of the syphilitic malady.

36. The most common seat of scaly syphilis is on the forehead, "*corona veneris*," and the breast. When, however, the patches speedily arise during acute or often-recurring primary disease, especially in depraved constitutions, they often appear first in the vicinity of the organs of generation, and are then more defined. The character of the patches or spots is, however, much altered by the treatment, especially by external applications.

37. The spots of simple *lepra* are generally larger and rounder than those of syphilitic origin, the latter being much more rarely confluent and united into broad bands and patches than those of the former. Scaly syphilis is, however, much modified by locality. When it is seated in the axilla, or between the toes, it is moist, whitish, and very offensively fetid. Sometimes, also, fissures form, and the cuticle peels rather than drops off. On the scalp it assumes a greenish livid hue. On the palms and soles it is usually guttated. The spots,

however, are not so distinct as in other parts, the cuticle, on being detached, also appearing more horny and yellowish; and in this situation exfoliation is often very protracted. If fissures form, and the feet and hands are subject to much pressure, they become deeply ulcerated. If the matrix of the nails become affected, painful or phagedenic onychia may follow. (DENDY.)

38. *E. Infantile scaly syphilis* is almost invariably marked by *snuffing* from the child's birth. The skin is of a dirty yellow or waxen hue, with numerous brownish pink spots, presenting a sprinkling of a gray or brownish white dust, which is often most abundant on the circumference of these spots. The disease may resemble, also, the livid spots already described, even at a very early age; but more frequently an association of these differently tinted spots are observed on the face and hands.

39. III. DIAGNOSIS.—The differences between the species of scaly eruption have often been exaggerated, or the extreme points of difference have been chiefly adduced and placed in bold relief by most of the writers on diseases of the skin, believing that the enumeration of minute distinctions and the recognition of modifications of the external characters would evince a more intimate knowledge of their nature than a display of their relations, not only with one another, but also with the state of the digestive, the assimilating, and the excreting functions, and of the circulating fluids. The devotion to "specialities," with the view of attracting the public by the presumed advantages of, and by the superior knowledge assumed from, a division of labour, was first manifested in modern times by the writers on skin affections; and, like all others devoted to a single craft, who adopt merely a minute segment of the great circle of medical science for their practices on the public, rather than for its proper cultivation and improvement, they merely partially advance the trivial and the mechanical to the detriment of profound or comprehensive views, and they fail in the recognition of extensive morbid relations. While a few local distinctions or mechanical contrivances are paraded as proofs of a superior acquaintance with the adopted subject, their narrowed powers of mental vision fail to recognise much more important relations and matters, the sources from which the local mischief proceeds, and the varied sympathies which either produce, or are produced by, the object of exclusive adoption and cultivation, a cultivation resembling merely the superficial scraping of the soil by the hands of savage ignorance, not the deep ditching, the draining, and the manuring of applied science. The human microcosm cannot be advantageously studied in one of its parts only, nor can its states, affections, or structural lesions be either understood or remedied by confining our inquiries and our means to a particular or limited locality, even although that locality is the seat of disease. The animal body is one and indivisible, no one part being independent of another—no single system, or organ, or tissue, being disordered or diseased without implicating more or less the functions, and even the organization of several, or even of all the rest. Hence it is that no division of labour which has been adopted in medical practice in ancient times, since the ages of the PHARAOHS, down either to the modern days of

the higher and more regular grades of empiricism, or to the lower degrees of quackery and imposture, has tended to advance medical science or to raise the respectability of our profession. On the contrary, all such divisions, all adoptions of a single member, organ, or viscus for special practice or study, have lowered, in proportion to the degree of division, our science to a craft, and sunk the physician to an empirical practitioner: they may have enriched the charlatan, but they have degraded the profession.

40. Those who have taken the eruptions of the skin under their protection, or the "Dermatologists," as they have dignified themselves, have generally laboured to point out the extreme distinctions which may exist between the several forms or cases of scaly eruption; limiting, however, their distinctions to the form, the size, the tint, and the thickness of a scale; and to the form, size, hue, and condition of the tissue underneath. Their distinctions have been always local, and without reference to the states of the assimilating and depurating functions, and of the circulating fluids and excretions. Even the most important of all local distinctions have been neglected; for they have failed to show whether the scales are an exuberant formation of cuticle—are diseased cuticle hastily formed and as hastily thrown off—or are merely a thin albuminous exudation on the inflamed surface, that becomes altered by the action of the oxygen of the air, and thrown off by the local morbid action and the state of its vital and vascular relations; or in how far various states or appearances of these scales depend upon a morbid cuticular formation, or upon a modified albuminous exudation, upon the production by and upon the skin of an oxidized albumen.

41. *The diagnosis of scaly eruptions* is therefore hardly to be regarded as respects the several forms which they assume, because shades of difference, too slight and too varied, and ever varying, to admit of description, are even more common than more marked distinctions; but it may be entertained as regards other eruptions with which the squamous may be confounded, upon a hasty or imperfect view, and if the history, progress, and morbid relations of the case are not observed. The chief differences which exist between the leprous and other species of psoriasis are, that generally in the former the patches are circular, with raised margins and somewhat depressed centres, the scales being moderately thick and slightly adherent; while in the other species the patches are irregular, not depressed in their centres, and are covered by thinner and more adherent scales. Psoriasis guttata, however, very nearly approaches to the leprous species, especially to the alphoid variety, the distinctions now stated existing in some respects, and the patches of the latter being generally of larger size. Pityriasis may be confounded with psoriasis; indeed, it is but slightly different, either in local characters or in pathological relations, from the several species of psoriasis; so that pityriasis, psoriasis, and lepra may be justly viewed as species of one genus. The distinction between pityriasis and the other species consists chiefly in the more superficial affection of the skin in the former, and in the smaller size and more



furfuraceous character of the scales. The integuments, moreover, are often chapped or fissured in the latter, and but rarely in the former. *Lichen circumscriptus*, with its annular clusters of papulæ, fading towards the centre, may sometimes be mistaken for leprous psoriasis, especially in process of cure; but the existence of the former is shown by the presence of marginal papulæ; whereas in the latter the inflamed surface, denuded of its scales, is smooth and devoid of papulæ. *Tinea annularis*, or *ring-worm*, at certain periods of its progress, either at the commencement or the end, when the crusts fall off and leave behind red annular-shaped patches, may be mistaken for lepra of the scalp, especially if there are patches on other parts of the body. But the one is as rarely seen on the body as the other is on the scalp; besides, the favous pustules of the former will indicate its nature. It should be recollected that several varieties of squamous eruption may exist in the same case, and that it may be associated with other eruptions, as with tinea.

42. IV. PROGNOSIS.—The several species of this eruption are more or less obstinate. The prognosis depends much upon the condition of the patient, and the duration, species, and state of the eruption. Even the mildest forms are apt to return after having disappeared, upon the recurrence of the causes, regimen, and diet especially, which first occasioned it. *Psoriasis guttata*, although not a severe form, is yet very obstinate, and is apt to return after disappearing. The *diffused variety* is still more obstinate, especially in debilitated, old, or cachectic persons; and the *inveterate form* often resists all treatment, particularly in those unfavourable circumstances. The same prognosis applies to the different forms of the *leprous species*. It is rarely attended by danger, and in young subjects it is often cured; but in adults and aged persons it is always very rebellious, and often incurable, although treatment may restrain its progress and palliate most of the more annoying symptoms. The existence of an hereditary predisposition to any of the species of scaly eruption militates strongly against a perfect cure, especially in patients advanced in life; for, even if almost or altogether removed, it seldom fails to return. The *syphilitic scaly eruptions*, when not associated with serious disease of the throat, or of the periosteum, or of the joints or bones, and not advanced to extensive ulceration, will generally be removed by appropriate treatment, unless the disease be developed in the scrofulous diathesis, or is connected with an abuse of mercury, when a less favourable opinion of the result, as respects the constitution and vital organs, should be entertained.

43. V. THE PATHOLOGY OF SCALY ERUPTIONS has been imperfectly, if, indeed, at all considered. These eruptions have been viewed as altogether local, and their obvious dependence upon the state of the circulating fluids most unaccountably overlooked. Many years ago (in 1822) my attention was attracted to the state of the blood by a case of psoriasis, for which I had prescribed venesection, and found the serum remarkably milky or whitish-coloured. Since then other cases have furnished evidence of a superabundance of insufficiently assimilated chyle, of albumen, and sometimes of fatty matter in the blood of patients severely affected

with either of these eruptions. It is very obvious that impaired function of the liver and digestive canal, as well as of other assimilating organs, will be followed by the presence, if not by the superabundance of imperfectly assimilated chyle, and chyle-globules in the circulation; and that equally impaired excreting function will occasion a state of excrementitious plethora; the imperfectly assimilated and the effete materials thus accumulated in the blood exciting and perpetuating irritation of the capillary circulation of one or other of those emunctories whose office it is to remove these materials from the circulation. Irritation of the cutaneous surface having gone on to inflammation of a slow and chronic form, and the blood abounding with albumen, a state of capillary action and a material are thereby furnished for the formation of the scales which are so abundantly produced on the inflamed surface, and which is rarely, excepting at the commencement of the eruption, an altered state of the cuticle, and a morbid reproduction of it, but an exudation of albuminous lymph from the diseased capillaries that is modified by the state of the blood and the local action, and by the oxygen of the air, so as to form the several varieties of squamæ observed in this genus of eruption. This view of the nature of squamous eruptions shows the impropriety of employing local or external means solely or chiefly in the treatment, and of thereby shutting up a safety-valve in the economy opened by the course of functional disorders; and it accounts for the occasional superposition of serious visceral disease upon the suppression of the cutaneous eruption. It also suggests the use for these and similar eruptions of such means as shall most effectually remove the disorders of the digestive, of the assimilating, and of the excreting functions, upon which these eruptions are chiefly dependent, and the impropriety of prescribing external means otherwise than as aids to internal and constitutional treatment.

44. VI. TREATMENT.—The circumstances which require especial attention, before the intentions of cure are determined upon in each case of scaly eruption, are the following: 1st. The habit of body, diathesis, age, and employment of the patient. 2d. The indications of disorder of the digestive, of the assimilative, and of the depurative functions in connexion with nervous and vital power. 3d. The duration and character of the eruption, the causes in which it originated or tend to perpetuate it. These last circumstances should be viewed in connexion with the previous diet, mode of living, &c., commonly adopted by the patient. These particulars being ascertained, the *states* of those suffering any form of the eruption may be arranged as follows, as furnishing the chief bases for therapeutical intentions: *First*, as regards *habit of body*, &c., indications of *plethora*, or of *anæmia*, and of *digestive* and *excreting derangement* ought to be carefully observed, and the several associations of these states. *Second*, as respects the *duration* and *appearances of the eruption*, the amount and character of the *inflammation*, and the *discrete or confluent*, or *syphilitic* form of the eruption ought to be noted; and, *Third*, the state of *vascular action*, generally and locally, and of *constitutional power*. These data having been obtained as accurately as pos-

sible, and with due reference to the states of the blood and of the functions of waste and supply, the intentions are, 1st. To remove whatever disorder may exist in the quantity or quality of the blood, and in vascular action; 2d. To restore the digestive and depurative functions, as being subsidiary to the first indication; and, 3d. To correct the morbid action on the skin by rational local means.

45. Viewing the cure of scaly eruptions as being thus dependent, at all times during treatment, upon a due exercise of the several vital actions, especially those of digestion and depuration, and upon a sufficient, but not an exuberant supply of wholesome food, the application of these indications of cure should be accompanied with strict attention to *diet* and *regimen*, as noticed in the sequel, and with a careful avoidance of the several predisposing and exciting causes (§ 3, *et seq.*).

46. A. If the patient be *plethoric, strong, or young*, and the eruption copious, red, and not of long duration, and more especially if the pulse present sufficient tone, local and general action not being impaired or asthenic, then *blood-letting*, according to the peculiarities of the case, should unhesitatingly be prescribed; and in healthy, dry, and country localities, if the patient has lived fully or richly, it may be repeated, according to the effect produced by the first. After bleeding, an active antimonial *emetic* ought to be given, and its operation freely promoted. When the stomach is quieted, the bowels, and, through them, the liver, should be freely evacuated by chologogue and stomachic *purgatives*. At first, and on several occasions afterward, a full dose of calomel, with some purgative, ought to be prescribed, and its free operation promoted by an *enema* containing spirits of turpentine and castor oil, or some other cathartic. These should be repeated according to circumstances, but sufficiently often to procure not only an entire evacuation of all crudities and accumulations, but also an increased discharge of all secretions and excretions from the digestive canal, and, through the medium of it, all effete or injurious materials from the blood.

47. B. When the patient presents no indications of *vascular plethora* or of increased action, and the patches are not very irritable or much inflamed, then blood-letting may be omitted, or a small blood-letting only prescribed. In the metropolis and large manufacturing towns, vascular fulness and excitement are not generally such as require more than a small, or a local bleeding only; and not infrequently a state of *anæmia*, requiring opposite means to this, is met with in connexion with scaly eruptions.—*a.* For the former of these cases *emetics* and *purgatives* are indispensable, and for the latter they are not the less so; but the purgatives should be either conjoined with *chalybeates* or vegetable *tonics*, or alternated with them, so as to improve the powers of digestion and assimilation simultaneously with the evacuation of injurious matters. MM. CAZENAVE and SCHEDEL remark, that “when the patient is young and vigorous, and the disease pursues a rapid course, the skin being hot and inflamed, and the pulse full and quick, then venesection, simple baths, diluents, strict regimen, and quiet are necessary.” To these, however, I would add emetics

and purgatives, as above advised (§ 46). In old and feeble persons, or in constitutions broken down by privation or excesses, in whom there is either but little inflammation, or inflammation of an asthenic or cachectic character, a course of tonics should be directed, and either alternated with or followed by purgatives and other energetic measures, according to the peculiarities of the case.

48. M. BIETT, although he says nothing as to exhibition of an emetic either at the commencement or in the course of treatment, strongly recommends a purgative course, especially when the disease is recent, and the patient young or robust. He advises calomel every morning, fasting, in four-grain doses, either alone or with the same quantity of jalap. Sometimes sulphate of soda or sulphate of magnesia, taken in a considerable quantity of a bitter infusion, is very beneficial; and occasionally a more active purgative, as colocynth, scammony, gamboge, &c., may be employed. The choice should be guided by the conditions of the patient and of the eruption, and by the effects of the medicine previously employed. M. BIETT advises the calomel and the other purgatives to be continued daily for several weeks—for two months—if they do not produce a complete cure within that time. If salivation or other specific effects of the calomel appear, this substance may be omitted or the dose reduced; but this effect would seldom appear, and will not delay the cure. It is often necessary, or even advantageous, to suspend the treatment for three or four days, and then renew it. I have generally preferred to combine the calomel with rhubarb, and sometimes also with magnesia; or to give the calomel alone, much less frequently, and soon afterward a full dose of sulphur and magnesia; or the pilula hydrarg., chloridi comp. with soap and extract of colchicum at bedtime, and sulphur with magnesia in the morning. When sulphur is prescribed with magnesia, an aromatic powder may be added, and the medicine continued once or twice daily, so as to keep up a free evacuation from the bowels for several weeks, the tepid or vapour bath, or other external means about to be stated being also employed in aid of them.

49. *b.* The *tincture of cantharides*, administered in any mucilaginous diluent in doses gradually increased from five to fifteen or twenty or thirty drops for a dose, was much praised by BIETT, and, as M. RAYER observes, occasionally causes the rapid disappearance of the eruption, especially of the leprous form, when not severe, or only recent and limited in extent. But if taken in larger doses, it may, although it relieves or removes the eruption, excite inflammation of the digestive or urinary organs, or of both.

50. *c.* The *arsenical preparations*, especially FOWLER'S solution, has proved very efficacious in scaly eruptions, and I have found it more certain in its effects than almost any other single medicine. But the good effects have seldom been permanent, or even so progressive as to effect a cure in the more severe cases, unless the diet be carefully regulated. There is often, also, a liability to a recurrence of the eruption after it has been removed by too large or too frequent doses of any arsenical preparation; but this liability exists in most cases, and is to be met only by a most careful avoid-



ance of the exciting causes. MM. CAZENAVE and SCHEDEL state, that as psoriasis is often more obstinate than lepra, the remedies, especially arsenic, should be pushed farther for the former affection; and that a permanent cure, without any dangerous results, may be obtained by the judicious administration of arsenical preparations. M. BIETT also entertains a similar opinion. These preparations should not be given oftener than twice daily, and the dose ought not to be larger than three drops at first, nor increased beyond ten or twelve. In many cases they should be given after a full meal, especially when the dose is large, and when the course is protracted; and, unless the dose is very small, an intermission in the use of the medicine for three or four days should be directed. The following is the mode in which I have usually prescribed arsenic for the cure of psoriasis:

No. 327. R. *Liquoris Potassæ Arsenitis*, ℥iij. ad ℥v.; *Liquoris Potassæ*, ℥xv. ad ℥xxxv.; *Extr. Fluidi særæ comp.*, ʒj.; *Tinct. Aurantii*, ʒj. *Infusi Gentianæ Comp.*, ʒx. *Aq. Cinnamom.*, ʒss. M. *Fiat Haustus bis quotidie sumendus.*

51. I believe that large or too frequent doses of arsenical medicines are not only more injurious to the constitution, but actually much less beneficial, as regards the eruption, than either very small or very moderate doses. This circumstance will account for the not very favourable opinion expressed by Dr. A. T. THOMSON respecting them. He observes, "That notwithstanding the powerful influence of arsenic in psoriasis inveterata, I have met with cases which resisted it, even when administered in the largest doses. In some cases erysipelas has accompanied the use of the arsenical solution, in which case the remedy should be suspended until the erysipelas be removed, and afterward renewed in smaller doses." (P. 67.)

52. *d.* Dr. THOMSON adds, "That the medicine on which the greatest confidence may be placed in psoriasis is the *liquor potassæ*." He commences with thirty drops in two fluid ounces of the bitter almond emulsion twice a day, and gradually increases the dose of the solution to eighty or even one hundred drops. If the patient be delicate, the infusion of yellow cinchona or of cascarrilla is substituted for the almond emulsion; and he has found the *hydrargyrum eum creta* in doses of six or eight grains, at bedtime, a useful aid to this practice. I have employed a similar treatment, but could rarely succeed in getting the patient to take so large doses of the solution as he advises; indeed, I view them as injurious to the digestive organs and kidneys. I have seen marked advantage derived from it conjoined with the *iodide of potassium*, and taken either in a bitter infusion or in one of the decoctions advised for this eruption.

53. *c.* The *bi-chloride of mercury*, taken in the decoction of cinchona, or of sarsaparilla, or of dulcainara, has been also recommended, and is beneficial in slight or recent cases; but has failed in every case of inveterate or of protracted leprous psoriasis in which I have tried it. Dr. A. T. THOMSON states, that he has found the combination of iodine with mercury the most successful of any mercurial preparation for this disease. "The *biniodide*, in doses of a sixth to a fourth of a grain, exerts almost a

specific influence upon the morbid state of the skin; and when given at the same time as the *iodide of arsenic*, and aided by blood-letting, it has rarely failed in curing the most inveterate cases." As the acrimony of the preparation has disturbed the alimentary canal, he has usually combined it either with opium or with eonium, carefully avoiding pyalism. As, however, he has usually combined the *biniodide of mercury* with the *iodide of arsenic*, it is difficult to determine what share each may have had in the cure. He prefers this preparation of arsenic to the *liquor arsenicalis*. The dose of it, at first, ought not to exceed one tenth of a grain; and in no instance should it be carried beyond one third of a grain. "Its obvious effects are quickness and hardness of pulse, with slight puffiness of the lower eyelids; but generally, before these symptoms display themselves, the disease has begun to yield. The symptoms which indicate a necessity for reducing the dose are, heat of the mouth and fauces, anxiety at the præcordia, pain at the epigastrium, or griping. If, besides these, there is tension, with stiffness around the eyes, erythema of the face, thirst, white tongue, the edges and tip of a florid red hue, and a quick pulse, the medicine should be suspended for some days. If nausea, cough, vertigo, or salivation supervene, it should be left off altogether. The employment of any arsenical preparation is inadmissible, if it cause an uneasy sensation in the chest from the first."

54. The reason of the failure of arsenic in the cure of leprous and inveterate psoriasis is, in many cases, the large or too frequent doses in which it has been prescribed; the poisonous effects of the arsenic being thereby produced before sufficient time is afforded for the development of the alterative operation of the mineral. Most writers who have depended chiefly on arsenic for the cure of sealy eruptions have advised small or moderate doses, and a protracted course of it. GIRDLESTONE, BIETT, RAYER, WILLAN, BATEMAN, and ERICHSEN advise from two to three drops twice a day, up to seven or eight, this dose not to be exceeded, and the course to be persevered in, if none of the injurious symptoms just noticed be occasioned by it.

55. *f.* Recently, a preparation of arsenic, iodine, and mercury has been strongly recommended for the most obstinate and inveterate cutaneous eruptions by Mr. DONOVAN, under the name of the "*Liquor Arsenici et Hydrargyri Iodidi*." The composition of this solution is as follows: Water, one drachm; arsenious acid, one eighth of a grain; peroxide of mercury, one fourth of a grain; iodine, as hydriodic acid, about three fourths of a grain. Twenty minims, three times a day, have been considered as a proper dose with which to commence a course of it, and forty minims, thrice daily, as the largest dose. I have prescribed this solution in many cases; but I consider the dose here advised as very much too large. If the tongue be at all foul or loaded, an emetic, followed by two or three doses of calomel and rhubarb, or jalap, ought to precede a course of it; and at first, from five to ten minims, twice or thrice daily, and very gradually increased to twenty or thirty, at the utmost, will be sufficient. This solution is most serviceable when the liver is

torpid or loaded, and in the strumous diathesis. It, as well as the biniodide of mercury, is very efficacious in the syphilitic scaly eruptions. Mr. DENDY recommends the occasional use of the warm nitro-muriatic foot-bath during the course of this solution.

56. As to the use of arsenical preparations in psoriasis and lepra, Mr. ERICHSEN very justly observes, that they should not be given until the disease had assumed a chronic or inactive character. As long as there is inflammatory redness, heat, or irritation of the patches, they ought not to be employed, as the irritation of the arsenic will augment these symptoms. Besides, during the earlier periods of the eruption, a cure may be effected by the antiphlogistic and other means I have above advised, especially by depletions, emetics, and purgatives, with strict attention to diet and regimen. It is only, therefore, in very indolent, or extensive squamous diseases, and after other remedies have failed, that any of the arsenical preparations should be prescribed; and in all circumstances they ought to be given cautiously, and their effects closely observed; for, if prescribed too largely, or too long, they may injure the constitution much more than the continuance of the eruption, which in many circumstances admits of palliation merely, and not of complete cure.

57. *g.* There are various other medicines that have been prescribed, internally, for the scaly eruptions. The chief of these are, the decoctions of *dulcamara*, of *guaiacum*, of *meze-reon*, of *elm-bark*, the infusions of *nettles*, of *marsh rosemary*, the decoctions of *sarsaparilla*, *sulphur*, and the *sulphurets*, or the milk of sulphur conjoined with magnesia, or with either of the alkaline carbonates, and the *æthiop's* mineral and other preparations of *antimony*. Either of these infusions or decoctions may be made the vehicles for the administration of other more active agents, as the liquor potassæ, with or without the iodide of potassium, the liquor iodidi arsenici et hydarargyri, the liquor hydrarg. bichloridi, &c. In some obstinate cases of psoriasis, after morbid secretions and excretions have been evacuated, I have lately resorted to the use of *spirit of turpentine*, internally and externally, prescribing this substance either alone or with oleum ricini, in doses of half a drachm, or of one drachm, twice or thrice daily, and, after two or three days, the occasional application of an epithem, or embrocation of this spirit over the part chiefly affected. The turpentine ought to be discontinued as soon as it irritates the kidneys, but persisted in if it acts gently on the bowels. It will be taken with little inconvenience on the surface of a little milk or coffee. I have occasionally prescribed *tar-water*, internally as well as externally. It will be found a medicine of considerable power in this and other cachectic disorders, if appropriately employed. *Pitch*, *tar*, and the *turpentine*s have been recommended internally and externally for squamous diseases, and generally in the form of pill when administered internally, tar and the turpentine being rendered more or less consistent by means of magnesia. They are sometimes of service; but they often, in this form, pass into the large bowels undissolved, become excrementitious, and hence have little effect.

[Dr. EMERY, of the Hospital St. Louis, had his attention turned to the investigation of the different products of tar as remedial agents in the treatment of skin diseases, on account of the successful results he obtained from the use of tar, and because of the unpleasant odour it gave forth. Various preparations were had recourse to, the most valuable of which proved to be the concrete naphthaline, which Dr. EMERY tried in fourteen cases. In two cases, one of psoriasis gyrata, and the other lepra vulgaris, it failed in effecting any good; in the remaining twelve it proved more serviceable. Eight of these were men, and four women. In two of the cases, lepra vulgaris of from fifteen months to two years' duration, arsenical and iodic preparations had been previously tried; in the younger patient the arsenic at first seemed to do good, but the improvement soon ceased. An ointment prepared with two scruples of concrete naphthaline to thirty of lard was applied, causing the scales to fall off, leaving the skin of a violet colour, with white circles around. A perfect cure was effected in six weeks, and although three months have passed since, there has not been any relapse. In four other cases the men were labouring under inveterate psoriasis; in one of them it had existed sixteen years, and had resisted arsenical, iodic, and mercurial treatment. The tar ointment was had recourse to, and with decided advantage, but the man becoming impatient on account of his business, an ointment of naphthaline, twice the strength of that used in the preceding cases, was spread on compresses, and applied over the diseased parts night and morning. The man was cured in six weeks. When the ointment was applied too strong, it caused a burning heat, which was soon removed by emollient baths and poultices. The other six cases were also instances of psoriasis cured by the naphthaline ointment. Dr. EMERY states, that this remedy has an unpleasant odour, which passes off, and it is apt to irritate the skin and cause erysipelas, if it be not carefully watched.]

58. *C.* The state of the constitution, as well as of general and local action, should guide the physician in the choice of remedies, which ought to be chiefly antiphlogistic and evacuant, in the acute or early stage, and alterative and depurative in the chronic or advanced states. In many cases, however, alteratives and depurative remedies require to be combined with tonics and even with chalybeates; especially in *cachectic habits*, and when the eruption assumes a livid or dusky hue. In these, the iodide of potassium with the carbonate or solution of potass and sarsaparilla, or tonic infusions, or the iodide of iron with sirup of sarsaparilla, or the bi-chloride of mercury in the tincture or decoction of bark, with tincture of serpentaria, or the fluid extract of sarsaparilla, will generally be of great service; and, if a cure be not effected by these, aided by external means (§ 61, *et seq.*), then the preparations of arsenic, or the combinations of arsenic, iodine, and mercury, may be resorted to, as above recommended.

59. *D.* The syphilitic varieties of squamous eruption should be treated with strict reference to the history of the case, and the means which have already been employed and the period of their employment. Several severe cases of this eruption, some of which had either gone



on to extensive ulcerations or become complicated with disease of the throat, or the bones or joints, have at sundry times come under my care. For these there are certain remedies, which, if judiciously employed, may be viewed as specifics.—*a.* The oldest and not the least efficacious of these is the *bi-chloride of mercury*, prescribed either in the manner recommended by VAN SWEITEN, or given dissolved in alcohol, and taken in water with the hydrochlorate of ammonia, or in decoctions of sarsa, &c., or prescribed with the decoctions or infusions, or tinctures of cinchona, serpentaria, &c. When the eruption and its antecedent symptoms have not been attacked by a mercurial course, then the bi-chloride should be given in decided doses, and preferably soon after a full meal, either in the form of a pill and in gradually increased doses, as advised by VAN SWEITEN, or as just recommended, in either of which combinations it may be taken in the intervals between meals. Salivation, unless it be slight, need not be produced; although the specific effects should be continued for some time; when either of the other remedies next to be noticed should be prescribed, if the eruptions have not nearly or altogether disappeared.

60. *b.* The next specific remedy for this species of eruption is *iodine*. I believe that this substance, or any of its preparations, had not been prescribed for any form of syphilitic disease when first I ordered it in the summer of 1825, the formulæ, as well as an ioduret of sulphur, having been prepared by Mr. MORSON, the eminent operative chemist. At first I employed the iodine either in the form of a weak tincture, or in combination with potash, or the iodide of potash with the addition of pure iodine. Subsequently I preferred the iodide of potash, conjoined with liquor potassæ and sarsaparilla; full doses of PLUMMER'S pill being taken at bedtime. The iodides of mercury have more recently been employed for this eruption, and are generally beneficial; but they are not superior to the treatment which preceded them. They are, however, advantageously given in the form of pills at night, or night and morning, the iodide of potash being taken during the day, with liquor potassæ and sarsa. In the syphilitic species, also, Mr. DONOVAN'S solution is an excellent remedy, and may be advantageously adopted in the more protracted cases.

61. *E.* The internal and external use of mineral waters, either natural or artificial, and of simple or medicated baths, will generally promote a cure. It is preferable, however, not to have recourse to these until morbidly increased action and vascular or excrementitious plethora is removed by depletions, emetics, purgatives, antimonials, &c. But this end being attained, the sulphur waters of HARROWGATE, LEAMINGTON, MOFFAT, CROFTON, and of other springs in this country; or of those of BAREGES, CAUTERETS, BAGNERES, BAGNOLES, &c., on the Continent, will be employed with great advantage. A frequent use of warm baths, the patient remaining in them for a considerable time, and using gentle friction over the affected parts, will often be of service. A small quantity of the sulphuret of potash may be added to the bath. If the eruption be attended by much itching, the biborate of soda dissolved in the water will prove very beneficial. Dr. DUFFIN recom-

mends the immersion of the part, especially when the extremities are chiefly affected, in warm artificial Harrowgate water; or the diseased parts to be washed or fomented with it twice or thrice daily, for fifteen or twenty minutes each time; and a mixture of equal parts of the weak citrine and tar ointments to be applied after each fomentation. The following formula is given by him for the preparation of this water: Sulph. magnesiae,  $\text{zj.}$ ; supertart. potassæ,  $\text{gr. x.}$ ; sulphat. potassæ cum sulphure (or sal polychrest),  $\text{zss.}$  These are directed to be dissolved in twenty-four ounces of warm water, and used for a wash or fomentation. I have lately employed a wash or fomentation, either warm or tepid, with tar-water, containing biborate of soda dissolved in it.

62. If the scales adhere or are accumulated in crusts, sulphureous vapour baths, followed by frictions, or gently stimulating ablutions, or fomentations, with a solution of the biborate of soda, or with a little liquor potassæ, will be of service. The application of steam or vapour, with or without the fumes of sulphur, is always of use. Lotions of diluted alcohol, of solutions of sulphuret of potash, or the decoction of dulcamara, will aid the exfoliation. When the scales are removed, BATEMAN and THOMSON recommend the unguentum picis, or the unguentum hydrargyri nitratis, diluted with the ceratum plumbi compositum, or with simple ointment; or, which is better than either, an ointment composed of equal parts of these two ointments. The ointments which I have preferred are the *ioduret of sulphur ointment* ( $\text{gr. xij.}$  or  $\text{xj.}$  to  $\text{zj.}$ ), the *calomel ointment* ( $\text{zj.}$  to  $\text{zj.}$ ), the *ointment of white precipitate*, the *zinc and lead ointments conjoined*, and the several *ointments of the nitrates of mercury* and of the *iodide of mercury*. These last should, however, be employed more or less diluted. The ointments containing either of the iodides are most suited to very obstinate cases, the others for slight or recent cases. The iodide of sulphur ointment was first employed by the author in 1825. The ointments should be applied at night and washed off in the morning with a saponaceous or alkaline lotion (as  $\text{zij.}$  of liquor potassæ in  $\text{zviij. ss.}$  of water), after which a solution of the bi-chloride of mercury in dilute alcohol ( $\text{gr. ij.}$  in  $\text{zj. p.}$ ) may be applied slightly by a sponge over the part. Besides these ointments, others, with the acetate or phosphate of mercury, with the sulphate and deutoxide of antimony, with an ioduret of ammonia ( $\text{zj.}$  to  $\text{zj.}$ ), with camphor, or with concrete naphthaline (two to four parts to thirty parts of lard), have severally been recommended by different writers. A principal advantage derived from ointments is the protection of the inflamed surface from the action of the air, to which very insufficient attention has been directed in the treatment of cutaneous inflammations. Therefore, after the surface has been cleaned by any of these ointments, they should be washed off, and some gelatinous, albuminous, or gummy preparation applied to it, so as to exclude the air, as advised for PITIRIASIS (§ 27); and this preparation should be allowed to remain as long as it answers this purpose, when it should be removed by fomentations and ablution, and reapplied until the parts are completely restored. I have lately employed for scaly eruptions a lotion of

one part of *Glycerine*, to three, four, or five parts of water, with marked benefit; and Dr. GLOVER has recommended *Iodoform* externally (3ss.—3i. to the ʒj. of cerate), and internally, in doses of two or three grains twice or thrice daily.\*

63. As I have shown in the article *PSYRIASIS*, the chief causes of the obstinacy of scaly and other cutaneous eruptions, are, 1st. The action of the air, from which they are not sufficiently protected during the treatment; 2d. The want of due attention to the state of the assimilative and depurative functions of the blood; and, 3d. Insufficient restrictions on diet and regimen. But, even when a cure is obtained, or nearly obtained, a *relapse* or a *return of the eruption* is a frequent occurrence—a relapse generally proceeding either from the causes just specified, or from a premature relinquishment of treatment; a subsequent return of the disease resulting from the same causes as produced it at first, or from inattention to the several digestive and excreting functions. Both these unfavourable contingencies are most likely to occur when the functions of the several abdominal organs have not received due attention during the treatment, and a restoration of them to the healthy state has not been effected; and also when the healthy conditions and colour of the parts affected have not been completely restored before the successful means were relinquished. These two causes, especially when acting simultaneously, with errors in diet and regimen, are most influential in producing relapses, and returns, at more or less remote periods, of scaly eruptions; and they are of greater importance than they have hitherto been considered.

64. The local forms of *psoriasis* and *lepra*, mentioned above (§ 16, *et seq.*), require chiefly the adaptation of the general and local treatment already described to the circumstances of each case.—(a) *Psoriasis palpebrarum* will often be benefited by the application of three or five leeches behind the ears, and by a lotion consisting of a weak solution of the nitrate of silver, or a lotion of sulphate of zinc, or diluted tincture of iodine, to the part. The calomel ointment, or the zinc ointment, or a diluted nitrate of mercury ointment, may be severally applied in this and the other local forms of the eruption.—(b) For *psoriasis genitalium*, emollient local baths, and the use of the lotions and ointments just mentioned, are most beneficial. If these forms be attended, as they usually are, with much itching or irritation, a solution of the bi-borate of soda in tar water, or in some emollient fluid, containing creasote, applied as a lotion, or by a sponge, will generally give relief and remove the eruption. Sulphur and cinabar fumigations are usually successful when the scrotum or anus is implicated.—(c) For *psoriasis palmaria*, after soothing the parts with local baths of the decoction of bran, &c., ointments containing the iodide of sulphur, or the iodide of mercury, or the other ointments already mentioned, may be employed in aid of the constitutional remedies recommended. In the more chronic states of *psoriasis palmaris*, Mr. WILSON advises a spirituous lotion of bichloride of mercury, followed by water dressing.

65. The mineral acids have been favourably

mentioned by some writers; but I have seldom observed much benefit derived from them, and have even believed them to have been sometimes injurious. In a few cases, however, after a due evacuation of accumulated secretions and excretions, the liver still continuing torpid, the nitro-muriatic acids given internally and employed externally have appeared of some use; and the sulphuric acid has occasionally been added, with marked advantage, to the neutral sulphates, dissolved in bitter infusions, and taken in quantities sufficient to keep the bowels freely open. Dr. C. SMITH and Dr. CUMMINS, however, are of opinion that dilute sulphuric acid possesses considerable efficacy in the treatment of squamous eruptions; the latter physician believing that the acid is decomposed, and that the system is thereby impregnated with sulphur. This may be the case when the quantity taken is small or very moderate; but in some experiments I found that the dilute acid, when given in large and frequent doses, could be detected unchanged in the urine. Acids, however, ought to be employed with caution, and with strict reference to the excretions, especially the urine and its saline constituents.

66. The diet and regimen are of the greatest importance in the treatment of all the scaly eruptions, and are often more beneficial, if strictly enforced, than even medical means. Animal food should be used sparingly; and pork, veal, ham, dried or smoked and preserved meats; fish and shell-fish, especially fried and rich fish; rich sauces, doughy articles, pastry, or pie-crust; pickles and preserves; heating and stimulating beverages, especially spirituous and malt liquors, coffee, punch, acid wines, &c., ought to be constantly avoided; and sugar, butter, and sweet or acidulated articles very sparingly taken. The remarks offered on this topic in the article *PSYRIASIS* (§ 34), a species of the eruption now treated of, strictly apply to the treatment of these eruptions.

BIBLIOG. AND REFER.—*Hippocrates*, De Usu Humidorum. Epidem., ii.—*Galen*, Method. Med., xii.—De Caus. Symp., iii., 6.—*Orbasius*, Morb. Curat., l. iii., 58.—*Celsus*, De Med., l. v., 28.—*Actuarius*, Meth. Med., ii., 11.—*Paulus Aegineta*, Trans. by Adams, iv., 2.—*Avicenna*, Canon., iv., 7, 2, 9.—*Haly Abbas*, Theor., viii., 26.—*Pract.*, iv., 4.—*Mercuriali*, De Morbis Cutaneis, 4to. Venet. 1585.—*M. Czanakius*, Encomium Scabiei ad Scabios Republicæ Scabianæ, 12mo. 1627.—*Sennertus*, Med. Pract., t. i., cap. 30.—*Mead*, Medicina Sacra, cap. ii.—*Turner*, Treatise on Diseases of the Skin, 8vo. Lond., 4th edit., 1731.—*D. Lyons*, Practical Essays, &c., 8vo. Bath, 1772. (On Eln Bark in Cutaneous Diseases.)—*J. F. Carrère*, Traité de la Douce Amère dans les Dartres, 8vo. Paris, 1789.—*Vogel*, De Cognosc. et Curand. Homin. Affect. Cl., viii., s. 699.—*Savages*, Nosolog. Method. Cl., x., ord. 5.—*Linnaeus*, Ament. Acad., vol. viii., p. 285.—Et Dissertation de Lede Palustre. Upsale, 8vo., 1775.—*Lorry*, De Morbis Cutaneis, 4to. Paris, 1777, p. 365.—*Falconer*, Memoirs of the Med. Soc. of Lond., vol. iii., p. 369.—*J. C. Smyth*, Medical Communications, vol. i., p. 191, 8vo. Lond., 1784.—*Meckel*, De Lepra Squamosa, 8vo. Halle, 1795.—*Moriarty*, A Treatise on Mercurial Lepra, 12mo. Dublin, 1804.—*C. H. Wilkinson*, Remarks on Cut. Diseases, 8vo. Lond., 1822.—*Willan*, On Cutaneous Diseases, 4to. Lond., 1811, p. 36.—*Alibert*, Maladies de la Peau, fol. Paris.—*J. W. Perkins*, Boston Med. and Surg. Journ., No. 182.—Et Journ. des Progrès, &c., t. xvii., p. 272.—*F. S. Bida*, Reflect. Pratiques sur le Mal de la Peau appel. les Dartres, 4th ed. Paris, 1828.—*Duffin*, On Squamous Disorders, in Edin. Med. and Surg. Journ., vol. xxv., p. 1.—*T. Bateman*, Practical Synopsis of Cutaneous Diseases, 7th ed., by A. T. Thomson, p. 35.—*Plumbe*, Practical Treatise on Diseases of the Skin, 8vo, 2d ed. Lond., 1827.—*M. Good*, Study of Medicine, vol. iv., p. 457.—*Chevalier*, Journ. de Chimie Med. Mars., 1826.—*Richter*, Specielle Therapie, &c., b. vi., p. 440.—*Rayer*, Traité des Maladies de la Peau. Transl. by Willis, 8vo. Lond., p. 631.—Et Dict. de Med. et Chirurg. Prat.,

[\* Gun cotton dissolved in ether is one of the best applications in these cases.]



art. *Lépre*.—*J. L. Alibert*, *Descript. des Mal. de la Peau, Observées à l'Hôpital St. Louis*, &c., fol. Paris, 1825.—*L. A. Struve*, *Synopsis Morb. Cutan. secundum Classes Genera, Species et variet.*, &c., fol. Berl., 1829.—*R. Willis*, *Illustrations of Cutaneous Diseases*, &c., fol. Lond., 1839.—*Donovan*, in *Dublin Journ. of Med. Science*, Nov., 1839, and Sept., 1840.—*J. Houghton and W. Cumin*, in *Cycloped. of Pract. Med.*, vol. iii., p. 25 and 543.—*J. Green*, *Pract. Compendium of the Dis. of the Skin*, 8vo. Lond., 1835, p. 199.—*E. Wilson*, *Pract. and Theor. Treatise on the Diag., Pathology, and Treatment of Diseases of the Skin*, 8vo. Lond., 1842, p. 214.—*Th. H. Burgess*, *Manual of Diseases of the Skin. From the French of MM. Cazenave and Schedel*, 8vo. Lond., 1842, p. 200.—*Et Diction. de Med.*, 2d ed., art. *Psoriasis*.—*W. C. Dendy*, *On the Causes, Nature, and Treatment of Lepra and Psoriasis*, fol. Lond. (with plates).—And a Treatise on the Cut. Dis. incidental to Childhood, 8vo. Lond., 1827.—*J. E. Erichsen*, in *Lond. Med. Gaz.*, vol. xxxii., p. 197.—*R. M. Glover*, in *Monthly Journ. of Med. Sciences*, Feb., 1848, p. 578.

[AM. BIBLIOG. AND REFER.—American editions of *Rayer, Green, Cazenave and Schedel* (by *Bulkeley*); *Good, Plümbe, Bateman*, &c., and reviews and medical journals already noticed.]

## PUERPERAL STATES AND DISEASES.

—THE PATHOLOGY OF PARTURITION.—DISEASES INCIDENTAL TO THE PUERPERAL STATES.

CLASSIF.—GENERAL PATHOLOGY.—SPECIAL PATHOLOGY.

1. Several of the diseases incidental to parturition and to convalescence from this act are discussed under their special denominations; and to these I shall refer as they successively take their places in the group of maladies usually called "*Puerperal*." In this place, therefore, it chiefly remains to discuss, 1st. *The pathological relations of the puerperal state*; and, 2d. *The very dangerous and often malignant maladies incidental to it, which are not treated of under other heads*. That a view of the pathological relations of the puerperal state, impartially exhibited, and without reference to peculiar doctrines, will be of use, it is hoped, in guiding the inexperienced during their intercourse with the deviations from the more common procession of morbid phenomena which will occasionally be met with by them, is only a reasonable expectation; and hence an inducement to undertake the labour which a faithful exhibition of this view involves.

2. I. THE PATHOLOGY OF THE PUERPERAL STATES.—i. OF THE STATE OF THE FEMALE AT THE MOST ADVANCED OR FULL PERIOD OF PREGNANCY.—The changes, as well as the principal deviations from the healthy state, during utero-gestation, are described in the article PREGNANCY, and under various other heads. It only remains to notice the state presented by the female economy when gestation is approaching, or has reached its full period. The uterus then has attained its utmost size; and it then enjoys a copious determination of blood for the nourishment and growth of the fœtus, and for the preservation of its own augmented structure. The distended uterus, especially in a first pregnancy, presses more or less, according to the size of the female and the capacity of the abdomen, upon the other viscera, especially on the urinary bladder, the kidneys, the rectum, and large bowels, the liver and biliary apparatus, and stomach; and, consequently, the descent of the diaphragm is impeded, and congestion of the lungs is favoured. But the pressure also influences the circulation through the large venous trunks, and often, in some degree, through the heart and lungs; hence arise congestion of remote parts, especially of the veins of the lower extremities, often followed by

cedema, and congestion of the sinuses within the cranium, with the dangerous consequences of this condition. The effects produced by the large size of the uterus are very much aggravated if pressure upon the lower bowels be allowed to interrupt the regular process of fecation and excretion, and if this cause or indigestion should give rise to flatulent collections in any portion of the alimentary canal.

3. With the increased development of the pregnant uterus, the peritoneal envelope of the organ, and even the ligaments experience a remarkable change, and are inordinately stretched, so as to favour the supervention of inflammation, especially upon the removal of the distending cause, when additional influences come into operation. With the ascent of the fundus of the uterus, the omentum is more or less displaced, and carried upward; its exact position and influence upon adjoining parts varying with the quantity of adipose substance it may contain.

4. It is obvious that changes of the position and condition of the viscera must influence more or less the functions performed by these viscera; and that, both during the progress of these changes and at their consummation, various disorders, noticed under PREGNANCY, are liable to appear; that the secretion and excretion of urine should be disturbed or impeded, or even arrested, the functions of digestion and assimilation disordered, the intestinal secretions and excretions interrupted, and sensibility and motion materially disturbed. At the full period of gestation, the circulating and respiratory organs, and still more the nervous centres, owing to the congestions to which they are exposed at this period, are severally liable to the most serious attacks as soon as the congestion, in which these attacks originate, is carried to the pitch requisite for their development.

5. In connexion generally with the changes now mentioned, if not always dependent upon these changes, the nervous system generally acquires increased sensibility and susceptibility of impression; and, through the medium of this system more directly, and through that of the vascular system more indirectly, the whole frame intimately sympathizes with the uterus, independently of the mechanical effects produced by it upon the other viscera. The nervous development of this organ, and the vascular determination to it, influenced by the nervous organization, renders the womb the centre of numerous sympathies and the source of many morbid phenomena, all which increase and become more prominent with the progress of pregnancy, and still more manifest at the full period, during parturition, and for some time after delivery. The activity of the nervous influence, and of the vascular circulation of the uterus at an advanced stage of pregnancy, influences remarkably the conditions of both the nervous and the vascular system generally, notwithstanding the various pathological conditions tending to impair the energy and sensibility of the one, and the tone and action of the other—notwithstanding interrupted excretion, and the various circumstances favouring excrementitious contamination of the blood, and congestion of it in venous trunks and sinuses.

6. ii. OF THE CHANGES TAKING PLACE DURING THE PARTURIENT PROCESS, AND THEIR INFLU-

**ENCES IN CAUSING DISEASE.**—The uterus, having completed its function of fetal development, or having carried this function as far as is consistent with the health and subsequent safety of the mother, experiences that state of action which is the best calculated to preserve both the child and the parent from injury and disease. But during this action, and the changes in the nervous and vascular systems which it more or less remarkably produces, various morbid conditions are apt to appear. The painful contractions of the uterus, although occurring only at intervals, tend to excite or react upon the nervous systems generally, but more remarkably upon the spinal cord, and through it upon the brain. These contractions also tend to diminish the flux of blood to the uterus, and to determine it in greater quantity to the brain, and thereby to change a pre-existent state of passive congestion into active and increased congestion, or to carry a condition of the vascular system, which was insufficient to produce acute disease, to that pitch which instantly develops such disease.

7. The uterine actions, although often thus productive of seizures depending upon the states of the cerebro-spinal nervous centres, especially as regards the circulation of these centres and the peculiarities of that circulation, are yet independent of these states. This fact is undeniably demonstrated by the occurrence of uterine action independently of the will, and during abolition of the functions of the cerebro-spinal system; by natural parturition taking place during paraplegia as well as hemiplegia, and as shown recently by the regular progress of the parturient process, while sensibility and voluntary motion are abolished by the inhalation of ether or of chloroform. It is obvious that the muscular contractions, and the painful excitement of the uterine nerves during parturition, will occasionally develop morbid tendencies in the nervous system when these already exist, owing either to hereditary or to acquired predisposition, and consequently that convulsive or apoplectic seizures, or phrenitic or maniacal attacks will occasionally appear during this process; the convulsive seizure presenting more or less of the apoplectic, of the epileptic, or of the simply convulsive character, according to the predisposition and peculiar circumstances of the case; the maniacal attacks rarely appearing during parturition, although frequently after this process. Convulsive seizures are not confined to parturition, for they occasionally take place previously to, as well as after, this process; but during it they are more apt to assume an apoplectic or epileptic, or a mixed form—in consequence of the greater liability to active congestion of the brain and spinal cord during the parturient act—the apoplectic being characterized by profound coma and stertorous breathing, with slight convulsions, the epileptic by the violence of the convulsions, by frothing at the mouth and injury to the tongue. (*See articles CONVULSIONS, PUERPERAL; and INSANITY, PUERPERAL.*)

8. Certain changes in the uterus itself may take place during pregnancy, or even may have existed previously, and may arrive at a dangerous or even fatal termination upon the accession or in the course of parturition. Thus in-

flammation may have attacked a portion of the pregnant uterus and occasioned softening, or impaired action and tone, or even a greater lacerability of that portion, in consequence of either of which changes rupture of the uterus, or dangerous hemorrhage may take place during parturition; or, if either of these do not supervene, inflammation of the uterus, or of its veins or sinuses, or peritonitis, or puerperal fever, may follow delivery, the previously diseased state, and the exhausted tone and contractile power of the organ especially favouring the occurrence of these maladies.

9. There are various circumstances connected with parturition productive of disease either of the uterus or of adjoining and associated parts. The interferences arising out of impatience and want of confidence in the efforts of nature, a premature or inconsiderate, or a too long delayed recourse to medicinal or mechanical aids of parturition, and the injury which these may occasion either to the uterus or to parts in the vicinity, or even to both, are among the most influential causes of disease, not only of the parts thereby injured, but of the frame generally through the media of the nervous and vascular systems. The means which have recently been recommended for the prevention of pain during parturition, although quite competent to the production of this result, cannot be viewed as altogether innocuous. Several instances have already occurred, evincing not merely dangerous, but actually fatal effects from recourse to them. A fatal issue may certainly be prevented from taking place immediately from these means; but the changes which may terminate fatally cannot be so readily prevented in all cases, and at the same time accomplish the intention for which they are employed. These anæsthetic agents have been demonstratively shown not only to destroy sensibility for a time, when inhaled for a short period, but also, in comparatively short periods of inhalation, to produce congestion of the lungs, a manifest change in the state of the blood, and even a rapidly fatal result. That these agents, when adroitly and cautiously administered, may not occasion any inconvenience subsequently to their inhalation may be the case, in nine out of ten instances in which they have been employed, will be readily admitted, but the tenth instance may be one of serious puerperal disease, of convulsions, or of mania, or of fever, or of congestive pneumonia, or bronchitis, owing to the previous state and predisposition of the patient: events which cannot be anticipated or guarded against by the physician. Pain is often salutary as respects its effects, and especially in enabling the œconomy to resist, and to rally against, the depressing operation of shocks upon the vital influence; and, when neither its violence nor its continuance is productive of injury to the constitution, or of exhaustion of vital power, to endure it is preferable to the annihilating of sensibility by an agent which acts so remarkably, and so immediately upon the chief manifestation of animal life, arrests the usual processes of nature, and even terminates existence itself if employed a few seconds longer than is required to destroy this the highest function of living creatures.

[On the other hand, it is not to be forgotten



that very serious consequences often happen from the shock produced by pain itself, as in a severe surgical operation, or from parturient throes, and that there may be less danger in overcoming these pains, and thus preventing the shock, than in allowing them to go on unimpeded. There is a choice of evils, and, if possible, we are to select the least. We have been led to believe, from what we have observed, that the general employment of anæsthetic agents in midwifery is inexpedient, being not unattended with danger. Dr. J. O. WARREN has very justly observed, that there is no parity between the abolition of pain in surgical operations and the abolition of the pains of labour, the former being only a part of that general law for preservation against injury, in consequence of which, whenever a foreign body threatens to impair the integrity of an organ, pain is produced, and the organ is instinctively withdrawn from the contact. While, therefore, there is nothing contrary to the laws of nature in the removal of pain from surgical operations, that which regulates the pains of labour is a general law, its final cause being sufficiently plain to show its utility, if not its necessity. It would certainly seem, *à priori*, that the use of so powerful an application through the whole period of a natural labour would, in proportion to the term of that labour, increase the dangerous tendency to organic excitation; and when this period is very protracted it might bring on distressing derangements of the stomach, brain, spinal marrow, or uterus, besides in many cases suspending the uterine contractions. Dr. W. is of opinion that the cases in which ether or chloroform can be properly resorted to in midwifery should be exceptions; such as, 1st. In a natural labour, when the pains are uncommonly severe, especially the terminating pains in a first parturition. 2d. During limited periods of labours prolonged by a preternatural cause. 3d. When, from the peculiarity of constitution, the patient cannot without danger support the usual amount of suffering. 4th. For the purpose of obtaining relaxation in irregular contractions of the uterus, as the hour-glass contraction after delivery.

On the contrary, there are other highly respectable accoucheurs who advocate the general use of anæsthetic agents in midwifery practice, as Professors SIMPSON, of Edinburgh, and W. CHANNING, of Boston, Mass. The former states that he has employed chloroform in almost every case of parturition for the last six months or more, not only without danger, but without any unpleasant symptoms. The testimony of Dr. CHANNING is also to the same effect. The conclusion, then, to which we are forced to come, in consideration of all the facts before us, is, that in properly-regulated doses, anæsthetic agents, like other powerful narcotics, as morphia, &c., may be administered not only with safety, but with the highest advantage, provided there be no contra-indicating circumstances, and due attention be paid to condition, age, temperament, sex, and constitution. We have found a small inhaler the most convenient method of giving chloroform, so as to regulate the dose with proper exactness. In this vessel place fifteen to twenty drops of pure chloroform, and let the patient inhale it carefully; if the dose is not sufficient, add ten or

fifteen drops more, which will usually be found an ample quantity to annul sensibility, if not consciousness.]

10. iii. OF THE STATE OF THE FEMALE AFTER PARTURITION, AND ITS INFLUENCE IN FAVOURING THE OCCURRENCE OF DISEASE.—In estimating the state of the female upon delivery, the previous conditions now passed in review, those just antecedent to parturition, and the act of parturition itself, ought to be held in recollection. The pressure produced by the gravid uterus upon adjoining viscera, and the effects of that pressure, as shown above (§ 6, *et seq.*), are now suddenly removed. The vitality of the frame has sustained some degree of shock from the violent contractions of the uterus, the expulsion of the fetus, and the detachment of the placenta, as well as from the sudden loss of blood, and the removal of pressure and distention. The internal surface of the uterus, moreover, resembles that of an extensive wound, especially where the placenta was attached to it; while the peritoneal surface of the organ, and the positions and physical conditions of the several abdominal viscera, are now more or less changed. The general results of these concurrent changes are not severely felt by robust or sound constitutions, beyond what may be viewed as a slight shock to the vital energy, attended by more or less exhaustion consequent upon the pains, the uterine action, and the loss of blood; but this result in these constitutions amounts not to disease; it is merely a state of vital exhaustion, which nature soon repairs, but which readily favours the development of disease whenever any of the causes to which puerperal females are often exposed comes into operation. It is different, however, with females who are otherwise circumstanced, especially with the delicate, the insufficiently nourished, and the morally depressed. If there exist a deficiency or poorness of blood; if fecal accumulations have formed in the large bowels; if the patient be nervous, hysterical, or subject to sudden or epileptic seizures; if she entertain fears of her state, or anxieties as to the present or future; and if she be exposed to the impure air of a low, miasmatic, damp, and close chamber or locality; or to the contaminating and infectious air of an hospital; or to any of the numerous causes which induce the diseases incidental to child-bed, then the effects, whatever may be the especial form which they assume, will be most serious and often fatal.

11. In proportion to the severity of shock produced by the parturient act upon the vital energy, and to the susceptibility of the nervous influence and sensibility of the patient, will the liability to the supervention of puerperal maladies be great. Mania, watchfulness, headache, convulsions, imperfect contractions of the uterus, or an impeded return of the organ to the size proper to the time which has elapsed since delivery; suppression of, or irregularities in, the lochial discharge; suppression of the secretion of milk, &c., may severally follow severity of shock, especially when heightened by marked susceptibility and sensibility; and these latter will in their turn be greatly aggravated by large losses of blood relatively to the condition of the vascular system, even although no other malady be superinduced. After consid-

erable hemorrhage, also, particularly when vital exhaustion is remarkable, or when the mind is anxious or depressed, morbid emanations strongly impress the nervous system, and readily pass, by endosmosis, into the pulmonary circulation. The contractions of the uterus being then also inefficiently produced, the lochial discharge is partially retained and rapidly altered; and, thus altered, it is partially imbibed by the vessels opening on the internal surface of the uterus, inflaming these vessels and venous sinuses. But the matters retained in the uterus may not merely inflame these vessels, they may also contaminate the organ itself; and being imbibed and absorbed into the circulation, contaminate also the whole mass of blood, with or without manifest change in the uterine vessels and structure; and, moreover, after such contamination, superinduce remarkable constitutional effects and structural lesions of those parts especially which have undergone the more evident alterations as to position and condition during the successive stages of gestation and parturition.

12. Thus, after parturition, the female frame is particularly open and liable to be invaded by the most influential causes of disease: 1st. By mental excitement and impulse, and by moral depression. 2d. By the inhalation of morbid effluvia, proceeding either from other diseases, or from the decomposition of animal discharges and secretions, or from the other sources generally productive of infectious emanations. 3d. By the absorption from the cavity of the uterus itself of retained and partially decomposed discharges. 4th. By infectious matters retained in the foul bed-clothes, mattresses, or beds in which the female is confined. 5th. By the retention and absorption of altered secretions and excretions, or of fecal matters from the alimentary canal; and, 6th. By interrupted secretion and excretion, the blood being altered more or less, owing to the accumulation in it of morbid or excrementitious materials.

13. IV. OF CONVALESCENCE AFTER PARTURITION.—A. THE NATURAL COURSE OF CONVALESCENCE.—a. The shock consequent upon delivery soon subsides when it is moderate and the patient obtains a few hours' sleep, if all disturbance or excitement be prevented. In proportion to the subsidence of this effect upon the vital power, the comfort and repose of the patient return, and nervous symptoms or vascular excitement are prevented. As the shock subsides and exhaustion is diminished, so are the several secretions and excretions, with the new secretion of milk, re-established. The circulation, as indicated by the pulse, which was excited or increased in frequency during the progress of labour, falls below the natural standard immediately after, and continues below it during a few hours. After varying somewhat for the following fourteen or fifteen hours, the circulation becomes slightly increased on the secretion of milk; and, when this secretion is established, it generally continues about the natural state.

14. b. The uterus contracts more or less firmly immediately after delivery, so as to reduce it, in the more energetic cases of contraction, to about the size of the infant's head. This contraction, 1st. Prevents hemorrhage; 2d. Empties the cavity of the uterus, and prevents

the lodgment of coagula; 3d. It constricts the uterine vessels and sinuses, evacuates their contents, and prevents their tendency to imbibed fluids, which may be retained in the cavity of the womb; and, 4th. It diminishes the afflux of blood to the uterus. The contraction and diminishing size of the womb proceed, although not regularly, or without recurrences of slight relaxation, until about the eighth, or ninth, or tenth day, when it descends into the pelvis. Previous to the eighth day, its state may be ascertained through the relaxed abdominal parietes; but afterward the fundus only can be felt above the pubis, and in six or seven days it can no longer be detected. This diminution of bulk is not altogether attributable to contraction, but to absorption in part, and in no small degree to the exclusion of the supply of blood, and to the pressure, by the contraction of the uterine fibres, of the fluids from the vessels and the interstices of the structure. It may, however, be doubted whether absorption is concerned in lessening the size of the womb after delivery, the lochial discharge probably contributing to this result.

15. c. The condition of the internal surface of the uterus, after delivery, is a matter of interest. "For several days after parturition, when no disease of the uterus has supervened, its lining membrane is coated with a yellowish brown, dark red, or ash-gray coloured layer of no great thickness, which seems to be formed chiefly of the fibrine of the blood, with small portions of deciduous membrane." The part to which the placenta was attached is raised above the surrounding level: its surface is unequal, resembling in this respect a granulating ulcer; its size is wonderfully reduced. In this situation dark-coloured coagula are found sealing up the orifices of the uterine sinuses, and frequently extending into the veins. The structure of the uterus is found to be less dense than natural, and the fibres more distinct. The os and cervix uteri are covered with ecchymoses, as if severely bruised; and sometimes small lacerations are observed on the edge. The orifice remains open for some days, but gradually closes. The vagina soon recovers its former calibre; considerable heat and soreness of it are experienced for only a short time, unless the head of the child have remained long in the pelvis, or the lochia be very acrid, when they are prolonged or pass on to inflammation of a more or less severe character. The vulva also resumes its natural capacity in a shorter time than might be expected. (See CHURCHILL.)

16. d. After-pains require no mention at this place, as they are considered under that head. (See art. AFTER-PAINS.) The lochia is merely a continuation of the discharge of blood which attends delivery, and proceeds from the vessels exposed by the separation of the placenta. For three, or four, or five days it continues of a red colour; but it is much thinner, and more watery than blood, and it is not coagulable. It then sometimes becomes yellowish, retaining its serous consistence; but it most frequently changes successively to greenish, yellowish, and, lastly, to a turbid appearance. The quantity and continuance of this discharge vary remarkably. Of the former no estimate can well be formed; the latter varies much; but the discharge seldom ceases altogether in a short-



er period than three weeks, unless in consequence of disease, or continues longer than a month. Its sudden disappearance, and even its short duration or scanty quantity, are important symptoms of puerperal disease.

17. *c.* The several secretions and excretions are more or less affected during the puerperal states. During parturition the *perspiration* is abundant, but diminishes gradually after delivery; but it usually continues free, and has a faint, sickly odour, until convalescence is fully established, when the skin presents its usual state. The *urine* varies in quantity with the abundance of perspiration and of fluid ingesta, and also with the *state of the bowels*, which also vary, owing to their previous conditions and other circumstances. The *milk* is secreted immediately, or soon after delivery. A serous fluid, approaching to, but in some respects differing from true milk, is generally secreted for some time before parturition; and occasionally true milk is secreted during labour, although rarely with first children. In this case the mother can suckle immediately after delivery. But more frequently the milk is not secreted for eighteen, or twenty-four, or thirty-six hours, when the breasts enlarge and stinging pains shoot through them. As the parturient shock passes off, and the contracted state of the uterus diverts the vascular determination from this organ, the secretion of milk commences and increases.

18. *f.* With the development of this new function a general disturbance of the system, constituting what is termed the *milk fever*, is produced. The severity and duration of this disturbance are influenced chiefly by the circumstance of the woman's nursing the infant or discouraging the secretion of milk, and by the state of the bowels and of the other secretions. At first, or about the second or beginning of the third day, the mammae are heavier, larger, and tenser, and the patient has slight chills or rigours, followed by heat of skin, soreness of the breasts, and acceleration of pulse. With these symptoms the secretion commences, at first slowly and with difficulty, but afterward more freely. As the secretion becomes more abundant, the above symptoms abate, and in two or three days disappear. The milk first secreted is thicker and richer than that which follows, and acts as an aperient to the infant. (*See art. LACTATION.*)

19. *B.* DEVIATIONS FROM THE NATURAL AND HEALTHY COURSE OF CONVALESCENCE AFTER DELIVERY. — Dr. HAMILTON justly remarks, 1st. That when there has been unusual suffering during labour, the usual changes after delivery cannot be expected to proceed in a healthy manner, because the exhaustion of sensorial power must more or less paralyze the actions of every part of the system; 2d. That the violent pressure to which the parts concerned in the mechanism of labour have been subjected must occasion a tendency to inflammation; and, 3d. That the violent and continued actions of the respiratory organs must render them liable to derangement. But, however influential these causes may prove in occasioning deviations from the ordinary course of convalescence, there are others not the less so, and these consist, 1st. Of disorders previously existing, or occurring during pregnancy; 2d. Of

peculiarity of constitution or predisposition; 3d. Of mental agitation and moral influences; and, 4th. Of numerous circumstances occurring, and of causes coming into operation after delivery.

20. (*a*) The *nervous shock* may be so very severe as to create alarm. The patient has the aspect of a person in a state of collapse or extreme exhaustion. The countenance is expressive of anxiety; the senses are either morbidly acute, or, what is still worse, unnaturally dull; the pulse is very rapid, small, and weak, or very slow, laboured, or irregular; and the respiration is hurried, panting, and often more frequent than accords with the state of the pulse. Between this more extreme state of vital shock and the natural state there are numerous grades; and even in the slighter states reaction may be long deferred, or may take place imperfectly, or even excessively. In the more extreme states of shock, death may occur in a few hours, without any attempts at reaction being made, the vital sinking proceeding until life is terminated.\*

21. *Dissection*, in these cases, detects no lesion to account for death. Dr. CHURCHILL remarks, that of several cases of this kind which he has seen, one was tedious, but terminated naturally, and two others were instrumental deliveries. A due estimate of the nervous shock is of great importance in severe cases; for in most instances the progress of convalescence is in inverse proportion to the amount of this disturbance. In some persons slight circumstances increase, in a wonderful degree, the susceptibility of impression; and, if this be overlooked, very serious results may follow.

22. (*b*) The *state of the pulse* is of the utmost importance after delivery. If it continue frequent or very quick, one of two, or even three, things is to be apprehended, even although no other untoward symptom may exist, namely, hemorrhage, internal or external, or the accession of inflammation, or of puerperal fever. Dr. CHURCHILL observes that, in almost all the cases of flooding after labour, he has found the pulse remain quick, and perhaps full, up to the occurrence of the attack. He might have extended the observation to inflammations and puerperal fevers; seeing that the phenomenon is equally applicable to them and to the commencement of lactation, to after-pains and to the retention of coagula, in some constitutions. The remark of Dr. JOHN CLARKE that no woman should be considered as safe whose pulse exceeds 100 is certainly just; and I may add, that if the pulse exceed 110, then the risk of puerperal fever or of internal hemorrhage having commenced, is very great; and a careful examination of all the symptoms of the case should be made, and the coming mischief anticipated, and, if possible, prevented.

23. When, with increased quickness of pulse, it is found that the uterus has not decreased so far in size as might have been expected from the time that had elapsed since delivery, or

\* We have known several cases of death from nervous shock after child-birth even as late as the second or third week, in very delicate females, and where no morbid changes could be found after death. In two instances the fatal result was caused by strong mental excitement when in a very feeble condition; syncope succeeded, from which the patient could not be roused. These cases require very great caution, in order to guard against accident.]

that, having been diminished, its bulk has increased about the fourth or fifth day, then inflammation of the womb or of its vessels may be expected to declare itself, if it have not already done so, by increased tenderness, by less firmness of the uterine tumour, by the diminution of the lochia, and by the sensations of the patient. These symptoms may, however, be occasioned by the retention of coagula in the womb; which, if retained long, or if not thrown off, by means which will aid the contractile action of the uterus, may cause inflammation or puerperal fever. As tenderness may accompany severe after-pains, it is proper to distinguish between the tenderness thus produced and that which depends on inflammation; and this may be effected by ascertaining whether or no the tenderness continues in the intervals between the pains and contractions which occasion them. If it does continue, inflammation should be suspected, especially if the pulse be quick, and if the lochia has suddenly become scanty or suppressed.

24. (c) The *lochia* rarely deviates from the usual condition without exciting some degree of anxiety in the mind of the patient and physician. This discharge may cease a few hours after delivery, after the birth of a still-born or putrid child; and, although putridity of the fetus may be viewed as risking the healthy condition of the uterus, yet the membranes may have protected this organ, so that no unpleasant symptoms appear. The lochia may also be very scanty, yet of the usual duration, as when flooding has occurred; and in this case no farther mischief may appear, although a greater predisposition to some other puerperal malady is thereby developed, as puerperal fever or mania, &c. This discharge may be, on the other hand, *excessive*, either as to the quantity within the usual time, or as to the prolonged duration of it. After having decreased in quantity and changed in colour, it may suddenly increase, or become even excessive. This is usually caused by sitting up too soon, or walking about; or by the expulsion of a clot which may have obstructed the passage of the discharge through the os uteri. If the lochia change suddenly from a paler to a redder colour, or if a *red colour* return after it has disappeared, the accession of secondary hemorrhage should be dreaded and guarded against. The passage of the discharge into uterine *leucorrhoea*, which may be permanent, will sometimes occur, and ought to be prevented. The lochia may assume an *acid* and a very *offensive* state. It is then of a dark or green colour, very profuse and watery, often so acid as to excoriate the parts, and always very fetid. These conditions of the discharge are often a sign of disease, but they often also are caused by the retention of a small portion of the placenta, or of coagula, either in the uterine cavity, or in the extremities of the veins and sinuses, or by portions of the decidua which putrify and come away.

25. (d) The *bladder* and *urethra* may suffer considerably after labour, especially when protracted, and be excessively tender; and redness and tenderness may extend to the *vagina* and *vulva*. This state is often productive of distressing strangury, sometimes with considerable fever.

26. C. OF THE MANAGEMENT OF CONVALESCENCE FROM PARTURITION.—(a) *For the natural course of recovery*, the recommendations of HAMILTON, CLARKE, SMELLIE, BURNS, CHURCHILL, and others accord in every respect, and are nearly the same as those which will be here adopted. The patient, after delivery, should be kept for some time in a state of perfect quiet. The room ought to be slightly darkened, and very few persons, except the nurse, admitted. Little or no talking ought to be permitted, unless in an under-tone, and no whispering. The conversation and demeanour of all should be cheerful; and no ill news, frightful stories, or unseasonable communications related. Mental excitement or emotion of every kind is liable to be injurious. The horizontal position must be strictly preserved, and sleep invited. After a few hours' sleep the nervous system will recover from its shock. The state of the *pulse* ought to be carefully watched, and excitement of it viewed attentively in connexion with every sign or symptom of disorder, as it is generally the first to indicate the approach of disease. "Immediately after delivery, it is proper to apply *compression* to the abdomen, by means of a broad binder. This is useful, in the first place, to fix the uterus, and secure its steady contraction; and, secondly, to encourage the contraction of the abdominal parietes. The binder should extend from the ensiform cartilage to the pubes, and be carefully applied for ten days or a fortnight." Immediately after the expulsion of the placenta, a warm napkin ought to be applied to the vulva, and changed at short intervals. "This will afford relief from the smarting pain consequent upon the passage of the child. After some hours, when the patient is recovered, the external parts should be washed with tepid milk and water, containing a small portion of spirit. This must be repeated twice a day, not only for the sake of cleanliness, but to aid in restoring the parts to their natural state."—(CHURCHILL, &c., *Op. cit.*, p. 253.)

27. The *horizontal posture* ought to be undeviatingly observed; and however the exact position may be changed, the horizontal state should never be departed from until permitted, and never until after the fourth or fifth day from delivery. The *after-pains* require such attention as is advised in the article respecting them. The *lochia* needs no farther attention than that the napkins should be changed sufficiently often, and that they be applied warm, and so as to prevent the admission of air, especially cold air, to the tender parts, and the action of the air on the internal surface of the vulva. The air in the chamber ought to be preserved in a fresh and moderately cool state, and a fire kept up in order to promote a renewal of air in the room. The bed-clothes ought only to be sufficient to afford a comfortable degree of warmth.

28. *Micturition* should be attempted as soon after delivery as may be felt to be requisite—in from five to eight hours—and it should take place as nearly in the horizontal position as possible. Dr. HAMILTON advises the patient to turn round upon her knees, by which any coagula accumulated in the vagina will readily be expelled. If micturition be neglected too long, the bladder may be paralyzed, or inflammation may attack it and extend to the peritoneum, or convulsions may be excited by its over-distension.



tion, as I have witnessed in two instances. If any difficulty in evacuating the bladder exist, a warm fomentation to the vulva, or the introduction of the catheter, will remove it. It is the more important that the urine should be voided when the patient complains of pain in the lower belly, with a desire to pass it, and when the labour has been severe or instrumental.

29. The bowels may remain quiet for twelve or eighteen hours after delivery; and if they are not moved at the end of this time, a dose of castor oil, or of senna, or of rhubarb may be given, and, if necessary, repeated. The frequency of repetition must depend upon the state of the bowels previously to delivery, and upon the presence of signs of fecal accumulations. Dr. HAMILTON remarks, that "unless it be unequivocally ascertained that the bowels have been regularly cleared previous to delivery, a dose of castor oil, or of aloes, with some narcotic, if necessary, ought to be given as soon as the woman has recovered from the shock of labour, and the appearance of the stools particularly examined." If indurated feces be present, the purgative should be repeated every ten or twelve hours, until the bowels are completely unloaded. When the reduction of the bulk of the uterus is tardy, purgatives are more especially required, or an enema, containing the spirit of turpentine and castor oil, may be occasionally administered.

30. If the breasts become hard and painful, warm fomentations, frictions with warm oil, or with a slightly stimulating liniment, and a dose of a purgative medicine are usually advised and repeated for those cases where the milk is to be discouraged, the woman not intending, or not being capable of suckling the infant. As soon as the secretion commences, the child should be put to the breast, in order to facilitate the discharge of the milk and to prevent distention. It is better, as Dr. CHURCHILL advises, to do this, even if the patient should not suckle her infant, as it will afford relief. When she is not to suckle, she ought to have every second or third day, according to her strength, till the secretion of milk ceases, and the tension of the mammae subsides, a dose of some purgative, as rhubarb or senna, with a neutral salt. She ought not to leave her bed, even to have it made, before the fifth day; and, if she be a delicate subject, she should strictly preserve the horizontal position for several days longer. Premature exertion, and inattention to position and to suitable diet, are the chief causes which combine with impure air, foul beds and bedding, and mental emotions to produce the maladies consequent upon parturition.

31. The patient's diet should consist chiefly of gruel, arrow-root, sago, rice, milk, whey, panada, weak black tea, with dry toast or biscuit, and very little butter for the first three or four days. When the vascular excitement attending the commencement of lactation has subsided, and no disorder is observed, broth, chicken, mutton, or other light articles of diet may be taken on the seventh or eighth day; and wine and water, preferably claret, may be allowed in a day or two afterward.

32. (b) *Deviations from the ordinary progress of convalescence* ought to be promptly attended to and cautiously treated.—a. If the vital shock be extreme, or even severe, small doses of opium,

with camphor, ammonia, or musk, should be frequently administered, and the quantity of each duly proportioned to the frequency of exhibition and the urgency of the case. These substances are preferable to wine or brandy, as they procure sleep, quiet the pulse, and prevent the subsequent reaction from being excessive; while the latter may occasion fever, or distressing headache, or even mania. In this emergency perfect moral and physical quietude should be preserved. As the shock subsides, suitable nourishment and restoratives are requisite.

33. *β. Increased frequency of pulse* ought always to excite suspicions and the strictest investigation. If the patient suffer from gastrointestinal irritation, the cause of frequency is thereby manifested, and blue pill, or the gray powder, with DOVER's powder, should be prescribed, and repeated according to circumstances. If fecal matters have accumulated in the bowels, the purgatives and enemata already mentioned are required. If the quickness of pulse still continue, the states of uterine contraction and of the lochia ought to be examined, with the view of detecting the commencement of disease in the uterus or its appendages, or in the peritoneum.

34. *γ. An acrid or morbid state of the lochia* is apt to occasion irritation, excoriation, or even inflammation of the vagina and vulva, with smarting and itching. In this case extreme cleanliness, frequent bathing, warm diluent vaginal injections, lotions containing lead, or the black-wash, or the sulphate of zinc may be employed; the simply diluent injections being first used, and the others subsequently or after the lochia has become scanty, or about to disappear, lest suppression of the discharge should be produced. The injections ought to be warm, and, if the lochia be very offensive, a small quantity of creasote, or of chloride of lime, or chlorinated soda may be added. During the treatment, the binder above recommended should be duly and carefully applied. When the lochia becomes excessive or prolonged, nutritious diet, tonics, as the preparations of cinchona, or quinine or chalybeates, or the tincture of the muriate of iron, ought to be allowed after a due time from delivery has elapsed. When the discharge becomes excessive, or changes in colour after having nearly ceased, the patient should be confined to the horizontal posture. In all these circumstances, and especially when the lochia is excessive, prolonged, or likely to pass into uterine leucorrhœa, the occasional administration of an enema containing oil of turpentine, or embrocations with this substance, applied either above the pubis or over the sacrum, will be of service.

35. *V. OF THE INFLUENCES AND AGENTS FAVOURING, PREDISPOSING TO, OR EXCITING PUERPERAL DISEASE.*—The same causes may produce any of the acute maladies incidental to the puerperal state; the particular malady being determined by the peculiar combination of causes and of circumstances aiding the development of the effects of these causes by the constitution, habit of body, and state of the patient previous to and during the parturient process, and by the changes consequent upon delivery; by these last more especially than by others. The remarks which have been offered above on the several changes

and varying states and circumstances tending strongly to predispose the female frame to the invasion of the exciting causes of acute disease, will sufficiently show the marked liability to such disease which these changes and states create, even in the more favourable circumstances in which she may be placed. But when it is considered that, with these successive changes, various mental emotions have been and continue in operation—fear and anxiety in most cases, and the most depressing of the moral sentiments in some—these changes must be viewed as receiving therefrom the most important aids towards the development of serious morbid effects. To these, moreover, are often added the influences of diet and regimen, not always the most suitable to the successive states of advanced gestation and of parturition, and more especially to the period immediately following delivery; the still more active agency of close, impure, and miasmatic air, of foul exhalations, and of imperfect ventilation; and the contingent operations of infectious effluvia variously generated and as variously conveyed and propagated.

36. Among the poorer classes, and even among the richer in some localities, the moist, putrid, and contaminating emanations from the numerous sources with which all cities and large towns more or less abound, are productive of the more malignant of the maladies incidental to the puerperal state. These sources have been fully described, and their influence shown in the articles *INFECTION* and *PESTILENCE*, *protection from*. But the most malignant operation of a foul or contaminated air is shown in lying-in hospitals, where every patient which enters them, at certain seasons or times, is seized with puerperal fever, or some other acute and often fatal disease. If the wards of a lying-in hospital contain more than four beds; if these wards are placed too close to each other; if they be not lofty and ventilated by a thorough current, by open fire-places, and by fires; if they be too closely shut during cold and moist states of the air; if the discharges be not quickly removed, and the cloths imbibing the lochia be not frequently renewed; and if the bed-clothes and bedding be not perfectly clean and duly purified, the more malignant forms of puerperal disease will soon make their appearance, owing to the generation of a morbid, an infectious, and a contaminated effluvia, by puerperal females and by their discharges, in too confined and insufficiently ventilated apartments. This effluvia, when once generated, may be conveyed by the clothes, or by other media, and may infect others so circumstanced as to be contaminated by it. Of this fact I have known numerous proofs, which will be noticed in the sequel.

37. There is every reason, moreover, to believe that lying-in hospitals are not the only source of the fevers which render these institutions a greater curse than a benefit to the community; for I have seen reasons for inferring, that the foul air extricated from the numerous sources of impurity, contamination, and death with which this city and others abound, and which I have described under the heads referred to above, especially when undiluted by due ventilation, or when accumulated in a humid, still, and confined atmosphere, and when admitted to and acting upon the recently delivered

female, will so depress organic nervous power, and so contaminate the circulating fluids, as to develop puerperal fever of a malignant character, which may, in its turn, generate an effluvia productive of a similar malady in other puerperal females when communicated to them.

33. The contaminating effluvia, or infected atmosphere, productive of the more violent states of puerperal diseases, and the sources from which such effluvia proceeds, cannot be disputed; but its modes of invasion and operation are not quite so manifest. I believe, however, from what I have observed in the different circumstances in which this effluvia or contaminated atmosphere has been generated, that its modes of invasion and operation differ materially according to the concentration of this cause, and to the circumstances favouring its invasion in one way in preference to another. Thus, in the more concentrated state of the effluvia, as generated in the crowded wards of a lying-in hospital during a cold and humid state of the air, and when due ventilation was prevented, I have seen females without any complaint, and dead within twenty hours afterwards; and on dissection neither the uterus nor its appendages, nor the peritoneum, has presented any manifest lesion, or any change more evident than that of other organs; the chief alteration being a fluid and dark state of the blood, some congestion of the lungs, and enormous flatulent distention of the elementary canal. (See hereafter.) In these cases, which were observed as closely as I was able, I attributed the intensity of the operation of the poison to its being respired with the air, to its operation on the nervous system and blood, to its contaminating the fluids, and to its impairing not only the crasis of the blood, but also the vital cohesion of the tissues, as evinced upon dissection, even before the body had entirely cooled.

39. In other circumstances, when the morbid or poisonous effluvia appeared to be less concentrated, and to be productive of a less malignant or less rapidly fatal disease, and where there was less crowding, and better ventilation of the wards, the effects were different both as to their procession and as to their issue. The appearances after death were varied, and were most remarkable in the peritoneum, or in the uterus, or in the uterine sinuses, or in the veins of the uterus and its appendages; and, in respect of these cases, I have doubted whether or not the poisonous effluvia or emanation had invaded the frame through the respiratory organs, or by the vulva and vagina, or by both avenues. It may be viewed as a somewhat extravagant notion to suppose that an agent disseminated in, and conveyed by, the air can contaminate or infect the frame by the latter avenue—by the vagina. But if the effects of the admission of even pure air into the cavity of an abscess, and the difficulty of preventing this admission on occasions of opening psoas and lumbar abscesses, and of puncturing empyema, be duly estimated, the probability of air finding admission by the vagina to the uterus will be admitted, especially when the states of these parts for some days after parturition is considered. If, then, the air already poisoned or contaminated thus finds its way into either the vagina or the uterus—an avenue much more



patent than the opening into a chronic abscess, &c.—it will necessarily occasion, in the puerperal state, effects even more remarkable than when admitted into other cavities; for the already infected air will contaminate not only the discharges retained in these situations, rendering them still more injurious and infecting, but also the surfaces with which they come in contact, and which, as respects the uterus, resemble those of a recent wound, and, as regards the vagina, are excoriated, tender, or inflamed.

40. If the production of dangerous states of puerperal disease by this local contamination be admitted, the very intimate connexion between certain forms of puerperal fevers and erysipelas will be farther demonstrated thereby; while, on the other hand, this admitted connexion between these maladies will evince the high probability of this mode of infection and contamination. It is extremely probable, moreover, that the vital depression produced by the foul air respired by the puerperal female, or even by an infecting effluvia communicated by the clothes of an accoucheur, will so influence the state of the recently-delivered uterus as to give rise to farther changes: 1st. To imperfect contraction of the uterus and impaired tonic action, and to the slow return to the natural states of the vagina and vulva; 2d. To an altered, contaminating, or morbid state of the lochia; 3d. To a more marked disposition to the absorption of such parts of this altered discharge as may be retained in the uterus or vagina; and, 4th. To the prominent changes observed after death in the uterus, its appendages, and peritoneum.

41. VI. THE CAUSES OF THE SERIOUS NATURE OF ALL, AND THE VERY DANGEROUS TENDENCY OF SOME, PUERPERAL DISEASES, will readily appear from what I have already advanced respecting the changes experienced by the female frame in connexion with the puerperal state, and the nature of the influences and agents to which the female in this state may be exposed. The shock which the vitality of the frame has received during parturition, its manifest effects on the nervous system of some females; the predisposition to fever, mania, or convulsion which it occasions; the sudden removal of distention and of pressure; the as sudden change in the state of the vascular system, as respects both fulness or deficiency, and distribution or determination of blood; the continuance of weakening discharges and of depressing mental emotions; the alterations in the secretions and excretions; and the organic disposition of the sexual organs and adjoining tissues and viscera to experience structural change during the puerperal states—all and severally tend to impart a serious or dangerous character to the diseases which occur during these states.

42. But it is not only to the changes which the female constitution undergoes in the puerperal states that the severity of the diseases incidental to those states are to be imputed, but also to the nature of the causes which produce these diseases, and to the pathological changes which necessarily follow, if they be not arrested by prompt and active measures at an early period of their progress, and before the fluids become contaminated, and the predisposed structures disorganized or altered. The diseases, also, with which puerperal females

are affected, whether those following the operation of the common or physical causes, of those induced by the imbibition and absorption of morbid secretions or excretions, or by infectious effluvia, are seldom simple or uncomplicated—are not confined to the nervous system, or to the vascular system, or to the sexual organs, or even to several of the abdominal viscera—but extend to all the general systems, implicate both the nervous and vascular systems, change the vital and physical conditions of the blood, and affect, in a more or less prominent manner, the generative organs and peritoneal surface, which in many cases manifest the greatest amount of organic lesion. It is obvious that diseases of so complicated and general a character, affecting the chief factors of life, changing the conditions of vital fluids and of vital organs, attacking the frame at that period of existence, and in that condition, which are the most liable and open to their invasion, and in which the vital energies are the least capable of resistance, will, in these circumstances, make a rapid, a dangerous, and often a fatal progress.

43. VII. OF THE PREVENTION OF PUERPERAL MALADIES.—The remarks which I have offered above on the management, both of the natural course of convalescence after delivery and of the slightest deviations from it (§ 26–34), and on the chief causes of the most important of puerperal diseases (§ 35, *et seq.*), will have already shown what the chief means of prevention are, and that they should have strict reference to the management of convalescence and to the treatment of those early deviations, as well as to the careful avoidance of those more noxious causes to which puerperal females may be exposed. Indeed, an early and judicious treatment of the slightest deviations from the usual progress of convalescence, and avoidance of the infectious or contaminating causes, constitute the chief means of prevention that can be adopted. Yet there are certain of these causes, and more especially of the sources whence they spring, which receive insufficient attention, and until lately have received no attention at all, even from those who consider themselves expert beyond all others, especially in matters which they view as their own particular province, and as being above all the rest most important. I believe that the chief sources of puerperal fevers, particularly of their more malignant forms, are lying-in hospitals, in which not only a very large proportion of those who are received become infected, but also from which the infection is carried abroad, not solely by the females who go out, but also by the clothes of the dead and of those who recover, and by the persons and clothes of the medical attendants. The charitable would much more wisely and humanely contribute their bounty for the promotion of cleanliness and comfort in the chambers of the poor, and for enabling the objects of their bounty to be delivered in their own houses, with requisite and healthful appliances and aids, than in causing them to be transported to sources of contamination, contingent infection, and in no very small proportion, even of death.

44. The importance of removing, and of avoiding, when removal cannot be attained, the several sources of infectious effluvia which have

been mentioned under the several heads already referred to, was not the less obvious because it was so generally overlooked previously to the appearance of those parts of this work in which the injurious effects of these sources of contamination were treated of; and even now they have not received the least attention as respects their influence in causing the more important maladies incidental to the puerperal state. The nature, the number, and the concentrated agencies of these sources are now too manifest to require description; but there is at least one to which insufficient attention—or, indeed, no attention at all—has been directed, namely, the impure state of the *bedding* used by many persons of the middle classes, and of those below them, although not the poorest. The beds, consisting chiefly of feathers or wool, always of animal substances—having imbibed the effluvium and perspiration of the persons who have slept on them during many years, or even during generations, without having once undergone purification—have become more or less contaminated by the continued use; and it cannot, therefore, be a matter of surprise if, in certain occasions of prolonged occupation, and in some atmospheric conditions, an effluvium should be evolved from them productive of infection or contamination to the susceptible and predisposed puerperal female. That a contaminating effluvium is actually evolved from foul beds in these circumstances, I believe, because I have seen proofs of this cause of dangerous disease; and hence more notice should be taken of this source of human, and especially of puerperal infection, than it has hitherto received. It is not improbable that puerperal females are not the only sufferers from this cause, and that puerperal fevers are not the only diseases which may occasionally originate in this source, but also that erysipelas, typhoid fevers, and other febrile and infectious maladies may often be produced by the same causes, both in the wards of an hospital, and in the close and impure sleeping apartments and beds of the poorer classes, and even of those next above them, when the infection becomes more generally diffused.

45. II. OF THE LOCAL AND FUNCTIONAL DISEASES INCIDENTAL TO THE PUERPERAL STATE.—Several of these diseases are treated of under distinct heads. *Phlegmasia dolens*, *puerperal convulsions*, *uterine hemorrhages*, and *puerperal mania* have separate articles assigned to them. (See *arts. CONVULSIONS*, § 27, *et seq.*; *HEMORRHAGE*, *UTERINE*, and *INSANITY*, *PUERPERAL*). The disorders incidental to the *mamma* and to the secretion of *milk* are considered in the articles *LACTATION* and *MAMMÆ*. It therefore only remains for me to notice at this place certain *lesions* of the sexual and adjoining organs which are apt to occur, during and subsequent to parturition, and the *fevers* to which puerperal females are liable.

46. i. STRUCTURAL LESIONS CONSEQUENT UPON PARTURITION.

CLASSIF.—IV. CLASS, IV. ORDER (*Author*).

47. A. SANGUINEOUS TUMOUR OF THE VULVÆ. *Sanguineous tumour of the labia*, CHURCHILL.—*Sanguineous extravasation into the labia*, CROSSE.—*Effusion of blood into the cellular tissue of one or of both labia* is of rare occurrence. It has been observed and described by MACBRIDE, MAIT-

LAND, DENMAN, BURNS, MERRIMAN, DEWEES, HAMILTON, CROSSE, and others.

48. The effusion may not be limited to the vulva, but may extend into the pelvis, and downward to the perinæum. It may occur during labour, previously to the delivery of the child, as in Dr. MAITLAND's case, but much more frequently immediately afterward. The tumefaction is generally sudden, and increases rapidly. The size varies much, and has even reached that of a child's head. Dr. CHURCHILL, quoting M. SCHEDEL, states, that as much as six or seven pounds of blood have escaped.

49. a. It is caused by the rupture of some vessel or vessels, by the pressure of the child's head while passing through the pelvis; and most probably the ruptured vessels have been in a varicose or disordered state previously. "Dr. BURNS supposes some of the vessels of the nymphæ to be ruptured; Dr. DEWEES, that the vessels of the vagina give way; and Drs. DAVIS and CAMPBELL, the pudic vein." But there is not sufficient reason to assign it to any particular vessel. It most probably arises from the rupture of several small varicose veins. This lesion has usually followed natural labours.

50. b. *Symptoms*.—The patient's attention is first directed to it by the swelling of the labia, and by a sense of weight and of bearing down. On examination, one or both labia are found distended, sometimes enormously, and the labium everted, so that the tumour appears partially covered by the mucous membrane. The colour is livid, or nearly black. The parts are extremely tender, and the pain is very great. The tumour increases rapidly until it covers the vulva and the perinæum. Dr. CHURCHILL states, that a considerable degree of fever is present; the pulse becomes quick, the skin hot, and the head pained; there is sometimes, also, delirium. Retention of urine, from the pressure of the tumour on the orifice of the urethra, increases the distress. The patient lies on her back, scarcely able to move, with the thighs widely separated, unable to bear even the pressure of the bed-clothes (DEWEES). After a few hours, relief is obtained by the rupture of the labium, which always takes place on its inner surface, and by the discharge of blood. A small portion of this surface begins to slough, and part of the blood escapes; but, some coagula remaining, the wound becomes offensive from their decomposition. The slough and remaining coagula are afterward thrown off, and the parts generally heal by degrees.

51. The rupture of the tumour rarely takes place during the labour; but in this case, as well as in others where it occurs before the blood is coagulated, the hemorrhage is so great as to occasion fainting, or even death, as in the instances adduced by PHILLIPART, CROSSE, NÆGALÈ, SCHEDEL, and others. If the tumour be very large before the birth of the child, it proves so serious an obstacle as to require surgical interference. This tumour cannot be mistaken for *hernia*; the rapidity of its appearance, the period of its occurrence, its size and colour sufficiently distinguishing it from *hernia*. It has been mistaken for the distended membranes, and punctured with this idea; but the bag formed by the membranes can be isolated from the labia and traced up to the os uteri. Besides,



this tumour generally does not occur until after delivery.

52. *c.* The *treatment* is evidently to give as early an issue as possible, after the blood has coagulated, to the contents of the tumour. If the risk of hemorrhage before coagulation be considered so great as to prevent an opening being sooner made in the tumour, the urine ought to be drawn off, and an enema, with an ounce or an ounce and a half of oil of turpentine, administered. In no case should this enema be withheld, and rarely ought an incision into the labium be delayed longer than two or three hours. When the small coagula infiltrating the cellular tissue causes an offensive discharge, then lotions with vinegar, water, and creasote, or with chloride of lime, or ehareal poultices, may be employed. If hemorrhage continue, or return, the turpentine elyster should be repeated, and compresses, moistened with oil of turpentine, applied. The bowels ought to be kept open, and the febrile and other symptoms treated according to general principles and the peculiarities of the case.

53. *B. LACERATION OF THE PERINÆUM.*—This accident is varied in extent. Where it is slight, it may not materially interfere with the comfort of the patient, but when it is extensive it is a cause of almost constant distress. It occurs most frequently during first labours.—*a.* "The exact *situation and extent* of the rupture vary with the cause and the circumstances of the case. 1st. It may commence at the anterior border and extend to the sphincter ani, and this is the most frequent extent. 2d. The rent may involve the entire perinæum, and extend through the sphincter ani, laying the cavities of the rectum and vagina into one. 3d. The central space of the perinæum is sometimes ruptured, leaving the anterior edge and the sphincter ani untouched." Both the child and the placenta may pass through this central laceration, or completely *per anum*. 4th. The recto-vaginal septum, sphincter ani, and part of the perinæum may be torn, so as to permit the passage of the child, leaving the anterior portion of the perinæum entire.

54. *b.* The *causes* are deviations from the ordinary mechanism of parturition; malconformation of the passages, or of the soft parts; exostosis or tumours in the pelvic cavity; excessive violence of the pains, and the too rapid passage of the head of the fœtus; great breadth, or extreme rigidity, or great weakness of the perinæum; malposition of the child's head, or malpresentations; and mismanagement or want of care, especially when instruments are used. Thus it will appear that this accident cannot always be prevented.

55. *c.* The *symptoms and consequences* of laceration depend upon the extent of it. If the injury be slight, no ill effects may probably result; but if it extend to the sphincter, the patient complains of want of support, and is liable to proclivita of the womb. If the recto-vaginal septum be torn, the state of the patient is most distressing. The fœces, for some time at least, pass through the vagina involuntarily; and the utmost attention to cleanliness is required, but cannot always prevent most distressing annoyances. When slight, the rent commonly contracts, and heals without interference, after a short time. Even when the

recto-vaginal septum is torn, partial union may take place, and leave only a fistulous opening. Dr. Burns remarks, that a valve may ultimately be formed, so that the patient may be partly relieved of her infirmity. But frequently the lochial discharge passing over the wound prevents the natural process of cure, and the torn surfaces become callous, or degenerate into ulceration in consequence.

56. *d.* The *prevention and treatment* of this accident are fully discussed in works on midwifery and surgery. To these I must refer the reader. But I may remark, that slight cases require only cleanliness: the part will heal of itself, and the patient may not even suspect what has occurred. Even when the laceration is more considerable, all that may be required is, to give at first one or two active purges, and afterward allow the bowels to become costive, to observe strict cleanliness, and to keep the patient in one position, so as to preserve the edges of the wound in contact. If these means do not succeed, a binder may be passed around the hips, and a pad on each side of the perinæum, so as to preserve the edges of the wound in apposition. Sutures of different kinds have been employed, and have succeeded in rare instances. After sufficient purging, it may be advisable to give opiates, so as to cause costiveness for a few days, and thereby to aid in the restoration of the parts. The catheter must be passed twice or thrice daily, and means used to absorb entirely the discharge. The *diet* should be spare, and chiefly farinaceous. Perfect quietude is necessary. In the various circumstances in which a failure, partial or complete, of the above means may occur, the assistance of the surgeon and mechanist will be required.

57. *C. RUPTURE OF THE UTERUS AND VAGINA.*—This fatal occurrence may take place during parturition, during pregnancy, and at an advanced period of life, of course unconnected with pregnancy; this last being the rarest. Dr. CHURCHILL adduces statistical details of this accident, from which it appears that Dr COLLINS met with thirty-four cases out of 16,654; that sixty-five cases occurred in an aggregate of 42,768 patients, or about one in 657. Dr. Burns says, that it happens about once in 940 cases. It is not so often met with in first as in subsequent pregnancies. Of seventy-five cases, nine occurred in the first pregnancy, fourteen in the second, thirteen in the third, and thirty-seven in the fourth and subsequent pregnancies.

58. *a. Causes.*—1st. *During gestation*, it may arise from that form of extra-uterine pregnancy called *interstitial fœtation*; the ovum being retained, in passing the Fallopian tube into the uterus, between the uterine fibres, where, as it grows, it occasions the absorption of that portion of the uterine parietes, which at last give way, and allows the fetus to pass into the abdominal cavity. Rupture of the uterus may also proceed from disease, as from inflammation, softening, or suppuration of a portion of the walls of the organ; or it may be produced by accidents, blows, falls, &c. It may even occur without any assignable cause, unless it be then occasioned, as Dr. Burns supposes, by irregular action of the fibres of the uterus.

59. 2d. *During parturition*, it may also arise from pre-existing disease, and especially from

any one of the usual consequences of inflammation. A portion, also, of the uterus may be atrophied, softened, or thinned by the pressure of the child against it, or by pressure of some part of the abdominal or pelvic parietes, so as to yield during the uterine contractions of parturition. DEPARQUE mentions scirrhus of the uterus as one of the causes of rupture; but this is doubtful. When partial inflammation of the uterus has existed during gestation (§ 58), then the laceration has usually corresponded with the situation of the previous pain marking the seat of inflammation. There can be no doubt that a perfectly healthy uterus is rarely or never ruptured. In one case M. MALGAIGNE attributed the rupture to the administration of ergot of rye.

60. *b.* The period of labour at which rupture may occur varies; "it may be at the beginning, before the rupture of the membranes; during the passage of the head through the pelvis; or in the moment when the child is delivered." Narrowing of the upper outlet may give rise to it; or any other mechanical obstacle opposing the actions of the uterus; or even oblique positions of the womb. The age of the patient has but little influence in predisposing to rupture.

61. *c.* The rupture may only be *partial*, some one of the tissues of the uterus giving way either previously to or during labour, probably owing to antecedent disease, or to peculiarity of structure. The peritoneal coat alone may be torn, or the muscular coat may be ruptured, the peritoneal covering remaining uninjured. Dr. COLLINS met with nine cases of this description. Although the extent of lesion is less in such instances, yet Dr. CHURCHILL considers it to be equally fatal. And as in other forms of rupture, it may be caused by external injuries, by excessive movements of the child, by overdistention, &c.

62. Violence in turning the child may cause rupture; "and it may accompany this operation, in certain states of the cervix uteri, without any fault of the operator." Rigidity of the os uteri, or imperforation, may also occasion laceration. Several instances are recorded in which the os uteri was torn completely off during labour. Pressure at the brim of the pelvis, rendering the cervix uteri thinner or softer than natural, and more easily torn, has been assigned for this occurrence.

63. *3d.* At an advanced period of life the structure of the cervix uteri is more or less changed, becoming dense, cartilaginous, and the canal reduced in size, or even obliterated. The outlet for the escape of secretions accumulated in the uterine cavity is thus closed; and if the quantity collected be sufficient to distend the organ, some portion of the walls experiences absorption and thinning, or inflammation and softening. Thus an opening or perforation may be made by absorption, or by rupture, into the peritoneal sac.

64. *d.* On dissection, the torn edges, and the parts immediately adjoining, usually exhibit marks of disease when the rupture has proceeded from this cause, the laceration in such cases occurring in any part of the organ. "When the rupture is the result of mechanical causes, it generally takes place near the cervix, and involves both the uterus and vagina,"

the part which gives way being usually near the union of the cervix with the vagina. The wound is commonly transverse. Of twenty-three cases, Dr. COLLINS found one on the right, one on the left side, eleven posteriorly, and ten anteriorly. The structure of the uterus is hardly altered—is firm in texture, and natural in colour, except a few ecchymoses. The edges of the laceration are jagged or uneven. In very rare instances the bladder has also been ruptured. When the *peritoneal surface* of the uterus has alone been torn, several small lacerations, resembling scarifications, from a quarter to half an inch in length, and one or two lines in depth, are found. They are attended by the effusion of blood in the peritoneal cavity, and by the usual appearances and products of peritonitis, which are caused by the effused blood and the injury. When the *muscular substance* is alone torn, there may or may not be found evidence of pre-existent disease. The peritoneal covering is generally inflamed, and blood is found effused in the cavity of the uterus. Laceration of the *cervix uteri* is accompanied with a bruised appearance; its edges are ragged and uneven, and the parts immediately adjoining red and swollen. The connexion between the cervix and vagina is not compromised. In cases of rupture of the uterus in *old persons* (§ 63), the viscus is rather perforated than ruptured; the changes caused by the contents, and the softening and thinning of a portion of the parietes, appearing more like perforation than rupture. *Peritonitis* always follows rupture of the uterus if the patient survive the shock.

65. *e.* *Symptoms.*—The symptoms vary somewhat with the extent of the rupture, according as the peritoneal or the muscular coat is singly torn. The circumstances which may suggest fears of rupture are the occurrence of partial inflammation of the uterus during gestation, and the existence of violent labour-pains in patients with a narrow or mal-formed pelvis. "Rupture of the uterus and vagina is marked by an acute, sudden, and intolerable pain like cramp; a sense of some part bursting, giving way, or tearing, with an audible noise, according to the testimony of the patient; the suspension of the labour-pains; hemorrhage from the vagina; and by a rapidly succeeding state of collapse." (CHURCHILL.) All these symptoms may not be observed in some cases, but the pain and collapse are never absent. When one of the coats alone is torn, the labour may continue if it be the peritoneal coat, and there may be no hemorrhage. In such cases, Dr. RAMSBOTHAM remarks that the symptoms of actual rupture of the uterine structure are observed in a diminished degree, excepting the escape of the child.

66. Rupture of the uterus is always attended by continued and extreme pain; nausea and vomiting supervene—at first of the contents of the stomach, then of a greenish, and lastly of a dark or coffee-ground-like matter; the countenance becomes pale, anxious, and ghastly; the surface and extremities cold and clammy; the pulse rapid, small, and weak, or fluttering and irregular; respiration is hurried, panting, and anxious, with a desire of fresh air; and hemorrhage takes place from the vagina, varying much in quantity. The shock or collapse character-



izing these cases is owing more to the nature and severity of the injury than to the amount of hemorrhage which may follow, although this is sometimes very considerable; but both conditions contribute to this result. When the rupture is complete, the child passes through the opening into the abdominal cavity, either partially or wholly, where it may be felt through the abdominal parietes, and the efforts at expulsion cease. If the presentation was within reach before the accident, it cannot now be ascertained. Dr. CHURCHILL refers to instances of a loop of intestine having passed through the rupture when complete, and become strangulated. The state of collapse may continue for some time, if it do not prove fatal. But at length reaction takes place to a certain amount, and the usual symptoms of peritonitis appear: exquisite tenderness, pain, and flatulent distention of the abdomen; pulse small, hard, rapid, and, lastly, weak; decubitus on the back, with the knees drawn up; hurried respiration, anxious and collapsed countenance.

67. *f. The terminations of ruptured uterus are, 1st. Death a few hours after the shock, or after delivery; 2d. Death from peritonitis; 3d. Death from consecutive lesions; and, 4th. Recovery.* In by far the greater number of instances the accident proves fatal. The aggregate of cases observed by SMELLIE, J. CLARKE, MERRIMAN, M'KEEVER, RAMSBOTHAM, COLLINS, and BEATTY, amounting to sixty-eight, furnished only six recoveries. OSIANDER, VELPEAU, and CHURCHILL quote several cases of recovery; but instances are very rare in which recovery has taken place when the fetus has remained in the peritoneal cavity. (DUPARCQUE.) In cases of interstitial foetation, also, patients have very rarely survived both shock and consequent inflammation. In all cases, therefore, of ruptured uterus the prognosis is very unfavourable.

68. *g. Diagnosis.*—The sudden and acute pain, the cessation of labour, the collapse, and the recession of the child, sufficiently indicate the nature of the mischief. When, however, the rupture is partial, the diagnosis is much more difficult. The sudden pain, collapse, and consequent peritonitis are the chief symptoms of rupture of the peritoneal coat; the pain, collapse, cessation of uterine action, and vaginal hemorrhage being the principal indications of rupture of the muscular coat. The sudden occurrence of peritonitis in *old women* may excite suspicions of perforation or rupture of the uterus, but certainty can be arrived at only by a *post-mortem* inspection.

69. *h. Treatment.*—When rupture of the uterus is recognised, the propriety of immediate delivery cannot be disputed. Common sense and experience, as evinced by the results of recorded cases, support this practice. When the os uteri is undilated, instant delivery cannot be effected; but the measures to be adopted on this emergency, as well as in others connected with the delivery, especially when the child has passed through the rent into the abdominal cavity, come not within the scope of my work. The means which should be administered during the continuance of the vital shock, or collapse, are camphor, ammonia, and opium, in such doses as may be just sufficient to support the powers of life without inducing inordinate reaction. If peritonitis supervene, calomel,

camphor, and opium; terebinthinate embrocations applied over the abdomen; opium in large doses, and the other means recommended in cases of inflammation of the PERITONEUM (§ 138, *et seq.*), should be prescribed, bearing, however, in recollection that the large loss of blood usually occasioned by the rupture, as well as the shock sustained by the vital powers, prevents either depleting or depressing measures from being too freely employed.

70. *D. INFLAMMATION OF THE VAGINA.*—Inflammation of the vagina may occur independently of the puerperal state, or it may arise from specific causes, or infection, as shown in the article VAGINA.—(a) It is of frequent occurrence after delivery, in various grades of severity. It may consist merely of slight soreness or excoriation, or irritation, and follow an ordinary or natural labour, and speedily subside, unless it be prolonged or exasperated by an acrid state of the lochia. When, however, the head of the child has remained a long time in the pelvis, pressing on the soft parts, or when the narrowness of the passage has created great difficulty, or when the presentation has been unnatural, or when instrumental aid has been required, the vagina is then liable to experience most severe inflammation, the consequences of which may be most serious.

71. (b) The symptoms generally commence with a smarting pain, more severe than that usually following delivery, soon passing into a sense of painful heat and scalding, extending from the external parts up the vagina. There is also a feeling of fullness and weight in this situation. On examination, the external parts appear swollen and bruised, with increased heat, and acute pain or tenderness, when touched. On averting the labia, the vagina presents large rugæ of a bright red colour. At first the discharge from the inflamed surface is scanty, but it afterward is purulent, or pus may be detected, mixed with the red lochial discharge. If the discharge have become more colourless, the puriform secretion from the vagina renders it more opaque. With the local increased action more or less of symptomatic fever is present; and in the more severe cases this fever may assume a very serious aspect.

72. (c) The terminations are sometimes serious. The slighter cases, or those which receive prompt and judicious treatment, usually terminate in resolution. The decrease of pain, and of the local and constitutional symptoms, is the chief indication of this issue. Suppuration and ulceration are not infrequent. When the injury causing the inflammation has been severe, or the attack violent from the first, suppuration advances rapidly, is attended by a copious puriform discharge, and, in the course of a very few days, is followed by the appearance of a number of sloughing ulcers, or, rather, of several partially detached portions of sloughing mucous membrane. As these separate, the parts which they covered appear deprived of membrane. If the sloughing ulceration be more severe, the coats beneath the mucous coat may be invaded; and it is then not uncommon to find the posterior part of the neck of the bladder attacked, and even an opening formed in this situation—a *vesico-vaginal fistula*; or to find a similar sloughing ulcer into the rectum—or a *recto-vaginal fistula* to be formed. When slough-

ing ulceration appears, the greatest care may not succeed in preventing these consequences from occurring.

73. *Gangrene* may rapidly follow when the pressure on the parts has been prolonged or excessive. In these cases the separation of the sloughs is generally followed by vesico-vaginal fistula; more rarely by recto-vaginal fistula. In 1845, a lady who had experienced the most unaccountable neglect while in the care of a surgeon in the East Indies, but who was perfectly well formed, came to London for the advice of the author and the late Mr. LISTON. Most extensive recto-vaginal and vesico-vaginal fistulae co-existed in her case. She had been a strong and healthy person previously to her protracted confinement in the East. When she came to London, the urinary bladder, the vagina, and the rectum formed a single cavity. The case was far beyond any measures, excepting mechanical aids, and strict attention to cleanliness.

74. (d) *Treatment*.—The usual antiphlogistic means, appropriate in kind and extent to the violence of the inflammation, and the habit of body and constitution of the patient, are required at an early stage. Dr. CHURCHILL has found *tartar emetic*, conjoined with a saline aperient, of great use. It should be given so as to nauseate without producing vomiting. "The external parts ought to be well fomented two or three times a day; and, during the intervals, a large poultice may be applied over the vulva. Twice or thrice daily, also, the vagina should be syringed with tepid milk and water, or a weak solution of acetate of lead. After the sloughs have separated, a careful examination should be made every second day, to ascertain the progress of healing; and when the surfaces begin to be covered with new membrane, we must take measures for preventing the formation of cicatrices. This can be done only by the repeated introduction of bougies, and the best kind are tallow or wax candles. At first a small-sized one should be oiled and introduced night and morning, and allowed to remain a quarter of an hour. Afterward, as the tenderness diminishes, the size of the candle should be increased; and it ought to be introduced oftener and retained longer. The warm injections should be continued, and the milk and water may be changed for some slightly astringent fluid." (CHURCHILL, *Op. cit.*, p. 281.) When sloughing ulceration or gangrene exists, a restorative or tonic treatment, and light, nutritious diet, are required. The unfavourable consequences of these changes—*vesico-vaginal* or *recto-vaginal fistula*—are sometimes remedied, when not very extensive, by surgical treatment. For the measures which may be attempted for these distressing lesions, I must refer the reader either to surgical works, or to the systems of midwifery practice referred to hereafter, and more particularly to Dr. CHURCHILL's work. (See art. VAGINA for other lesions not necessarily proceeding from the puerperal state.)

75. *E. INVERSION OF THE UTERUS*.—*The inside of the uterus may be turned out, and either drawn or pushed down into the vagina.* It may take place in different degrees, and form what has been called, 1st. Simple depression; 2d. Incomplete inversion, when the fundus uteri is

merely engaged in the orifice; and, 3d. Complete inversion, when it protrudes from the vagina, with the mouth turned upward. The vagina, in this latter case, is also partly reversed, so that the tumour is often of considerable length. When the inversion is only partial, the tumour is retained altogether, or chiefly within the vagina, the fundus protruding in part through the os uteri.

76. (a) *Symptoms*.—The patient with inversion of the uterus feels severe and obstinate pain, accompanied with bearing down efforts, by which a partial inversion is sometimes rendered complete. She is very weak; her countenance is pale and anxious; and her pulse is feeble, small, or almost imperceptible. Hemorrhage is generally present, and is often most profuse. It is frequently scanty, or absent, when the inversion is complete; although a very partial inversion may be attended by a fatal discharge. A sense of dragging at the epigastrium, or of a dragging downward of the bowels, is usually present; and fainting and convulsions may occur even when the hemorrhage is trifling. These symptoms cannot fail of exciting suspicions of inversion, which will be readily ascertained on examination; the womb protruding like a mass of flesh, and no uterine tumour being present in the hypogastrium.

77. (b) *Causes*.—Inversion is produced by pulling the cord in endeavours to remove the placenta, which may even adhere when the uterus is pulled down; but it is generally separated; or it is caused by the sudden expulsion of the child, the cord being short or entangled about the child, the fundus receives a jerk, and is thereby inverted. Dr. BURNS thinks that great pressure or strong contraction of the abdominal muscles on the fundus uteri may cause depression of the fundus, in a cup-form, and encroach on the uterine cavity. This may rectify itself, but it may increase and pass on to complete inversion some time after delivery. An incomplete inversion, as well as the complete, may become chronic, and occasion incurable fluor albus, and even hemorrhage.

78. (c) *Inversion terminates* in different ways: it may be rapidly fatal by hemorrhage, or by syncope, or by convulsions; or it may be slowly fatal by inducing over-distention of the bladder, or inflammation, and various consequent changes. After severe pains and expulsive efforts, the patient may survive, or even partially recover, from the immediate injury; the uterus may slowly diminish to its natural size, become *chronic*, and cause little inconvenience; or it may discharge fetid matter, and give rise to frequent debilitating hemorrhages, with copious mucous discharge in the intervals; or hectic or pulmonary symptoms may come on, and the patient ultimately sink.

79. (d) *The treatment* consists in reducing the inversion, if it be discovered sufficiently early. This is to be done by first pressing the uterus, if it have protruded without the vagina, within this passage. The tumour should be grasped cautiously in the hand; and, while it is compressed, the most prominent part of the fundus ought to be pushed up in the direction of the axis of the uterus. If reduction is accomplished, the hand should be kept within the uterus, so as to excite contractions, which will



detach the placenta, if it still adhere. Even after the reduction, when the patient is apparently doing well, she may be seized with a fit, and die. But she generally remains long weak if she recover.

80. If inversion have not been early discovered, it is always much more difficult, and sometimes impossible, to reduce it. The obstacle is the contracted state of the os uteri. It may not admit of reduction, even after a few hours from its occurrence; and if it have become much more chronic, it is not prudent to make the attempt, as violent or dangerous convulsions may be produced thereby, and the uterus is often so swollen and inflamed as to render reduction impossible. The *chronic state of inversion* is considered under the head UTERUS, as it does not strictly belong to puerperal maladies.

## II. THE SPASMODIC AND NERVOUS AFFECTIONS OF THE PUERPERAL STATE.

### CLASSIF.—II. CLASS, III. ORDER (Author).

81. The nervous and spasmodic diseases of puerperal females are *convulsions*, *mania* or *insanity*, *hystericalgia*, *paralysis*, and various irregular *spasmodic* and *nervous affections*, which seldom assume any precise or definite form. The first and second of these are considered in separate articles; the others will be briefly noticed at this place.

82. *A. HYSTERALGIA.*—(a) This *painful affection of the uterus* occurs soon after delivery; but it is more continued and severe than the usual *after-pains* (which see). It is characterized by severe pain in the back and hypogastrium, by sickness, faintness, and a feeble, or sometimes quick pulse. These sensations may or may not be attended by the expulsion of coagula, or by a sense of severe bearing down. It not improbably is sometimes occasioned by some malposition of the uterus consequent upon delivery. It is often connected with obstruction of the lochial discharge, which obstruction is probably caused by the painful affection of the uterus. Hystericalgia is most apt to occur after a severe or tedious labour. It may not appear until the third or fourth day, or when the patient has got up too early to have the bed made. It seems to be caused by an irregular spasmodic action of the muscular fibres of the organ, the spasmodic action and the altered sensibility sometimes extending also to the bowels.

83. (b) The *symptoms* of hystericalgia vary with the extension of these morbid states to parts adjoining the womb and its appendages. The suddenness of the attack; the absence of rigours or chills; the greater severity of the pain than that attending inflammation; the suddenness of the remission or cessation of the pain, and generally the absence of tenderness or of increased suffering on pressure, chiefly serve to distinguish this affection from inflammation of the uterus.

84. (c) The *treatment* consists of the administration of a purgative clyster with turpentine, castor oil, and camphor; and, after the bowels have been freely evacuated by these, or by a repetition of them, or by a draught containing half an ounce each of castor oil and turpentine, an opiate may be given, or may be administered in an enema. Terebinthinate fomentations or embrocations should also be applied, suffi-

ciently warm, over the hypogastrium; and warm or camphoreted diaphoretics and opium, or henbane, may be given, to equalize the circulation and procure a free respiration. Warm cloths soaked with oil of turpentine, and kept applied over the seat of pain, also will seldom fail of procuring relief. The abstraction of blood is rarely required, unless the affection be actually inflammatory, as evinced by increase of pain on slight pressure, by the states of the skin and urine, and by the pulse.

85. *B. VARIOUS OTHER NERVOUS OR SPASMODIC AFFECTIONS* sometimes appear in the puerperal state, especially in hysterical, delicate, or nervous females, and are evidently owing to the effects produced by uterine action and the vital shock upon the organic and cerebro-spinal nervous systems.—(a) *Palpitations of the heart* are not infrequent soon after delivery in the temperaments just mentioned, especially after considerable loss of blood, and upon any alarm. The patient experiences a violent beating not only at the præcordia, but also in the epigastrium and in the head, sometimes with dyspnoea, or short panting respiration. She is alarmed, apprehensive of dissolution, and her fears aggravate the symptoms. As the attack passes off, languor, depression, or a sense of sinking, or profuse perspiration, and flatulent distention usually supervene, and after a time the disorder subsides.

86. (b) *Hysteria* is not uncommon, in some form or other. It may occur with dyspnoea, or with syncope, with hiccup, or with pains in the side or abdominal muscles, &c., and is generally aggravated, if not excited, by the secretion of air into the alimentary canal. The dyspnoea is seldom attended by cough, and is owing chiefly to exhausted power of the respiratory muscles, and sometimes to either too great or too little tightness of the abdominal bandage, the abdominal muscles and floating ribs being thereby too much compressed and embarrassed in the one case, or insufficiently supported in the other. When the *dyspnoea* is owing to an affection or *spasm of the diaphragm*, it is felt most on inspiration, and pain is often complained of in the back or sides, or pit of the stomach, with a feeling of suffocation, sharp pain sometimes darting across the lower part of the thorax, and with a very rapid weak pulse. This affection of the diaphragm usually occurs a few hours after delivery, and is always sudden in its accession and departure. It may readily be distinguished from pleurisy by these circumstances, and by the slower accession of pleurisy, which is usually accompanied with shivering or chills, and which very rarely or never appears so soon after delivery.

87. (d) *Colic* may occur within a few days from delivery. It usually attacks suddenly, and in the evening; but it is not preceded by shivering, although it is sometimes attended by sickness or vomiting. The pulse is at first slow or natural, but it soon becomes frequent. The pain is remittent or intermittent, but commonly subsides altogether after some hours, when judiciously treated. If the irritating cause be not soon removed it may induce inflammation. *Cramp of the stomach*, or spasmodic gastrodynia, may occur during the first fortnight or three weeks after delivery. Its attack is always sudden, the suffering extreme

and the danger great in delicate or exhausted females. It is often attended and aggravated by flatulence. It requires decided and prompt treatment.

88. (c) Females who have been subject to the more obstinate and complicated forms of hysteria, and especially to *spinal irritation*, or to affections reflected from the spinal chord or roots of the spinal nerve, often experience various nervous disorders, either immediately after, or at more distant periods from delivery. Soon after the expulsion of the placenta they feel urgent *sinking* or debility, with a sensation and dread of flooding, although neither internal nor external hemorrhage exists. In the more extreme cases, if stimuli be not administered, the patient may suddenly die, without any other obvious cause than the *sinking* or *exhaustion* consequent on the shock of parturition. These severe cases of sinking not only may affect the weak and delicate, or those weakened by flooding, or by greater losses of blood than the state of the vascular system can well sustain; but sometimes even fat, plump, and apparently strong females may be placed in jeopardy by these attacks. In other instances, the sinking is followed by violent determinations of blood to the head, threatening phrenitis, or puerperal mania, or even passing into either, or into lethargy, coma, or apoplexy. Fat, plump, and pale females are even more liable than others to experience these dangerous forms of nervous sinking, owing to their deficiency of vital power and resistance, and the states of the blood and vascular system; and in them nervous and vascular reaction are more rare.

89. (d) Partial or even complete *paraplegia* sometimes occurs after delivery, although the labour may have been easy or natural. The head is unaffected, but pain or weight is felt in the back or loins, occasionally with retention of urine. The palsy exists in various degrees, but it generally disappears after a few weeks, when the treatment is judicious. A more severe and protracted form of partial paraplegia occasionally follows severe, protracted, or instrumental delivery. In these cases severe pain is complained of in the back and loins, with disordered secretion and excretion of urine. In most of these states of paraplegia there is either increased effusion of serum from the membranes of the spinal chord, with congestion of these membranes and of the cord itself; or, what is more probable, extreme congestion, also, of the venous sinuses external to the sheath, in the lumbar and dorsal regions of the spine. *Hemiplegia* is not more frequent in lying-in than in other females.

90. (e) *The treatment of these several affections* is generally successful if it be prompt and efficient.—a. *Palpitations of the heart* (§ 85) require the administration of antispasmodics with anodynes or narcotics—of HOFFMANN'S anodyne with small doses of opium or henbane; of the boracic acid with camphor and opium, or henbane; or with the ammoniated tincture of valerian, with either of these narcotics. When the paroxysm has been relieved by these, the antispasmodics should be conjoined with tonics and aperients, and change of air, preferably to the country or to the sea-side, ought to be recommended.

91. β. *The hysterical affections* (§ 86) are re-

lieved by the remedies just now enumerated, more especially by the ethers, valerian, ammonia or camphor, and opium; and if dyspnoea be present, the state of the abdominal bandage should be examined and adjusted. If the symptoms be aggravated by flatulence, as they often are, ammonia or magnesia may be given with anti-spasmodic stimulants and warm terebinthinate embrocations, or epithems applied over the epigastrium. When the hysterical affection assumes a *colicky* form (§ 87), from two to four drachms of oil of turpentine may be given with half an ounce of castor oil, and a drachm of tincture of senna, on the surface of an aromatic water; and the same remedies, in increased doses, administered as a clyster, if the bowels are not freely evacuated in six hours. After the evacuation of the bowels a full dose of opium, or of the compound soap pill will be given with benefit. If *flatulence* still continue, ammonia or magnesia, with gentle tonics, or the fetid spirit of ammonia or the compound galbanum pill, may be prescribed at intervals. If the colicky symptoms assume the form of *cramp of the stomach*, or severe *spasmodic gastrodynia*, the patient is placed in jeopardy, especially if it occur within a fortnight or three weeks from delivery. A draught containing a full or even a very large dose of laudanum, with camphor and ether, or with musk, or the compound spirit of ammonia, ought to be immediately given, and the warm terebinthinate embrocation, or a mustard poultice, be applied over the epigastrium.

92. γ. For those states of distressing *sinking* following parturition (§ 88), Dr. BURNS advises about thirty drops of laudanum, and afterward small doses of wine or brandy, or of compound spirit of ammonia, or ammoniated tincture of valerian, taking care not to give stimuli too freely, lest cerebral affection be thereby excited. Musk or camphor with opium is generally beneficial in these cases; and light nourishment ought not to be overlooked, as not a few of these cases arise from inanition, or the prolonged privation of requisite food and restoratives. If *phrenitic* or *maniacal symptoms* supervene, the treatment must depend upon the habit of body and strength of the patient. Vascular depletions, general or local, cold applications to the head, active purgatives, and terebinthinate enemata, external derivation and irritation, and the other measures advised for cases of *Puerperal Mania* (see INSANITY, PUERPERAL, § 55, *et seq.*) should be employed.

93. δ. The occurrence of *paraplegia* in the puerperal state requires strict attention to the urinary functions and free purging, large doses of purgatives being sometimes necessary. Cupping or leeching near the spine may be requisite. Terebinthinate embrocations may also be applied in the course of the spine, and if these prove not of service, repeated blistering or open blisters may be directed, and the other means advised when treating of paraplegia (see art. PARALYSIS, § 215, *et seq.*) may be adopted. Three cases of this disease in the puerperal state have come before me, and have proved both obstinate, and afterward associated with amenorrhœa. In one which had been of long standing, the amendment was slow. As soon as the patient is able to move the lower extremities, she should endeavour to use them as



much as possible, and persist in the use of derivatives, both internal and external, of frictions, and of rubefacients.

### III. THE Milder Fevers INCIDENTAL to the Puerperal State.

CLASSIF.—III. CLASS, II. ORDER (*Author*).

#### i. EPHEMERAL FEVER.—WEED.—PUERPERAL EPHEMERA.

94. DEFIN.—*Chills or shiverings during early convalescence from parturition, followed by headache, pain in the back and limbs, thirst, rapid pulse, terminating with profuse perspiration and cessation of fever, generally in from twenty-four to forty-eight hours.*

95. A. *Causes*.—The increased sensibility, susceptibility, and irritability of puerperal females give rise to febrile attacks upon exposure to comparatively slight causes, especially when the temperament is nervous or irritable, and the constitution is delicate. These states of *predisposition* are, however, much heightened by the changes in the vascular system, and in the blood itself, consequent upon pregnancy and parturition; and these, moreover, are associated with the predisposed conditions of the uterus, mammae, and intestines, always present in these cases. The *exciting causes* are, commonly, exposure to cold, irregularities of diet, fatigue, exhaustion, want of rest, mental emotions, inattention to the state of the bowels and indigestion, getting up, or leaving the bed, or changing the apartment too soon; accumulations of morbid secretions and excretions in the biliary organs and bowels, &c.

96. B. *Symptoms*.—On the approach of the disease the patient is languid, yawns frequently, and experiences a sense of cold in the course of the spine, and extending over the body. The chilliness may increase to shivering, with or followed by headache, pain in the back and limbs; full, irregular, and rapid pulse, thirst, and slight diminution of the milk and lochia. The bowels are usually costive and flatulent, the stomach disturbed, the tongue coated; the patient is depressed in spirits; complains of shifting pains in the abdomen, is anxious or afraid of dying; and, in the more smart attacks, she is slightly delirious at night. The face is flushed, and she has pain in the breasts and in the forehead, with throbbing of the temples, and slight soreness of the abdomen. To these symptoms a copious perspiration succeeds, and removes the fever and its attendant symptoms, the milk and lochia returning to their previous states. The attack is usually terminated in about twenty-four or thirty-six hours; and, if judiciously treated, it seldom returns; but, if it be neglected, it may assume an intermittent, a remittent, or a continued form; or it may be complicated with some visceral disease, and assume a dangerous aspect.

97. C. *Diagnosis*.—The suddenness of the attack, the irregularity of the pulse, the absence of local pain, excepting that of the head and of abdominal tenderness, the rapid succession of the different stages, and the cessation of the paroxysm in a few hours, distinguish this state of fever from true puerperal fever, from which, however, it will be distinguished with difficulty during the early stage, if all the phenomena of the latter be not duly considered. (See hereafter, § 251, *et seq.*)

98. D. *Treatment*.—During the cold stage,

warm diluents, warm flannels to the back, gentle restoratives, and external warmth are required. The states of the several functions should be carefully examined; the uterine discharge, the mammae, and the abdominal secretions and excretions demanding the utmost attention. If the tongue be loaded, or if nausea be present, an ipecacuanha emetic should be given, and its operation promoted by warm diluents. If the bowels have been, and still are confined, a full dose of calomel or of calomel and jalap should be taken. In all cases the bowels ought to be freely evacuated by these or other purgatives, as the infusion of senna and salts, &c.; and, having hastened on the hot stage, saline diaphoretics, fewer bed-clothes, and diluents should be directed, in order to procure a free perspiration, which may be kept up for five or six hours. As the perspiration declines, or at the end of that period, the patient should have her clothes changed; and gentle restoratives, especially such as may promote the secretions and excretions, ought to be prescribed, with a view of preventing a return of the attack, and of restoring the tone of the system. From two to three grains of camphor, with as much henbane, taken twice or thrice daily, and such restoratives and diet as the state of the patient will suggest, will prove beneficial. If the patient be exhausted by the attack, wine-whey, or wine and water warm, with sugar, &c., may be allowed; or the tonic infusions, or the infusion of valerian, or the decoction or infusion of cinchona may be given, with the solution of the acetate of ammonia, the ammonia being a little in excess, and the spirit of nitric ether may be prescribed. The abdominal excretions ought to be freely promoted by a combination of the compound infusions of senna and gentian, and any neutral salt, with tincture of cardamoms; and rest procured by a soothing dose of camphor (1 to 3 grs.) with opium or henbane, or with morphia. Change of air, especially to the sea-side, is always beneficial. The diet should be light and nutritious as convalescence advances. The states of the mammae and uterus should receive strict attention, and if either organ present prominent disorder, the treatment should be directed accordingly.

#### 99. ii. INTestinal OR GASTRIC FEVER.—FEBRIS GASTRICA VEL INTESTINALIS.—F. Gastrica vel Intestinalis Puerperalis; Puerperal gastro-intestinal Fever.

CLASSIF.—*Ut supra*.

100. DEFIN.—*After chilliness or shivering, fever, with nausea or vomiting, flatulence, griping, diarrhoea, and various nervous symptoms.*

101. A. This state of fever is generally caused by previous torpor of and inattention to the bowels, by accumulations of bile in the biliary organs, and of morbid secretions and faecal matters in the bowels, especially during the advanced period of gestation; by errors of diet after delivery; by close, low, damp, and cold apartments or situations; and by the use of acid, cold, or unsuitable drink or beverages. It usually appears within ten or twelve days from delivery, and is liable to be confounded with ephemeral fever at its commencement; and, when attended by inflation of the bowels, with the puerperal fevers.

102. B. *Symptoms*.—After chilliness or rigours

the patient is oppressed at the stomach, loathes food, and becomes sick. The pulse is frequent and soft; she complains of being cold, although the skin, except that of the feet or legs, feels from the first hot to another person. Afterward she is thirsty, has a slimy or white tongue, sometimes with red edges, and vomits a ropy mucus or bile. She now feels hot, especially in the hands and feet, is distressed with flatulence and griping pains in the abdomen, and the bowels are at first either open or costive, the stools dark and very offensive, and subsequently relaxed or even purged. Purgative medicines always act abundantly, and afford relief. The pulse continues quick; the patient does not sleep, or merely slumbers; and then she talks, or is tormented by visions and dreams. She often complains of short, darting, or nervous pains, or of throbbing or confusion in the head. There is no fixed pain in the abdomen or hypogastrium, nor any tumour in the belly, which is generally soft. The local discharge is not necessarily obstructed, nor is the secretion of milk affected during several days; but, when diarrhoea is considerable, or continues, both one and the other are much diminished or suppressed. The countenance is unchanged at first, and continues so for some days, unless nervous symptoms, or pain in the hypogastrium, or some complication supervene. In some cases, when this disorder continues longer than six or seven days, and is neglected, inflation of the bowels, pain and tenderness in the lower part of the belly, pain on making water, or on passing the fæces, and other indications of irritation of the sexual organs supervene; while, in other cases, various nervous symptoms, as palpitation, vertigo, a feeling of sinking, or startings, and shooting pains in the head, are complained of. The duration of this fever, which is manifestly symptomatic of gastro-intestinal irritation, or consequent upon accumulation of morbid secretions in the biliary organs, and of fecal matters in the bowels, is usually from a few days to a fortnight.

103. *C. The Diagnosis.*—Intestinal fever may be distinguished from *ephemeral fever* by not appearing so soon after delivery; by its more gradual accession, and by the manifest disorder of the stomach and bowels attending it; by the character of the evacuations and the griping or shifting pains in the abdomen; by the ready and copious action of purgatives, and the more protracted duration of the disease. It may be mistaken for either *puerperal fevers*, but the symptoms just enumerated, the relief obtained from purgatives, the softness of the abdomen, and the absence of fixed pain, of tension and of inflation, unless occasionally in very protracted cases, the state of the pulse, and the general condition and appearance of the patient will distinguish this complaint from the more serious fevers of the puerperal state.

104. *D. Treatment.*—An emetic of ipecacuanha is always serviceable on the accession of, or early in this complaint. When its operation is over, saline diaphoretics and tepid diluents are then beneficial. A full dose of calomel may be given in a few hours after the emetic, and its operation on the bowels should be promoted by the administration of rhubarb and magnesia, or by a single dose of castor oil with spirit of turpentine. If the evacuations still

continue offensive, with griping pains, either of these purgatives should be repeated; but if they be more natural, or if diarrhoea supervene, then the existing irritation ought to be allayed by opiate or anodyne enemata. The bowels should never be allowed to become costive; either of the purgatives just named, or the infusion of gentian and senna, being interposed, or given according to the requirements of the case. If griping pains or flatulence, or inflation of the bowels become troublesome, the application of the warm terebinthinate embrocation over the abdomen, and an enema containing spirit of turpentine, with olive oil and asafoetida, will afford complete relief. The diet should depend upon the state of the bowels. If diarrhoea exist, light farinaceous articles of food, arrow-root, sago, and jelly may be given. If there be no diarrhoea, ripe fruit may be allowed; and, as convalescence proceeds, the several farinaceous articles, various preparations of rice, beef-tea, warm jellies, chicken-broth, &c., may be taken. Ginger-wine with water, Seltzer water with old Madeira or Amontillado sherry, the milder tonics, as the infusion of columba or of cheyreita, may also be prescribed as recovery proceeds.

105. *iii. MILIARY FEVER—FEBRIS MILIARIS—FEBRIS MILIARIS PUERPERALIS.*—The eruption described under the head *miliary eruption* sometimes occurs during the puerperal state as a symptom of puerperal fevers. By several older writers, and by some as recently as the last century—by WHITE and others—it was described as one of the most formidable epidemics of child-bed; but it is now rarely met with, unless occasionally as a symptom of ephemeral fever, of milk fever, and of puerperal fever, when they are attended by profuse perspiration, and is evidently dependent upon a morbid state of the circulating fluids, consequent upon imperfect secretion and excretion, or upon the absorption of morbid matters, in connexion with excessive secretion from the skin. It occurs most frequently in delicate females, and commonly from the fourth to the twelfth day from delivery. This eruption affords no crisis to the disease of which it is symptomatic, nor relief to the symptoms. The treatment of this eruption, or, rather, of the disease of which it is a symptom, should be directed to the pathological conditions of that disease, as stated in the article "MILIARY ERUPTION."

IV. SEVERE PUERPERAL FEVERS.—SYNON. *Puerperal Fevers.*—*Febris Puerperalis; Febris Puerperarum; Metritis Puerperarum*, Sagar, Sauvages. *Hysteritis*, Vogel, Cullen. *Metritis Puerperalis*, Boivin, Dugès. *Peritonitis Puerperalis*, Forster, J. Clarke, Hull. *Pièvre Puérpérale*, Fr. *Kindbetterinn-fieber*, Germ. *The low fever of child-bed*, John Clarke. *Child-bed fevers; severe child-bed fevers.*

CLASSIF. — III. CLASS, II. ORDER (Author in Preface).

106. DEFIN.—i. NOSOLOG. *Great frequency of the pulse, and pain, tenderness, and tumefaction of the abdomen occurring in the puerperal state; the pain often commencing in the pelvic region with rigours, the patient generally lying on her back, with the knees more or less elevated.*

107. ii. PATHOLOG.—*Fever occurring in the puerperal state; commencing, in some cases, in local disease, with rigours or chills; in other cases, from*



*infection of the frame and contamination of the fluids, with or without chills or rigours, and frequently with, but sometimes without, prominent local lesion of structure.*

108. When treating of FEVERS in an early part of this work, I took occasion to point out the several and very different forms or types which the febrile diseases of the puerperal state assume (see FEVER, § 44); and Dr. FERGUSON, in his classical work on "Puerperal Fever," has adduced the arrangement I then suggested, with others adopted by the more recent writers on puerperal diseases. It is evident, from what this able writer has stated, as well as from the best works which have been published on the subject since the middle of the last century, but still more from an extensive experience of puerperal diseases in different circumstances, seasons, and periods of their prevalence, that *puerperal fever* is not either a simple or an unvarying malady, and that, thus influenced, it assumes the most diverse types, forms, and complications, and often the most malignant and fatal character of any disease met with in European, or even in other countries. It is hence the more difficult to comprise within the succinct limits of a *definition* those characters which are applicable to all the states which puerperal fever may assume, without omitting what is really important, and at the same time embracing only such features as are essential to its actual and individual existence.

109. i. LITERARY NOTICES OF PUERPERAL FEVERS.—Previously to 1689 and 1733, when HAKE and BERGER wrote on the "Fever of Puerperal Females," no satisfactory account of puerperal fevers existed, although inflammation of the womb after child-birth had been noticed by FELIX PLATER and TULPIUS; and the diseases incidental to this period had been viewed as consequences of errors in diet and regimen, and of interruptions or suppressions of the secretions and discharges, by SENNERTUS, RIVERIUS, WILLIS, DE LA BOE, MAURICEAU, STROTHER, BOERHAAVE, and others. The earliest accounts of puerperal fever as a distinct malady appeared in inaugural dissertations, published at some of the continental universities. These were probably of some importance at the times of their appearance, as containing much of the experience and views of the professors in these institutions respecting this malady, the earliest of these having been printed at Leyden in 1689. In 1746, puerperal fever prevailed in Paris, chiefly at the Hôtel Dieu, where scarcely any recovered from it, the albuminous exudations found in the peritoneal cavity appearing like to coagulated milk on the surface of the intestines, with a copious effusion of whey or milk-like serum; and hence the effusion was viewed as a metastasis of the milk, although a slight attention to the history of these cases would have shown that the secretion of milk was not suppressed, or even interrupted. (FONTAINE, COL DE VILLARS, &c., in *Hist. de l'Acad. Roy. des Sciences*, 1746, p. 16.)

110. POUTEAU (*Mélanges de Chirurg.*, p. 180) mentioned the appearance of this malady in the Hôtel Dieu of Lyons in the spring of 1750, and its great fatality. He noticed sero-puriform effusion into the peritoneal cavity, thickening and contraction of the omentum, a relaxed and softened state of the uterus, and gaseous distention

of the intestines as the chief appearances on dissection, and was the first who regarded the disease as an epidemic erysipelatous inflammation of the peritoneum. Dr. HALL wrote an account of this fever in 1755; and SAUVAGES viewed it as inflammation of the uterus, occurring, 1st. In the puerperal state; 2d. Associated with typhoid fever; and, 3d. With suppression of the milk. STOECK has stated that puerperal fever broke out in the hospital of St. Mark, at Vienna, in 1770, and prevailed through that city during the two following years. It was characterized by pain in the hypogastric region and abdominal swelling, the uterus presenting marks of inflammation and gangrene, and the intestines being covered by false membrane. Dr. DENMAN was the first author, after Dr. HALL in Edinburgh, who attempted in this country to give an account of this malady; but he appears not to have examined the body after death from this disease, although he more correctly infers that the milky matter described by the French pathologists as existing in the peritoneum is a product of inflammation. Dr. MANNING wrote soon after (in 1771), and ascribed the disease to a putrid tendency in the humours; and HULME, LEAKE, and WHITE, who followed him in quick succession, while they viewed the disease as inflammatory, and as affecting chiefly the pelvic viscera and peritoneum, believed that it could not be ascribed to simple inflammation, but to the inflammatory associated with a putrescent disposition; and MILLAR subsequently adopted the same view.

111. Next to POUTEAU, KIRKLAND espoused the most rational doctrine of the nature of this malady, on which he wrote in 1774, and considered it as arising from, and consisting of, sundry pathological changes; from absorption of putrid or morbid matter from the uterus; from inflammation of the womb; from the retention and absorption of morbid secretions and excretions. He concludes that, while absorption of morbid matter and inflammation originating in the uterus will occasion puerperal fever, the abdominal lesions will also be consequent upon the fever when occurring primarily. While KIRKLAND thus wrote so creditably, this malady appeared in the Hôtel Dieu of Paris, and prevailed during 1774 and 1775, but presented nothing of additional importance to what had already been ascertained. During the middle and towards the close of the eighteenth century, the disease was observed by numerous physicians, many of them of great reputation, but little was added to the existing knowledge of its nature and treatment, the fatality caused by it in hospitals being often so great as to harass the feelings of those who were called upon to combat it. More or less detailed accounts of the pathology and treatment of the malady appeared during this period in the writings of STOLL, BANG, BURSERIUS, BUTTER, HECKER, DE LA ROCHE, DOUBLET, FRANK, REIL, and others referred to in the *Bibliography*, but there is nothing furnished by them deserving especial notice.

112. In 1787 WALSH wrote on the disease, and considered it as an infectious fever complicated with diffuse inflammation of the peritoneum. In 1787 and 1788 this malady was prevalent in the General Lying-in Hospital in London, and an account of the appearances ob-

served upon dissection was given by Dr. JOHN CLARKE in 1788 and 1793. In that manifestation of the disease the peritoneum presented the chief morbid changes, and these he has described with greater precision than any of his predecessors. He remarked that the uterus and ovaria sometimes partook of the inflammation of the peritoneum, but not more frequently nor more remarkably than other parts, and that the interior surface of the uterus was not inflamed. From this time, and guided by Dr. JOHN CLARKE's description of the changes after death, puerperal fever was viewed merely as *inflammation of the peritoneum in the puerperal state*; and this view was adopted by Dr. GORDON, of Aberdeen, by Dr. JOSEPH CLARKE, of Dublin, by Dr. HALL, Mr. HEY, Dr. CAMPBELL, Dr. MACKINTOSH, and by Dr. ARMSTRONG, with but slight modifications, or with no farther modification than the expressing of the same idea in somewhat different words; for in medical writings different words are too often substituted for different ideas. These writers bring down the literature of puerperal fever in this country to 1822; their works deserving notice chiefly as furnishing examples of a particular form or epidemic state of the disease, without any recognition of other still more important states observed by other authors, and insisted on by HAMILTON, BURNS, BOER, DOUGLAS, and others referred to in the sequel.

113. In 1823 I became consulting physician to Queen Charlotte's Lying-in Hospital, notorious at that time, and indeed for some years before and after that time, for the recurring appearances of this malady in the most malignant forms in its wards; and for several years subsequently to 1823 I had numerous occasions of there observing the several states of puerperal disease. Contemporaneously with my own researches, and still more recently, investigations of a similar nature were made both on the Continent and in this country; and the results proved that inflammation of the peritoneum, in some form or state, although one of the most constant, is not the only, and often not the earliest change; and that alterations of the uterus, its sinuses, veins, and appendages, are equally common. POUJEAU had stated, about a century ago, that the inflammation of the peritoneum and pelvic viscera, in puerperal fever, is of an erysipelatous kind; and the same opinion was subsequently maintained by HUNTER, GORDON, and others, and still more recently by numerous writers. Indeed, the erysipelatous or diffusive character of the inflammation, when once the disease has commenced, could neither be overlooked nor disputed; for this character is, as I have shown when describing the causes of puerperal maladies (§ 35-43, 130, *et seq.*), a necessary consequence of the operation of these causes, which, by their effects upon the states of organic nervous power and of the blood, preclude the formation, by the inflamed surface, of organizable or coagulable lymph, by aid of which the extension of the disease may be arrested.

114. It has been shown by KIRKLAND, and still more demonstratively by BANG, of Copenhagen—a pathologist whose clinical and necroscopic researches have not received their merited attention—that not only the uterus, but also the ovaries and the Fallopian tubes

were inflamed, softened, or contained purulent collections; and that the womb often presented various changes in its internal surface. Similar lesions were afterward described by JOHN CLARKE, SELLE, and OSIANDER, and more recently by numerous authors in Germany, France, and Great Britain. Inflammation of the uterine sinuses and veins was first distinctly described by BANG and J. CLARKE, and subsequently by DANCE, LUROTH, R. LEE, DUNPLAY, TONNELLÉ, CUSACK, INGLEBY, the author, and others, and shown to exist, in many cases of puerperal fever, by several of these writers. Dr. JOHN CLARKE, however, in 1793, attempted to prove that the low, or the most malignant form of this malady, is distinct from that which is attended by inflammation of the peritoneum, and of the uterus and its appendages; and although doubts have been expressed of the truth of this doctrine, still my experience has shown its accuracy, and has convinced me that a most rapidly fatal and most malignant form of puerperal fever is occasionally developed in lying-in hospitals which is certainly not characterized by uterine phlebitis, nor by purulent collections in the uterus or its appendages, nor even in some cases by peritonitis, the chief lesions often being merely a remarkable alteration of the blood, general lacerability of the tissues or loss of their vital cohesion soon after death, with a dirty, muddy, offensive, and sometimes scanty serous effusion into the serous cavities. It is true that the circumstances by which this form of the disease is developed are seldom observed, and still more rarely at the present day than formerly; but when once developed in these hospitals, under the circumstances in which I have observed it, not a single patient, within a week or fortnight from her delivery, will escape this pestilence, which may even be propagated abroad to puerperal females, if the proper precautions be not taken. When I became consulting physician in 1823 to Queen Charlotte's Lying-in Hospital, the wards were small, crowded, and without ventilation, a large number of females being confined in each ward; and, as might have been anticipated, *à priori*, a most pestilential form of puerperal fever was always recurring a few months after it was reopened, after each occasion of its having been shut up for the purposes of fumigation and purification. In the fatal cases—and at first all the cases were fatal—the appearances now stated were those chiefly observed, in some instances with more marked disease of the peritoneum, and a relaxed or uncontracted state of the uterus. Subsequently, when the representations of the medical officers procured enlargement and better ventilation of the wards, with a diminution of the number of beds in a ward, puerperal fever was of rarer occurrence, and assumed different types and forms, with the progress of these sanitary alterations, inflammatory appearances in the uterus and appendages, in the uterine sinuses and veins, and in the peritoneum, being then most frequently observed in fatal cases. As I believe that in the present and advancing state of medical science and of sanitary improvement, the circumstances which have produced the more malignant forms of puerperal fever, the local pestilence, which I had to treat many years ago, are not likely to exist and to



occasion a similar intensity of the disease, so I infer\* that the various stages of inflammation of the uterus, of its appendages, of the uterine veins, and of the peritoneum will constitute the chief lesions of puerperal fever; and that the type or character of the fever will entirely depend upon the state of inflammatory diathesis; upon the states of vital power and of the blood, accompanying the inflammation; and upon the absence or the presence of contamination of the circulating fluids by retained or absorbed morbid matters and excretions.

115. ii. ARRANGEMENT OF THE FORMS AND STATES OF PUERPERAL FEVER.—Numerous writers have described only one or other of the several forms or states of this fever, very probably from having seen only such form during a limited experience, and in peculiar circumstances, or from having described what they saw on a single occasion, or in a particular epidemic. That this has actually been the case is shown by the fact that these authors have not described the same form or variety, but each has adduced the variety he has described as the true and only form of the disease, and has been indignant at those who believed that any other state of the malady can exist excepting that which he has observed. Thus ARMSTRONG, HEY, MACKINTOSH, CAMPBELL, &c., who observed chiefly inflammatory forms of the disease, accompanied with a sthenic diathesis, could not tolerate the idea that any other state of the malady existed, and were most ireful at J. CLARKE, HAMILTON and others, who believed that a low, typhoid, or malignant form, very different from that which they described, sometimes broke out. Thus, from the days of STOLL and DOUGLASS to almost the present time, some writers have described only a single variety, and have believed it only to be the true malady. But, as will appear more fully hereafter, the symptoms, characteristic features, and still more the *post-mortem* appearances, display diverse features and extensive complications, according to the circumstances occasioning the disease and influencing its course.

116. Several writers, on the other hand, with stronger powers of observation, or with more extensive experience, have viewed puerperal fever as more or less varied in form and complicated in its nature, and not from a single position or aspect merely, as those just alluded to, but according as diverse circumstances, seasons, or epidemic influences have impressed on it different forms and complications. Thus JOHN CLARKE, having observed, 1st. Inflammation of the uterus and ovaria; 2d. Inflammation of the peritoneum; 3d. Inflammation of the uterus, Fallopian tubes, or of the peritoneum, connected with inflammatory fever; and, 4th. Low fever, connected with affection of the abdomen, which is sometimes epidemic, recognized three types or forms of puerperal fever: 1st. That consisting of local inflammation in the puerperal state; 2d. Primary inflammatory or synochal fever developing local inflammation; and, 3d. Typhoid fever with inflammation. Professor VIGAROUS next divided the disease into, *a.* The gastro-bilious; *b.* The putrid-bilious; *c.* The putrid, proceeding chiefly from season, &c.; *d.* The inflammatory, or associated with inflammation of the uterus, peritoneum, &c.; *e.* and the sporadic, arising from

mental causes, cold, &c. M. GARDIEN arranged the forms of puerperal fever into the following: 1st. The angiotonic, or strictly inflammatory; 2d. The adeno-meningic, or slow insidious fever; 3d. Meningo-gastric, with bilious derangement, yellow skin, &c; 4th. The adynamic; 5th. The ataxic or nervous; and, 6th. Fever with local phlegmasiæ.

117. Several continental writers on puerperal diseases have confounded those which belong more essentially to the puerperal state with those which may occur under every contingency, which are quite unconnected with this state, and are not more likely to affect puerperal females than other persons; and they have thus embarrassed the subject with complicated sub-divisions and compound terms. Thus BUSCH enumerates the following varieties in the local affection, occurring in the puerperal state: (*a*) Puerperal fever with inflammation within the abdomen; (*b*) With inflammation within the cranium; (*c*) With inflammation within the thorax; (*d*) With inflammation of the extremities; and he believes that the character of the fever may also be varied as follows: 1st. Gastric fever; 2d. Nervous fever; 3d. Typhus fever; and, 4th. Petechial fever. RIETZ, like BUSCH, has rendered what is often a very complicated subject still more complicated and involved by his mode of discussing it. He views puerperal fever as a disturbance of the economy in its attempts to bring the organism back to the unimpregnated state; and he contends, that any organ in the three cavities of the body may become inflamed during this disturbance. He considers the term "*Malacoplachnitis puerperalis*" as the best that can be applied to the malady, since not only may the peritoneum be attacked, but any other viscus also, the chief peculiarity being the marked tendency of the local lesion to terminate in large fluid effusion.

118. Dr. ROBERT LEE, who has directed his attention to the state of the uterine vessels in puerperal fever, has referred the symptoms to four varieties: 1st. To inflammation of the peritoneal covering of the uterus, and of the peritoneal sac; 2d. To inflammation of the uterine appendages, viz., the ovaria, Fallopian tubes, and broad ligaments; 3d. To inflammation and softening of the proper or muscular tissue of the uterus; and, 4th. To inflammation and supuration of the absorbents and veins of the uterus. It is manifest, however, that although cases will sometimes present one or other of these lesions, either singly or chiefly, much more frequently two or more of them will be associated in the same case; and therefore, instead of founding the varieties upon the individual lesions, it would be preferable to consider the local lesions as complications, or prominent changes occurring in the course of the malady.

119. The arrangement adopted by some other recent writers have been much more simple, and have possessed this recommendation, although it may have been carried too far. MARTENS acknowledges only the *inflammatory*, where one organ only is affected; the *nervous*, commencing with delirium; and the *putrid*, where the frame is more generally implicated. DOUGLASS has three forms, the *inflammatory*, the *gastro-bilious*, and the *epidemic*, or *contagious* or *ty-*

*phoid*. TONNELLÉ assigns only three varieties, the *inflammatory*, the *adynamic*, and the *atatic*. BLUNDELL adduces also three, the *sporadic*, the *mild epidemic*, and the *malignant epidemic*. This last physician believes that in this last form, where the epidemical disposition to peritonitis is strong, the diffusion of the inflammation is great and rapid, whence the difficulty of the cure; that in the milder epidemic the peritonitic disposition is weaker, and the inflammation of smaller extent; and that in the sporadic the epidemical constitution is wanting altogether, and the local affection is limited, and the treatment much more successful.

120. Dr. GOOCH, Madame BOIVIN, and M. DUCÉS have reduced the varieties to two: the *simple inflammatory form*, or metro-peritonitis, and the *typhoid*. In this last form, M. DUCÉS includes all cases of softening of the uterus and of suppuration of the veins; but he is certainly not accurate in his description of the symptoms characterizing it.

121. The author, in 1834, adopted an arrangement of the *forms or states* of puerperal fever (see article FEVER, § 44), which he had observed in practice, and which will be followed and illustrated in the sequel. In that arrangement the local affection or affections were viewed as often being accidents or contingencies in the progress of the fever—as complications supervening in its course; while inflammations of the uterus and its appendages, and of the peritoneum, were admitted to be sometimes primary diseases, of which the fever was symptomatic. Dr. MOORE, in his very excellent treatise, published in 1836, very justly remarks, that the varieties observed in the local lesions in puerperal fever, arising under the same circumstances, cannot be viewed as forms or varieties of the disease, which may be known by the symptoms, but should be considered rather as complications appearing in its course.

122. Dr. FERGUSON, in his very able work on this malady, assigns as the result of his extensive experience *four forms*: 1st. Puerperal fever characterized by abdominal pain; 2d. Fever with gastro-enteric irritation; 3d. Nervous form of fever; and, 4th. Complicated form of puerperal fever.

123. Dr. CHURCHILL, the most recent writer on puerperal fever, divides it, according to the predominant local affection, into *five varieties*, which he has placed in the order of frequency of occurrence: 1st. Peritonitis; 2d. Hysteritis; 3d. Inflammation of the uterine appendages; 4th. Uterine phlebitis; 5th. Inflammation of the absorbents. This arrangement is open to the following objections: (a) It takes for granted that the lesions of these individual parts are truly and always inflammatory—are, in truth, inflammation seated in one or other of these structures, and the fever the symptomatic constitutional expression of the inflammation of such structure—positions which cannot be supported by enlightened observations. (b) It leaves without any recognition or mention the type or nature of the fever as a consequence or effect of the exciting causes: it takes no account of the varying character of the constitutional disease, upon which, and upon it only, can rational and successful indications of cure be founded. (c) It takes for granted that these lesions are primary, although this is only

occasionally the case; and fails of viewing them, as they are presented in practice, in various circumstances, and in different endemic and epidemic states of prevalence. It is based upon a partial or piece-meal consideration of the malady, and instead of being founded on a comprehensive and mature digest of constitutional and local changes, it assumes that the nature of the constitutional affection, as well as of the local lesion, is always the same, the only difference being the part originally affected; and it remarkably fails in this distinction, inasmuch as the local changes are rarely limited to a single organ or tissue, but are generally extended to several, and even to many. When most strictly limited, the appropriation of symptoms, so as to mark the limitation, cannot be effected with either truth or accuracy.

124. The above divisions of the several forms of puerperal fever comprise those which appear most deserving of notice. The classification of these forms, adopted from the results of my experience, and published in 1834, and subsequently by Dr. FERGUSON in 1839, embrace, 1st. The *inflammatory states* of puerperal fever, or *inflammation*, (a) of the uterus, (b) of the ovaria and tubes, (c) of the peritoneum, (d) of any two or all of them. 2d. *Synchochoid puerperal fever*, complicated with inflammation—a, of the peritoneum, β, of the uterine veins, γ, of the uterus and appendages. 3d. *Adynamic or malignant puerperal fever*—a, simple; b, complicated with predominant alteration; α, of the blood; β, of the fluids and peritoneum; γ, of the fluids, serous surfaces, and soft solids generally; δ, of the uterus, or of the uterus and appendages; ε, of the internal surface of the uterine vessels, substance of the uterus, &c.—(a) The *first form* comprises the *primary or idiopathic inflammations*, most liable to occur in the puerperal state, and which, commencing in either of the organs or structures here specified, are attended by symptomatic fever, characterized according to the diathesis, strength, and circumstances of the patient, and are limited, or more or less extended or associated, according to these and other influences and causes.—(b) The *second form* embraces those cases of frequent occurrence, especially in lying-in hospitals, in which it is difficult to determine whether the fever or the local affection is primary, or in which the local alterations rapidly follow the constitutional or febrile affection. In this form of the disease the symptoms are much more asthenically inflammatory than in the first, more insidious at the commencement, and often referable to a local contamination or infection. It may prevail in lying-in hospitals, on certain occasions which admit not of precise description, and may be propagated by contagion. It is not infrequently connected with the prevalence of erysipelas. I have seen it in the wards of hospitals which have not been over-crowded or apparently ill-ventilated.—(c) The *third form* is the most malignant, and in its most intense and pestilential states is seen chiefly in lying-in hospitals, or wards, when over-crowded and ill-ventilated. The whole frame appears infected from the commencement, and whatever local affections or lesions may exist are developed in the progress of the malady, such lesions merely presenting more prominent forms than those observed in other parts of the body. This



form of puerperal fever is caused by the local or endemic infection of the ward—by respiring an infected atmosphere; the infection originating as stated above. The disease produced by it may terminate rapidly in death, without any tissue or viscus having presented a more prominent lesion than the rest of the body. The blood, however, always is more or less altered, and the tissues generally are very deficient in vital cohesion immediately after death. When this form of the malady is less rapidly fatal, one or more of the complications, or rather of the more prominent alterations enumerated above, are generally observed.

125. Between the more primary inflammations, appearing sporadically, and constituting the *inflammatory form* of puerperal fever, and the *malignant form* now mentioned, that form which I have named the *synchooid* holds an intermediate place, passing insensibly into either of the other forms with the intensity of the exciting causes and the amount of predisposition. This *synchooid* or *intermediate form* may arise not only from a less concentration of the causes; from a less impure or contaminated air; from a less concentrated or intense effluvia; but also from an impure or infected state of the bed or bed-clothes, or from the infected hands of the accoucheur, causing a local infection during examination; or from other circumstances either already or about to be noticed; but according to the nature of the causes, their concentration, the state of the patient and the predisposition, so will it approach either the inflammatory form on the one hand or the malignant on the other; and so will it occur sporadically, or even extend by infection.

126. Another circumstance deserving a brief notice is the fact, which has been presented to me on several occasions, that, although the cases which occurred when ventilation was most deficient were generally of the third or most malignant form I have mentioned, yet occasionally a less malignant case, or one more properly belonging to the second form, presented itself, and was to be ascribed to the greater constitutional powers of the patient. But during this state of ventilation and infection not one escaped the disease who was confined in the hospital. Subsequently, when ventilation was improved, and when a fever ward was provided outside the institution, the cases presented generally the second form, and very few of the most malignant or third form were then seen.

127. Besides these three forms of puerperal fever, with their complications or more prominent lesions, another may be adduced, namely, infectious, or *truc typhus fever* occurring in the puerperal state; and of which I have seen a few instances. The infection may have been received before or after delivery; but typhus fever appearing in this state should no more be viewed as a form of puerperal fever than small-pox, or any other of the exanthematous fevers ought to be so considered, when attacking a woman in child-bed. I shall, therefore, notice it no further than the diagnosis may require.

128. In the several works which have appeared upon puerperal fever, the *epidemic* and the *sporadic* occurrences of its several forms have been mentioned in a very loose manner. I have no doubt of any of the forms of the mal-

ady appearing sporadically, more especially the first and second forms which I have assigned, when circumstances combine to develop them; nor can I deny that any of these forms, more particularly the second and third, may become so prevalent, owing to a combination of causes, as to deserve the epithet epidemic. But most of the instances in which puerperal fever has become so prevalent as to be so called have occurred in lying-in wards; and the disease has been limited to them, unless on some occasions when the infection has been carried abroad from them. The term epidemic is, therefore, not strictly applicable, the malady being truly *endemic* as respects such institutions as thus occasion it, the character, the type, intensity, and other features of the malady depending much upon the *endemic sources*—upon the concentration of the infectious effluvia and other causes generated in these institutions and wards. It is not improbable, however, that certain atmospheric constitutions, depending upon the states of terrestrial and atmospheric electricity, and of humidity and temperature, and other circumstances affecting the prevalence of febrile maladies, may so affect also the form and prevalence of puerperal fever as to render it not only endemic in lying-in hospitals, but also epidemic, or approaching to this state, in various places in which it may break out. For, as I stated above (§ 36, 44, 138), causes similar to, or almost identical with, those which generate it in the lying-in wards, actually exist in various houses and localities, in such forms and degrees of concentration as to give rise to sporadic cases, which, when circumstances combine to favour their spread, may propagate the malady.

129. It will be asked, what are these causes which thus exist locally or endemically? 1st. Beds and blankets contaminated by prolonged use, without any attempts at purification (§ 44); 2d. Privies containing immense accumulations of faecal matters, often rising as high as the boards, emitting contaminating vapours, particularly when frequented or disturbed, and sometimes occasioning, as I have remarked in several instances, asthenic or irritative and spreading inflammation of the vulva, vagina, and cervix uteri of married females, and even also of the rectum. I am convinced that the domestic causes of disease, and even of the most malignant maladies, which I have described in the article PESTILENCES, PROTECTION FROM (§ 10–23), and of which I have even assigned proofs (§ 14) at that place, are mainly concerned in producing the more serious forms of puerperal disease, the malignancy of the attack depending chiefly upon the concentration or intensity of the cause.

130. iii. CAUSES.—The *causes of puerperal diseases* have been stated above, with reference both to the peculiar condition of the puerperal female, or the predisposition thereby acquired (§ 6, *et seq.*), and to the more efficient and immediate agents and influences (§ 35, *et seq.*, 129). These are disposing and exciting causes, which with their several concomitants, and especially when present in concentrated or intense forms, commonly occasion puerperal fevers—produce it sporadically and favour its spread. From the days of HIPPOCRATES down to the close of the last century, the suppression of the lochia

or of the milk was viewed as the chief cause of puerperal fevers; and certainly there can be no doubt that the suppression of these will often be followed by very serious disease, particularly of a febrile kind. But in most instances the suppression is merely one of the effects of antecedent causes; and it may not—indeed, most frequently it does not—take place in the most malignant states of the disease.

131. *A.* The *predisposing causes* of puerperal diseases have been already enumerated, and the influence of mental emotions has been noticed. The depression caused by *fear* of the disease, especially in lying-in charities, when the death of a patient is known, has a remarkable effect in favouring the extension of the disaster, and the *depressing feelings* entertained by unmarried puerperal females exert a similar influence. *Large losses of blood*, by uterine hemorrhage or otherwise, have a manifest influence, not only in predisposing to, but also in aggravating the danger of this disease, more especially in lying-in hospitals and wards. Several instances demonstrating the truth of this statement have been observed in the course of my experience. Hemorrhage appears to increase the predisposition, both by augmenting vital depression and shock, and by favouring the absorption of morbid secretions and excretions, and the passage of contaminating effluvia into the circulation.

132. Hydrometric and thermometric states of the *atmosphere* also favour the occurrence of puerperal fever, both by depressing nervous power and by concentrating animal exhalations. Cold and humid states of the air frequently prevent due ventilation of wards and apartments, and the requisite dilution of the contaminated atmosphere; and all methods of warming lying-in apartments which do not promote due ventilation, or currents of fresh air, tend remarkably to generate a pestilential effluvia in lying-in wards or hospitals. *Humidity* at all seasons, but more especially during winter and spring, favours the generation and propagation of this and its allied diseases, as remarked by writers of all ages, more especially of erysipelas, fever, dysentery, and rheumatism.

133. Some difference of opinion has existed respecting the seasons and states of the weather favouring the development of puerperal fever, especially in lying-in wards. My experience convinces me that *cold* is influential chiefly by preventing that amount of ventilation which is requisite when several women are in child-bed in the same apartment. According to my own observations, during a period of thirty years, the disease has been most prevalent during the last three months and the first four of the year. M. DUGÉS's observations, which are limited to 1819 and 1820 merely, show an order of frequency as follows: November, February, January, October, December, September, May, March, April, August, July, June. M. DE LA ROCHE, of Geneva, exhibits the following order of prevalence: January, March, November, December, April, October, September, February, July, August, May, June. As respects the influence of humidity there is greater uncertainty. But I believe that a moist state of the air, especially when conjoined with a low temperature, is most injurious, especially as respects lying-in wards; and in this opinion I

am supported by CHAUSSIER, DUGÉS, CLEIT, and others, while M. DE LA ROCHE considers that a dry state of the air is most favourable to the prevalence of the malady. Humid states of the atmosphere, conjoined with warmth and stillness, are certainly not infrequently productive of sporadic cases arising from the local sources of contamination and infection already pointed out (§ 36, *et seq.*); and from these cases either contagion or infection may extend, when the media are suitable to the transmission, especially by the midwife or nurse.

134. But neither temperature nor grades of humidity, nor both conjoined, always account for the prevalence or absence of this distemper. There seems to be a disposition to the prevalence of it at some periods and not at others, independently of the conditions now remarked upon. The states of the electricities, in as far as they affect the human body, may be the cause of this predisposition, or emanations from the soil, of a nature quite incognizable to our senses and means of detection, may favour its development and diffusion. But the epidemic occurrence of the malady seems allied to the prevalence of low, or adynamic, or eruptive fevers, more especially of typhus and erysipelas; and when puerperal fever is found to prevail in lying-in hospitals, independently of crowding or want of due ventilation, it generally partakes of the nature of the prevailing epidemic, or of the general epidemic constitution.

135. Neglected states of the bowels, constipation, or diarrhœa; improper or insufficient food; addiction to the use of spirituous liquors or cordials, and living in low, ill-drained, and ill-ventilated houses, also predispose to puerperal fevers. It is difficult to determine the influence of first or subsequent labours, or of the kind of labour. But very quick labours have been viewed as favouring the occurrence of puerperal disease in those confined for the first time; and prolonged or difficult labours in subsequent confinements. Premature labour seems to dispose to puerperal fever; but it may be mentioned that, when the patient is infected by the disease previously to delivery, or to the full period of gestation, premature labour will be thereby induced. Of this I saw two instances in consultation with medical friends in the winter of 1827 and 1828.

136. Other circumstances often concur with the foregoing in predisposing to puerperal fevers, more especially an age approaching to or above forty years; females who have suffered previous abortions, and who are vitally or mentally depressed or exhausted; severe, prolonged, or instrumental labours; those who have been subject to diarrhœa, hemorrhoids, or leucorrhœa; and those who are cachectic, or have been ill-fed, or kept *too low* during their confinement. Indeed, insufficient nourishment, or *inanition*, in the puerperal state, is a more frequent predisposing cause than usually believed. These require no remark, especially when they are concomitants of the foregoing causes, and with other states of predisposition noticed above. (*See* § 6, 10, *et seq.*)

137. *B.* The *exciting causes* are chiefly those which tend to contaminate the atmosphere of the lying-in apartment, or which may occasion a local infection.—(a) The *sources* of contamination have been described above (§ 35, *et seq.*,



128, 129); and although their nature and effects must have been long ago recognised, their removal and prevention have hitherto received very slight attention. But these are not the only sources. Many houses retain within their own walls sufficient causes of contamination and of local infection, as just stated, and as fully demonstrated under the head *PESTILENCES, protection from* (§ 10-23). These causes are often productive of dysentery and of asthenic inflammation of the vagina and uterus, and they may be inferred not to be less innocuous to females on the eve of delivery, the foul air evolved from these sources infecting the female organs, and thus producing sporadically either some one of the forms of puerperal fever, or uterine diseases incidental to the puerperal state. That these maladies have been thus produced in several instances I have had sufficient evidence to prove; and that the more febrile or severe may be propagated to other females in this state, when circumstances combine to favour the propagation, I firmly believe. Besides these sources of *extrinsic* contamination, and the effluvia disengaged from foul beds (see § 44), there are other influential causes which should not be overlooked, namely, direct and mediate contagion or infection, and the *intrinsic* contamination caused by morbid matters imbibed, and carried into the circulation from the uterus and vagina.

[The epidemic puerperal fever which proved so fatal among the lying-in patients of the New York Alms-house at Bellevue in 1840, could be distinctly traced to a vitiated state of the atmosphere, both general and local. For twelve or fifteen months preceding, there had been an unusual tendency to epidemic disease, generally of a typhoid character. An incurable diarrhœa, followed by mortification of either extremity of the alimentary, often with the loss of eyes, defied the efforts of medicine. Mortification often succeeded blood-letting. Ophthalmia, when treated in the usual antiphlogistic manner, was followed by rapid ulceration of the cornea. Scarlatina was very malignant and fatal. In short, there was a universal typhoid tendency in all diseases, requiring a tonic and supporting course of treatment.]

138. Not the least important of the exciting causes of sporadic cases, which, however, in circumstances favouring infection, may become more or less prevalent, is confinement in a low, close apartment, near where the exhalations from privies, cess-pools, or drains find an outlet and contaminate the air. Apartments near the ground floors of houses which are provided with privies and cess-pools that have no communication with drains and sewers—and most houses are thus most injuriously constructed—are liable to have the air in them contaminated at all seasons from these sources; but more especially in winter, when they are kept more closely shut, and when the exhalations arise not much less abundantly, and penetrate wherever hydrogenous exhalations may possibly pass.

139. The unguarded use of improper beverages, as beer, ale, wine, spirits, &c.; all sudden mental emotions, or shocks, frights, chagrin, anxieties, &c., and premature excesses of any kind, may concur to induce an attack of certain forms of the disease, especially of the more inflammatory. Coagula in the womb, or

retained in the vagina; portions of the placenta left adhering to the uterus, and death of the fœtus in utero, may severally cause uterine phlebitis, or other forms of this disease, especially if the labour has been tedious, or has required the use of instruments.

140. (*b*) *The infectious nature* of puerperal fever has been denied by some, proved and believed in by many, and imperfectly elucidated, or stated without precision or due limitation by most recent writers on the disease. Infection, or even contagion, is undoubted—unless by the inexperienced and the skeptical—in certain circumstances and forms of the malady. MM. TONNELLÉ and DUGÉS, however, do not believe in the contagious nature of puerperal fever, and adduce their experience at the Maternité in Paris in support of their opinion. During the latter part of 1818 and spring of 1819, the disease was extremely prevalent in Paris, where I was then residing, and had an opportunity of seeing some of the cases which were so numerous in that institution, where alone about three hundred women died of it in these two years. It was prevalent at that time not only in lying-in wards, but also throughout Paris and its environs. These physicians state that it did not extend itself to the bed nearest that in which a patient was affected by it; and they assert that women newly delivered there had each a separate apartment, and yet were attacked. These are the chief facts in proof of their opinion, but they prove nothing beyond what has often been demonstrated (see § 143, *et seq.*), viz., that the malady is often propagated by the mediate contact of the hands of the midwife, and by the effluvia imbibed and conveyed by the clothes. They, however, admit, what was generally observed, both there and in other institutions, that when the fever was prevalent it generally attacked several in the same ward, and was sometimes confined entirely to one ward, a fact sufficiently demonstrative of at least an infectious or contaminated state of the air or of the bedding in that ward.\*

(\* Dr. VACHE, of New York, has given a very interesting account of the prevalence of epidemic puerperal fever at the New York Alms-house in 1840. The disease made its appearance in the Alms-house on the 12th of June, 1840, and was quickly followed by two more cases, apparently so malignant that it was immediately determined to vacate the room, with a view to its purification. The inmates were accordingly removed, and the apartment was whitewashed, ventilated, and scrubbed; the bedsteads were cleansed, new beds and bedding introduced, and at the expiration of about a week it was considered sufficiently disinfected to return to it in safety. But the disease immediately reappeared, equally as violent and irremediable as before, and it was concluded most judicious to abandon the building. Another was therefore prepared at some distance from the Alms-house, and appropriated as a nursery, after being put in the most perfect order; the bedsteads were cleansed and painted; new beds and bedding were furnished; the physician and nurse were changed; the pregnant women were directed to cleanse their persons by bathing; new clothes and shoes were given to them immediately previous to transferring them to their new habitation, and all intercourse arrested with the inmates of the surrounding premises. Notwithstanding these precautions, the first woman confined, and subsequently four others in succession, out of five labours, were attacked with the disease, and in every case it was fatal. The lying-in apartments at Bellevue were then abandoned, and others procured at Blackwell's Island. The same precautions were observed, and for a time the change of air, free ventilation, and a more generous diet seemed to have accomplished the object; several were delivered, convalesced, recovered, and were discharged without an untoward symptom; but the disease soon broke out with redoubled fury, attacking almost every woman confined, and setting at defiance every effort for their recovery. The disease in each locality was almost uniformly fatal. The treatment was diversified, consisting a

141. A circumstance worth noticing is mentioned by M. DUGÈS, which is no mean proof of the influence of the infected air of the hospital upon the lower animals. During 1819 several cats, frequenting the wards of the Maternité during the prevalence of fever, were attacked by painful distention of the abdomen, and tumefaction of the parts of generation. The most of them died in four or five days; and the dissection of them was made, in the presence of Professor CHAUSSIER, by M. DUGÈS, who found in the peritoneal and pleural cavities a large quantity of a whitish serum mixed with albuminous flocculi, and a thin whitish coating covering the abdominal and thoracic viscera. A similar instance of the cat of the hospital becoming infected occurred in the hospital to which I was consulting physician during the prevalence of the fever in it.

142. In 1824, I was requested by a practitioner in the Edgeware Road to see a patient with him in this disease. She was the sixth case which he had had in the course of a few days. She was moribund when I saw her. I learned from him that each case of midwifery which he had attended from the first of these six cases was attacked in succession and had died; that he had called the most eminent accoucheurs to see these cases; that they had prescribed large bleedings; and that the present case had been also largely bled, as was then the general practice, the injurious effects of which were making themselves apparent. I insisted that contagion had caused these cases, advised measures to be taken against his being the medium of its transmission, and no other cases occurred to him for a considerable time.

143. Dr. CAMPBELL wrote on this disease in 1822, from a short experience; and, because he saw no reason to satisfy himself of the propagation of it by contagion, contended, in opposition to the no mean authority and more extensive experience of HAMILTON and GORDON, that the disease was neither infectious nor contagious, although he has adduced no conclusive evidence that some, at least, of the numerous cases which occurred in 1822 did not arise from contagion. It must be admitted that the sources of sporadic contamination which I have described above (§ 137, 138), are so abundant in Edinburgh, where Dr. CAMPBELL practiced, that the difficulty of discriminating between the influence of these and of contagion is thereby much increased. With a candour which always characterizes the truly scientific inquirer, this physician states that subsequent experience has shown him his error (*Lond. Med. Gaz.*, Dec., 1831), and, much to his credit, he adduces the following facts: After examining the body of a female who died of the disease after an abortion, and carrying some of the diseased parts to the class-room, he attended the delivery of a woman the same evening without having changed his clothes: she died. Next morning he went in the same clothes to assist a difficult case, the subject of which also died of the disease; and of others who were seized, within a few days, three shared the same fate. In June, 1823, he assisted at the dissection of

a case, where, from want of accommodation, he was unable to wash his hands with due care. He was soon after called to two patients requiring assistance, and went without farther ablution, and without changing his clothes, and both these were seized with the disease and died.

144. Dr. GORDON states, that the malady attacked only those women who were attended by a physician or nurse who had previously attended those affected with it. He remarks, that he had abundant proofs that any person who had been with a patient in puerperal fever became charged with an atmosphere of contagion which infected every pregnant or puerperal woman who came within its sphere. Dr. HAMILTON affirms that this fever is produced by an infection *sui generis*, and that he is quite positive that this infection is of so virulent a nature that it may be conveyed by a third person. Dr. GOOCH records that a surgeon, after opening the body of a woman who died of this disease, continued to wear the same clothes, and delivered a lady a few days afterward, who was attacked by a similar malady and died. Two more of his patients were seized in rapid succession, and also died. He then suspected the transmission of the infection by his clothes, changed them, and met with no more cases of the distemper. A washerwoman and nurse washed the linen of a female who had died of puerperal fever. The next lying-in patient she nursed died of this disease, and so did a third; when the circumstance having become known, she was no longer employed. At Sunderland, forty out of fifty of these cases occurred in the practice of one surgeon and his assistant. Many other proofs of infection have been adduced by Drs. LEE, MOORE, WALLER, ROBERTSON, and by many recent writers. The last-named writer, in a most instructive communication (*Lond. Med. Gaz.*, vol. ix., p. 503), states, that a midwife in extensive practice among the out-patients of a lying-in charity, within one month delivered thirty cases living in an extensive suburb of Manchester, and of this number sixteen were attacked with puerperal fever, and they all died; and that, of about three hundred and eighty delivered at this time by the midwives of this charity, none had the disease except the patients delivered by this midwife. Other conclusive facts are adduced of contagion by this writer.

[Numerous facts of a similar kind have fallen under our observation during a practice of twenty-two years, mostly in this city; but we conceive it unnecessary to go into detail to prove the contagious nature of this disease, as there are few, if any, American practitioners who do not fully believe in this doctrine. In three instances we have known the disease to follow up the accoucheur so closely that he has found it necessary to relinquish practice for a season, notwithstanding all the precautions he could use to avoid extending the disease through the medium of his clothes, &c. There is something truly remarkable in the extreme tenacity of this animal poison, and the minuteness of dose necessary to infect the lying-in female, as well as the certainty of infection upon exposure to the smallest particle of the infectious matter.]

145. These facts sufficiently show the contagious nature of this disease; that this fever may be propagated both by the hands, and by

general bleeding, cups, leeches, blisters, and fomentations to the abdomen, Dover's powder, camphor, turpentine, calomel, and opium, mercurial purgatives, Peruvian bark, stimulants, &c.]



the clothes, or by either, of a third person, that third person being generally the midwife or nurse. But not only is it thus contagious—the tangible communication often taking place during an examination *per vaginam*—but it is also infectious through the medium of the bedclothes or bedding, or the body-clothes of a patient, or of a midwife or nurse, or the contaminated air of a lying-in ward. I have had several occasions of observing that a lying-in hospital, or ward, for some time after having been opened or purified, will remain free from puerperal disease; but that, if too many patients be admitted, or if, owing to the season, weather, temperature, and humidity, the wards are too closely shut, the emanations from the discharges, &c., will soon contaminate the air, and infect the more recently-delivered women, the effluvia from those first attacked increasing the infectious state of the air, which is confined for a time to the wards where the emanations were first accumulated, but which soon becomes diffused through all the wards and apartments.

146. It has been very justly remarked by Dr. HOLMES, of Boston, United States, that, "suppose a few writers of authority can be found to profess a disbelief in contagion—and they are very few compared with those who think differently—is it quite clear that they formed their opinions on a view of all the facts; or is it apparent that they relied mostly on their own solitary experience?" Dr. DEWEES, in the last edition of his treatise on the diseases of females, has expressly said, "In this country, under no circumstance in which puerperal fever has hitherto appeared, does it afford the slightest ground for the belief that it is contagious." The evidence already furnished may be viewed as quite decisive of the infectious and contagious nature of the disease in Europe; but Dr. DEWEES is incorrect as to his statement of the matter as respects the United States; for, as Dr. HOLMES has remarked, Dr. FRANCIS states that the disease was, in some instances, supposed to be conveyed by the accoucheurs themselves; and Dr. PIERSON, of Salem, United States, admits this to have occurred to himself in several consecutive cases. Dr. CONNIE, although not previously a believer in the contagious nature of the malady, "has, nevertheless, become convinced by the facts that have fallen under his notice, that the puerperal fever now prevailing is capable of being conveyed by contagion." (*Trans. of Coll. of Phys. of Philadelphia*, July, 1842.) Dr. WARRINGTON stated at the same meeting of the college, that, after assisting at an autopsy of puerperal peritonitis, he was called upon to deliver three women in rapid succession. "All these women were attacked with different forms of what is commonly called puerperal fever." At this meeting, also, Dr. WEST stated that seven females delivered by Dr. JACKSON in rapid succession were all attacked with puerperal fever, and five of them died. These were the only cases which occurred in that district; for the women became alarmed at the existence of what Dr. DEWEES and a few with him have denied, and sent for other assistance. "And here I may mention that this very Dr. S. JACKSON is one of Dr. DEWEES's authorities against contagion!"

147. A physician in Boston, United States, had the following consecutive cases: on the

24th March, 9th, 10th, 11th, 27th, 28th April, and 8th May, seven in all, of which five died. He then left town. Another physician writes to Dr. HOLMES as follows: "The first case was in February (1830), during a very cold time. She was confined the 4th and died the 12th. Between the 10th and 28th of this month I attended six women in labour, all of whom did well except the last, as also two who were confined March 1st and 5th. Mrs. E., confined February 28th, sickened and died March 8th. The next day, the 9th, I inspected the body, and the night after attended a lady, Mrs. G., who sickened and died the 16th. The 10th I attended another, Mrs. B., who sickened, but recovered. March 16th, I went from Mrs. B.'s room to attend a Mrs. H., who sickened and died 21st. The 17th I inspected Mrs. G. On the 19th I went directly from Mrs. H.'s room to attend another lady, Mrs. G., who also sickened and died 22d. While Mrs. B. was sick on the 15th, I went directly from her room, a few rods, and attended another woman who was not sick. Up to the 20th of the month I wore the same clothes. I now refused to attend any labour; and did not till April 21st, when, having thoroughly cleansed myself, I resumed my practice, and had no more puerperal fever. The cases were not confined to a narrow space. The two nearest were half a mile from each other, and half that distance from my residence. The others were from two to three miles apart. There were no other cases in their immediate vicinity." (P. 517.) In another communication, the writer considered that he carried the contagion to five cases; and both he and the preceding correspondent state that the disease infected the young and the more aged—the strong and the weak; and without being influenced by the labour or other circumstance.

148. Dr. RAMSBOTHAM remarks, that he has known the disease to spread through a particular district, or to be confined to the practice of a particular person, almost every patient being attacked by it, while other practitioners had not a single case; and he views the distemper as being capable of conveyance in not only common modes, but through the dress of the attendants on the patient. (*Lond. Medical Gaz.*, 2d May, 1835.) Dr. BLUNDELL says, that some practitioners have lost ten, twelve, or a greater number of patients in scarcely broken succession; "that this fever may occur spontaneously, he admits; that its infectious nature may be plausibly disputed, he does not deny; but he would considerably add, that he had rather "that those he esteemed the most should be delivered, unaided, in a stable, by the manger-side, than that they should receive the best help in the fairest apartment, but exposed to the vapours of this pitiless disease. Gossiping friends, wet-nurses, monthly nurses, the practitioner himself, are the channels by which the infection is chiefly conveyed." (*Lect. on Midwifery*, p. 395.) My friend, Dr. KING, of Eltham, mentioned at a meeting of the Medical and Chirurgical Society (*Lancet*, 2d May, 1840), that some years since a surgeon at Woolwich lost sixteen patients from puerperal fever in the same year. He was compelled to give up practice for one or two years, his business being divided among the neighbouring practitioners. No case of the disease had occurred in the practice of these

practitioners, or occurred afterward. Mr. DAVIES states, that in the autumn of 1822 he met with twelve cases, while his medical friends in the neighbourhood did not meet with any, or at least with very few. He could attribute this to no other cause than his having been present at the examination of two cases, and his having conveyed the infection to his patients, notwithstanding every precaution. In December, 1830, a midwife who had attended two fatal cases of puerperal fever at the British Lying-in Hospital, examined a patient who had just been admitted to ascertain if labour had commenced. This patient remained two days; but labour not coming on, she returned home, when she was suddenly delivered before she could return to the hospital. On the third day she was seized with the fever, and died in thirty-six hours. A young surgeon, shortly after examining the body of a sporadic case that had died, delivered three women, who all died of puerperal fever. Mr. INGLEBY states, that two gentlemen, after the post-mortem examination of a case of this disease, went in the same dress, each respectively, to a case of midwifery. The one case was attacked in thirty hours afterward, the other in three days. One of the same surgeons attended, in the same clothes, another female, and she was attacked on the evening of the fifth day, and afterward died. These cases belonged to a series of seven, the first of which was believed to have originated in a case of erysipelas. Mr. INGLEBY also adduces another series of seven cases which occurred to a practitioner in 1836, the first of which was also attributed to his having opened erysipelatos abscesses shortly before.

149. Dr. RIGBY remarks, that the discharges from a patient in puerperal fever are highly contagious; that the puerperal abscesses are also contagious, and may be communicated to healthy lying-in women by using the same sponge, as proved repeatedly in the Vienna Hospital; and that the women engaged in washing the bed-linen of the General Lying-in Hospital have been attacked with abscesses in the hands and diffuse inflammation of the cellular tissue. Dr. RAMSBOTHAM, in a letter to me, mentions a series of seven cases, two of which he saw, which occurred successively to a surgeon in this city; and he, moreover, notices the connexion of erysipelas with certain of these cases; but to this I shall revert in the sequel. Now, after the evidence I have adduced—and I could have quadrupled the amount—is it not criminal for any medical man to go from a case of this disease, or even from a case of erysipelas, to a female in the parturient or puerperal state, without using the strictest precautions? I may conclude this part of my subject by stating that the fact of the contagious nature of this malady is completely set at rest by the above evidence, especially when it is undisputed that within the walls of lying-in hospitals a miasm is often generated as palpable to the senses, and even sometimes much more so, than the fumigations used to destroy it, so tenacious as often to withstand the common measures of purification, and, when generated, more deadly than the plague, if not arrested at its commencement by the most prompt and efficient means. I may farther add, that lying-in hospitals, or even lying-in wards, ought not to be

allowed to exist, for the reasons rendered apparent by what I have adduced, and because the aid they afford may be more beneficially furnished in other ways; and that boards of health, if such existed, or without them, the medical institutions of a country, should have the power of coercing, or of inflicting some kind of punishment on those who recklessly go from cases of puerperal fevers to parturient or puerperal females, without using due precaution; and who, having been shown the risk, criminally encounter it, and convey pestilence and death to the persons they are employed to aid in the most interesting and suffering period of female existence.

150. The contagious nature of puerperal fever has been denied by HULME, LEAKE, HULL, BEAUDELOCQUE, TONNELLÉ, DUGÉS, DEWEES, and others; but GORDON, J. CLARKE, DENMAN, BURNS, HAMILTON, HAIGHTON, GOOCH, BLUNDELL, RAMSBOTHAM, LOCOCK, DOUGLAS, LEE, INGLEBY, ALISON, RIGBY, WATSON, CHANNING, and others have professed their belief in, or adduced proofs of, the existence of this property, as respects this, the most frightful of any of our domestic pestilences; and if any would prefer the weight of authority to the overwhelming evidence now adduced, the names I have enumerated must satisfy him—at least they are quite, nay, more than sufficient to warrant him in acting with caution, and to render him criminal in the eyes of the considerate part of the community if he should ever be the medium of transmitting contagion and death to those who confide not only in his science, but also in his humanity, and in the incalculable value attached by him to human life. Dr. HOLMES has forcibly and eloquently brought this much-neglected subject before the profession; and he thus concludes: "It is as a lesson, rather than as a reproach, that I call up the memory of those irreparable errors and wrongs. No tongue can tell the heart-breaking calamity they have caused; they have closed the eyes just opened upon a new world of love and happiness; they have cast the helplessness of infancy into the stranger's arms, or bequeathed it with less cruelty the death of its dying parent. There is no tone deep enough for regret, and no voice loud enough for warning. The woman about to become a mother, or with her new-born infant upon her bosom, should be the object of trembling care and sympathy wherever she bears her tender burden or stretches her aching limbs. The very outcast of the streets has pity upon her sister in degradation when the seal of promised maternity is impressed upon her. The remorseless vengeance of the law is arrested in its fall at a word which reveals this transient claim for mercy. The solemn prayer of the Liturgy singles out her sorrows from the multiplied trials of life, to plead for her in the hour of peril. God forbid that any member of the profession to whom she trusts her life, doubly precious at that eventful period, should hazard it negligently, unadvisedly, or selfishly!"

151. *C. What connexion is there between puerperal fevers and erysipelas?*—The connexion apparently existing between these diseases has been hinted at above; but it is more remarkable at some seasons and occasions than at others. It was first observed and insisted upon by POUTEAU in 1750, who considered the puer-



peral fever as it then prevailed in Paris as an epidemic erysipelas of the peritoneum. Drs. HOME and YOUNG, of Edinburgh, and Dr. LOWNER, of London, not long afterward, also maintained this opinion. Dr. ABERCROMBIE, as Dr. MOORE has remarked, adopted a similar view, and founded his opinion principally on the circumstance of both diseases giving rise to serous effusion. In the various discussions this subject has given rise to, it has been contended by Dr. WHITING, Dr. WALLER, and others, that the identity of both these maladies is shown by the similarity of symptoms, and by the ill success of remedies; they asserting that, like erysipelas, puerperal fever cannot be arrested, and that it is contagious. This last property has been shown to exist, and cannot now reasonably be doubted. But that puerperal fever may be arrested I have proved on numerous occasions; and I shall have occasion to describe the means by which its arrest may be accomplished. Phlebitis of the capillary veins not infrequently complicates erysipelas, and uterine phlebitis is a frequent complication of the second or more intermediate grades or states of puerperal fever. These phenomena evince a certain amount of alliance, but not identity. GORDON, HEY, ARMSTRONG, and others contend for similarity, if not for identity. Dr. LEE states that in 1829, when the fever broke out in the British Lying-in Hospital, three children died of erysipelas, and on examination after death, the peritoneum in these infants was found extensively inflamed, and covered with a copious sero-purulent effusion. Three other cases are related as having occurred under similar circumstances; but it is admitted that cases of infantile erysipelas repeatedly occurred when there were no cases of puerperal fever in the hospital. I find it remarked, in my notes of cases of this disease observed by me in Queen Charlotte's Lying-in Hospital, that the relation subsisting between puerperal fevers, whether of an inflammatory, or of a malignant, or of an intermediate type, and erysipelas, especially of an epidemic form, has been evinced on several occasions, and during several periods, in which the former have prevailed. Instances of both diseases occurred in the winter and spring of 1823 and 1830, and of almost every intermediate year. But cases have also been observed of either malady without the other; and, while infantile erysipelas has occasionally been seen contemporaneously with the appearance of puerperal fevers among the women, the former has not infrequently been met with when the latter did not exist, either sporadically or endemically.

152. Dr. HOLMES notices, in his instructive memoir, that Dr. S. JACKSON went from a case of gangrenous erysipelas which he had been dressing to the first of the series of cases which took place in his practice; and that a Dr. C., who delivered seven women in succession, who were all seized with puerperal fever, had made, on the 19th of March, the autopsy of a man who died after a very short illness, from oedema of the leg and thigh followed by gangrene, and the first of these seven cases was delivered by him on the 20th, the following day. When making the autopsy on the 19th, Dr. C. wounded his hand, and was confined to his house, after delivering the first case on the

20th, until the 3d of April, and on April the 9th he attended the second case of fever. "Several cases of erysipelas occurred very soon afterward in the house where the autopsy of the man just mentioned took place. There were also many cases of erysipelas in town at the time of the puerperal cases. The nurse who laid out the body of the third puerperal patient was taken on the evening of the same day with sore throat and erysipelas, and died in ten days. The nurse who laid out the body of the fourth case of puerperal fever was seized on the day following with symptoms like those of that case, and died in a week, without any external marks of erysipelas."

153. Another physician, who had a series of five successive cases of puerperal fever, states, in a letter to Dr. HOLMES, that for two weeks previously to the first case of puerperal fever he had been attending a severe case of erysipelas, and the infection may have been conveyed through him to the patient, as he admits; but, he asks, "Wherefore does not this occur to other physicians, or to himself at other times; for he has since had a still more inveterate case of erysipelas, but he has had no disease in any of his midwifery cases?" It would be culpable in him to make the experiment, or to repeat the risk, without due precautions. Inoculation with the matter of smallpox or cowpox does not always communicate the disease; indeed, it often fails of doing so; but no one now disputes the contagious nature of the virus inoculated. Dr. MERRIMAN, an able and cautious practitioner, mentioned (*Lancet*, 2d May, 1840) that he was at the examination of a case of puerperal fever at 2 P.M. *He took care not to touch the body.* At 9 o'clock the same evening he attended a woman in labour; she was so nearly delivered that he had scarcely any thing to do. The next morning she had rigours, and died in forty-eight hours. Her infant had erysipelas, and died in two days. A patient whom I was attending in the hospital, in 1828, was seen by a lady; and, while listening to her faint voice, her breath was felt by the lady, who was stooping over her. This lady was the following day attacked with erysipelas in the face.

154. Dr. RIGBY states that, in one epidemic in the General Lying-in Hospital, the child of every woman who died of the disease perished of erysipelas, which ran its course in a few hours. Dr. RAMSBOTHAM remarks, respecting this topic, that the cases recorded by CEELY and INGLEBY are so strongly in point, as to render it almost impossible to withhold the conviction that there is a form of fever to which puerperal women are liable, not only arising from the contagion of erysipelas, but, in its turn, also occasioning that disease in other persons. Whether in this affection, when it arises under such circumstances, the peritoneum is always attacked, is a question which he believes may be answered affirmatively in the great majority of cases. He further states, that on three occasions he has known the women who have nursed patients that died of this fever attacked with erysipelas of the leg; that in 1841, when erysipelas was prevalent in Roth-erithe, a medical friend of his had six cases, and while attending these he delivered a lady, who was speedily seized with puerperal fever,

and very soon afterward died. Her nurse was attacked with erysipelas of the hand, and was attended by another surgeon. One day, after having made an incision and dressed the wound, this latter surgeon was called to a case of midwifery: puerperal fever supervened, and the patient sunk very rapidly. A third fatal case, attended by the same practitioner, Dr. R. also saw, and others that did well. The disease disappeared in that vicinity when these practitioners declined to attend women in labour. Since the appearance of the second edition of his work, Dr. R. has met with additional facts, which he has had the kindness to communicate to me. A surgeon, in Clerkenwell, had five fatal cases of puerperal peritonitis, rapidly following each other, and two others, which Dr. R. saw, and both recovered; but both the children of these two latter cases died of erysipelas. One of the nurses in these last cases also took erysipelas. When this surgeon attended the first case of puerperal fever, he was just recovering of an attack of diffuse inflammation of the cellular tissue, with abscess of the fore-arm, consequent on having pricked his finger in opening the body of a woman who died of cancer of the uterus. Dr. R. concludes with believing, that "the connexion between malignant puerperal fever—that is, the fever in which the peritoneum is the seat of disease, and which terminates in the rapid effusion of soft lymph and whey-like serum into the cavity—and erysipelas is perfectly established." I may add to the above my opinion that the evidence is altogether satisfactory; that some of the series of cases of the more malignant states of puerperal fever have been produced by an infection originating in the effluvia proceeding from erysipelas, or by the contagion of the matter or contaminating material produced by erysipelas. It is quite unnecessary for me to adduce farther facts in support of this inference, but they may be found in the writings of CEELY, ACKERLEY, RIGBY, S. JACKSON, HOLMES, INGELBY, PALEY, STORRS, NUNNELLY, and numerous others, referred to in the *Bibliography* to this article. My opportunities of observing this disease since 1812, and what I have seen of it in hospitals and in private practice, have convinced me of the propriety of the following *inferences* and *precautions*.

155. *a.* That lying-in hospitals and wards have been established and supported on mistaken views as to the benefits they confer on individuals and the community; that the charity would be bestowed more safely to the objects themselves, and to others contingently, if it were so administered as to afford the required aid, to increase the comforts, and to improve the sanitary conditions of females in the puerperal states at their own places of residence.

156. *b.* If these institutions be still continued and supported, as introductions to midwifery practice, or for the doubtful benefit of the recipients of a certain kind of charity, the obstetric physicians and surgeons attached to them ought not to attend those cases of puerperal fever or of erysipelas which so frequently break out in the wards of such institutions; for, by doing so, they convey the poison from one patient to another, both within and without the institution. In all such circumstances, the consulting physician or surgeon to the institution, who, as

in my own case, should not be engaged in the practice of midwifery, ought to take charge of these cases, which should, immediately upon their attack, be removed, with due care and precaution, into a separate ward, provided for the reception of such cases, and situated without the walls of the hospital, but apart from other houses.

157. *c.* A physician or surgeon engaged in obstetric practice, upon the occurrence of puerperal fever in any of his cases, should either explain the matter to her friends, and call in a physician not engaged in this practice, to whose care she ought to be committed; or he should relinquish the care of puerperal females during his attendance on cases of this fever, and even of erysipelas; or he should change all his clothes, and carefully wash his hands, after seeing cases of either of these maladies, before proceeding to a puerperal female.

158. *d.* An obstetric practitioner should not make an autopsy of a case of puerperal fever, or of erysipelas, or of peritonitis, or of diffusive inflammation of the cellular tissue, or of the disease occasioned by the necroscopic poison (*see art. Poisons*, § 487, *et seq.*), nor even attend, or dress, or visit any of such cases, without immediately afterward observing the precautions just stated, and allowing two or three days to elapse between such attendance and midwifery engagements, or visits to puerperal females, [and even where these precautions have been strictly observed, we have known the disease to be communicated by the physician to his lying-in patients.]

159. *e.* It is the duty of obstetric practitioners attached to public institutions to prevent, as far as possible, the spread of this pestilence by midwives, nurses, or other assistants; and, as soon as two or three cases occur in succession, or other causes of suspicion present themselves, to take the most decided measures against the extension of contagion. Whatever indulgence may have heretofore been extended to those who have been the ignorant causes of the misery disclosed by the above statements—which convey but a small part of what has occurred in recent times—cannot now be expected, and ought not to be granted; for the practitioner is now too well informed, or, at least, the sources of information as to this matter are too open for him to be longer ignorant, that this most deadly of our domestic pestilences is conveyed from the infected to the healthy chiefly and most frequently by the accoucheur, when it occurs without the walls of a lying-in hospital, and that ignorance of, or inattention to, this fact, already not unknown to the well-informed part of the community—this flagrant neglect of what we owe to those who confide in us, and to society in general, to whom we must look for consideration and esteem—will be no longer viewed as a *misfortune*, but will be more justly considered a *crime* of no small magnitude.

160. *D.* What connexion is there between puerperal fever and other maladies, especially such as are epidemic or endemic? and may atmospheric vicissitudes or conditions be viewed as concerned in this connexion, and in their prevalence severally or collectively?—The infectious nature of puerperal fever has been demonstrated above (§ 140 *et seq.*), and it has been shown, as in Dr. MER



RIMAN's case, that the disease may be communicated without contact, although there is also reason to believe that the contact of a *materia morbi* will also convey it. The connexion between this fever and *erysipelas*, also a contagious disease, has next been shown (§ 151, *et seq.*); and it has been proved that the effluvia from a case of puerperal fever will produce *erysipelas* in a person predisposed to this latter malady, while that evolved from a case of *erysipelas* will occasion puerperal fever in newly-delivered females. Moreover, it has been shown by several cases in the course of my practice (to two of which I was called by one practitioner in the winter of 1827-28), that the infection of either this fever or *erysipelas* may be transmitted to females who are pregnant, more especially at a far-advanced period of gestation, and may rapidly produce premature delivery, followed by all the characteristic phenomena of malignant puerperal fever; while, on the other hand, abortion or premature delivery, particularly when either is accompanied with great hemorrhage or flooding, predisposes remarkably to the infection of puerperal fever, as well as to that of *erysipelas*.

161. The prevalence of *typhoid* or *adynamic* fevers have been considered by some writers as more or less connected with the occurrence of puerperal fever, and, indeed, that this latter is merely typhoid fever modified or aggravated by the puerperal state. We find that *smallpox* and *scarlet fever*, or *measles*, are remarkably aggravated, and the danger from them greatly increased, when they attack a puerperal female. But these diseases always preserve their identity and their specific forms, and the power of perpetuating or extending themselves. Their characters are not lost in those of puerperal fever; and if, during their course, the phenomena or the internal lesions and complications usually observed in malignant puerperal fever appear also in them, they are merely superadded, and become the causes of the greater malignancy and more rapid progress of the malady to a fatal issue. Now this has been the case also with the *true* or *exanthematic typhus*, when it affects a puerperal female, as far as my observation enables me to judge; for the characteristic eruption and the low, muttering delirium—the typhomania—marking this fever have also appeared in the puerperal manifestation or complication of it, the features of the puerperal malady being also present; the puerperal state imparting to this specific fever, as it does to the exanthemata, dangerous complications, more malignant characters, and a much more rapid and unfavourable issue.

162. I have had reason, however, to believe that puerperal fever may arise sporadically from the same causes as that form of fever which I have denominated *putro-adynamic*—the *putrid fever* of the older writers (*see art. FEVER*, § 484)—that fever, varying in its subordinate features, and in the lesions supervening in its course, may be produced in the puerperal state by the same causes as those which occasion that form of continued fever; that animal exhalations, the foul vapours from putrid animal matter and burying-grounds, the effluvia from privies and sewers, and the infectious emanations yielded by those affected by this fever,

will produce puerperal fever, in all respects the same as when it prevails in lying-in hospitals; and that the puerperal fever thus originating may be spread in the manner above demonstrated; that, in short, malignant puerperal fever may arise sporadically from those sources of infection I have described when treating of this property (*see INFECTION*, § 11, *et seq.*) and of the causes of *putro-adynamic fever* (*see FEVER*, § 449, *et seq.*, 484), and be transmitted from one puerperal female to another, when the circumstances favouring this transmission are present.

163. Dr. COLLINS states, that puerperal fever has become epidemic in the Dublin Lying-in Hospital on several occasions when typhus fever prevailed in that city, and at other periods when *erysipelas* was frequent. A patient was admitted at a late hour labouring under fever with petechial spots over the body. She was removed to a separate apartment, and died soon afterward. The two females who occupied the beds adjoining hers were attacked with puerperal fever and died. A patient in fever was admitted at night into one of the labour wards, where she remained for some hours. This ward contained four beds. The three women occupying the other beds were attacked with puerperal fever, and two died. Dr. COLLINS adds, that the recovery of the patient attacked with typhus fever at the *full period* of pregnancy is an interesting fact, as he believes that no complication proves more generally fatal than the premature expulsion of the child under such circumstances.

164. The prevalence, also, of the low types of the exanthemata, of rheumatism, and even of other diseases, which are favoured more or less by humid, stagnant, and cold states of the atmosphere, may exist contemporaneously with that of puerperal fever; but in such circumstances the only connexion subsisting between them is to be ascribed to the atmospheric conditions, especially those just stated, probably also associated with certain electrical conditions of the earth's surface and of the air, and with emanations from the various sources of impurity and of infection with which all crowded localities, towns, cities, factories, &c., abound more or less, particularly when these emanations are not swept away by high winds and due ventilation.

165. iv. DESCRIPTION.—*Puerperal fevers* present certain *types* or *forms*, depending chiefly upon the following circumstances: 1st. Upon the intensity or concentration of the exciting causes, relatively to the predisposition of those exposed to their operation; 2d. Upon the degree of depression of organic nervous energy or powers of life produced by those causes; 3d. Upon the extent of contamination of the circulating fluids consequent either on the respiration of a foul or infected atmosphere, or on the absorption of morbid matters from the sexual organs, or from other parts; 4th. Upon the continued operations of these, or of various concurrent causes and influences, during the progress of the malady; 5th. Upon the states of season, weather, and epidemic constitution at the time cases of this malady occur; and, 6th. Upon the manner in which the infection is produced, and the media or channels by which it is conveyed, when the disease is propagated by infection or contagion, as shown above

(§ 140, *et seq.*). These circumstances, aided by constitutional peculiarities, the previous conditions of organs and functions, and the morbid tendencies of the patient, are also the chief causes of the complications, ultimate changes, and results observed in the advanced course and at the termination of the malady.

166. The various arrangements of the forms of puerperal fever adopted by medical writers have involved the following important questions, namely: (a) *Are the several forms or types of puerperal fever the consequences of local changes—of those lesions observed after death; or, in other words, are they merely symptomatic disturbances of the constitution produced by these lesions?*—(b) *Are the structural lesions or prominent changes found on dissection produced in the course of the malady, and are they the ultimate results of that malady?*—(c) *And are these forms or types different from their commencement, and the effects of different grades of intensity of the exciting causes, and of the different avenues or channels by which these causes invade and poison the frame?*

Now the solution of these important questions has been eschewed by all writers, and even by the obstetrical writers on this malady, many of whom have mystified, rather than enlightened the subject. The answers which may be given to these questions will appear more illustratively in the sequel, for the importance of the topics to which they refer is great, not merely as respects an accurate description of the different resulting forms and states, but also as regards the adoption of appropriate prophylactic measures and rational indications of cure. The discussion of this topic cannot, therefore, be neglected with propriety. It is necessary first to advert to the modes and avenues by which the poison or infection may contaminate the frame, as above demonstrated (§ 143, *et seq.*). 1st. The atmosphere of a ward may be infected by animal effluvia—by exhalation from decomposed discharges, &c., as there shown; or a puerperal female may inspire the poisonous effluvia absorbed, retained, and afterward given out by the clothes of the medical attendant or nurse. In these cases the frame is infected through the respiratory avenue; organic nervous power and the circulating fluids being thereby morbidly impressed or affected. Whatever local changes or prominent lesions are observed after death, whether implicating the peritoneum, or the sexual organs, or other parts, are, in such cases, *consequence* of the operation of the exciting cause upon the nervous and vascular systems, and upon the blood. In these there can be no doubt as to the local lesions being consecutive of the infection thus produced; although the mode in which the consecutive lesions or complications are developed may admit of discussion, as noticed hereafter (§ 245, *et seq.*).

167. 2d. It has been shown above (§ 137, *et seq.*) that the poison may be conveyed to the uterus or vagina by contact—by the hands of the accoucheur; or the poisonous miasms or vapours exhaled from foul privies frequented just before delivery—a gust of foul air on those occasions—may infect the vagina and os uteri; or the decomposition of coagula in the vagina or uterus, or of a portion of a retained placenta may so contaminate these parts, the imbibition and absorption of the decomposed matters,

or of ichorous or puriform secretions in these situations, affecting not only the state of vital power and resistance, but also changing the constitution of the circulating fluids in such a manner as to give rise to all the phenomena and complications of this malady. In this latter mode of infection—and through the channel or avenue now stated—the local changes in the sexual organs are, as respects their earlier grades, the first to be developed; although they subsequently increase in extent and intensity with the depression or exhaustion of vital power, and with the contamination of the circulating fluids; and progressively extend to the peritoneum, digestive organs, heart, and other remote parts, as hereafter described. In the first of these modes of infection (§ 166) the local alterations are generally *consecutive* of the constitutional affection; in the second they are *primary*, but of such a nature as rapidly to contaminate the whole frame, and as to become themselves quickly aggravated and extended by the consequent constitutional infection. The former of these modes is produced by an extrinsic cause or poisonous emanation generally conveyed through the medium of the respired air; the latter by the contact of a material poison either directly applied to the prominently diseased parts, or affecting them in the manner already stated (§ 129).

168. It may, however, be admitted that, when the frame of a puerperal female is infected by a foul air, generated either in a lying-in ward, or in an apartment by privies and sewers, &c., and when vital power is thereby depressed and the circulating fluids contaminated, the secretions or discharges from the uterus will then also become altered, more or less acrid or otherwise morbid, and thus infect the parts with which they are in contact. Nor will the local alteration, thus originating, be limited to these parts, but it will extend to adjoining parts and surfaces, and even to remote situations, as shown in the *second* of the above categories; the complications or local lesions thus supervening upon the constitutional infection, and in their turn augmenting that infection. Such being the two modes of procession of the morbid changes, it becomes the more important to recognise the phenomena by which each is distinguished; and to inquire, as I shall endeavour to do in the sequel—as I have many years since inquired and acted, and not unsuccessfully—respecting the means which may be rationally employed to arrest the onward tendency of these changes to disorganization, to dissolution of the vital cohesion of the tissues, and to death.

169. 3d. Besides the two classes of cases now specified, and arranged according to the manner in which their efficient causes invade the economy and develop the malady, there is a *third*; and to this class may be referred those cases which evince a more strictly local character, which are more individualized in their manifestations and more limited in their tendencies and structural changes. These generally are *primary*, or commence with local changes of an inflammatory character, the constitutional disturbance being symptomatic of such changes, and varying with the state of the patient, and with the influences to which she is subjected. In this class the local affection is



more decidedly inflammatory; and if the diathesis be not altogether *sthenic*, it is at least much less *asthenic* than in any of the former classes. The cases in this third class may occur independently of any infection taking place in either of the modes, or by either of the avenues, indicated above; or, if they be produced at all, as there stated, the causes are so weak, or operate in such a manner as not materially to reduce vital power or resistance, or remarkably to lower the tone of vascular reaction. Some of these cases may be referred to causes productive of irritation or of determinations of blood to the affected parts; or to the suppression of the secretions and excretions; or to the nature of the ingesta, or to various other causes of visceral inflammation. If in any case either of the modes of infection above specified be concerned in producing this form of the disease, the infectious agent fails in occasioning the same amount of vital depression, of structural changes, and of general contamination characterizing the other forms, owing either to the relative weakness of this cause, or to the constitutional power and strong vital resistance of the patient. Keeping, therefore, in view the different or varying forms of the malady—the progressively malignant states of puerperal fever, with the nature, intensity, or concentration of the existing causes, and with their continued operation, I proceed to consider, *first*, the more local and *sthenic*, or inflammatory form or type of the malady, and afterward the more *asthenic* and malignant.

170. *A. INFLAMMATORY PUERPERAL FEVER.*—This form of the disease has been viewed by many writers as an *idiopathic* or *primary inflammation*, occurring in the puerperal state—as a *puerperal peritonitis*, or as *puerperal hysteritis* or *metritis*, or as *puerperal ovaritis*, according as the *peritoneum*, or the *uterus*, or the *ovaria* and *ligaments* are the chief seats of inflammatory action and of local change. That this form of the disease may thus occur primarily, being developed by causes which tend to localize disease, owing to their nature and channels of operation, must be admitted. Cold, humidity, neglect of various comforts and requisites, improper food or beverages, mental emotions, &c., may primarily excite either of these local diseases, and symptomatic fever, varying in the character or type of vascular action, with the state of constitutional power, and with numerous other concurrent influences and circumstances. But in other cases, as shown above (§ 169), the primary character of the local disease is lost in the intensity or severity of the constitutional disturbance; and the more prominent lesion of one or more of the parts just particularized, either is an attendant of the vascular reaction following the operation of the exciting causes and the shock produced by parturition, or is consequent upon the reaction, and is favoured by those conditions and circumstances insisted upon above as being influential in determining and localizing puerperal maladies (§ 10, 11, 41). When the common causes of inflammation occasion disease of one or more of these parts, the constitutional disturbance is modified more or less by the puerperal state, and by the constitutional powers and other circumstances of the patient. But as the infectious and contaminating effluvia in poi-

son, so influential in causing the malignant forms of the malady, has little or no share in the production of the sporadic or inflammatory cases constituting this form, they generally present more or less of a *sthenic* diathesis, and pursue a more favourable and less rapid course than the others.

171. (*a*) *PUERPERAL PERITONITIS.*—*Peritonitis Puerperalis.*—*Inflammation of the peritoneum* may occur in the puerperal state sporadically from causes already noticed, or even without any very obvious exciting or external cause. It may either be primary, or the consequence of the extension of irritation or inflammatory action from some one of the organs or parts seated in the pelvic cavity to that portion of the peritoneum enveloping the part thus primarily affected. This latter mode is probably the most frequent; for the uterus, the tubes or ovaria, owing to injury, to excoriation, or to the irritation of the lochia, or to other causes, may be so affected as not to betray the nature or amount of the affection, in consequence of the peculiar condition of the patient, until the disease extends to the peritoneum, and thus the parts primarily disordered are either overlooked or unrecognised, and the more prominent and secondary alteration attracts the chief attention, and is considered the only seat of the malady. This form of the disease is most frequently caused by violence during delivery, by exposure to cold, or damp or wet linen or bed-clothes, or by the use of improper food or stimulants. It may not appear for a fortnight or three weeks after delivery; but when it is the primary lesion it may occur on the second or third day, or earlier than inflammation of the uterus. Uterine hemorrhage predisposes to it as well as to the other forms of puerperal fever.

172. *a* *The symptoms of puerperal peritonitis* vary with the constitution, habit of body, and other circumstances of the patient and the mode of attack. The pulse often continues to rise in frequency from the appearance of the reaction consequent on the shock of delivery, and pain is felt in different parts of the belly, which are soon followed by chills, rigours, or shiverings. With these great increase of pain in the abdomen, with tenderness and tension, sickness or vomiting, is complained of. The pain is occasionally universal, but it is sometimes limited to one part, and the belly soon becomes swollen and tense. The pulse is frequent, hard or sharp, and small. The skin is hot; the pain and tenderness increase, and extend over the belly. The patient lies on her back with the knees raised. The tongue is white and dry; sometimes clean, or loaded only towards the root. There are more or less thirst, occasional vomitings, and an irregular state of the bowels, which are generally at first costive, but afterward often relaxed or bilious. The lochia and milk are much diminished soon after the rigours, and are subsequently entirely suppressed.

173. These symptoms often appear rapidly and acutely, especially when the peritoneum is primarily attacked. But they sometimes come on less severely and more insidiously, especially when they are consequent upon irritation or inflammatory states of the uterus or its appendages. In these cases, the disease may at first be mistaken for after-pains; but the fre-

quency of the pulse, tenderness above the pubes, the shiverings, and the swelling and tension extending upward from the hypogastrium, indicate the nature of the disease. When the malady thus commences the symptoms are milder and more protracted at first; and the pain for some time is not severe until it rises above the hypogastrium, when it is rapidly aggravated and extended, and all the other symptoms increased. Whether the early symptoms are rapid or slow in their accession, or whether they are limited or extended, they soon augment; the belly becomes nearly as large as before delivery, and so tender as not to tolerate the weight of the bed-clothes; and the patient is deterred from turning, or lying even for a few moments upon either side, by the increase of pain thereby caused. With the extension of the inflammation over the peritoneum, the respiration becomes more strictly thoracic, and the movements of the abdomen less apparent; and when it reaches the diaphragm the breathing is difficult, anxious, short, and performed entirely by the intercostal muscles. Cough then sometimes occurs, which is short, suppressed, and painful. Painful eructations, or belchings of flatus, take place at intervals, attended sometimes by discharges of fluid from the stomach. The bowels, which were generally confined, become more relaxed, and dark, bilious, or variously coloured evacuations, or even purging supervene.

174. *β.* If a favourable termination is likely to occur, the abdominal swelling does not greatly increase. The pain either is arrested in its extension, or it gradually abates. The vomitings cease, the pulse becomes slower and fuller, the urine more abundant, and occasionally the lochia reappears, or is more copious. The breathing is easier and more abdominal, pressure is less painful, and the patient can turn more easily in bed. In rare and less favourable cases, the disease terminates in suppuration, and the abscess points and bursts externally at periods more or less distant from the attack, the matter in some such instances passing out at the umbilicus in about one or two months.

175. *γ.* If the disease proceeds unfavourably, the swelling and tension of the abdomen increase; the belly is round and prominent; the vomiting continues or becomes peculiar, consisting of a pumping or belching up of the contents with much flatus. The countenance becomes sharp, anxious, or pinched; the pulse still more rapid and irregular; and her slumbers short, unrefreshing, and sometimes attended by a wild or wandering delirium; but she often continues sensible to the last. The pain frequently ceases suddenly, although the abdominal swelling increases; the countenance sinks; the extremities become cold, and the tongue apthous. A fatal issue usually takes place within five or six days; but the disease may be protracted much longer. According to the constitution and other circumstances of the patient, and the period that has elapsed from delivery, puerperal peritonitis may vary between the forms described as sthenic and asthenic peritonitis, when treating of *inflammations of the peritoneum* (see § 19–28), the symptoms and progress of the malady being altogether the same as there described. *The appearances on*

*dissection* are also the same as there stated, (§ 80, *et seq.*), or as exhibited hereafter (§ 221, *et seq.*).

176. (*b*) **PUERPERAL METRITIS.**—*Hysteritis Puerperalis.*—*Inflammatory puerperal fever often commences in the uterus*, the substance of the organ being affected about the third or fourth day after delivery, but often much later. It may arise from prolonged, difficult, or instrumental labour; from cold or damp; from stimulants or heating food; and from other predisposing and exciting causes already noticed.—*a.* The symptoms vary much with the severity of the attack, and with the extension of the inflammatory action to the uterine peritoneum on the one hand, and to the ovaria and ligaments on the other. It thus assumes mild or severe forms, the progress of which is modified by the rapidity of the extension just mentioned. The milder states of *hysteritis* usually commence from the fourth to the ninth day, and much resemble the ephemeral fever. The patient is chilly or shivers, is sick, and sometimes vomits. The pulse is frequent and soft; and with the establishment of reaction, pains, which were occasionally felt in the hypogastrium, and which were, perhaps, only considered to be after-pains, become more constant, but are not severe. They are usually felt behind the pubis; but they may extend a little to either side, or towards the groin. Pain is also sometimes felt in the back, especially if the patient attempts to sit up. It may not be complained of even in the hypogastrium, when she lies still; but it is usually felt when turning to either side, or when pressure is made above the pelvis. There is no fullness, hardness, or tenderness of the abdomen. The lochial discharge gradually diminishes; but it does not necessarily stop; and the milk sometimes continues plentiful. The skin is hot; there are more or less thirst, no appetite, sickness at stomach, and disturbed sleep. The pulse varies from 90 to 110; the head is confused rather than painful; the urine is high-coloured; the bowels confined, and wandering pains are felt in the belly and sides. The bowels afterward become loose or irregular, the stools being dark, offensive, or morbid. Strangury, frequent calls to pass the urine, pains in the hips, and hearings down on micturition are often complained of. In the course of a few days, sometimes not until ten, twelve, or fourteen days have elapsed, the pulse becomes slower, the appetite returns, the painful symptoms referred to the uterine region subside, occasionally a slight discharge takes place from the womb, and the disease entirely disappears. Sometimes, however, the patient continues to experience more or less disorder referable to the uterus, with or without slight alterations of the position of the organ, until the menstrual discharge is fully established, when it subsides.

177. *b.* The more severe form of *hysteritis* is often caused by difficult parturition, by rude management, or by other more intense causes. It usually commences between the second and fifth day, but it may appear at a later period. It is ushered in by chills or rigours, which are often present, although the skin is hot, and which are generally preceded by pain in the lower part of the abdomen. With the appearance of reaction and of the febrile symptoms,



the pain becomes more constant and severe, but is usually characterized by exacerbations. The uterine region is very painful on pressure just above the pubis, and in this situation there is generally some swelling, which, however, does not extend farther until the peritoneum is affected. The abdominal parietes is slack or soft, so as to admit of the state of the fundus of the uterus being ascertained. The uterus is larger, harder, and much more sensible than usual. The pain extends to the back, shoots to the groins and hips, is attended by a sense of weight, and by difficulty of passing the urine. Occasionally there is distressing strangury, or complete suppression of urine. The lochial discharge is early suppressed, and the secretion of milk diminished or arrested. The temperature of the vagina is increased, and the sexual and urinary organs feel generally hot, inflamed, painful, and tender, the situation of the pain at the commencement varying with the part in which the inflammation originates. With the development of the local malady the symptomatic phenomena become prominent and severe. The pulse is very frequent, somewhat hard, or sharp; the skin is hot; thirst is increased; the tongue is white or dry; the urine high-coloured and scanty, or turbid; the bowels are at first confined, but afterward lax or irregular; headache is present; the countenance expresses suffering, but it is not collapsed or constricted as in peritonitis; and nausea and vomiting are urgent. Sometimes the internal surface or part of the womb is chiefly or only affected; and in this case a puriform discharge follows the diminution or suppression of the lochia.

178. *c.* If the inflammation do not extend over the peritoneum, a *favourable issue* is more likely to take place than in any other form of puerperal fever. This *termination* often is preceded by a copious perspiration, by diarrhœa, or by uterine hemorrhage, which is the most complete crisis. The abatement of pain and of the febrile symptoms; diminished frequency of the pulse; the reappearance of the lochia and of the milk; a free and general perspiration; a more natural state and excretion of urine; cessation of nausea and vomiting, and a more natural state of the bowels, are the surest signs of a favourable result.

179. *d.* An *unfavourable termination* of this form of the disease is to be feared when the inflammation extends either to the peritoneum or to the uterine appendages, or when it goes on to suppuration, either of the substance or sinuses of the organ.—*a.* If it extend to the *peritoneum*, the local symptoms, especially the pain and tenderness in the hypogastrium, advance upward, and gradually invade all the abdomen, or sometimes only the lower regions; and swelling, tension, and tenderness of the belly, with all the symptoms of *peritonitis* (§ 172, 173), supervene and *complicate* the metritis.—*β.* If this latter go on to *suppuration*, the pulse becomes still more frequent, fuller, softer, and afterward weaker, or more compressible, and smaller. The tongue is red or dry; the pain does not materially abate, but it becomes throbbing; chills or shiverings are sometimes experienced; and in the absence, or consecutive of these, copious sweats break out at intervals. The face is paler, or is more sharp than be-

fore, and occasionally a circumscribed hectic flush appears in the cheeks. The urine now deposits a pink sediment. The nights are sleepless, and, if the patient slumbers towards morning, she awakens in a profuse sweat. This suppurative form of hysteritis may prove early fatal; the pulse increasing in frequency, the tongue being red and raw, and the strength sinking; or the hectic symptoms may continue for weeks, and at last be fatal. Occasionally matter is discharged from the vagina, or by the bladder or rectum—oftener by the rectum. When it passes by the vagina the patient may recover; but when it passes by the other channels recovery more rarely occurs. It may break into the peritoneal cavity and produce fatal peritonitis.—*γ.* When metritis becomes associated with inflammation of the *ovaria, ligaments, and tubes*, the symptoms about to be mentioned supervene at an earlier or later period (§ 182).

180. *c.* The *appearances on dissection* depend upon the direction the disease takes towards the fatal issue. If it has terminated by fatal peritonitis, the usual alterations produced by that malady are found, sometimes with more or less softening of the uterus, or with sero-puriform infiltrations or purulent collections in the walls or in the sinuses of the organ, occasionally also in the veins and absorbents in the vicinity. If the disease has not extended to the peritoneum, but has terminated by suppuration, these latter changes are the more remarkable; and no farther disease of this membrane may exist beyond some alterations of the portion covering the uterus and appendages, consisting chiefly of exudation of lymph, with little or no serous effusion, but often with puriform infiltrations or collections underneath the peritoneum, and softening of the tissue. Gangrene or sphacelation is rarely observed, unless the autopsy has been delayed longer than twenty-four hours.

181. (*c*) **PUERPERAL INFLAMMATION OF THE UTERINE APPENDAGES.**—It is comparatively rare to find, either during life or on examination after death, the ovaria, broad ligaments, and tubes inflamed independently of peritonitis, or of peritonitis associated with hysteritis, in the more *inflammatory form* of puerperal fever. In the more *synchoïd* and *malignant states* of this fever, the uterine appendages are very frequently the seat of lesions hereafter to be described; but they are, perhaps, never found in these latter states affected alone; the peritoneum or the uterus, or both, and often several other structures, being also more or less altered. It is only in the inflammatory or more sthenic form of puerperal fever that these appendages are affected alone, or chiefly, and then only in rare instances. Even when the disease appears to originate in these, which is not unusual, it soon extends to the peritoneum; and, if it preserve its sthenic character, it does not spread much farther than to the portion of the membrane adjoining; but if the asthenic condition exist, or if vital power become depressed, or the blood contaminated by the absorption of matters from the uterus or vagina, the disease soon spreads from the uterine appendages over the peritoneum, if it be not arrested in its progress by treatment.

182. *a.* The *symptoms* of inflammation of the uterine appendages, whether the affection ori-

ginates in or extends to these parts, are generally ushered in with rigours, and with pains, tenderness, and fullness in one or both sides of the hypogastrium, extending to the groins, the pains generally shooting down the thighs. As vascular reaction is established, the pulse becomes rapid, the skin hot, the urine scanty, high-coloured, &c.; and headache, thirst, diminished or suppressed lochia, suppression of the milk, and other symptomatic phenomena appear. An examination *per vaginam* evinces increased heat and tenderness at the upper part of the canal, and in some cases even a tumour may be felt laterally. When the disease extends to the peritoneum, pain, tension, fullness, and exquisite tenderness advance upward; and all the symptoms of *peritonitis* supervene, sometimes with others more strictly appertaining to *hysteritis* (§ 176), with which the inflammation of the uterine appendages may be associated, as either the primary or consecutive affection.

183. *b.* The terminations of the inflammation of the uterine appendages are, 1st. In *resolution*, which may take place, as in cases of metritis, without any permanent injury being sustained. 2d. In *adhesions*, by the medium of coagulable lymph to adjoining parts, which, by their situation or extent, may be injurious at some future period. 3d. In *obliteration of the Fallopian tubes*, and the consequent loss of function, or sterility, which ensues. 4th. In *suppuration*, the matter forming either in the ovary, or in the broad ligament, or in the veins. The purulent collections or deposits may exist in these situations in various forms, the patient dying of the attendant softening and disorganization of the adjoining parts and of the purulent absorption, but most frequently of the consequent or associated peritonitis, and more rarely of the complication with metritis. A large collection of matter in these parts may burst into the peritoneal cavity, or may open into the vagina, or into the rectum, or through the abdominal parietes, near *POUPART'S* ligament. The appearances on *dissection* are described in the article *OVARIA*, and in the sequel (§ 229).

184. *B. SYNOCHOID PUERPERAL FEVER.*—*Consecutive Puerperal Fever.*—This form of the malady is that most frequently observed both in private practice and in lying-in wards, unless the causes be intense or concentrated, and then the disease assumes a more malignant character. This form may be sporadic, or endemic, or even epidemic, especially in lying-in hospitals; and in these, as well as elsewhere, it assumes modified states of vascular action and local affection, according to the constitution and other circumstances of the patient, to the relative intensity of the exciting cause, and to the avenues through which this cause affects the frame. Hence it presents, in different cases, every modification, from the inflammatory to the malignant. The same causes, or combinations of causes, as infectious miasms, transmitted by the medium of the surrounding air, or contagious fluids or secretions conveyed by the hands of the accoucheur, aided by concurrent influences, may, in the same ward, or in other places, produce this form of the malady in one female, and the malignant form in another; the state of the female, the period that has elapsed from delivery, the predisposition resulting from uterine hemorrhage, &c., remarkably favouring

the intensity and character of the attack. Thus I have seen in the same lying-in ward, and even in contiguous beds, cases not only of this form, but also of the most malignant form of the malady, each presenting different prominent affections: one peritoneal disease chiefly, another very remarkable uterine affection, a third prominent alteration of the uterine appendages and peritoneum, and in a fourth inflammation of the veins or lymphatics of the uterus and its appendages, or of both these vessels. This occurrence, and the circumstances connected with it, indicate two things, namely, the spread of the disease owing to the operation of a cause infectious or contaminating in its nature; and the production of different local alterations, in different cases, in connexion with the infection and contamination of the constitution; of the nervous and vascular systems, and consecutively of all the living structures.

185. *a.* The symptoms of this form of puerperal fever vary with the circumstances already noticed, and with the mode of its accession. In many cases the *uterus* is the first to be attacked; in some the *uterine appendages* are the first to manifest pain, tenderness, &c.; in others the *peritoneum* appears to be primarily seized; and in a large proportion alterations exist chiefly in the *uterine veins*, with more or less lesion of other parts. The mode of accession of the disease is no less varied than the local lesions discovered after death; and neither it, nor the progress of the symptoms subsequently, can always be strictly attached to the several states of the malady so as to indicate them truly during life. The accession of pain is often sudden, and as often insidious, appearing as after-pains, or as an aggravation of these, or merely as the increased sensibility of the uterine organs usually consequent upon parturition. It is frequently attended by chills or rigours, or by a recurrence of these; or the chills may be so slight as to escape observation. In the more robust, and when the powers of life are not remarkably depressed by the exciting cause, the shiverings are often severe; and in these reaction is usually more fully developed, and the disease more nearly approaches the inflammatory or sthenic form. As the chills disappear, the pulse, which was already frequent and small, becomes more frequent and fuller; but still soft, open, and compressible. The skin is hot; thirst, nausea, and vomiting are complained of, sometimes with cough, vertigo, or pain across the forehead. Soon after, or almost instantaneously with these symptoms, pains in the abdomen are experienced, in various degrees of severity; and the patient lies on her back, with the knees drawn up.

186. *b.* If the local disease commence in the *uterus*, the pain and tenderness on pressure are first felt in the region of the uterus, and the abdomen, above this region, is soft and flaccid. The body of the uterus is enlarged; and the pain, frequently at first recurring in paroxysms, or presenting exacerbations, is often mistaken for after-pains, until pressure indicates great tenderness, and discloses the nature of the attack. With the aggravation of the fever, the countenance becomes suffused and the respiration hurried. With the extension of disease from the uterine peritoneum to the rest of the membrane, the pain and tenderness extend up



ward over the abdomen, which becomes swollen, tympanitic, acutely painful, and tender. Vomiting of dark-coloured or greenish fluids ensue, often attended by diarrhœa, the stools being dark, offensive, and watery. The pulse soon becomes remarkably rapid and feeble, sometimes irregular; the tongue brown or dry, the teeth covered by dark sordes; the countenance sunk and pallid; the breathing short, laboured, and intercostal, with a short, suppressed cough, singultus, and eructations of flatus, with which more or less dark fluid is thrown up, without retchings. Coldness of the extremities, remarkable smallness and frequency of pulse, and a cold and clammy surface, with a short, gasping respiration, usher in dissolution, the mental faculties being often but little disturbed.

187. *c. If the local alterations commence in the uterine appendages* the symptoms generally are but little different from those just stated. Pain, tenderness, and fulness are first felt in either or both sides of the hypogastrium, instead of behind or immediately above the pubis, as when the disease begins in the uterus. The primary affection, however, may be seated in the uterus, without being detected, and extend to the appendages, or both to the uterine peritoneum and to the appendages, and thence, more or less, over the peritoneal cavity. In the early period of these cases, the abdomen may remain for a short time flaccid, and tolerant of pressure; but it soon presents all the symptoms just mentioned, with the severe constitutional infection, which rapidly increases and aggravates the local changes by sinking the powers of life and contaminating the circulation. When the peritoneum becomes implicated to a great extent, the symptoms above described are always present; and, if the disease be not arrested at an early stage, the fatal issue advances as there stated—the lesions observed after death being most remarkable in the uterine appendages, as will be shown in the sequel.

188. *d. That the prominent alterations so frequently seen in the peritoneum* actually originate in it cannot be doubted, in respect of some cases of this form of the disease; for the seat of the early symptoms and the appearances on dissection are not sufficiently demonstrative of a primary affection of the uterus or of its appendages. Nevertheless, it may be admitted that a local poison or a contagious fluid may affect the internal surface of the uterus, and that the change which takes place primarily in this part may be extended along the tubes to their fimbriated extremities, and thence over the peritoneum, the symptoms of the early lesions not being fully developed, or escaping observation, until the peritoneum is extensively implicated. When this membrane is thus primarily attacked, the pain generally commences at the epigastrium or about the umbilicus, is sudden and acute, and is attended by extreme intolerance of pressure, tympanitic distention of the abdomen, a rapid pulse, and vomiting; these symptoms being generally ushered in with chills or rigours, which may either precede or accompany the pain and tenderness of the belly. In some cases the chills or rigours are either slight or of very short duration, and may thus escape notice; but they are seldom ab-

sent altogether in this state of the disease. The pulse is always quick from the commencement, and even before either pain or rigours are experienced. The lochia and milk, in this as well as in the other states of this form of puerperal fever, are either diminished or suppressed from the appearance of the rigors. The urine is always high-coloured and very scanty, or even suppressed; the bowels irregular, the stools at first lumpy, afterward relaxed, watery, dark, and offensive; and the tongue white or parched, subsequently dark or brown. The countenance is anxious and collapsed, the respiration short, quick, gasping, and thoracic; and, during the advanced progress of the malady, the acute pain and tenderness of the abdomen subside with the supervention of fluid effusion into the peritoneal cavity; and the tension subsequently also subsides, the abdomen often being very tumid, but soft and swaggy. All or most of the symptoms accompanying an unfavourable termination of the other states of the disease now supervene with a rapidity varying with the severity of the attack and with the degree of vital power attending it, or of vital resistance opposing the occurrence of dissolution.

189. *e. Inflammations of the veins of the uterus and its appendages, sometimes of the lymphatics, and, in rare instances, of both orders of vessels,* are frequently the primary and essential alterations in the form of puerperal fever now under consideration; but they are not the only changes, especially in fatal cases; for, in these especially, various consecutive lesions, of an extensive and disorganizing kind, are also found on dissection, or even become very manifest before death. *Uterine phlebitis* is most commonly observed in the puerperal state; but it may occur, independently of this state, in consequence of ulceration of the os or cervix uteri, or of ulceration consequent upon the presence or removal of polypus. It is caused in child-bed by the usual circumstances and influences which occasion other inflammatory diseases in persons weakened or exhausted by prolonged suffering or by losses of blood, these conditions, especially flooding and difficult or instrumental labours, the depressing emotions, and a varicose state of the veins, favouring the occurrence of phlebitis. The chief or essential cause is undoubtedly the circumstance of the vessels of the uterus being placed, by the separation of the placenta, in an analogous state to the wounded surface of a limb after amputation. The irritation occasioned by an adherent portion of placenta, or by the decomposition of it, or of coagula which have not been thrown off, owing to the imperfect contractions of the uterus after delivery, is often a cause of this state of the disease. Injury, also, sustained during delivery, and alterations or decomposition of portions of the retained lochia, may either inflame the sinuses or veins, or may contaminate the blood in them, the portion thus contaminated farther changing the circulating fluid, and even affecting the vessels through which it passes. The disease of these vessels may, however, be produced by the contact of an infectious fluid, or by the changes occasioned in the lochia by the foul air to which this discharge may be exposed, as shown above (§ 137, *et seq.*).

190. *a. Uterine phlebitis* generally commences

in the vessels which have become in some respects exposed by the removal of the placenta, as shown by the frequent limitation of it to the vessels of that part or side of the uterus to which the placenta was attached. It often extends to the veins and sinuses of the greater part of the uterus, and to the veins also of the ovaria and tubes, but chiefly to those of one side, that side being the seat of attachment of the placenta, or principally its seat. Uterine phlebitis is often a simple or uncomplicated disease of the uterine organs, but it seldom continues any time without giving rise to various consecutive lesions, both of adjoining and of remote parts. When it is associated with inflammation of the internal surface of the uterus the phlebitis may be consequent upon this latter lesion; but when the substance of the uterus or the uterine appendages are also inflamed, it is difficult to determine which is primarily diseased. When thus complicated, the veins in some cases are most affected, and the substance of the uterus in others. In many instances, however, uterine phlebitis is associated with peritonitis, without the substance of the uterus being materially changed, or merely with slight softening; while in some there are not only phlebitis and peritonitis, but also extensive softening of the uterus and of the ovaria and ligaments. It is possible that the alterations of the sinuses, veins, and substance of the uterus may be nearly coeval; for if we admit the influence of injury, or of retained putrescent matters upon that portion of the uterus to which the placenta was attached, and upon the exposed openings of its vessels, the effects may be produced upon both the vessels and substance of the organ. But it cannot be disproved that inflammation may commence in either and be limited to it, or extended to the other, as circumstances may favour the extension.

191. Inflammation of the uterine veins generally extends to the veins of the tubes and ovaria; but those of the uterus may be inflamed on both sides, and yet the disease may extend only to the veins of one tube or ovary. M. DANCE states that the veins of the right tube and ovary are more frequently altered than those of the left. However extensively the veins of the uterus and appendages may be inflamed, the disease may be limited to these organs; but as frequently it is extended to their trunks, even as far as the hypogastric vein, or nearly to the vena cava. It may be asked, however, what are the changes which may be viewed as consequences of uterine phlebitis? and, should the presence of pus, merely in the uterine veins, be viewed as indicative of inflammation of them? The existence only of pus in the veins of the uterus is not sufficient proof that the pus is a product of inflammation of these veins, for the pus may have been imbibed by the veins from the cavity or internal surface of the uterus, where it had been produced by inflammation of that surface; and therefore, unless its existence be associated with changes in the coats of these veins, it cannot be viewed as a satisfactory proof of uterine phlebitis.

192. *β. The symptoms* of this form of puerperal fever—of uterine phlebitis—cannot be stated with the desired precision. Indeed, the accomplishment of the attempt is nearly impossi-

ble; for the change is so frequently and so early associated in puerperal females with alterations of the substance of the uterus and appendages, and not only with these, but also with changes in the peritoneum and in remote parts, that it is most difficult to separate the phenomena which belong to the phlebitis from those which are attached to the other lesions. The symptoms, therefore, of this form of the disease should be viewed as not strictly those of uterine phlebitis, but of that state of puerperal fever in which this particular lesion constitutes a more or less important part of the organic changes found after death. That this lesion is an important one in puerperal fevers is shown by the fact that pus and other changes in the veins have been found by M. TONNELLE in ninety-three cases out of two hundred and twenty-two, and in twenty-four cases out of forty-five by Dr. R. LEE. But in most of those cases in which it has been seen it was associated with other changes, as just stated.

193. Uterine phlebitis usually commences in from twenty-four to forty-eight hours from delivery, with pain in the uterus accompanying, preceding, or following rigours. The uterine region is tender on pressure, and upon the cessation of the shiverings and chills the lochia and milk are generally found much diminished, and if not altogether suppressed, they soon are. The pulse is frequent from the first, and general uneasiness, with physical depression, nausea, or vomitings, and headache are experienced. As the rigours cease, the skin becomes hot, the pulse more accelerated, but soft, often full, broad, and open, and the vomiting more frequent, a greenish fluid being usually thrown up. With the headache some degree of incoherence may be remarked in some cases, or delirium and agitation in others, which often pass into extreme exhaustion or a state of drowsiness or partial insensibility. Tremours of the muscles of the face and extremities, dysuria, or scanty or entirely suppressed urine, an irregular state of the bowels, or diarrhoea and offensive stools; extreme thirst, parched mouth, dry and brown tongue; a sallow, lurid, and dirty hue, occasionally with miliary or petechial eruption, and more rarely a dirty yellowish appearance of the whole surface of the body, generally supervene as the disease advances.

194. The pain in the hypogastrium varies in severity, but it may not increase with the progress of the malady, but the tenderness in this region is generally aggravated, and the abdomen is commonly swollen or tympanitic. If the phlebitis be associated with peritonitis, extreme pain and tenderness of the abdomen, great tension and tympanitic distention of the abdomen are experienced with all the symptoms attending the peritoneal state of the malady (§ 172, 173).

195. If the uterine phlebitis proceeds without being associated with inflammation of the pelvic or abdominal peritoneum, little or no pain in the hypogastrium may be complained of; or merely a dull pain, with a sense of weight. But this region will generally be found tender, or painful on pressure. The uterus, too, may return to its reduced volume, or nearly so if its substance be not implicated; but, if its substance be diseased, it commonly remains above



the brim of the pelvis, and is large, hard, and very painful on pressure. In many instances these local symptoms may be so slight as to escape attention, the constitutional symptoms caused by the passage of morbid matters into the blood, especially prostration of strength, feeble and rapid pulse, vomitings, and diarrhoea, low wandering delirium, brown parched tongue, diminished, suppressed, or puriform or offensive lochia, &c., at last exciting alarm, and indicating the existence of a most dangerous malady. A large proportion of cases terminate fatally in this more acute stage, or within eight or ten days; but a larger number live longer, some *secondary affection* supervening.

196. *γ*. The *consecutive affections* generally appear in remote organs, especially the lungs, pleura, brain, liver, spleen, the joints or muscles, the cellular tissue, the eyes, and digestive canal. One or other of these organs and parts, in the course of a few days, experiences a rapidly-disorganizing form of congestion or asthenic inflammatory action; softening, puriform, or sanious infiltrations, purulent deposits, and even gangrenous softening or liquefaction of the tissues, and effusions into serous cavities quickly following the secondary local affection, which is undoubtedly occasioned by the passage of the sanious and purulent matters into the circulation, and by the action of the contaminated blood on the capillaries of predisposed or susceptible parts. Many of these secondary affections advance insidiously, and without being attended with much pain or local distress until they reach the last stage of disorganization; while others betray much earlier, and by more evident symptoms, the nature of the consecutive mischief. Their progress, generally to a fatal issue, is often rapid; but not infrequently it is much slower, the duration of the malady depending on the seat and extent of the consecutive disorganization.

197. In this form of puerperal fever the inflammation may be limited to the veins of the uterus, but more frequently the muscular tissue adjoining the veins participates in it, and becomes of a dark-red or brown colour, and remarkably soft consistence; the peritoneal covering of the uterus may also be implicated, and the changes hereafter described be found in the appendages and peritoneum. The veins which return the blood from the uterus and appendages may be either wholly or in part inflamed; commonly, however, the spermatic are chiefly affected, and generally the one on that side of the uterus to which the placenta was attached; and it may be confined to a small portion of the vessel, or extend throughout it. Injection, infiltration, or condensation of the cellular tissue in which the veins are imbedded; thickening induration and constriction of the coats of these vessels; and the exudation of lymph, mixed with pus and coagula of blood within their canals, are the changes chiefly observed in fatal cases of uterine phlebitis. The hypogastric veins are more rarely affected than the spermatic. Dr. R. LEE ascribes this to the latter vessels being invariably connected with the placenta; but as in respect of the spermatic, so it is observed as regards the hypogastric, that only one is affected. Marks of disease of the uterine veins may extend by the iliae or the spermatic veins to the vena cava itself. "This

occurrence seldom takes place to a great extent through the medium of the spermatic; the inflammation usually terminates abruptly at the opening of the spermatic into it on the right side, or of the renal on the left. If it pursue, as it sometimes does, the direction of the kidneys, the substance of these organs, as well as their veins, may be involved in the disease."

198. *C. MALIGNANT PUERPERAL FEVER.—PUTRO-ADYNAMIC PUERPERAL FEVER.*—This most fatal form of the malady—most fatal if not very early, very decidedly, and most appropriately treated—occurs chiefly in lying-in wards, and in circumstances described above (§ 36-40, 140). It was the almost only form of the distemper observed in Queen Charlotte's Lying-in Hospital in 1823 and 1824, and until the improvements were made in the house. It is the most certainly infectious and contagious form of puerperal fever, being often conveyed by the clothes of the accoucheur or nurse. When this disease is produced sporadically by the foul or contaminating air of a close or crowded lying-in ward, or of a low apartment, liable to gushes of foul air from privies, sewers, or cess-pools, it is not infrequently conveyed to other puerperal females, as already shown (§ 137, 138); and it produces a similar, or but slightly-modified state of disease to that which transmitted the infection. In all its essential characters—as respects its exciting causes, the general depression of vital power, the rapid contamination of the circulating fluids and loss of the vital cohesion of the soft solids, &c., this disease very closely resembles *Putro-adyamic fever* (described at § 472, *et seq.*, of art. FEVER). The chief differences between them arise from the peculiar circumstances of the female at the time of infection; and to these are entirely to be imputed the rapid progress of the puerperal disease, the greater malignancy, if not early arrested by judicious means, and the local complications which frequently either appear during the course of the malady or are detected on examination after death.

199. *a*. The symptoms of malignant or putro-adyamic puerperal fever vary in the mode of their *accession* with the period of the puerperal state at which the infection appears to be produced. In three sporadic cases, to which I was called in consultation, the disease commenced in the last week or fortnight of pregnancy; and in two instances it either followed or caused abortion, for I was unable to determine the sequence; but as I traced, as I conceived, the disease in two out of the three sporadic cases just mentioned to the frequenting of privies having no communication with drains, and containing the accumulated exuviae of many years, it is not improbable that the abortion was the result of a local infection. When, therefore, the infection, poison, or contamination, however, or by whatever channel it may be communicated, attacks a female before delivery, or immediately afterward, or not until several days have elapsed from delivery, the *accession* of the early symptoms may be expected to vary accordingly.

200. (*a*) In a case of a female attacked *before delivery*, to which I was called by Mr. BARNWELL, the symptoms were the same as those observed by me in other cases. This patient was seized early on the 12th of February with acute pain throughout the abdomen, with enormous disten-

tion and exquisite tenderness ; with very rapid, full, and soft pulse, varying from 130 to 136, and with frequent vomiting. I saw her in the afternoon of the same day. The vomiting and state of the pulse were as now stated. She complained of headache and of thirst, and was very despondent. Her tongue was broad, flabby, slimy, and tremulous ; her countenance pale, anxious, and covered by perspiration, and her general surface moist, warm, and clammy. Labour-pains came on that evening, but were soon inefficient, the action of the uterus having ceased. Mr. BARNWELL administered *secale cornutum*, which ultimately induced uterine action, and she was delivered after a labour of about twenty hours. On the following day (the 16th) the distention and tenderness of the abdomen were diminished ; and the sickness and vomitings, with borborygmi and flatulent eructations, continued. A pathetic depression of spirits, anxious expression of countenance, flabby and slimy state of tongue, a very rapid, fluent, and weak pulse, clammy state of skin, scanty and almost suppressed urine, quick and oppressed breathing, a feeling of pressure on the diaphragm, requiring the head and shoulders to be elevated, were soon followed by the symptoms ushering in dissolution.

201. (b) When the disease follows *almost immediately upon delivery*, or soon after this event, the earliest indication of the impending mischief is the great rapidity, softness, and weakness of the pulse, often attended by pain and tenderness at the epigastrium, by sickness and vomiting, followed by general distention of, and pains darting through the abdomen ; but in the majority of cases there are neither chills nor rigours ; in a few, a feeling of coldness only ; and in still fewer, slight rigours. In this state of the disease the patient soon becomes despondent, predicts her dissolution, is afterward apathetic, and makes little or no inquiry for her infant. The milk and lochia are either little or not at all diminished, or are more than usually abundant. The abdominal pain and distention are sudden or quick in their accession, but the pain often soon ceases, the distention remaining, and afterward changing its character, if the disease continues above two or three days. The tongue, from the commencement, is flabby, broad, and slimy, or covered by a mucous or creamy coating ; the pulse is usually from 120 to 140, or even upward, fluent, soft, or broad ; and the general surface presents a lurid, or dusky or dirty hue, and is covered by a clammy and offensive perspiration. The countenance is pale and inexpressive, unless when the pain is acute, when it becomes anxious and covered by perspiration. The mind is but little disturbed beyond a state of complete apathy. As the disease proceeds, respiration is short, suspirious, or difficult ; the pulse small and soft, or irregular ; the bowels frequently relaxed, and the stools offensive and passed without control. Distressing feelings of sinking, leipothymia, or restlessness supervene, and are soon followed by the symptoms of impending dissolution.

202. (c) When the disease does not appear until *two, three, or more days have elapsed from delivery*, the abdominal pain, distention, vomiting, vital depression, and rapidity of pulse are very often sudden in their accession, and unattended by either chills or rigours ; much more

rarely they are more gradual, and attended by chilliness or slight rigours. But physical and mental depression, absence of hope of recovery, of all affection or care for the infant, and of regard for any object whatever, and perfect indifference, characterize this form of the malady at whatever period of the puerperal state it makes its appearance. In one case, which occurred in the hospital in 1824, the attack took place above a fortnight after the patient was delivered, and while I was in the board-room. When I was visiting some other patients about an hour before her attack, she was sitting in a chair by the fire-place making no complaint ; and after this short period I found her complaining of agonizing pain over the whole abdomen, with enormous tympanitic distention, extreme tenderness, and a pulse so rapid as hardly to be counted. Vomiting with eructations of flatus, leipothymia, cold, clammy, offensive perspirations, quick, short, and laborious respiration ; failure of the pulse at the wrist ; cold, clammy extremities ; moist, flabby, and tremulous tongue ; singultus, eructations or belchings of the contents of the stomach, and loss of power of the sphincters successively supervened, and terminated in death within twenty hours from the accession of the seizure.\*

\* The following case, recorded at the time, will illustrate this form of the malady. I adduce it, not as being characterized by extreme malignancy, nor by any marked peculiarity, but as a specimen of the disease as it was then prevalent, and as the treatment which had been adopted was such as could not have influenced the rapid tendency of the disease to dissolution. Mrs. TURNER, married, aged about twenty, was delivered on the 2d of February, after a natural labour. She was seized on the 11th, without any chill or rigour, with severe pain in the epigastrium, distention and tenderness of the abdomen, rapid, soft, and weak pulse, sickness, and vomiting. The matters thrown off consisted chiefly of greenish fluids, and the pain extended to the hypogastrium and both groins. I was not called to her until the evening of the 13th, about fifty-four hours after the accession of the disease. She then presented the following symptoms : The pulse was so rapid and weak as hardly to be counted or felt at the wrist ; the hands and feet were cold and clammy ; the breathing remarkably quick, difficult, and labouring ; the countenance sunk, and of a pale, livid hue ; the conjunctiva pearly, and the pupil contracted ; the abdomen was tumid, but not tense nor very painful ; the milk was abundant, and the lochia scanty, but not much more so than usual at that period after delivery. The tongue was clean, broad, and slimy ; the skin was covered with a clammy, offensive perspiration, and the heat of the trunk was below the natural standard. The urine had been scanty, but passed without difficulty ; the bowels duly evacuated. The odour exhaled from the body was peculiar and very marked. Her mind was collected, but indifferent to everything. She died a few hours afterward—about sixty hours after the first feeling of disease.

Inspection twenty-four hours after death, present Drs. COPLAND and DENNISON, and Mr. CHOLMONDELEY. The thoracic viscera presented no farther disease than congestion of the posterior parts of the lungs, and loss of vital cohesion. The peritoneum was very slightly adherent in parts by means of a film of puriform lymph which covered the membrane throughout the whole surface. This film was thickest on the right side, and over the diaphragm, stomach, liver, and spleen. These viscera, as well as the kidneys, were healthy, excepting that they were more friable and softer than usual, especially the spleen. The omentum was remarkably softened, and was drawn together like a cord in the middle of the abdomen between the convolutions of the intestines. There was not much fluid effused, but it had a livid and whey-like appearance, especially between the convolutions of the bowels, and between the right ovary and cæcum. The peritoneum, when the film of puriform lymph was wiped off, was congested, with dark blood in points or streaks, and much softened, so that it could be torn in parts like to wetted paper. The uterus was of the usual size, for the period which had elapsed from delivery ; and its structure, when divided, appeared natural. The internal surface of the uterus seemed, also, sound in consistence and colour. The veins of the organ were quite healthy. The spermatic and hypogastric veins on both sides were natural, and contained little blood. The right ovary was of a



203. (*d*) Whatever may be the period or mode of its accession, this variety of the disease always pursues a rapid course; and, unless early arrested by energetic means, it almost always tends to general contamination of the fluids and structures, and to death. At its commencement the nervous system of organic life and the blood appear to be suddenly and seriously affected, as shown by the general loss of vascular tone and of sthenic action; by the disturbance of all the vital functions, and relaxation of contractile parts. The earliest symptom is often the remarkable rapidity of the *pulse*, which is also broad, open, soft, or fluent, or small, thready, or irregular, but always very quick and compressible. *Rigours* and chills are generally absent; or if they have been present, they are either slight or of short duration. In the most rapidly fatal cases, or such as occur in crowded or close lying-in wards, they rarely occur; and in these the disease may be *uncomplicated*, or present no prominent lesion or affection, the whole frame participating in the malady, through the medium of the organic nervous and vascular systems; or, if any prominent lesion appear, the peritoneum and other shut cavities most frequently experience it, and present the appearances hereafter to be noticed.

204. *a*. These more *simple states* of this form of the malady may run their fatal course in from twenty hours to two or three days, the earliest symptoms being remarkable frequency and softness of pulse; pain in the epigastrium or extending over the abdomen, with tympanitic or flatulent distention, and tenderness; frequent vomitings, and sometimes purging; a scanty or suppressed state of the urine; a lurid or dusky appearance of the surface, which is covered by a clammy perspiration, and exhales a peculiar and disagreeable odour; a pallid, apathetic, and sometimes slightly livid or sallow countenance, the eyes being sunk, or surrounded by a dark circle; a broad, flabby, tremulous tongue, which is covered by a slimy or cream-like mucus; little or no thirst; an abundant secretion of milk, and a copious discharge of the lochia, which often becomes offensive or otherwise changed, and great apathy and disregard of the infant and of all relatives. These symptoms may exist in the most marked degree; the respiration becoming short, spurious, and gasping, the vomitings being more frequent, and attended by belchings of flatus, or passing into a pumping up, or eructations of the contents of the stomach, and alternating with singultus or

with leipothymia, and the abdomen still continuing remarkably distended by flatus, until, after a period varying in duration, as just stated, dissolution takes place, preceded either by extreme restlessness, difficulty of breathing, and lividity of countenance, or by sudden or gradual sinking of all the vital functions, and a feeling of impending death. In these cases the mind may evince no farther disturbance than the state of indifference just mentioned, or a low wandering delirium at times, the patient answering correctly when roused, and expressing a conviction of dying, and indifference as to the issue.

205. *β*. When this most malignant form of the disease is *complicated*, or accompanied with any of the prominent lesions to which frequent allusion has been made, the symptoms are somewhat modified either early or in the course of the malady. The most frequent complication is that with effusion into and other lesions of the *peritoneum*. When this surface is prominently affected, the pain and tympanitic distention and tenderness of the abdomen are most severe, and is either general, or is felt most severely near the epigastrium, or in one or both sides of the hypogastrium, indicating in this latter case the origin of the mischief in the tubes or ligaments. In rare and most severe cases, especially if the malady has followed floodings, dissolution may take place before the peritoneum experiences farther change than is presented by other parts; but more generally, or if the case continues two or three days, the abdominal pain subsides more or less, and with it the tympanitic distention and tenderness partially diminish. The abdomen now furnishes indications of more or less effusion into the peritoneal cavity, which generally increases, and which, by its acridity, increases the loss of cohesion which this membrane evinces after death. In other respects the symptoms of this state of the disease pursue the same course as that just described (§ 204), varying only slightly with the severity of attack, and the extent of contamination or change of the circulating fluids and the degree of vital resistance opposed to these and other alterations.

206. *γ*. There can be no doubt of the *uterus* and its *appendages* undergoing, in some cases and on some occasions in which this form of the malady appears, more or less prominent changes; but it is very difficult to determine the period of the disease in which they occur, or the exact procession of the morbid phenomena. Although the peritoneum may present the chief lesions, as shown above in some cases, it is seldom that the uterus, and its appendages especially, are much disorganized without this membrane being also implicated very extensively or throughout. It is very probable that disease may have extended from the internal surface of the uterus and Fallopian tubes to the fimbriated extremities, and thence over the peritoneum, at least in some cases; and that the uterus may have been so early softened and otherwise affected as to implicate the peritoneum, the change thus induced in this membrane rapidly extending, owing to the infected and contaminated state of the frame. It may not unreasonably be assumed that the general infection produced by the exciting cause will render the lochia more acid or septic than in

brownish colour, and slightly enlarged. When divided, a little colourless fluid escaped from the interstices of its structure. The right Fallopian tube appeared slightly inflamed, especially at its fimbriated extremity. No purulent or other matter was found in the sinuses or veins of the uterus. The site of the placenta was somewhat darker than usual at the surfaces, and covered with a dark, semifluid lymph; but the vessels proceeding from the part were empty, and of natural appearance. The veins of the heart were much engorged with black blood. The left ventricle was empty and flaccid, the right was filled with black blood. The body was but little rigid, and the external surface slightly discoloured, of a yellowish livid hue. The whole intestinal canal was greatly distended by gas. This and other cases which I have examined have suggested the belief that in some instances at least the disease extends from the internal surface of the uterus along the Fallopian tubes to their fimbriated extremities, and thence to the peritoneum. I have frequently observed that the structural changes, both in the ovaria and peritoneum, have been greater in the same side as that in which the fimbriated extremities of the tubes were most altered.

more favourable circumstances, and that this state of the discharge, especially when retained in the sexual passages, may contaminate these parts, and give rise to the changes observed, in some cases not only in them, but also in the peritoneum and adjoining cellular tissue. I have usually observed that in these instances the milk has been undiminished, and the lochia more or less offensive, usually abundant, sometimes remarkably putrid or fetid. In this complication of the malignant state of the disease, pain, tenderness, and fulness have commenced either in the hypogastrium, or in one or both sides of this region, and extended to the sacrum and loins, shooting irregularly through the abdomen, which has also presented considerable flatulent distention, with borborygni. The pain has also often extended to the groins and tops of the thighs. In all other respects the symptoms are the same as are observed in the simple and peritoneal states of the malady; but their progress to a fatal issue, although not the less certain, when they are not judiciously interfered with, is generally less rapid, and is often accompanied, as in the former states of the malignant form, with frequent recurrences of faintness or sinking, with dysuria or suppression of urine.

207. *δ*. In the most malignant states of puerperal fever, the *veins* and *lymphatics* rarely present inflammatory changes. It is chiefly in the synchoid form, or when the disease displays a less degree of malignancy and pursues a less rapid course (§ 189, *et seq.*), that purulent matter and other changes are found in these vessels. It does not, however, follow that morbid matters are not imbibed by either the veins or lymphatics, or even by both, and carried into the circulation because they do not evince any lesion of their parietes; on the contrary, it is not improbable that sanious or putrid matters may be imbibed by the veins in this form of the malady, and contaminate the blood, without producing sthenically inflammatory lesions, or any very evident changes, in these vessels; the irritation produced by such matters on their internal surface giving rise, in the existing state of the frame, to an ichorous exudation, which is carried into the blood and mixes with it, and not to that form of lymph which coagulates and arrests the progress of the mischief, nor even to a puriform matter, such as often is met with in the synchoid or less malignant forms of the malady, not only in the veins, but also sometimes in the lymphatics.

208. The *lymphatics* of the uterus and its appendages, and their vicinity, present changes in a few cases which have been viewed as, and which probably are, inflammatory. These changes, however, consist chiefly of the presence of pus in the lymphatics, and of congestion of the glands in the vicinity, and are found chiefly connected with inflammatory changes, or with the presence of pus in the veins, or with purulent deposits, or with ulcerations in the pelvic viscera and parietes. The *symptoms* of changes in the lymphatics of the pelvis are hardly to be recognised during life, owing to their associations with the alterations of other parts just mentioned. I have observed these changes chiefly in cases which have commenced with asthenic inflammatory symptoms referable to the uterus and other pelvic viscera, and even also

to the pelvic parietes, which have been of several days' duration, from eight or nine to fourteen or more, and which have terminated in one or other of the consecutive lesions already noticed (§ 196). I have, however, remarked that these cases generally are attended by acute pain in one or both sides of the hypogastrium, extending to the groins, with tenderness, and sometimes with enlargement of the deeper-seated glands in the groins; but the former of these symptoms also accompany prominent affection of the ovaria and ligaments.\*

209. *D. Of certain Symptoms marking the Form and Terminations of the Disease.*—*Rigours* and *chills* have been stated by most writers as ushering in the disease. This is the case certainly in the more inflammatory states, whether of a sthenic or asthenic diathesis, but they seldom occur in the most malignant forms. When they do occur, then generally are the *milk* and *lochia* diminished or suppressed, if, indeed, the secretion of milk has commenced before the accession of the malady. But in some cases rigours are experienced without the suppression either of the secretion or of the discharge; but this is rather the exception than the rule. In the malignant states of the malady, even when effusion into the peritoneal cavity is very great, neither is the milk, nor is the lochia suppressed or even diminished, but, on the contrary, they are more than usually abundant, while the latter is often very offensive and contaminating. In the more strictly inflammatory, and in the synchoid or intermediate forms of puerperal fever, suppression or diminution of the milk and lochia generally obtains—suppression in the more inflammatory, and diminution in the synchoid. In the malignant states of the disease observed by me in 1823, 1824, and 1825, the lochia was rarely remarked; but in 1827 and 1828, after better ventilation was established, diminution and occasionally suppression of the lochia were observed; the disease having then assumed the synchoid or intermediate grade of impaired vital power. M. DUGÈS states (*Journ. Hebdom. de Méd.*, t. i., p. 348), that in eighty-nine cases observed by him at the Maternité, there were twenty-five instances of suppression or diminution of the lochia during the rigour, twenty-seven of suppression or diminution in the progress of the disease, and thirty-seven instances in which there was no diminution, but were sometimes an augmentation of the discharge.

\* Professor AUSTIN FLINT, of Buffalo, maintains (*New York Journal of Medicine*) the following two prominent propositions in relation to the epidemic puerperal fever which prevailed in that city in 1844: 1. That the disease is an essential fever, and not a merely modified form of peritonitis or metritis; and, 2. That it is a fever having a close analogy with that of erysipelas. In corroboration of the latter, the author narrates the following case: Two ladies were in constant attendance upon a friend who died of puerperal fever. In the course of three days they were both taken ill, one with severe erysipelas, the other with premonitory symptoms of the same disease, and which were fortunately dissipated by the action of an emetic. A labouring woman who was employed to wash the clothes of the same patient, having received a slight scratch on the hand while so doing, was attacked with erysipelous inflammation of the absorbents, and died after a short illness.

M. COLOMBAT D'ISÈRE speaks of puerperal fever under two forms, that of puerperal peritonitis and uterine phlebitis; and in the treatment of both forms, both he and his translator, Professor MEIGS, lay great stress upon the inflammatory origin, and consequently strongly recommend both general and local blood-letting.]



210. In some cases in which the lochia is diminished, an increase of it takes place after a judicious treatment. But a return of the lochia is not always followed by amendment; and when this result ensues, the return of the lochia is evidently the consequence of the amendment, and not the cause of it. In estimating the value of this indication, the time which has elapsed from delivery, and the state of this discharge from the period of delivery, should be considered. It may be stated, as a corollary, that the state of the lochia varies in different epidemics and forms of the malady, and in different individuals even in the same epidemic or endemic prevalence of it, according to its more or less inflammatory character, and to the kind of complication which marks its commencement or progress.

211. (*b*) The secretion of milk, if established before the attack of the most malignant states of the disease, is generally not influenced thereby; and if the accession of the malady precede the appearance of the milk, the accession of this secretion may occur in the course of the malady. I have seen the breasts full of milk at the period of dissolution, although they appeared more or less flaccid. In all respects, this secretion generally presents the same relations to the forms and states of the fever as have been just stated in respect of the lochia.

212. (*c*) A correct interpretation of the pulse is of the utmost importance in the estimation of the nature, forms, and states of this malady; and is not less so as regards the diagnosis and prognosis. A very frequent pulse—a pulse above 110 after parturition, should always be viewed with suspicion, if the acceleration cannot be accounted for, or referred to mental emotion or physical excitement, although no other symptom be complained of; and inquiries, as well as a more particular examination, should be directed to the secretions and excretions, to the condition of the uterus, and to the sensations excited by an examination of the abdomen and hypogastrium. If, in connexion with great acceleration, the pulse is open, expansive, and soft, the inquiries now suggested are the more necessary, especially if pain, fullness, tenderness, or distention in any part of the abdomen be also present. If the pulse rise above 120, the probability of the accession of puerperal fever is much greater, the type or character of the fever being indicated by the tone or resistance furnished by the vessel, and by the various existing symptoms. In the more malignant states of the malady the pulse becomes remarkably frequent, often so as hardly to be counted, and at the same time open, expansive, soft, or fluent, as if insufficiently filled with blood. There are also observed, in connexion with this pulse, a free and offensive perspiration, copious discharges from the bowels and from the stomach, while both the milk and lochia are abundant. These evacuations must necessarily soon leave the vascular system more or less deficient in its contents; and this deficiency must be the more serious, the greater the loss of blood during parturition, and the lower the patient is kept during the first days after delivery, as too frequently directed by accoucheurs, who are more capable of adopting a fashion or mode than of thinking rationally, uninfluenced by hypothesis, and

conformably with the dictates of sound common sense. If we duly consider the effect which the abundant evacuations observed in the course of the more malignant form of puerperal fever must have in reducing the quantity of blood circulating in the vessels, and view this reduction in connexion with the impaired tone or contractile power of the vascular system generally, the want of due relation between the quantity of the blood and the capacity of the vessels containing it must necessarily appear as no mean cause of the leipothymia, faintings, or sinkings so generally observed, and of the rapid progress of the disease to dissolution, especially when a lowering or depletory treatment is adopted.

213. (*d*) In the more malignant states of puerperal fever vomiting is almost a constant symptom. It is generally present from the commencement, and frequently consists at first of a greenish-yellow ropy fluid, afterward becoming greenish-brown, and lastly nearly black, watery, and turbid. A dark greenish fluid is often ejected from the beginning. At first the vomitings are attended by considerable retchings; but as the disease advances to a fatal issue, the matters are belched up with little or no effort. Vomiting sometimes occurs at the commencement of the disease, then subsides, and is followed by diarrhœa, and afterward recurs in its worst form, the diarrhœa frequently continuing also.

214. (*e*) The states of the bowels and of the evacuations vary considerably in the different forms of puerperal fever. The intestinal irritation, or gastro-enteric disorder, which has been viewed by some writers as a form of the disease, is merely a symptom which is often more or less prominent in all the varieties, but more especially in the most malignant and rapidly fatal, in which depression of vital power, alteration of the blood, and loss of vital cohesion of the tissues are the most manifest phenomena. In the more inflammatory, and in the intermediate or synchooid forms, the stools are at first bilious, feculent, or frothy, sometimes costive, or not relaxed, or irregular; but they are often relaxed and irregular, or offensive as the disease advances. In the more malignant states the evacuations are generally dark-green, greenish-brown; in a few cases almost approaching to black. They are commonly, also, fluid, very copious, occasionally slimy, and usually containing numerous small pieces of soft albuminous flakes mixed with them. They are always extremely offensive. Toward the fatal close of the more malignant cases they are often passed involuntarily.

215. *b. The state and appearances of the blood* vary most remarkably in the different varieties of puerperal fever. In the more inflammatory, particularly when the sthenic diathesis obtains, and the disease presents the characters of peritonitis or hysteritis, the blood does not differ materially from the states of this fluid usually seen in other inflammations of serous or fibrous structures. It is chiefly in the inflammatory form that an opportunity of examining the blood, while the patient is living, is afforded the physician. But I have been called to cases of the malignant form, produced by infection, in which venesection has been practiced, and opportunities have thus been furnished, fatally to the pa-

ulents, of observing the appearances of this fluid in that form during their lives.

216. (a) In the case of a patient who exhibited the first symptoms of *puerperal peritonitis* on the evening of the second day after delivery, the pulse being very quick, hard, and full, the respiration rapid, with heat of skin and thirst, Dr. SIMON found that the blood formed a tolerably firm clot, and was covered by a buffy coat of a line and a half thick, the chemical analysis furnishing very nearly similar results to those about to be adduced from ANDREAL and GAVARRET. These physicians made eight analyses of the blood in four cases, one of *peritoneal fever*, the others of *metro-peritoneal*. Two of the cases terminated fatally, and in these a large quantity of purulent matter was found in the abdominal cavity. The following are the results:

Venesections.		Water.	Solid residue.	Fibrin.	Blood-corpuscles.	Solid residue of serum.
1st case	1	787.2	212.8	5.5	122.8	84.5
2d case	1	822.9	177.1	5.4	88.3	83.4
	2	831.6	168.4	5.3	73.6	89.5
	3	851.0	149.0	3.6	60.5	84.9
3d case	1	786.4	213.6	7.2	117.0	89.4
4th case	1	789.4	210.6	3.8	120.0	86.8
	2	802.7	197.3	4.7	109.5	83.1
	3	813.5	186.2	6.1	100.3	80.1
Healthy blood		790.0	210.0	3.0	127.0	80.0

217. The second case, which proved fatal, revealed puriform effusion into the peritoneal cavity. The fourth case did not manifest symptoms of *metro-peritonitis* until the second bleeding was ordered, this disease having been fully developed on the occasion of the third bleeding, when the quantity of fibrin in the blood was greatest. In cases of *metro-peritonitis* quoted by Dr. DAY, from the analysis of SCHERER, HALLER, BECQUEREL, and RODIER, the blood presented a similar increase of fibrin, and a much greater diminution of blood-corpuscles.

218. (b) In cases of *metro-phlebitis puerperalis*, the clot of the blood drawn from a vein was, according to EBERT, large, and more or less concave. It was covered either with a thin, true buffy coat, or more frequently with a thick and often discoloured stratum of gelatinous substance, forming a false buffy coat. Gelatinous coagula of a similar nature were also frequently seen floating in the serum. The microscope often detects pus in the blood in the course of the disease. In two instances, in which the blood was analyzed by SIMON, in this form of puerperal fever, a nearly similar increase of fibrin and diminution of blood-corpuscles to the above were found. The quantity of albumen and of fat in the blood was much augmented, the former amounting to 103.35 and 112.77, the latter to 3.12 and 4.32.

219. (c) I am not acquainted with any analysis of the blood in the most malignant form of puerperal fever, unless that which Dr. DAY adduces from HELLER, who states that the blood was of a very dark brown colour. The clot was dark, of a loose consistence, and covered by a buffy coat, over which was a delicate membrane, which presented under the microscope a finely granular appearance, and fat vesicles.

The serum was turbid, but after standing for some time became clear; its reaction was alkaline; its specific gravity 1025. The fibrin was 5.16; the blood-corpuscles 77.52. According to BECQUEREL and RODIER, the cholesterine and phosphates are increased.

220. The appearances of the blood in puerperal fever will necessarily vary not only with the form and state of the disease, but also with the period or stage at which it has been taken away. During 1821, 1822, 1823, 1824, and 1825, and even in some following years, when the mischievous writings of ARMSTRONG, and other insufficiently experienced authors, had misled those who trusted to ephemeral and unworthy authority, blood-letting had been resorted to in all cases of this disease to which I was called, some of them having been actually moribund, or even dead before I reached them, in consequence partly of the practice; and on every occasion I was struck by the peculiar faint odour and very dark hue of the blood; by the very soft state of the clot when the blood did separate into crassamentum and serum; by the appearance, which occasionally presented itself, of a mass exactly resembling, in colour and consistence, a common jelly, the colouring matter covering the bottom of the vessel in the form of a precipitate; and by, in some instances, a slight separation only of serum, the large, loose, or gelatinous crassamentum consisting chiefly of this jelly-like matter, the lowest stratum of which contained the black or dark brown precipitate of colouring matter. These appearances of the blood were presented in several cases in the hospital in 1823, and three or four subsequent years, in which cases blood had been taken before I saw the patients. It may be here remarked, that I have seen many cases of this form of the disease in which leeches had been applied to the abdomen; but in nearly all, and especially in those which occurred in the hospital, the blood which flowed from the bites did not coagulate; and great difficulty, amounting almost to an impossibility, of arresting the bleeding from them, was generally observed, owing both to the state of this fluid and to the impaired vital cohesion of the tissues characterizing the advanced stage of the malignant form of this domestic pestilence.

221. V. APPEARANCES AFTER DEATH.—The lesions observed after death from puerperal fevers vary remarkably, according to the type, and form, and complication of the malady; the mode and nature of the infection; and the manner in which the infection appears to have invaded the frame. In the more *inflammatory type*, or in those cases which present much of a *sthenic diathesis*, in which vascular reaction are more developed, and the pulse less frequent and attended with more tone and resistance, the alterations of structure, whether limited to the *uterus* or *appendages*, or to the *peritoneum*, or to all these parts, approach more or less closely to those which are consequent upon primary and uncomplicated inflammations of these structures, and are not materially, if at all different from those described when treating of inflammations of the *uterus*, *ovaria*, and *peritoneum* (§ 80-98).

222. A. In the *asthenic* or more *malignant varieties* of this distemper, the alterations of structure present different characters from those ob-



served in the more sthenic states, or in those cases which are characterized by greater vascular reaction and vital resistance. In the *most malignant* of these (§ 198, *et seq.*), the changes consist chiefly of impaired cohesion of the tissues generally, often with more or less of a turbid serous effusion into the serous cavities, more especially into the peritoneal cavity. I examined several bodies after death from this state of the disease in the years between 1822 and 1830, and during that period, as well as subsequently many others, in which the fever manifested an intermediate grade of intensity between that state and the more sthenic or inflammatory, I made notes at the time of the appearances; and the description of them are derived from these sources.

223. *a.* It was but rarely that death took place previously to the effusion of fluid into the *peritoneal cavity*. Such an occurrence, however, was sometimes observed in the most malignant form of the malady, especially when the powers of life rapidly sunk, and the patient expired within thirty-six or forty-eight hours. In these cases the peritoneum was finely ingested or congested throughout, especially its venous capillaries; but the injection was not generally diffused; it was usually in the form of spots, patches, or streaks. Those parts of this membrane which were closely in contact, as if pressed upon, were less vascular. The congested patches were generally of a reddish-brown, or livid hue; and the peritoneum throughout of a dirtier and more unhealthy colour than usual. The membrane was soft, easily torn; and with this loss of cohesion it appeared somewhat thickened. These changes were not limited to a single or to several situations, but were general. In some cases, however, they were most remarkable in the peritoneal coat of the intestines, in others in the *omentum*, which was often contracted, or pushed upward, very much softened, of a reddish-brown colour, and sometimes so readily torn as to be incapable of sustaining much more than its own weight. This diminution of the usual cohesion of the peritoneum was occasionally attended by little or no effusion in the most rapidly fatal cases, or merely by a delicate film of exudation most remarkable in the open interstices between the convolutions of the intestines and viscera. This film of exudation may be unobserved until the finger is passed over the surface, when it will be collected in a sensible semifluid mass. In several of these cases the inspection was made while the body was still warm.

224. In these cases there was but little fluid effusion, not above two or three spoonfuls, and that was of a dirty, light-brown, or reddish-brown hue, or of a whey colour; more rarely it resembled a sanguineous ichor; but it always possessed an offensive odour. In some instances, at least, it may have been the result of *post-mortem* transudation. In cases in which life continued longer to resist the fatal tendency of the malady, or where attempts at reaction had partially taken place, with a nearly similar state of the peritoneum to that now described, there was a greater or less quantity of fluid effused. This fluid, in the more rapidly-fatal instances, and where depression of the powers of life, with flaccidity of the muscles generally, was most remarkable, had a dirty or muddy, or

sero-sanguineous appearance and fetid odour in some cases; and was more abundant in others, and was then either whey-like or of a dirty yellowish tinge. When death had not occurred until about the end of three or four days, the effused fluid was often very abundant, consisting of a curdled substance, of which the more consistent part nearly resembled recently curdled milk, the curd being soft, gelatinous, and friable, of a cream colour, or approaching it; and the serous portion closely resembling a pale whey. This effusion was generally most abundant in the pelvis, in the more depending situations and open spaces between the viscera, and convolutions of the bowels. It is obviously this state of the effusion which induced several French physicians to ascribe the malady to *metastasis* of the milk. In other cases the effusion was equally great, but it presented the appearance of an emulsion of a more or less deep yellow, yellowish-green, or grayish-yellow hue. In some instances it consisted of a dirty serum, with semifluid, albuminous, or puriform matter mixed with the serum. Occasionally the effused liquid was almost puriform, or sero-puriform.

225. *B.* In those cases in which the disease, owing either to the robust constitution of the patient, or to the less intense action or concentration of its exciting cause, has not rapidly sunk the frame into dissolution without some degree of sthenic vascular reaction, the peritoneum, in addition to a large effusion of a serous or whey-like fluid, containing flakes or masses of lymph, or of a puriform or albumino-puriform matter of various sizes floating in it, was very generally covered by a thick coating of lymph, or of a substance of a yellowish or greenish-yellow colour, of a soft consistence, in some places slightly agglutinating the opposing surfaces, in others occasioning no adhesion, however slight, and containing in the open spaces the fluid just described. These exudations were most abundant in the pelvic portion of the cavity and lower abdomen, and sometimes also in the vicinity of the liver, spleen, and diaphragm, and around the omentum, which seldom presented the same appearances in two cases. The odour of this effusion was peculiar and disagreeable, and it, as well as the fluid previously described, was often so acrid as to irritate the backs of the hands of the examiners of the body.

226. *a.* Even in cases of the greatest effusion, the *peritoneum* was often the most devoid of redness; the congested state of its capillaries, particularly of the venous capillaries, noticed in those cases which terminated most speedily and without effusion, was observed only in parts, streaks, dots, or spots, its surface being of a dirty grayish colour. This membrane itself was opaque, thickened, and somewhat softened, and readily torn, more especially in those parts reflected over the viscera of the pelvis and lower abdomen, but sometimes, also, in the iliac fossæ, even more remarkably in the omentum, and occasionally in the mesentery, and in that reflected over the abdominal parietes. In a few instances only were slight ecchymoses under the peritoneum remarked. In rare cases only has gangrene of the peritoneum been observed, and only in those portions reflected over the fundus of the

womb and the appendages, and over the iliac fossæ; and in still rarer instances has it existed in the peritoneal covering of the bowels. In some cases, probably, this change had taken place, or become more marked, after dissolution. The external or adhering surface of the peritoneum, or, rather, the *connecting cellular tissue*, in the most rapidly fatal cases, was sometimes slightly œdematous, or infiltrated by a serous or sanguineo-serous fluid, and this was most frequently seen in the omentum, when it was remarkably softened, and in the Fallopian tubes; but it was associated with no farther change in the uterus, appendages, or veins than slight softening of the former, from participation in the loss of vital cohesion so remarkable throughout the frame. In cases which had continued three or four days, and in which vascular reaction had partially appeared, slight infiltrations of a serous or a sero-sanguineous, or a sero-puriform, or even of a pus-like matter under this membrane were found, occasionally so minute as hardly to be detected, until it was squeezed out upon dividing the parts. When thus slight the peritoneum was opaque, and had a dirty, macerated appearance. These infiltrations were most remarkable under the reflections of the peritoneum over the pelvic viscera and iliac fossæ, and in the omentum and folds of the mesentery.

227. *b.* The *viscera* enveloped by the peritoneum were frequently sound, excepting their impaired vital cohesion, and old or pre-existent lesions, and the changes observed in the *sexual organs and their vessels*, which were the next in importance to those found in the peritoneum. These organs in the most malignant and most rapidly fatal cases, as in those which occurred in the hospital during 1823, 1824, and 1825, generally presented no farther change than remarkable relaxation, flabbiness, or softening, without any purulent matter having been found in the vessels or sinuses of the *uterus*, this organ being but little or not at all contracted, although several days had elapsed from delivery. The peritoneal covering presented the changes just described, in some cases in a great degree, and in those latter the uterine appendages participated very remarkably.

228. These were often the principal changes in the most malignant states, or when the disease at its commencement was not localized in any particular region of the pelvis or abdomen, as in those cases which occurred in the most unfavourable circumstances of deficient ventilation and contamination of the air. But in the less rapidly fatal or intermediate states of the malady, where the duration of the morbid action admitted of the development of various complications, or when the disease appeared to originate in the absorption of morbid matter from the uterus and vagina, or from contamination in these situations, not only were those organs more or less altered, but serious lesions were observed also in remote parts. The *uterus* was generally flabby and relaxed; its substance softened throughout, but most remarkably toward the inner surface, or infiltrated by an ichorous, sero-puriform, or purulent matter; its *sinuses* and *veins* containing also puriform matter, or a substance resembling that found in the uterus, a similar matter irregularly filling or distending the veins and *lymphatics*

not only of the viscus, but also of all its appendages. None of the cases which I examined during 1823 and 1824 presented these changes in the vessels; the first case in which I found the vessels of the uterus and its appendages inflamed or containing purulent matter, occurred in the spring of 1825, Mr. MULLINS having assisted me in the autopsy.

229. The inner surface of the womb was often covered with a gelatinous layer coloured by partially decomposed blood, or by a dark green, or greenish brown exudation of soft lymph, sometimes by a thick purulent coating of a greenish yellow or yellowish brown matter; these matters were generally offensive, or even had become putrid at the earliest period of inspection. The changes in the uterus were always most remarkable in the part where the placenta was attached, whether those seated in the substance of the organ or in the veins and sinuses. The *Fallopian tubes*, *broad ligaments*, and *ovaria* were swollen, injected with blood, infiltrated with an ichorous serum, or with pus; their vessels charged with similar matter, and their substance more or less softened, and readily broken down.

230. *c.* The *veins* and *sinuses* of the uterus are frequently changed, and the *lymphatics* sometimes also implicated, the changes occasionally extending to the whole sexual apparatus and along the spermatic and renal vessels to their trunks. The coats of the vessels, in a few cases, were thickened, the canals partially obliterated, or their parietes contracted in parts and dilated at intervals. The internal surface of the veins was sometimes covered with a false membrane, although it was pale when examined. The adjacent cellular tissue was often infiltrated, or contained purulent or sero-puriform deposits, especially in the iliac fossæ. These changes in the coats and contents of the vessels were in some instances limited to the uterus, in others extended to the appendages; and they occasionally did not exist in the uterus, but were found in the latter parts; and in a few cases they were observed only or chiefly in the spermatic or renal veins. Puriform or other morbid matters were, in a few instances, most abundant in the lymphatics, forming in them small pouches, and more rarely they were found in both the veins and lymphatics. The veins often contained not only ichorous or puriform matter or pus, or these more or less mixed with small, grayish, or light-brown coagula, or with blood variously altered, but generally fluid or grumous, without any marks of inflammation of their parietes.

231. *d.* The *heart* was usually flabby, softened, or friable. In the more malignant cases these changes were often remarkable; and the endocardium was often deeply stained, this change of colour generally extending to the arterial trunks. The cavities of the heart sometimes contained fluid dark blood. A small quantity of a dirty serum, or of a sero-sanguineous fluid, was occasionally effused in the pericardium, especially in the most rapidly fatal states of the malady.

232. *e.* The *diaphragm*, especially at its peritoneal aspect, partook of the changes observed in the peritoneum. Slight infiltrations of sero-puriform or sero-sanguinolent matter were seen in a few instances in the connecting cel-



lular tissue, but they rarely extended into the muscular structure. The *mediastinum* was sometimes infiltrated with a similar matter. The *pleura*, in some of the most malignant cases, presented nearly the same alterations as were found in the peritoneum, more especially the diaphragmatic and pulmonary *pleura*. This membrane was more easily torn than usual, or was softer, or appeared in places cedematous and discoloured, owing to infiltrations of a dirty serum or of a sero-sanguineous fluid in the connecting cellular tissue. The pleural cavities contained, in some cases, a turbid or whey-like serum—more rarely a scanty sero-sanguineous effusion. In some of the most rapidly fatal cases little or no effusion was found, while in some of the more prolonged malignant cases the effusion in, and the state of, the *pleura* were similar to those of the peritoneal cavity (§ 223, *et seq.*), excepting that the quantity of the fluid was much less. In those cases in which the changes were seated chiefly in the uterus and appendages, and in the more prolonged and sthenic form of the disease, the *pleura* presented either slight or no material alteration.

233. *f.* The *lungs* were generally more or less congested with dark fluid blood, especially at their posterior or more depending parts. Their substance was soft and friable in the most malignant states of the malady. In the more prolonged cases, and when uterine phlebitis existed, they sometimes contained small puriform deposits or infiltrations, or larger collections or abscesses, with grayish hepatization or other changes consequent upon congestive pneumonia.

234. *g.* The *digestive canal* presented few changes in its mucous surface. Sometimes, however, inflamed patches were observed; and more or less softening of the mucous membrane, especially of the *stomach*, was not infrequent. Occasionally the softening of this organ was attended by erosions and perforations; and more frequently a brownish, transparent, and gelatinous substance was found between the mucous and muscular coats. Softening and perforation of the *stomach* has been more frequently observed by DUGÈS and others than I have seen them. This physician thinks that the brownish viscid matter exuded from the perforated portion of the *stomach* acts upon the adjoining parts as a caustic, softening, dissolving, and perforating them. But these changes, as they respect the *stomach* and adjoining viscera, are, in my opinion, in a great measure *post mortem*, and are much more rarely observed when the inspection has been made a few hours only after death. The *intestinal parietes* seldom presented other changes than deficient physical cohesion, especially in the most rapidly fatal cases. In a few of longer duration, the glands of Peyer and Brunner were enlarged or otherwise changed; but I rarely observed ulceration of them, or in their vicinity. The whole digestive canal was remarkably distended with air, and contained much brownish or brownish-green fluid matter; that which was found in the *stomach* and *oesophagus* being similar to the matters thrown up shortly before death.

235. *h.* The *liver* was covered by the matter described above as being found in the perito-

neum; and a layer of soft lymph, or of a substance similar to that covering the fundus of the uterus, was often interposed between it and the diaphragm, or between it and the stomach, even, in some instances, where the abdominal portions of the peritoneum were comparatively but little altered. The substance of the organ was often softened, more friable than natural, in some cases congested; in others, pale, soft, as if it were parboiled, and deficient of blood. In rare instances it contained purulent deposits. The *gall-bladder* often contained much greenish bile, which was occasionally thick andropy. The *spleen* was softened, somewhat enlarged, and in the more malignant cases it was so friable and soft as hardly to admit of being handled, even when the examination was made while the body was still warm; and the blood contained in it resembled treacle.

236. *i.* The peritoneal coat of the *kidneys* generally participated in the changes existing in other portions of this membrane. The veins of the kidneys in some instances contained puriform matter mixed with grumous blood; and deposits of pus were found in the substance of the kidney generally on the same side as that in which the ovarium and ligaments were most altered or their veins inflamed. The *brain* and *membranes* were rarely diseased, even in cases attended by delirium. Slight softening was met with in a few instances of the more malignant form of the malady.

237. *k.* Effusions of sero-puriform, or purulent matter in the *joints*, especially the hip, elbow, and knee-joints, and more rarely into the shoulder, ankle, or wrist-joints, were met with in the states of the disease complicated with uterine phlebitis; and when the case was protracted beyond five or six days, infiltration of a sero-puriform or sero-sanguinolent fluid into the cellular and muscular tissues were sometimes observed. These fluids were hardly ever encysted; they always infiltrated, softened, and, as it were, decomposed the texture which they infiltrated, the parts around the softened places gradually passing to a healthy appearance. The muscular structure presented a pale-brown hue where it was thus softened and infiltrated; the skin was lurid or dusky, and the part swollen or boggy, occasionally to the extent of some inches. The soft solids passed rapidly to decomposition; the internal viscera, especially the abdominal, being the first to evince the change. In the more malignant form of the malady this change commenced before the animal warmth had altogether departed. Nearly all my examinations were made before twenty-four hours from dissolution had elapsed, most of them from eight to twelve hours after death. I believe that several of the changes which have been described by some writers have taken place after death, or at least have become more remarkable during the period between this event and inspection of the body, for decomposition follows death more rapidly in this disease than any other.

238. *ii.* *Results of Post-mortem Examinations made by some other Physicians.*—A. M. DUGÈS adduces the results of 341 deaths. In these *peritonitis* was observed 266 times. Of these 266 peritonitic cases the uterus was affected in three cases out of each four. But M. DUGÈS remarks, that if the cases in which pus was found

in the veins, and which he believes, with considerable probability, not to have been cases of uterine phlebitis, be abstracted, the ratio of *metritis* would be very remarkably lowered, and reduced to 29 in 266, or 1 in 9. He states that the *ovaria* are affected in the proportion of one to seven cases; and that in the 266 cases the *stomach* was perforated in 10; the *stomach* and *intestines* were inflamed in 4; there was single or double *pleurisy* in 40; *pericarditis* in 6; *arachnitis* in 1; *purulent deposits* in muscles in 8. It is not improbable, however, as stated above, that the perforation of the *stomach* in some of the cases, at least, was either a post-mortem change, or was increased after death.

239. B. The researches of M. TONNELLÉ are more precise.—(a) Of 222 dissections he found *peritonitis* in 193; alterations of the *uterus* and *appendages* in 197; lesions of both the *uterus* and *peritoneum* in 165; the *peritoneum* alone affected in 28; *uterus* alone in 29.—(b) The alterations of the *uterus* and *appendages* were, simple *metritis*, 79; superficial softening, 29; deep softening, 20; inflammation of the *ovaries*, 58; inflammation of the *ovaries* with abscess, 4=190.—(c) The alterations of the *vessels* were, pus in the veins in 90; pus in the lymphatics in 32; pus in the thoracic duct in 3; suppuration of the lumbar and inguinal glands in 9=134.—(d) The combinations of these lesions were, suppuration of *veins* and *uterus* in 32; suppuration of *veins* and putrescence of *uterus* in 11; suppuration of *veins* with *metritis* and softening in 5; suppuration of *veins* with *peritonitis* alone in 34; suppuration of *veins* alone in 8=90. Suppuration of *lymphatics* and *veins* in 20; suppuration of *lymphatics* and *uterus* in 13; suppuration of *lymphatics* and softening of *uterus*, 6; suppuration of *lymphatics* and simple *peritonitis*, 3; suppuration of *lymphatics* alone, 2=44. Inflammation of *ovaries* with *peritonitis* alone, 29; with various uterine lesions, 27; with *metritis* alone, 8; with softening of *uterus*, 7; with suppuration of *vessels*, 12; with all the preceding lesions, 6=89.—(e) The secondary affections were, in the *pleura*, *pleurisy*, 29; effusion of blood, 6; of serum, 8=43. In the *lungs*, pneumonia, 10; tubercles, 4; abscess, 8; gangrene, 3; pulmonary apoplexy, 2=27. In the *heart*, dilatation, 4; hypertrophy, 3; *pericarditis*, 1; hydro-pericarditis, 6=14. In the *digestive canal*, softening of the *stomach*, 8; perforation of *stomach*, 5; ulceration of *stomach*, 5; gastro-enteritis, 5; entero-colitis, 1=24. In other parts, abscess of the *liver*, 3; of *pancreas*, 2; abscess in muscles, 14; infiltration of blood in muscles, 3; abscess in *pubes*, 2; in the *elbow*, 2; in *knee*, 6; alteration in cellular tissue of *pelvis*, 6; sanguineous infiltration, 2=40.

240. C. Of forty-five dissections made by Dr. R. LEE, the *peritoneum* and its appendages were inflamed in 32; the uterine *veins* in 24; softening of the *uterus* in 10; pus in the *absorbents* in 4. The *peritoneum* was not altered in thirteen cases of the forty-five; and there was no phlebitis in seventeen. Dr. COLLINS found, in thirty-seven dissections, the *peritoneum* more or less affected in all; and in seven fluid was effused in the thoracic cavities similar to that found in the abdomen. The effusion into the peritoneal cavity was of a straw-colour in twelve, and sero-purulent, or of the consistence of thick cream,

in eighteen. It consisted of a sanguinolent serum in seven, and had a glutinous feel when rubbed between the finger and thumb. All these last cases were rapidly fatal, and no coagulated lymph was found in them. In the other cases lymph was deposited in large quantities, and generally, but more especially in the vicinity of the uterus. "The uterus in the great majority was quite natural in appearance; in some it was soft and flabby, and in a few unhealthy matter was found in the sinuses. The ovaries in many instances had suffered much from the effects of inflammation; being generally enlarged, and so softened as to be broken down by the least pressure." (P. 393.)\*

241. VI. PATHOLOGICAL INQUIRIES RESPECTING PUERPERAL FEVERS.—i. Is inflammation or alteration of the blood-vessels, or absorbents of the uterus, a necessary consequence of the passage or imbibition of morbid matters, or of other infecting agents from the sexual passages into the circulation?—Although uterine phlebitis exists chiefly in cases which originate in an extrinsic or intrinsic local infection—which are caused by an internal or external contaminating or infecting agent—and occurs less frequently or more equivocally when the malady is produced by the general infection of the frame received through the medium of the respiratory organs, I nevertheless believe that, in the latter class of cases, more especially if the patient has experienced flooding, or is vitally depressed, or continues under the influence of an impure or infected air, morbid matters or fluids may be imbibed by the uterine vessels, or absorbed from the sexual passages and carried into the circulation to such an extent as to contaminate the circulation and infect the whole frame without producing any inflammatory alterations of the vessels. I was so impressed by the symptoms and course of the disease, and by the examination of the bodies after death, in 1823 and the following years, as to infer at that time, and subsequent experience has confirmed my belief, that morbid matters, or altered or putrid fluids are imbibed, in the circumstances just mentioned, and passed into the circulation, producing the effects now specified without inflaming the vessels, or producing such a change in their internal surface or in their parietes as may be recognised by the unaided senses; and that the passage of these matters from the uterus into the circulation may take place so rapidly and so efficiently as to produce their effects in so malignant a manner, and in so short a time, as not to admit of the production of the usual alterations consequent upon irritation of the vessels along which these matters have passed. From this it may be inferred that the absence of change in the uterine vessels is not a conclusive proof, in rapidly fatal cases of puerperal fever, that morbid matters, or altered fluids, or other infecting agents have not been imbibed from the uterus and carried into the circulation. When the imbibition of such matters or agents takes place without causing, in the first instance, irritation, inflammation, and its consequences in the vessels, there is every reason to believe that the effect upon the frame

[\* It is unnecessary to quote American authorities relative to the pathological appearances found in puerperal fever, as they closely correspond with those described by our author.]



will be the more immediate and intense, owing to the absence of these changes, and to the free passage thus afforded to the morbid agents about to enter into the current of the circulation. Whereas there are equally cogent reasons for concluding that, when the morbid matter excites inflammation of the vessels which imbibe it, the passage of it into the circulation will be either altogether prevented, or retarded, or diminished by the inflammation thereby produced.

242. ii. *Are the uterine vessels actually inflamed in all, or even in the majority of instances, in which they contain pus, puriform, or other morbid matters?*—When the disease is not arrested by the prompt adoption of rational and decided means, or when such means have not been employed early, or not at all, then the altered fluids, an offensive or putrid lochia, or the secretion produced upon the internal surface of the uterus may be imbibed by the vessels, and either inflame them, or contaminate the blood without inflaming them, as inferred above (§ 241), or may both inflame the vessels and contaminate the blood. That the vessels are inflamed, and present the changes consequent upon inflammation, are among the most frequent changes observed in this disease; and that matters similar to those covering the internal surface of the uterus, or in its cavity, are also found in the veins, and that even puriform matter is seen in these vessels, sometimes without any marks of inflammation of the containing vessels, are undisputed facts, and serve to confirm the view, already stated, that these matters may pass into the circulation and change the blood without leaving any signs of phlebitis. It is not improbable that, when the passage of morbid matters from the cavity of the uterus into the veins takes place towards the close of life, or when it has been increased at this period of the malady, the change of the blood remaining in these vessels will then be more manifest; and the contents of the vessels will more closely resemble the morbid matters existing in the uterus, or will be more or less altered, owing to admixture of these matters with the blood; and that, while the matters found in the vessels will thus be much altered, the state of vital power and vascular action at this period of the malady will preclude the occurrence of inflammatory changes in the vessels by which these matters were imbibed. It may, therefore, be concluded, 1st. That the morbid matters found in the uterine vessels may be the products of inflammation of these vessels, and in this case inflammatory appearances or changes are also found in the coats of the vessels. 2d. That they may have been imbibed from the uterus, and their presence may have caused irritation and inflammatory alterations in the vessels; and, 3d. That they may be imbibed by the vessels, pass through them, or be retained in them, especially at an advanced period of the disease, or near the close of life, and yet fail of producing any marks of phlebitis, although contaminating the blood and all the frame.

243. iii. *Are the softening and other changes often found in the substance of the uterus and of its appendages the results of inflammatory action, and to what other pathological conditions may they be imputed?*—(a) Certain of these changes are the undoubted consequences of inflammation,

others are the results of a very different state of vital and vascular action. Even the most obviously inflammatory lesions are not referable to pure sthenic action, but rather to an asthenic or diffusive state, unattended by the exudation of a healthy lymph, and characterized by its tendency to spread, to soften, dissolve, or disorganize the parts which it affects; and to infiltrate them with a sero-puriform or sero-sanguinolent matter. The flabbiness of the parts, their swollen, softened, and infiltrated states, their friable and almost putrescent conditions in some instances, and the deposits of puriform matter, without any cyst or exudation of firm lymph in others, evince the asthenic character of the vascular action, of which these changes are the results. In some cases, especially when vital power is less depressed and the disease is more prolonged, the matter found in the substance of these organs is more consistent, in larger collections, and more nearly approaches that produced by sthenic action.

244. (b) The depression of vital power and contamination of the circulation caused by the exciting or infecting agents, when they operate energetically, occasion changes in the lochia, or so affect the fluids exuded from the internal surface of the uterus and sexual passages as not merely to irritate the parts with which they come or remain in contact, but also to contaminate them locally, so as to partially dissolve their vital cohesion, to soften and almost liquefy or putrify them, even before life has taken its departure. This local contamination thus supervenes upon the general infection produced by the poisonous agent, and in proportion to the intensity of its operation, relatively to the remaining power of vital resistance, will be the extent of change; of softening or disorganization that will result in the uterus, in the ovaria, and in the ligaments, the mischief extending, moreover, to the peritoneum, and spreading throughout its surface with a rapidity proportionate to the reduction of vital power and to the contamination of the circulating fluids. In many of these cases the softening and disorganization of the uterus and appendages, especially of the ovaria, are carried to the utmost extent. If, however, the examination of the body be delayed beyond eighteen hours after death, these changes may be viewed as partly *post mortem*.

245. iv. (a) *Is the peritonitis existing in the majority of cases of puerperal fever a primary morbid condition? (b) or is it consecutive of the infection and febrile action? (c) or is it the result of an extension of the morbid action from the uterus and appendages to this membrane?*—These are questions by no means easy to solve, for they admit of being answered both affirmatively and negatively, inasmuch as there is reason to believe that the procession of changes is different, or even opposite in different cases or forms of the malady, and according to the channels through which the causes invade the frame.—(a) Instances have occurred in which I have believed the disease to originate in inflammation of the peritoneum, of greater or less extent, the accompanying fever preventing varying grades of action between the sthenic diathesis on the one hand, and the asthenic on the other. The peritoneal affection may be primary, and yet appear as a complication, or as a

consecutive lesion, especially when it occurs very soon after labour, or is developed with the reaction following the shock produced by parturition. Indeed, both the fever and the peritoneal affection may be coæteaneously produced; the latter, commencing as reaction, follows the depression caused by delivery, or by the exciting causes of the malady. This latter mode is probably that which actually obtains most frequently, whether the disease is characterized by sthenic or inflammatory action, or by asthenic action, or marked deficiency of vital power. But, as reaction is adynamic and imperfect in the latter cases, the prominent affection of the peritoneum in these is modified accordingly, and presents alterations varying in extent and character, especially as regards the fluid effused, with the intensity or concentration of the cause, with the state of vascular action and vital power, with the constitutional peculiarities of the patient, and with the several circumstances of the case.

246. (b) That the peritoneal affection may, however, be consecutive of the constitutional infection and febrile action, at least in some instances, is shown by the fact that death has taken place, although in comparatively rare cases, before the peritoneum has presented a more remarkable change than other parts—before exudations of lymph or fluid in its cavity had supervened; such cases having occurred in the same ward, and in similar circumstances, with those in which the peritoneal symptoms and effusion into the cavity were most prominent; in some of these cases effusions of fluid have also taken place into the pleural cavities, and even into the pericardium.

247. (c) That the changes in the peritoneum are often an extension of those which had previously taken place in the substance or vessels of the uterus and its appendages cannot be disputed. The phenomena characterizing the progress of the malady; the occasional limitation of these changes to the peritoneum reflected over the pelvic viscera, the uterus and appendages, in some one or more of their constituent structures, being more or less altered; and the frequent extension of the peritoneal changes, as distinctly marked by the symptoms, from the pelvic peritoneum to the reflections of this membrane over the abdominal viscera and diaphragm, demonstrate that the abdominal alterations often commence and advance as now stated. In those cases which originate in a local infection, and even in those where the general infection is followed by a local contamination, it may be reasonably inferred that the morbid irritation and its consequences, thus produced in the internal surface of the uterus, extend along the sexual passages—along the Fallopian tubes to their fimbriated extremities, and thence to the peritoneum, over which it spreads with a rapidity great in proportion to the intensity of the infection, and to the prostration of vital power and resistance.

248. v. *In what manner are the consecutive changes in the joints, cellular and muscular tissues in the eyes and in the viscera, to be explained?*—These consist chiefly of the deposit of puriform matter, in smaller or larger collections, and of infiltrations of this matter in the softened, disorganized, or otherwise altered structure; and are only sometimes observed. That

they are to be referred to the imbibition or absorption of puriform, or ichorous, or putrid matters from the uterus into the circulation, or to the passage of a purulent or ichorous fluid into the blood from irritation or inflammation extending from the sinuses and capillary veins of the uterus and appendages, is generally admitted; either modes of contamination, or both, occurring according to the early states and peculiarities of the case. The morbid matter, having thus passed into the blood, excites and develops a diffusive form of inflammation, with puriform deposits, softening and disorganization of those parts which are most predisposed by previous disorders, by depressing influence, or by impaired vital resistance. These consecutive or secondary purulent collections and destruction of parts have been viewed by some as resulting from the mere deposit of the morbid matter circulating in the blood; while others more correctly consider it as the termination of an asthenic, gangrenous, or destructive form of inflammation produced by the presence of the imbibed contaminating matter in the circulation. This matter, by acting upon the interior surface of the capillaries, produces effects much more disorganizing and diffusive than those resulting from the usual states of inflammation consequent upon external irritation. Although these secondary lesions are most frequently seen after puerperal fevers, and uterine phlebitis occurring in the puerperal state, they supervene in various other circumstances; and as I shall show in the article *UTERUS*, sometimes upon ulceration of the *os uteri*, and of other parts. This subject is more fully discussed in the articles *ABSCESS* (§ 24, *et seq.*), *ABSORPTION* (§ 15, *et seq.*), *CELLULAR TISSUE* (§ 10, *et seq.*).

249. VII. *DIAGNOSIS.*—After what has been remarked respecting the forms and states of puerperal fever, and the descriptions of these forms and of the appearances after death, it is unnecessary to do more than briefly to notice this topic. The *diagnosis* of fevers in the puerperal state has, however, been very loosely stated by some writers, and most inaccurately by others; while by nearly all those who have written, with a dogmatism and self-sufficiency which would be ridiculous if they were not most mischievous, and actually destructive of life in the most interesting epoch of female existence, the inflammatory form has been assumed as the type of all the others. Most writers, even the most recent, have described and attempted the diagnosis of puerperal fevers with reference only to the local or prominent affections presented at their commencement or their course, and with entire neglect of the different states of vital power and resistance which characterize their several forms, more especially the synchoid and malignant. The vital depression, the poisonous contamination, the mental apathy, or, rather, the despondency conjoined with indifference, characterizing the worst cases from their commencement, and the origin of such cases in infectious causes—in foul air, poisonous effluvia, contagious emanations, &c., even of a domestic nature, and which I have fully described at another place (*see PESTILENCE, preservation from*, § 10, *et seq.*)—heightened, favoured, or predisposed to, by the exhaustion consequent upon parturition,



and the state of almost inanition, or of deprivation of requisite nourishment and even of accustomed stimuli in which puerperal females are often kept too strictly or for too long a period—are pathological conditions and etiological circumstances of the greatest importance not only as respects the diagnosis, but even more as regards the indications and the means of cure.

250. *A. The inflammatory form of the disease, occurring either as peritoneal, or metro-peritoneal, puerperal fever, are indicated by the mode of accession, by the seat of pain and tenderness, by the vascular reaction consequent upon shivering, by the state of the pulse, especially its hardness in the former and its fulness and firmness in the latter; by marked diminution or suppression of the milk and of the lochia; by thirst and dryness of the mouth and tongue; by the often costive state of the bowels at the commencement, and by irregularity afterward, the evacuations being offensive; and by scanty urine, the excretion of it being more or less disordered. Peritonitis, occurring in the puerperal state, presents most of the symptoms described when treating of inflammations of the PERITONEUM, the disease assuming more or less of a sthenic form on the one hand, or of an asthenic on the other, according as the disease is inflammatory, synchoid, or malignant, the symptoms and lesions found after death very closely approaching, or being identical with, those described under that head, the chief differences arising from the constitutional influence exerted by the puerperal state, by the constitutional infection, or by the exhaustion, or inanition, or other circumstances of the patient.—(a) Peritoneal puerperal fever cannot be confounded with *gastro-enteric irritation* (§ 103, *et seq.*), if the abdomen be carefully examined; for in this latter the abdomen is not tympanitic, nor tense, nor very tender on pressure; nor does it usually appear so soon after delivery, nor cause so marked constitutional disturbance as the peritoneal or metro-peritoneal disease.—(b) *Ephemeral fever* cannot be mistaken for any state of inflammatory or synchoid puerperal fever, inasmuch as the former is unattended by the severe abdominal pain, tympanitic distention and tenderness characterizing the latter; and is, moreover, a much less severe disease, of much shorter duration, soon terminating in a copious perspiration, the lochia being uninterrupted, and the breasts continuing distended.*

251. *B. Puerperal fever, commencing either as hysteritis or as ovaritis, or affecting chiefly the ligaments, and either limited to these, or extending thence, to a greater or less extent, over the peritonum, whether it assumes an inflammatory or sthenic type, or a synchoid or asthenic, will generally be recognised by the severity of the constitutional symptoms; by the persistence of the local signs, especially the pain, tenderness, fulness, and tension in the hypogastric and iliac regions, shooting through the abdomen to the loins and tops of the thighs; by the rapidity of the pulse, prostration of strength; by the dysuria and irregularity of the bowels; and by the diminution, irregularity, and offensive state of the lochia. If the peritonum continue unaffected, the abdomen will be neither tympanitic, nor tense, nor ten-*

*der; excepting towards the pelvic regions, where the pain, tenderness, and fulness will be considerable, and the uterus will generally be felt hard and enlarged. The persistence and duration of these symptoms, the grave character of the attendant fever, the disordered states of the secretions and discharges, will distinguish these states of puerperal fever from after-pains, from ephemeral fever, and from gastro-intestinal irritation.*

252. *C. The malignant form of puerperal fever often arises from similar infectious and contaminating sources to those which produce putro-adyamic fever; and it may be considered in every respect a putro-adyamic fever in the puerperal state, presenting all the characters of this fever in an aggravated form. It is distinguished chiefly by the absence of chills or rigours at its accession, by a remarkably rapid, soft, broad, open, and compressible pulse, which soon becomes small, weak, fluent, and irregular; by a broad, flabby, or tremulous tongue, covered by a slimy or cream-like mucus; by the little, or almost entire absence of thirst; by the character of the discharges from the stomach and bowels, as above described (§ 214); by the persistence of the milk and lochia, or the greater abundance and more putrid state of the latter; by the dusky, lurid, or sallow appearance of the general surface and countenance; by the free, clammy, and peculiarly offensive perspiration; by the frequent recurrence of faintness or of a sense of sinking, with moral apathy and vital depression; by the manifest contamination of the circulating fluids and impaired vital cohesion of the tissues; by the quick and peculiar state of perspiration; by the extremely tympanitic distention of the abdomen, and the almost constantly rapid progress of the malady to dissolution, if not early arrested by judicious means; singultus, eructations of flatus, and dark fluids from the stomach, a dirty livid hue of the face and general surface, and loss of the power of and control over the sphincters, ushering in death. After death, the rapid accession of putridity, especially of internal organs, the pelvic particularly, and the little or no diminution of bulk—the almost entire absence of emaciation, notwithstanding the free discharges from the stomach, bowels, and skin during the disease, remarkably attract attention.*

253. The malignant form of puerperal fever has been considered by many, especially when the peritonum is prominently affected, as an *erysipelas* of internal surfaces and organs in the puerperal state; and by others as *typhus* or *typhoid fever*, modified by this state.—(a) The evidence adduced above (§ 151, *et seq.*), and the facts which have fallen under my own observation as early as 1826 and 1827, have convinced me of a connexion between *erysipelatos* and *puerperal fevers*, arising chiefly out of a similarity, if not identity, of their respective predisposing and exciting causes, and of the constitutional—nervous and vascular—conditions existing in their progress, and characterizing their terminations; the connexion being remarkable chiefly as respects the synchoid or intermediate states of puerperal fever, more especially that with prominent affection of the peritonum. It cannot be said that both maladies are identical, for their respective seats are altogether

er different. The connexion or similarity I now point out certainly obtains in a remarkable manner, and is of great importance as respects both the origin and treatment of puerperal fevers. A similar connexion may, however, be traced between several other malignant maladies, arising out of their exciting causes, and their prominent pathological conditions, tendencies, and terminations. A septic or contaminating animal poison, varying in kind, administration, application, and avenue of invasion, is the exciting cause of them all; and, while this cause depresses organic nervous power, contaminates the circulating fluids, loosens the vital cohesion of the tissues, weakens constitutional or vital resistance, and disposes the whole frame to dissolution, it thereby generates miasms, exhalations, and secretions, equally poisonous with itself, and produces effects altogether similar to, if not identical with, those which itself had produced. In this category of effects may be arranged the severer forms of erysipelas, diffusive inflammations of the cellular tissue, poisoned wounds in dissection—the necroscopic poison—puerperal fevers, especially the synchoid and malignant, putro-adyamic fever, and other fevers of a malignant form, which are generally produced by animal emanations or poisons.

254. (b) The opinion as to puerperal fevers being prevailing *typhoid* or *other fevers*, occurring in the puerperal state, may be thus disposed of: 1st. The most malignant form of puerperal fever does not produce typhus or typhoid fevers in other persons, however susceptible they may be, by age and otherwise, of the infection of these fevers, as shown on several occasions both in lying-in institutions and in private practice. 2d. When other fevers, both typhous and exanthematous, occur in the puerperal state, whether the invasion of such fevers have taken place immediately before or very soon after parturition, these diseases retain their distinctive characters, although they are generally much more severe in the puerperal state, as I have observed on various occasions. As respects the exanthemata, the diagnosis requires no remark; but in respect of typhus fever appearing after delivery, a few observations may be here offered.

255. (c) *Typhus* or *typhoid* fever may appear after delivery, from infection either shortly before or soon after this event. And it is not improbable that an adynamic or typhoid fever may occur in the puerperal state, owing to great anxiety of mind, or other moral emotions, or to exposure to various morbid exhalations. When, however, typhoid or adynamic fever occurs during child-bed, it generally assumes a more than usually severe and almost malignant form. The patient complains, after chills or rigours, of severe pain of the head, back, and lower extremities; rapid pulse; dry, hot, and acrid skin; wandering or low delirium, occurring first at night, and becoming permanent, the ideas running upon one subject; deafness, and suffusion of the conjunctivæ; grinding of the teeth, thirst, and dryness of the mouth, the tongue being loaded, brown, or furred, dark, and dry. The position of the patient is on the back, with the knees but little or not at all drawn up. During the delirium the patient gives short and irrational answers when roused. The coun-

tenance is sunk, livid, or sallow; the features are afterward sharpened; and the delirium passes into coma, with subsultus tendinum. The pulse varies from 100 to 120 or 130, and is generally soft and quick; respiration is quick, and accompanied with frequent sighing; the abdomen is not remarkably, or but slightly, tumid or tender; the bowels at first are slow or costive, subsequently irregular or relaxed, the stools being offensive; the urine is scanty and turbid, sometimes suppressed; and the milk and lochia are early diminished, and soon afterward entirely suppressed. At last the patient sinks down in bed; the tongue is dry and dark; the evacuations are involuntary, and without consciousness; and eschars form on the parts most pressed upon. The duration of the fever is generally longer than that of any of the forms of puerperal fever, and is seldom shorter than fourteen days, and is sometimes above twenty-one days. The history of typhoid fever in the puerperal state shows several points of difference from puerperal fevers; indeed, the phenomena just described are distinctions between these fevers, most of them not existing in the latter; and, in addition to these, petechiæ are observed in typhoid, and the measly eruption in true typhus, these never appearing in any of the forms of puerperal fever.

256. VIII. PROGNOSIS.—An opinion of the result of a case of puerperal fever should depend chiefly on the form and state of the disease, in respect both of the character of the constitutional disturbance and the prominent local affection, and on the period of its progress, and the effect produced by treatment.—a. In the *inflammatory form* of the malady, a *favourable issue* may be anticipated from a gradual abatement of the acute symptoms; from a return, or an increase, or a more natural state of the secretions and excretions; from a diminution of the pain, distention, tenderness, and tension of the abdomen; and from a less frequent and more natural state of the pulse. An *unfavourable result* is indicated by the appearance of delirium; of increased distention of the abdomen, which becomes round and very prominent; by an aphthous eruption in the throat; by increased frequency and irregularity of the pulse; by a sudden cessation of pain; or by evidence, by percussion, of copious effusion into the peritoneal cavity; by sinking and sharpening of the features; by continued eructations of flatus with dark fluid matters from the stomach, and singultus; by rapid or gasping respiration; by cold, clammy perspiration, or a similar state of the extremities; by involuntary evacuations and restlessness; these latter phenomena indicating speedy dissolution.

257. b. The *synchoid* or *intermediate grades* of puerperal fever furnish nearly similar phenomena to the above, by which their terminations may be anticipated; for, although the sthenic diathesis obtains at the commencement, or during the early progress of the inflammatory form, still it more and more nearly approaches the synchoid or asthenic, as respects both the constitutional disturbance and the local changes, as the disease continues, especially as it proceeds towards an unfavourable issue, so that an advanced stage of the inflammation differs but little from the same period of the synchoid form, as respects the indica-



tions of the ultimate result. In this latter form of the malady treatment is seldom availing, unless it be early and decidedly prescribed; and unless symptoms of amendment, or, at least, of alleviation, soon follow the remedies employed. If the secretions and discharges have been suppressed, the return of these; an improvement in the states of the pulse and of the abdomen, as ascertained by a careful examination; and the capability of turning or of lying for a time on either side, are the chief indications of a *favourable issue*; and these may not continue long, an exacerbation of all the symptoms sometimes occurring, and soon carrying off the patient; or an alleviation of the more painful symptoms may take place, the pulse still continuing rapid, and after a very few days be followed by secondary affections, as described when treating of the metro-phlebitic state of the malady, which ultimately destroy the patient.

258. An *unfavourable issue* is indicated by the symptoms already mentioned (§ 256), and especially by the character of the vomitings and of the matters thrown up; by singultus and the state of the respiration; by faintness or leipthymia; by failure or irregularity of the pulse; by the amount of effusion in the abdomen, as indicated on percussion, and by the toleration of percussion in connexion with effusion; by the suppression of urine; by the indifference of the patient to her child, and to all other objects; and by an early entertained idea or anticipation of an unfavourable result by the patient herself. Sinking of the animal heat and of the features, and a lurid hue or lividity of the face, extremities, or surface generally, indicate approaching dissolution.

259. *c.* The *malignant form* of the malady often manifests the result from the accession of the attack, especially in the suddenness and severity of the appearance of the abdominal symptoms. This form of the disease is seldom recovered from, if it continue but a few hours, without the administration of appropriate and energetic means; and, unless these soon procure an alleviation of the symptoms, especially of the vomitings, and of the pain and distention of the abdomen, and an improvement in the pulse, particularly in diminishing its frequency and in improving its tone, hopes of recovery should not be entertained. The symptoms just enumerated usually precede a fatal issue; and that issue may be expected if the lurid, dark, or nearly livid hue of the countenance and surface; the clammy and peculiarly offensive state of the perspiration; the putrid odour of the lochia; the moral apathy, and mental and physical depression appear soon after the attack; inasmuch as these symptoms indicate a contamination of the circulating fluids, and a depression of organic nervous energy which is rarely removed. A soft or flabby state of the tissues in conjunction with the gastric symptoms described above; a pulse too fast to be accurately counted; loss of power over the sphincters; absence of abdominal pain, the abdomen continuing tumid, with a swagging or tremulous motion when struck or examined, loss of pulse and coldness of the extremities are rapidly followed by death.\*

260. IX. PATHOLOGICAL INFERENCES. — (a) *Puerperal fevers* are varied in the character or type of the constitutional disturbance, and in the seat or seats of the prominent local changes. — (b) They present the most inflammatory and the most malignant forms—the most sthenic, or the most asthenic or ataxic, with all intermediate grades, according to the nature of the exciting causes, and the mode of operation or avenue of invasion of these causes—as the local affection is primary or consecutive, and as the constitutional disturbance, with its secondary changes, are the effects of infection by an animal miasm or poison. — (c) Owing to these varied constitutional conditions; to these different grades of vital power and resistance, and

one was attacked before delivery; one in six hours after delivery; one in nine hours; one in ten; three in twelve; one in thirteen; one in fifteen; two in seventeen; one in eighteen; one in twenty; one in twenty-one hours; and two in thirty hours. Thirty-two were attacked on the first day; twenty-nine on the second day; eight on the third; two on the fourth; and one on the eighth day. The attacks were earlier than those observed by me in Queen Charlotte's Lying-in Hospital in 1823, and the seven following years. During that period the majority of the cases were of the most malignant type, and the largest proportion of the attacks were on the second, third, and fourth days. In one most rapidly fatal case the attack was on the fifteenth day from delivery. The statement of Dr. COLLINS, that in only thirty-three cases out of eighty-eight was the accession of the malady attended by shivering, very nearly agrees with my own experience, which also is in accordance with the following: In fifty-six deaths this termination took place at these periods from the attack, viz.: Two in twenty-four hours; one in twenty-seven; one in thirty-six hours; nine on the second day; fifteen on the third day; thirteen on the fourth; four on the fifth; four on the sixth; three on the seventh; two on the eighth; and one on the eleventh day. "Forty-four of the eighty-eight cases occurred in women who had given birth to first children; sixteen with second children; nine with third; six with fourth; seven with fifth; two with seventh; and four with eighth children. Thirty of the forty-four women delivered of first children died. Fifty-four of the eighty-eight gave birth to male children." Dr. COLLINS adds, that "when he was assistant physician in 1823, puerperal fever raged to an alarming extent. The master (physician) of the hospital was a strong advocate for the free removal of blood generally at the commencement of the attack. With his approbation it was resorted to with great frequency, and in the promptest manner. The effect on the patient and the mortality was such as to satisfy him fully of the inexpediency of adopting this line of treatment." It may be remarked in palliation of such adoption, that just before this outbreak of the fever several works had appeared filled with the results of an experience of a few months' duration of this malady, most of them written before the authors were of legal—certainly not of medical age, although distinguished by the title of doctor; which results were dogmatically, and, to my own knowledge of one of these productions, falsely adduced in favour of blood-letting. In the case of this malady, as in that of a somewhat similar pestilence, blood-letting was once extolled as the "sheet anchor" of treatment, especially by the navy wielders of the lancet, who, like DOVER of old, rendered this minute instrument of mighty mischief one of the greatest importance with those who credulously received assertions as facts, and believed all assertions according to the confidence with which they were made. Early in the present century a work appeared on the diseases of intertropical countries, in which blood-letting was the first "sheet anchor," and calomel was the second. In it all preceding writers were ridiculed, and told they knew nothing of what they had written upon, and these remedies were considered so good that patients could hardly have too much of them. This work was the guide of all the inexperienced in tropical diseases, and the results may be inferred from the statement made to me by an inspector of hospitals when I was travelling within the tropics, in answer to my request to know his opinion of the treatment of the fevers of the country, that, for the first nine cases of fever he treated he prescribed blood-letting, relying on the confidently-expressed results of the experience of the author of the work alluded to, and they all died; that he next tried large doses of calomel, but was not more successful; and that he lastly had recourse to cinchona (quina was not then discovered), but he could not get it to remain on the stomach. I suggested to him that he would succeed better if he conjoined the bark with capsicum. He some time afterward was himself a victim to this fever.

\* Dr. COLLINS, formerly the resident physician of the Dublin Lying-in Hospital, states that of eighty-eight cases

diverse complications, the arrangement of the forms of these fevers must necessarily be arbitrary and conventional, inasmuch as each form is not defined by any precise limit or line of demarcation, but passes insensibly into that nearest it in grade or character.—(d) The contaminating or poisonous influences of the causes upon the circulating fluids, and their depressing effects upon organic, nervous, and vital power, affect the states of all the secretions and excretions, and ultimately impair the vital cohesion of the tissues and the tone of the vascular system and of the capillary vessels, thereby occasioning effusions into serous cavities, and increased discharges from exhaling and secreting surfaces, and all the phenomena characterizing the progress of the more malignant forms of this malady.—(e) The most important parts of the pathological conditions of puerperal fever are the states of vital power and of vascular tone characterizing the disease, inasmuch as these states, more than the seat and amount of local lesion, mark the kind and tendency of the malady, and either resist or remarkably favour the extension of the local changes.—(f) According to the mode of operation of the exciting causes, or to the avenue by which these causes invade the frame, either the constitutional infection or the local affection may be primary; but, whichever may be secondary, an aggravation of the primary disorder will be produced by it, the one reacting upon and increasing the other until disorganization and death result, if the procession of morbid actions be not arrested by agents capable of changing the states of vital power and vascular action, and of enabling them to resist farther alterations, as well as to restore those which have already taken place.—(g) A due recognition and estimation of the states of vital power and of vascular action are the basis on which a rational treatment of puerperal fevers should be placed, inasmuch as it is by means of agents affecting these especially that we are enabled to arrest the progress of the malady, and to resist the extension, and even to remove the effects of the local disease.

261. X. TREATMENT.—It is obvious that, in order to be successful, the treatment of puerperal fevers should be appropriately assigned to each of its forms; and that, as these forms are characterized not only by different, or even opposite states of vital power and of vascular action—by very different pathological conditions—so the treatment should be assigned accordingly. Has there appeared in the numerous works on puerperal fevers, or in the still more numerous productions on the diseases of females, either a due estimation of the different forms of these fevers, or a satisfactory exposition of the treatment suited to each form, supposing that the forms and states of these fevers are there duly set forth? Let the reader, who may be supposed to be excited by a desire to know as much as possible of the opinions of those who profess themselves to be experienced by attempting to instruct others—of opinions of the greatest importance to the community respecting, moreover, the most fatal disease known in this country, and that disease attacking only females in the most interesting and most important period of their existence—refer to the works enumerated at the end of this ar-

ticle, and then let him answer not only the above question, but also the following two questions: Have these numerous productions, which have appeared since the latter part of the last century, advanced our knowledge of the pathology and treatment of these fevers in any important particular, or in any way excepting as respects a few subordinate details? Have certain remedial measures, confidently recommended many years ago by physicians possessed of experience, and capable, by ability and education, of observing and of reasoning with, at least, an average degree of accuracy, been satisfactorily tested, or adopted, or at all appropriately employed in those institutions which are most notorious for the generation of these maladies? Leaving these questions to be answered by those whom they may concern, and suppressing those painful and humiliating reflections which the subject suggests to the minds of those even partially informed as to its ethical as well as therapeutical relations, I proceed, *first*, to consider the treatment which my experience has shown me to be most appropriate to the different forms and states of puerperal fever; and, *next*, to notice the several methods and means advised by other writers, and the value which I believe to be attached to them.

262. A. THE INFLAMMATORY FORM OF PUERPERAL FEVER, in its more sthenic manifestations, whether commencing as *puerperal peritonitis*, or *hysteritis*, or as *metro-peritonitis*, requires the prompt and decided antiphlogistic treatment recommended for inflammations of the PERITONEUM (§ 137, *et seq.*) and of the UTERUS, with a due consideration of previous sanguineous losses or exhaustion of the patient, of the state of her constitution, and of the several circumstances and symptoms connected with the case. It should not be overlooked that all cases of these inflammatory states of the disease are not possessed of an equal amount of sthenic diathesis; but that, owing to the nature of the causes, and to the constitution or previous state of the patient, the febrile disturbance as well as the local affection may approach nearer the asthenic than the sthenic condition, and thus the synchoid or intermediate grade of the malady be nearly approached, if not altogether reached. In these states it may be a matter of doubt as to the extent to which vascular depletions, either general or local, ought to be carried; or, if they have been already employed, as to the propriety of repeating them. In these circumstances, and especially in large towns, or in a vitiated atmosphere, less risk will accrue from the rational adoption of other measures; from a due recourse to calomel and opium, conjoined, in the more asthenic cases, with camphor, to terebinthinate embrocations or fomentations, and to the other means recommended for *peritonitis* (see PERITONEUM, § 138–143), than from large or frequent bleedings. When the disease commences in the uterus, in the form either of *hysteritis*, or of *metro-peritonitis*, or in the uterine appendages, as *ovaritis*, too large depletions may only favour the extension of the inflammatory action, unless the *sthenic* diathesis exist, or the patient be not remarkably exhausted by previous losses or inanition. When the local affection assumes an *asthenic* character, the most appropriate treatment is that



which I have advised for the asthenic form of peritonitis. [see art. PERITONEUM, § 150], and which is equally suited to the other prominent affections appearing in this and in the synchoid forms of the malady.

263. *B. THE SYNCHOID OR INTERMEDIATE FORMS OF PUERPERAL FEVER*, however commencing—in whatever organ or structure, as fully set forth (§ 185, *et seq.*)—require a treatment which should have strict reference to the states of vital power and vascular action; to the predominance of either the sthenic or asthenic diathesis; for, however obvious may be the local seat of mischief, the treatment is not materially or at all different as respects the local affection, especially at an early stage, or until the disease is far advanced. In this form of the disease, especially when commencing with rigours, the early reaction associating the local disease assumes more or less of a sthenic or inflammatory character, which, however, soon passes into the asthenic, especially when the patient breathes a close or impure air, or is morally or physically depressed, or when the veins are more especially affected. In many cases of this form vascular action is often attended by great irritation or excitement, and by an expansive or open state of the pulse, indicating an alteration in the state of the blood both in quality and in quantity—in quantity especially as relates to the capacity of the vascular system, and to the power of adjusting itself to the quantity of blood contained—and in these *vascular depletions* are often injurious, whether general or local; and although, in some instances, a small or a local bleeding may be of service, yet, if it at all pass a very moderate amount, the most irreparable mischief may ensue. In this form of the malady, the inflammatory states of the parts so generally complicating it, if not altogether asthenic at the commencement, soon passes into this condition, especially when the treatment is calculated to lower the powers of vital resistance; and, as vascular depletions not merely possess this property, especially with females confined in lying-in wards, or in the close and impure air of large towns, &c., but also remarkably favour the imbibition and absorption of the discharge retained in the uterus and sexual passages, the occurrence of uterine phlebitis or lymphangitis, and contamination of the circulating fluids, they are most liable to be injurious, and they ought to be most cautiously and moderately prescribed.

264. *a.* A large proportion of the cases of this form of puerperal fever originates in imperfect contraction of the uterus, owing to deficiency of vital power, or to the vital depression more immediately following the impression of the infectious or poisonous cause; the imperfect contractions favouring the retention of an unusually large quantity of lochia within the cavity of the organ and in the vagina, followed by changes in this discharge of a septic and contaminating nature. Thus altered, the lochia not merely affects the surfaces with which it is in contact, but is also imbibed by the vessels, inflaming or irritating them, and altering the blood. With the view of enabling the uterus to throw off the coagula and fluid which may be retained in it, I have advised, in cases where the contraction of the organ after delivery ap-

pears to be weak or imperfect, those remedies which are most calculated to produce or to promote a tonic or contractile action of the womb. With this intention, I have directed the early application of the infant to the breast; and, if the uterus fails to contract sufficiently, an occasional dose of the biborate of soda, or of ergot of rye, or an enema containing spirits of turpentine with asafoetida. When, therefore, the disease commences thus locally, the cause is, owing to the circumstances just stated, more or less septic or contaminating, although the vascular reaction may be considerable, when the strength and habit of body of the patient are capable of developing it; and the local effect produced by this cause is generally of a diffusive kind. Admitting that the effect produced locally by this cause, or by any other calculated to occasion it, is of an inflammatory nature, the question still remains, Is the inflammation of a sthenic or asthenic nature, or to what amount may it be supposed possessed of either of these characters? That it is not purely sthenic inflammation of the parts, is shown by the state of the pulse and other constitutional symptoms, and especially by the rapid extension and consequences of the local mischief; and that it is either wholly asthenic, or largely possessed of this property, is proved by the constitutional disturbance, by the rapid diffusion of the local affection, and by the products of such affection. As it has been demonstrated by JOHN HUNTER, and confirmed by all subsequent observers, that asthenic or diffusive inflammations, and inflammations of circulating vessels, are not arrested or even mitigated by general vascular depletions, and hardly even by local depletions, but that they are aggravated in their most distinctive characters and consequences by this treatment, more especially by venesection, it is a matter of the utmost importance that some other than this most abused means should be resorted to. Cases, however, may occur where a nearer approach to sthenic inflammatory action, and a more robust and plethoric state of the patient may warrant a recourse to a moderate depletion; locally in preference, and early in the attack, especially when it is followed by the remedies about to be mentioned; but cautious observation and experience should direct this measure, too often recklessly prescribed by the insufficiently informed, or by the followers of worthless authorities, not a few of which have appeared in recent times.

265. Whether this form of the disease originate in the uterus or uterine vessels, or in the uterine appendages, or in the peritoneum, as shown, both here and in other places, to be probably the case in many instances; or whether it proceed from a constitutional infection received through the avenue of the respiratory organs, the local affection or affections being secondary or contingent, as contended for in respect of other instances (§ 245, *et seq.*), there is certainly no remedy so efficacious as a decided and judicious use of *spirit of turpentine*. This medicine was first employed for this disease by Dr. BRENAN, of Dublin; and although it has been “damned by faint praise” by subsequent writers, who either have not had recourse to it, or have employed it insufficiently or injudiciously, I can assert that it is the most efficacious remedy that can be employed in this

form of puerperal fever. I state this from a lengthened and diversified experience of this substance in disease; and yet in England I know not of any other physician than myself who has given it a satisfactory trial in puerperal fever, even up to the present day. I state this, in order that the remark may be disproved as regards the knowledge of others, and that I may be enabled to record the fact. The chief hinderances to the employment of this substance are, 1st. A mistaken view of the nature and consequences of its operation; 2d. Its nauseous or unpleasant effects; and, 3d. The opinion that it cannot be retained by the stomach when nausea and vomiting are complained of. As to the *first* of these, I can assert that it is, according to the mode of its exhibition, antiphlogistic in acute inflammations, and more efficacious in arresting the progress and consequences of asthenic or diffusive inflammations than any other substance; while it possesses the property of accommodating, by its tonic and astringent operation, the vascular and capillary system to the state and amount of its contents, of lowering the frequency of the pulse, and of restraining effusion from serous and mucous surfaces. That it is unpleasant, and that it is sometimes thrown off the stomach, I admit; but in many such cases it is beneficial nevertheless, its emetic action, independently of the impression produced by it on a vital organ, occasionally being of service, and even actually required. In those cases where the irritability of the stomach is even the greatest, it not only is the most easily retained, but is actually the most efficient remedy for the removal of the irritability, which, in the opinion of many, is the chief reason against a recourse to it. But the exhibition of it by the mouth is often not the only, and sometimes not the most beneficial way of prescribing it; for it may also be administered in enemata, or applied externally and occasionally, according to the nature of the case, even more efficaciously than in any other mode.

266. Although the spirit of turpentine may be more efficaciously employed in this form of puerperal fever than in the more sthenically inflammatory or in the malignant, still it is a valuable remedy, also, in both these extreme forms; in the inflammatory after sufficient vascular depletions, aided by other means, as described when treating of *inflammation of the Peritonæum* (§ 141, *et seq.*); and in the malignant, as will be shown hereafter. In this, the intermediate state of the malady, whether commencing locally or with a constitutional infection, this remedy is most beneficial when employed early, or before effusion into serous cavities, or softening or disorganization of the tissues has made much progress. In this, as well as in other forms of the malady, success depends upon a prompt recourse to treatment. If even a few hours elapse from the invasion, changes beyond the reach of remedies may have already supervened. If the symptoms and circumstances of the case, and especially the state of the pulse, indicate the propriety of a small or moderate venesection, or of local depletion, this should be immediately adopted; if the latter mode of depletion be preferred, a number of leeches, varying with the peculiarities of the case, may be applied near the seat of tenderness and pain;

and when they come away, flannels wrung out of hot water, and freely sprinkled with spirits of turpentine, should be applied over the abdomen, and covered by oiled silk or by a napkin; or the spongio-piline may be employed instead of these; and contemporaneously with the application of leeches, a full dose of calomel, camphor, and opium (calomel, gr. v.—viij.; camphor, gr. iii.—vj.; and opium, gr. ij.) ought to be given. A few hours after this medicine has been taken, about half an ounce of spirit of turpentine, and, if the bowels are not freely open, an equal quantity of castor oil should be taken on the surface of an aromatic water, or on spearmint water, or on milk, or in a cup of cold coffee. In most instances the intention is not so much to evacuate the bowels, for they are often sufficiently open, as it is to exhibit a remedy which is calculated, by its passage into the circulation, at least partially to resist the changes taking place in the blood and vascular system generally; and, at the same time, to procure the discharge, both from the bowels and from the uterus, of such morbid matters as would be inevitably most injurious if retained even for a short period. In prosecution of this intention, therefore, an enema containing spirits of turpentine should also be administered some hours afterward; the quantity of this substance, the medicines conjoined with it, and the time of having recourse to it, depending upon the peculiarities of the case. If the bowels are too frequently acted upon, castor oil should not be conjoined with it, either when taken by the mouth, or administered in a clyster; but olive oil may be substituted. Indeed, the latter may be very advantageously given with the spirit of turpentine in almost every state of the disease; for if the bowels should be too relaxed, the compound tincture of camphor or laudanum, or sirup of poppies, may be added; and emollients or demulcents may be made the vehicles for its administration, with olive oil, in enemata. The repetition of these medicines, of the turpentine more especially, the quantity of each, and their combinations, must necessarily depend upon the acumen and experience of the physician, upon the appropriate use of them, and upon the effects produced. But, with their internal employment—by the mouth or in clysters—a recourse to the turpentine embrocations or stupes should be persisted in as long as tenderness, pain, or distention in any part of the abdomen is complained of; and the above dose of turpentine should not be given by the mouth oftener than twice or thrice at the most.

267. If the urinary organs should become affected, either by the quantity of turpentine prescribed, or by its retention by the alimentary canal, the effects will soon disappear if demulcents are freely exhibited; and, if much depression be experienced, either from the operation of this medicine or the state and period of the malady, restoratives, such as quinine with camphor and capsicum, or wine taken in Seltzer water, or opium conjoined with aromatic stimulants, &c., may be administered, according to the state or urgency of the case.

268. *b. Metro-phlebitis* is one of the most frequent complications of this form of puerperal fever, although it is rarely recognised at an early stage. But, if recognised, should the



treatment be different from that now recommended for the arrest of this serious state of the malady? I believe that no other plan of cure will be found more beneficial for it than that now advised; that no other than powerfully restorative, tonic, and soothing means will be found beneficial in this form of phlebitis, or, indeed, in any other form. Dr. R. LEE, who has attached so much importance to metro-phlebitis as a pathological condition of puerperal fever, adds nothing to the treatment of this condition, and is even unaware of the means recommended, with great propriety, and often with great success, by JOHN HUNTER in cases of phlebitis. Dr. LEE gives us no farther information on this topic than to profess his want of confidence in the use of mercury for this state of the malady. HUNTER's treatment of phlebitis was powerfully tonic, stimulant, and restorative, and he directed it with the view—correct both in pathology and in therapeutics—of enabling the vessels of the diseased part to throw out lymph capable of coagulation, and of assisting the powers of life, by these or other means, to resist the progress and to retrieve the consequences of the disease. Of the use of oil of turpentine in this malady, Dr. R. LEE entertains a most unjust opinion. I question much the fact of his having given it a satisfactory trial. He distrusts the evidence furnished by Dr. BRENNAN's cases, is not convinced that the lives of those to whom it was administered were saved by it, and says that he has seen many recover without turpentine, in whom the symptoms were more unfavourable than in the cases described by Dr. BRENNAN; and that he has seen other patients in whom the disease appeared to be aggravated by its use. Now it would have been most desirable if Dr. LEE had favoured his readers with an exposition of the treatment which was so fortunate as to restore many cases in which the symptoms were more unfavourable than in those described by Dr. BRENNAN, seeing that in those turpentine had not been used; “sed de non apparentibus et non existentibus eadem est ratio.” Having myself since 1815 prescribed this substance in numerous diseases, malignant, febrile, and inflammatory, and having for many years—since about the above period—employed it in puerperal diseases, I have been induced to make inquiries respecting its use by other physicians; and yet, notwithstanding the notoriety of the practice, and its undoubted success if duly and appropriately prescribed, I have not heard of its having been employed by any other physician in this metropolis besides myself. This is somewhat singular, when the general fatality of the disease, and the highly favourable reports of the practice which have been made by Dr. BRENNAN, Dr. DOUGLAS, and myself, are considered. What are the obstetric practitioners, who appropriate the treatment of puerperal diseases, about? Should the obstetrician cease to be physician, in respect of liberality and candour of sentiment, and of a due appreciation and adoption of remedies recommended by others?

269. Let the opinion given by Dr. DOUGLAS, in an excellent memoir on puerperal fever, be the answer to this question as regards the remedy in question. He states that, in the epidemical and contagious puerperal fever, *zijj.* of the turpentine should be given, with an equal quan-

tity of sirup, and *3vj.* of water, three or four hours after the first dose of calomel; and that after an hour this should be followed by an ounce of castor oil, or some other purgative; or the turpentine and castor oil may be given together; and he restricts the internal use of turpentine to twice only. I have, however, given it even in a larger dose—in half an ounce—thrice in the same case, besides administering it in enemata and externally, with complete success; although I have found one or two doses more generally sufficient. “The external application of turpentine,” he adds, “without either its internal use or the aid of blood-letting, I have frequently experienced to be entirely efficacious in curing puerperal attacks; and although I have hitherto omitted to speak of turpentine for the cure of the other varieties of this disease, yet I should not feel as if I were doing justice to the community if I did not decidedly state that I consider it, when judiciously administered, more generally suitable, and more effectually remedial, than any other medicine yet proposed. I can safely aver, I have seen women recover, apparently by its influence, from an almost hopeless condition, certainly after every hope of recovery under ordinary treatment had been relinquished.” (*Dublin Hosp. Rep.*, vol. iii, p. 157.)

270. Now, without referring to my own experience and authority in the matter, and to the statements of that experience which have appeared in various quarters, I may remark that Dr. BRENNAN's publication was in 1814, and Dr. DOUGLAS's statement, now quoted, was made in 1822; and yet, unless in those cases for which I prescribed this remedy in Queen Charlotte's Lying-in Hospital, I am not acquainted with any sufficient trial which has been made of turpentine in any of the lying-in wards of this city. The eminent senior physician to the General Lying-in Hospital, writing in 1839, remarks as follows: “I have no experience of the use of this remedy (turpentine) introduced by Dr. BRENNAN in 1814, and praised by Dr. DOUGLAS of Dublin, and KINNEIR of Edinburgh, in puerperal fever.”

271. C. THE MALIGNANT OR PUTRO-ADYNAMIC FORM OF PUERPERAL FEVER (§ 198, *et seq.*), if not recognised at its commencement, and promptly treated, is always fatal. If even a few hours elapse from its seizure, the changes which have already taken place in the fluids, and even in the vital cohesion of the structures, are rarely arrested in their onward course by any treatment. The means of cure should therefore be early, promptly, and decidedly employed. When thus prescribed they are generally efficacious; at least they proved so in several outbreaks of this form of the malady in Queen Charlotte's Lying-in Hospital, especially when I had the advantage of the assistance of an intelligent resident pupil. In one of the most severe of these epidemics I had the aid of Dr. VOWELS, an intelligent and well-educated young physician, who was constant in his attendance, and who, immediately upon an attack, had recourse to the treatment about to be recommended, varying it according to my directions with the peculiarities of the case and the effects produced by the early part of it. On this occasion almost every case recovered. When I was first called upon to prescribe for

this disease in the hospital, the most malignant form prevailed, and every case that had occurred had terminated fatally. I first had recourse to DOULCER's plan of giving emetics, but it failed, probably owing to my being called at an advanced period of the disease. Having frequently employed the spirit of turpentine in the more malignant states of fever, and being aware of Dr. BRENNAN's recommendation of it for this malady, I next prescribed this substance, both by the mouth and in enema, trusting to it principally; but without obtaining from it all the advantages which I had expected. It should, however, be stated, that frequently I was not called to a case until it was far advanced. I was next induced, by my experience of the effects of large doses of calomel and opium in some acute diseases, to try the effects of these; but they still more signally failed. I afterward had recourse to both modes of treatment, and prescribed every four, five, or six hours a large dose of calomel and opium, and the spirit of turpentine with castor oil, the turpentine being employed both internally and externally. From this practice more success accrued than from either of the plans adopted singly. Yet as the success did not equal my wishes, and reflecting upon the phenomena, pathological conditions, and structural changes of the disease, I resolved upon trying the effects of camphor in large doses, in conjunction with calomel and opium, and sometimes with opium alone, or with quinine and capsicum, omitting the calomel, aided by the turpentine, in the manner about to be stated, and upon preceding these by an emetic when its use was indicated by the symptoms.

272. Immediately upon the accession of the disease, or as soon afterward as possible, from ten to twenty grains of calomel, from eight to sixteen grains of camphor, and from one to three grains of opium were administered in the form of bolus, with conserve of roses, the quantities of these medicines thus varying with the apparent severity of the case and the state of the pulse. In some instances, when vital depression was extreme, or the disease farther advanced, the camphor was conjoined with capsicum and opium, and occasionally either with ammonia or with sulphate of quinine, the calomel being omitted. The above were the extreme doses of the camphor, calomel, and opium; and when the largest quantities were given, five or six hours were allowed to elapse before they were repeated. If smaller doses were given, three or four hours only were sometimes allowed to pass. Soon after the second exhibition of these medicines, about half an ounce of spirit of turpentine, with or without castor oil, according to the state of the bowels, was taken as above directed; and a few hours afterward a larger quantity was administered in an enema, with castor oil or with asafoetida, and demulcents or emollients, as circumstances suggested. The intention was to make a strong impression on the constitution by means calculated to arrest the morbid action, and to counteract the changes taking place in the blood. Very soon after the development of the abdominal symptoms, especially the pain, distention, and tenderness, several folds of flannel, sufficient to cover the whole abdomen, were directed to be wrung as dry as possible out of hot

water, sprinkled very freely with turpentine, and applied as already described. This application was renewed at intervals, if the progress and symptoms of the case required a recourse to it.

273. In two or three hours after the treatment had advanced thus far—or after one or two of the boluses had been taken, and one dose of the turpentine and an enema administered—the symptoms had generally much abated, if these means had been early employed. In this case the doses of the camphor, calomel, and opium, or of the other combinations of which the bolus was composed, were diminished, and wine also given at the longest intervals above mentioned. The turpentine draught was seldom prescribed oftener than twice, and one only was taken in the twenty-four hours. It sometimes also contained an aromatic spice, as capsicum, &c. If the enema was soon thrown off, another was sometimes administered a few hours afterward, and the fomentation was renewed. If the malady resisted the first or second doses of these substances, the bolus was repeated a third, and sometimes a fourth time after the longer intervals, and in a few instances a third dose of the turpentine was ordered; or the enema containing it was repeated and conjoined with other medicines, according to the state of the bowels. If vital depression was extreme, the turpentine was given in small doses or withdrawn, and capsicum, or carbonate of ammonia, was taken in the bolus instead of the calomel; and a dose of decoction of cinchona, with chlorate of potash, carbonate of soda, and the compound tincture of cinchona or tincture of serpentaria was ordered in the intervals. If the lochia were very offensive, injections containing the solution of chlorinated soda were employed; and the same solution, or a solution of chloride of lime, was used in the wards.

274. If the symptoms evinced marked biliary disturbance or congestion, and the other indications for the exhibition of an *emetic* were present (§ 278), fifteen grains of ipecacuanha were given immediately and previously to the first dose of calomel, camphor, and opium; and the free operation of the emetic was promoted by the repetition of the same dose in an hour, and by the infusion of chamomile flowers. The emetic generally procured the early evacuation of much altered bile, both by the stomach and by the bowels, and also caused a copious sweat, which the camphor and opium farther promoted, and the terebinthinate embrocations on the abdomen tended to encourage and to perpetuate. But of the use of emetics in these cases I shall take farther notice in the sequel (§ 278).

275. When the above treatment was employed early, or before either effusion into the peritoneal cavity or other structural change had supervened or made any considerable progress, it was generally successful both in preventing or arresting these changes, and in resisting farther alterations of the blood, as well as in removing such as may have already taken place, by increasing the depurating actions of the several excreting organs. The successful employment of the above means required the constant attendance of an intelligent assistant as well as the frequent visits of the physician. During the prevalence of the disease I visited the cases three or four times in the day, direct-



ing the repetition, succession, or modification of the above remedies, according to their effects or to circumstances. If beneficial results did not follow after a very few doses—after the repetitions of the medicines as now stated—or if they did not appear in from twenty-four to forty-eight hours after their first exhibition, the patient rarely recovered. In some extremely malignant cases, for which I did not consider the calomel to be indicated, as well as in others which I did not see sufficiently early, I prescribed emphor in large doses, with capsicum and moderate doses of opium, and sometimes also in conjunction with the sulphate of quinia, which, at the time of the occurrence of these worst cases, was coming into frequent use. In some of these very hopeless cases these means, aided by an occasional dose of turpentine, given either by the mouth or in an enema, and by the external application of this substance, proved almost unexpectedly successful. In others, however, a temporary check only appeared to be given to the disease, the duration of this improvement being seldom longer than a few hours; these cases suggesting the conviction that the changes observed after death had advanced too far to be removed by the agents employed in medical practice. Of the other means which were occasionally tried in this and the preceding varieties of the disease, mention will be made in the sequel.

276. *B. REMARKS ON SEVERAL MEANS OF CURE, &c.*—In many of the works which have appeared on puerperal fevers some particular remedy or method of cure has been recommended, empirically rather than conformably with rational views of the pathology of these diseases; and in most of these the treatment, which seemed, in the eyes of those recommending it, successful to an extent which satisfied their expectations, was lauded as altogether applicable to all appearances of these maladies which may hereafter occur. But while each held forth his own method as most worthy of adoption, other methods, which had been equally praised by equally sanguine predecessors, met with little approbation, if, indeed, they escaped a complete condemnation. It would neither be gracious nor profitable to trace the various differences of opinion as to the treatment of these diseases to their sources; for some of them may be referred to those imperfections of our nature, which medical practice is calculated to develop and to foster when not directed and elevated, in its ethical relations, by the higher and more generous sentiments; while others may appertain to the very different forms of these maladies in different occasions, circumstances, and epidemic constitutions. With no marked disposition to be skeptical on the one hand, or to be credulous on the other; not disposed, with saintly faith, to place much confidence in that which I cannot explain, or to believe in what appears impossible, still I cannot attempt to set limits to the operations of nature, or to the influence of mind and its numerous manifestations on the vital actions. What may appear now as at least improbable may hereafter be found to be entirely in agreement with some principle hitherto concealed from our superficial knowledge. The unknown may seem difficult, complex, unfathomable, and even unattainable, but, once known, it may be easy,

simple, obvious, and within the reach of every intellect. The malady which is found to-day fatal, malignant, and pestilential may be proved to-morrow to be possessed of these properties only in virtue of our ignorance, and of our endeavours to encounter a formidable calamity by complex and ill-understood means; simpler agents, promptly and efficiently applied, accomplishing the ends, with a direct and beautiful simplicity, which were attempted, under the delusions of "false science," by multiplied and inappropriate measures and jarring influences.

277. *a. Vascular depletions and other antiphlogistic measures* were advised for these fevers at an early stage by HULME, KIRKLAND, GORDON, HORN, ARMSTRONG, CAMPBELL, MACINTOSH, and others; and, while some carried these depletions to a great extent, others recommended greater circumspection; while a still greater number of writers prescribed very different or opposite measures. All were equally sincere, and all equally erred; all applied, as true of the genus, what was true only of the species; for, as I have shown above, there are *sthenic* inflammatory, *asthenic* inflammatory, and *malignant* or putrid states or forms of the malady, this last state having no inflammatory attribute whatever, and to each of these different or opposite means are requisite. In the *first* of these, venesection, carried to an amount which can be truly assigned only by the closely observing physician to the peculiar circumstances of each case, is absolutely necessary; in the *second* of these forms, local depletions, by a number of leeches, are only contingently required, and often then with a caution which should never be laid aside; and in the *third*, vascular depletions of any kind are certain agents of destruction. Thus the different forms of the malady, depending upon very different states of vital power, of vascular action, and of constitutional disturbance—upon different pathological conditions—occurring at different periods and in peculiar circumstances, required very dissimilar methods of cure, the method which is quite appropriate to the one form being inappropriate to the others; the great error of writers being their recommendations of what they found most beneficial in their limited sphere of observation, and in the short period of their experience, for all other outbreaks or manifestations of these fevers, without reference to form, character, or epidemic constitution. There is one circumstance connected with the employment of leeches in the more asthenic states of this malady which should always be kept in recollection, namely, the difficulty of arresting the hemorrhage from them, owing to the states of the blood and the impaired tone of the capillaries and tissues. Many years ago, when all cases of this disease, under the delusions created by those who, in the fulness of their ignorance, rushed into reckless print, were treated by bleeding of some kind or other, a large number of leeches were applied over the abdomen of a patient, and, upon these falling off, were followed by a warm fomentation. When this fomentation was looked to after a time, she was found lying dead in a pool of blood. In another case, which occurred in the hospital, leeches were prescribed by one of my colleagues, and the night-nurse who was left to attend to them fell asleep; and although no long period could

have elapsed, the patient was found dead when she awoke. These facts prove not only the risk of copious hemorrhage from leech-bites in certain states of the disease, but also the impropriety of having recourse to them in these states, when even a small loss of blood may occasion fatal sinking.

278. *b. Emetics* had at one time a great reputation in the disease, and have received the commendations of WILLIS, WHITE, DOULCET, BANG, LENTIN, WALSH, LE ROY, HUFELAND, OSIANDER, and DESORMEAUX; while KIRKLAND, HORN, R. LEE, and many others are opposed to the exhibition of them. Ipecacuanha has generally been preferred as the emetic substance, and is certainly most deserving of adoption whenever a trial of this practice may be determined upon, although it may be conjoined with other substances. Among the experienced writers favourable to ipecacuanha emetics, DOULCET is most distinguished. Observing, in 1782, that the disease often commenced with vomiting, he viewed this as an indication of nature, and he assisted her efforts by giving fifteen grains of ipecacuanha, which were repeated the next day. "The patient recovered. This unexpected success led him to try it on all the rest, and two hundred were saved, while six, who refused to take the emetic, died. This treatment, when methodized, consisted in giving fifteen grains of ipecacuanha, repeated in an hour. The last dose acted generally on the bowels, an action which he sustained by a potion, consisting of olei amygdal., ʒij.; sirupi malvæ, ʒj.; kermes mineral, gr. j. M.; a table-spoonful of which was taken every two or three hours. He repeated the emetic the next morning if the symptoms were alleviated, and the rather if they were not. If the belly remained meteorized and painful for several days, he looked upon it as a reason for persevering. The previous devastation of the malady, and the consequent despondency in the practitioners of France, caused the news of DOULCET's success to be hailed with enthusiasm throughout the kingdom. The government compensated the discoverer largely. The Faculty of Medicine drew up minute instructions for this mode of treatment, and distributed them gratuitously over the whole of France. On the following year the malady was once more epidemic, and the remedy of DOULCET resorted to in full and earnest faith, but this time it was quite unsuccessful." Dr. FERGUSON, from whose work I have now quoted, justly remarks, that the failure arose from want of discrimination between the varieties of this malady, and from applying in all cases that which is useful only in some. The evidence in favour of emetics is quite as great as that for bleeding or mercury; and it is not supported merely by DOULCET's remarkable success, but by the experience, also, of RICHTER, CRUVEILHIER, TONNELLÉ, and DESORMEAUX. The question is, however, *What are the cases to which this remedy is applicable?* When there are nausea and vomiting on the accession of the disease; when there is bilious vomiting or diarrhœa, with bilious or dusky suffusion of the skin, or signs of congestion of the liver; when the upper regions of the abdomen are the earliest or chief regions affected; when the invasion of the attack is unattended by rigours; and when the disease presents more of the malignant than of the in-

flammatory or synchoïd characters, then the early exhibition of an ipecacuanha emetic has proved most serviceable. On the other hand, when the painful symptoms appeared in the hypogastrium, or when the pain and distress of the abdomen were aggravated by vomiting; when the disease had advanced; and when signs of effusion into the peritoneal cavity had appeared, emetics were manifestly contraindicated, and were not prescribed. In a few of the most malignant cases which I treated, I prescribed, previously to other means, when the patient was seen at the commencement of the seizure, a full dose of sulphate of zinc with powdered capsicum, in order to procure a more immediate operation, and to prevent any contingent depression, which I dreaded from the use of ipecacuanha. This last substance I sometimes gave also thus combined. I remarked, however, that when the ipecacuanha was thus combined, the emetic effect was liable to be prevented by the capsicum, while the operation on the bowels and skin was evidently increased by it.

279. Dr. FERGUSON, in his very instructive work, remarks as follows upon this important part of the treatment of this most dangerous malady: "Besides the examples of the utility of emetics afforded by TONNELLÉ, I have been informed by my friend Dr. R. MAUNOIR, that his father, the celebrated MAUNOIR of Geneva, looks on ipecacuanha as the remedy most to be relied upon in the treatment of puerperal fever—a faith founded on repeated experience in an extensive practice. Among the older authors, WILLIS, WHITE, and A. PETIT were advocates for its employment. In our own times, OSIANDER and HUFELAND in Germany; RECAMIER, CLIBT, TONNELLÉ, and DESORMEAUX in France, have all borne their testimony to the signal benefits to be derived from the use of ipecacuanha as an emetic. It would appear that some seasons, or some portions of the year, are more favourable for its exhibition than others. DESORMEAUX first tried emetics in the end of 1828, with great success. During the greater part of the following year they failed; but their use did not aggravate the symptoms. In September, 1829, being cold and humid, they were again given with great benefit. Towards the end of October they lost their power, and in November were totally useless. When it is considered that puerperal fevers are often cured, or alleviated, by copious spontaneous perspiration, or by purging and vomiting, we ought not to wonder at the success of an agent like ipecacuanha, which is capable of producing, and usually does produce, all these effects at once." (*Op. cit.*, p. 210.)

280. *c. Purgatives* have been recommended by HULME, SELLE, WHITE, DENMAN, STOLL, AASROW, LEAKE, BUTLER, HEY, CHAUSSIER, and others. Dr. FERGUSON states that CEDERSKIÖL, a Swedish physician, tried them extensively, and concluded that the more drastic purgatives are prejudicial. This is also the opinion of BAGLIVI and JOHN CLARKE. The treatment which I have advised above almost precludes the necessity of having recourse to any other purgative medicines than those comprised in the above plan; for the large doses of calomel, sometimes preceded by an emetic, and the subsequent recourse to turpentine and olive or cas-



for oil, and to enemata containing the same substances, as circumstances may require, are sufficient to answer all intentions as to biliary and fecal evacuations, and to produce at the same time an impression on the economy calculated to arrest the progress of the malady, and to augment the functions of the several emunctories. Dr. FERGUSON justly remarks, that in the wielding of this remedy, as of every other useful one, the disputants have each tacitly assumed the universal similarity of all puerperal fevers—an assumption, I may add, which has been fatal to thousands. His own experience with regard to purgatives is, that whenever they create tormina, there is the greatest risk of an attack of metro-peritonitis succeeding. In order to avoid this, he invariably mixes some anodyne—usually DOVER's powder, or hyoscyamus, or hop—with the purgative.

281. *d. Mercurials* in various states of combination and modes of administration have been advised for puerperal fevers. Calomel, however, is the preparation generally preferred, and is usually conjoined with opium, as recommended by HAMILTON, and subsequently by WOLFF, HUFELAND, and many others. The inunction of strong mercurial ointment over the abdomen has been suggested by GEBEL and J. DAVIES, who have likewise advised the weaker ointment to be applied over the blistered surface of the belly. But the larger doses of calomel, as I have employed them above, appear to me most deserving of adoption; for it is not so much from the specific action of this medicine that benefit is to be expected, in many cases, as from the operation of it on the biliary organs, and secretions and excretions generally—by its depurating action on the blood, through the medium of the liver and of the other excreting organs. It should not, however, be inferred that calomel or other mercurials are equally beneficial in all the forms of this malady. They, especially calomel, are most serviceable in the inflammatory varieties—in the sthenic after blood-letting, in the asthenic after local depletions, or after an emetic. In the malignant form of the malady, calomel was most serviceable at an early stage, conjoined with stimulants and opium, and was employed chiefly with the view of increasing the actions of the liver and other emunctories. It was often followed by powerful tonics and restoratives. If the large doses of calomel failed early in the disease, they were seldom of any advantage at an advanced stage, although this substance was given subsequently in smaller quantities. When the bowels are irritable, Dr. FERGUSON recommends the abdomen to be kept constantly covered with the linimentum hydrargyri compositum. He agrees with Sir B. BRODIE in considering the bi-chloride of mercury to be preferable when the disease is presumed to be connected with uterine phlebitis; and in this complication the bi-chloride may be conjoined with camphor and opium, or taken in a decoction of cinchona, as I have given it in several analogous pathological conditions.

282. *e. Opium* has long possessed considerable reputation in the treatment of puerperal fevers and peritoneal inflammations. (*See art. PERITONEUM*, § 150–153.) For the former, it has been much confided in by GEBEL, HOLST, HORN, MICHAELIS, BATES, &c.; for the latter,

by HAMILTON, ARMSTRONG, GRAVES, STOKES, BATES, and others. It has been variously combined with other medicines for these states of disease—with calomel, or with antimonials, or JAMES's powder, or with ipecacuanha, or with musk, or with camphor, or with valerian, or with capsicum, &c., according to the views of the physician and circumstances of the case. The influence of opium in these maladies has been very justly estimated by Dr. WATSON, who truly remarks: "Of the great value of this remedy in certain cases, and after sufficient blood-letting (in the treatment of inflammation), I have long been satisfied. I presume its beneficial operation is to be explained by its known power of tranquillizing disturbed and uneasy nerves. Mere nervous irritation appears sometimes to keep alive or to rekindle inflammation, which depletion of the blood-vessels had almost or for a time extinguished; and opium, given in a full dose, will often prevent this renewal of disturbance in the vascular system, by quieting the nervous irritability. I am, indeed, persuaded that opium is, of itself, equal to the cure of some forms of inflammatory disease in which bleeding would be improper, the disorder of the capillary vessels subsiding spontaneously as soon as the teased and teasing condition of the nervous system is allayed. Accordingly, the opiate treatment has been found the most effectual in persons who possess by nature, or who have acquired through disease or intemperance, undue irritability of frame. It is especially useful, also, whenever local inflammation is attended by much hody pain, which in all persons is a source of irritation." It is most satisfactory to me to find my views, as to the pathology and treatment of INFLAMMATION (§ 7–9 and 206), in accordance with those of so able and discriminating a physician as Dr. WATSON.

283. Mr. BATES, of Sudbury, confides chiefly in opium for the treatment of puerperal inflammations and fevers. According to *one plan*, which appears to be directed against the more inflammatory states of disease, he directs bleeding from the arm to about a pint, except there be great exhaustion; and an opiate enema, consisting of ʒj. to ʒij. of tinctura opii in ʒxij. decocti amyli calefacti, to be repeated in twelve hours if there be no return of pain, and whenever there is a renewal of the symptoms. The patient is allowed only barley water or thin gruel, cold, and in small quantity. When the bowels are confined, and after the pain and sickness are removed, and the abdominal tenderness somewhat abated by the foregoing means, he prescribes the following clyster:  $\mathcal{R}$ . Vini aloes, ʒij.; magnesiæ sulphatis, ʒj. ad ʒij.; olei olivæ, ʒj.; aquæ calidæ, ʒxij. Misce. He farther directs bottles of warm water to the feet; fomentations and linimentum saponis cum opio to the abdomen; and leeches when great tenderness is present. According to *another plan*, the following bolus is to be taken as soon as possible, and repeated in an hour, and then to be continued every two hours until the pain has ceased. Ease ensues, he says, from the administration of the fifth to that of the tenth bolus; if not, he resorts to the enemata.  $\mathcal{R}$ . Pulveris opii, pulveris acaciæ, pulveris antimonialis, aa, gr. j.; confectio nis rosæ caninæ, q. s. Misce. Fiat Bolus.

284. *f. Stimulant, restorative, and even tonic remedies* have been recommended by several writers, and are more or less serviceable in the more malignant states and far-advanced stages of the disease. I have very often had recourse to them, and almost always in conjunction with opium. The substances belonging to this category which I have most frequently prescribed are camphor, as directed above, capsicum, ammonia, and sulphate of quinine. Musk and valerian have likewise been advised, but commonly conjoined with opium, by HORN, MICHAELIS, and others. The ammoniated tincture of valerian I have found of service in some instances, variously conjoined with tincture of opium and other medicines, according to the peculiarities of the case. These stimulants and tonics are efficacious in the more malignant states of the disease only when given early, in full, large, or frequent doses of opium, in large doses, and aided by the turpentine, as prescribed above (§ 266); and after the second or third dose I have not found any benefit derived from calomel in these states of the disease, when repeated more frequently.

285. *g. Of other internal remedies* recommended for this malady but little notice is required. *Calumba* has been preferred by some writers when a tonic is required; and *alkalies* have been employed by BARKER and ALLAN. *Borax* has been given by BREFELD, BANG, and myself; and it is certainly of use under certain circumstances, especially in promoting the contractions of the uterus, and the discharge of coagula or retained matters from this organ; and thereby removing a cause of the disease, or an obvious source of aggravation and contamination. BOER attributed his success in the treatment of an epidemic appearance of this malady to his use of an antimonial preparation, which was without doubt the well-known JAMES'S powder, which, when conjoined with opium, or with camphor and opium, is certainly extremely beneficial, and when prescribed after vascular depletions, in the inflammatory states of the malady, or when given from the commencement in the synchoid or intermediate form, so as to produce copious diaphoresis.

286. *h. Of clysters, or enemata*, it is unnecessary to add any thing to what I have already stated. The medicines which are most beneficial, when thus administered, are the spirit of turpentine, olive oil, castor oil, opium, camphor, asafoetida, &c., according to the form and stage of the disease.

287. *i. Injections into the vagina*, and even into the cavity of the uterus, have been recommended by several physicians, and by the author when the lochia is acrid, excoriating, and offensive. COLLINGWOOD, SCHMIDTMANN, DANCE, and TONNELLÉ have advised frequent injections of warm water only, or chiefly. I have seen benefit derived from the addition of a small quantity of one of the chlorides, or of creasote, to the fluid when the discharge was manifestly offensive. MICHAELIS directed vaginal injections, consisting of an infusion of valerian and linseed, and they were probably of service in washing away the morbid discharge, and in soothing the irritation of the sexual passages produced by it, the chief intentions which these means are calculated to accomplish.

288. *k. It is hardly necessary to notice any*

other external means of cure besides those already mentioned. General warm *baths* and *hip-baths* have been directed by several writers; but there are several difficulties placed in the way of them; and in many of the most severe cases they are either of doubtful or of no advantage. Still they ought not to be entirely overlooked in the more inflammatory states of the malady after depletions, and occasionally in other circumstances, which will suggest a recourse to them, but which hardly admit of description. The application of a *large blister* to the abdomen has received the approbation of GOODWIN, MICHAELIS, HUFELAND, and J. DAVIES, and is certainly deserving of adoption in several states of the disease; although a more immediate and decided advantage is derived from the turpentine stupes mentioned above (§ 266), especially when early and perseveringly employed. If these cease to be of service, or are insufficient, or inappropriate to certain advanced states of the more prolonged cases, a blister will occasionally be of use. [There are some striking cases on record, where *cold water* applied to the abdomen has been remarkably efficacious in the treatment of the disease. Although no friend to the indiscriminate use of water as a remedial agent, we believe, nevertheless, that it is, when judiciously applied, a most powerful remedy, and well worthy of trial in this affection.]

289. *C. PROPHYLACTIC MEASURES.*—I have already noticed certain topics connected with the prevention of puerperal diseases generally (§ 43, *et seq.*); but there are others more especially relating to the prevention of puerperal fevers that require a very brief notice. Prophylactic measures relate, 1st. To the management of the female during and subsequently to parturition; and, 2d. To the prevention of foul and contaminated air in the ward or apartment in which she is confined, and to the destruction and counteraction of these and all other infectious and contagious agents.—(a) As to the former of these, it is unnecessary to state more than that an officious interference with the parturient process, violent measures used to hasten it, or the neglect of means to promote it, when the efforts of nature are either insufficient or exhausted, the admission of a foul and contaminated air to the generative organs after parturition, or the retention of such an air or of foul exhalations in the vicinity of these organs, and neglect of due measures of cleanliness and of the frequent removal of the discharge, are calculated to cause or to favour an attack of this malady, and, consequently, that a careful avoidance of these causes should always be observed.

290. I quite agree with Dr. R. LEE that the administration of acrid cathartics soon after delivery should be avoided, and that the greatest care ought to be taken in performing the requisite operations of midwifery. The hand ought not to be passed into the cavity of the womb unless with the greatest gentleness, when the introduction of it is quite indispensable; and portions of the placenta should be prevented from remaining to become decomposed within the uterus. "It is impossible to condemn too strongly the practice recommended by Dr. GOOCH, in cases of flooding after the expulsion of the placenta, of passing the hand into the uterus for the purpose of compressing the part



where the placenta was attached, and from which the blood is flowing." (*Op. cit.*, p. 113.)

291. (b) *The prevention of infection or contagion* in respect of puerperal fevers can be accomplished only by the adoption of those measures which I described when treating of INFECTION (see § 55, *et seq.*), and by the avoidance of those causes (§ 41, *et seq.*) which are productive of these fevers, as well as of those sources of contamination described when treating of the prevention of PESTILENCE. The measures recommended in that article are especially applicable to the prevention of and protection from outbreaks of puerperal fevers in lying-in wards; and for the purification of these and other chambers, and of the bed-clothes and bedding on the occasions of these outbreaks. To that article I must, therefore, refer the reader, and more particularly to what I have stated at § 77, and when treating of the "*Domestic Sources of Pestilence.*"

BIBLIOG. AND REFER.—Willis, *De Febribus*, cap. 16.—*Hake*, Dissert. de Febre Puerperarum. Leyd., 1659.—*C. Strother*, Criticon Febrium, or a Critical Essay on Fevers, 8vo. Lond., 1718, ch. ix., p. 212.—*A. Berger*, Dissert. de Febribus Puerperarum. Fran., 1733.—*Hall*, Dissert. de Febre Acuta Puerperis superveniente. Edin., 1755.—*Thilenius*, Med. and Chirurg. Bemerkungen, p. 140. (*Insists on the diverse forms of Puer. Fev.*)—*T. Denman*, Essays on Puerperal Fever and on Puerperal Convulsions, 8vo. Lond., 1768.—*H. Manning*, A Treatise on Female Diseases, 8vo. Lond., 1771, ch. 20.—*N. Hulme*, A Treatise on the Puerp. Fever, wherein the Nature and Cause of this Disease are represented in a new Point of View, &c., 8vo. Lond., 1772.—*C. White*, A Treatise on the Management of Pregnant and Lying-in Women, &c., 8vo. Lond., 1772.—*Bang*, in Acta Reg. Soc. Med. Hafn., t. i., p. 266, et t. ii., p. 75.—*Burserius*, Instit. Med. Pract., t. i., p. 519.—*J. Leake*, Practical Observat. on Child-bed Fever; also, On the Nature and Treatment, &c., 3d ed. 1775.—*T. Kirkland*, A Treatise on Child-bed Fevers, and on the Method of preventing them, &c., 8vo. Lond., 1774.—*W. Butler*, Account of Puerperal Fevers, &c., 8vo. Lond., 1775.—*H. Hecker*, Dissert. de Febre Puerperarum. Erf., 1780. (*Points out its asthenic nature.*)—*P. P. Walsh*, Practical Observations on the Puerperal Fever, wherein the nature of the disease is investigated, and a method of cure recommended, &c., 8vo. Lond., 1787. (*Believed P. F. to be a putrid fever modified by the Puerperal state.*)—*Boer*, Abhandlungen Geburtshöflichen Inhalts, b. ii., st. 2. (*Softening of the uterus.*)—*Selle*, N. Beyträge, b. i., ii., et iii., *pluries*.—*Home*, Clinical Experiments, &c., p. 183.—*Michælis*, in Hufeland, Jour. de Practischen Heilkunde, b. xiii., st. 2; b. xix., st. 4. (*Contents for the notion that the disease is a metastasis of the milk.*)—*Pujot*, in Stark's Archiv., b. iv., p. 162 (*also contends for lactæal metastasis*).—*De la Roche*, Recherches sur la Nature et le Traitement de la Fièvre Puerperale, &c., 12mo. Paris, 1793.—*Stoll*, Ratis Medendi, vol. ii., p. 68.—*Sandifort*, Observat. Anatom. Pathol., iv.—*Walter*, De Morb. Peritonæi, &c., p. 23.—*Rinck*, in Stark's Archiv., b. vi., p. 67. (*States the disease to have been always fatal in Copenhagen.*)—*Leutin*, Beyträge, b. i., p. 313. (*Attributes P. F. to unwholesome diet in Pregnancy.*)—*L. J. Boer*, Die Nätürliche Geburtshölle, 2 bs., 8vo. Vien., 1790, *pluries*.—*Wilson*, in Transact. of Soc. for Improv. of Med. Knowledge, vol. iii., p. 74. (*Uterine Phlebitis.*)—*Ratzky*, De Lactis Metastasi, causa fibris Puerperarum nuperrime rursus defensa. Jena, 1789.—*Osiander*, Denkwürdigkeiten für die Heilkunde und Geburtschilfe, vols. i. and ii.—*J. Hunter*, Transact. of a Soc. for Improvment of Med. and Chirurg. Knowledge, vol. i. Lond., 1793.—*J. G. Sasse*, De Vasorum Sanguiferorum Inflammatione. Halle, 1797.—*J. M. J. Vigarous*, Cours Élémentaire de Maladies des Femmes, &c., 2 vols. 8vo. Paris. An. x., vol. ii., p. 284; *et seq.*—*J. Clarke*, An Essay on the Epidemic Disease of Lying-in Women, of the years 1787, '88, '89, 4to. Lond., 1788; and Practical Essays on the Management of Pregnancy and Labour, and on the Inflammatory and Febrile Diseases of Lying-in Women, 8vo. London, 1793.—*Jos. Clarke*, Observations on Puerperal Fever, &c., Edin. Med. Commentaries, vol. xv., p. 299. 1790.—*D. C. Doulet*, Mém. sur la Mal. qui a attaqué les Femmes en Couché à l'Hôtel Dieu, &c., 4to. Par., 1782; and in Jour. de Méd., t. lviii., p. 448, 502.—*F. Doublet*, Nouvelles Recherches sur la Fièvre Puerperale, 8vo. Paris, 1791.—*A. Gordon*, A Treatise on the Epidemic Puerp. Fever of Aberdeen. Lond., 1795.—*Holst*, in Roeschlaup Magazin der Heilkunde, b. iv., p. 294.—*Millar*, Observations on the Diseases of Great Britain, &c., p. 313.—*Reil*, Memorab. Clin-

ica, fasc. ii., art. 8; et de Febre Puerporarum. Halle, 1791.—*J. Hull*, An Essay on Phlegm. Dolens, including an Account of the Symptoms, Causes, and Cure of Peritonitis Puerperalis, &c. Manchester, 1800.—*Horn*, Archiv. für Medicinische Erfahrung, b. i., p. 18, 131; b. ii., p. 987. (*Is asthenic fever with local abdominal affection.*)—*J. B. L. Rouzier*, Consid. sur la Mal. de Femmes en Couches, dite Fièvre Puerperale, 8vo. Paris, 1803.—*J. P. Frank*, De Curandis Hominum Morbis, l. ii., p. 192.—*Baumes*, Reflexions sur les Mal. Aigues chez les Femmes en Couches, Paris, 1807; et Journ. Génér. de Méd., t. xxx., p. 120.—*Laennec*, Histoires d'Inflammations du Péritonée, 8vo. Par., 1804.—*Layler*, in Stark's Archiv., b. iv., p. 325. (*Instances without abdominal pain or swelling.*)—*Marabelli*, in Giornale di Milano, t. xi. (*An examination of the fluids effused in the peritoneal cavity.*)—*Marabelli*, in Giornale della più recente Letteratura, &c., t. xi., p. 65.—*Jaeger*, in Osiander, Neuen Denkwürdigkeiten, b. i., p. 202. (*Remarks on its fatal nature.*)—*Marcus*, Magazin für die Specielle Therapie, b. i., p. 363. (*Adduces Sthenic and Asthenic types of the disease.*)—*L. Boer*, Naturalis Medicinæ Obstetricæ Libri Septem, 8vo. Vien., 1812, l. iv.—*F. E. Naegeli*, Schilderung des Kindbettfiebers, welches vom Junius, 1811, &c., 8vo. Heidelberg, 1812.—*Dun*, in Edin. Med. and Surg. Journ., v. xii., p. 36.—*F. C. Naegeli*, Schilderung des Kindbettfiebers, 8vo. Heidelberg, 1812.—*Horn*, Archiv., &c. May, 1809, p. 92.—*Ibid.*, 1810, p. 312.—*Ibid.*, 1811, p. 519.—*J. Brennan*, Thoughts on Puerperal Fever, and its Cure by Spirits of Turpentine, 8vo. Dublin, 1814.—*J. Armstrong*, Facts and Observations relative to the Fever commonly called Puerperal, 8vo. 1813.—*W. Hey*, A Treatise on the Puerperal Fever, illustrated by cases which occurred in Leeds and its vicinity, in the years 1809-12, 8vo. Lond., 1815.—*Ramsbotham*, On sudden Sinking after Delivery. In Lond. Medical Repository, vol. ii., p. 42; *ibid.*, vol. iii., p. 309.—*Gaitskill*, in *ibid.*, vol. xiv., p. 180.—*D. G. A. Richter*, Die Specielle Therapie, &c., b. ii., p. 147.—*J. Burns*, The Principles of Midwifery, including the Diseases of Women and Children, 8vo. Lond., 6th ed., p. 556.—*A. J. Sedillot*, des Ternes, Recherches Historiques sur la Fièvre Puerperale, 4to. Paris, 1827.—*Douglas*, Dublin Hospital Reports, vol. iii., p. 139.—Puerperal Fever observed in Vienna in 1819. Edin. Med. and Surg. Journ., vol. xxii., p. 83.—*F. Ribes*, in Mémoires de la Société Méd. d'Emulation, &c., pour l'année 1816, 8vo. Paris, 1817, p. 624. (*Senious suppuration of the Uterine veins, with peritonitis in P. F.*)—*Murat et Gasc*, in Dict. des Sciences Médicales, t. xlv., p. 88.—A Treatise on the Epidemic Puerperal Fever, as it prevailed in Edinburgh in 1821, '22, &c., 8vo. Edin., 1822.—*J. Macintosh*, A Treatise on the Disease termed Puerperal Fever, illustrated by numerous Cases and Dissections, 8vo. Edin., 1822.—*Gaspard*, in Magendie's Journ. de Phys. expériment. et Path., t. ii., p. 1.—*M. Bernard*, Journ. Complém. des Sciences Médicales, Dec., 1819. (*Rupture of the uterus, the child having passed into the peritoneal cavity, whence it was extracted through an incision in the linea alba twelve hours afterward. The uterus had contracted fully: the woman recovered.*)—*Birch*, in Trans. of Med. and Chirurg. Society, vol. xiii., p. 357; and in Med. and Chirurg. Review, vol. viii., p. 335, 359. Edin. Journ. of Medical Sciences, vol. i., p. 160.—*S. Barnes*, in Trans. of Med. and Chirurg. Society, vol. vi., p. 583.—*Earle*, Medico-Chirurg. Review, vol. xii., p. 271. (*Treatment of vesico-vaginal fistula.*)—*Malogodi*, Archives Gén. de Médecine, t. xxi., p. 127.—*Cummin*, in Edin. Med. and Surg. Journ., vol. xxi., p. 62.—*Dupuytren*, his Treatment of Vesico-vaginal Fistula. American Journal of Med. Sciences, vi., p. 254.—*Campbell*, in Edin. Med. and Surg. Journal, April, 1828.—*Sweeting*, in Lond. Med. Repos., vol. ix., p. 353.—*R. Lee*, in Trans. of Med. and Chirurg. Society of London, vol. xv., p. 405; and Researches on the Path. and Treatment of the most important Diseases of Women, 8vo. Lond., 1833; and Cyclop. of Practical Medicine, vol. ii., p. 246.—*Hussong* et *Dance*, in Répertoire Génér. de Anat. et Phys. Patholog., t. iv., p. 74. Paris, 1827.—*Luroth*, in *ibid.*, t. v., p. 1.—*Boivin* et *Dugès*, Traité Pratique des Maladies du Puerus et de ses Annexes, t. i., p. 134.—*Göden*, in Philad. Journal of Medical Sciences, No. 12, p. 411.—*Fodéré*, in Med. and Phys. Journal, vol. xli., p. 433, 526.—*Ibid.*, vol. xlii., p. 36, 423. Lond. Med. Gaz., vol. xvi., p. 127, 177.—*Gasc*, Rêvue Médicale, t. ii., 1826, p. 345.—*Guerseit*, Archives Génér. de Médecine, t. xv., p. 385.—*Duges*, in *ibid.*, t. xviii., p. 454.—*W. P. Dewees*, A Treatise on the Diseases of Females, 2d edit., 8vo. Phil., 1823, p. 325, *et seq.*—*Wigton*, in Lond. Med. Repository, l. xix., p. 212.—*Velpeau*, Rêvue Médicale, &c. Janv., 1827. (*Mercurial frictions in P. F.*)—*Payne*, in Edin. Med. and Surg. Journ., vol. xviii., p. 538.—*Smith*, Répertoire Génér. d'Anatomie, &c., vol. v., p. 1.—*Danyau*, Essai sur la Metrite Gangreneuse, 8vo. Paris, 1823.—*Dance*, Essai sur la Metrite Puerperale, 8vo. Paris, 1826, et de la Phlébite utérine et de la Phlébite en général, &c. In Archives Génér. de Méd., Dec., 1828, et Jan. et Fev., 1829.—*J. Hamilton*, on the Diseases of Females, &c., 8vo, p. 196.—*Anon.*, Rêvue Médicale, t. i., 1827, p. 4. (*Cases of Uterine Phlebitis associated with Peritonitis.*)—*J. W. Collingwood*,

in London Med. Repos., vol. xv. 1821.—*Chapman*, Philadelphia Med. Journ., Febr., 1824. (*Turpentine with Castor Oil*).—*Kinneir*, Lond. Med. and Phys. Journ., vol. liv.—*Ehrhart*, Med. Chirurg. Zeit., b. iii., 1826. (*After general or local vascular depletions, when required, camphor, calomel, and opium. This was the treatment adopted by the author in 1823, '24, '25, &c., and then noticed in the medical journals of the day.*)—*M. Hall*, Commentaries on the moro important Diseases of Females, &c., 8vo. Lond., 1827, p. 151, *et seq.*; and Cyclop. of Pract. Med., vol. iii., p. 548.—*P. Dubois*, in Dict. de Méd., art. *Puerperale*.—*Schmidt-mann*, in Horn, Archiv. für Prac. Medicin., b. v., p. 27.—*Schmidt-müller*, in ibid., b. v., p. 222.—*Desormeaux*, Journ. Complem. des Sc. Méd., t. xxxvii., p. 209. Medico-Chirurg. Review, vol. vii., p. 201.—*Tonnelle* and *Legallois*, in Archives Génér., &c., b. xix.—*R. Gooch*, An Account of some of the most important Diseases peculiar to Women, 8vo. Lond., 1831.—*A. Danyau*, Essai sur la Metrite Gangreneuse. Paris, 1820.—*M. Nauche*, Des Maladies propres aux Femmes, 8vo. Paris, 1829, p. 465.—*Baudelocque*, Traité de la Peritonite Puerperale, 8vo. Paris, 1830.—*Beatty*, in Dublin Journ. of Med. Science, vol. xii., p. 296, and vol. xvi., p. 340.—*Alexander*, in Lancet, No. 327, p. 339, and No. 328, p. 373.—*Martin*, in ibid., Aug. 6, 1836, p. 640.—*Michælis*, in Brit. and For. Med. Review, Oct., 1837, p. 517.—*S. Susack*, on Puerperal Fever, in Edin. Med. and Surg. Journ., No. 98, vol. xxxi., p. 25. Lond. Med. and Surg. Journ., vol. iii., p. 18.—*Nonat*, sur la Metro-Peritonite Révue Médicale Franc. et Etranq. 1837.—*J. Davies*, in Lond. Med. Repository, vol. xxii., p. 177.—*Legallois*, Mém. des Mal. occasionées par la Resorption du Pus. Journ. Hebdom. de Med. 1828.—*Velpeau*, Traité Élémentaire de l'Art des Accouchemens, 8vo. Paris, 1829, t. i., p. 167.—*Anon.*, in Lond. Med. Gaz., vol. vi., p. 490.—*Waller*, in Med. and Phys. Journ. July, 1830.—*R. Lee*, Researches on the Pathology and Treatment of some of the most important Diseases of Women, 8vo. Lond., 1833.—*Dugès* et *Mme. Boivin*, Traité Pratique des Mal. de l'Uterus, &c., t. ii., p. 216.—*Coely*, in Lancet, for 7th of March, 1835.—*Crucilhier*, Anatomie Pathologique, livr. iv. and xiii.—*Tonnelle*, des Fièvres Puerperales Observées à la Maternité de Paris. In Archives Génér. de Méd., t. xxii., p. 356.—*Duplay*, in ibid., t. xxxvii., p. 293.—*Bartsch*, in Lancet, 16th of April, 1836.—*Ingleby*, on Epidemic Puerperal Fever, in Edin. Med. and Surg. Journ. 1838, vol. xlix., p. 412.—*G. Moore*, An Inquiry into the Pathology, Causes, and Treatment of Puerperal Fever, &c., 8vo. Lond., 1836.—*Y. Ackerley*, in Lond. Med. Gazette. 1838.—*Paley*, in ibid. for 1839.—*R. Ferguson*, Essays on the most important Diseases of Women, part i., Puerp. Fever, 8vo. Lond., 1839.—*R. Colkins*, A Practical Treatise on Midwifery, &c., &c., 8vo. Lond., 1835, on P. F., p. 380.—*F. Churchill*, Observations on the Diseases incident to Pregnancy and Child-bed, 8vo. Dublin, 1840, p. 233.—*E. Raynaud*, des Affections Gangréneuses observées chez les Nouvelles Accouchées, 4to. Paris, 1841.—*Storrs*, in American Journal of the Medical Sciences. Jan., 1843.—*O. W. Holmes*, Of the Contagiousness of Puerperal Fever, in New-England Quarterly Journ. of Med. and Surgery. April, 1843, p. 503. (*A very able and sensible Memoir.*)—*Rokitansky*, Handbuch der Speciellen Pathologischen Anatomie, b. ii., p. 556-579.—*Roche*, Nouveaux Elements de Path. Medico-Chirurg. Paris, 1844, t. v., p. 438.—*F. H. Ramsbotham*, The Principles and Practice of Obstetric Medicine and Surgery, in reference to the process of Parturition, &c., 2d ed., 8vo. Lond., 1844, p. 513, *et seq.*—*J. F. Simon*, Animal Chemistry, with reference to the Physiology and Pathology of Man, 2 vols. Translated by *G. E. Day*, 8vo. Lond., 1845, vol. i., p. 232.—*P. U. Schleismir*, Barselsfeberens og den Purulente Infections Pathologie, &c., 8vo. Kiøbenhavn, 1846.

[AMER. BIBLIOG. AND REFER.—*Alexander F. Vache*, Reports of Cases of Puerperal Fever occurring at the New-York Almshouse, in New-York Journ. of Medicine, vol. iii., p. 97-192.—*J. A. Davenport*, An Essay on Puerperal Fever, in New-York Journ. of Medicine, vol. iv., p. 313.—*Austin Flint*, Report of Cases of Epidemic Puerperal Fever occurring at Buffalo, New-York, in New-York Journ. of Med., vol. v., p. 25.—*C. S. Magoun*, in Boston Med. and Surg. Journ., vol. ii., p. 99, v. 33.—*William Harris*, Lectures on Puerperal Fevers. Phil., 1845, p. 50, 8vo, and in Boston Med. Journ. vol. ii., p. 238, 245.—*J. L. Chandler*, in Boston Med. and Surg. Journ., vol. ii., p. 341. (*Dr. C. describes a singular epidemic in Rutland county, Vermont, in which all the females confined with their first children over a large section of country were attacked, and all others escaped.*)—*John Ware*, Account of some Puerperal Cases in the Boston Almshouse, 1823, '4, in New-England Journ. of Medicine and Surgery, vol. xiv., p. 13.—*Norman Lyman*, in ibid., vol. xiii., p. 337.—*Robert Kelsey*, in Boston Med. and Surg. Journ., vol. xii., p. 312.—*D. F. Condie*, in Quarterly Summary of Transactions of the College of Physicians of Philadelphia for May, June, and July, 1841.—*Hall and Dexter*, in Amer. Journ. of Med. Sciences, 1843. (*Some of the best accounts on record of the identity of puerperal peritonitis and epidemic erysipelas.*) Also, in Boston Med. and Surg.

Journ., vol. xxix., p. 490.—*Charles Knowlton*, in Boston Med. and Surg. Journal, vol. xxx., p. 92-5.—*Samuel Knee land*, on Contagiousness of Yellow Fever, in Amer. Journ. of Med. Sciences, vol. ii., p. 45, N. S.—*F. W. Sargent*, in ibid., vol. x., p. 287, N. S.—*O. W. Holmes*, in New-England Quarterly Journal of Medicine and Surgery. April, 1843.—*M. M. Wilson*, in Amer. Journ. of Med. Sciences, vol. v., p. 244, N. S.—*Charles D. Meigs*, Translation of Calombat d'Isere, Am. edit., and Introductory Essay to Treatises of *Gordon*, *Hey*, *Armstrong*, and *Lee*. Philad., 1842, 8vo, p. 338; also, Females and their Diseases: a Series of Letters to his Class. Phil., 1848, 8vo, p. 670.—*John W. Francis*, American edition of *Denman's* Midwifery. (*Dr. F., like Dr. MEIGS, is strongly in favour of copious bleeding in the early stages of this disease.*)—*Willoughby*, on Puerperal Fever, in New-York Med. and Phys. Journ., vol. v.—*M. P. Dewees*, on Diseases of Females.—*R. M. Hurton*, Am. edit. of *Churchill's* Midwifery. Phil., 1848, 8vo.—*G. S. Bedford*, Translation of *Baudelocque* on Puerperal Peritonitis, 8vo.—*S. Bard*, Treatise on Midwifery, &c., 8vo.—For various isolated notices on the subject of Puerperal Fever, see different American medical journals. The monograph of *Dr. O. W. Holmes* and the Lectures of *Dr. W. Harris* are the most important contributions to the literature of this disease yet made in this country.]

PULSE.—*Pulsus*.—Σφύγμος. *Pouls*, Fr. *Puls*, Germ.

CLASSIF.—GENERAL PATHOLOGY.—SEMI-  
OLOGY.

1. The arterial pulse is produced by the blood thrown into the aorta by each contraction of the left ventricle. There are three elements which contribute to the production of this phenomenon: 1st. The arterial tubes or vessels which manifest it to the touch; 2d. The blood, or contents of these tubes, which, upon receiving the impulse from the heart, affect the condition of the arteries; and, 3d. The heart itself, which originates the impulse transmitted through the blood to the vessel, and by the vessel to the touch. According to the conditions of these three elements or constituents of the pulse—the arteries, the blood, and the heart—and to the various combinations which they may severally produce, will the pulse vary in disease, and even in health, although within a much more confined range. These three constituents of the pulse require an individual and particular consideration in estimating the states of the pulse, or, rather, as the causes of these states, and in connecting these states with functional and organic changes—with the manifestations of vital power and action.

2. I. HISTORICAL NOTICES AS TO THE PULSE.—Little mention is made of the pulse by HIPPOCRATES; and CELSUS notices it chiefly to record his opinion as to its fallacies. GALEN may be justly viewed as the first who attempted to investigate the pathological relations of the pulse, and he did this at great length. An abridgment of his treatises on this subject has been made and published by ANDRÆA LACUNA. As far back, probably, as the days of GALEN, if not even farther, the Chinese had published treatises on the pulse; and by means of their acquaintance with it, and by it chiefly, they pretended to a knowledge of all diseases. The importance attached to the pulse by GALEN, and by all the writers on medicine in Eastern countries, in ancient times, appears to have been such as to have given rise to the greatest charlatany and pretence in the practice of medicine. It was supposed in those times, and down to the present day in these countries, that the pulse furnished all the information which the physician required, both as to the seat and as to the nature of a disease; and it was not until past the middle of the seventeenth century that attempts were made by BELLINI to



investigate the subject with some reference to scientific principles; the researches and discoveries of HARVEY having opened paths by which the ruins of ancient opinion might be removed, and laid foundations for permanent structures. The publication of Sir J. FLOYER's "pulse watch," in 1707, first imparted precision to our estimation of the pulse; and various conditions of it, possessing much importance in practice, especially as being sources of prognosis, were pointed out by SOLANO in 1731, and more clearly illustrated by NIELL in 1745, in his "New and extraordinary Observations concerning the Prediction of Crisis by the Pulse." The subject was farther pursued by FOUQUET and BORDEU about the middle of the last century in France, and towards the close of that century by HEBERDEN and FALCONER in this country; these latter divesting the subject of much of the inanities and puerilities which had become connected with it since the days of GALLEN. Although these writers had thrown aside much of the encumbrances under which sound observation was more or less concealed, still correct views as to the states of the pulse were very far from being entertained. Nor could such views be exhibited while the morbid conditions—functional and organic—of the heart itself, the prime factor of the pulse, remained hardly or very imperfectly known.

3. II. PHYSIOLOGICAL PATHOLOGY OF THE PULSE.—Before the various states of the pulse can be duly considered, some notice must be taken of the conditions of each of the *three constituents* of the arterial pulse—of the *arteries*, of the *blood*, and of the *heart*.—A. The ARTERIES, as I have shown in other places (*see articles IRRITABILITY and SYMPATHY*), are not inert tubes, but living vessels endowed with certain *vital* as well as *physical* properties.—a. Their *physical properties* are chiefly expansibility, extensibility, and elasticity: *expansibility* in the expansion of their diameters or enlargement of their calibres; *extensibility* in their elongation to a certain extent during muscular movements, and other causes; and *elasticity*, or the recovery of their natural states immediately upon the removal of the expanding and elongating causes. These properties are possessed by arteries in a very eminent degree, and in virtue of their conformation—of their fibrous coats, and of their serous and dense cellular and connecting tunics. They are evinced to a great extent after death; but they exist to a greater extent during life, vitality not only endowing these vessels with peculiar properties, but also increasing their physical qualities.

4. b. *The vital properties of arteries*, and which contribute very remarkably to form the character of the pulse, depend especially upon the organic or ganglial nerves, which not only accompany all the arterial trunks and ramifications, but form reticula around them, and are lost in their fibrous and serous coats; the states of organic nervous energy affecting the vital conditions of these vessels. These conditions or properties are referable to different states of one vital endowment, viz., *tone* or *tonicity*. According to the state of vital tone will the arteries manifest a greater or less degree of *expansion* or of *contraction*, both when subjected to the sense of sight and when examined by the sense of touch. The *expansion* and the *contraction* are

states of vital tone, or different states of vitality manifested by the arterial system, through the medium or influence of the organic or ganglial nervous system supplying it, and are easily made apparent by means of various agents; as, by plunging the hand in warm water, a certain increase of the vital expansion of the arterial vessels will follow, and the vessel will become full and broad; and by plunging the hand in cold water, the artery will become small and more contracted. In an excellent lecture by Dr. C. J. B. WILLIAMS (*Lond. Med. Gazette*, vol. xxi., p. 594), he observes, that he repeatedly observed the aorta of an ass recently killed contract very remarkably when plunged in cold water; while the pulmonary artery did not contract so much. The vital conditions of the arterial system vary remarkably: 1st. With the states of vital energy of the whole frame—with the states of constitutional power; 2d. With the influence of agents acting externally or internally on the vessels, the operation of agents varying according as they are thus external or internal; 3d. With the conditions of the capillary and venous circulations, and with the freedom from obstacle to the onward transmission of blood circulating through the arteries.

5. (a) When *constitutional or vital power* is *unimpaired*, the arterial pulse then presents a state of healthy or natural tone, modified somewhat with the peculiarity of constitution or the amount of vital energy. In these cases the pulse evinces neither broadness, nor expansion, nor softness, nor weakness, on the one hand, nor undue constriction, hardness, or smallness on the other. It is then possessed only of moderate firmness and fulness, its frequency or number in a given period depending upon the action of the heart. When vital power is *reduced*, and in proportion to the reduction, is the tone of the artery weaker and rendered soft, compressible, and otherwise changed according to the states of the blood and heart's action (*see § 6, et seq.*). When, on the other hand, the vital energy is *excited*, the state of the vessel is then firm, round, or hard, and otherwise altered with the action of the heart, and the quantity and quality of the blood. Marked modifications in the state of the arteries result from agents influencing the conditions of the organic nervous system; but these agents frequently also co-ordinately affect the heart—both the arteries and the heart; whether these agents affect this part of the nervous system *primarily* and *externally* to the arteries and heart, or *secondarily* and *internally* to the vascular system, by imbibition and absorption, or through the medium of the blood; the state of the arterial vessels being, in either case, thereby more or less changed, according to the nature of, and the influence exerted by, these agents. The natural conformation of the arterial system is sometimes different in different individuals, some persons possessing a more powerfully constituted state of this system than others, especially in respect of the fibrous coat, the vessels thereby acquiring increased tone, and often a greater degree of hardness or firmness, both in health and in states of excited action.

6. B. The BLOOD is another necessary constituent of the pulse; the uninterrupted column of blood, extending from the commencement

of the aorta to the part of the artery to which the finger is applied when feeling the pulse, being essential to the sensation communicated by the artery to the organ of touch. It is presumed, in our examinations of the pulse, that the states of this column of blood are the same throughout the arterial system, the difference being only as respects the diameter and length of the column, according to the artery which is felt. This, however, is not always the case, as slight modifications will occasionally follow from local determinations, influenced by the state of nervous power, and from local impediments or obstructions to the venous or capillary circulation of a part. But without reference to these modifications, we shall find sufficient sources of alterations of the pulse in the *conditions of the blood* circulating through the arterial system. The conditions of the blood which affect the pulse are, 1st. *Quantity*; 2d. *Quality*, or alterations in its physical and *sensible conditions*, and probably also in its *vital states*.

7. *a.* Adverting first to *quantity*, it is obvious that any deviation from that quantity which is adapted to the capacity of the vascular system generally will affect, in a very sensible manner, the arterial pulse, as respects both the states of the arteries and the contractions of the heart. When there is a *due correspondence* between the capacity of the vascular system and the quantity of blood circulating in this system, the coats of the arteries will be kept in that state of healthy tension, or tone, favourable to a regular, firm, free, natural, or healthy pulse, varying chiefly in frequency with the state of the heart's action, which will depend upon either exciting or depressing causes.—(a) When the quantity of blood in the system is *excessive*, more or less of oppression may be evinced in the state of the artery, as well as either of increased or of diminished frequency, much of these changes arising from existing states of vital excitement or depression. Excessive fullness of blood, however, may exist, and, being attended by congestion of one of the minor circulations—of the lungs, of the liver, or of the sinuses of the cerebro-spinal axis—may not materially affect the pulse. But as this state will not long continue without evincing its connexion with either depression or reaction of vital power, so will the pulse, through the medium of the heart's action, be slow or frequent, as well as oppressed; the degree of frequency depending on the heart's contractions, and these contractions depending upon the state of the organic nervous or vital influence, and other causes, to be noticed hereafter. The sensation produced by an artery in cases of excessive vascular fullness I have designated that of oppression, the vessel feeling as if it were kept in a state of tension, or of distention, in the intervals between the beats; and, if the pulse be at the same time much accelerated, an idea suggests itself that the heart is excited by the load, and, by its more frequent contractions, is endeavouring to disembarass itself and the vascular system generally; while if, with this state of the artery, the pulse is slow, the notion presents itself that the organic nervous energy actuating the heart is insufficient for the amount of blood circulating through the frame. Under these circumstances, it is found that the abstraction of blood renders the pulse more free,

less tense or oppressed, and more natural, while it diminishes the acceleration in the former circumstances, and increases it in the latter.

8. (*b*) *Deficiency of blood* is attended by a very different state of the arterial pulse; the frequency of it depending, as in all other cases, upon the cardiac action, and the tone of the vessel very much upon the state of vital power. When the blood is very deficient in quantity, the state of the pulse will depend much upon the power of the vessel, and of the vascular system generally, to accommodate themselves to that deficiency. If the vital or the organic nervous power is not depressed to a very low state, the vessels will evince merely less fullness, or become more constricted or smaller, yet, at the same time, soft or compressible. If vital power is excited or irritated, notwithstanding the loss of blood, the vessel imparts, with great frequency, much quickness, or suddenness of impulse against the finger, and greater constriction. If it be extremely depressed, the pulse may be either rapid or slow, according to the irritability of the heart, but the vessel feels very soft or compressible, the slightest pressure obstructing its canal, while the impulse communicated to the column of blood in the artery is quick or rapid when the heart's action is excited, the vessel feeling as if it were nearly empty between each impulse, and is slow, undulating, and weak when the contractions of the left ventricle are much weakened, and irritability exhausted. Much, however, of the changes in the states of the pulse, with alterations in the *quantity* of blood in the body, is owing not only to the associated state of cardiac action, but also to the *quality*; to the constitution and states of the blood, physically, sensibly, and vitally.

9. *b.* The *quality of the blood*, as well as the quantity, has been shown in various parts of this work (see art. BLOOD, DISEASE, FEVER, PESTILENCE, &c.) to be remarkably changed in its sensible appearances, and in its vital states. I have in several places attempted to show that the blood, in addition either to excess or deficiency in its quantity, may have either an excess or deficiency of its red globules, or of its fibrin, or of any other of its constituents; and that it may, moreover, abound in morbid or in foreign matters, owing either to imbibition and absorption, or to imperfect depuration and excretion. Still there are manifestly additional morbid states of this fluid which also affect the pulse, although these cannot be accurately estimated in grade or kind: these are the vital conditions of the blood, derived from the vessels and body generally, through which this fluid circulates. That there is a very intimate relation and even connexion between the vital conditions of the vascular system and the constitution of the blood, especially of its globules and liquor sanguinis, cannot be doubted; and although the vital states of the blood are derived from or dependant upon those of the vascular system, still they react upon this system, especially if they continue for any time, or are not removed by the efforts of the constitution, or by the aids of medicine.

10. During the progress or continuance of changes in the sensible qualities and vital states of the blood, especially as evinced in the course of rheumatic, inflammatory, or of adynamic,



malignant, and pestilential maladies, the pulse can only imperfectly manifest such changes, which usually commence in the nervous and vascular systems, although most apparent in the blood. In cases of *vascular excitement*, in inflammations, in acute rheumatism, &c., the fibrin of the blood is abundant, and the vital crasis of the coagulum is firm or even increased, and these states may continue after repeated blood-lettings, showing that these changes of the blood proceed from vascular excitement or reaction rather than that the changes in the blood cause the vascular reaction; the condition of the blood being the effect, not the cause of the state of the pulse, which is always more or less quick, sharp, and rapid, owing to the increased irritability and irritation of the heart. When, with this state of vascular excitement, there is also vascular fullness, then the pulse will feel full and hard, as well as sharp, quick, or rapid; but if the vascular excitement continues, or is fed by irritation or pain, or by the state of organic nervous sensibility and energy, after the vascular system is depleted, or after large losses of blood, then the pulse will become sharp, constricted, rapid, and of various grades of tone or strength, according to the nature and seat of the disease, as observed in acute rheumatism, &c.

11. In cases of *depressed vital power*, or when the organic nervous energy and vascular action are more or less weakened, as well as otherwise altered, as in the course of malignant, pestilential, or specific maladies, the fibrin of the blood is diminished, the constitution of the hæmato-globuline is altered, and the crasis of the blood remarkably impaired. In these circumstances the pulse is affected, and the experienced and close observer may even predicate from the state of the pulse the character of the changes proceeding in the blood, although he may not infer their exact amount; but according to their nature and extent—in proportion to the loss of vital power and of the crasis of the blood—will the pulse become open, broad, soft, weak, and compressible, the artery suggesting to the mind of the examiner ideas of defective or lost tone, of impaired elasticity, and of relaxation. But with these changes in the vessel others are associated, depending upon the amount of blood and the state of the heart's action. If the blood be abundant in quantity, in proportion to that abundance will the pulse be full as well as broad and soft. The artery will furnish a sensation of largeness, and feel full and broad, but still soft between each impulse communicated by the contraction of the ventricle, the parietes of the vessel feeling as if they yielded to the impulse, especially if the heart's action be excited. If, on the other hand, the amount of blood be deficient, the pulse is not only soft, weak, relaxed, or open, and very compressible, but the vessel feels to the examiner as if it were nearly empty between each wave of fluid undulating through it, the impulse of each wave being quick or sudden while the heart's action continues excited, but weak, or languid, or slow as the irritability of the heart becomes exhausted. The action of the heart will be noticed hereafter; but it may now be stated that, in these as well as in many other circumstances, to it belong those changes in the number of the pulse in a given time with

the qualities of quickness, sharpness, or suddenness of the impulse of the column of blood against the parietes of the vessel where it is pressed upon by the finger, or with the opposite qualities of languor, weakness, smallness, &c., according to the excited, or weakened, or nearly exhausted irritability of this organ.

12. C. The HEART furnishes, besides *frequency*, several other qualities, as already noticed, to the pulse. The influence of the heart on the pulse is, 1st. *Functional*, or dependant upon the strength or weakness of the contractions of the organ, and upon the grades of irritability possessed by it; and, 2d. *Structural*, or owing to lesions in the parietes of the cavities, or in the valves or orifices of the heart.—a. The *functional influence* of the heart on the pulse varies with different diseases, as these diseases are characterized by excited or increased organic nervous energy and vital power, and increased irritability of muscular and contractile parts on the one hand, or by impaired or exhausted power and irritability on the other. The heart being, by nervous supply from the ganglial and cerebro-spinal nervous systems, and by muscular structure and vascular connexions, intimately associated with all the vital functions, is not only influenced by these functions, but also influences them. But whatever may be the state of the heart's action, thus influenced and influencing, the *frequency* and the character of the *impulse* communicated to the column of blood in the artery is produced by the contractions of the left ventricle. When the actions of the heart are unimpaired in tone or in strength, if the irritability of its structure is unexhausted, the frequency of the pulse is seldom very great, although the excitement may be very considerable. In strongly constituted persons the pulse seldom rises above 100 in a minute, even during inflammations; and it is only as the excitement or irritation becomes associated with diminution of vital power—this latter always gradually supervening upon, and increasing with the continuance of excitement or irritation—that the pulse becomes very frequent, or much above 100. In delicate, susceptible, or nervous females especially, the pulse is often very rapid during nervous excitement; or in various febrile or inflammatory diseases, or in states of irritation; but in them power is deficient, and although the irritability of the heart is readily excited, it is the more rapidly exhausted.

13. But frequency of pulse may be occasioned not only by nervous excitement, by increased irritability, or by febrile or inflammatory action, but also by losses of blood, and by the want of due correspondence between the quantity of blood and the capacity of the vascular system in general. It is difficult, however, to determine whether or not the increased frequency be caused by this want of correspondence, and the efforts made to compensate for deficient quantity by accelerated motion, or by augmented excitability consequent upon the loss of blood. Most probably this latter effect is that which is immediately caused by this loss; the former effect, or the compensating influence of accelerated motion, being the result of exalted excitability. But the acceleration of the heart's contractions caused by losses of blood has always a more or less obvious relation to the

amount of such loss, and to the conditions of the blood which remains. If the quantity lost be very great, the irritability of the heart soon becomes exhausted, even although the morbid state of the remaining blood, or other sources of irritation, may tend to excite and to prolong the irritability of this organ. This is evinced by various diseases for which large vascular depletions are ordered, and by acute or active hemorrhages, &c. At the commencement of the former of these, while the vascular system is full, vital energy excited, and the blood uncontaminated, or at least not very materially altered, the pulse is full, firm, or strong, and not remarkably frequent, the contractions of the heart being energetic, without abruptness or quickness. After a considerable loss of blood the pulse becomes soft, the impulse of the column of blood against the wall of the artery pressed on by the finger much more frequent and more abrupt, and the vessel is felt more empty in the interval between each impulse. The contractions of the ventricles are more frequent and sudden, because the excitability of the organ is at first increased, probably, not only in consequence of the loss of power, but, also, owing to the state of the blood supplied to the structure of the heart itself. If still more blood be lost, the constitution of the remaining blood is more or less altered, the pulse becomes more accelerated, more abrupt and quick, softer, smaller, or more compressible; the contractions of the heart more numerous and abrupt, but much less energetic; and if the patient be not aided, or if still more blood is abstracted, the action of the heart becomes weaker and weaker; in some cases so frequent as not to be counted; in others as remarkably slow, according to the states of the remaining blood, and of the organic and cerebro-spinal systems, by which the vital properties of muscular structures, irritability, and excitability are developed and influenced.

14. A somewhat similar procession of changes in the pulse follows acute hemorrhages. During the vascular excitement often preceding the loss of blood the pulse is very full, more or less frequent, and often bounding, the impulse of the column of blood against the walls of the vessel apparently exciting a reaction, or developing the elastic property of the artery. In this case the contraction of the ventricle, and the consequent momentum transmitted to the column of blood, is so great or energetic as partially to overcome the vital tonicity of the artery, and to manifest the resiliency of its walls; hence the bounding or hemorrhagic pulse. But as soon as blood is lost, particularly if the quantity be large, the pulse becomes still more frequent, quicker, or more abrupt, much softer and opener, the vessel feeling more empty, or, at least, much more compressible in the intervals between the abrupt or sudden pulsation. If the hemorrhage be still progressive, and excessive or fatal, the pulse will present changes similar to those just mentioned, modified, however, by constitution, by the seat of hemorrhage, and by the diversified circumstances affecting the patient externally and internally. In many cases, however, commencing in the acute manner described, a moderate loss of blood, by relieving the vascular system of a load too great for the tonicity of the vessels, and by lowering the in-

creased action of the heart, restores this system and the pulse to their natural states, and, with such restoration, a cessation of the hemorrhage results.

15. *b.* The influence of *lesions of the heart* upon the pulse is necessarily remarkable. But the changes in the pulse which these produce belong to the diseases of the membranæ, the valves, the orifices, and the structure of this organ. (*See art. HEART.*) These changes consist of intermissions, irregularities, smallness, weakness, remarkable slowness, and numerous other states of the pulse, which, however, can never be duly estimated without a close examination of the sounds and impulses of the heart simultaneously with a similar examination of the pulse, and a comparison of the phenomena furnished both by the heart and by the artery. Many of the states of the pulse caused by structural lesions of the heart may also proceed from nervous and functional disorder; impaired nervous power of the organ, with or without other functional changes affecting the state of the heart or large vessels, so disordering the actions of the ventricles as to produce intermissions, irregularity, inequality, remarkable frequency or slowness, or smallness, &c., which soon disappear as nervous power is restored, or the functional disorder is removed. A pulse may present intermissions, although the heart contracts during the intermission, the contraction being only too weak to communicate a momentum to the column of blood sufficient to be felt by the examiner, or the quantity of blood thrown out by the ventricle being too small to produce any manifest change in the column of blood in the artery.

16. III. SEMEIOLOGICAL NOTICES OF THE PULSE. —Having considered the *principles* on which our knowledge of the pulse is based, and with due reference to the principal conditions of the three *constituents*, or elements of the pulse, it may be useful to take a brief view of those states of the pulse which attend, and hence indicate certain morbid actions, and their several seats. In the view which has just been taken of the elementary principles of the pulse, it has been shown that changes in the vital manifestations of the frame—in the organic nervous energy, in the irritability or excitability of living fibres, and in the quantity and quality of the blood—remarkably and co-ordinately affect the tone of the vessels and the contractions of the ventricle; and that, while an alteration may originate in any one of the three constituents of the pulse, and affect it chiefly for a time, it will not long exist thus limited, but will implicate more or less the others. Changes commencing in the blood will affect both the tonicity of the vessels and the actions of the heart, and generally co-ordinately in grade and in kind. Changes, moreover, originating in the organic nervous system will necessarily extend themselves not only to the heart, but also to the arteries, as it is this system which supplies and actuates both heart and arteries, and ultimately to the blood and structures generally; and the alterations thus superinduced in the blood will react upon both the heart and arteries. Hence, in the course of disease, the pulse becomes a more or less accurate index of the vital conditions of the heart, of the vascular system generally, and even of the blood; the indications



furnished by it being accurate, according to the powers of the physician to interpret them correctly, the want of accuracy depending more upon the observer than the object of observation. The pulse varies in *diseases*, and even slightly in *health*, as to its *development* and *rhythm*.

17. i. The *DEVELOPMENT* of the pulse differs in different cases, and in different stages of the same case, in *force*, *consistence* or *tone*, and in *volume*; and according to these differences, and to the various combinations of these, the following states of the pulse occur, without reference to frequency or rhythm: 1st. Hard, resistant, tense, firm, or sthenic. 2d. Contracted, constricted, or concentrated, and small. 3d. Full, large, broad, ample, or open, and bounding, rebounding, &c. 4th. Soft, compressible, empty, weak, feeble, unequal, small, &c. 5th. Precipitate, quick, rapid, sudden, vibratory, &c. 6th. Languid, undulatory, &c. Several of these terms are, however, nearly synonymous, and convey the same, or very nearly the same idea. —ii. The *RHYTHM* of the pulse, in its various grades, is *superadded* to any of the above, and differs remarkably in frequency, regularity, and inequality, or intermittence.

18. A. A *hard, resistant, tense, firm, or sthenic pulse* are terms applied by writers to convey nearly the same notion, and are met with, attended by more or less *acceleration* of the pulse, in young, robust persons of the sthenic diathesis and muscular habit, and irritable temperament, during the early stage of reaction in inflammatory fevers, in inflammations of serous membranes, in acute rheumatism, in inflammations of the membranes of the brain, in the hot stage of intermittents, and in eccentric hypertrophy of the heart, and when the arterial system is strongly developed. They always indicate the sthenic diathesis, and excited power and action, and admit of large vascular depletions.

19. B. A *contracted, constricted, concentrated, and small and hard pulse* are various terms applied to the same state, and are intended to convey an idea of that pulse which is met with in some cases of the diseases just mentioned, especially when there is less fulness of blood, and which is usually attended with greater acceleration of the heart's contractions, and indicates a more violent and less favourable disease. This state of the pulse, as well as the foregoing, seldom continues long without passing into some one of those about to be noticed; and it more especially indicates the supervention of structural lesion, and a dangerous issue if not promptly or actively treated, especially by moderate and early depletion, diaphoretics, relaxants, and derivatives.

20. C. A *full, large, ample, broad, open, bounding, or rebounding pulse* are states not altogether identical, but very nearly approaching each other. They are met with in various diseases. —a. In inflammatory fevers, especially at an advancing stage or after a moderate depletion. —b. During inflammations of mucous, cellular, and parenchymatous structures. —c. In inflammations of serous membranes after the preceding states of the pulse have been removed by large blood-lettings. —d. Preceding and accompanying hemorrhages, the pulse being also much accelerated when the hemorrhage is abundant, and when inflammations have been treated by copious blood-lettings. The pulse is fre-

quently then open and compressible, rather than full, and often passes into the two next states to be noticed. A full, large, or broad pulse is often observed in inflammations of the structure of the lungs, and of the substance of the liver, with various grades of acceleration. It is generally met with in young, plethoric persons, and in the sanguine temperament, also in the scrofulous and hemorrhagic diathesis. It indicates a less degree of tolerance of blood-letting than the preceding states; and if it assumes an open, bounding, and, at the same time, a compressible quality, blood-letting should be prescribed with great circumspection.

21. D. A *small, soft, compressible, feeble, empty, and unequal pulse* are modified conditions, which severally indicate important states both of the vital power and of the blood. *Smallness* is generally dependant upon diminished quantity of blood, or an afflux of the fluid to a quarter remote from that where the pulse is felt. *Softness* and *compressibility* indicate defective tone and vital power. *Feebleness* is merely an advanced state of the same qualities, showing still greater depression of power, especially of the heart; and a feeling of *emptiness* in the vessel suggests the same condition, and a deficiency of blood in addition. *Inequality* of the tone, or strength, or fulness of the pulse usually attends, as well as the other qualities just instanced, diseases characterized by debility, or a far-advanced stage of acute maladies; and in these several circumstances it presents certain modifications. The strength, tone, and fulness of the pulse may differ in different parts of the body; and this is not uncommon in the course of various nervous diseases. It generally occurs also in connexion with local congestions and determinations, and in various states of exhaustion and of the blood. The inequality may exist as regards the character of the pulse in the same vessel, and it may then present a modified form in different diseases. It may be unequal, inasmuch as it varies in strength and fulness for three, or four, or five beats in an ascending scale, or in a descending scale returning for two, or three, or more pulsations to a natural standard, or to a more constant rate or grade. This state of the pulse is often met with in the advanced course of diseases of the abdominal viscera, when inflammations of serous surfaces terminate in effusion, after hemorrhages or during convalescence from them; and it is generally attended by a varying rhythm, or by different degrees of acceleration.

22. E. A *precipitate, rapid, quick, sharp, sudden, vibrating pulse* should not be viewed as indicative of increased frequency. These terms, which are expressive of the same, or nearly the same quality, have reference merely to the character of the impulse of the column of blood in the vessel against the finger, and, as the impulses are thus brief, the intervals between them are more distinct, or even prolonged, when the pulse is not accelerated, which, however, it generally is more or less when it presents this character. These states of the pulse are caused by the rapid or precipitate contractions of the ventricle, and are indicative of morbidly excited irritability in connexion with deficient power, and often also with more or less anemia. It is met with in chlorosis, in anemia, in diseases of debility characterized by increased

susceptibility and excitability, in the advanced stages of acute diseases, especially after copious hemorrhages and blood-lettings, and in the advanced progress of fever, and when the blood is either contaminated or deficient. When there is no deficiency of blood the pulse may, at the same time, be full, large, or open, or even bounding (§ 20), but it usually is also soft or compressible, indicating the defective vital power which attends it. More or less frequency is also present, especially in the advanced stages of acute diseases, when the acceleration is generally very great, and great in proportion to the exhaustion of vital power. This combination of quickness or precipitancy with extreme frequency is characteristic of the operation of contaminating poisons, of poisoned wounds, of malignant puerperal and other fevers, and of that state of morbid action which surgeons have called irritative fever, and which is owing to excessive irritation in connexion with depressed vital power, and often also with a poisoned or contaminated state of the blood. It suggests active means of a powerfully restorative nature, and diametrically opposite to vascular depletions; and yet I have seen these latter insisted upon, and even employed to the rapid destruction of the patient, the quickness and great acceleration of the pulse having been misunderstood from a culpable ignorance of the states of the pulse, and of the indications furnished by a true interpretation of them.

23. *F. A languid and undulating pulse* occurs in the course of diseases characterized by exhausted vital power, especially in melancholic temperaments and leucophlegmatic habits of the body. When the pulse is merely languid, a weak and protracted contraction of the ventricle may be inferred, owing either to exhausted or to weakened excitability, or to visceral congestion. If the pulse be also small, deficiency of blood generally also exists, and this is still more likely to be the case if the pulse assumes an undulating character. Languid and undulating states may coexist with various grades of frequency, but the latter is most manifest when the pulse ranges below, or but little above 100 or 110 in a minute.

24. ii. The *РѢТМЪ*, or frequency of the pulse, differs both in *health* and in *disease*.—*A.* In *health* it varies with the *age*, *sex*, and the *temperament* and *diathesis* of the individual.—*a.* As to *age*, the pulse usually ranges from 120 to 130 soon after birth; and it is generally somewhat more frequent, or from 130 to 150, during the early course of dentition, or from three to six or seven months. After six or seven months, the pulse becomes less frequent with the advance of age, so that at about two years of age and up to four it varies from 115 to 110, and from four to ten it ranges from 110 to 90 or 80. After puberty, and during middle age, the pulse varies in different persons from 60 to 80 in a minute; and, as old age advances, the pulse generally falls to 50 or 60, or ranges between these numbers; numerous exceptions, however, occurring, and even instances of an increased frequency sometimes being met with.

25. *b. Sex* has some influence on the frequency of the pulse. In *males* the pulse in health varies from 60 to 75, with the position of the body, &c., from 65 to 70 or 72 being the most common grade of acceleration. In *females* the pulse

usually ranges from 70 to 80 or 85, and it is also more excitable, particularly upon mental emotions, especially in early age, a similar excitability being also often observed in males about the age of puberty or soon after. The most common range in females in good health is from 72 to 80; but the pulse is usually more frequent and more developed during pregnancy.

26. *c. The temperament and diathesis* affect the pulse in a slight degree even in health and in repose, as the pulsations are somewhat more frequent in the nervous, the irritable, and sanguine than in the melancholic, bilious, or leucophlegmatic or lymphatic temperaments, and the action of the heart is more excitable in the former than in the latter, and in the scrofulous than in the rheumatic diathesis. Habit of body also affects the pulse more or less; but much depends upon the actual fullness of the vascular system; for if plethora exist, the pulse may be a little slower than the usual rate, especially in a state of repose; and if the blood be somewhat deficient in quantity the pulse may be much accelerated, and very excitable. In all our investigations of the pulse, not only the above causes of variation in frequency should be recollected, but others also of not less influence, as the *position* of the body, and the states of *sleeping* and *waking*.

27. *d. The position* of the body varies the frequency of the pulse more or less; but, according to my own observation, in no definite grade, the effect in health, and still more manifestly in acute and febrile diseases, differing in amount with different individuals, in some cases in a very remarkable degree, and in others very slightly. The *recumbent position* generally reduces the pulse somewhat below the standard of health, as observed in the *sitting posture*; while the standing posture raises the pulse above this standard even more than the recumbent depresses it. As to any scale of depression in the one posture and of exaltation in the other, it is impossible to determine with satisfactory accuracy, as the variation, which is wide in different cases, and even in the same case at different times, depends most probably upon several causes besides those already adverted to, and it is not more easy to assign the *causes* than to determine the exact *amount* of variation. The complete repose of the body and absence of muscular exertion during the *recumbent position* may be supposed likely to leave the heart also in a state of quietude; but probably other circumstances favour this state of the circulation. The slight retardation or embarrassment of the respiratory movements, when a person lies on either side, the position of the heart with reference to itself and its large vessels, and to that of the trunk and the contained viscera, the disposition to congestion of the lung of the side on which the person lies, and the state of the circulation within the cranium, seem to me severally to combine to slightly retard the circulation in the recumbent position. In the *sitting posture* these causes are removed, and with them the retardation of the pulse, while the heart is in a position the most favourable for its action. That the *standing posture* should accelerate the pulse may be inferred, although to a less amount than is often observed, from the circumstances of this posture admitting not only of a free circulation,



but also favouring it by the slight degree of muscular action required to sustain this position. It also favours the full exercise of the respiratory functions, which will also influence the circulation more or less.

28. *c. Sleeping and waking* favour different states of frequency of the pulse. During *sleep* the pulse becomes slower than in the sitting posture, and even sinks below what the recumbent posture generally manifests, and it is at the same time softer. The influence of sleep in reducing the frequency and tone of the pulse is most remarkable in nervous and irritable persons, in females, and in early age, in whom the pulse often then becomes unequal. *Dreaming*, however, often excites the pulse much above the healthy standard; so that the individual may awaken up remarkably excited with palpitations, flushings, or with pallor, and a rapid, small, or weak pulse, according to the nature of the dream—as the dream occasions fear, anxiety, depression, or anger, &c.

29. During the *waking hours*, the pulse is liable to be remarkably affected, not only by the emotions of mind, but also by the impressions made on the senses, according to the various states of excitability of the heart. The influence produced on the pulse in the *course of the day* is not very remarkable, as so many causes of deviation are apt to occur, and affect the individual more or less—the external or physical influences to which he is exposed, the emotions of mind, the *ingesta* and *egesta*, and the states and stages of digestion and assimilation. It was stated by Dr. Knox that the pulse is more frequent soon after waking in the *morning*; but Dr. CHRISTISON has shown that the heart is only more excitable in the morning, the pulse continuing nearly the same throughout the day, all things being equal; but much depends upon the nature of the food, even in the absence of all stimuli.

30. *B. DISEASE* furnishes the widest range in the *rhythm* of the pulse, and the greatest deviations from the healthy condition. The *morbid pulse* may range from twenty or thirty to two hundred, or even more, beats during the minute; but neither of these extremes can be looked upon as being compatible with a probable, or even with a possible recovery, or with the continuance of life for any time.—*a.* Remarkable *slowness of the pulse* may be caused by pressure on the brain, especially near its base and the medulla oblongata, or by intense vital shock; but the more extreme states of slowness most frequently depend upon structural or vital lesions of the heart itself. A more than usually slow pulse may, however, be constitutional, or be met with in health. I have thus found the pulse range from 50 to 60 in a minute; and a pulse from 55 to 60 is not infrequent in bilious, melancholic, and leucophlegmatic temperaments and diatheses; and it is sometimes hereditary. Great slowness of the pulse occasionally is observed on the invasion of acute diseases, particularly periodic and continued fevers, and shortly before death from malignant fevers, from some acute maladies, and from diseases of the brain, or of the heart itself, especially when vital power is either suddenly or violently depressed, or remarkably exhausted by previous inordinate excitement.

31. *b.* It is often difficult to determine the

*degree of acceleration* of the pulse which should be viewed as morbid; for nervous, weak, susceptible females, and the irritable and sanguine temperaments in this sex, sometimes present, in states of very slight mental excitement, or even soon after a full meal, a very considerable acceleration of pulse, and yet preserve their usual good health; and these temperaments, in this sex particularly, are often attended by the greatest frequency of pulse during acute diseases, more especially when these diseases occur during the puerperal state. A pulse ranging above 110, in a person older than twenty-five years, of the male sex, and not of the nervous or irritable temperament, is not without risk, the amount of which will depend on concomitant circumstances. If it rise to 120, or above this, the danger is great, unless in nervous and susceptible temperaments, and in females. In this sex, especially the nervous, the hysterical, irritable, or delicate, the pulse may range as high as 130 without any risk; but this will depend much upon the nature of the disorder, upon its seat, and upon other circumstances.

32. The frequency of the pulse is seldom very great in the early stage of acute diseases, while vital power is unimpaired, as of inflammations, fevers, &c., unless in the class of patients just mentioned. It is chiefly when these diseases have gone on to the exhaustion of vital power, or to the contamination of the blood, and in this class of females, and in the puerperal state, that the pulse rises above 120; and at that amount or frequency, and more especially if the number is increased, it behooves the physician to be cautious as to his prognosis, and as to the treatment he may adopt; for, unless the pulse be also firm, or full, or hard, or at least not deficient in tone, venesection, particularly if it be large, may aggravate the disease, remarkably increase the frequency of the pulse, and even endanger the patient. Great acceleration of the pulse, as above 110, should be viewed as militating against, rather than in favour of, vascular depletions, unless in small quantity, or locally. If, however, this frequency be attended by fulness, hardness, or firmness, vascular depletions, to an amount which concomitant states and symptoms will regulate, may be prescribed, especially when serous surfaces are affected. When the acceleration amounts to 110 or 120 and upward, and when it is attended by a very soft or compressible, precipitate, small, feeble, or languid state of the pulse (see § 8, *et seq.*), then restorative measures, rather than depletory or depressant, are required, and required with an urgency proportionate to the greatness of the acceleration and the want of power or of tone in the vessel, and other concomitant symptoms.

33. *c. Inequality or irregularity* of frequency of pulse, as well as of fulness and power, is often observed, especially in persons far advanced in life. It is sometimes met with in *children* when asleep, even when in health. It occurs in diseases of the heart, in affections of the liver, in these of the brain, and not infrequently in the maladies of the puerperal state. When, with this inequality, the pulse is small, weak, or precipitate also, or when the inequality is very great, then a serious or even dangerous state may be inferred. LEROY says (*Du Prog-*

*nostic dans les Maladies Aiguës*, § I., ch. i.), that when this state of the pulse is accompanied with hemorrhage, or with bilious vomiting or purging, a favourable crisis may take place.

34. *Irregularity*, or marked inequality, of the pulse is not infrequent in the puerperal states, especially at the accession and in the advanced progress of puerperal fevers, and should be viewed as indicative of great danger, especially if the pulse is at the same time very rapid, broad, precipitate, or undulating. In these cases, as well as in the advanced stage of malignant fevers, this state of the pulse is generally connected with failure of vital power and an altered condition of the blood.

35. The pulse is necessarily always of the same frequency in different parts of the body; but it varies often in strength, fulness, and tone in opposite or remote parts. In hemiplegia the pulse is often weaker, smaller, and softer in the paralyzed side, and in paraplegia in the lower extremities. In cases of local determinations of blood, and in susceptible and nervous persons, the pulse varies in fulness, volume, and strength in different parts, according as the local irritation and vital power may determine an increased flow of blood, and thereby disturb the natural equability of the circulation and distribution of the blood.

36. *d. An intermitting pulse* is not uncommon in every period of life, and in different diseases. It is rarely observed in children, unless when they are the subjects of rheumatic endocarditis or pericarditis, or of the more dangerous states of disease of the brain. It is in rare instances also observed in children when they are asleep, but not so often as inequality and slowness of pulse. An intermitting pulse is much more common in aged persons, and common in proportion to advanced age. At this period of life it is often caused by organic change; but it is sometimes, although not so frequently, the result of impaired organic nervous energy, and is connected with dyspepsia, or with flatulence or torpor of the liver. In these latter circumstances, however, the intermissions are not so frequent nor so complete as in cases of organic lesion, and the pulsations between the intermissions are more equal. At all periods of life, functional intermissions of the pulse may occur, although most frequently in advanced age, in the dyspeptic, the flatulent, and the sedentary; and in these it is generally irregular, or after various numbers of regular pulsations, and is caused by impaired organic nervous power, and by flatulence either pressing on the diaphragm, or rising in the œsophagus, and embarrassing the dilations of the auricles and ventricles. In many instances, however, of these intermissions the ventricle does not altogether fail to contract; it only contracts too weakly, or throws out an insufficient quantity of blood to occasion the usual impulse of the column of blood in the vessel on the finger (§ 8, *et seq.*). In these cases, therefore, the heart should always be examined by percussion and by the ear, in order to ascertain the state of contraction of the left ventricle, and to ascertain the cause of the intermission, and its dependance upon functional disorder, or upon organic lesion, as well as the nature of that lesion as far as this may be inferred. When the intermission is complete,

is frequent, and depends upon organic lesions, the danger is greater and more imminent than when the intermission is merely incomplete, and caused by impaired vital power, unless, indeed, at a far-advanced stage of low or malignant fevers, or in acute diseases attended with effusion into shut cavities. Our opinions, however, as to the indications furnished by intermissions of the pulse, should depend much upon the nature and history of the diseases in which they are observed, and upon the character of the pulse and of the sounds of the heart's contractions between the intermissions. An intermittent pulse, in connexion with great frequency or even with remarkable slowness, with a small, weak, languid, or undulating state of the vessel, occurring in hemorrhagic diseases, or at an advanced period of fevers, especially when they are attended by hemorrhages, is generally a fatal indication.

37. It is unnecessary in this place to consider at greater length the several irregularities of the pulse, as they are noticed more appropriately when treating of those diseases in which they are most apt to occur. Nor will my limits admit of any notice of the influence of diverse stimuli, or of various depressants on the pulse. I may, however, simply mention, that the remarkable influence of the exciting emotions of the mind on the one hand, and of the depressing emotions on the other, upon the frequency and character or development of the pulse, should never be overlooked; that the nature of the usual food and beverages of the patient is also important, especially when either has been partaken of shortly, or even for some time before the pulse is examined; and that great frequency of pulse, especially when caused by exhaustion and vital depression, will often be reduced most remarkably by suitable stimuli and restoratives, even although the skin may be hot, if other symptoms do not decidedly contraindicate them. The effects of various energetic agents on the pulse will be seen by referring to the symptoms produced by poisons. (*See art. Poisons.*)

BIBLIOG. AND REFER.—*Galen*, De Usu Pulsuum. De Pulsibus Libellus. De Pulsuum Differentiis, libri iv. De Dignoscendis Pulsibus, libri iv. De Causis Pulsuum, libri iv. De Prasagitione ex Pulsibus, libri iv. Synopsis Librorum Suorum sexdecim de Pulsibus. A good account of these is contained in *Epitome Galeni Pergameni Operum* in quatuor partes digesta, &c., per A. Lacunam. Accesserunt Annotationes, et de Ponderibus et Mensuris Medicinalibus utilis Commentarius, folio. Argentor., 1604.—*Philaretus*, Libellus de Pulsibus. Venice, 1483.—*G. Valla*, De Differentiis Pulsuum, &c., 8vo. Strasb., 1529.—*J. Struthius*, Ars Pulygmica, seu Pulsuum Doctrina supra, 1200 Annos perditâ et desideratâ, &c., 8vo. Bâle, 1545.—*L. Mercado*, De Pulsibus, libri ii. quibus tota Ars cognoscendi Morbus et prognosticandi dissertissime pertractatur. Valladolid, 4to, 1584.—*L. A. Allemand*, Secret de la Médecine des Chinois; consistant dans la Connaissance du Pouls, 12mo. Grenoble, 1671.—*L. Bellini*, De Urinis et Pulsibus, &c. Bologna, 4to, 1683.—*Manchart*, *Camerarius*, and *Stahl*, in *Halleri*, Disputat. ad Morbos, vol. ii., p. 435, 479.—*F. Hoffmann*, Pulsuum Theoria et Praxis, 4to. Halle, 1702. Et Opera, t. vi., p. 237.—*J. T. Geoffron*, Doctrina Pulsuum, in v. libri divisa. Génève, 1706.—*J. Floyer*, The Physician's Pulse-watch, to explain the Art of feeling the Pulse, and to compare it with the help of a Pulse-watch, 2 vols. 8vo. Lond., 1707-10.—*F. Solano*, Lapis Lydius Apollinis, fol. Madrid, 1731.—*J. Nihell*, New and extraordinary Observations concerning the Prediction of various Crises by the Means of the Pulse, 8vo. Lond., 1741.—*M. Fleming*, De F. Solani, Inventis circa Arteriarum Pulsu, &c., 4to. Lond., 1753.—*T. de Bordeu*, Recherches sur le Pouls par rapport aux Crises, 12mo, 3 tomes. Paris, 1756.—*D. Cor*, Nouvelles Observat. sur le Pouls Intermittent, qui indique l'Usage des Purgatifs, 8vo. Amsterd., 1760.—*H. Fouquet*, Essai sur le Pouls, par Rapport aux Affections de princi



paux Organes, 12mo. Paris, 1767.—*F. de Lamure*, Recherches sur la Pulsation des Artères, &c. Montpel., 4to, 1769.—*J. L. Roche*, Nuevas y Raras Observat. para Pronosticar las Crises por el Pulso, 4to. Madrid, 1762.—*K. Sprengel*, Beiträge zur Geschichte des Pulses, 8vo. Berl., 1789.—*J. Wetsch*, Medicina ex Pulso, sive Systema Doctrinæ Sphygmica, 8vo. Vien., 1790.—*W. Falconer*, Observations respecting the Pulse, &c., 8vo. Lond., 1796.—*J. Rumball*, An Attempt to ascertain the Nature and Causes of the Pulse, 8vo. Lond., 1797.—*C. P. Claye*, Observat. sur le Puls et Méthode facile d'en reconnaître les différentes Espèces, 12mo. Paris, 1792.—*Caldani*, in Memoria di Fisica della Società Italiana à Modena, t. xii., p. 2.—*C. H. Parry*, An experimental Inquiry into the Nature, Cause, and Varieties of the Arterial Pulse, 8vo. Bath, 1816.—*J. Bostock*, in Cyclop. of Pract. Med., vol. iii., p. 561.—*Vaidy*, in Dict. des Sciences Médicales, 8vo. Paris, 1820, t. xlv., p. 401.—*Martin-Solon*, in Dict. de Méd. et Chirurg. Prat., art. *Pouls*.—*J. Radius*, Observationis quædam de Pulsu Arteriarum Valetudinis Signo, 4to. Leips., 1822.—*J. L. Formey*, Versuch einer Würdigung des Pulses, 8vo. Berl., 1823.—*J. Rucco*, Introduction to the Science of the Pulse, as applied to the Practice of Medicine, 2 vols. 8vo. Lond., 1827.—*F. J. Schedel*, Physiologia Pulsus, 8vo. Pesth, 1829.—*J. Graves*, in Dublin Hospital Reports, vol. v., p. 561, and Dublin Journ. of Medical Sciences, vol. ix., p. 282.—*W. A. Grey*, in Med. and Chirurg. Rev., vol. xxix., p. 615, and Lond. Med. Gazette, vol. xxiv., p. 453.—*Gorham*, *ibid.*, vol. xxi., p. 321.—*C. H. Nick*, in Archives Génér. de Méd., t. xxvi., p. 112.—*A. Donnè*, *ibid.*, 2d ser., t. ix., p. 129.—*Jackson*, in American Journ. of Medical Sciences, vol. vi., p. 104.—*Burke*, in Lond. Medical Gazette, April 8, 1837.—*Rochoux*, in Dict. de Médecine, 2d ed., art. *Pouls*. [AMER. BIBLIOG. AND REFER.—*P. Earle* and *A. Brigham*, on the Pulse of the Insane, in Amer. Journ. of Med. Sciences.—Woodward, *ibid.*]

PURPURA.—SYNON. Πορφύρα, Galen. *Purpura*, Riverius. *Petechiæ sine febre*, Auct. Var. *Scorbutus*. *Hæmorrhæa petechialis*, Adair. *Phanigmus petechialis*, Sauvages. *Porphyræ*, Good. *Morbus maculosus hæmorrhagicus*; *Morbus maculosus Werlhoffii*, *Purpura hæmorrhagica*; *Purpura sine febre*; *Miliaria rubra*, Auct. Pourpre, Fr. Dcr Purpur; Das Purpur friesel, Germ. *The Purples*.

CLASSIF.—3d Class, Sanguineous Diseases. 4th Order, Cachexies (Good). 3d Order, 5th Genus (Bateman). CLASS IV., ORDER IV. (Author).

1. DEFINIT.—i. NOSOLOG.—*The occurrence of small, distinct, purple specks or patches in the cutaneous surface, attended by languor, general debility, sometimes by pains in the limbs, and always by evidence of disorder of the digestive, the assimilating, and excreting functions.*

2. ii. PATHOLOG.—*Depressed organic nervous energy giving rise to impaired tone of the capillaries, especially of the mucous and cutaneous surfaces, and to diminished crasis of the blood, thereby permitting the passive exudation of this fluid.*

3. This disease is intimately related to the hæmorrhages on the one hand, and to scurvy on the other, being intermediate between them, or forming the link which connects them, certain cases hardly admitting of any distinction between them and hæmorrhage from mucous surfaces, and others being almost identical with scurvy. *Purpura* usually appears independently of fever, with a number of reddish, purplish, or livid spots, of various sizes, on the cutaneous surface, these spots being usually termed *petechiæ*, *vibices*, and *ecchymoses*, according to their sizes; and in the severer cases it is attended by hæmorrhage from one or more surfaces, but chiefly from the mucous surfaces. The spots or patches are rarely elevated above the surrounding level of the skin, are not attended by any uneasy sensation, and, when examined closely, they are found to consist of exudations of blood between the layers of the dermis, or in the subjacent cellular tissue, or,

rather, of serum coloured by the red globules variously altered. They cannot be viewed as an eruption, or rash, but are strictly a passive hæmorrhage of the vascular tissue of the skin.

4 Several acute diseases present, in their advanced stages, when organic nervous or vital power is exhausted, and the crasis of the blood diminished, or its constitution contaminated, or otherwise changed, this state of cutaneous hæmorrhagic exudation, in the form of petechiæ, vibices, ecchymoses, &c., and they have hence been denominated petechial fevers, or febris petechialis, or febris purpurata; and in these fevers hæmorrhages from some mucous surface is very apt to supervene. These changes of the capillary vessels and blood, manifesting themselves more especially and visibly on the cutaneous and mucous surfaces, are not infrequent in low and asthenic fevers, both simply continued and exanthematic, and were more common formerly when a heating regimen, insufficient purging, and ventilation were generally employed. But in these fevers the petechiæ and purple spots are merely symptomatic—are consequent upon a series of changes produced by the fever, while they constitute one of the chief phenomena of the disease under consideration, although attended by others, and often followed by several of most serious import, the former being a continued or exanthematic fever with petechiæ or purpura, the latter a *purpura sine febre*, or *purpura non-febrilis*.

5. RIVERIUS first distinguished purpura from the petechiæ sometimes symptomatic of the typhoid, adynamic, or malignant states of fever; and WERLHOFF long afterward briefly described it. STRACK next noticed it, and was followed by BEHRENS and GRAFF; and, almost contemporaneously with these last, by DUNCAN, SEN., ADAIR, and FERRIS. Soon afterward TATTERSALL, WALKER, WILLAN, BATEMAN, BERENGER, ACREL, PIERQUIN, BRACHET, and others referred to in the BIBLIOGRAPHY, treated of purpura as an idiopathic malady. WILLAN considered the disease as nearly identical with scurvy; but this opinion was shown to be untenable by PARRY and HARTY, although an intimate connexion cannot be disputed; and the alliance is certainly closer than these last writers have endeavoured to show.

6. Writers have generally divided the disease into certain varieties, respecting which they have not been quite agreed. WILLAN and BATEMAN have designated the *Purpura simplex*, *P. hæmorrhagica*, *P. urticans*, *P. scnilis*, and *P. contagiosa*. RAYER has recognised the *simplex*, the *hæmorrhagica*, and the *scnilis*, to which he has added the *febrilis*. BIETT considers that the first and second of these varieties only deserve notice, and that the others are rare occurrences, or are symptoms belonging to other maladies. While GOLDIE retains only the first, second, and third varieties of BATEMAN'S arrangement, WILSON has divided the varieties of purpura into *simplex*, *hæmorrhagica*, *urticans*, *scnilis*, *cachectica*, and *febrilis*.

7. The exudation of blood in minute spots, or in larger patches, from the capillary vessels of the integuments, constituting either petechiæ or ecchymoses, takes place in the superficial layer of the dermis, or beneath the epidermis, especially when it forms merely petechiæ; and in the cells of the corion, or even in the subcu-

aneous cellular tissue, particularly when it appears in the form of vibices or ecchymoses. The colour of the spots varies with the quantity of red globules in the effused serum, with the quantity of blood, and with the time elapsed in the exudation. At first the *petechiæ* are usually a dark-red, and successively purple, livid, and reddish-brown. As they are absorbed, or farther changed, they become yellow, and at last disappear as pale-yellow stains. The *ecchymoses* are not only larger than the *petechiæ*, but are of a purplish or darker hue from the first, the exudation of blood being greater, and they become by degrees successively blackish, reddish-brown, greenish-yellow, and yellowish, until they entirely disappear. The spots, whatever may be their size, are of a deeper or darker colour in the centres than in the circumferences, which latter pass into the hue of the surrounding skin.

8. I. DESCRIPTION.—VAR. i.—PURPURA SIMPLEX.—SYNON. *Petechia sine febre*, Auct. *Phænigmus petechialis*, Sauvages. *Porphyra simplex*, Good. *Pétéchies sans fièvre*, Fr. *Rothe punkt*, Germ. *Petechial scurvy*; *Simple purpura*.—This variety, like all the others, although less remarkably than they, is preceded by more or less constitutional disorder. The patient has complained, and even still more complains, of languor, loss of muscular power, of weakness of the joints and pains in the limbs, increased on slight exertion. The complexion becomes pale and sallow; the pulse is weak, soft, and excitable; the tongue is loaded, and its edges often marked by the impressions of the teeth; the bowels are confined, the stools offensive, and the urine loaded, or thick upon cooling. The appetite is impaired, and sometimes there are nausea and headache. The *petechiæ* and small *ecchymoses* usually attending and characterizing this variety may affect the surface either partially or more or less generally. When partial, they are limited chiefly to the lower extremities, or affect also the upper; but very frequently they are numerous on the insides of both the lower and upper extremities, and on the breast, neck, and abdomen. They vary in size from a minute point to that of a pea, are rounded, do not disappear on pressure, and are not attended by itching, nor other uneasy sensation. They may be either simultaneous in their appearance, or nearly so, or successive; in the former case, the tints they assume may differ little; in the latter, the hues of each point or spot vary more or less with their respective durations. The face is often free from them; but if they appear there they are usually observed also in the conjunctivæ, and in the mucous membrane of the mouth and fauces. Their duration varies, as they are simultaneous or successive in their appearance, being usually two or three weeks in the former case to as many months in the latter. When this variety is neglected it may pass into the next.

9. VAR. ii.—PURPURA HÆMORRHAGICA.—SYNON. *Hæmorrhagia universalis*, Wolf. *Morbus maculosus Werlhoffii*, *Morbus maculosus hæmorrhagicus*; *Porphyra hæmorrhagica*, Good. *Pourpre*, *Hæmorrhagie pétéchiale*, Fr. *Land scurvy*.—This variety is often preceded for some weeks by great lassitude, and by the constitutional symptoms now enumerated (§ 8), but in a more marked degree. In some instances it occurs

much more suddenly. It is always, however, accompanied with extreme debility and depression of spirits; by marked disorder of the digestive, assimilating, and depurating functions; by morbid states of the evacuations; by a feeble, soft, compressible, and excitable pulse; by slight chills alternating with flushings or perspiration; by pallor, or sallowness, or duskiness of the skin; and by a loaded, flabby tongue, and spongy state of the gums. In some instances the hypochondria are distended; syncope or faintness is complained of; or the extremities swell when in a depending position. The breath is fetid, and the odour of the body is offensive. Pains in the limbs, or about the præcordia, back, or abdomen are not infrequent. The pulse may be slow, or of natural frequency, but it is readily excited. More or less emaciation is commonly observed.

10. The *petechiæ*, in this variety, are interspersed with *ecchymoses* and vibices, sometimes with livid stripes or patches, resembling the marks left by bruises. They commonly appear first on the legs, and, at varying periods afterward, on the thighs, arms, and trunk of the body. The hands are seldom spotted with them, and the face is generally free. They are usually of a bright-red colour when they first appear, but they soon become livid or purple, and when they are about to disappear they change to a brown, greenish-yellow, and pale-yellow hue. When they arise successively, then the surface presents a variety of colour. The cuticle over them is smooth and shining, but is not sensibly elevated; in rare instances only has it been raised, or assumed the appearance of a vesicle containing dark blood. This appearance has more frequently been observed as regards the spots in the gums, cheeks, palate, and fauces, where the slightest force ruptures the epithelium and allows the blood effused to escape. Slight pressure, also, in any part of the surface often produces the exudation of blood, and *ecchymoses* and vibices in that part.

11. In connexion with this disposition to exudation of blood in the integuments, there is a still more marked disposition to exudation of this fluid, and often in large quantity, from the internal surfaces, especially the mucous. These hemorrhages are not only sometimes profuse, but are also restrained with difficulty, and are even occasionally suddenly fatal. In a majority of cases, however, they are less abundant; and in a few instances they have recurred daily at stated periods. Other cases present only occasional and irregular effusions of blood, and some are attended by an almost constant oozing. The bleeding occurs most frequently from the gums, cheeks, fauces, tongue; from the stomach and bowels; from the kidneys, bladder, uterus, or vagina; from the nose, bronchi, or lungs; and more rarely from the conjunctiva and external ear. There is the utmost variety as to the period of the disease in which the hemorrhages commence and cease, and as to the proportion which they bear to the exudations in the integuments which chiefly mark the character of the diseases, in connexion with the general disposition to hemorrhage.

12. The duration of this variety is extremely uncertain. It may continue for weeks or months, and even, in very rare instances, for



years; and at some period, especially upon sudden exertion or excitement of the circulation, hemorrhage may occur to a profuse, dangerous, or even fatal extent. When the disease terminates fatally, the result is to be imputed to the amount of hemorrhage, internal or external, or to the vital exhaustion more slowly caused by a continued oozing of blood; and in this case emaciation, œdema of the extremities, and occasionally serous effusions into either of the shut cavities, precede dissolution.

13. VAR. iii. *PURPURA URTICANS*.—SYNON. *Porphyra urticans*, Good. *Nettle-rash Scurvy*.—This variety is merely a rare modification of the first. It is distinguished by commencing in rounded reddish elevations of the cuticle, resembling the small weals of urticaria, but it is not attended, like them, by any tingling or itching. As these small weals dilate they subside to the level of the surrounding surface, assume a darker, and at length a livid hue. As they generally appear in succession in different places, they present different tints; the more recent being of a brighter colour, the older spots being level, and of various degrees of lividity. They are most frequently seen on the legs, mixed with petechiæ, but they sometimes also appear on the thighs, arms, and breast. The duration of this variety is from three to six weeks. Hemorrhages very rarely occur in the course of it. This variety sometimes attacks delicate young females, and in them it is generally attended by some œdema of the extremities. In one case, which occurred in a young lady under my care, it soon disappeared after an attack of menorrhagia and the treatment adopted for this attack.

14. VAR. iv. *Purpura Senilis*.—SYNON. *Senile Purpura*.—*Scurvy of Old Age*.—This variety is rarely met with, and occurs chiefly in aged females who live on a poor and insufficient diet. It appears principally on the legs and forearms, in successive dark or purplish spots or blotches, of irregular forms and various sizes. Each of the spots continues from ten to fifteen days, when the exuded blood is absorbed, and they disappear; but a repeated series of these blotches may continue to appear for months or even years. The health does not appear to suffer so much in this variety as in the preceding. I have not seen, among several cases that I have observed, one instance of hemorrhage supervening in the course of this variety. Dr. BATEMAN states, that he has met with this affection only in elderly women, and on the outside of the forearm. I have seen it sometimes in elderly males, and more frequently in the legs than in the forearm.

15. II. COMPLICATIONS OF PURPURA.—The complications of purpura are extremely diversified; for not only may this change in the skin supervene in the course of the adynamic and malignant states of fever, but it may be almost, although in very rare instances, co-existent with fever, the purpura assuming a *febrile character*, and not being merely a contingent phenomenon in the advanced progress of fever. Moreover, even the non-febrile purpura may be complicated not only with hemorrhages from mucous surfaces, and into various structures, but also with various states of visceral lesion. It will be useful to notice these several associations more fully.

16. i. *With Fever*.—*Purpura Febrilis*.—*Exanthema hæmorrhagicum*, GRAVES.—This complication of purpura may be *sporadic*, or even *epidemic*, as shown by LORDAT, LATOUR, RAYER, and others. *Febrile purpura* may attack persons of all ages and of every state of constitution. It usually commences with great lassitude and a feeling of vital depression, by chills or rigours, followed by heat, pains in the back and limbs, headache, a sense of oppression or of heat over the body, by nausea, retching, and by rapid pulse. Petechiæ and ecchymoses appear from the third to the sixth day, sometimes without hemorrhage from the mucous surfaces—*purpura febrilis simplex*, sometimes with such hemorrhage—*purpura febrilis hæmorrhagica*. In most cases, more or less fever precedes the change in the skin for a few days; very rarely is the fever and the purpura nearly simultaneous; and not unfrequently, with the vascular reaction characterizing the febrile attack, or about the second or third day, exanthematous patches, resembling urticaria, first appear, and are followed by purplish petechiæ and ecchymoses. Hemorrhage from the mucous surfaces seldom occurs in febrile purpura, until the characteristic change has taken place in the skin, the hemorrhage being consequent upon the purpura, as the purpura usually is on the fever; both forms of sanguineous exudation being strictly symptomatic of the fever, or complications of it.

17. The duration of this complication is usually from fourteen to twenty-four or thirty-one days; but it may terminate *fatally* at an earlier period, and seldom later than the twenty-fourth day. This event generally takes place in consequence of hemorrhage from the bowels, the stomach, the lungs, &c.; or into the substance of an organ, as the brain, lungs, spleen, &c.

18. ii. *The cachectic association of purpura* is the most frequent; indeed, purpura is eminently a cachectic malady, proceeding from causes which affect the vital tone and condition of the tissues, and consisting of changes not only in the condition of the textures, but also in the state of the blood. This cachectic habit of body both precedes the purpura and attends it, and favours the occurrence of hemorrhage, which so frequently takes place, and is one of the most important complications of the malady. The evidence of cachexia is, however, not limited to the supervention of hemorrhage, but is supported by the appearance of the countenance, of the cutaneous surface, even before the purpura appears, by the states of several assimilating and excreting functions, and by the condition of the whole frame.

19. iii. *Visceral complications* are very common, especially in the more chronic and severe cases. Very few of these cases are unconnected with functional or structural disease of the liver, or spleen, or both. I have repeatedly seen purpura, even in children, associated with great enlargement of the spleen; and in these cases the cachectic appearances have been most marked. I have seen, also, purpura follow protracted intermittents, the abdominal viscera being also more or less diseased; and in rarer instances associated with chronic diarrhœa, and enlargement of the mesenteric gland.

20. iv. The hemorrhage in purpura occurs chiefly in the variety denominated hæmorrha-

gica, and but rarely and contingently in the other varieties. It appears most frequently as epistaxis in children and young subjects; as metrorrhagia in females; and as intestinal and pulmonary hemorrhage in adults. When it takes place from the mouth or gums, it is often associated with bleeding from the edges of the tongue, from the fauces, and from the nose. Hæmatemesis is also then not infrequent. When purpura occurs at an advanced age, it is often attended by hemorrhage from the bowels or urinary organs.

#### 21. v. The Appearances of the Blood and Urine.

—(a) The chief changes in the blood consist in the physical conditions and appearances of this fluid, rather than in its chemical constitution, which, however, is so far altered that a very marked deficiency of fibrin has been ascertained. I have treated several, indeed many, cases of purpura, but I never had occasion to bleed one. The appearances of the blood which has escaped furnish no small proof of its condition. Cases, however, have occurred in which blood has been taken from a vein; but these cases have been attended either by signs of vascular plethora, or by excited vascular action—states likely to change the blood, or at least to be connected with a condition of the blood very different from that which usually exists in this malady. In a case of marked purpura hæmorrhagica, where much blood was lost, recorded by Dr. DUNCAN, the blood, while flowing slowly from the vein, resembled diluted arterial blood, formed a loose coagulum, from which no serum separated; the coagulum being like jelly, tremulous, transparent, and colourless, the colouring matter having subsided to the bottom of the vessel. In other cases detailed by JEFFREYS, GAIRDNER, FAIRBAIRN, and COMBE, the blood was pale, coagulated slowly, formed a tremulous jelly, separated no serum, and nearly resembled that described by Dr. DUNCAN. The blood which I have observed in the hemorrhages occurring in the course of the disease did not coagulate, and appeared without fibrin and vital crisis, and deficient in hæmotosine.\* —(b) The urine, in the cases where I have had an opportunity of observing it, was generally of a dark colour, emitting an ammoniacal odour, and usually presenting an alkaline reaction. It appeared to contain much of the earthy phosphates, and soon became offensive and very alkaline.

22. III. APPEARANCES ON DISSECTION vary remarkably with the form, complication, and amount or seat of hemorrhage.—a. The mem-

\* In a case of this disease, the blood discharged from the mouth was examined by SIMON. It contained much saliva, and some flocculi of mucus, but no fibrin. It had a faint disagreeable smell, was of a dark (almost black) red colour. It was composed of

Water . . . . .	948·889
Solid residue . . . . .	51·111
Fat . . . . .	1·377
Albumen and mucus . . . . .	34·032
Globulin . . . . .	5·610
Hæmatin . . . . .	0·102
Alcohol extract, bilin, and salts . . . . .	4·635
Water extract, ptyalin, and salts . . . . .	2·555
Biliverdin . . . . .	0·366

In a case analyzed by ROUTIER, in 1000 parts he found

Water . . . . .	795·244
Solid constituents . . . . .	204·756
Fibrin . . . . .	0·905
Blood corpuscles . . . . .	121·701
Residue of serum . . . . .	83·405

—(SIMON'S *Animal Chemistry*, by DAY, vol. i., p. 316-319).

branes of the brain are seen, in some instances, spotted with ecchymoses; and small clots of blood and ecchymoses of various sizes, from that of a pin's head to that of a bean, are found in the convolutions of the brain. The surfaces of the ventricles present small petechiæ, and these cavities contain much serum. In some instances the effusion of blood within the cranium is in larger quantity, forming one or more large coagula, the patients having died comatose or apoplectic, with or without palsy. The mouth, fauces, and pharynx, and often also the œsophagus, are covered with black spots and ecchymoses.—b. The external surface of the lungs is often thickly studded with ecchymoses. This organ is commonly congested with dark blood, and parts of it sometimes present circumscribed engorgements; and in rarer instances circumscribed hemorrhage into its substance, or pulmonary apoplexy.—c. The pleura and the pericardium, also, often present numerous ecchymoses or livid patches. The substance of the heart is often somewhat soft and easily torn.—d. The serous, and, still more, the mucous membranes in the abdomen almost always exhibit ecchymoses or patches of exuded blood; the mucous epithelium, and even the membrane itself, being detached or softened in parts.—e. The urinary surfaces are sometimes similarly changed.—f. I have seen the spleen remarkably enlarged and softened; and the liver also soft, friable, and of a pale hue. The most remarkable change, and one which has not been sufficiently considered, especially with reference to the pathology of the disease, is the general want of vital cohesion, or the softening and friability of the tissues, which exist immediately after death.

23. IV. DIAGNOSIS.—It is scarcely requisite to advert to the diagnosis of this malady. Its external characters mark it sufficiently; and when it assumes the features of hemorrhage on the one hand, or of scurvy on the other, the pathological condition is that which should be recognised, and not the nosological distinction. In scurvy, however, the gums are more prominently affected, and the ecchymoses are most evident on the extremities, and are larger. (See art. SCURVY.) Adynamic and malignant fevers, continued and exanthematic, are often accompanied with petechiæ or purple spots or patches, identical with those of purpura, and sometimes with hemorrhages; but these maladies retain their own distinctive or specific characters, and proceed from determinate causes, which are entirely unconnected with this disease.

24. V. PROGNOSIS.—*Purpura hæmorrhagica*, which shows itself by ecchymoses on the skin, is a more serious disease than that which appears by petechiæ; and even this latter form is more dangerous than *purpura simplex*, or *purpura* without hemorrhage. RAYER observes, that *purpura febrilis* and *hæmorrhagic fever* are less serious than those forms of *hæmorrhagic purpura* which commence without fever, but become febrile after hemorrhage has recurred several times; and that a small, hard, and very frequent pulse—from 130 to 140 in a minute—is often precursory of a renewal of the hemorrhage, or of other serious symptoms.

25. Ecchymoses on the nose are often followed by profuse epistaxis; palpitations or op-



pression in the chest, with or without cough, are frequently followed by hæmoptysis; and pulsations in the epigastrium by hæmatemesis. If these hæmorrhages recur often; if the blood does not coagulate, or is thin and watery, or exhibit a sanious appearance; if the signs of cachexia are manifest, and if those of anæmia are also present; if the pulse be very small, rapid, or weak; if the bowels become relaxed, with black or bloody evacuations; if the matters vomited present a black, grumous appearance; if the evacuations be attended by faintness or by syncope; if hæmorrhage take place from the tongue and from the urinary organs, the danger is great, and the patient should not be allowed to assume, especially suddenly, either the sitting or standing posture, or to make the least exertion. All the evacuations should be passed in the recumbent position, lest fatal syncope take place on passing them. If a prompt and decided treatment fail of affording relief in cases attended by one or more of these symptoms, the danger ought to be viewed as not only great, but also imminent. The occurrence, also, of lethargy, or coma, or apoplexy, especially when the case has been unattended by external hæmorrhage, is generally fatal.

26. VI. CAUSES.—This malady occurs at every period of life, and in both sexes; but most frequently in women, and in boys before the age of puberty; especially those of delicate constitutions, who live in cold, humid, and miasmatic situations, or in low, damp cellars, or in apartments which allow the dampness or exhalations from the soil to pass through them, and in houses which have no cellars or sunk areas. It affects chiefly also those who live in close, crowded, and ill-ventilated lanes, closes, or houses; who are employed in sedentary occupations, in close and densely inhabited towns; who suffer from mental anxiety, the depressing emotions, from fatigue and want of sleep; and those more especially who live on a poor, unwholesome, or unwholesome food, or who have too little food. It may attack those, also, who live too exclusively on animal food, and deprive themselves of a sufficient quantity of fresh vegetables and fruits. It was remarkably prevalent during 1846 and 1847, when the crops of potatoes and of vegetables were generally blighted and scarce; potatoes and other vegetables, farinaceous food and milk, in due quantity and proportion, manifestly tending to preserve the blood in a state incompatible with the existence of purpura and scurvy.

27. Purpura has also followed other diseases, or appeared during convalescence from them, especially from small-pox, measles, scarlet fever, and affections of the liver or spleen, and in children after various disorders of the digestive organs. It has also followed remittent and intermittent fevers. It has occurred, however, in persons previously healthy, and in those who have appeared to live well, and in healthy localities; but I suspect that even in these the modes of living may not actually be wholesome; that too much animal food is habitually partaken of, either absolutely or relatively, to the proportion of vegetable substances, and that the animal food is not always of the most wholesome kind; that it is either imperfectly preserved or cured, or consists of pork, veal, and other indigestible or hurtful articles, or of the blood or

viscera of animals; and that, in connexion with an excessive use of animal food, congestion and oppletion of one or more of the internal viscera, especially the abdominal viscera, are produced. Hence the relief often observed to follow losses of blood in the course of purpura, and, in some cases, the entire disappearance of the disease after such losses. Purpura is said to have been hereditary in a few instances; it may even be epidemic or endemic in some parts; and instances of its prevalence as an endemic and epidemic have been recorded. The nature of the causes will readily account for such manifestations of it on some occasions, especially when several of these causes concur to produce it.

[Owing to causes sufficiently obvious, *purpura hæmorrhagica* only occasionally appears, and that as a sporadic disease, in this country. In this form it is sometimes to be seen, especially in our larger cities, and then for the most part in peculiar localities, and affecting the impoverished, the dissolute, and those habituated to alcoholic potations. As the sequela of other diseases, it is by no means so rare an occurrence, and most practitioners must have encountered it as often following our more malignant forms of bilious intermittent and remittent fevers. That type of the disease denominated by RAYER the *purpura febrilis*, though generally deemed less serious in its nature, is, nevertheless, capable at times of assuming a highly malignant character; and, about three years ago, was recognised prevailing as an epidemic on Long Island, near Williamsburgh, opposite the city of New York. A combination of local causes, as the impure air of a limited district near the salt water, aggravated by the air of badly-constructed and ill-ventilated apartments, and the foul materials of ships and docks, seemed to have been the prominent causes to which it owed its origin. In two instances several members of the same family were cut off by it. The number of cases might have been twelve. The disease terminated fatally in several cases after the fourth or fifth day's duration. In those who recovered, the most diffusible stimuli, tonics, and nutrients were had recourse to. The most effective treatment was the tonic and stimulant. It is hardly to be credited, says Dr. J. W. FRANCIS, how large a quantity of vinous, spirituous, and fermented drinks, blended with nutritious aliment, the patient took in order to secure his recovery. *Purpura hæmorrhagica* afflicted the Texan troops in the campaigns of 1836-7. The middle-aged suffered most by it. It arose from the want of fresh provisions, according to the testimony of the surgeon-general of the Texan army, Dr. ASHBELL SMITH. In many instances the disease was characterized by large maculæ on the legs, and excessive hæmorrhage from the bowels. Its worst forms occurred in impoverished habits. Those who lived mostly on fresh pork and on fresh beef, with little or scarcely any salt, paid the severest penalty. The deaths were not a few. Bark and wine were the tonics most relied on. The nitrate of silver in strong solution was administered in many cases when the hæmorrhagic loss from the bowels was most annoying and prostrating. Almost all our prominent writers have noticed *purpura hæmorrhagica* in connexion with yellow fever, as it has prevailed in our sea-ports at dif-

ferent periods in the United States, viz., in 1798, 1803, 1805, and 1822. See TOWNSEND on *Yellow Fever* in 1822; the *American Medical and Philosophical Register*, edited by Drs. HOSACK and FRANCIS; *New-York Medical and Physical Journal*, edited by Drs. FRANCIS, DYCKMAN, BECK, &c.; RUSH on *Yellow Fever*.]

28. VII. TREATMENT.—The treatment of purpura depends essentially upon the habit of body, and age, and strength of the patient. If the patient be plethoric, and the pulse full and strong, or if evidence of visceral congestion or oppletion exist, and if the purpura be simple or not complicated with hemorrhage, or if the hemorrhage has been inconsiderable, a moderate blood-letting will then be of service; but the disease may be removed without it; and it ought not to be prescribed if there be evidence either of anæmia, or of deficient crasis of the blood. By bleeding in these circumstances, we do not only diminish the already deficient proportion of blood globules and the impaired vital crasis of the blood, but we also lower the already depressed vital tone of the vessels; and we also disturb, or even altogether overturn, the mutual dependance subsisting between the blood-vessels, especially the capillaries and their contents. If we at all base our treatment upon the pathology of the disease, blood-letting will rarely be required, and only in moderation, in the circumstances just mentioned; and probably, also, when the cases thus circumstanced have presented somewhat of a febrile character.

29. Viewing the disease as essentially dependant upon impaired vital tone, and cohesion of the capillaries and of the several tissues, with more or less manifest change in the blood, either proceeding from or connected with impaired assimilation and excretion (§ 26, 27), I have hardly ever directed vascular depletion, but have prescribed those remedies which appeared to me the best suited for the removal of these pathological states; and I have never found, in the many instances in which I have prescribed it since 1817, the *oleum terebinthinæ* fail in removing the disease when prescribed in a suitable form or dose, or in such combinations as the peculiar features of the case required. Numerous other means will often succeed in curing this malady; but there is none so efficacious as this in the hemorrhagic states of the disease, and none which will be more beneficial, conjoined with purgatives, in the several circumstances requiring a purgative treatment. If we wish to arrest the hemorrhagic disposition, the turpentine should be given in doses varying from half a drachm to a drachm three or four times daily; and if the vital powers be much depressed, a few drops of tincture of capsicum, or of some aromatic tincture, may be conjoined with it. If it be more desirable to act upon the bowels, then it may be prescribed in much larger doses, with castor oil on the surface of an aromatic water, or in any other mode; or it may be administered similarly conjoined in enemata. If the exhibition of it by the mouth produce vomiting, this occurrence may prove salutary, or may even be promoted, as tending to emulge the biliary ducts, and to remove congestion of the abdominal viscera. If, on the other hand, it should be preferred neither to risk nor to produce this effect, or even the unpleasant sensations which it may produce when thus exhibited,

then the administration of it in enemata, in moderate doses, with a few drops of tinctura opii, or with a drachm or two of tinctura camphoræ comp., repeating the enemata frequently, or according to the period of their retention, and to their action on the bowels, will be very beneficial. If the patient complain of abdominal pains and flatulence, epithems of turpentine, or liniments or embrocations containing it (see APPENDIX, Form 295–297, 311), may be applied over the abdomen, or frictions with these may be directed.

30. Many other remedies will be found more or less serviceable in the various states of purpura. When the disease is complicated with enlarged spleen, or when there is manifest *anæmia* produced by losses of blood, and especially when the attendant hemorrhage has been restrained by the turpentine as advised above, then the preparations of iron will be most beneficial. The tincture of the sesquichloride of iron may be given either alone, or with an addition of hydrochloric acid, in the infusion of calumba; or the sulphate of iron may be conjoined with the sulphate of quina, camphor, and as much of the purified extract of aloes as will act sufficiently on the bowels, this latter, when conjoined with the quina, operating sufficiently in very small doses. These and other tonics may likewise be prescribed with purgative salts, and with the acids which are compatible with them. If the functions of the liver are torpid, the nitro-muriatic acids may be given in tonic infusions; and even a dose of a mercurial may be prescribed occasionally. In these cases, and especially when the purpura is associated with congestion of the abdominal viscera, a full dose of calomel, with an aromatic, should be given at bedtime, and either a turpentine or castor oil draught, or other purgatives, with tonics, the following morning and day, until the bowels are freely evacuated. The compound infusion of roses, with either of the sulphates and a tonic tincture; or the compound infusion of gentian, with the sulphate of magnesia, sulphuric acid, and tincture of orange-peel, or similar combinations, may be prescribed with this intention, and repeated according to their effects; the calomel being also repeated if the congestion continue.

31. In the *febrile state*, as well as in other forms and complications of the disease; the decoction of cinchona may be directed, with liquor ammoniæ acetatis, the acetic acid being in excess; or the same decoction may be conjoined with the chlorate of potass, or with the hydrochloric acid, the hydrochloric ether, and tincture of serpentaria, purgatives being employed from time to time, according to the state of the case. Purgative enemata also may be occasionally employed, especially those containing the spirit of turpentine. In some instances I have found the decoction of cinchona and tonic infusions more serviceable when conjoined with small doses of the nitrate of potash and carbonate of soda or of potash. The treatment I have advised for the more asthenic forms of HEMORRHAGE (§ 45, *et seq.*) will also be found appropriate to this disease; and that for SCURVY will often prove as successful in this as in that malady.

32. The diet and regimen during the treatment requires attention. The causes (§ 26) should be



avoided as much as possible, and the food ought to be light and digestible. Milk should be freely allowed, in conjunction with rice and farinaceous articles. Animal food ought to be partaken of sparingly, and fresh vegetables and fruits freely allowed. The beverages may consist of lemonade, or of diluents rendered pleasantly acid with lime-juice or pomegranate-juice. Spruce-beer, especially the Dantzic spruce; Seltzer-water, soda-water, with sherry or hock, or Seltzer-water with milk, or water made pleasantly acid with raspberry-vinegar, will generally be both agreeable and beneficial.

**BIBLIOG. AND REFER.**—*L. Riverius*, *Praxeos Medice*, 12mo. Lugd. Bat., 1674, t. ii., p. 630.—*Werthoff*, *Commer. Norimberg*, ad *Rei Med.* et *Sc. Nat.* Incrementum Institut., 8vo. 1745.—*C. Strack*, *Observ. Med. de Morbo cum Petechiis*. Carol., 1766.—*J. B. Adair*, *Diss. Med. de Hæmorrhæa Petechiale*, 8vo. Edin., 1789.—*Reil*, *Memorabilia Clinica*, fasc. v.—*Ferris*, *Med. Facts and Observ.*, vol. ii. 1791.—*R. Willan*, *Reports on the Dis. of London*, 1801; and on Cutaneous Diseases, p. 452.—*Duncan*, *Medical Cases*, &c. Edin., 1781, p. 90.—*Tattersall*, *Edin. Med. Commentaries*, vol. xx., p. 269.—*Parry*, in *Edin. Med. and Surg. Jour.*, vol. v., p. 77.—*Harty*, *ibid.*, vol. ix., p. 186, and vol. xiii., p. 402, and No. civ., p. 52.—*Jeffreys*, *ibid.*, vol. viii., p. 435.—*Bateman*, *ibid.*, vol. vi., p. 224 and 374.—*Walsh*, *ibid.*, vol. ix., p. 161.—*Johnston*, *ibid.*, vol. xvii., p. 402.—*Combe*, *ibid.*, vol. xvii., p. 83.—*Duncan*, *jun.*, *ibid.*, vol. xviii., p. 405.—*W. Nicholl*, *ibid.*, vol. xviii., p. 540.—*Darwell*, *ibid.*, vol. xxiii., p. 53.—*Magee*, *ibid.*, vol. xxiv., p. 307.—*Davis*, *ibid.*, vol. xxii., p. 291.—*Yeats*, *Medical Transact. of Coll. of Phys.*, vol. iv., p. 429.—*Gardner*, *Trans. of Edin. Med. and Chirurg. Society*, vol. i., p. 671.—*Wood*, *ibid.*, vol. i., p. 680.—*Fairbairn*, *ibid.*, vol. ii., p. 157.—*W. M. Latham*, in *Lond. Med. Gazette*, vol. i., p. 544.—*J. Watson*, *ibid.*, vol. vii., and vol. x., p. 499.—*M. Good*, *Study of Medicine*, vol. ii., p. 875, and *System of Nosology*, p. 268.—*Stoker*, *Pathological Observations*, part i. Dublin, 1825.—*Plumbe*, *Treatise on Diseases of the Skin*, 2d ed., 8vo. Lond., 1827.—*Anon.*, *Journ. Complement des Sc. Méd.*, t. xxvi., p. 425.—*Journ. des Progrès des Sciences Médicales*, t. xvii., p. 264.—*Grateloup*, in *Archives Génér. de Méd.*, t. v., p. 311.—*R. Macleod*, in *Lond. Med. Gazette*, Feb. 4, 1837, p. 697. (*Apoplexy during*).—*R. Bright*, *ibid.*, Sept. 30, 1837, p. 775. *Lancet*, Aug. 19, 1837, p. 775, 777. (*Large bleedings—Citric Acid*).—*M. Stoltz*, *Archives Génér. de Méd.*, t. xv., p. 92.—*Rogerson*, *Lond. Med. and Phys. Jour.*, vol. xlii.—*Latour*, *Hist. Philos. et Méd. des Hæmorrhagies*, 8vo. Paris, t. ii., p. 172, *pluries*.—*Olivier D'Angers*, in *Archives Génér. de Méd.*, t. xv., p. 296.—*Brachet*, in *Revue Médicale*, t. vii., p. 83. Paris, 1822.—*Fourneauux*, *Obs. sur quelques Hæmorrhagies Cutanées et sous Cutanées*, 4to. Paris, 1826.—*P. Rayer*, *A. Theor. and Pract. Treatise on the Diseases of the Skin*, 2d ed. Trans. by R. Willis, 8vo. Lond., 1835, p. 888.—*G. Goldie*, *Cyclop. of Pract. Med.*, vol. iii., p. 571.—*E. Wilson*, *Pract. and Theor. Treatise on the Diseases of the Skin*, 8vo. Lond., 1842, p. 266.

**[AMER. BIBLIOG. AND REFER.]**—*S. W. Avery*, *Remarks on the Nature and Treatment of Purpura Hæmorrhagica*, with Cases, in *New-York Med. and Phys. Jour.*, vol. ii., p. 261.—*W. Channing*, in *Boston Med. and Surg. Journal*, vol. viii., p. 381.—*Transylvania Journal of Medicine*, 1836.—*David King*, *Fiske Fund Prize Dissertation of R. I. Med. Society*, 1836, on the Causes, Nature, and Treatment of Purp. Hæmorrhagica, and in *Boston Med. and Surg. Journal*, vol. xvi., p. 213-219, 245-263.—*A. J. Coons*, in *St. Louis Med. and Surg. Jour.*, Jan., 1844. (*Recommends creasote as a powerful remedy in purpura*).—*Charles A. Lee*, in *New-York Med. and Phys. Journal*.]

1. **PUS**—*Pus*, Fr.; *Eiter*, Germ.—is a morbid secretion, from an inflamed or otherwise altered animal tissue or tissues, depending upon a change from the healthy state of the capillaries of the affected part, and probably also of the organic nerves supplying the capillaries and tissues implicated. It is one of those pathological formations which is foreign to the economy, and is incapable of organization, beyond that which it already possesses in its independent cells. Its pathological relations are fully considered in the articles *ABSCESS*, *DISEASE* (§ 131, *et seq.*), and *INFLAMMATION* (§ 44, *et seq.*); but since these were written recent microscopic researches have thrown farther light upon the

constitution of this fluid, although much yet remains to be determined respecting its relation to the blood in the capillaries of the parts, upon or in which it is formed.

2. In order to understand recent views respecting pus it is necessary to premise the principal topics connected with the *cell-theory* of formation, nutrition, and morbid fomentations, which has very lately been promulgated in Germany. According to SCHWANN, the author of this theory, development is always dependant upon a formation of cells in an amorphous *plasma*, which, when giving rise to organized formations, or the production of cells either in independent forms; as in the fluids, or variously continuous or coalesced, as in the several tissues, he has termed *cytoblastema*, or, for brevity, *blastema*; and the formation proceeds in this manner, according to the description of VOGEL. In the first place, one or more minute granules—*neucleoli*—appear, around which the cytoblast—*neucleus*—is formed; and this, again, becomes surrounded by a membrane—the *cell-wall*—which at first closely envelopes it—the nucleus; but subsequently the cell-wall, in the course of its growth, becomes separated from the nucleus, thus leaving a cavity between them. This is termed the cavity of the cell, and is filled with a substance differing essentially in character both from the nucleus and from the cell-wall. In the cell thus produced, the nucleus is not in the central point, but is situated eccentrically at a point on the inner surface of the cell-wall. It is from these cells alone, by a process of farther development, that all organized products arise.

3. That this mode of development from cells takes place in morbid as well as in normal formations may be readily shown in numerous cases; and, as VOGEL remarks, can be most obviously traced in the formation of pus corpuscles. SCHWANN describes the corpuscles of pus as peculiar cells which are formed in the serum of pus—the *cytoblastema*, exuded during inflammation, in increased quantity and of anomalous composition—precisely in the same manner as mucous corpuscles originate in mucous, and, indeed, as all cells form in their cytoblastema. Pus corpuscles appear to be earliest formed upon the surface of the granulations, owing to the circumstance of the pus-serum—their cytoblastema being constantly exuded at that part, and with the greatest amount of plastic force. SCHWANN considers it most likely that the nuclei of the pus corpuscles are first formed, and that the pus cells pursue an independent growth for a period. The more healthy the pus, the greater is its plastic force, and the greater the number of cells which are formed in it, so that in healthy pus the quantity of serum is small in comparison with the number of cells.

4. VOGEL states, that when pus is produced from a fluid blastema on a free surface, or in a cavity connected with the exterior of the body, numerous isolated granules are first seen, and that these granules become surrounded by a very delicate transparent cell membrane, which subsequently forms so thick and opaque a wall that the nucleus can no longer be seen through it; but the addition of acetic acid, which either dissolves the cell-wall, or renders it transparent, again renders the nucleus visible. As

to the early relations of the nucleus and nucleolus, he cannot determine whether or not the nucleolus exists prior to the nucleus—that the nucleolus is, as it were, the means of forming the nucleus in the same way as the nucleus forms the cell. In some cases he thinks that this may happen, but certainly not in all. VOGEL agrees with HENLE, in opposition to REICHERT, in believing that SCHWANN's cell-theory represents only one of the various forms of development, of which the type in different cases may present very numerous differences. The English reader will find this theory developed in Mr. HENRY SMITH's Translation of SCHWANN and SCHLEIDEN's researches for the SYDENHAM Society, and this and other pathological subjects fully discussed in Dr. DAY's very excellent translation of, and additions to, VOGEL's *Pathological Anatomy of the Human Body*, where the pathology of pus is ably considered and at great length. The recent literature of this formation is abundant; but there is nothing furnished by the numerous authors who have written on it essentially different from the results furnished by SCHWANN and VOGEL.

[The pus corpuscles are peculiar cells which are formed in the serum of pus, *i. e.*, in cyto-blastema, exuded during inflammation in increased quantity, and of anomalous composition, precisely in the same manner that mucous corpuscles originate in mucous, and, indeed, as all cells form in their cyto-blastema. According to some recent observations, they are earliest formed upon the surface of the granulations, and for the reason that their cyto-blastema, the pus-serum, is constantly exuding freshest at that part, and therefore possesses, in that situation, the greatest amount of plastic force, as we see in the formation of new yolk-cells, on the outside and in the neighbourhood of the vitelline membrane. It is, however, probable, that the pus-cells pursue an independent growth for a period, as in yolk-cells, far removed from the vitelline membrane; and the nuclei are also probably their first-formed part. The more healthy the pus, the greater is its plastic force, and the greater the number of cells that are formed in it, so that in healthy pus the quantity of serum is very small in comparison with the number of cells. The mucous, pus, and lymph corpuscles are then small round cells, with a nucleus attached to their walls. According to HENLE, mucous and pus corpuscles cannot be distinguished in any way from one another, and those of lymph differ from them only inasmuch as their nucleus is more round and granulous, and does not crumble under the action of acetic acid; but no difference exists between them in the form of the entire cell. The blood corpuscles present a higher degree of development. In them we find not only very characteristic cell contents, the red colouring matter, but the form of the cell also undergoes an important alteration, inasmuch as it becomes flattened; and as this flattening takes place in cells which float free in a fluid, it cannot be explained as the result of mechanical causes, but must manifestly be regarded as a peculiar stage of development of those cells. The nucleus is persistent in all these cells, while in those more highly developed it usually disappears at some subsequent period.]

BIBLIOG. AND REFER.—T. Gluge, Observat. nonnullæ

Microscop., &c. Berol., 1835.—Gueterbock, De Pure et Granulatione. Berol., 1835.—H. Wood, De Paris Naturalque Formatione. Berol., 1837.—T. Schwann, Microscopical Researches into the Accordance in the Structure and Growth of Animals and Plants. Transl. by H. Smith, Svo. Lond., 1847, p. 71. (For the Sydenham Society.)—J. Vogel, Ueber Eiter, Eiterung mid die damit verwandten Voränge. Erlang., 1838. Et Icones Histologie Pathologicae, Tabulæ Histologium Pathologicam illustrantes. 4to. Lipsie, 1843, p. 8, tab. iii.; and the Pathological Anatomy of the Human Body. Transl. from the German, with additions, by G. E. Day, Svo. Lond., 1847, p. 133.—Henle, Ueber Schleim- und Eiterbildung.—Hufeland, Journ. f. 8 Pract. Heilk., b. lxxvii, p. 5.—Gluge, Anaton.-Mikrosk. Untersuchungen. Minden, 1838, p. 15.—L. Mandl, Anatomie Microscop., 2 liv. Pus et Mucus, Svo. Paris, 1839. And Manuel d'Anatomie Générale appliqué à la Physiologie et à la Pathologie, Svo. Paris, 1843.—Gruby, Observations Microscopiques, &c. Vindol., 1840.—F. E. Braun, Der Eiter, &c. Ketzingen, 1841.—Messerschmidt, De Pure et Sanie. Lipsie, 1842.—E. von Bibra, Chemische Untersuchungen Verschiedener Eiterarten. Berl., 1842.—F. Bühlmann, Beitr. zur Kenntniss der kranken Schleimhaut der Respirationsorgane. Bern., 1843.—Henle, Zeitschrift für Rationelle Medicin, &c., b. ii., p. 177.

PUSTULAR ERUPTIONS.—SYNON. *Pustulæ*; *Pustulic*; *φλυκταιναι*; *Ecpyesis*, Good. *Pustules*, *Boutons*, Fr. *Eiterblättern*, Germ. *Pimples*.

CLASSIF.—5th Order (Willan). 6th Class, 3d Order (Good). III. CLASS, I. ORDER (Author).

1. DEFIN.—A pustule consists of a small and nearly rounded elevation of the cuticle, with an inflamed base, containing pus from the commencement of this elevation.

2. WILLAN and BATEMAN distinguish four varieties of PUSTULES. 1st. *Phlyæcium*, a pustule commonly of a large size, raised on a hard circular base of a vivid red colour, and succeeded by a thick, hard, dark scab. 2d. *Psudracium*, a small pustule, often irregularly circumscribed, producing a slight elevation of the cuticle, and terminating in a laminated scab. Many of the psudracia usually appear in clusters and become confluent, and after the discharge of pus they pour out a thin watery humour, which often forms an irregular incrustation. 3d. *Achor*, a small acuminated pustule, containing a straw-coloured pus, having the appearance and nearly the consistence of strained honey, and succeeded by a thin, brown, or yellowish scab; and, 4th. *Favus*, a larger and flatter pustule than achor, not acuminated, and contains a more viscid matter. Its base, which is often irregular, is slightly inflamed; it is succeeded by a yellow, semi-transparent, and sometimes cellular scab, like a honey-comb; whence it has obtained its name.

3. Pustules arise from an inflammation of the skin, and the consequent formation of purulent matter under the cuticle, elevating this latter into small circumscribed tumours. Most commonly the inflammation of the base of each pustule is distinct; but sometimes several or even many pustules arise from an extended inflamed surface. The fluid contained in the pustules desiccates and often terminates in a scabby incrustation, varying in hardness according to the tenacity of the contained fluid; sometimes in superficial ulceration. The number, form, and aspect of the pustular ulcerations in these latter cases, and even of the cicatrices which succeed them, should be attentively considered, as they are characteristic of the particular species of the pustular eruption. There is no class of diseases, and especially no class so limited as this is, that has so little in



common in their constitutional characters as this presents. It is only in the pustular eruption that they have any resemblance to each other; for some are contagious, and others are not, and some are acute, and others chronic.

4. Pustules are liable to be confounded with vesicles, especially when the latter, by a sort of reparative action, and by the greater intensity of the inflammation in their dermic bases, form pus, which mingles with the serum, and forms at first a sero-puriform, and subsequently a purulent or even a pustular vesicle. In such instances the eruption is actually vesicular, the pustular eruptions containing pus from their earliest formation.

5. Much difference of opinion exists among writers on diseases of the skin as to the eruptions which should be classed as strictly pustular. WILLAN and BATEMAN comprise five species: 1st. *Impetigo*; 2d. *Porrigo*; 3d. *Ecthyma*; 4th. *Variola*; and, 5th. *Scabies*. The disciples of BIETT, especially RAYER, CAZENAVE, and SCHEDEL, give a different arrangement. RAYER reckons seven forms of pustular eruptions: *Variola*, including varicella; *Vaccinia*, comprising *Vaccinella*; *Aenc*, *Rosacca*, *Mentagra* or *Sycosis*, *Impetigo*, *Favus*, and *Ecthyma*. To these M.M. CAZENAVE and SCHEDEL add *Glanders*. Mr. WILSON, however, reduces the species of pustulæ to two, namely, *Impetigo* and *Ecthyma*, and proceeds to remark that the genus *Porrigo* of WILLAN comprises eruptions of the most opposite kind, and has been the source of much confusion, so much, indeed, that it would be well that the term for the future should be discarded. *Scabies*, again, is a disease presenting several elementary forms, of which both vesicles and pustules are accidental, and only occasionally present.

6. Although *variola* is a pustular disease, still it is more appropriately classed with the exanthemata, and others comprised by RAYER would be as well arranged under different genera. The causes, characters, and modes of terminations of pustules have reference merely to the individual species, as neither of these is common to all the species, however their number may be limited. Their diagnosis and treatment are, therefore, to be considered under their several heads, where they are treated of by the names usually applied to them; the question as to the eruptions which should be viewed as strictly pustular becoming apparent in these places, all arrangements of these eruptions being entirely conventional.

BIBLIOG. AND REFER.—*Celsus*, De Med., l. v., c. 28.—*Alexander Trallianus*, Opera, l. i., c. 5.—*Ætius*, Tetrab., ii., ser. ii., c. 68.—*Paulus Ægineta*, De Re Med., l. iii., c. 3.—*Oribasius*, De Loc. Affect., l. iv., c. 12. (*All the Ancients confounded Pustules with Vesicles.*)—*Bateman*, Synopsis of Cut. Dis., 7th ed., p. 205. (See the works of RAYER, PLUMBE, GREEN, CAZENAVE, SCHEDEL, WILSON, and DENDY, and WILSON, referred to in other articles on Cutaneous Eruptions.)

PUSTULE, MALIGNANT.—*SYNON.* *Malignant Pustule*; *Pustula maligna*; *Contagious Carbuncle*; *Persian Fire*; *Charbon malin*.—*Pustule maligne*, CHAUSSIER. *Bouton malin*; *Anthrax malin*; *Anthracion*, RAYER. *Gangrenous Pustule*; *Malignant Carbuncle*.

CLASSIF.—III. CLASS, I. ORDER (Author).

1. DEFIN.—A large vesicle filled with a sanious or sero-sanguineous fluid, under which a lenticular induration is formed, which is speedily surrounded

by a phlegmous erysipelatous arcular swelling, a larger or smaller portion of which soon becomes gangrenous.

2. I. CAUSES.—This malady is very rarely seen in this country, although it is not uncommon in some parts of France and of the Continent. It is generally caused by the contact of some poisonous animal fluid or matter, which, from the nature of its effects, may justly be classed as a *septic poison*. ENAUX, CHAUSSIER, and many others are of opinion that malignant pustule constantly follows contagion or inoculation, or the contact of this gangrenous tumour, or of the offal or blood of animals affected by it. They state, in support of this opinion, 1st. That it has been seen most frequently in smiths, veterinarians, shepherds, graziers, tawers, tanners, butchers, knackers, mattress-makers, &c., or those who have the care of animals, or who handle their carcasses and offal. 2d. That it appears exclusively on parts of the body which are most exposed, as the face, neck, hands, arms, &c., or have been exposed accidentally. 3d. That it has been most frequently observed in human subjects during pyæzooties, attended by buboes and carbuncles. They farther state, that the sanies poured out by the disease is one of the means by which it is propagated. M. RAYER observes, that the blood of a sheep affected with this disease having flowed over a shepherd's hand, produced malignant pustules; and that a butcher was attacked in the tongue from having taken the knife with which he was skinning an ox between his teeth for a few seconds. These statements, M. RAYER adds, are in accordance with the results of M. QUERET's researches on the changes undergone by the blood in different diseases. It has even been contended that the blood of over-driven cattle has produced this malady, and instances have been adduced in support of the fact; but this requires confirmation, or farther investigation.

3. It is stated by THOMASIN that a woman, while dressing the gangrenous sore of her husband, having touched her cheek soiled with some of the discharge from the sore, became affected in two hours with anthracion, in this situation, that spread with alarming rapidity. HUFELAND says, that a woman caught this malady from a female affected by it with whom she had slept. But it is contended by JEMINA, on the authority of several practitioners, and supported by various experiments communicated to MALACARNE, that the malignant pustule caused by contact of an animal affected with it cannot be transmitted from one individual of the human species to another; and M. RAYER states that one of his pupils, M. BONET, inoculated himself with the matter of anthracion without being infected.

4. It has been supposed that malignant pustule may occur sporadically in the human subject, owing to the nature of the ingesta, or of other causes, as a modified or malignant form of furmiculus. The nine cases of *gangrenous pustule* detailed by M. BAYLE certainly closely resemble cases of malignant pustule, or anthracion, and the persons who were their subjects had never touched the remains of any animal which had died of anthracion, or had partaken lately of any suspected animal food. M. DAVY LA CHEVRIE has recorded six cases of this mal-

ady, in which no evidence could be detected of infection from another person, or from a deceased animal. It would appear, that although many cases of anthracion may be traced to the contagion, or contact of morbid matters from the lower animals, and to contagion from the human subject, as contended for by some, and most probably with truth in certain circumstances, yet other cases may occur sporadically, as it has been impossible to trace the malady to contagion in some instances. But it is not unlikely some severe cases of carbuncle have been mistaken for the contagious malignant pustule.

5. M. RAYER says, that anthracion is pretty common in several districts of Franche-Comté, in Lorraine, and especially in Burgundy; but that it is rare in Paris. He has, however, met with it in butchers, tanners, and more frequently in workmen engaged in dressing hides, skins, and wool; and he met with several cases which came from a manufactory of which the business was cleansing and dressing hair from Russia.

6. II. SYMPTOMS.—The description of malignant pustule has been fully given by RAYER, ROCHOUX, and the writers already mentioned; but I shall chiefly follow that given by M. RAYER. When the malady is caused by contagion, the interval between the time of infection and the eruption of the gangrenous spot varies from a few hours to five or six days. If the intensity of the disease be made the basis of a division, the cases may be arranged under three heads: 1st. *Slight anthracion*, with circumscribed mortification. 2d. *Severe anthracion*, with diffused gangrene. 3d. *Fatal anthracion*, with alterations in the blood, and in one or several of the viscera.

7. *A. Anthracion with limited gangrene*, or the "pustule maligne prominente," begins with a seropurulent or sanious elevation, the base of which is hard, tense, and deeply seated, and is soon surrounded by a phlegmono-erysipelatous inflammation. The central point of the tumour is attacked with gangrene, but it rarely happens that the mortification extends beyond this primary seat, the disorganization soon stopping spontaneously.

8. *B. Severe and diffuse gangrenous pustule*, or *anthracion*, commences with much pruritus, followed by the appearance of a red spot like a flea-bite. The vesicle, at first of the size of a millet-seed, soon acquires larger dimensions, and, if not ruptured by the patient, bursts spontaneously. From twenty-four to thirty-six hours after the pruritus, a small, hard, circumscribed nucleus, of the form and size of a lentile, is felt under and around the vesicle; and in the circumference a soft but somewhat resisting swelling is developed, of a reddish or livid colour, covered by-and-by with secondary sero-sanguinolent vesicles, at first discrete, but speedily becoming confluent. The central spot, now of a brownish hue, extremely hard, and very insensible, becomes gangrenous. The inflammation extends to a considerable distance and depth; the adjoining skin is dark-red and shining; and the sub-cutaneous cellular tissue is puffy, tense, and apparently emphysematous. The central part is numb or insensible, and gangrene advances rapidly.

9. If the malady continues to proceed, or tends to an *unfavourable issue*, the constitutional symptoms assume a severe form; the pulse is

small and weak; the tongue is dry and brown; the skin is parched; the patient complains of a feeling of anxiety; is attacked with fainting, or with leipothymia; his features are shrunk, and his eyes are glassy; his mental and physical powers are depressed; and cardialgia, eructations, hiccough, and low delirium precede dissolution. The duration of this variety of the disease varies from two or three days to several days.

10. If the malady ceases to make farther progress, and tends to a *favourable result*, a vivid red circle appears around the eschar; the swelling, which had spread extensively, diminishes at the same time, and the patient feels an agreeable warmth, accompanied with a pulsating motion of the affected part. The pulse acquires power, the strength and spirits increase, and, if febrile reaction is considerable, it is resolved by a gentle perspiration. Suppuration takes place between the living and dead parts, and the detachment of the eschar leaves a suppurating surface of various extent in different cases.

11. *C. Malignant pustule, with fatal contamination of the blood and viscera*, advances with frightful rapidity, death sometimes taking place in eighteen or twenty-four hours from its invasion. The local alteration in the integuments is occasionally of no great amount; the formidable symptoms and the fatal terminations are explicable only on the supposition that changes in the blood, or in the internal organs, or in both, have taken place to an extent incompatible with the continuance of life. M. RAYER has adduced two cases of this form of the malady which were treated by him and examined after death.

12. *D. Certain local modifications of the malady* have been observed. When anthracion attacks the *face*, it is attended by a phlegmonous erysipelas of the features, often extending to the neck and anterior of the chest. When the eyelids are the seat, it occasions an enormous and very painful tumefaction of the face, with intense headache and delirium, often with the loss of the eye, always with eversion of the eyelids, which are then formed by the orbicularis muscle and the conjunctiva alone. Wherever muscular fibres are contiguous to the skin, there the gangrene extends less deeply. Nevertheless, when the lower lip is attacked with anthracion, it is apt to be destroyed through a considerable extent either by the disease or by the caustics employed to arrest its progress. When the *neck* is the seat of the malady, the deep extension of the inflammation impedes respiration and deglutition; and pyalism, epistaxis, swelling of the face, &c., generally take place. If the parietes of the *chest* are attacked, the inflammation generally extends to the sub-cutaneous cellular tissue of the thorax and axillæ. When the back of the *hand*, or the *instep*, is the seat of anthracion, every part of the limb is successively attacked with a phlegmonous-erysipelas inflammation.

13. *E. Appearances after Death*.—In the more severe and general states of the disease, unequivocal symptoms of an altered condition of the blood, of congestive inflammation of the lungs, or of asthenic gastro-enteritis, or of the absorption of purulent sanies into the blood, are observed before death. M. LITTRE, in a case of anthracion of the lower lip, found pus within



the veins of the face, and a number of small abscesses in the substances of the lungs. In addition to the destruction of the integuments and adjoining cellular tissue of the affected part, marks of congestive inflammation with ecchymoses have been observed in the lungs, liver, spleen, and digestive canal. M. VIRICEL states, that he found malignant pustules in the colon; and M. LAMBERT says, that the gelatinous serous deposits always found in the adjoining subcutaneous cellular tissue is occasionally also found in the cellular tissue of the mediastinum. A quantity of sanguinolent serum is commonly effused into the serous cavities. The several tissues are more or less softened, and the viscera and blood present the same changes as are found in the malignant carbuncle of animals.

14. III. DIAGNOSIS.—On its first appearance the malignant pustule may be mistaken for the bite of an insect; but it wants the minute central yellowish point of an insect bite, and soon presents the painful indurated base, and the sanious vesicle with which malignant pustule commences, and which, with the diffuse or erysipelatous and emphysematous-looking inflammation surrounding it, also distinguishes it from furuncle, carbuncle, or anthrax. Malignant pustule in some instances, however, can hardly be distinguished from the more gangrenous form of carbuncle (see art. FURUNCULAR DISEASES, &c., § 14, *et seq.*); and it is most probable that the one affection runs into the other, those cases of sporadic anthracion which have not been traced to contagion being only instances of very severe carbuncle, the local and constitutional characters of which they have certainly possessed.

15. On the other hand, anthracion may be confounded with phlegmonous or gangrenous *erysipelas*, and with the gangrenous or sphacelating ulceration of the cheeks, and labia majora vulvæ met with in children, or even with the *bubo* or carbuncle of plague; and certainly cases of these occasionally very closely resemble anthracion, and if they be not seen at an early stage, or at their commencement, the diagnosis will be difficult, if not impossible in some instances. These, however, do not present the sanious vesicle or the puriform pustule with which anthracion originates; and the gangrenous affection of the cheeks of children commences in the inside of the mouth, and extends to the skin. From pestilential carbuncle and bubo anthracion is distinguished by the absence of the symptoms characterizing plague, and by the several circumstances attending either the one or the other. Cases of anthracion, however, are not so readily distinguished, as M. RAYER supposes, from the carbuncles in cases of sporadic or scattered plague. Indeed, he endeavours to draw distinction, but conceals close resemblances between this malady and those which are very closely allied to it, if they be not altogether identical with it. I would, however, infer, that the sporadic or uncontagious cases of malignant pustule, or the affection described as such, are severe cases of carbuncle (see FURUNCULAR DISEASES, § 14, *et seq.*); that the malignant pustule or anthracion, caused by the contact of a poisonous or morbid animal matter, consists of local changes which closely resemble the worst cases of carbuncle, and of a constitutional disturbance often of a more intense

and more rapidly fatal tendency than in the latter; and that the true anthracion or malignant pustule is generally infected by the morbid fluids of cattle, &c., and especially by the malignant carbuncle of animals, or that attacking sheep and other woolly and hairy animals, and which I shall briefly describe.

16. *The malignant carbuncle, or charbon, of animals* is characterized by the appearance of a voluminous uncircumscribed tumour, which yields to pressure, crepitates like emphysema, and exhales a peculiar putrid odour. The centre of the swelling is black, as if carbonized, and the circumference is infiltrated with a brownish or yellowish fluid, and distended by a very fetid gas. After death the substance of the heart is softened, and its external surface ecchymosed in the course of the blood-vessels. The blood in the heart and large vessels is generally fluid. In the veins it is very black, sometimes containing clots of a black or yellowish colour. The lungs are covered by small ecchymoses, which are also seen penetrating their substance. The stomach and intestines present black sanguineous ecchymoses, of various sizes, between the inner coats and under the peritoneum, and variously distributed in different parts of the canal. The liver and spleen are gorged with dark blood. The nervous system is said not to offer any change.

17. The same changes, local and visceral, which are found in the malignant carbuncle of animals are also found in the blood, heart, lungs, digestive organs, and other viscera in cases of fatal malignant pustule in the human subject; and, moreover, the discharge from the disease of the brute produces the same malady in man—malignant pustule or anthracion. The identity of both these diseases cannot, therefore, be disputed, although the spontaneous or sporadic appearance of anthracion in man may be disputed, or may want confirmation.

18. IV. PROGNOSIS.—The first variety may recover of itself, the gangrene terminating spontaneously, or being readily arrested by treatment. The second is much more serious, but it will generally be cured by the prompt and energetic use of caustics. The third variety is generally mortal, and it may end fatally in twenty-four or forty-eight hours from its appearance. The danger is always greater from the second variety, when it attacks the face, head, or neck, than when it affects the extremities. It is also aggravated by extremes of temperature.

19. V. TREATMENT.—M. RAYER states, that as soon as the existence of anthracion is ascertained, the part must be deeply scarified and extensively cauterized. To be effectual, the incisions should extend to all the gangrenous parts, but not beyond them. The vesications on the surface ought to be immediately opened and the fluid absorbed, and the denuded surface covered with a dossil of lint dipped in the liquid muriate of antimony, or with a small fragment of caustic potash, kept in its place by a strip of plaster and a bandage. Five or six hours afterwards this application may be removed, and the eschar covered with lint spread with the unguentum resinorum, or some other salve of a similar kind. Instead of the caustics advised by M. RAYER, I would recommend the *nitric acid* to be freely applied, and to be followed by the usual dressings and the internal treatment pre-

scribed for gangrenous inflammation of the cellular tissue and for carbuncle. (See articles CELLULAR TISSUE, § 35, *et seq.*, and FURUNCULOUS DISEASES, § 20, *et seq.*)

20. Next day, if it be found that no vesicular areola has been formed around the eschar, and if the patient complains of but little pain, without smarting or pungent heat, it may be inferred that the cautery has included the whole of the disease. If, on the contrary, a hard and deep-seated tumour has appeared around the primary seat of the malady, and symptoms of phlegmous-erysipelatous inflammation are present, the caustic must be applied again, having first removed the gangrenous parts, after dividing them by a crucial incision. This procedure is also necessary when the slough, which forms the centre of the swelling, has already become hard and impermeable like a piece of leather; for it must be removed to admit of the action of the caustic being exerted on parts not yet sphacelated, after which they are to be covered with a stimulating poultice.

21. The value of *eschariotics* in the treatment of malignant pustule is incontestable. They are indicated as long as the gangrene shows a disposition to spread, or while its limits are undefined; but, in order that the constitutional or vital powers should be enabled thus to limit the extension of the local mischief, and to resist the imbibition and absorption of the morbid matters of the gangrenous part—should oppose the general infection and contamination which the peculiar matter of anthraxion produces, and the consequent congestions, congestive inflammations, and visceral lesions which are observed in fatal cases, the powerful internal restoratives, aided by the aperients and enemata, that I have recommended in similar states of constitutional and local disease, should not be overlooked, but be promptly and efficiently prescribed. (See CELLULAR TISSUE, *Diffusive Inflammation of*, § 35, *et seq.*; ERYSIPELAS, § 73, *et seq.*; INFLAMMATIONS, § 236, *et seq.*; GANGRENE, § 66, *et seq.*; and POISONS, § 698, *et seq.*)

BIBLIOG. AND REFER.—*Celsus*, De Re Med., l. v., 28.—*C. P. de Herrera*, De Carbunculis Animadversiones, 4to. Vallad., 1604.—*Fournier*, Observat. et Expériences sur le Charbon Malin, avec un Moyen assuré de le Quérir, 8vo. Dijon, 1769.—*Enaux et Chaussier*, Manière de Traiter les Morsures des Animaux enragés, et de la Vipère, suivie d'un Précis sur la Pustule Maligne, 12mo. Paris, 1785.—*Thomassin*, Sur la Charbon Malin de Burgoyne, ou la Pustule Maligne.—*Jemima*, in Jour. de Médecine, t. liv., p. 144.—*G. L. Bayle*, Consider. sur la Nosologie, la Médecine d'Observat. et la Médecine Pratique, suivies d'Observations pour servir à l'Histoire des Pustules Malignes, 8vo. Paris, 1802.—*Davy la Chevré*, Sur la Pustule Maligne, 4to. Paris, 1807.—*Littre*, in Journ. Hebdomad. de Med. Sep., 1829, p. 449.—*Lambert*, Révue Médicale. 1830, p. 481.—*Hurtel d'Arboval*, Diction. de Chirurg. Vétérinaires, 8vo. Paris, 1826, art. Charbon.—*Leuret*, Recherches et Expériences sur les Altérations du Sang., 4to. Paris, 1826.—*Lallemand*, in Archives Génér. de Méd., t. iv., p. 242.—*Costallat*, in Journ. Hebdom. de Méd., t. i., p. 51.—*Blandin*, *ibid.*, t. iv., p. 417. (Treated by the application of the Acidulous Nitrate of Mercury.)—*Lisfranc*, in Journ. Complément des Sc. Médicales, t. xxxix., p. 304. (Prefers the actual Caustery to the potential.)—*Decaris*, Révue Médicale, t. xv., p. 429. (A case cured by phosphorus dissolved in ether.)—*Schwann*, *ibid.*, t. xvi., p. 463.—*P. Rayer*, Theoretical and Practical Treatise on the Diseases of the Skin, 8vo. Paris. Transl. by R. Willis, 8vo. Lond., 1835, p. 557.—*J. Bouillaud*, in Dict. de Méd. et Chirurg. Pratiques, 8vo. Paris, art. Charbon.—*Rochaux*, in Dict. de Méd., 2d ed., art. Pustule Maligne.—*D. Hoffmann*, in Rust Magazine, b. xxi., p. 70.—*Marjolin et Olivier*, in Dict. de Méd., 2d ed., art. Charbonneuses Affections. (They adduce several instances of the charbon, or malignant carbuncle of animals, having produced malignant pustule in the human subject; and cases of constitutional disease, with visceral lesions, and

change of the blood without external gangrene.)—*Bland*, Nouv. Biblioth. Méd., t. ii. 1826, p. 18.—*Wagner*, Med. and Chirurg. Review, vol. xxix., p. 562.

PYLORUS. See STOMACH, Diseases of.

PYROSIS.—SYNON. *Ἰπυρσις* (from *ἵπυρ*, fire, and *πυρῶς*, fut. *ωσῶ*).—*Pyrosis*, Sauvages, Sagar, Cullen. *Cardialgia sputatoria*, Linnaeus, Good. *Ardor ventriculi*, Hoffmann. *Soda*, *Gastrorrhœa*, *Ardor stomachi*, Auct. *Ardeur de l'Estomac*, Cremason, Fr. *Das Brennen*; *das Sodbrennen*, Germ. *Black-water*, *Water-brash*, *Heart-burn*.

CLASSIF.—2d Class, Nervous Diseases. 3d Order, Spasmodic Affections (Cullen). i. Class, Diseases of the Digestive Function. i. Order, Affecting the Alimentary Canal.—I. CLASS, I. ORDER (Author).

1. DEFIN.—*Constrictive pain at the pit of the stomach, extending to the back, and bending of the body forward, followed in a short time by eructations, without nausea or retchings, of a large quantity of a thin, watery, and often insipid, fluid that afford relief.*

2. The description furnished by Dr. CULLEN has generally been considered as most accurate, his experience of the disease in a country where it is prevalent having been considerable. But it is liable to the objections which may be urged against nosological descriptions, namely, that it represents merely a single type or phase of the disease; a single and distinctly characterized form, without any notice of the modifications and gradations which ally it to other disorders of the digestive organs. I shall first describe this affection nearly in the terms used by Dr. CULLEN, and afterward notice such variations as have fallen under my observation.

3. I. SYMPTOMS.—*Pyrosis* appears most commonly in persons under middle age, but seldom before the age of puberty. When it has once taken place, it is apt to recur occasionally for a long time after; but it seldom appears in persons far advanced in life. It affects both sexes, but more frequently the female. The fits of the disease usually come on in the morning and forenoon, when the stomach is empty. The first symptom is pain at the pit of the stomach, with a sense of constriction, as if the stomach were drawn towards the back. The pain is increased by raising the body erect, and is alleviated by bending forward. It is often severe, and after continuing for some time it is followed by an eructation of a thin, watery, limpid, or nearly clear and often ropy fluid in considerable quantity. This fluid is generally insipid, but it is sometimes more or less acid. The eructation is for some time repeated frequently, and does not immediately give relief to the pain; but it does so at length, and terminates the attack.

4. I may add to the above, that I have seen this affection more than once in males much below puberty, occurring at any hour of the day when the stomach was empty, and affecting patients with good appetites and rapid digestion. I have seen it also unattended and not preceded by any actual pain at the pit of the stomach, but by slight uneasiness only in that situation; and in more than one case the patient complained of the great coldness of the fluid thus ejected. The pain is quite different from that of *cardialgia*, or *heart-burn*, when the fluid brought up is abundant, insipid, ropy, and



colourless; but when it closely resembles cardialgia, the sensation of constriction, with bending forward of the trunk, is not present, and the fluid ejected is often acid, and less abundant than when the pain is of the constrictive character above described. In no case is the disease attended by fever, or by nausea or retchings. The fluid is always regurgitated or eructated by a similar inverted action of the esophagus to that producing rumination. It has appeared to me, during a careful observation of some cases, that the constrictive pain, as well as the ejection of the fluid, partly may be referred to the diaphragm.

5. *Complications.*—Pyrosis may be independent of indigestion, or be attended by rapid digestion; it also may be associated with either of the forms of dyspepsia or with flatulency. It is commonly complicated with costiveness, and often with torpid function of the liver, or even with disease of this viscus. That it is often associated either with organic or with functional disease of the pancreas seems probable. Indeed, it has been long supposed, and by various writers, that the fluid thrown off is merely an excessive discharge of the pancreatic fluid regurgitated into the stomach, and thence into the mouth; but, as Dr. KERR has justly remarked, if this were the case, we should expect the fluid to be mixed with some bile. Besides, it could hardly be expected that so large a quantity of fluid could be furnished by the pancreas in so short a time as during a fit of pyrosis. I am not aware of any instance in which organic disease of the pancreas has followed pyrosis, or in which such disease had taken place in a patient who had been at any previous period the subject of this affection. Dr. SEYMOUR adduces a case in which organic change in the liver followed pyrosis; but the cases which I have observed have not been associated with any organic change, excepting in one instance, although various functional disorders have often been present. It is not unusual, especially in northern countries, where pyrosis is most prevalent, to observe it in the course of pregnancy, and in both married and unmarried females, complicated with leucorrhœa. I have seen it in one instance associated with disease of the ovaria, and frequently in these countries with chronic rheumatism.

6. II. *DIAGNOSIS.*—*Pyrosis* is readily distinguished from other affections of the stomach by the absence of the usual symptoms of indigestion; by the appearance of the fluid ejected, its clear, colourless, generally insipid nature, and abundant quantity; by the absence of fever, of nausea, or retchings; by the manner in which the fluid is thrown off; by the mere regurgitation without nausea; and frequently by the little inconvenience or general disturbance attending it. The eructations which often accompany *cardialgia*, or other forms of indigestion, are usually observed during the progress of digestion; the fluid eructated being generally in small quantity, and aerid, always discoloured, and often furnishing indications of the indigestible matters. When the fluid of pyrosis is at all acid or acrid, these properties are much less marked than in *cardialgia* or the allied states of dyspepsia (*see art. INDIGESTION*, § 13, 14); it furnishes no indications of undigested matters, and is thrown up from a stomach which

has digested its contents, and contains nothing but the fluids which it thus ejects. *Pyrosis* cannot be confounded with simple *gastrodynia*, inasmuch as the former is attended by the copious discharge of a peculiar fluid, without nausea or vomiting, and as this discharge may be abundant although the pain may be very slight, *gastrodynia* being only a symptom of several gastric diseases. Dr. WEST states, without, however, adducing his authority, that the secretion of true water-brash is composed of water, albumen, and a trace of sodaic salt, with an excess of soda; and that, when it is acid, this property is owing to the muriatic and acetic acids. A recent analysis of the fluids thrown off the stomach has been published; but they do not appear to have been the fluids ejected by pyrosis, as they were mixed with undigested food, and contained much acetic acid. (*SIMON'S Animal Chemistry*, by DAY, &c., vol. ii., p. 393.)

7. III. *PROGNOSIS.*—Having once taken place, pyrosis is very apt to recur, and it is often very difficult to cure; but I have not met with an instance of it having passed into serious or structural disease, or been attended with danger. I am intimately acquainted with a gentleman who was long subject to this disorder when he was a boy residing in the north of Scotland, and who was afterward frequently attacked by indigestion; but he is now well and strong at an advanced period of life. Persons who are subject to it generally are able to pursue their avocations without much inconvenience; and often continue free from it for a considerable time, without any very obvious cause, and then are attacked, owing either to some error of diet, or exposure to cold and moisture. When the complaint is prolonged, the patient frequently becomes pale, considerably emaciated, and debilitated; and when it is protracted in females, scanty, or difficult, or painful menstruation is a common consequence.

8. IV. *CAUSES.*—A. *Pyrosis* is more frequent in females than in males, and in the unmarried than in the married. It may occur at any age, after six or seven years, but it is most common after puberty and until far-advanced age. It is so prevalent in some countries as to be considered *endemic* in them, especially in Sweden, Norway, Lapland, Scotland, and the Isles, &c. It has been attributed to the diet used by the natives of these countries—to the use of rye, barley, oats, potatoes, &c., and the want of animal food. It has been supposed that the use of unleavened or unfermented bread may be concerned in producing it. The share that these causes may have in occasioning it can hardly be determined. But it is also prevalent in countries where not only these causes prevail, but others which may concur with them, as the use of dried and smoked meats in considerable quantity, and of dried fish—both the dried meats and the dried fish being preserved without salt, or with very little. *Pyrosis* is certainly, also, much more frequent in cold and humid climates than in temperate, dry, or warm countries, and among the poor and ill-clothed than among the wealthier classes; although the latter are not exempt in these climates. LINNÆUS states that nearly one half of the population, men and women, living near the mountains in Lapland, were in his time the subject

of this complaint, and that in some it endured through their entire lives.

9. *B.* The exciting causes of pyrosis are chiefly long fasting, errors in diet, tasting savoury articles of food, without partaking of them—cold and humidity, especially when their influence is prolonged, and the warmth of the body is not promoted by exercise; cold applied to the lower extremities; powerful mental emotions; a poor and unwholesome diet; the privations often contingent upon a laborious life in a cold and humid climate; and the want of salutary stimuli, or of wholesome beverages, experienced by persons who are thus circumstanced.

10. *C.* The nature of this complaint has been much discussed. Pyrosis has been viewed as a form of indigestion, and it is probably allied to indigestion in many instances as it occurs in this and other temperate countries; but in northern countries I have seen instances of it attended by powerful and rapid digestion. Dr. PEMBERTON viewed it as a morbidly increased secretion from the stomach, analogous to a diabetic secretion of urine by the kidneys. Some physicians imputed it to obstruction or congestion of the collatitious viscera; and in this light it appears to be viewed by Dr. SEYMOUR. Others have considered it as actually a disease of the pancreas; this organ furnishing the fluid which collects by regurgitation into the stomach, where it causes pain and irritation, followed by its expulsion. The reasons which militate against this opinion have already been noticed (§ 5); and the analysis of the fluid is said to demonstrate that it is not pancreatic, although this is not a sufficient proof, for the pancreatic fluid may be considered just as likely to be altered in quality as in quantity. I once considered it as not improbable that this fluid partly consists of the gastric juice; for, having observed it in persons possessed of powerful digestion, and who live on food requiring strong digestive and assimilative powers, I inferred an abundant secretion of this juice, which would not infrequently be continued to be secreted in excess, especially in circumstances favouring the determination of blood to the digestive viscera, and in the very circumstances by which I have observed a fit of pyrosis to be produced, although there existed no food in the stomach to excite the secretion of the gastric juices; or, in other words, that pyrosis is produced by the continuance of the secretion of the gastric juices after the food taken into the stomach has passed into the duodenum; and that these juices, by irritating or otherwise acting on the stomach, cause the pain attending the disorder, the inverted action of the organ, or the regurgitation by which they are thrown off; the complaint ceasing for a time with the rejection of these juices, and returning only when the exciting causes (§ 8, 9), the nature of the food, or prolonged abstinence from it, or other circumstances which may favour the secretion of these juices, without furnishing food to the stomach on which they may act, are brought into operation. According to this view, the frequent discharge of secretions, so instrumental as they are in the assimilative processes, must necessarily be followed, in protracted cases, by pallor, emaciation, anæmia, and the other complications and consequences mentioned above (§ 5).

11. *V. TREATMENT.*—The indications of cure should be based upon sound views of the nature of a disease; but if these views are not to be found, we must fall back upon the results of experience as far as they may be trusted. If the above opinion that the disease is generally produced by a diet requiring a copious secretion of the gastric juices, but that the attack is excited by the want of that supply of food which is usually furnished to the stomach, or which is required for the quantity of the juices habitually secreted, or secreted in excess under the influence of circumstances, be at all correct, the intentions of cure may be readily devised. Indeed, this view, as well as the treatment, or, rather, the no treatment, founded on it, is not infrequently adopted by persons subject to this complaint; for they generally endeavour to prevent long fasting, rather than to cure the attack by eating, when the pain characterizing an attack has commenced; for if food were attempted to be taken at that time, unless in the slighter fits, it either could not readily pass into the stomach, or it would be rejected along with the fluid which has now occasioned a retrograde action of the stomach. According to this view, a change to a more digestible diet—to food habitually requiring a less abundant secretion of the gastric juices, and avoiding long fasting, will often be sufficient to cure the disease. This, in most places, cannot be even attempted; although a popular recourse to several articles has been recommended as substitutes for change of diet, and to prevent the ill effects of long fasting or of improper food. Thus, opium, spirituous liquors, nuxvomica, canabis Indica, tobacco-smoking and chewing, &c., are severally used in some countries with these intentions, and are more or less efficacious in warding off an attack in persons who are subject to this complaint. These substances, by allaying the morbid irritation of the nerves of the organ, diminish or prevent the excessive secretion of the gastric fluids causing the disorder; but, as long as the diet is persisted in that causes the complaint, the continued use of these substances is required to prevent a recurrence of the disorder, and thus the remedy often becomes as great an evil as the disease itself.

12. Many systematic writers, as well as authors of works on diseases of the digestive organs, appear either to have had no experience of pyrosis, or to have observed it imperfectly, for they have confounded it with cardialgia and other forms of indigestion on the one hand, or with the more common occurrences and states of gastrodynia or gastralgia and of vomiting on the other, and have treated it accordingly. Doubtless there is a more or less close approximation of cases of these affections to each other; still they are distinct. The pain of pyrosis is different from that of cardialgia, or of the more usual painful affections of the stomach termed gastrodynia, or gastralgia, and it may be so slight as to amount only to uneasiness. The matters brought up from the stomach are either not acid or very slightly so, are unmingled with undigested matters, are clear and colourless, are so abundant, and are so peculiar, even as respects their low temperature, as to constitute the chief feature of the complaint. The substances ejected either by eructations



or by retchings, in the ordinary forms of disordered stomach, are generally acrid, acid, or rancid; consist partly of, or contain, undigested articles; and proceed from an unloaded, or a partially loaded, as well as irritated stomach. They are often the products of excess, or are consequent upon errors of diet, or are owing to a weakened or an irritated state of the stomach. But pyrosis occurs only when the stomach is empty, after the usual diet, taken in very moderate or even in insufficient quantity, and the fluids, by which it is chiefly characterized, are regurgitated without nausea or retchings, and always unmixed with undigested matters, as already stated (§ 6).

13. States of disorder quite distinct in themselves, and different in their natures and characters, have thus been confounded with each other; and substances which have been found of service in one or more of these have been recommended as cures for pyrosis, although they are either altogether inappropriate, or only temporarily beneficial. Indeed, unless the chief causes of the disorder be removed—unless many of those who are the subjects of pyrosis live on more nutritious and digestible food, and are better protected from cold and wet than usually fall to their lots—no permanent advantage can be expected from treatment. Most of the remedies which have been prescribed for pyrosis, and have been said to remove it, merely alleviate the attack, but seldom succeed in preventing a recurrence of it. These medicines are generally appropriate in cardialgia, and in most cases of indigestion which are attended by acidity and flatulence, and by the eructation of fluid matters, more or less acid, or acrid, containing undigested, or partially digested substances. But these cases are not cases of pyrosis; and although these medicines are sometimes useful in this latter affection, still they are not permanently beneficial unless they be aided by change of diet, especially by an improved diet. Among the remedies thus recommended, those usually prescribed for the severer forms of indigestion hold prominent places, especially absorbents, as lime-water with milk; soap with small doses of opium; magnesia with various antispasmodics, and narcotics (RANOE, &c.); the oxyde of bismuth, with aloes or henbane (ODIER, MARCET, &c.); and ammonia in bitter infusions. As pyrosis was thus generally viewed as a form of indigestion, and not as an affection, caused by the nature of the diet and by the influence of cold and humidity upon the surface and extremities, and independent of defective digestive power, numerous other digestive aids were prescribed for its cure; and among these I may mention, as being sometimes beneficial, the mineral acids, particularly HALLER's or MYNSVCHT's sulphuric acid—the acidum sulphuricum aromaticum—the preparations of iron, and the balsams, especially the Peruvian balsam. Bitter almonds, with ammonia and the preparations of angelica root, were much praised by several German writers; and inspissated ox-gall,\* with asafetida and soap,

by NIEMANN and others. LINNÆUS recommended nux vomica in powder for the native Laplanders subject to pyrosis; and most probably, if it had been long or often used, in the doses (20 grains) to which he allowed it to be carried, the remedy would have been soon found worse than the disease. (*See article Poisons*, § 371, *et seq.*) Dr. BAILLE prescribed a drachm of the tincture of benzoïn suspended by mucilage, and Dr. PEMBERTON, ten grains of powdered kino with half a grain of opium every fourth hour at the commencement of the attack; or a bolus, consisting of six grains of alum with two or three grains of the soap and opium pill, the bowels being kept in an open state by rhubarb or other aperients. There can be no doubt of the occasional efficacy of these and of other remedies, especially those prescribed for the more painful forms of dyspepsia (*see articles INDIGESTION*, § 49, *et seq.*; and *STOMACH, painful affections of*), when they are aided by diet and warm clothing; but without such aids they will often fail. Change to digestible and wholesome food, due promotion of the cutaneous functions, and an open state of the bowels by means of stomachic or tonic aperients, are most deserving confidence, both for the cure and for the prevention of attacks of this complaint, which if otherwise treated will always prove most obstinate.

[Pulverized charcoal, blended with carbonate of magnesia and united with ginger, has been successfully given (since 1812) in various forms of gastralgia and pyrosis, according to Dr. FRANCIS.]

BIBLIOG. AND REFER.—S. Alberti, *De Morbis Mesenterii, Ardore Stomachi*, &c., 8vo. Witteb., 1578. In Halleri, *Biblioth. Med. Pract.*, vol. ii., p. 214.—J. Crüger, *De Ardore Stomachi*, &c. Erf., 1715.—Raven, *Beobachtungen*, p. 111.—Ranoe, in *Acta Reg. Soc. Med. Haun.*, vol. iv., p. 258.—Henke, in *Horn, Archiv. für Pract. Medicin.* July, 1809, p. 252.—M. Good, *The Study of Medicine*, vol. i., 4th edit., p. 119.—Cullen, *First Lines of the Practice of Physic*, &c., vol. iv., p. 13, and *Works by Thomson*, 2 vols. 8vo. 1827, vol. ii.—Reydellet, in *Dict. des Sciences Médicales*, t. xvi., p. 341.—B. Parr, *Lond. Med. Dict.*, 4to. London, 1809, vol. ii., p. 492.—C. R. Pemberton, *A Practical Treatise on the various Diseases of the Abdominal Viscera*, 4th edit., 8vo. Lond., 1820, p. 99.—E. J. Seymour, in *Lond. Med. Gazette*, vol. i., p. 783.—M. Baillie, *Lectures and Observations on Medicine*, 8vo. 1825.—J. P. T. Barras, *Traité sur les Gastralgies et les Entéralgies, ou Maladies Nerveuses de l'Estomac et des Intestins*, 3d ed., 8vo. Paris, 1829.—W. Kerr, in *Cyclop. of Pract. Med.*, vol. iii., p. 578.—T. West, *A Treatise on Pyrosis Idiopathica, or Water-brash*, &c., 8vo. Lond., 1841. (The systematic works of the *Franks, Hufeland*, and others generally err in confounding this affection with Cardialgia, and with those states of Indigestion which are attended by a discharge of acid, acrid, and undigested substances.)

[AMER. BIBLIOG. AND REFER.—Francis, *Cases of Morbid Anatomy*, in the *Transactions of the New-York Literary and Philosophical Society*, vol. i., 4to.—Delbee's *Midwifery*.—Meigs, *Diseases of Females*]

QUARTAN FEVER. *See* FEVER, *Intermittent*.

QUINSY. *See* THROAT, *Affections of*.

QUOTIDIAN FEVER. *See* INTERMITTENT FEVER.

RABIES.—SYNON. *Hydrophobia* (from *ὕδωρ*, water, and *φόβος*, dread); *Υδροφοβία*, Galen. *Hydrophobica passio*, *Pantaphobia*, *Aquafuga*, Auct. var. *Rabies canina*, Boerhaave. *Rabies contagiosa*, Parry. *Erethismus hydrophobica*, Young. *Lyssa* (λύσσα); *Lyssa canina*, Good. *Clonus hydrophobia*, Parr. *Cynolyssa*; *Phobodipsia*; *Phrenitis latrans*, Auct. *La Rage*, *Hydrophobie*, Fr. *Hundtollheit*, *Hunds-*

\* It may be mentioned that the ox-gall was recommended in several places of the first part of this work, and numerous formulæ, in which it formed the chief ingredient, were given in the *Appendix*. These were published in September, 1832; but this medicine was employed by me in practice since 1820, and was not viewed as a novelty, as it had been for centuries prescribed on the Continent; yet has it

recently been paraded as a discovery by some writers in medical journals.

*wuth, Wasserseheu, Germ. Idrofobia, Ital. Canine madness; Rabidity; Hydrophobia.*

CLASSIF. — *Class 2d, Nervous Diseases. Order 3d, Spasmodic Diseases (Cullen). Class 4th, Diseases of the Nervous Function. Order 3d, Affecting the Muscles (Good).* — II. CLASS, III. ORDER (*Author in Preface*).

1. DEFIN.—*A disease which is said to occur spontaneously or sporadically in the canine race, and is often communicated by contagion to man and other animals; and is characterized by dread of water and other fluids, by anxiety or distress at the epigastrium, by nervous spasms and choking sensations in the throat, and by paroxysms of uncontrollable impulsive violence (rabidity), terminating in death within a few days from the accession of the symptoms.*

2. Although the term *Hydrophobia* has been generally applied to this terrible disease, I have preferred that of *Rabies*, or *rabidity*, as being more characteristic of the chief phenomena manifested by it both in man and in the lower animals. The dread of water, or hydrophobia, is a very rare symptom of other diseases, which differ in every respect from the one now defined, and is only one of the phenomena observed in cases of rabies affecting the human subject. There is even reason to believe that it is not a characteristic symptom, or not always present in cases of the disease occurring in several of the lower animals. But this topic more appropriately falls under the diagnosis. In whatever manner the poison communicating the distemper may have originated—whether the malady is perpetuated only by contagion, without the contagious virus being renewed, or generated *de novo* by certain animals, or whether this latter alternative obtain—it propagates itself throughout animals of different species, of different races, and of distinct kingdoms, from the highest to the lowest, and, probably, from the lowest capable of inoculating the poison up to the highest animals; the inoculated animal acquiring a disposition by the development of the malady to inoculate others, and thereby to perpetuate itself. The slight mention which has been made of this disease before the Christian era, and the silence of the Hebrew writers respecting it, have induced some to believe that it is more prevalent in modern times than during periods of remote antiquity. In many places of continental Europe rabies appears so frequently in some of the lower animals, and so destructively as respects the attacks of the rabid animals on man, as to require a closer investigation of several topics connected with it than it has hitherto received.

3. *The Literary History of Rabies* has been investigated by SPRENGEL, BARDSLEY, HOFFMANN, and ADAMS; but although many of the ancient writers, from Homer down to the commencement of the Christian era, made allusions to, rather than special mention of, this malady, CÆLIUS AURELIANUS was the first to describe the symptoms with accuracy. CÆLIUS and GALEN concerned themselves more particularly with the prevention and treatment than with the history of the progress of the distemper; yet GALEN attempted to explain the prolonged period which the poison sometimes requires to develop its effects, and which he states to be

occasionally as long as a twelvemonth. The Arabian writers add but little to what may be found in the medical works of the Greeks and Romans. AVICENNA, however, notices the affection of the urinary organs, and the occasional termination of the malady by apoplexy; while his description is more full than those of his predecessors. As to the prevention and treatment of the malady, the ancient writers are as instructive as many recent authors; although that which is really valuable and appropriate is often mixed up with much that is either absurd or irrational; yet not equalling the extreme absurdity and irrationality of some of the doctrines and means of the present day.

4. I. DESCRIPTION.—This disease presents well-marked specific symptoms both in the human subject and in the lower animals; yet these symptoms vary somewhat in different animals. In the domestic dog it assumes two forms, the *sullen* and the *furious*; while in the feline race it generally presents only the latter form. In some animals the dread of water is said not to exist, at least at one period of the progress of the malady; while in man it is a very prominent symptom, although it frequently disappears shortly before death. Whether the disease arises only from contagion or inoculation, as supposed by some, or whether it is spontaneously evolved in certain circumstances in the canine, or also in the feline race, and is communicated by these modes from the subject of its spontaneous evolution, as believed in by many, the period of its incubation is generally long, while its course is extremely rapid when it has once declared itself. These are its characteristics in all animals inoculated by the poison producing it; but there are also others which mark the *periods* or *stages* into which it may be divided.

5. (a) *Stage of Incubation; the Latent Period.*—In this, the first stage, the symptoms of disorder may be either wanting or so slight as to escape observation. The wound by which the distemper is usually inoculated, whether dressed or neglected, generally heals up as kindly as similar injuries, if, indeed, not more rapidly than they, leaving a cicatrix which differs in no respect from those usually following such injuries. In some cases, however, pain has been felt in the cicatrix a considerable time after the accident, and in a few a slight fever or a rapid pulse has been remarked to continue from the receipt of the injury to the outbreak of the distemper. The *duration* of this period is seldom shorter than forty days, or longer than two years. Undoubted instances have, however, been adduced by M. TROLLET, whose experience of this disease has been most extensive, in which the characteristic symptoms appeared as early as the eighth day, and he even quotes instances of their occurrence as early as the day following the injury. That the duration of this period sometimes extends to six or nine months has been satisfactorily proved. Apparently, authentic cases have been adduced of a much longer time. J. HUNTER, R. HAMILTON, and S. BARDSLEY have endeavoured to show that all credible cases on record have occurred before the eighteenth month, while other authors have contended for even a longer period. Dr. URBAN states confidently, that he has known cases to occur as late as twenty months, and



four years after the injury, and similar prolonged periods have been adduced by others. In these the question is, whether the disease has been actually inoculated at a period so far back, or has there occurred a reinoculation at some intervening period? The solution of the doubt as to the possible duration of this period is one of some importance as respects the fears of a person who has sustained this most distressing injury.

6. The circumstances which, in man especially, seem to shorten the duration of this period on the one hand, and to prolong it on the other, have not been fully inquired into. It is not improbable that a small dose of the poison communicated to the wound will take a longer time to produce its effects upon the constitution of the injured person than a stronger or larger dose; that the rapidity of the effect will have some relation to the virulence or quantity of the inoculated poison, and the constitutional powers of the subject. In cases, however, where symptoms of hydrophobia, with spasms, &c., follow immediately or very soon after a bite, a question suggests itself: Are the symptoms actually those of inoculated rabies, or are they merely induced by the nature of the local injury, by the laceration of a nerve, by the puncture of a tendon, or by the fright or mental anxiety consequent upon the accident? This topic requires only to be kept in recollection in relation to this part of the subject: fuller consideration will be given to it in the sequel. The causes which more especially tend to hasten the development of the distemper after inoculation are debility of constitution, previous ill health, the fright experienced at the time, the fear and anxiety afterward entertained, the depressing passions, venereal excesses, exposure to the sun's rays, and injuries received on the cicatrices; while, on the other hand, a vigorous constitution, and absence of all dread, and of all causes of mental depression or of bodily exhaustion, probably either prolong the period of incubation, or successfully resist the influence of the poison, especially when the quantity inoculated has been small.

7. Although the period of incubation has presented no disorder, or the patient has made no complaint of any, still instances are common of more or less disorder being experienced. Still it is doubtful whether or not this disorder is caused by the silent and slow operation of the poison on the economy, or by the mental anxiety caused by the risk in which the patient finds himself placed. I am inclined to impute whatever disorder may appear to the former cause, without, however, underrating the influence of the latter. In a case in which this period was about the duration of seven weeks, and in which but little fear of the result appeared to have been entertained, the patient gradually became more sallow than usual, the eyes more sunk, the pulse somewhat accelerated, more excitable and weaker, and he complained of general debility. In another case, in which this period was of more than four months' duration, the patient continued apparently well until shortly before the accession of the malady, when the *precursory symptoms* became well-marked. In some instances, however, the patients are gloomy, desponding, retiring, and timid or melancholy, the countenance being

anxious, and pale, or sallow, and all the digestive functions impaired.\*

8. II. SYMPTOMS.—(b) *The precursory stage and symptoms* more immediately precede the outbreak or development of the malady, and continue for a short period merely. This stage commences with morbid sensibility of, or with pain in, the bitten part, and with alterations in the appearances of the cicatrix, which become painful, tender, tumid, and livid; and, according to Dr. URBAN, surrounded by small phlyctenæ containing a bluish fluid, which fluid he contends is capable of communicating the malady. This physician asserts that, although he has treated about forty cases of rabies, he has not seen the pustules under the tongue described by MAROCHETTI and MAGISTEL; but as he wrote soon after these physicians, it is very probable that he never examined the parts at the period of the appearance of these pustules. We are, however, still insufficiently informed as to these pustules, and especially on their pathological and therapeutical importance and relations.

9. With the accession of changes in the cicatrix, and sometimes even without any very obvious change beyond a greater fulness or itching, an aching pain, resembling that of chronic rheumatism, extends from the seat of injury in the direction of the nerves. If the injury have been received in the hand, it proceeds along the arm to the shoulder and to the muscles of the neck or back; if it have been received in a lower extremity, it extends along the thigh to the hips or loins. Sometimes with this pain the cicatrix becomes more irritable, of a dark livid red, and in rare instances opens up, and discharges a watery or ichorous fluid. Occasionally the pain shoots from the seat of injury to the epigastrium or præcordia, and it is often attended with headache, frequent sighing, oppression at the chest, with short attacks of difficult breathing, and with acceleration or irregularity of the pulse, which is usually soft or weak, occasionally full. The sleep is very

\* About 1820, Dr. MAROCHETTI, who had visited the Ukraine, stated, that in that country the formation of vesicles or pustules under the tongue had been remarked during this period, and that the opening and cauterization of these pustules prevented the development of this malady. The matter has not attracted my attention in this country; but M. MAGISTEL, in France, has stated that in 1822, at Boulay, ten persons of both sexes and some sheep were bitten by a rabid dog. The wounds, however, were not cauterized until forty-eight hours from the infliction of the injuries had elapsed. He carefully watched for the appearance of the pustules mentioned by MAROCHETTI, and he observed pustules arise, without occasioning pain or cramping the movements of the tongue. Some of these pustules appeared on the sixth day, others subsequently, and the last on the thirty-second day. He distinguished two species, the *crystalline* and the *opaque*. The former were projecting, rounded, and the size of hemp-seed; they were transparent, and contained a limpid, serous fluid. The latter were flattened, of a circular form, of the size of a lentile, and without transparency. The *crystalline* were seated superficially in the inferior surface of the tongue; the *opaque* penetrated more deeply, and presented, when opened, a small, ulcerated cavity. Almost all these pustules were situated on the sides of the frænum lingue, and on the lateral parts of the inferior surface of the organ. The *crystalline* appeared early in the latent stage, and not in all the persons who were bitten; the *opaque* appeared at a more advanced period, all the bitten exhibiting them. The cauterization of both species was soon followed by perfect cicatrization, and the *decoctum geniste*, recommended also by MAROCHETTI, was perseveringly continued. Five out of the ten were seized with the malady and died. M. MAGISTEL disproves the idea, formerly entertained, that ruminating animals labouring under rabies do not bite. Several sheep, which were bitten and became rabid, endeavoured to bite other sheep which were with them.

disturbed, accompanied with frightful dreams, often concerning the animal that inflicted the injury; loss of appetite, or nausea, occasionally vomiting; slight rigours or chills alternating with flushes; constipation of the bowels, pains in the back and limbs, sunk eyes, with dilatation of the pupils, and sometimes intolerance of light. These symptoms may usher in any acute disease; but when they occur in a person who has been bitten by any animal they should be viewed with strong suspicion; and more especially if several of them be conjoined with marked timidity and increased nervous susceptibility and sensibility, with an anxious expression of countenance, with fatigue on slight muscular exertion, and continued lassitude, with unusual depression of the animal spirits and sometimes extreme sadness, with increased acuteness of the intellect and of the senses, with slight cardiac palpitation, and with the changes in the cicatrix. It has been ascertained by several physicians, as well as by myself, that the painful sensations do not extend from the cicatrix in the course of the blood-vessels or absorbents, but in that of the nerves. The absorbent glands are never affected. The duration of this stage varies from two days to three, or four or five, or probably to a longer period in some instances, if the commencement of the symptoms in their slighter or incipient states were ascertained.

10. (c) *The hydrophobic period, or fully developed disease*, is attended by increase of the uneasy sensations, and other symptoms experienced in the cicatrix and extending from it, as well as of the precursory symptoms just enumerated. Added to these, there are often drowsiness, chilliness, frequent sighing, a bloated or tumid state of the face, a peculiar pain or distress referred to the epigastrium; alternations of chills and flushes of heat; a sense of constriction at the throat, with stiffness or pain about the root of the tongue and angles of the jaws, extending to the larynx and *pomum Adami*; the respiration is hurried and loud, and attempts to swallow any thing, especially liquids, are attended by pain and distress, and by spasms of the pharyngeal muscles, causing the forcible ejection of such matters from the mouth. These spasms are accompanied with feelings of distress, with epigastric suffering, and with a state of general spasm and excitement, creating a dread of swallowing fluids, although food and the more solid substances are taken with much less difficulty or distress. The alarm and suffering on attempts to swallow fluids rapidly increase; and even the idea of making the attempt, and the running and splashing of liquids, occasion the most distressing spasms of the muscles generally, but especially of those of the throat, face, and neck; followed by sobbings, tremour, forcible respiration, and exhaustion.

11. As the malady proceeds, or about the second day, the above symptoms are more severe, and are attended by dryness of the mouth and throat; by distressing thirst, and the utmost dread at attempting to quench it; by flatulent distention of the stomach and bowels; by flatulent eructations and vomiting of greenish or dark-coloured matters; by a rapid pulse, pain at the epigastrium, and in the course of the diaphragm; by restlessness, headache, a peculiar expression of countenance, or that of alarm and

anxiety conjoined; by contracted brows, staring eyes, with a wild and sparkling appearance; and by retraction of the angles of the mouth. Pains are experienced in the neck, sometimes extending along the spine, and occasionally shooting under the sternum to the epigastrium. The mouth and tongue are clammy, although a frothy saliva is secreted, and repeatedly and forcibly thrown out. A burning heat and dryness of the fauces and throat are now constant; and, with the viscid state of the saliva, increase the distress of the patient. The respiration is now hurried, laborious, or loud, and the voice, owing to the dryness of the throat, becomes hoarse; and all attempts to relieve the dryness and thirst are followed by returns of the spasmodic or convulsive paroxysms, and by signs of alarm and distress. In the advanced state of this stage, the susceptibility and sensibility of the surface are extreme; a breath of cold air, the slightest touch, a fly settling on the skin, &c., often inducing a return of the spasms. Frequent micturition is experienced, sometimes with priapism; the splashing of water, the sight of bright objects, the jingling or rattling of glass, hardware, or metallic substances, often reproducing the spasms and general distress, and occasionally also the micturition. All the senses are now morbidly acute, and light and sound become distressing. Yet the mental powers are often undisturbed, or even unusually acute, although they are as frequently slightly disturbed, especially as respects morbid impulses, and the entertaining of suspicions or dislikes of particular persons.

12. The mental disturbance accompanying rabies may be so slight as to escape observation, and is rarely very manifest or prominent, unless during a paroxysm, when it consists of an involuntary impulse to run against any one who is opposite, and of a desire, which the patient states himself to feel, but only momentarily, and for which he expresses his regret in the intervals, of tearing in pieces who and whatever opposes him. This rabid impulse, although only momentary, distresses the patient; he struggles to suppress it, and it is often strongest against those to whom he is most attached. I have seen it in two cases; and in one, attended by Mr. Denny and myself, the patient called out to be held, so that he might not dart upon the person opposite to him. Actual delirium is rarely present, nor is the mental disturbance greater than that now stated; nor does it often proceed farther than greater loquacity than usual. In a few there are frequent muttering, unconnected talking, and even certain hallucinations or illusions, especially as respects the animal that inflicted the injury; but the patient answers rationally when addressed. These illusions sometimes excite alarms, and occasionally violent efforts to avoid the objects of them; but he is readily influenced by the friends around him, although some degree of restraint is often required during the convulsive or rapid paroxysm.\*

\* The following extract from the history of a case attended by Mr. DENNY and myself will illustrate this advanced period of the disease: "The previous night was passed in a restless manner, with little or no sleep. He still talked rationally during the interval between the fits of violence, and exerted his faculties in praying more than his years (aged twelve) or knowledge promised. He was fully impressed with the idea of dissolution. The pulse



13. The above symptoms may have all been observed by the end of the first day from the appearance of the hydrophobia; but they are more generally observed in the course of thirty-six or forty-eight hours, or by the third day. About this period, the tongue is generally clean, but dry; there is still thirst, and sometimes, also, hunger, which becomes more and more urgent. The heat and dryness of the fauces increase, and the saliva is viscid, adhesive, and, not being swallowed, owing to the distress caused by deglutition, is either forcibly thrown out, or accumulates in the throat and vicinity of the glottis, occasioning the unnatural noise during respiration, which has been fancifully likened to the barking of a dog; or it adheres to and collects about the lips, sometimes producing a frothy appearance. This accumulation of mucus in the throat, together with the distress and strangulating sensation on attempting to swallow, occasions the difficulty of breathing, or the feeling of impending suffocation, often now complained of. Restlessness, tremours, and guttural and general spasms return more frequently, are excited by the slightest causes, and are often attended by a sort of furor, or rabid violence. The sensibility of the surface and senses is extreme, and is painfully excited by the slightest contact or stimulus. The patient dislikes strangers or dreads them; the pulse is now very rapid, small, weak, or irregular; the skin is cool, and the excretions present no very morbid appearances. Vomiting of greenish, dark, and glairy fluid, or bilious matter, often occurs, and is attended by pain at the epigastrium and flatulent distention of the abdomen. During the paroxysms, especially when the spasms affect severely the abdominal muscles, the urine is often passed involuntarily, or without control, and sometimes with erections. The blood taken from a vein at this period presents nothing beyond a somewhat loose coagulum, and a deeper colour than

was fluttering, small, weak, irregular, and about 135 in a minute. The bowels were freely evacuated; the stools were dark. The characteristic symptom, hydrophobia, had entirely disappeared; he drank a considerable quantity of ginger beer without difficulty. The rabid paroxysms were now more frequent and severe, but of very short duration. They sometimes occurred without any exciting cause; but were induced by the mere mention of them, or by whatever excited his dislike, his sensations, or his temper. At our visit this morning, while Dr. COPLAND was making some inquiries respecting the fits of rage at his mother, on whose knee he was then sitting, he sprang forward at Dr. C. by an involuntary and irresistible impulse, which required the strength of his mother to restrain, although he expressed great attachment to Dr. C., and a desire of seeing him frequently. As soon as the momentary paroxysm had subsided, he excused himself very rationally, and stated that his conduct arose from a violent impulse, and a feeling as if he could tear in pieces whatever came in his way, which was beyond the influence of his will to prevent or control. Deglutition was now much less affected, and he felt considerable appetite. He ate bread and cheese, and drank porter in our presence; but the sensibility of the surface was increased. He could not bear the least breath of fresh air; even the touch of a fly caused him distress. He sighed less profoundly, but more frequently, and his timidity and fear of strangers were greater. There was no spasm present, unless during the act of swallowing, and then it was only perceived in the abdominal muscles in a slight degree. The vital energies of the system were much more sunk than yesterday; yet he could still walk across the room, but with an unsteady step. He complained of no pain, but of considerable uneasiness between the shoulders, when he wished the place to be pinched or pressed. The pupils were dilated, but readily contracted from the stimulus of light." He died six hours afterward, when attempting to walk out of the house. (See Mr. DENDY, in *Lond. Med. Repos* vol. xviii., p. 296.)

usual. The powers of life either sink suddenly or evince a gradual but rapid depression; the debility characterizing the disease from the commencement quickly passing into exhaustion from the frequent recurrence of the nervous and muscular exacerbations, or spasmodic paroxysms. At length, after one or two violent exacerbations, life is extinguished.

14. In some cases the patient suddenly becomes tranquil, and most of the symptoms subside. The hydrophobia disappears, and he can drink and eat even voraciously. Occasionally the difficulty of swallowing still continues more or less, but the attempt is not attended by the former spasmodic attacks of suffocation, or general spasms. Still the impulsive paroxysms, or attacks of furor, may be as frequent or severe, or more so. The sound of water, of splashing, the jingling of glass, the sight of bright objects, which excited attacks of guttural strangulation and general spasm, often with micturition, no longer distress him. This state of calm occasionally passes into more complete repose, upon waking from which, or from an apparent sleep, he suddenly expires. But more frequently he is carried off in this state of calm by an impulsive paroxysm, or general spasm, extending to the respiratory muscles, or while making some effort. In many cases no calm is observed, but the exacerbations or paroxysms become more violent and frequent, the debility in the intervals more marked, until life is terminated during an exacerbation. In all the cases which I have seen, the surface becomes cool, and dark or lurid, the eyes sunk, the pupils dilated, and the lips and tongue livid or dark before death, and covered by much viscid, thick, or frothy mucus. The eyes, however, retain their brightness. Dr. BARDSLEY states that the muscles remain rigid long after death; but in a case which I saw immediately after dissolution the muscles presented the usual relaxation observed at that period, although the *post-mortem* rigidity followed. The rigidity observed in other cases is probably the continuance of the general spasm, which sometimes terminates existence.

15. Such are the usual symptoms and progress of this advanced stage of the disease. The duration of it may vary from thirty-six hours or from two or three days to five or six; but it is seldom longer than eighty hours after the symptoms are fully developed. Dr. BARDSLEY mentions the more prolonged period of eight or nine days in a few instances; but in these cases the period must have been reckoned from the first appearance of the premonitory symptoms (§ 8), the distemper rarely continuing longer than this latter period from the first manifestation of precursory signs. Individual cases often present phenomena either different from the more common course above described, or in addition to them. In some, severe pains are complained of in the spine, especially the cervical region; in others they are experienced at the epigastrium, and are attended by violent contractions of the abdominal muscles. The sensibility is always increased, and occasionally it is most remarkably great, the slightest touch, polished surfaces, strong light, noises, &c., exciting the paroxysms. The patient often perceives odours and hears sounds which others cannot perceive or hear. MAGENDIE states that

a patient who was deaf and dumb from birth heard during the paroxysm. The distress experienced about the throat is not accounted for by the appearances, which seldom are more serious than slight vascular turgescence, or redness of the mucous surface.

16. The paroxysms are rather those of spasm than convulsion, or consist chiefly of violent impulsive actions of the muscles, impelled by an uncontrollable volition; and the spasms which are excited by attempts to swallow are accompanied with violent contractions of the abdominal muscles, of the cremasters, and of the sphincters; sometimes with micturition, by priapism, and even by seminal emissions. The pulse is always accelerated, and becomes more and more rapid with the duration of the disease; it varies remarkably in strength, fulness, and regularity; but it is usually from 126 to 150, and very weak, small, and irregular during the last few hours of existence. The breathing is at first loud or convulsive, and attended by profound sighs or sobs, and by fits of strangulation during the paroxysms. In the intermissions it is more easy, but is always accompanied with sighs, which are more frequent, but less profound, as the disease advances. The tongue is sometimes clean, more commonly furred, with a thick, viscid, or frothy saliva, and mucus adhering to its sides. A disposition to bite is certainly present in some cases, although not generally, as in the lower animals, and only occurs in the paroxysms towards the close of the malady. It is generally successfully resisted by the patient. Thirst is constant, but nausea and vomiting are less frequent. The skin is generally cool, unless during the paroxysms, when it becomes warm, or covered by perspiration; it becomes dark or lurid toward the close, and the lips purplish or livid. The bowels are generally costive, and shortly before death both feces and urine are sometimes passed involuntarily. The patient is aware of his condition, of the result, and of the nature of his disease, although they may have been attempted to be concealed from him. Death takes place by asphyxia, caused either by complete palsy of the respiratory nerves, or by protracted spasm of the respiratory muscles, according to the degree of pressure or of irritation existing near the origin of these nerves; the respiratory functions being impaired, or otherwise affected, from the first manifestation of the malady; an aggravation of the changes inducing this affection of respiration at last suddenly extinguishing the function.

17. (d) *Symptoms of Rabies in the Dog and other Animals.*—It is of importance to know the phenomena characterizing this malady in the lower animals, chiefly as respects the determination of the question as to the existence of rabidity, which the medical man is often called upon to determine. Mr. YOUTT, whose experience of the disease in the dog and other animals was greater than that of any other person of whom I have heard, has described the disease as it occurs in them; and from his descriptions, as well as from many such cases which I have seen under his care, the following may be viewed as the usual course of the disease in these animals. One circumstance of great importance, much insisted upon by Mr. YOUTT, is that the disease in quadrupeds is not

in some respects similar to that observed in man; and that, while hydrophobia is never, or very rarely, absent in the latter, it is never seen in the former. Hence many think that because the animal has no dread of water, and does not appear wild or furious, he is not rabid; and hence he is allowed to commit farther mischief, and the injured person is prevented from having recourse to proper preventive measures, which may have saved a life which is soon sacrificed to the security caused by ignorance.

18. The first symptoms observed in the dog is a change in the usual habits of this animal; in some there is a disposition to pick up straws, rags, bits of paper, or any small object; others are frequently or constantly licking cold surfaces, as stones, iron, or parts of other dogs with which he is domesticated. In a few instances the dog becomes attached to animals to which he was formerly indifferent, but much more frequently he exhibits a marked antipathy to strange dogs and cats. This antipathy appears very early, and is greatest to cats. The animal becomes lonely, or sullen and irritable; is less eager for or neglects his food; but he is constantly thirsty. There are sometimes redness and watering of the eyes; the expression is suspicious, the look haggard, and the ears and tail droop. The respiration soon afterward becomes difficult, and saliva flows from the mouth, and soon assumes the form of a viscid foam. Vomiting is occasionally observed. The rabid dog now shows great irritability or snappishness, with a disposition to bite other animals, but is still obedient to the voice of his master. He now flies at every creature he meets, but seldom attacking the human subject unless enraged. The holding up of a whip or stick never intimidates the animal, but always excites great fury. Towards the close of the malady the breathing becomes more laborious, and death takes place during strong spasms or convulsions. In no period of the disease, as observed in the lower animals, is there any dread of water. "The dog, although unable to swallow, runs to it with eagerness; and all other quadrupeds in the rabid state, with, perhaps, an occasional exception in the horse, drink with ease and with increased avidity. In most instances, also, there is not the savage fury which persons in general expect to find, but rather a snappish irritability." In many instances, however, the most furiously rabid dog is obedient to his master.

19. III. APPEARANCES AFTER DEATH.—a. The body externally presents the usual *post-mortem* rigidity, which is, however, of shorter continuance than after death caused by most other diseases. The depending parts are generally livid, from the accumulation of dark blood in the venous capillaries. The bitten part presents nearly a similar state to that observed during the disease, but with less vascularity and lividity. AUTENREITH, BRANDRETH, and SALLIN have seen the nerves communicating with the cicatrix inflamed.—b. Of internal parts and organs the throat has been most frequently affected; the fauces, pharynx, and commencement of the œsophagus either generally, or in some part more especially, being reddened, injected, covered with lymph, or presenting some sign or other of what has been considered inflamma-



tory irritation or action. These changes partly—but by no means altogether—explain certain phenomena of the malady, and have been noticed in various grades by MORGAGNI, SAUVAGES, RUSH, BADER, DALRUE, FERRIAR, HUNTER, VERDEIL, BAILLIE, LOFTIE, ROSSI, WILLAN, MARCET, RIBES, BARDSLEY, and others. But it should also be stated that these parts have been found hardly or not at all affected by MORGAGNI, ROLFING, STOLL, and myself, although some degree of change in them is most frequently found. The lower portion of the *œsophagus*, the *stomach*, and even the *intestines* have presented slight inflammatory changes in their villous surface, which have been more remarkable in some instances and in divers parts than in others; and in a few cases they have been attended by some degree of ecchymosis. These appearances have been recorded by SAUVAGES, HUNTER, RUSH, LOFTIE, WILLAN, BADER, DALRUE, ROSSI, and others. Very marked inflammatory appearances in the stomach have been remarked by POWELL, BALLINGAL, OLDKNOW, and DUPUYTREN. The *salivary glands* have been stated to be enlarged and vascular by some writers, and to present no alteration by others. In many instances they have not been examined with any intention, and even not at all.

20. *c.* The *respiratory and circulating organs* have, until recently, received only slight notice. M. TROLLET first directed especial, but much too exclusive, attention to these organs. Previously to the appearance of his work, inflammatory appearances had been remarked in the *larynx* by MORGAGNI, BABINGTON, and WATT; in the *trachea* by RUSH and OLDKNOW; and in the *lungs* by MORGAGNI; but these received only a passing notice; and, although not deserving the importance attached to them by M. TROLLET, they serve to explain certain symptoms often attending the malady, and to illustrate the more immediate cause of death. The alterations which have been most remarkable in the respiratory passages and lungs, as observed by PORTAL, MARSHALL, BALLINGAL, TROLLET, FAURE, RIBES, LALOUETTE, myself, and others, and which have been by some considered inflammatory, but incorrectly, are, 1st. Injection or congestion of the capillaries of the bronchial mucous membrane with very dark blood, extending to the trachea and larynx. 2d. The presence of a thick, grayish, viscid, frothy mucus, which covered the respiratory mucous surface, and which in places almost filled the bronchial canals. 3d. Congestion of the lungs, these organs being of a very dark colour, especially posteriorly, and containing black fluid or semi-fluid blood. These changes are certainly more congestive than inflammatory; and certainly the cases I have seen have presented no true symptoms or signs during life, nor appearances after death, which I could consider as actually inflammatory. The *heart* and *pericardium* have presented no other changes than congestion of the auricles and adjoining veins, which have sometimes contained gelatinous clots. The *blood* has almost invariably been very black and fluid; a state more immediately resulting from the mode of death in this disease, namely, by asphyxia consequent either upon paralysis of the respiratory nerves, or upon interruption to the changes produced on the blood during respiration, owing to the accumulation of mucus in the bronchi. These

changes in the blood have been remarked by MORGAGNI, SAUVAGES, and others, who have stated that the blood is early decomposed after death. There can be no doubt, however, of a dark, black, and fluid state of the blood being found after death in every case of rabies, and that it must be assigned to either or to both the causes just mentioned.

21. *d.* The *nervous system* has, in various parts, been found more or less changed, but these changes have neither been always observed, nor have they been the same in different cases; and they certainly have not been observed, even when present, with due precision. As respects the *brain and its membranes*, the most frequently remarked alterations are congestion of the vessels and sinuses with black blood, and slight effusion of serum into the ventricles (MORGAGNI, FERRIAR, MARSHALL, ROSSI, &c.), and within or under the arachnoid; but these changes are usually slight, or almost absent, although more remarkable in some instances. M. TROLLET found them in six of the cases which he examined, and remarked also increased vascularity of the surface of the cerebrum, and congestion of the plexus choroides. In two cases blood was extravasated near the base of the cranium, and in others a plexus of injected vessels surrounded the origins of the optic and pneumo-gastric nerves. Dr. BARDSLEY states, that of five cases which he examined three presented marks of increased vascularity of the brain. In one there was only slight turgescence of the vessels of the pia mater and of the choroid plexus; in another the brain was natural. Other changes have also been remarked within the cranium, as slight softening of the brain in some instances, increased firmness or induration in others, with various other appearances of slighter moment; but these, with other contingent lesions of a chronic nature, are most probably quite unconnected with this malady. BONETUS, VAN SWIETEN, LIEUTAUD, and many others have seen no change of the brain or its membranes—certainly none to account for the symptoms; and I may add, that even the most remarkable alterations presented by these parts are quite insufficient to explain the phenomena, the progress, and termination of the disease.

22. *e.* The *medulla oblongata and spinal cord* have received insufficient attention in pathological researches respecting this malady; and it is only in comparatively recent times that these parts have been examined after death from this malady. Congestion in this situation has been found by BRERA, SALIN, SAUNDERS, REID, TROLLET, GOODRICH, OLLIVIER, RIBES, BARDSLEY, and others; but this state is extremely equivocal, is often the result of the mode of death, and of post-mortem fluidity of the blood. Of two cases recorded by Dr. GREGORY and Dr. A. T. THOMSON, one presented no change of these parts of the nervous system; but in the other the spinal cord was remarkably congested, particularly in the cervical and dorsal regions; and the whole of the cellular tissue between the theca vertebralis and parietes of the canal was loaded with suffused blood, which, in several places, lay in black coagula. In a case, also, by M. CLOT, adduced by OLLIVIER, the cellular tissue, in the same situation as in the former case, was very red and infiltrated with blood; the substance, also, of the cervical portion of the cord was in-

tensely inflamed, and contrasted strongly with the whiteness of the dorsal and lumbar portions. In a case mentioned in the *Medico-Chirurgical Review* for 1817, inflammatory appearances were observed in the coverings of the pons Varolii, medulla oblongata, and upper part of the cord. In a case recorded by Dr. BRIGHT, the substance of the inferior portion of the dorsal spinal cord was completely softened; and a similar change in the same part of the cord was found in a case detailed by OLLIVIER. Fluid has also been found in the spinal canal, but it is doubtful whether or no the fluid has been, in quantity or quality, such as to constitute a morbid condition. Dr. BRIGHT mentions the existence, in one case, of small plates of bone in the arachnoid of the spine, a lesion which I have seen connected with increased vascularity of the membranes of the cord in cases of tetanus. MM. DUPUY, BARTHELEMY, and several others have seen inflammatory changes in the medulla oblongata, upper portions of the cord, and their membranes, in the lower animals. LAENNEC and ORFILA have also observed inflammatory appearances in the spinal cord; and in a dissection described by Mr. COPELAND, these appearances existed chiefly at the base of the brain, on the crura cerebra, and tuberculum annulare. M. GENDRIN, however, and some others contend that many cases of this malady present no evidence of disease in the spinal cord or nervous ganglia.

23. It may, however, be remarked, that the precise character and amount of change in the medulla oblongata and spinal cord in this malady have not been sufficiently investigated; that the absence of all lesion in these parts has not been satisfactorily shown; and whether the existing lesion be one of an inflammatory nature, or one interesting the intimate structure of these parts in such a manner as to escape the detection of our unassisted senses, there are strong reasons for inferring that some change actually exists in these situations, although it may not be limited to them, but may extend to the related or associated nerves, and even to the parts supplied from these sources and by these nerves. In a case assiduously attended by Mr. DENDY and myself in 1821, I was induced to examine the state of the larger nervous ganglia, expecting to find inflammatory or other changes in these parts of the nervous system, but they presented no appearances which could be considered as morbid, or could be detected without the aid of the microscope. Since then MAYER and VILETTE have stated that the ganglionic nerves have been seen inflamed by them, but these ganglia are generally very vascular even in health. In the dissection of a case by Dr. BRANDRETH, the par vagum was seen covered by a blush of inflammation, its sheath was injected, and small ramifications of blood-vessels were seen running parallel to the nervous fibrils in the cellular tissue connecting these fibrils. The fourth, fifth, sixth, and seventh cervical nerves were also highly vascular, both in the sheath and between the fibres. Some of these were so much altered as to resemble muscular fibres, being scarlet externally, and pink internally.

24. *f.* The states of the urinary and sexual organs have not been examined in most of the dissections which have been recorded. The

only change which I have remarked has been an empty and contracted state of the urinary bladder. BADER says that he found in one case the uterus tumid, and both it and the vagina very vascular. The abdominal viscera, excepting the changes observed in the villous surface of the stomach and intestines, have presented no alterations which could he imputed to this malady. ASTRUC, MORGAGNI, SAUVAGES, ENAUX, CHAUSSIER, and ROCHOUX state, that the body of the rabid patient undergoes a more rapid putrefaction than in ordinary circumstances. This may depend upon the debility and nervous exhaustion characterizing the disease, and upon the fluidity of the blood after death, decomposition generally supervening more rapidly when the blood does not undergo the usual coagulation consequent upon dissolution. That the dead body exhales a peculiar fetor is a circumstance noticed by M. ROCHOUX and myself.

25. IV. DIAGNOSIS.—(a) The existence of true rabies—of hydrophobia from the bite of a rabid animal—cannot always be determined with ease; for several of the symptoms of this malady may attend other diseases, or may even be induced by alarm. The dread of water—the hydrophobic characteristic—has had too great importance attached to it in all histories of cases and descriptions of this disease; and many cases have been very loosely detailed, in which this symptom was very prominent, as closely simulating rabies, the resemblance often existing more in the minds of the describers than in the cases themselves. When this symptom occurs in other diseases, which are so characterized by their history and other phenomena as not to be confounded with true rabies, as in the course of fevers, and inflammatory affections of the throat, &c., there can be no difficulty in the diagnosis; but when it occurs in certain states of hysteria, or when it is associated with the severe nervous affection consequent upon alarm, then the diagnosis may be most difficult. PIREL states that a soldier was alarmed at midnight by his comrades, and was immediately attacked with convulsions, burning and constriction of the throat, dread of liquids, and expectoration of a copious frothy saliva. “In the morning the horror of fluids and burning pain in the throat were more intense, accompanied with a sense of weight in the head, hurried and irregular respiration, feeble intermittent pulse, and intolerance of light, but without alteration of the intellectual functions. He was certain that he was never bitten by any animal. The symptoms increased, and he died. The examination presented nothing extraordinary. A quantity of mucus only was found in the throat.” A case fully reported in the *Journal des Savans* (August, 1757, p. 81) is referred to by Dr. BENNETT in his able treatise on this malady, and in it all the symptoms of true rabies are said to have existed, and to have terminated fatally, no other cause having been ascertained than fatigue during a hot day. This writer also refers to a case in HUFELAND’s *Journal*, where the person was bitten five weeks before the symptoms appeared, by a dog which was perfectly healthy, and remained so after the individual bitten had died with all the symptoms of rabies. Either these persons had been inoculated with the virus producing rabies at some antecedent period unknown to themselves,



or alarm and other causes are capable, on some rare occasions, and owing to peculiar combinations of causes, of producing a disease which, if the relations of these cases are to be relied upon, is identical in its course and termination with true rabies. The hydrophobic symptom observed in rare instances in hysterical, epileptic, and tetanic attacks; or in the course of exanthematous, febrile, inflammatory, or rheumatic diseases, is associated with very different groups of symptoms from those which either precede or accompany rabies, and, even when it occurs in the worst cases or forms of these maladies, it is not attended by the alarm, the violent spasms and distress extending from the throat to the epigastrium and abdominal muscles generally observed in rabies. The symptomatic hydrophobia, observed in connexion with these or with other maladies, is seldom the prominent or most important part of the disorder, and in many cases where it has been observed an undue importance has been imputed to it.

26. (b) It has been supposed that, when the rabid symptoms follow almost immediately upon or soon after the bite of a rabid animal, the disease is not caused by the inoculation of the virus, but by the mind of the patient. There may be some truth in this opinion; for the influence of the mind in causing, in aggravating, or in developing a malady of this nature, so greatly dreaded by every person, is undoubted in certain circumstances and in some temperaments. The mental influence, strongly or uninterruptedly determined through the medium of the nervous system to a particular organ or part, especially if habitually influenced by acts of volition, will change the sensibility, painfully excite this vital manifestation, and more or less disturb every function it performs in health. But that true rabies will be produced in a bitten person by the influence of the mind, independently of the operation of the inoculated virus, can hardly be demonstrated, and, although not impossible, should not receive complete credence in the present state of our knowledge of the mode of operation of the poison causing the malady. Extreme or prolonged alarm may rapidly develop the action and the effects of the inoculated poison, or may have the same influence upon an inoculation of it on some previous occasion so remote as to have escaped the recollection. I have met with three instances of ladies of a highly nervous temperament, where the mind was most anxiously and distressingly affected by rabies having occurred in their dogs, and by the circumstance of their hands or face having been licked by these favourites shortly before the disease was recognised. The animals were removed to the care of Mr. Youatt, and soon afterward died; and although the mental anxiety and distress of these ladies were extreme for a considerable period, and were attended by slight dread of fluids, still the symptoms were chiefly of a hysterical character, and at no time closely resembled rabies, their duration and the progress of the disorder soon demonstrating the nature of the affection, which subsided with the lapse of time.

27. (c) The early symptoms of rabies may be mistaken for *hypochondriasis* or *melancholia*, especially when the injury has been inflicted long previously, or has been forgotten; but the rapid development of rabies, the precursory symp-

oms (§ 8, *et seq.*), and the painful and convulsive deglutition, with the dread of water, will prevent any mistake. *Hysteria*, however anomalous its symptoms may be, or however closely it may simulate rabies, by the presence of hydrophobia, or of painful and convulsive attempts to swallow, will be distinguished from rabies by the presence of *borborygmi*, by the *globus* or *clavus hystericus*, by the states of the urinary and uterine functions, by the appearance of the salivary secretion, by the vacillations of the mind and temper, and by the history and duration of the case.

28. (d) The resemblance between *tetanus* and rabies is not so close as some writers have believed, especially in their fully developed states. The spasms in the latter are only occasional, continue but for a very short period, and are followed by complete relaxation—are altogether clonic. In the former they are constant, although presenting slight remissions and exacerbations—are tonic and violent. *Tetanus* commences and is attended with distress, or pain or anxiety under the sternum, with pain and stiffness in the muscles of the jaws, which are gradually fixed, closed, and cannot be opened. Rabies commences with uneasy or painful sensations, extending upward from the seat of injury, with uneasiness at the pharynx and root of the tongue, and the precursory symptoms described above, the mouth opening and shutting readily. Thirst and vomiting are common in the latter, and very rare in the former malady. Hydrophobic symptoms and difficulty of swallowing are very rarely observed in *tetanus*; while the spasms occurring in rabies as rarely present the form and characters of *tetanus*, which, moreover, is never accompanied with the extreme sensibility of the surface and of the senses, with the rabid or impulsive paroxysms, and with the symptoms referable to the urinary and genital organs that are characteristic of rabies.

29. V. PROGNOSIS.—The opinion which may be formed as to the ultimate result has reference, 1st. To the disease when the symptoms, precursory or developed, have appeared; and, 2d. As to the probable occurrence of the malady after the bite of a rabid animal.—(a) When even the precursory symptoms of rabies make their appearance, and *a fortiori* when the symptoms are more fully developed, are undoubtedly those of rabies, and consequent upon the inoculation of the rabid virus, I doubt the existence of a single well-authenticated case which has been cured. A few instances of recovery have been recorded, but the evidence is not sufficient to convince me that they were ever caused by the inoculation of this poison, and that they were not caused entirely by fright or more continued alarm. The fatal issue of rabies being so general, if not universal, when the malady declares itself, it may be next (b) inquired, What is the prospect of escape furnished to those who are bitten by a rabid animal? The prospect varies remarkably with the species of the animal, with the seat and circumstances of the injury, with the season of the year, with the period after the injury at which prophylactic measures were resorted to, and with the nature and efficiency of these measures.

30. The bite of a rabid wolf, which generally flies at the face, is much more dangerous than

that of a rabid dog. This latter animal most frequently bites through the clothes, which intercept the poison and prevent the inoculation. M. TROLLET states that, at Brives, seventeen persons were bitten by a wolf; of these ten died; and that, of twenty-three persons bit by a she-wolf, thirteen died, although in most of these precautions had been resorted to, but in many after some time had elapsed from the infliction of the injury. "Mr. J. HUNTER has stated, that on one occasion a dog bitten twenty persons, of whom only one was infected with the disease. In 1780, at Senlis, a dog bit fifteen persons, of which three only died of hydrophobia."—(BENNETT.) Of those persons who are bitten by the same animal, the first injured, and those who have been bitten in parts unprotected by clothes, are the most liable to become infected; the saliva, or virus, is most abundant in the first cases, and is intercepted, by the clothes in the others. M. JOLLY thinks that the poison of a rabid animal is more dangerous in warm seasons and climates than in cold or temperate periods and countries. Accidents from rabid animals, especially dogs, are certainly more frequent in warm seasons; but it is doubtful whether or no the frequency be owing to the more frequent occurrence of rabies in these animals at these seasons, or to an increased intensity of the poison—most probably to the former circumstance. Wounds which are deep, irregular, sinuous, and bleed but little, are more dangerous than others, inasmuch as the imbibition of the poison from them is more easy or rapid, and the prophylactic measures cannot be so completely employed. When more than one injury or bite has been inflicted, when it is situated on the face, or on the neck, or on the upper regions of the trunk, the danger of infection is increased, and the rabid symptoms are more rapidly developed, the period of incubation being generally shorter. It is obvious, that the longer the period which has elapsed from the infliction of the injury to the employment of preventive measures, the greater are the chances in favour of the inoculation of the disease. As to the efficacy of those measures, more particular notice will be taken in the sequel.

31. VI. CAUSE.—A. Rabies being the ultimate effects of a specific animal poison, which is capable of acting upon all animals; upon every constitution, temperament, and habit of body, and upon both sexes, at all ages, and in all circumstances of climate, season, and locality, the *predisposing causes* of the malady cannot be determined. As the inoculation of a specific virus, or poison, is the only cause of true rabies, and as the inoculation may or may not have been effected in many cases of persons bitten by rabid animals, it is impossible to state with truth that the inoculation had not taken effect owing to the predisposition of the person who had thus escaped, or that it had produced this fatal disease in consequence of predisposing circumstances in the unhappy sufferer. The most that can be said respecting predisposition is merely inferential. It may be rationally supposed that, when the quantity of the inoculated poison is great, the more rapidly will its effects be developed; that when the vital energies are strong, the longer they will be opposed; and that, when the nervous system

is depressed by fear, anxiety, and other causes, the more rapidly will the malady be produced, and the more likely is the poison, even in a small dose, to take effect.

32. But it may be asked, May not a small dose of the poison, inoculated by the teeth of a rabid animal, whether this poison consist of the saliva, or be conveyed in the saliva, or in the frothy matter in the mouth, or on the teeth and lips of the animal, fail of producing its dire effects in persons possessed of strong constitutional powers; or, in other words, may not a quantity of the poison, which would be productive of the malady in a debilitated, timid, and frightened person, fail in causing it in another person differently or oppositely constituted and circumstanced? The answer may be made, with seeming truth, in the affirmative; but we have no facts which can prove it, although the escape of many persons from the consequences of the bite, under circumstances which tended to prevent the full inoculation, or to diminish the dose, of the poison, and the subsequent imbibition or action of it, appears to favour the inference. The circumstance of the full operation of the poison sometimes not appearing until months, or even years, have elapsed from the time of its inoculation, favours the idea that, in such instances, the dose of the poison is too small or weak, relatively to the powers or state of the constitution, to produce its specific action until some circumstance or change takes place calculated to aid, to determine, or to develop its influence.

33. B. The only *exciting cause* of true rabies in the human species is the inoculation, or application to an abraded or mucous surface, of the virus formed in a rabid animal; this virus either consisting of, or being conveyed in, the frothy saliva and mucus in the mouth, and on the teeth and lips of such animal. This I believe to be the sole cause of rabies. The very few cases of the disease which have been said to have arisen from alarm or other causes have not been sufficiently verified in all their details to warrant the inference that rabies may appear in the human subject from other causes than the one now stated. It cannot be proved that even in these the poison of rabies had not been communicated at some former period, or on some forgotten occasion, taking it as proved that the disease is actually rabies; and certainly most of the instances which have been adduced of spontaneous rabies have not been conclusive as to this origin. We have so many false facts in medicine, that credence should be withheld from those which are opposed to the usual course of events until they are satisfactorily demonstrated. One physician publishes the case of a child that died of rabies caused by the bite of a dog which, he says, was not rabid, as a proof of the spontaneous origin of this malady, or at least of the occurrence of it independently of contagion. But another physician states that the animal which injured the child, and which was said not to be rabid, was actually killed shortly after in circumstances warranting the inference of its rabidity. The desire of publishing whatever appears singular or anomalous, chiefly from an insufficient recognition of all the phenomena, and often from the neglect of many which are most important, gives rise to an accumulation of false



facts, which bewilder even when they fail of misleading.

34. It has been considered that there is no reason wherefore rabies should not occur spontaneously or independently of contagion, because other contagious diseases occur in this manner. But other contagious diseases certainly furnish no very manifest evidence of spontaneous origin on many occasions. Syphilis, smallpox, measles, scarlet fever, &c., present no such occurrences, and are propagated only by a specific poison, although certain seasons and epidemic influences or constitutions favour their prevalence and extension. The same is observed in respect of other contagious and pestilential maladies, which, with those now named, cannot be shown to originate *de novo* on all or any of the occasions of their appearing without contagion being traced as the cause of their appearance. It has likewise been considered that, when rabies occurs almost immediately after the bite of a rabid animal, the disease is actually not the consequence of the inoculation of the poison, but the result of alarm acting upon a susceptible nervous system, and producing a state of disturbance which, in its characters and issue, is identical with true rabies. This is barely possible; but, because the poison requires several days, or even months, to develop its effects in most cases, there appears no reason, nor can this be considered a sufficient reason, against its immediate action in certain circumstances, such as the inoculation of a large dose of it, or unusual susceptibility of the nervous system to the morbid impressor. caused by it. As respects the few instances in which rabies has been said to have appeared consequent upon fright or other intense causes, and independently of the bite of a rabid animal, either the history and symptoms of the cases are deficient of precision of detail, and of a recognition of all the facts, or the probability of a previous infection, communicated in some way or other, has not been disproved.

35. Much of the misapprehension existing on this subject has arisen from the circumstance of those cases of nervous or other diseases, especially those which have been fatal, and which have presented, with other nervous or spasmodic symptoms, a difficulty of swallowing or a dread of water—a *hydrophobia*—having been denominated cases of hydrophobia, and considered from this single symptom as an identical disease with that produced by the bite of a rabid animal. But to prove their identity, the communication by inoculation of the disease from these spontaneous cases to some lower animal ought to have been tried, but it has never been even attempted. That dread of water, generally depending upon difficulty of swallowing, upon disgust, or some antipathy temporarily entertained, and generally associated with spasms or other nervous symptoms, may assume a prominence in form, character, duration, and termination, to deserve the appellation of hydrophobia, cannot be doubted; and that it may, in certain circumstances of the individual affected, occur directly from the impression of various intense causes, or be associated contingently with other maladies in some period of their course, I readily admit; but I am convinced that either of these occurrences is not so fre-

quent as supposed by some; nor is this hydrophobia, believed by a few writers to be instances of spontaneous rabies, so prominent a characteristic in such cases as it has been made to appear. Viewing, therefore, hydrophobia thus occurring, independently of the contagion of the rabid poison, as a symptom rarely observed in other maladies, and as of doubtful or very rare occurrence as a primary or idiopathic disease, I shall dismiss the consideration of it in connexion with this subject.

36. Believing that rabies—that the disease described above in its fully-developed stage (§ 10, *et seq.*)—never appears in the human subject unless it be communicated by a specific virus or poison, it next remains to be inquired, 1st. What animals thus communicate it? 2d. Do these animals generate or originate it *de novo*, or without previous inoculation or infection? and, 3d. Can the disease be communicated otherwise than by inoculation?—(a) *Certain species of the canine and feline genera* most frequently inoculate the human subject with this poison; the dog, the wolf, the cat, and the fox being the animals which most commonly become rabid and infect others by inoculation. But these other animals may, themselves being infected, communicate the disease to others, provided that they are capable, by the formation of their teeth, jaws, and mouth, of wounding the animals they may attack, and at the same time of applying to the wound the poison which may be present in their mouths or on their teeth. Ruminating and herbiferous animals, owing to the forms of their teeth and jaws, seldom inoculate the disease when they become rabid; and hence many have believed that the secretions of the mouths of these animals are not contagious. But M. BRESCHET has demonstrated that the saliva of these animals, when rabid, will communicate the malady, by inoculation, to other animals. The disease may likewise be transmitted to birds of all kinds; but, owing to the absence, as respects them, of the conditions just mentioned as being necessary to this mode of communication, the individuals belonging to this kingdom of nature can hardly be considered as capable of infecting others, although the possibility of their doing so may be admitted. Of all animals the carnivorous are the most frequent propagators of the malady to others as well as to man; owing chiefly to the circumstance of these animals having preserved the contagion among themselves more especially, by the frequent inoculation of it, and to the form of their teeth, which is the most calculated for inflicting a deep wound, and at the same time for the insertion of the poison—the lacerations, and the other wounds they inflict, not only being very readily poisoned by the fluids of the mouth, but more tenaciously retaining the poison, in consequence of their depth and nature; and of the slight hemorrhage or absence of all hemorrhage characterizing them.

37. The possibility of this malady being communicated by the human subject has been doubted; and experiments have been performed upon dogs with the frothy saliva of rabid persons by VAUGHAN, BABINGTON, GIRAUD, GIRARD, and others, in order to determine this point, but without having succeeded. More recently, however, the question has been decided by MM. MAGEN-

DIE and BRESCHET, who inoculated two dogs with the frothy saliva and mucus issuing from the mouth of a man in the Hôtel Dieu shortly before his death from rabies. One of the dogs became rabid at the end of four weeks, and bit other dogs, which also became rabid. The result of this experiment should render persons cautious, lest the saliva or fluid issuing from the mouth of the rabid human subject should come in contact with some abraded, injured, or mucous surface of another person, as the probability of infection in this way is certainly demonstrated by it; and the statements of MM. ENAUX and CHAUSSIER, that persons have been seized with rabies in consequence of having wiped their lips with napkins or cloths which were soiled with the saliva of a rabid subject or animal, ought not to be viewed as being apocryphal, as they have been by some. CÆLIUS AURELIANUS states, that a person was attacked with this malady after having employed his teeth to undo the fastenings of a mantle worn by a person who had died of it.

38. (b) *Are certain species of the canine and feline races, as the dog, the wolf, &c., capable of generating the malady de novo without previous inoculation or infection, and of communicating it afterward?* The generation of this disease *de novo* by the animals which appear to be most frequently affected by it has been believed in by the great majority of writers, yet I do not consider the matter to be at all determined. Experiments have been made by DUPUYTREN, BRESCHET, MAGENDIE, BOURGELAT, and others on dogs and cats, these animals being placed in those circumstances in which they have been said to originate rabies, without this disease having appeared in a single instance among them. This point is most difficult to be determined; and, probably, a just conclusion respecting it will be more likely to be arrived at by careful observation of facts and by extensive experience than by experiments, the failure of which can prove nothing, while what may appear as a conclusive result will admit of cavil. The late Mr. YOUNG, a well-educated, able, and candid observer, and possessed of the greatest experience, remarked to me that he believed that the disease rarely, or perhaps never, originated *de novo*, but in contagion. It has certainly not existed for ages in certain insulated or secluded places, until introduced by inoculation on well-ascertained occasions, while it has never been observed in other places similarly circumstanced. The matter deserves farther investigation, as serving to arrest the propagation of this distressing malady.

39. Those who believe that rabies may occur spontaneously in the dog, wolf, or cat, furnish no precise information on the subject; and it certainly cannot be proved that, when it does appear in one of those animals, it is not the consequence of inoculation or infection at some previous period. The long time often required for the development of the disease after undoubted inoculation, and the possibility of its being communicated otherwise than by inoculation—by the contact of the virus with a mucous surface—serve to render the proof of actual communication by contagion a matter of difficulty. Those who contend for the spontaneous origin of the disease suppose that protracted thirst or hunger, extreme heat, violent excitement or anger, the sexual heat, &c., severally

or variously associated, may develop the malady independently of contagion. Still these are merely suppositions, and are unsupported by positive evidence. M. TROLLET states that the months of January and August, the coldest and the warmest, furnish the fewest instances of rabies; and that in March and April the greatest number of wolves are rabid; and that in May and September the greater number of dogs. Several writers have contended that the malady is very rare in very hot and very cold climates, while it is most frequent in temperate countries; but much uncertainty, and even obscurity, envelops the subject of the spontaneous origin of this terrible distemper.

40. (c) *Can the disease be communicated otherwise than by the bite of another rabid animal, or by the actual inoculation of the virus?* The bite of the rabid animal is merely the inoculation of the poison, which may be communicated by other modes of inoculation, as shown above. SCHENCK and ZACUTUS LUSITANUS aver that rabies has been caused by wounds from sabres with which dogs had been killed long previously. That the virus of rabies may cause the disease when brought in contact with an abraded surface, or sore, or wound, cannot be doubted; and that it may produce its specific effects, if allowed to remain in contact with a mucous or an absorbing surface or part, has been argued for by some and denied by others. It has been stated that both sheep and cows have been infected with rabies after eating the hay or straw on which rabid dogs, pigs, and other animals have died; and although these and similar occurrences admit of reasonable doubts, they are certainly not impossible. Numerous instances have been recorded of a rabid animal, especially the dog, having licked the lips, the hands, or abraded parts or sores of its master or mistress, and thus communicated the disease; and it has even been stated by PALMARIUS and others that the kiss of a rabid person has actually proved infectious to the saluted individual. That the disease may be thus communicated, especially if there have been any abrasion of the lips, or even if the foam from the mouth of a rabid animal remain in contact with a mucous surface, is extremely probable, although the facts in proof of this mode of infection are few. They are, however, so probable, and are supported by so many analogies, as to deserve attention. The instances which have been recorded—certainly remarkably few—of rabies, or hydrophobia, occurring without any bite, may have been produced by the poison of rabies nevertheless, which had been communicated in some other way than by this mode of inoculation. Authenticated instances have been published (FABRICIUS HILBANUS, HEISTER, PALLETTA, &c.) of the communication of the malady by linen, rags, cloths, &c., which had been torn by, or imbued with the saliva of, rabid animals, and even by the cords with which these animals had been tied. The skins, fleeces, and furs of animals which had retained the saliva or foam that had issued from the mouth at an advanced stage, have even been the media of transmitting the malady, by having brought the virus in contact with an abraded or mucous surface of the infected person. Such occurrences, however, must be remarkably rare; but they are so possible as to render caution necessary whenever



an animal is in any way dealt with in this disease, or even when the existence of the malady is suspected. The statement which has been made, that the breath of a rabid animal at an advanced stage may communicate the malady, rests upon very insufficient evidence. The experiments of MAGENDIE and others show that the blood, milk, flesh, semen, and abdominal secretions of a rabid animal cannot transmit the disease. As to the particular source of the rabid virus, I shall offer some remarks in the sequel.

41. VII. NATURE OF RABIES.—That the poison of rabies is not imbibed by the capillaries of the injured part and carried into the circulation, is shown by the long period which elapses from the inoculation until the disease is developed, and by the characters of the preursory and early symptoms. That it is not absorbed by the lymphatics is evinced by the absence of every sign of irritation of these vessels, or of their associated glands. It is, therefore, to the nervous system that we are compelled to look for the earliest changes consequent upon the inoculation of the virus. As to the pustules said by MARROCHETTI and MAGISTEL (§ 7, note) to appear under the tongue from three to fourteen days, and even, in some cases, at a later period, from the inoculation of the virus, their existence may not materially affect the question as to the mode in which the poison affects the constitution. But it is by no means determined that these pustules actually exist; and, even admitting their existence, their pathological relations and nature are unknown. It is possible that they are merely enlarged or obstructed mucous follicles; but, as such merely, their presence ought to be positively determined, and their connexion with rabies investigated in its several relations.

42. The history, progress, and character of the phenomena of rabies are entirely those of a nervous malady of the most intense form. The gradual accession of the symptoms; the altered, and especially the acute, sensibility accompanying them; the readiness with which this sensibility, either of the surface or of the senses, induces, spasmodically and in paroxysms, the reflex actions of the muscles of voluntary motion even independently of volition; the intermittent character of these actions; the marked disorder of the organs influenced by the eighth pair of nerves; and the inordinate susceptibility of the nervous system generally, combine to demonstrate an important change of that part of the nervous system to which sensibility may be especially referred, and which either gives origin to, or is more particularly connected with, the pneumo-gastric nerves. The changes more recently and most generally observed in the medulla oblongata, often extending to various parts of the base of the brain on the one hand, and to the spinal cord on the other, explain the characteristic symptoms now enumerated. It is only in comparatively recent times that our investigations have been directed to this portion of the nervous system in respect of this disease; and in all cases where the inquiry has been duly instituted, some lesion indicative of extreme irritation or vascular excitement in this quarter has been found. Vascular injection, ecchymoses, increased redness or congestion, serous effusion, softening of the cerebral or nervous

structure, &c., have been severally observed after death. M. TROLLET, one of the first observers who directed attention to this part of the nervous system in rabies, states, that the choroid plexus is generally gorged with dark blood; that a small vascular plexus shuts posteriorly the fourth ventricle, and extends to the origin of the eighth pair of nerves and corresponding parts of the brain, which are found redder than usual; that this plexus is generally so deeply injected or coloured as to appear ecchymosed; and that the most remarkable lesions are found in the vicinity of the origins of the optic and pneumo-gastric nerves, which latter perform so important a part in rabies. A due recognition of the several functions of the pneumo-gastric nerves, and of their connexions with the ganglionic nerves both of the thorax and abdomen, will serve to explain most of the phenomena of this malady. Dr. BENNETT justly observes, that a careful perusal of the experiments of Dr. J. REID (*Edin. Med. and Surg. Journ.*, No. 134), and of other physiologists, will show that congestion of the membranes at the base of the brain, producing more or less pressure on the origins of the eighth pair of nerves, is capable of explaining all the phenomena the disorder presents.

43. Certain of the changes observed after death may be directly referred to violent irritation or vascular excitement in the parts of the nervous system above mentioned; but others are altogether consecutive of these conditions, or are the results of the paralyzed functions of the eighth pair of nerves, induced by the changes in these nerves, or in the vicinity of their origins, while there are also others which depend either upon the mode of death, upon asphyxia either suddenly or gradually induced, or upon cadaveric conditions, or most probably upon both. Several of these consecutive changes, existing either in the digestive canal or in the respiratory passages, have been viewed as the seats and origins of the malady, and, however slight, have had an importance assigned to them to which they are not entitled. Because the pharynx presented appearances of irritation, FOTHERGILL considered rabies as merely a spasmodic angina, and, as this irritation often extended to the larynx and trachea, PARRY viewed these as being chiefly concerned with the pharynx in the production of the malady; subordinate and secondary changes being thus assigned as the conditions constituting the disease. The alterations observed in the lungs, bronchi, and blood are obviously to be referred to the lesions found in the medulla oblongata, base of the brain and vicinity, and to the consequent paralysis or similar disorder of the functions of the pneumo-gastric nerves; the circulation in the lungs and bronchial mucous surface, the secretion from this surface, and the chemical changes in the blood being thereby affected.

44. *What are the humours of the rabid animal which contain the virus perpetuating this malady? And what is the mode in which this virus acts in producing its fatal effects?*—These questions have a real importance as respects the prevention and prophylactic treatment of rabies; but they are beset with difficulties.—(a) As to the first of these, the evidence is rather negative than positive. M. TROLLET, MAGENDIE, and

others have shown, by direct experiment and observation, that neither the blood, nor the flesh, nor the milk, nor the seminal fluid, nor the breath of the enraged animal, is capable of propagating the malady. A similar inference may be arrived at in respect of the secretions and excretions from the abdominal viscera. It is, therefore, to the secretions of the mouth, or to those issuing from this outlet, that we must exclusively look, as the vehicles of, or as the actual poison. The saliva has been viewed from the earliest period of medical history as constituting, or as conveying, this poison; and the mode of communicating the malady has been of itself a strong proof that this is actually the poison. More recently, M. TROLLET has contended that the saliva possesses no contagious properties, unless it becomes mixed with the frothy matter which is driven out from the bronchi, this latter matter constituting the poison or virus which produces the disease. He rests his opinion upon the absence of any evidence of disease, of enlargement, of inflammation, or of congestion of the salivary glands, upon the morbid changes always existing in the bronchi of the rabid animal, and upon the analogies furnished by other contagious maladies.\* Although I consider M. TROLLET's opinion to be deserving due consideration in all our future investigations, still it cannot be altogether admitted that he has proved the saliva, unmixed with other fluids, to be devoid of the poisonous property, or that he has demonstrated this property to be present in the secretions of the bron-

chial mucous membrane. Nevertheless, his investigations and his views are deserving attention, far beyond what they have hitherto received in this country.

45. (b) *As to the mode in which the rabid virus acts in producing its effects*, we know nothing more than of the operation of other animal poisons, and perhaps even less. The oldest opinion, as to the action of the virus, after being received into a wound, was that it is absorbed and mixed with the circulating fluids, and that it thus produces a general infection of the humours and solids of the body. A subsequent theory ascribed its action to the effects produced in the place injured, and the propagation of this lesion through the whole nervous system. That the fluids and secretions are, generally, infected by this poison is disproven by experiments and observation; and the local effects of the injury bear no proportion to the subsequent constitutional disorder, so as to furnish an argument in favour of the opinion that the disease arises from the propagation of the local impression throughout the rest of the system. It has already been stated that the virus does not act by absorption, because the lymphatics and glands betray no signs of irritation, and because the blood-vessels also present no lesion. It has been supposed that the change locally produced is propagated to the nervous system generally; but granting that this is the case, we are still at a loss to explain the production of a contagious principle, and the limitation of the production of it to a particular part and to a particular secretion. We may, however, readily conceive that the virus affects or irritates the nerves in the part injured, and that this local change in the nerves is propagated, by means of the sensory nerves, to the medulla oblongata, or to parts in its vicinity, to which they are more especially related; that the morbid condition or change thus produced is reflected by means of the nerves arising in these parts of the cerebro-spinal axis, to the respiratory and gastric organs, and more especially by the pneumogastric nerves; and that, in consequence of the change in the influence transmitted by these nerves, the circulation, secretions, and functions generally of these organs are altered. As to the source of the contagious virus, the evidence is inconclusive, although it cannot be doubted that the secretions which are excreted from the mouth actually contain this poison, and that the formation of it takes place at that period of the disease when the functions of those organs, supplied by the pneumogastric nerves, present more or less disturbance. That the succession of changes just stated is followed by the formation of a specific poison—of a secretion capable of perpetuating the malady—is extremely probable; but the exact source or seat of its formation has not been demonstrated satisfactorily. The poison is evidently contained in the fluids issuing from the mouth; but whether it is present in the saliva, or in the mucus secreted by the respiratory passages, as contended for by M. TROLLET, or in the mucus secreted by the mucous follicles of the mouth, or more or less in all these, is very far from having been determined. Supposing that the poison emanates from one or other of these sources, it still remains to inquire, Does the poison consist in a material, organized, or chemical change in

\* As this is a topic of the utmost interest to pathologists, and as the lungs were never viewed, before the researches of M. TROLLET, as the chief seat (although the consecutive seat only, in my opinion) of morbid appearances in cases of rabies, and as furnishing the poison, the developed effects of which human science has hitherto failed to remove, I here adduce the conclusions at which he arrives: 1st. "The organs of respiration, and the vascular system in the brain, present constant marks of derangement in rabies. The other organs offer nothing that can be rigorously attributed to this malady. 2d. The salivary glands, and the cellular tissue enveloping them, present not the least vestige of inflammation, nor any change in their volume, nor in their colour or texture. 3d. The mucous membrane of the mouth and pharynx are of a pale gray, and are lubricated by a slight moisture: these cavities contain no saliva, nor any frothy matter. 4th. The larynx is rarely inflamed, the trachea more frequently, especially in its inferior portion; the bronchi always. In rabies, the capillaries of the lungs are injected; and this organ is red and congested. The sensibility of this viscus is also greatly increased; a burning heat, pain, and constriction are experienced—pathognomonic signs of inflammatory action. 5th. This inflammatory state of the lungs is specific, and arises from the virus of rabies, as the eruption from the virus of small-pox; the inflammatory appearances being present in different degrees, in different subjects. These appearances are seated in the mucous membrane of the bronchi and trachea; the cellular tissue and serous covering of the lungs being not affected. 6th. A frothy mucus is generally found in the parts inflamed; sometimes in the larynx, oftener in the trachea, towards its lower portion; it is generally found in the bronchi, and it may be squeezed from the air-cells. This frothy matter is a product of the inflamed mucous membrane, and is driven over the lips of the rabid person in the last stage of the disease, when the respiration is quick, forcible, and stertorous. 7th. I consider this frothy matter, thus driven, by the spasmodic expirations, from the air passages over the lips, to be the true vehicle of the virus of rabies, and not the saliva; because the salivary apparatus is not the seat of any pain during the disease, and does not present any lesion after death; because the bronchi are inflamed, are the seat of pain, and furnish a diseased secretion; and because, in all contagious diseases, the virus is produced from the part inflamed; as in gonorrhœa, small-pox, &c. The saliva, therefore, is no more the vehicle of the virus of rabies, than the semen is that of the virus of syphilis."



the secretion constituting the virus; or is the secretion merely the vehicle of a nervous aura or emanation, which is actually the infecting agent, and which is retained by its vehicle only for a short period? If this latter alternative be admitted; and if it follow that the infecting influence is powerful in proportion to the exposure of the injured part to the mouth and teeth of the animal inflicting the injury, and is lost soon after removal of the secretion from its source, several phenomena connected with the propagation of the malady may be thereby explained. HERTWIG's experiments, however, prove the former of these alternatives, namely, that the poison is of a definite character, that it may impregnate various substances, and that it retains its activity for a long period. Possessed of these characters, the circumstance of rabies appearing without the injury or contagion being traced, in rare instances, cannot be a matter of surprise.

46. VIII. PATHOLOGICAL INFERENCES AND REMARKS.—(a) The spontaneous occurrence of rabies in man, although believed in by some, and supported by two or three instances loosely detailed and suggesting numerous doubts, rests on no foundation of a satisfactory kind: the fear of water, and the nervous symptoms present in some instances of other diseases, furnishing no approximation in character to this dreadful malady.—(b) The spontaneous origin of rabies in the dog, wolf, or cat is a much rarer occurrence than many believe (§ 38, 39). I have stated my reasons for this inference. ZIEGLER, however, assigns such an occurrence to the want of the instinctive degree of nourishment from flesh and blood by these animals, and terms the malady *blood-thirstiness, blut-durst, or flesh-crawling, fleischgier*.—(c) The saliva or secretion issuing from the mouth of the rabid animal conveys or constitutes the poison usually inoculating rabies. HERTWIG's experiments show that its application to an open wound is not indispensable to the manifestation of its effects, and that it may infect a healthy animal when applied to parts with a thin epidermis, even without abrasion. He farther states that it is inert when applied to the uninjured villous surface of the stomach; but, in opposition to MAGENDIE (§ 40), he considers that his experiments with inoculation prove the blood of the rabid animal to be contagious.—(d) The time of the development of the malady, after the inoculation of the virus, varies with the corporeal and mental influences, dose of the poison, &c., from seven or eight days to seven or nine months—usually from four to sixteen weeks. But there are cases on record, which are well authenticated, of years having elapsed from the infliction of the injury until the development of the malady.—(e) When the disease is developed, the *pathognomonic symptoms*, in man, are the severe constriction about the throat, and spasmodic action of the diaphragm, with general spasm or convulsion, upon attempts to take any fluid, and subsequently at the sight of water, or of any glittering object, or the least breath or current of air, or the slightest touch of the surface;\* the tenacious

and clammy state of the saliva; and the phrensed or rabid paroxysms, which become more frequent and marked with the progress of the malady. This phrensed or rabid state is not continuous, or at all resembles delirium. It is present only during the impulsive or rabid paroxysm, and ceases during the intervals; although attended, towards the close of the malady, in some cases, by certain illusions of sight, it is not accompanied by any mental delusion.\* It may be denominated a momentary state of phrensy or madness; but it is neither insanity, nor mania, nor delirium.—(f) According to the observation of several writers, all the *premonitory*, and many of the *advanced, symptoms of rabies appear* after the bite of a rabid animal, and either *suddenly or gradually disappear*.† It is difficult to assign this occurrence to its true cause, or to any single circumstance. The symptoms in these cases may have been developed entirely by the influence of the mind, and have suddenly subsided, or gradually worn themselves out; or the dose of the poison may not have been sufficient for the full development of the malady; or the disease may actually admit of a sudden or gradual arrest under the influence of vital resistance or of medicinal agents. But the occurrences in question are remarkably rare.—(g) The *duration of the disease*, when distinctly formed, generally varies from somewhat less than seventy-four hours to six or seven days. The duration has not been observed to depend upon age, nor even upon strength of constitution. The greater number

of hydrophobia, the muscles of the throat arc, at the same time, violently contracted, so that the glottis violently closes, and the attempts of the diaphragm to descend, and of the muscles of the chest to elevate the ribs, are frustrated from moment to moment. The closure of the glottis is, however, not continuous, but alternates with relaxation of the muscles, so that a succession of sobs takes place.

\* CHÉLIEU says that there is often an uncontrollable disposition to bite. Mr. SOUTH doubts the truth of this, as regards the human subject. I have, however, seen it in two instances; and it is also mentioned as being observed by POWELL and MAGENDIE. According to my own observations, the disposition in man is rather to strike, during the rabid paroxysm, and only to bite when he is restrained forcibly at that period. The remark of Mr. H. CLINE, that animals afflicted with this disease are invariably disposed to use their organs of defence—the dog and wolf to bite; the horse to kick and bite, &c., appears quite just. In the cases in which I have observed the rabid paroxysm attended by an impulse to violence, the impulse was momentary, uncontrollable by the patient, and was always regretted and apologized for during the intervals. In all the male cases I have seen, there were almost constant erections, and furious disposition for sexual connexion, especially during the rabid paroxysm—a symptom evidently connected with the seat and nature of the lesion of the cerebro-spinal axis produced in the progress of the malady.

† Dr. ELLIOTSON thinks it possible that the symptoms may proceed no farther than the precursory, and that the disease may go off; and he instances the case of two girls, who were bitten in the face by the same dog. "She who was bitten the second became hydrophobic, and died. The other, at exactly the same time, experienced the same premonitory symptoms as her sister, but they all went off." Dr. MEAD remarks, that it will not seem strange "that a poison so different in its force, and so alterable by many circumstances, should in some subjects produce symptoms of the same convulsive kind, yet not to such a degree as to hinder deglutition, and these, too, only at particular times. A soldier, of a strong habit of body, came to me, who once a month was seized with a great anxiety, palpitation of the heart, and difficulty of breathing. He had been bitten by a mad dog about six weeks before he began to complain. By bleeding, cold bathing, the powder of lichen with pepper, and volatile medicines, during the oppression, the fits were every month less violent, and at last quite left him" (p. 151).

\* Dr. ELLIOTSON, whose description is remarkably accurate, justly states that the effect produced by these causes very much resembles that produced upon stepping into a cold bath. A sudden and involuntary inspiration is made, followed by several shorter ones; "and, in cases

of cases, however, terminate on the second, third, and fourth days, and sink either very suddenly or rapidly, and often unexpectedly.—(h) In the dog and other lower animals the dread of water is not observed, nor is it a sign of rabies. As the dog, in the early stage of the disease, has a disposition to lick the hands, face, &c., of persons, this should never be allowed, as I have seen, in several instances, the greatest anxiety and misery experienced for many months by persons who have permitted this filthy and dangerous habit, owing to the circumstance of rabies having appeared in the animal thus indulged.\*—(i) The poison of rabies

\* Having given above (§ 17, 18) some account of the symptoms of rabies in the dog, much abridged from the description of Mr. YOUATT, I here add that furnished by HERTWIG and CHELIUS. (a) In the furious form of madness, the dog evinces a change from its usual manner, uneasiness, and disposition to change its bed or place of residence, with a desire of licking cold substances. There is loss of appetite, especially for firm food; and disposition to devour straw, wool, leather, sticks, &c. It licks up not only its own, but also other dogs' urine; and sometimes it eats its own dung. It is obstinately covetous, evinces a disposition to bite, especially when excited or threatened, and snaps in the air, as if it would catch flies. There is more particularly a peculiar change in the voice and bark; the voice is hoarse, peevish, and uneasy-sounding; the bark is always followed by a peculiar howl. About the second or third day the eyes become reddened: the skin on the forehead is drawn into wrinkles, giving the animal a fretful appearance; and afterward the eyes become dull and languid. Mr. YOUATT remarks, that the glands concerned in the secretion of saliva become increased in bulk and vascularity. There is at first an increased secretion of saliva; but it soon lessens in quantity, becomes thicker, viscid, adhesive, and glutinous; and it adheres to the corners of the mouth, fauces, and teeth. The dog furiously attempts to detach the saliva with its paws; and if, after a while, it loses its balance in these attempts and tumbles over, there can no longer be any mistake. This is an early symptom, and is owing to the saliva becoming more and more glutinous, irritating the fauces, and threatening suffocation. Mr. YOUATT insists upon the alteration of the sounds uttered by the dog. In every case in which this animal utters any sound during the disease, there is a manifest change of voice which is characteristic. It is generally standing, or occasionally sitting, when the singular sound is uttered. Its muzzle is always elevated. The sound is, at the commencement, a perfect bark, ending abruptly in a singular howl. In some cases this singular bark and howl is absent, but there is instead a hoarse inward bark, with a characteristic elevation of tone; or there are two or three distinct barks, followed by the peculiar one followed by the howl.

(b) In dumb madness, the dog changes its manner, becomes less lively and watchful, more quiet and melancholy. The lower jaw drops as if paralyzed. The saliva flows down to the ground; and every thing, even fluid, which the animal wishes to swallow drops from its mouth. It can, therefore, bite but little, as the inclination to bite, to run, or even to restlessness, is diminished. All the other symptoms resemble those of furious madness. In the great majority of both furious and dumb madness, there is an evident affection of the lumbar portion of the spinal cord. There is a staggering gait, referable to the hind quarters, and indicating an affection of the lumbar motor nerves. In a few cases it approaches a general paralytic affection. Mr. YOUATT observes, that absence of pain in the bitten part is an almost invariable accompaniment of rabies. The dog will gnaw the flesh completely away from the part. Is this owing to the itching of the part? "However severely a mad dog is beaten, a cry is never forced from it."

(c) Diagnosis.—Care should be taken to distinguish pain in the ear in common canker from rabies in the dog. The ear is, oftener than any other part, bitten by the rabid dog; and when the wound in the ear becomes painful, the dog rubs its ear against every projecting body, scratches it, and tumbles over and over while thus employed. Canker, both internal and external, is a disease of slow growth. The length of time that the animal has thus suffered will usually be a sufficient guide. The dog will often scratch violently enough when it has canker; but will not roll over and over like a football, except it is rabid. The presence of inflammation and ulceration of the internal membrane of the ear in the former, and hardly at all in the latter, notwithstanding the scratching, are deserving of re-

affects primarily and especially the nerves of the part, and extends with various grades of rapidity to the medulla oblongata and origins of the pneumogastric nerves, and then the characteristic symptoms of rabies appear; the whole nervous system ultimately becoming more or less implicated, and the secretions and blood very manifestly changed.—(k) The pathognomonic symptoms and changes observed in rabies more immediately depend upon the lesion of the medulla oblongata and pneumogastric nerves; but how such lesion gives rise to the formation of a specific poison capable of perpetuating itself, does not appear, nor can the mode of production of this poison be shown: in this respect, rabies does not differ from other specifically infectious maladies.—(l) The supposition, lately published, that there is no such specific disease as rabies, and that it is merely the result of mental anxiety, &c., is only one of the absurdities thrown up on the surface of medical doctrine, and hardly deserves mention, and much less serious refutation.

47. IX. TREATMENT.—The treatment of the bite of a rabid animal is, first, to prevent the imbibition or morbid impression of the rabid virus, assuming that inoculation of it has followed, and the consequent infection, or contamination, and other changes; and, secondly, to use reasonable endeavours to arrest the malady, or to ward off death when the symptoms declare themselves. Although a small proportion of those who are bitten by rabid animals may be ultimately seized by the malady, especially when the bites have been inflicted through the clothes, precautionary measures should be taken, nevertheless, in order to prevent the distressing and, it may be said, the incurable effects contingent on these injuries.

48. i. PROPHYLACTIC TREATMENT.—The preventive measures usually had recourse to have generally been employed with the intention either of preventing the imbibition or contaminating impression of the poison, by removing or destroying the injured parts, or of fortifying the system against, or of counteracting the influence of the poison. The former of these intentions are most to be relied upon, for we have no proof of any substance being possessed of the power of counteracting the poison when it has infected the frame, although numerous substances have been supposed to possess this property, owing to the non-appearance of the malady after inoculation of the virus was inferred. But in many instances the disease has not appeared, even after manifest proofs of inoculation, and when no prophylactic measures have been resorted to. Most of the means which have been advised as efficacious in counteracting, or in enabling the system to resist successfully, the operation of the poison, have likewise been employed in various states of combination, or in different modes, when the effects of the poison begin to appear; but however successful they may have proved as prophylactics—doubtful at the best—they have very rarely or never been efficacious when the mal-

mark. Mr. YOUATT states that he has never seen a case of rabies in the dog in less than fourteen days after the bite. The average time he considers to be five or six weeks. In three months he considers the animal tolerably safe. He, however, met with one case after five months, and another after seven months.



ady has declared itself. In noticing the *preventive measures* which have been recommended, I shall take them in that order which the period at which they may be resorted to will suggest; those means which may be employed the latest, or in the advanced progress of incubation, being often appropriate, in various associations, when the precursory symptoms appear, if they have not been prescribed previously, and their inefficiency been thereby proved.

49. (a) *Ligatures or cupping-glasses* may be instantly employed, when a recourse to either is possible, until other measures may be adopted, especially excision, escharotics, &c. *Ligatures* have been advised by PERCIVAL and others, and they ought to be instantly applied, immediately above the seat of injury, when this can be done. Where they cannot be applied, *cupping-glasses*, as recommended by CÆLUS, and recently by Sir D. BARRY, may be resorted to, the glass being placed so as equally to surround the bitten part. In emergencies of this nature, any glass, or even deep cup, may be thus applied, with the aid of a piece of burning paper, especially after having been dipped in any spirit. Neither ligatures nor cupping-glasses, however, should be trusted to longer than either excision or escharotics may be employed by a competent person.

49. (b) *The complete excision* of the injured part has been next advised, and even amputation of the part, as recommended by Mr. S. COOPER, may be resorted to when a finger or limb has been severely injured or lacerated, or when complete excision of the parts is almost impossible or dangerous. Mr. YOUTT, whose experience attaches great importance to his advice, remarks respecting this operation, that it demands greater skill than is supposed, and that every portion of the wound with which the tooth could possibly come in contact must be removed. This is often exceedingly difficult, owing to the situation and direction of the wound. The knife must not enter the wound, or it will be likely itself to be empoisoned, and then the mischief will be increased. Dr. MASSEY was convinced of this risk, when he advised that, "should the knife by chance enter the wound made by the dog's tooth, the operation should be recommended with a clean knife, otherwise the sound parts will become inoculated." There is no doubt of this risk; and to this cause, as well as to the passage of blood into the bitten wound, to the contamination thereby caused, and to the communication of the contaminated blood with the excised surface, the occurrence of the malady, by no means rare, in cases of excision, is chiefly to be imputed. Aware of the risk arising out of excision, unless completely accomplished without incurring it, many practitioners use the caustic after the knife. Nevertheless, SAUVAGES, SABATIER, CÆLIUS, SOUTH, and many others, trust chiefly to excision, and consider the objections just stated insufficient to cause the relinquishment of the practice. Mr. SOUTH remarks that, when the disease appears after excision, it is because all the infected part has not been removed. As a portion of the poison may remain, or be dried upon the cutaneous surface immediately surrounding the bitten part, I would advise ablation of this part of the surface with a caustic or alkaline solution just be-

fore excision is performed; and that the recommendation of Mr. H. CLINE to thrust a probe to the deepest part of the injury, and to remove all the soft parts around the probe, without cutting into the wound, so that they may be brought out like a glove-finger on the probe, should be adopted. The subsequent free application of caustic potash, of nitric acid, or of the nitrate of silver, is also advisable, in order to destroy whatever poison may still remain, owing either to the penetration of the knife into the contaminated parts, or to the poisoned part having been not entirely removed.

50. (c) CÆLIUS states that, when complete excision cannot be done, the *quick cleansing of the wound and its entire vicinity* with water, salt water, water and vinegar, &c., should not be neglected; and that when the wound is small it should be enlarged, and bleeding promoted by cupping-glasses or warm water. The whole he recommends to be thoroughly *cauterized* by the actual cautery, butter of antimony, caustic ammonia, or caustic potash, or with gunpowder, which is to be exploded. He adds, that the slough is to be soon removed, and a free suppuration is to be kept up for months, by scattering powdered cantharides and by irritating salves. He farther advises mercury to be rubbed in around the wound until pytalism is produced. The same treatment is prescribed by him if the wound, already closed, begins to smart and swell. CÆLIUS here judiciously associates various measures which have singly found strenuous supporters.

51. (f) Mr. YOUTT recommends, as an *escharotic*, the nitrate of silver, as it may be shaped into so sharp a form as to penetrate as far as the tooth of the animal can have reached, and as it forms a dry eschar. The danger which he attributes to the alkaline caustics, and to nitric acid, of suspending the virus, &c., I believe not to be justly dreaded; for these, in their caustic state, may be considered as capable of destroying the poison, and as completely as the nitrate of silver possibly can. Of the several substances recommended as escharotics little need be said. The one is probably as efficacious as the other; that one which, with efficiency, may be most promptly procured being always preferable.—a. Mr. YOUTT, as just stated, prefers the *nitrate of silver*, and adduces the successful employment of it in hundreds of cases in support of his opinion.—β. ECKER, FERRIAR, PINEL, RUBIÈRE, MARTINET, SOUTH, and others advise the *caustic alkalies*, either the fixed or volatile.—γ. MEINHARD, AGRICOLA, MALDEN, FLAJANI, and numerous more recent writers, recommend the *hydro-chloric* or *nitric acid*, or the *sulphuric* or other concentrated acids.—δ. The application of *butter of antimony* to the part, after enlarging the wound, has found advocates in SABATIER, PINEL, and LE ROUX; and a similar application of *arsenic* or of *arsenical paste*, has been prescribed by AGRICOLA, ZINCKE, ROUEMONT, HARLES, and others.—ε. FABRICIUS HILDANUS and GÖCKEL advise *boiling oil* to be poured into the enlarged wound, so that it may reach the bottom, and produce a large eschar, followed by free suppuration.—ζ. VALENTIN recommends *combustion* of the part, even after several days, by means of the bark of the *fraxinus* burned in the wound.—η. Recourse to the *actual cautery* has been long and generally

had; but it cannot be considered efficacious unless early employed, and unless it reach the bottom of the wound.

52. (g) After a satisfactory employment of the actual or of the potential cantery, *suppuration of the wound*, kept up for several weeks, according to some, or even for months, according to others, has found numerous supporters; very different means having been used with this intention. CELSUS, GALEN, FABRICIUS HILDANUS, SCHLEGEL, SCHMUCKER, BALDINGER, &c., attach much importance to this measure, while GEISELER, PLANK, O'DONNELL, and the FRANKS believe it to be useless. The means which have been most commonly employed for this purpose are powdered *cantharides*, or the powder of the *meloe proscarabæus*, or *scarabæus majalis* (KEMME, FRITSCH, MÜLLER, HANNOVER, &c.), *savine*, the diluted *acids*, and strong brine, or a solution of *common salt* (DU HAMEL, PAULINI, AWSITER, &c.). Dr. BENNETT states that AXTER, of Vienna, applies a *blister* over the wound, and afterward dresses it with powdered *lyttæ*, or some stimulating lotion, for six weeks; that he gives also a grain of powdered *lyttæ* and six grains of *cancrorum oculi* internally for six days; and that, "during a period of twenty-seven years, no patient thus treated had been brought back to the hospital under this disease." Dr. HAUSBRAND employs general *bleeding*, and makes deep *scarifications* of the wound, which he washes with *salt and water*, after favouring the flow of blood as much as possible. He then applies an ointment of *unguent. basilicum* and *pulv. lyttæ*, and keeps up a discharge for three months. He also gives *camphor* and *opium* internally during the first three days. "Eleven persons bitten by dogs actually rabid escaped after this treatment." Dr. WENDT, besides keeping up for six weeks *suppuration* of the wound by means of *pulv. lyttæ*, or other irritating applications, employs *mercury* internally, so as to produce salivation. Of 180 persons thus treated in the Breslau hospital, of whom half had been bitten by dogs actually rabid, or supposed to be so, only two died. The German physicians generally confide in *prolonged suppuration of the wound*; but Mr. YOUTT, who has employed the *lunar caustic*, having previously enlarged the wound, when this is necessary, to upward of 400 persons, and four times on himself after bites from dogs decidedly rabid, has not seen the disease appear in one instance.

[In two cases where persons were bitten by a dog decidedly rabid, we kept up suppuration in the wound by pulverized nit. silver for several weeks, with the effect of preventing a subsequent attack. In one case complete excision proved successful, the only case in which we have had an opportunity of trying it.]

53. A. The foregoing measures are those which have been most confided in when adopted immediately or soon after the infliction of the injury. But they have likewise been resorted to during the *latent period*, or at a time more or less remote from the receipt of injury; and various additional means have also been prescribed as prophylactics during this period. Dr. A. T. THOMSON supposes that the virus remains latent in the wound during this period, and produces no marked effect until the state of the constitution favours its action; and hence

he infers that *excision* and other *local measures* may be useful at any time before the precursory symptoms appear. Several facts have been adduced tending to show that this opinion is deserving of attention. RUSH has related a case in which "excision was performed thirty-one days after the bite, and even after the hydrophobic symptoms had appeared, and the patient's life was saved." Dr. HARDER relates a case (*Petersburg Med. Trans.*, vol. i., p. 170) in which hydrophobia supervened five months after the bite, and eight weeks after excision; but another excision and cauterization then saved the child. In two weeks the symptoms returned, and a pale and painful excrescence formed in the bottom of the wound. This was excised, and the wound cauterized by nitrate of silver, and recovery took place. Dr. BENNETT states that M. RECAMIER opened the cicatrices, which were tumefied, in a person who had been bitten by a rabid animal fifteen days before, and cauterized them with the crystallized *nitrate of mercury*. Baths and diaphoretics were also employed, and the patient escaped the malady; although another person, who had been bitten by the same animal at the same time, perished of rabies. These cases fully warrant excision and the cautery at any period, even up to the time of the manifestation of the disease, and especially when pain, swelling, itching, or discoloration of the cicatrix appears. At this period more particularly, Dr. SCHLEFFER recommends the nerves going to the part to be divided.

54. (a) Dr. MAROCHETTI, who considers that small pustules form under the tongue during the latent or incubative period (§ 7, *Note*), contends that the true preventive measures consist of *opening and cauterizing these pustules* within twenty-four hours after their formation, of washing the mouth with a decoction of the *genista tinctoria*, and of the patient's drinking a pint and a half of this decoction daily for six weeks. SALVATORI and ROSSI have been said to have succeeded in some cases in which these means were adopted; but M. MAGISTEL states that, of ten cases in which he employed them, five died, although more might have been affected if nothing had been done.

55. (b) During the latent period numerous other means have been advised, in order to counteract the operation of the poison, or to enable the constitution to resist its influence. Many of these means have been recommended with more or less rational intentions, while others have been employed empirically. Of those which have been advised with the former of these intentions, some have been suggested with the view of exciting certain emunctories, and thereby preventing changes affecting the constitution of the blood from taking place; and others have been prescribed with a view of supporting the vital powers, and thereby resisting the action of the virus, and of accomplishing other contingent intentions. Some of these means are both local and constitutional, and others are employed either externally or internally only.

56. (c) *Powdered cantharides*, both locally and internally, have been recommended by WERIHOF, ALIX, WICHMANN, VOGEL, CATANI, SCARAMUCCI, and ROUGEMONT for some time after the bite, and even when signs of irritation appear



in the cicatrix; and STAHL and others advise that the use of this substance should be persisted in until the urinary organs are affected, or until bloody urine is produced, a recommendation to which AVICENNA attached importance in respect of the employment of other active diuretics in this malady. The *melö proscarabæus* was similarly prescribed by SENNERT, SCHREDER, REIDLIN, and others, both immediately after the injury and during the latent period.

57. (d) *Chlorine, chloric, and hydrochloric acid* have been much used, both locally and internally, to disinfect the wound and to resist the influence of the virus on the frame. MALDEN, AGRICOLA, MEINHARD, and SEMMOLA have attached much importance to these substances; but several instances have been recorded of the appearance of the malady, notwithstanding a prolonged recourse to them. *Arsenical preparations* have likewise been employed in the latent period, both locally and internally, and continued for a considerable time, or according to the quantity prescribed and its effects. HARLES, and others already mentioned, appear to have attached some importance to their use. An infusion of *ruc* in *acetic acid*, or the *acetum ruta*, has been employed both locally and internally by WEDEL and others, and continued for several weeks after the injury; the *theriaca* being also taken for a considerable time.

58. (c) There are few preparations whose local or external and internal use have been more frequently recommended than the *mercurial*. The *bi-chloride, the chloride, and the ointments* have been severally employed both locally or externally and internally in the course of the latent period, and even when the precursory symptoms have appeared; and not only singly, but also in various quantities and combinations. The application of the *sublimate* to the wound was first prescribed by FABRICIUS HILDANUS and PALMARIUS; and, more recently, WEDEKIND, PERCY, and numerous writers in the Memoirs of the Royal Academy of Medicine of Paris for the years 1777, 1778, 1782, and 1783, advised its use, both locally and internally, as a prophylactic. *Calomel* was employed with *sulphuret of antimony, camphor, and various other substances* by RANBY, WESTALL, and others, and given in large and frequent doses until the *mercurial action* appeared. The strong *mercurial ointment* was applied to the wound, also, externally by *friction*, conjoined with camphor, by BAUDOT, DESAULT, HANNOVER, POSTAL, and others; and while this application was made to the wound PERCIVAL recommended *cinchona and wine* to be taken, in order to promote the nervous energy and the vital resistance of the constitution to the poison. Mercurial frictions, the ointment being mixed with camphor and musk, were directed over the parotid glands by SCHREDER and SAULGIER, and continued until salivation followed. Whether used internally or externally, or in any of the combinations just mentioned, or in any other, HOLDERFREUND, COLOMBIER, FALCONER, and many others, advised the preparations of mercury to be persisted in until salivation was produced, and to be continued for a considerable time.

59. (f) *Frictions with olive oil*, while this oil is taken internally so as to preserve a regular state of the secretions and excretions, were

recommended by SHADWELL, SIMS, and FOTHERGILL, and to be continued for a long time after the injury. BAUDOT and others advised that the frictions should be made with a combination of the oil with mercurial ointment and camphor, and MEASE and LOFTIE with olive oil and the *oleum succini*. WATT recommended a seton to be introduced into the nape of the neck, and the discharge from it to be freely promoted: a suggestion by no means undeserving of adoption, considering the very remarkable changes generally found in the medulla oblongata and its membranes after death, and which the seton may prevent by the revulsive irritation produced by it.

60. (f) *Baths, cold, warm, and medicated, salt-water baths, the cold affusion, &c.*, have severally been mentioned by writers, from CELSUS downward; but they are of doubtful service. Cold salt water bathing and shower baths seem most appropriate, as tending to diminish susceptibility and to invigorate the frame; but I am unacquainted with any satisfactory proofs of their efficacy.

61. (g) *Numerous stimulants, antispasmodics, and tonics* have been advised, with the intention of enabling the nervous system to resist the operation of the rabid virus. *Musk*, in various combinations, and more especially with opium, has been employed by several writers; and *opium*, in numerous forms of association, has been prescribed by many authors. *Myrrh*, with opium, &c., was recommended by SCHLEGEL; *serpentaria*, with the wine of *absinthium*, by VALENTINI; the infusion or decoction of the leaves of the *taxus baccata*, internally and externally, by ROUGEMONT, ROEMER, and HILDEBRAND; the decoction of *ruc*, with that of the *taxus baccata*, by BLAINE; the powder, or infusion, or the oil of *valerian*, by BOUTEILLE and others; *ammonia* and its various preparations, in large doses, and in various combinations, as with the *anagallis purpurea*, the *oleum or spiritus succini*, &c., by ANDRY, RAVENSTEIN, and others; *asafetida*, with camphor, musk, and opium, by SCHMUCKER, ALIX, and NUGENT; the powder or extract of *nuxvomica* by SCHULZE and ROUGEMONT; *phosphorus* in ether by ZINCKE; and *cinchona, wine, aromatics, and various tonics*, by MEASE, LOFTIE, and numerous other writers. The *anagallis flore purpuræ* was praised by KÆMPF, ANDRY, and RAVENSTEIN, was given in doses of a scruple every sixth hour, and was prescribed with ammonia by some, and both externally and internally by others; but RAYMOND and other writers state that it is inefficacious.\*

62. (h) *Several anodyne, narcotic, and sedative substances* have also been tried during the latent period, with the hope of thereby preventing the development of the malady, but with no evidence of such partial success as may hereafter warrant recourse to any of them. These substances, as well as those belonging to the preceding category, were seldom prescribed alone, but were generally conjoined with other internal or external means. Thus *stramonium* was prescribed internally by HARLES,

[\* A decoction of the *Scutellaria lateriflora* (*scull-cap*) has been highly recommended by some writers in this country as an efficacious prophylactic against this disease, but without any satisfactory evidence in its favour. The same remark will apply to all the other vegetable prophylactics hitherto recommended in this country.—Ed.]

with laurel water, and *belladonna*, by HANNOVER, MUNCH, and HENNING, while suppuration of the wounds was promoted.

63. (i) It is unnecessary to pursue farther the history of means employed in order to prevent the development of the malady after inoculation of its virus is either feared or presumed. An impartial view of all the circumstances involved in cases of injury by rabid animals, discloses various fallacies which weaken the evidence of success which has been imputed to many substances which have been employed as prophylactics; and, while some have been insufficiently tried, and their inefficacy hence not demonstrated, others have been found to fail, upon the success of which much reliance had been previously placed. But it may be asked, should these latter be discarded altogether, or should the facts stated in their favour be discredited because they have been found to fail in one, two, or even in a few instances? The answer I would suggest is, that they ought not to be discarded unless in favour of means which promise a more certain success; for if they be relinquished for these reasons, then with equal reason should all diseases be left to the unaided efforts of nature, inasmuch as no unvarying plan of cure, or no single remedy is efficacious in all cases of any specific malady; and, as regards the prevention of rabies, means which often have proved efficacious in respect of some states of constitution, or against certain grades of infection, may nevertheless fail in other circumstances, either of constitution or of inoculation.

64. ii. CURATIVE TREATMENT?—However doubtful, or even hopeless, the success to be derived from treatment when the malady has declared itself, nevertheless the attempt to cure the patient should be rationally made. Instances of recovery from the developed disease are so few as to induce many to believe that they were not really cases of this disease, but of some other affection, in which dread of water was a prominent symptom. Nevertheless, in a few cases of recovery—certainly very few—the evidences as to the actual existence of true rabies admits not of doubt.—(a) In most, if not in all of these, *blood-letting*, carried to the utmost extent, was the remedy to which recovery was chiefly imputed—a treatment advised by BOERHAAVE, MEAD, FOTHERGILL, FERRIAR, MEASE, NUGENT, HARTLEY, RUSH, WOLLASTON, and others. I have referred to the published cases by HARTLEY, PETERS, INNES, TYMON, BURTON, SHOOLBRED, WYNNE, VOGELSANG, and DU HEAUME, in which very copious blood-letting was employed with success. This treatment has certainly been resorted to by many physicians without success; but I believe that in many instances it has not been carried sufficiently far, or has not been resorted to at an early enough stage of the declared malady. I think that these causes of failure are manifest in the cases detailed by Dr. ALBERS, of Bremen, TROLLET, and by others; and that the opinion expressed by Mr. S. COOPER, and by Dr. J. L. BARDSLEY, as to the successful cases not having been instances of true rabies, is not correct, as an attentive perusal of the details of these cases convinces me that they were actually what they professed to be. BERGER, one of the earliest writers who recommended blood-let-

ting, advised that the blood should be taken from the frontal veins; and WEDEL that it ought to be drawn from the sublingual veins. In the vicinity of BRESLAU, in 1719, a cow, the subject of rabies, was cured by an enormous venesection. The case of recovery recorded by Dr. BURTON was treated by the abstraction of 122 ounces of blood within four days, and by calomel and opium. In the much earlier instance recorded by Mr. HARTLEY about 120 ounces were taken, and the cold bath frequently resorted to; a similar treatment, with the addition of opiates and sudorifics, having been resorted to successfully by HILLARY. In Mr. TYMON's case, very copious blood-letting was accompanied with large and frequent doses of opium, with calomel, JAMES'S powder, and mercurial inunction. Dr. SHOOLBRED, finding immediate relief to follow a very large venesection, trusted to this agent chiefly. In Dr. DU HEAUME's case profuse blood-letting allayed the fully-developed symptoms, and draughts, with digitalis, hydrocyanic acid, and morphia, were given, and a drachm of the strong mercurial ointment was rubbed into his legs night and morning. Dr. VOGELSANG, after insisting upon blood-letting as the remedy alone to be confided in, shows that it should be resorted to as early as the malady declares itself, and that it ought to be carried at first to the greatest length consistent with the immediate safety of the patient. Dr. SHOOLBRED's recommendation is to a similar effect; but he advises that the venesection should be with a large orifice, in order that full syncope should follow.

65. It does not appear that the very large doses of opium, the calomel and mercurial ointment, the cold baths, or the diaphoretics prescribed in several of the successful cases in which large blood-lettings were practised, had much to do with the recovery; inasmuch as these means had, on numerous occasions, been employed to a very great extent without any benefit. Probably, however, the mercurials, the consequent salivation, and copious diaphoresis, produced some service, or aided in preventing the recurrence of the rabid paroxysms. That blood-letting is a rational method of treating this malady is not only proved by its recorded success, but also evinced by the inflammatory or congestive changes found after death in the medulla oblongata, lungs, and brain (§ 20-23).

66. *B. Other evacuates*, besides blood-letting, have been employed, but with doubtful results.—(a) *Emetics* often repeated were recommended by MASSALIEN, ROUGEMONT, SATTERLY, and others; the antimonial emetics, conjoined with camphor, musk, &c., being preferred, with the view of producing also free diaphoresis. How far they may be of service I am unable to state; but the occasional imperfect retchings or vomiting, and the state of the alvine evacuations, indicate the propriety of an early recourse to them, or as soon as the hydrophobic period declares itself.

67. (b) *Purgatives*, after blood-letting and emetics have been resorted to, have been advised by comparatively few writers; but I agree with the few who approve of their exhibition that the chologogue purgatives are required, more especially calomel, or the corrosive sublimate, or the turbitih mineral, aided by purgative enemata. Most of the writers who have



advised these latter preparations have entertained the intention of producing *salivation* by them as well as a free evacuation of bile, and have therefore aided this latter operation by the inunction of strong mercurial ointment, and by conjoining them with antimonials, or with camphor, or various other remedies, according to the progress which the disease had made. These medicines have been much employed as prophylactics (§ 58); and when thus resorted to, it is difficult to form a correct estimate of the amount of benefit derived from them; but when the hydrophobic stage has supervened, there is very slight evidence of decided advantage having been derived from them, although, in one or two instances on record, success even in this stage has been imputed to them.

68. (c) *Profuse diaphoresis* has been said to have proved successful when early procured and perseveringly promoted. It is most difficult, however, to produce the effect in a sufficient degree by internal medicines, unless they are promoted by the vapour bath, or by heated air. This practice has nevertheless been sanctioned by GÖCKEL, VATER, WALDSCHMIDT, PAULINI, HILLARY, RICHTER, and others; but I doubt that it has been employed in so decided a manner as to test sufficiently its effects upon the malady.

69. C. The *sedatives, narcotics, and anodynes*, usually prescribed in medical practice, often have been employed as soon as the hydrophobic symptoms have appeared, but scarcely even with a palliative influence.—(a) Of the several *sedatives* which have been suggested, the *cold affusion, prolonged shower baths, or submersion and cold baths*, are the most energetic. They have been recommended by RANBY, HARRIS, RUSSEL, WARD, and others, but upon no evidence of their efficacy; while FOTHERGILL, DICKSON, WALDSCHMIDT, and many other writers, have considered them worse than useless. The same contradictory opinions have been emitted in respect of *warm, and variously medicated, and alkaline baths*, which have been advised from theoretical views rather than from any experience of their influence on this malady. In most of the instances, however, in which I find any record of the manner of employing these baths, they appear not to have received a satisfactory trial, and not to have been persisted in, or repeated, so as to produce a copious and prolonged sweat, or to an extent equal to that suggested above (§ 68). Of other *sedatives, digitalis, hydrocyanic acid, and the diacetate of lead* are the most deserving of notice. *Digitalis* was suggested by Dr. PERCIVAL, and several instances in which it has been given without any marked effect have been recorded. No advantage can be reasonably expected from it unless it be prescribed promptly, and in nearly poisonous doses. *Hydrocyanic acid* was given by Dr. A. T. THOMSON, but with little or no benefit. The remark just offered respecting *digitalis* is even more applicable to this acid when prescribed for rabies; and if it should ever again be given in the developed malady, I would advise it to be tried in the largest dose compatible with the continuance of life; and to be followed, during its sedative action, by the affusion of cold water over the head and occiput. I may add, that *laurel-water* was recommended with belladonna by HECKER and SCHWA-

BISCHER in the developed state of the disease, but it does not appear that the recommendation proceeded from any sufficient experience of advantage from them. The *acetate of lead*, advised by HEGEWISCH, and the *infusion of tobacco*, as an injection, prescribed by Mr. SAWREY, belong to this category, and hitherto no evidence has been produced in their favour.

70. (b) Of *anodynes and narcotics, opium and its various preparations and salts—the acetate and muriate of morphia*—have been most employed; but, although severally prescribed in remarkably large and frequently repeated doses—although as much as 200 grains of opium have been given within twelve hours, no benefit was derived. Mr. WARD advised opiate frictions, and Dr. BOOTH the injection of a solution of the acetate of morphia into the cephalic vein. This latter measure was practised by Drs. BRANDRETH and BARDSLEY without any advantage. The preparations of opium and of morphia have been given in all combinations and forms—with camphor, with musk, with myrrh, with ammonia, with valerian, &c.—by the mouth and in enemata, but with no benefit when confided in as the chief means of cure, and only with equivocal advantage when prescribed after large bleedings.—*Belladonna* has been recommended not only as a prophylactic, but also as a cure, by MUNCH, HENNING, HANNOVER, and others already mentioned, aided by division of the nerves going to the cicatrix, or by reopening the cicatrix and procuring a copious discharge from it; and by combining the belladonna with the substances just enumerated. But there is no evidence of success having followed a recourse to this medicine. The same remark is equally applicable to *stramonium*, which was suggested by HARLES to be given in laurel-water; and *conium* is equally inefficient. More recently the tincture, infusion, or extract of the Indian hemp—*cannabis Indica*—has been recommended, but I have not heard of any instance of success from the use of this intoxicating substance. Indeed, when the changes found after death are considered, no advantage can be rationally expected from any one of the anodynes or narcotics, when trusted in chiefly, or given in excessively large doses. It is extremely probable that *ether, chloroform*, and other substances productive of insensibility when administered by inhalation, will receive an early trial in this malady; but, for the reason just assigned, no sanguine hopes of success from them can be entertained. Nevertheless, “*Anceps remedium melius est quam nullum*,” and the remedies of this class may be productive of some benefit, either when inhaled or taken internally, or when administered externally or locally. The local application, also, of these anodynes may be of use, both in the premonitory stage and in the advanced course of the malady.

71. D. The most powerful *antispasmodics and stimulants* have been advised, and often employed, but with no proof of advantage having been derived from any of them.—(a) The *ethers, musk, camphor, ammonia, castor, asafetida, turpentine, valerian, &c.* have severally received satisfactory trials, and their want of efficacy in this malady has been sufficiently demonstrated, both when given alone or in conjunction with other medicines, in which latter form they have

been most commonly prescribed, more especially with *opium*, or with *belladonna*, or other narcotics, as mentioned by MEASE, BUCHHOLZ, NUGENT, and many others. And these medicines have not only been administered by the mouth, but also in enemata, and in various combinations. *Ether* was thus given with opium by MEASE; with *phosphorus* by ZINCKE; with the succinated spirit of ammonia, with camphor, &c., by several other physicians. *Musk* has been exhibited in similar modes and combinations—with opium, belladonna, camphor, &c.; and with cinnabar, ereta, and opium, forming the pulvis Cobbii or Tinguinensis; but there is no sufficient evidence of its efficacy. In a case which I attended with Mr. DENVY, the spirit of *turpentine* received for the first time a sufficient trial—a trial demonstrative of its want of efficacy in this malady.—(b) *Electricity* and *galvanism* were recommended by Rossi and ALDINI, but no permanent benefit was derived from them. The *nitrous oxide gas* was administered by Dr. BARDLEY with little effect.

72. *E. Tonics* of various kinds have also been tried, but with no marked benefit. *Nux vomica* was given by ROUGEMONT and SCHULZE, and *strychnia* by Dr. BARDLEY. The *mineral acids*, more especially the *hydrochloric*, have been recommended by MEINHARD, AGRICOLA, MALDEN, ANCELLI, BRUGNATELLI, and others; and, probably after bleeding, the *chlorate of potash* and the *chloric ether* are deserving a trial. The *mineral salts*, especially the nitrate of *silver*, the preparations of *zinc*, the muriated tincture and other preparations of *iron*, have likewise been prescribed, the last by Dr. ELLIOTSON, BRIGHT, and others. The several *vegetable tonics*, especially the *cinchona* and *cascarilla* barks, *sulphate of quina*, &c., have also been suggested, variously combined, and aided by other means, as wine, aromatics, antispasmodics, &c.; but, although MEASE, LORTIE, and others have conceived that advantage might be derived from this class of medicines, especially when thus associated, or combined with anodynes or narcotics, no satisfactory evidence that benefit has been derived from them, when the disease is developed, has hitherto been furnished. Dr. SEMMOLA has insisted upon the employment of chlorine, both internally and externally, as a prophylactic and as a means of cure.

73. *F. Diuretics* were recommended for rabies by AVICENNA; but STAIL considered that no advantage could be derived from them unless they are given in so large doses and so frequently as to produce bloody urine; and with this view cantharides and the meloe proscarbæus have been prescribed by numerous writers, even since the empirical reputation of the latter in rabies has been shown to be, like all other nostrums, without any foundation.

74. *G. Tracheotomy* was advised to be performed by Drs. RUSK and PHYSIC in America, and recently by Mr. MAYO, with the view of averting death as long as possible, believing that this issue was more immediately produced by spasm of the laryngeal muscles; but it is doubtful whether or no spasm of these muscles is more concerned in producing this result than spasm, or even than paralysis, of other muscles or parts.

[In a recent conversation (Nov. 23, 1849) with Dr. MAPSHALL HALL, he expressed the de-

cided opinion that death in hydrophobia resulted from suffocation produced by spasm of the laryngeal muscles, and that the operation of tracheotomy would prove more successful than any other treatment. Experiments hitherto have not been sufficiently numerous to establish its value as a remedial resource.]

75. H. M. MAGENDIE, believing that the fluid parts of the blood were diminished by the inability of the patient to swallow fluids, and by the continued transpiration from the surfaces, injected a pint of water, of the temperature of 30° of REAUMUR, into the veins of a man in an advanced stage of rabies. The patient immediately became tranquil, and his pulse, in twenty minutes, fell from about 150 to 80. The spasms ceased, and he drank a glass of water. He continued to improve until the fifth day, when abscesses, primary and secondary, appeared, in consequence of portions of lancets, which had broken during attempts to bleed him in the feet during the paroxysm, having remained in the wounds. He died early on the ninth day.—(*Journ. de Physiol.*, t. iii., p. 386.)

76. In a malady so little under the control of medical treatment as this confessedly is, reliance cannot reasonably be placed on any single remedy; and hence various means have been often employed, coetaneously or successively, to arrest its progress, or to combat its more distressing symptoms. Numerous combinations of the medicines noticed above, either as prophylactics or as curative agents, have been advised by writers, but advised rather as suitable means for trial than recommended from satisfactory, or even from any experience of their efficacy.

77. (a) B. D. MAUCHART long ago directed blood-letting from the arm of the side in which the injury was inflicted, and a quantity of blood to be taken great in proportion to the time which had elapsed from the infliction of it. If the patient had become melancholic, or if any of the symptoms of the invasion of the malady existed, he ordered the blood-letting to be carried to the production of full syncope. He next ordered the cicatrix to be scarified and the bleeding from it to be encouraged; afterward the mithridate, rue, theriaca, &c., to be constantly applied to it, and these and similar substances to be taken internally. He farther directed a copious diaphoresis to be kept up, and prescribed the same or similar means both to prevent the malady and to cure it when it appeared, success having been said to follow this plan even where the disease was fully developed. It would be impossible for me to notice within reasonable limits, other associated means which have been suggested by authors. The reader will find most of them in the numerous works and papers referred to in the sequel; and he will farther observe that substances confidently recommended, either empirically or by professional credit, as most efficacious remedies in this malady, have, after a time, altogether lost their reputation, not merely from having been displaced from public or medical favour by newer means, but because they have been found totally inefficacious when employed.

78. (b) The uncertain or fluctuating views as to the pathology of rabies have tended not only to render equally uncertain the plans and



means of treatment, but also to increase the number of substances advised as specifics with the utmost confidence which ignorance imparts to empirical means. As certain contagious maladies have been cured by medicines viewed as specific means, or such as may be depended upon for the removal of these maladies, so has it been expected that rabies was to be cured by some particular remedy which, if once found out, might be proclaimed as the true panacea. Hence various substances have been from time to time thus dignified, and enjoyed a short-lived popularity. At a time when credulity was not limited to a few individuals, but extended to scientific and corporate bodies, or, rather, when individuals were so generally credulous as to impart this character to the societies which they constituted, certain substances received a reputation from this weakness of the human mind, and at a time when it was most implicitly believed by all physicians from Oxford and Cambridge, but by themselves only, that all learning and knowledge were concentrated in themselves alone, the ash-coloured liverwort was dignified by these physicians with the name of the *Pulvis antilyssus*. Subsequently other empirical remedies have thrown the college nostrum in the shade, and the virus inoculated by the bite of a viper, the guaco-juice, the *Scutellaria laterifolia*, the *Alyssa Plantago*, the *Ophiorkiza mungos*, the *Genista tinctoria*, the *Thalictrum flavum* and *angustifolium*, the *Delphinium consolida*, the *Anagallis purpurea* [Mikania Guaco], phosphorated ether or phosphorated water [common salt locally applied], and numerous other substances, have, in different countries and at successive periods, enjoyed their undeserved and short-lived reputations, and sunk into congenial oblivion. It may be added, for the information of those who take delight in empirical remedies, that in almost every town, in every country, may be found some old man or old woman who rejoices himself or herself, or knowingly deceives the neighbours and all the credulous within reach, in all ranks, with the professed possession of a specific against rabies; and that these specifics, according to the amount of patronage conferred upon them, have at different times enjoyed a reputation, which was overturned only after numerous proofs of their want of efficacy. The Ormskirk powder and the pulvis Tinguinensis are sufficient illustrations of the popular faith in vaunted but worthless specifics, and the credulous confidence they inspired. Numerous recent deceptions, absurdities, and fooleries—deceptions on so large a scale as to comprise the whole range of disease—have thrown these and other absurdities into the shade, and have proved humiliating illustrations of human nature, demonstrative of the extent to which knavish pretension, with a designing sacrifice of human life to selfish acquisition on the one hand, and credulous patronage on the other, lower the just estimate of moral and intellectual endowment, and sink the general standard of common sense and sagacity, as manifested throughout the community, from the highest places, through all ranks, classes, and grades, down to the lowest sinks of wretchedness.

79. I. Treatment advised by the Author.—After the review which I have now taken of the treatment which has been recommended for the cure

of rabies in the earlier as well as in the more advanced stages of the developed malady, and reflecting upon what I have myself observed, I may be permitted to state the means in which I am disposed to place reliance when the disease has declared itself: *Bledings* from the arm to syncope, or large *cupplings* on the nape of the neck, repeated, or carried as far as the habit of body and circumstances of the case will permit, have a greater amount of evidence in their favour than other remedies, and are moreover more consistent with the lesions observed after death. After bleeding, the nerves proceeding to the cicatrix may be divided, and the cicatrix itself laid freely open, suppuration from it being as speedily and freely produced as possible. Immediately upon opening the cicatrix, &c., a free perspiration should be procured and kept up by a hot-air bath, for which the materials are always at hand—namely, blankets and a lamp—or by a vapour bath. In other respects the treatment must depend much on circumstances, and on the predominance or urgency of particular symptoms, for which emetics, mercurials, purgatives, enemata, anodynes, narcotics, antispasmodics, stimulants, tonics, &c., may be employed according to the procession and severity of the morbid phenomena.

BIBLIOG. AND REFER.—*Aristoteles*, Hist. Animal., l. viii. — *Plinius*, l. xxix., cap. 5.—*Celsus*, De Med., l. v., cap. 27. — *Galenus*, De Locis Affect., l. vi., c. 5.—*Oribasius*, Synopsis, &c., l. viii., ch. 13.—*Celsus Aurelianus*, Acut. Morb., l. iii., ch. 9.—*Paulus Aegineta*, l. v., c. 3.—*Avicenna*, Canon, l. iv., fen. vi., tr. 4, c. 5.—*F. Ponzetti*, De Venenis, lib. iii. Venet. fol., 1492.—*J. Bravus de Piedra Vita*, De Hydrophobia Natura. Salamanca, 8vo, 1571.—*H. Mercurialis*, Tractatus de Maculis pestiferis et Hydrophobia. Patav., 4to, 1580.—*H. Fracastorius*, De Morbis contagiosis (l. ii., c. 10; iii., c. 9, opp. om.). Ven., 4to, 1584.—*A. Baccius*, De rabidi Canis Morsu. (Append. ad Prolegom. de Venenis). Rom., 4to, 1586.—*A. Mancinelli*, Opusculum floridum de Morsu Canis, &c. Venet., 12mo, 1587.—*J. Bauhins*, Denkwürdige Historie von etlichen wüthenden Wölfen, &c. Mompelg., 8vo, 1591.—*A. Roscius*, Epistola de Morsu Canis rabidi (etiam in Hildan. Opp.). Basil., 8vo, 1602.—*Camerarius*, Memorab., cent. xvi., No. 100.—*Fernelius*, De abdit. Rer. Causis, l. ii., cap. 14.—*B. Coderchus*, De Rabie, seu Hydrophobia. Francf., 18mo, 1610.—*T. Spackmann*, A Declaration of such grievous Accidents as commonly follow the Biting of mad Dogges. Lond., 4to, 1613.—*M. Hamel*, Traité de la Morsure de Chien enragé. Lissieux, 8vo, 1620.—*J. Caranta*, De Morsu Canis rabidi. Savil., 4to, 1623.—*Fabricius Hildanus*, cent. i., obs. 90; ii., obs. 98; iii., obs. 87; iv., obs. 88.—*J. ab Aromataris*, De Rabie contagiosa. Francf., 4to, 1625.—*Bartholinus*, Hist. Anat., cent. v., obs. 52.—*Palmarius*, De Morbis contagiosis, p. 266 (caused by the kiss of a rabid patient).—*Durey*, De stupendo Infortunio ex Lupo rabiente. Divion, 8vo, 1661.—*Zacutus Lusitanus*, De Prax. admirab., l. iii., obs. 87; et Prax. Med. Prin. Hist., l. v.—*J. Varisani*, De rabidi Canis Morsu et de Hydrophobia. Regiom., 8vo, 1666.—*Heister*, Wahrnehmungen, b. ii.—*Neuhans*, Homo hydrophobus. Hannov., 12mo, 1689.—*Paulini*, Cynographia, sec. iv., cap. ii.—*T. Ravely*, Traité de la Maladie de la Rage. Par., 12mo, 1696.—*T. Mayerne*, in Philosoph. Transact., No. 191.—*R. Lentiuss*, De Hydrophobie Causa et Cura. Ulmae, 12mo, 1700.—*P. A. Bufaletti*, Lettera sopra un Idrofobo, divenuto tale coll' Impeto dello Sdegno. Maurata, 8vo, 1702.—*Lister*, in Philosoph. Transact., No. 147.—*A. B. Scaramucci*, Lettera sopra un Idrofobo. Maurata, 8vo, 1702.—*H. Ridley*, Observations de Aethmate et Hydrophobia. Lond., 8vo, 1703.—*Callisen*, Syst. Chirurg. hodierni, vol. i., p. 595.—*M. Hamel*, Traité de la Morsure d'un Chien enragé. Lissieux, 8vo, 1704.—*Kennedy*, in Philos. Transact., No. 242.—*R. J. Camerarius*, et *T. G. Scharf*, De Alyssio Clave (Haller, Diss. ad Med., vol. i.). Tub., 4to, 1693.—*Mead*, in Philos. Transact., No. 323; and Mechanical Account of Poisons.—*P. Hunauld*, Entretiens sur la Rage et ses Remèdes, 12mo, 1714.—*Bonet*, Sepulchretum, &c., l. i., sect. 8 and sect. 13, p. 341.—*Fuller*, in Philosoph. Trans., No. 448.—*Mortimer*, in ibid., No. 443.—*Nourse*, in ibid., No. 545.—*Hartley*, in ibid., No. 448.—*Peters*, in ibid., No. 475.—*Wollaston*, in ibid., No. 448.—*Callisen*, in Soc. Med. Hann. Collect., vol. i., No. 32 (caused by a rabid dog

- having licked the patient).—*J. S. Canlier*, Information wie die gebliesene Personen zu tractiren. Landr., 8vo, 1733.—*P. Desault*, Dissertation sur la Rage et Dissertation sur la Phthisie. Paris, 12mo, 1734.—*C. du Bau*, Preservative against the Consequences of the Bite of a mad Dog. Lond., 8vo, 1734.—*R. James*, Method of preventing and curing the Madness from the Bite of a mad Dog. Lond., 8vo, 1735.—*M. Lister*, Tractatus de quibusdam Chronicis (L. iii, de Hydrophobia). Geneva, 4to, 1737.—*F. Falese*, Dell' Idrofobia. Lucca, 8vo, 1739.—*C. du Choiseul*, Nouvelle Méthode pour le Traitement de la Rage. Paris, 12mo, 1752.—*T. Andree*, Cases of the Epilepsy, &c., with Cases of the Bite of a mad Dog. Lond., 8vo, 1753.—*F. B. Sauvages*, Dissert. sur la Nature et la Cause de la Rage. Toulouse, 4to, 1749.—*C. Nugent*, An Essay on the Hydrophobia, &c., 8vo, Lond., 1753.—*D. Brogiani*, Tract. de Veneno Animantium naturali et acquisito. Flor., 1752.—*C. L. Gallarati*, Riflessioni sul Morso d'un Cane rabbioso. Milan, 8vo, 1754.—*A. Bruce*, De Hydrophobia (Hall. D. ad M. i.). Edin., 1755.—*M. Morandi*, Della Cura preservativa della Rabbia canina. Ancona, 8vo, 1755.—*A. Catani*, Riflessioni sopra un nuovo Antilisso, &c. Neapoli, 8vo, 1756.—*C. du Choiseul*, Easy, short, and certain Method of treating Persons bit by mad Animals (transl. from the French). Lond., 12mo, 1756.—*A. Arrigoni*, Della Mania, della Rabbia, &c. Milan, 8vo, 1757.—*J. Benvenuti*, Tractatus de Hydrophobia, &c. Lucca, 8vo, 1757.—*L. de Lavrotte*, Observations sur une Hydrophobie spontanée. Paris, 12mo, 1757.—*P. H. Dahl*, De Morsu Canis rabidi saniti Observationes. Götting., 4to, 1760.—*R. James*, Treatise on canine Madness (2d edit.). Lond., 8vo, 1760.—*A. M. Hagg*, De Hydrophobia ejusque per Mercurialia Curatione (also in *Baldinger*, Syll. i.). Argent., 4to, 1761.—*D. P. Lazard*, Essay on the Bite of a mad Dog. Lond., 8vo, 1762.—*J. Acsiter*, The true Sea-bath and Drinking of Salt Water, 4to. Lond., 1762.—*J. S. Dalby*, The Virtues of Cinabar and Musk against the Bite of a mad Dog. Birm., 4to, 1764.—*F. Tribolet de la Lance*, De Hydrophobia sine Morsu prævio (*Baldinger*, Syll. i.). Basil, 4to, 1765.—*J. P. Baumer*, Unterricht wie man einem Menschen von tollen Hunde gebissen helfen solle. Erf., 4to, 1766.—*J. Kaempf*, Unterricht wie der Wasserscheu vorzubeugen. Frankfurt, 4to, 1766.—*Anon.*, Essay on the Bite of a mad Dog. Lond., 8vo, 1767.—*Morgagni*, De Scd. et Caus. Morb., epist. viii., art. 22, 23, 32; ep. lxi., 9, et seq.—*A. Arrigoni*, Osservazioni intorno alla Malattia della Rabbia. Milano, 8vo, 1767.—*Kemme*, *Buchner*, and *Haffner*, De nonnullis ad Rabiem caninam et Hydrophobiam pertinentibus (*Baldinger*, Syll. i.). Hal., 4to, 1767.—*C. Ponteau*, Essai sur la Rage. Lyon, 8vo, 1768.—*M. A. Baudot*, Essais antihydrophobiques. Paris, 4to, 1771, et Mém. de la Soc. Roy. de Méd., an 1782 et 83.—*Innes*, Medical Essays and Observations. Edin., vol. i.—*F. B. De Sauvages*, Dissertation sur la Rage. Paris, 12mo, 1771.—*C. F. Struvc*, De Rabiei caninæ Therapia (*Baldinger*, Syll. i.). Lips., 4to, 1774.—*J. Lott*, Saggio della Cura preservativa dell' Idrofobia. Venet., 1775.—*J. M. F. de Lasselonne*, Méthode éprouvée pour le Traitement de la Rage. Paris, 4to, 1776.—*T. Heysham*, De Rabie canina (*Smellie's* Tracts, vol. iii.). Edin., 8vo, 1777.—*Audry*, in Mém. de la Société Roy. de Médecine, an 1776, p. 104; an 1777, p. 78.—*F. Asti*, Compendio de Notizie circa il Veleno de' rabbiosi Animal. Mantova, 8vo, 1778.—*Buonamico*, *Benigo*, Lettera sul Veleno de' rabbiosi Animal. Yverdon, 8vo, 1778.—*J. Fothergill*, Case of Hydrophobia (Med. Obs. and Sug. v.). Lond., 8vo, 1778.—*J. Vaughan*, Cases and Observations on the Hydrophobia. Lond., 8vo, 1778.—*Baudot*, in Mém. de la Soc. Roy. de Méd., an 1782 et 83, t. ii., p. 91. (*The Memoirs of this Society between 1770 and 1785 contain numerous papers on Rabies*).—*J. W. Schroeder*, Beantwortung der Frage: ob die Wasserscheu ohne vorhergegangene Ansteckung entstehen könne. Göt., 8vo, 1779.—*F. Kämpf*, Abhandlung von der Wasserscheu. Hannover, 8vo, 1780.—*A. Leroux*, Observations sur la Rage, et sur les Specifics, &c. Dijon, 8vo, 1780.—*Frisch*, Geschichte der Hundswuth, &c. Weim., 8vo, 1781.—*F. Hoffman*, Anweisung wie die Folgen des Bisses, &c., zu vermeiden. Altenb., 8vo, 1781.—*J. Rchmann*, Unterricht für die von tollen Hunden beschädigte, &c. Tub., 8vo, 1782.—*J. Berkenhout*, On the Bite of a mad Dog. Lond., 8vo, 1783.—*M. Deck*, De Rabie canina (*Doering*, b. i.). Freib., 1783.—*M. Mederer*, Syntagma de Rabie canina. Freib., 8vo, 1783.—*Mathieu*, in Mém. de la Soc. Roy. de Méd., an 1782 et 83.—*J. H. Münch*, Kurze Anleitung wie die Belladonne im tollen Hundebiss anzuwenden ist. Götting., 8vo, 1783.—*Johnstone*, in Mem. of Med. Soc. of London, vol. i.—*K. F. Schwartz*, De Hydrophobia ejusque Specifico, Meloe, &c. Lips., 8vo, 1783.—*R. White*, The Use and Abuse of Sea Water, &c., 8vo. Lond., 1783.—*A. Leroux*, Dissertation sur la Rage qui a remporté le Prix, &c. Paris, 8vo, 1783.—*Wilbraham*, in Philosoph. Transact., vol. xlvii.—*J. Fehr*, Ueber den Hundswuth. Münt., 8vo, 1784.—*Raymond*, in Med. Observ. and Inquiries, vol. v.—*Dickson*, in ibid., vol. iii.—*R. Hamilton*, *M.D.*, Remarks on the Means of obviating the Effects of the Bite of a mad Dog. Ipswich,
- 8vo, 1785.—*A. Leroux*, Traitement local de la Rage, &c. Edin., 12mo, 1785.—*Simmons*, Med. Facts and Observat., vol. v., art. 9.—*Shadwell*, in Mem. of Med. Soc. of Lond., vol. iii., No. 26.—*Sims*, in ibid., vol. ii., No. 1.—*Lofite*, in Medical Facts and Observat., vol. i., art. 2.—*B. G. Münch*, De Belladonna, efficacie in Rabie canina Remedio (Frank Del. Op. i.). Tic., 8vo, 1785.—*Mangor*, in Acta Regia Soc. Med. Hafn., vol. ii., p. 408.—*J. C. Harter*, Geschichte einer Wasserscheu, &c. Regensb., 8vo, 1785.—*M. Stoll*, Rat. medendi, &c., t. iii., p. 433.—*Colombier*, Journ. de Méd., t. xlv., p. 185.—*J. Foot*, An Essay on the Bite of a mad Dog, &c. Lond., 8vo, 1788.—*Bardsley*, in Mem. of the Literary Society of Manchester, vol. iv. (*twelve years after the bite*).—*J. B. Keup*, Etwas ueber den Wasserscheu. Dusseld., 8vo, 1788.—*T. Houlston*, in Edin. Med. Commentaries, vol. viii., p. 304.—*G. Ueberlacher*, De Hydrophobia (*Eyrell*, b. ii.). Vien., 8vo, 1789.—*J. Fehr*, Nachricht von einer tödlichen Krankheit nach dem tollen Hundbiss. Goett., 8vo, 1790.—*Ferriar*, in Med. Facts and Observat., vol. i., art. 1; and Medical Histories, &c., vol. iii., No. 1.—*J. Lemke*, De Anagallidis Viribus contra Hydrophobiam. Rostock, 8vo, 1790.—*K. F. Bader*, Versuch einer neuen Theorie der Wasserscheu, 8vo. Fr. et Leip., 1792.—*A. Johnston*, in Edin. Med. Comment., vol. xxx., p. 264.—*M. Duplant*, Coup-d'œil sur la Rage. Par., 8vo, 1792.—*Hunter*, in Transact. of a Soc. for Advancem. of Med. and Chirurg. Knowledge, vol. i. Lond., 1793.—*T. Arnold*, Case of Hydrophobia successfully treated. Lond., 8vo, 1793.—*J. Mease*, An Essay on the Disease produced by the Bite of a mad Dog. Lond., 8vo, 1793.—*E. Barry*, On the Necessity of reducing the Number of Dogs, and on Hydrophobia. Lond., 8vo, 1795.—*Sabatier*, in Mém. de l'Institut National, t. ii.—*T. G. Crusius*, Von der Tollheit, Wasserscheu oder Hundswuth. Leip., 8vo, 1795.—*C. Pucciardi*, Pensiere e nuovo Metodo per render inefficace i Veleni della Vipera e del Morso del Cane rabbioso. Pisa, 4to, 1795.—*C. A. Struve*, Noth- und Hülfstafel vom Hundebiss, &c. Goertz, 8vo, 1796.—*S. G. Crusius*, Von der Tollheit, Wasserscheu oder Hundswuth, 8vo. Leip., 1795.—*V. J. V. Hildenbrand*, Ein Wink zur Kenntniss und Heilart der Hundswuth. Wicn, 8vo, 1797.—*Haynes*, in Mem. of Med. Soc. of London, vol. v., art. 29.—*P. F. Roser*, Abhandlung ueber das Entstehen, &c., der Hundswuth. Stettin, 8vo, 1797.—*B. Rush*, Observations on Gout and Hydrophobia. Philad., 8vo, 1797, and Medical Inquiries and Observations, vol. v. Philad., 1798.—*R. Hamilton*, Remarks on Hydrophobia, &c. (2 vols.). Lond., 8vo, 1798.—*Baumgarten*, in Edin. Med. Commentaries, vol. xiv., p. 242.—*R. Pearson*, Arguments in Favour of an inflammatory Diathesis in Hydrophobia. Birm., 8vo, 1798.—*Babington*, Med. Records and Researches, vol. i., p. 121.—*J. C. Rougemont*, Abhandlung von der Hundswuth. Frankfurt, 8vo, 1798.—*Gaitskill*, in Mem. of Med. Soc. of Lond., vol. v., art. 1.—*Norris*, in ibid., No. 29.—*T. Percival*, Essays, &c., vol. ii.; and Edin. Med. Commentaries, vol. xvi., p. 362.—*A. Monnet*, Observations sur l'Hydrophobie. Besanc., 8vo, 1799.—*A. Portal*, Observations sur la Nature et le Traitement de la Rage. Ivord., 8vo, 1799.—*G. C. Reich*, De la Sièvre, de la Rage, &c. Metz, 8vo, 1800.—*J. Mease*, Observations on the Arguments of Rush, of the inflammatory Nature of Hydrophobia. Philad., 8vo, 1801.—*J. U. F. Autenrieth*, J. L. F. Metzger, De hactenus prætervisa Nervorum Lustratione in Sectionibus Hydrophoborum. Tub., 8vo, 1802.—*G. Wedekind*, Kurze Nachricht von der Hundswuth. Augsburg, 8vo, 1802.—*E. F. M. Bosquillon*, Mémoire sur les Causes de l'Hydrophobie. Paris, 8vo, 1803.—*Satterly*, Med. Trans. of College of Phys. Lond., vol. iv.—*F. Grundmann*, Abhandlung ueber animalischen Electricität, wodurch die wahre Natur der Hundswuth, &c. Bresl., 8vo, 1803.—*Palletta*, in Nuovo Giornale de Milano, t. ix.—*J. M. Savarin-Marestan*, Sur les Hydropisies articulaires, avec un Mémoire sur la Rage. Paris, 8vo, 1808.—*G. G. Zincke*, Neue Ansichten der Hundswuth. Augsburg, 8vo, 1804.—*S. N. Sauter*, Esperienze intorno alla Cura dell' Idrofobia. Bologna, 8vo, 1806.—*Anon.*, Cases of Hydrophobia selected from the Gentleman's Magazine up to 1807. Lond., 8vo, 1807.—*Malden*, in Mem. of Med. Soc. of London, vol. vi.—*S. A. Bardsley*, Medical Reports of Cases, &c., with an Inquiry into the Origin of canine Madness. Lond., 8vo, 1807.—*G. Lipscombe*, Cautions and Reflections on canine Madness. Lond., 8vo, 1807.—*T. W. G. Benedict*, Ideen zur Begründung einer Heilmethode der Hundswuth. Leips., 8vo, 1808.—*Schroeder*, in Mursina Journ. der Chirurgie, b. i., p. 395. (*Mercurialunction contra the parotids*).—*R. Powell*, A Case of Hydrophobia. Lond., 8vo, 1808.—*F. M. P. Lervat*, Traité analytique de l'Hydrophobie. Bourg, 8vo, 1808.—*B. F. Bourrat*, Recherches et Réflexions sur la Rage. Paris, 12mo, 1809.—*G. Girard*, Essai sur le Tétanos Rabien. Lyon, 8vo, 1809.—*C. F. Hartes*, Ueber die Behandlung des Hundswuth (*by stramonium*). Frankf., 4to, 1809.—*W. Marriot*, A Treatise on the impossibility of Hydrophobia being caused by the Bite of a rabid Animal. Lond., 8vo, 1809.—*Hume*, in Lond. Med. and Phys. Journ., vol. xii., p. 344.—*C. Armstrong*, in



ib., vol. xx., p. 323, 520.—*Physick and others*, in *ibid.*, vol. xx., *pluries*; and *ibid.*, vol. xxi. and xxii., *pluries*.—*R. Mosely*, On Hydrophobia, its Prevention and Cure. Lond., 8vo, 1809.—*G. Lipsecomb*, The History of canine Madness and Hydrophobia. Lond., 8vo, 1809.—*A. Portal*, Mém. sur la Nature et le Traitement de plus. Mal., t. ii., 33.—*M. Ward*, Facts on opiate Friction in spasmodic Diseases; also an Attempt to investigate the Nature of Hydrophobia and Tetanus. Manchester, 8vo, 1809.—*J. Wendt*, Ueber den tollen Hundsbiss. Bresl., 8vo, 1811.—*Willan*, Reports of the Dis. of London, p. 218.—*J. Gillman*, A Dissertation on the Bite of a rabid Animal. Lond., 8vo, 1812.—*T. F. A. Lalouette*, Essai sur la Rage. Paris, 8vo, 1812.—*T. Tatch-er*, Observations on Hydrophobia. Plym., 8vo, 1812.—*O'Donnell*, Cases of Hydrophobia, with Observations, &c. Lond., 8vo, 1813.—*Tymon*, Edin. Med. and Surg. Journ., vol. ix., p. 24.—*Wynne*, *Rice*, Particulars of a successful case of Hydrophobia. Shrewsb., 8vo, 1813.—*C. H. Parry*, Cases of Tetanus and Rabies contagiosa, &c. Lond., 8vo, 1814.—*A. Marshall*, The morbid Anatomy of the Brain in Mania and Hydrophobia. Lond., 8vo, 1815.—*Vogelsang*, in London Medical Repository, vol. iv., p. 500.—*H. A. Goeden*, Von der Bedeutung und der Heilmethode der Wasserscheu. Bresl., 8vo, 1816.—*B. Gnechchi*, Osservazioni sulla Rabbia, e del relativo Metodo di Cura. Milan, 8vo, 1817.—*Biancani*, in Edin. Med. and Surg. Journ., vol. iv., p. 109.—*Clarke*, in *ibid.*, vol. iv., p. 431.—*R. Reid*, On the Nature and Treatment of Tetanus and Hydrophobia. Dub., 8vo, 1817.—*Mozler*, in Edin. Med. and Surg. Journ., vol. iv., p. 504.—*H. Edmonstone*, in *ibid.*, vol. x., p. 495; and vol. xi., p. 141.—*Marcel*, in *ibid.*, vol. vi., p. 500.—*J. Dixon*, in *ibid.*, vol. viii., p. 293.—*F. V. Sotgiu*, Untrügliches Heilmittel wider der Biss toller Hunde. Petersburg, 8vo, 1817.—*Marci*, Dict. des Sc. Méd. (art. *Hydrophobie*), t. xxii. Paris, 1818.—*Brera*, in Mem. Soc. Ital. Scienza Modena, t. xvii.—*G. Pinckert*, Cases of Hydrophobia. Lond., 8vo, 1819.—*Trolliet et Viterme*, in Dict. des Sciences Médicales, vol. xlviii., p. 47.—*T. Smou*, Considérations sur la Nature et le Traitement de la Rage. Paris, 8vo, 1819.—*L. Spalding*, A History of the Introduction of Scutellaria lateriflora as a Remedy of Hydrophobia. New York, 8vo, 1819.—*Preitali*, Osservazioni pratiche sull'Idrofobia, e nuova Cura profilattica della medesima. Milan, 8vo, 1820.—*J. C. Riffe*, Natur und medicinische Geschichte der Hundswuth Krankheit. Leips., 8vo, 1820.—*Baltingal*, in Edin. Med. and Surg. Journ., vol. xi., p. 74; and xvi., p. 209.—*N. F. Day*, in *ibid.*, vol. vi., p. 7.—*Abers*, in *ibid.*, vol. xi., p. 413.—*Berry*, in *ibid.*, vol. ix., p. 26.—*R. Wynne*, in *ibid.*, vol. x., p. 495.—*R. Pearson*, in *ibid.*, vol. xvi., p. 153.—*Reid*, in *ibid.*, vol. xv., p. 292.—*J. Johnson*, in *ibid.*, vol. xv., p. 212.—*F. W. Sieber*, Ueber die Begründung der radical Cur ausgebrochener Wasserscheu. Münch., 8vo, 1820.—*Brandreth*, in Edin. Med. and Surg. Journ., vol. xxiii., p. 76.—*L. F. Troillet*, Nouveau Traité de la Rage. Lyon, 8vo, 1820.—*Gorey*, Recherches sur l'Hydrophobie, 8vo. Paris, 1821.—*H. Julius*, Kurzer Unterricht von der Hundswuth. Hamb., 8vo, 1821.—*F. Magendie*, in Journ. de Physiologie, t. iii., p. 382.—*B. Gaspard*, in *ibid.*, t. iv., p. 132.—*A. F. C. de St. Martin*, Monographie sur la Rage. Paris, 8vo, 1828.—*M. Marrochutti*, in *Magendie's Journ. de Physiologie*, t. v., p. 275.—*J. Booth*, Practical Observations on Hydrophobia. Lond., 8vo, 1824.—*Urban*, Journ. des Progrès des Sciences Méd., t. ii., p. 43; t. iii., p. 261.—*A. Capello*, Memoria sull'Idrofobia. Rom., 8vo, 1824.—*Macrotichis*, Hufeland's Jour., March, 1824; and in Archives génér. de Méd., t. ix., p. 80, 247.—*Chomel*, Dict. de Méd. (art. *Hydrophobie*), t. xi. Par., 1824.—*Haclet*, Trans. of Med. and Chirurg. Soc. of London, vol. xiii., p. 264.—*A. T. Thomson*, in *ibid.*, vol. xiii., p. 298.—*Marcel*, in *ibid.*, vol. i., p. 132.—*G. Gregory*, in *ibid.*, vol. xiii., p. 250.—*J. L. Magistel*, Mém. sur l'Hydrophobie, 2d ed., 8vo. Paris, 1824.—*F. Flevee*, Considérations sur la Rage, &c. Paris, 8vo, 1824.—*Omodei*, Annali universali di Medicina. June, 1825.—*A. J. L. Magistel*, Mémoire sur l'Hydrophobie (2d edit.). Paris, 8vo, 1824.—*P. Mentré*, in Archives génér. de Méd., t. xviii., p. 526.—*R. White*, Doubts of Hydrophobia as a specific Disease. Lond., 8vo, 1826.—*J. Reid*, in Edin. Med. and Surg. Journ., No. 134, p. 109.—*G. Girard*, Réflexions sur le onéxistence du Virus rabique. Lyon, 8vo, 1827.—*J. A. Hoffmann*, Rabiell caninum ad Celsum usque Hist. critica, 8vo. Leips., 1829.—*T. Murray*, Remarks on the Disease called Hydrophobia. Lond., 12mo, 1830.—*C. H. Hertwig*, in Archives génér. de Méd., t. xvii., p. 567.—*W. Youatt*, On canine Madness. Lond., 8vo, 1830; and Lectures on, in Veterinarian Journ., 1838, p. 1.—*Jolly*, Dict. de Méd. Prat. (art. *Hydrophobie*), t. x. Paris, 1832.—*J. L. Bardsley*, Cyc. of Pract. Med. (art. *Hydrophobia*), vol. i. Lond., 1832.—*Xanthos*, in Archives génér. de Méd., t. vi., p. 119.—*Semmla*, in *ibid.*, t. xviii., p. 434.—*Mayer*, in *ibid.*, t. xix., p. 421.—*Villette*, in *ibid.*, t. xx., p. 129, 451.—*Peindlov*, in Revue Médicale, t. i., 1826, p. 223.—*M. M. Laenne*, in *ibid.*, t. i., 1825, p. 257.—*Locher-Barber*, in *ibid.*, t. iv., 1825, p. 118; and Edin. Med. and Surg. Journ., vol. xxiv., p. 432.—*Lambert*, in Journ. des Progrès des Sciences Méd., 2d ser., t. ii., p. 240.—*Trolliet et Martin*, in

Edin. Med. and Surg. Journ., vol. xxvi., p. 139; in *ibid.*, vol. xxxii., p. 378; and Lond. Med. Repository, 1826, vol. ii., p. 448.—*M. V. Lenhosock*, Die Wuthkrankheit, nach bisherigen Beobachtungen und neueren Erfahrungen Pathol. in Therap. dargestellt., 8vo. Leips., 1837.—*J. N. Sauter*, Die Behandlung der Hundswuth in polizeilicher, prophylaktischer u. therap. Hinsicht, 8vo. Const., 1838.—*Long*, in Dublin Journ. of Med. Sciences, &c., Jan., 1837, p. 447.—*Davey*, Lancet, Feb., 1837, p. 739; *ibid.*, March, 1837, p. 627.—*Bennett*, in Library of Medicine, vol. ii., p. 246.—*G. Breschet*, Recherches expérimentales relatives au Mode de Transmission de la Rage, in Comptes rendus de l'Acad. Roy. des Sciences, &c., t. xi., p. 435.—*Rockow*, in Dict. de Méd., 2d edit., art. *Rage*.—*De Haume*, in Lond. Med. Gazette, Dec. 30, 1837, p. 538.—*J. Burne*, in Brit. and For. Review, July, 1838, p. 268; and in London. Med. Gazette, April, 1838, p. 100.—*J. M. Chelius*, System of Surgery, &c. Translated from the German, with additional Notes and Observations, 2 vols. Lond., 1845, vol. i., p. 361, *et seq.*

[AMER. BIBLIOG. AND KEFER.—On Blood-letting in Hydrophobia, Medical Repository, N. S., vol. ii., p. 19-82; vol. iii., p. 375.—*L. Bartlett*, in Med. Repository, vol. iii., p. 383.—On Scull-cap, Medical Repository, vol. xiv., p. 232.—*H. Alden*, in Communications of Med. Society of Connecticut, vol. i., 1810, p. 80.—*James Thacher*, Observations of the Hydrophobia, &c., 8vo, p. 302. Plymouth, Mass., 1812.—*Idem*, in Med. Repos., vol. i., p. 175.—*James Mease*, in *ibid.*, vol. v., p. 992.—*J. R. Coxe*, in *ibid.*, vol. v., p. 257.—*J. G. Knauff*, in *ibid.*, vol. vi., p. 391.—*J. C. Rousseau*, On Hydrophobia, in North Am. Med. and Surg. Journ., vol. viii., p. 73; a very good Essay.—*George Russell*, Case of Hydrophobia from the Bite of a Raccoon. N. England Journal, vol. xii., p. 363.—*W. P. C. Barton*, on the Prophylactic Virtues of Scutellaria lateriflora, or Scull-cap, Phil. Med. and Phys. Jour., vol. i., p. 333. *Dr. R.* very clearly proves its inertness in this disease.—*John Barnes*, Am. Med. Recorder, vol. v., p. 650. Essay on Hydrophobia, in *ibid.*, vol. ix., p. 62; vol. x., p. 177.—*B. Rush*, in Medical Repository, vol. vii., p. 165.—*Robert Barton*, in *ibid.*, vol. viii., p. 15.—*S. P. Hildreth*, in *ibid.*, vol. vii., p. 359; *ibid.*, vol. vi., N. S., p. 95.—*Felix Pascalis*, in *ibid.*, N. S., vol. v., p. 138.—*R. E. Hoffman*, Account of an epidemic canine Rabies, in *ibid.*, vol. v., N. S., p. 138.—*L. Spalding*, On Scutellaria lateriflora, Pamphlet; also in Med. Repos., vol. v., p. 430.—*C. A. Lee*, Cases of Hydrophobia, with Dissections, Am. Journ. Med. Sciences. See works on Practice, under "Scarlatina.")

## RECTUM AND ANUS, DISEASES OF THE.—

### CLASSIF.—GENERAL AND SPECIAL PATHOLOGY.

1. Disease is rarely limited to either the one or the other of those parts, but commonly extends to both when originating in either. Affections of the rectum and anus, whether functional or structural, cannot be satisfactorily understood unless the *structure*, *functions*, and *sympathies* of these parts are duly considered.—(a.) As respects *structure*, the fully developed states of the mucous membrane, of the connecting cellular tissue, and of the muscular coats of the intestinal outlet; the numerous mucous follicles with which this part is provided; the connexions of the veins of the rectum and anus with the mesenteric and portal veins, and of the nerves with the ganglial and spinal; the plicated state of the internal surface, admitting of great distention when accumulations of faeces or of flatus take place in the rectum; the folds of mucous membrane, both transverse (*transverse valves*—*rectal valves* of Houstoun) and longitudinal, existing in the internal surface, and the development of these folds during irritation or contraction of the bowel; the liability to congestion of the congeries of veins of the rectum and anus from irritation of the mucous surface, or from interrupted circulation through the mesenteric and portal veins, or from certain positions; the interposition of, and the support furnished by adipose matter; the various alterations of sensibility, and the numerous sympathies, in which nervous and vascular connexions involve the rectum and anus, constitute an assemblage of circumstances which, individually and collectively, re-

quire due consideration in all our investigations into the nature and treatment of the affections to which these parts are liable.

2. (b) The *functions* of the rectum and anus are not confined merely to the giving exit to the contents of the bowels. The rectum allows, in some degree, the feces to accumulate within it, until opportunity and the consequent irritation and distention admit of their expulsion; and on frequent occasions, when want or neglect of such opportunity, or mechanical obstruction at the verge of the anus, or a weakened or paralyzed state of the muscular coats of the bowel, causes accumulations of feces and of flatus, remarkable distention, not only of the rectum, but also of the colon, is thereby produced, so that the former fills up a very large space in the pelvic cavity. The rectum, moreover, in connexion with the colon, produces more or less of change in the blood circulating to its mucous surface. The numerous follicles with which this surface is studded actively aid in depurating the blood and in removing materials which, if allowed to remain, might act injuriously when carried into the portal and pulmonary circulations, while the secretions which they furnish constitute a portion, and facilitate the evacuation of the intestinal excretions. The rapidity and amount of absorption by the internal surface of the rectum, whether by venous imbibition or by lymphatic absorption, as demonstrated in health and disease, and by the injection of fluids, simple, medicated, or poisoned, are of great importance as respects not merely disease of this bowel, but also the administration of medicinal agents.

3. (c) The *sympathies* of the rectum and anus are of importance not only as respects the diseases of these parts themselves, but also those of the other divisions of the alimentary canal and of the several associated and related parts, more especially the urinary and generative organs. *Continuity* of surface, membrane, and structure; *contiguity* of position, and the mutual support derived therefrom, and from the interposed and surrounding adipose tissue; the *connexions* consisting of vascular communications and of nervous distribution—an abundant distribution of organic or ganglionic nerves in connexion with the ganglia and plexuses supplying the urinary, generative, and intestinal viscera—an evident accession of spinal nerves, both sensory and motory, to these nerves and ganglia, and to the structures of the rectum and anus, this accession becoming more marked and abundant as the anus is approached—and the muscular apparatus with which the outlets of the intestinal, the urinary, and the genital canals are provided, combine to associate various phenomena affecting these parts, and to develop numerous sympathies in disease. A knowledge, or a due recognition of these sympathies, especially in respect of their sources and relations, very materially assists our researches into the nature and treatment, not only of the affections to which the intestinal outlet is liable, but also of those which implicate the rest of the canal, and which are seated in the urinary and sexual organs. This knowledge, moreover, is often one of the chief aids which we possess in the appropriate administration of curative means.

4. (d) The *diseases* of the rectum and anus

will receive but a brief consideration in this place, especially as several of them require surgical treatment, although neither so generally nor so frequently as many surgical writers maintain. The strictly medical discussion of these diseases will chiefly engage my attention, and with a due regard to the importance of the topics which will successively come before me. Much misapprehension has existed, and still more misrepresentation has gone forth, respecting the sources, the nature, the frequency, and the treatment of several of these diseases, both medical and surgical; and while not only in practice, but also in publications, deception, mystification, and injurious means have been resorted to or recommended by a few, the nature and treatment of these maladies have been elucidated by several able, experienced, and honest writers, to whom and to my own observations I shall chiefly refer.

5. I. MALFORMATIONS OF THE RECTUM AND ANUS fall not within the province of the physician beyond a recognition of their nature and consequences, as all attempts to remedy them belong to the province of the surgeon. These malformations are, 1st. Imperforation of the anus. 2d. Imperforation of the rectum. 3d. Unnatural termination of the rectum. 4th. Termination of other organs into the rectum; and, 5th. Absence of the rectum. It is chiefly the first and second of these which admit of surgical aid; and the writers referred to furnish ample directions for the best manner of affording it. I may add, that the anus may be so formed as hardly to amount to a malformation requiring surgical aid, although sometimes occasioning or heightening disorders which are more or less medical. This outlet may be either too *small* or narrow, congenitally, or too *large*. The former may be so considerable as to interfere with the function of defecation, and lead to serious consequences. Hence the occurrence of such a conformation should be kept in mind in cases of fecal retentions during infancy and childhood. A *large* or *wide* anus is not infrequent; and when the sphincter ani is impaired in power, prolapsus of a portion of the rectum is thereby favoured, and a portion of the mucous secretion of the lower part of the bowel, sometimes with a little fluid feces, occasionally escapes.

6. II. FOREIGN BODIES IN THE RECTUM, AND LACERATION OF THE RECTUM AND ANUS, although strictly belonging to the surgeon, should receive due attention from the practical physician.—A. *Foreign bodies* may be lodged in the rectum in three ways: 1st. The body may have been swallowed, and have passed along the alimentary canal without occasioning much or even any disorder until it reached the lower part of the rectum, where it is retained. 2d. Concretions may form in the bowels, or indigestible substances may collect and congregate in them, or gall-stones may pass into them and occasion obstruction in the rectum. Although these are not always foreign to the economy, they are as respects the healthy functions of the bowels, and there act as foreign bodies. 3d. Various substances or bodies may be introduced accidentally or voluntarily into the rectum through the anus, and occasion mechanical irritation, or obstruction, or ulceration, or inflammation, according to the nature, form, or consistence of such bodies.



7. (*a*) *Foreign bodies* are often swallowed by infants, and accidentally by children or older persons, and, after passing through the bowels, causing either little or no disturbance, or more or less suffering, are arrested at the sphincter ani, producing painful tenesmus and straining, and much consequent disease, if the state of the anus and rectum be not carefully examined. Instances are not infrequent of infants and children having swallowed rings, with various kinds of stone, coins, pebbles, the large stones of fruit, pieces of glass, &c., and experienced little or no disorder until they reached the sphincter, by which they were arrested. An attentive examination of the anus, as soon as straining at stool is complained of, and a careful introduction and turn of the finger in such cases, will readily turn out the obstructing body.

8. (*b*) *Concretions* formed in the bowels are occasionally passed along the canal until they reach the anus; and, when much fecal matter and flatus are collected in the colon and rectum, behind the concretion plugging up the inferior portion of the rectum and anus, the nature of the disorder is often misunderstood, and a mischievous perseverance in the exhibition of purgatives by the mouth often increases, instead of removing the evil. Nor is the cause of disorder always ascertained by prescribing enemata; for these may pass the cause of obstruction—the pipe of the instrument may either pass by the side of the concretion, or may even perforate the substance of the concretion so formed, and be retained, or pass off by the channel formed by the pipe, without any effect. But the patient may not escape so fortunately; for the enema may be administered by an ignorant or a careless nurse, who, in attempting to introduce the pipe of the instrument, and to overcome the obstacle which the concretion furnishes, may actually push the pipe into, or even through, the parietes of the bowel, and convert an easily remedied disorder into a dangerous or even fatal disease. Concretions of various kinds have formed in the bowels and been thus arrested at the sphincter ani, occasioning remarkable disturbance, sometimes without the exact seat and nature of the obstruction having been for some time ascertained. Hardened feces may collect to such an amount as to fill up the greater part of the pelvis, the muscular coats of the rectum being paralyzed by the inordinate distention. But, when the parts are irritable, small concretions, or hardened feces of comparatively small bulk, will produce great disorder from the irritation, and the consequent straining they occasion, and from the accumulations of feces and flatus, and of retained secretions and excretions above them. In the course of practice, I have been called to cases where the concretions obstructing the rectum and anus consisted in one case of brown paper which had been habitually chewed and swallowed; in another of wax, which had likewise been chewed and swallowed; in a third case of sealing wax of various colours, which had been likewise swallowed; and in a fourth of chewed cedar of which drawing pencils are made. The first and last of these cases occurred in girls at school, the substances having been reduced to a pulp, and having passed into the bowels, were cemented by mucus into balls so hard as not to

be capable of changing their form so as to pass the sphincter without producing great disorder. The second and third of these cases occurred in married women, under thirty years of age, without children; the wax being agglutinated into large hard balls. These concretions were numerous in all the cases, had evidently existed long in the cells of the colon, until the irritation they produced and the treatment adopted had dislodged them and carried them to the rectum, when they were arrested by the sphincter. Besides these, magnesia, the carbonate of iron, and other substances, may form concretions productive of the disorder, to which attention is now directed.

9. (*c*) The *treatment* of indurated substances, whether altogether foreign or partly or wholly formed in the bowels, is generally simple, and, if judiciously managed, may be brought to a successful issue without much or even any surgical aid. Warm olive oil should be carefully injected; and the concretions, if still retained, should be turned out by the slow introduction of the finger, and the gradual resistance thereby furnished to the irritable contractions of the sphincter will facilitate their expulsion. When the concretions are less indurated, or consist of hardened feces, they may be broken down by the handle of a spoon, or by a marrow-spoon, and then oleaginous enemata will remove the parts which still remain. As respects the effects produced by *foreign bodies* introduced through the anus, and the removal of these bodies, I must refer the reader to the surgical works enumerated or referred to in the BIBLIOGRAPHY.

10. (*d*) *Lacerations of the rectum and anus* are not infrequent occurrences. They vary much in their extent, in their seat, and as respects the direction in which they occur. They may be complete or incomplete as regards the coats of the intestine; and they may be limited to either the rectum or anus, or extended to both. The rectum or anus, or both, may be torn partially by the passage of large concretions, or hardened fecal matters, passed hastily, or after violent straining. Such occurrences are rare; and the laceration is generally *partial* or *incomplete*, or involving merely the inner coats. *Complete laceration* takes place almost always from external injury or accident, and from parturition. *This form* of laceration may be limited to the anus, or not extend above the sphincter, and it commonly is caused by parturition. An instance, however, came under my notice of its occurrence from sitting upon a chamber pot which had been previously cracked. A *second form* is that consisting of rupture of all the coats within the sphincter, the anus, especially at its origin, not being injured. This form may be caused by foreign bodies in the rectum, by an unnatural position of the child during parturition, or by the unskilful use of instruments for this process. A *third form* of laceration consists of a division of the rectum and anus, and is caused by parturition. In this variety the recto-vaginal partition, the perineum, anus, and sphincter are all torn, the rectum and vagina forming one cavity.

11. (*c*) The *treatment* of partial and complete laceration of the rectum and anus is chiefly surgical. When the laceration is only partial, medical treatment will generally be sufficient.

A prudent recourse to olive or castor oil, to oleaginous and demulcent enemata, occasionally to suitable ointments, to the supine posture, and to a spare farinaceous diet, will commonly remove this lesion in the course of a few days. Inattention or maltreatment, a too full diet, or a too heating regimen, may cause partial laceration to be followed by inflammation, or by ulceration, or by abscess, or by fistula, lesions which will be considered in the sequel.

III. INACTION OF THE RECTUM AND ANUS.—SYN-  
ON.—*Local Paralysis of the Rectum and Anus ; relaxation or atony of these parts.*

CLASSIF.—I. CLASS, I. ORDER (*Author in Preface*).

12. DEFIN.—*Retention and accumulation of faecal matters in the rectum, with constipation and a sense of fulness and weight in the pelvis, and with an inability to expel the contents of the bowels.*

13. This complaint, which is not infrequent in aged persons, especially in old females of sedentary habits, in aged debauchees, and in other persons who have exhausted the energies of the ganglial and spinal nervous systems, has hitherto been confounded with the more common states of constipation. It is, moreover, the usual form of constipation in connexion with palsy, especially with paraplegia and general palsy; costiveness or obstinate constipation thus proceeding not only from various kinds of obstruction in the vicinity of the anus or in the rectum, but also, in a different class of cases, from defective contractility of the muscular coats of the rectum, owing to impaired or lost power of the ganglial and spinal nerves actuating these coats.

14. i. CAUSES.—(a) The circumstances chiefly *predisposing* to this complaint are the usual causes of debility or exhaustion, more especially very advanced age; sexual excesses, masturbation, or excessive voluntary or involuntary pollutions; want of exercise in the open air, sedentary occupations and habits; the rheumatic and gouty diathesis, especially when accompanied by pains in the loins from congestion of the spinal sinuses or veins, and low or nervous fevers, or convalescence from them.

15. (b) The most common *exciting causes* are neglect of the early intimations to evacuate the bowels, the rectum thus becoming over-distended by faeces and flatus, and the muscular coats thereby losing their powers of contraction; paraplegia or paralytic affection of any kind; hysterical disorders; inordinate sexual indulgences; diseases of the kidneys; congestion of the spinal veins or sinuses, however produced; exposure to cold or to currents of air, especially when directed on the loins or sacrum, and an excessive use of calomel or aloetic purges. But whatever impairs the vital energy of the ganglia and ganglial plexuses of the pelvic viscera, or whatever suppresses, removes, or diminishes the influence of the spinal nerves, with which the pelvic ganglia are re-enforced, as congestion, inflammation, injury, or structural lesions of the spinal cord, will generally be followed by inaction or paralysis of the coats of the rectum, and generally also with relaxation of the sphincter ani.

16. ii. SYMPTOMS.—Besides the usual symptoms of constipation, the patient feels a weight and distention, sometimes with pain or aching in the pelvis toward the sacrum. The desire

to evacuate the bowels is often slight or absent; or if it be experienced, there is an inability to accomplish the intention. In many cases the retained faeces, which are the lowest in the rectum, become remarkably indurated, and furnish an obstacle to the evacuation of the portions above. In some of these cases the sphincter ani is so relaxed or paralyzed as to admit of the hardened faeces being seen through the open anus. Not infrequently these cases proceed from neglect of local examination, and from purgatives given by the mouth being confided in alone, until a fatal issue ensues; and, if the administration of enemata be intrusted to an ignorant nurse, the nature of the disorder is equally unknown; and these medicines are reported to have been either inefficacious or immediately returned.

17. If the complaint continues, without removal of the faecal accumulations, ulceration or sphacelation of some portion of the parietes of the rectum, with absorption of excrementitious materials into the circulation, is a common result, occasioning low irritative fever, pains about the sacrum, vomitings, suppression or incontinence of urine, restlessness, followed by coma and nervous symptoms, varying with the circumstances and complications of individual cases. In some instances, violent pains, occurring in paroxysms, are complained of toward the close, or at an advanced stage of the disease, and dart down into the pelvis and to the anus; but contingent phenomena vary remarkably with the age of the patient and the morbid associations or peculiarities of the case.

18. iii. COMPLICATIONS.—This affection occurs much more frequently in connexion with some other malady than as a simple or primary disorder. In the latter form, it is occasionally met with in aged persons or exhausted constitutions, more especially in sedentary females; and it may continue until the unfavourable issue mentioned above (§ 17) supervenes. It is a common attendant upon paraplegia, partial or complete, or from whatever cause, and upon general paralysis, and the palsy of the insane; and, in these maladies, it is often associated with relaxation of the sphincter ani, faecal accumulations being thereby prevented, the evacuations passing off involuntarily, or as position and gravitation may favour their exit. It is also not infrequently complicated with diseases of the uterus and ovaria, with displacements or enlargements of the uterus, or with diseases of the kidneys or urinary bladder, or with enlargement or other lesions of the prostate gland. It is often associated with impaired function of the rest of the digestive canal, or with torpor, obstruction, or organic lesions of the liver.

19. iv. TREATMENT.—In the more simple states of this disorder purgation requires to be aided by stimulating enemata. Often a combination of disulphate of quina with the purified extract of aloes, or this latter with the compound galbanum pill, or these three medicines conjoined, will sufficiently excite the action of the rectum. If these fail, the more violent cathartics, as croton oil, the extract of elaterium, &c., will occasion more disorder than benefit; for, if this latter be derived, it is only temporary, inaction of the bowel being increased by them. Suitable enemata are generally required,



and the addition of the spirit of turpentine to the injection is usually beneficial. It is not uncommon to find the rectum enormously distended with hardened fæces, when proceeding to administer an enema; but the state of the rectum and anus ought to be previously ascertained, and the accumulation should be removed, at least in part, by direct and mechanical means, before an injection is administered. The kind of enema adopted ought to depend upon the circumstances and complications of the case, and the effect produced; but a daily recourse to it is generally requisite.\*

20. In complicated cases, the treatment should also be directed to the associated malady; but in these, generally, the means now recommended will prove more or less serviceable, although others may be required in addition. In all cases the state of the urinary functions requires attention, and undue accumulations of urine in the bladder must be prevented. The condition of the sphincter ani, and of the sacrum, or other parts unduly pressed upon, should be ascertained; for, when the sphincter is relaxed, much inconvenience and increase of disorder, with bed-sores, &c., will follow, and will with difficulty be prevented, although the greatest care be exercised, especially in aged, paralytic, and debilitated persons. In these persons especially, not only are the muscular coats of the bowel paralyzed, but the secretions from the villous surface and mucous follicles are remarkably diminished, thereby favouring induration of the contents, and delaying or preventing their passage from the bowel. In these cases the injections, whether saponaceous, saline, oleaginous, or terebinthinate, may be advantageously thrown up as high into the colon as possible by means of the flexible tube, as recommended by Dr. O'BEIRNE, for in such instances fecal accumulations may exist far above the rectum. The combination of disulphate of quina, aloes, and compound galbanum pill, recommended above (§ 19), or the two former with inspissated ox-gall, as advised by me in 1832, will generally restore the action of the bowels, unless in extreme or seriously complicated cases.

#### IV. INFLAMMATIONS OF THE RECTUM AND ANUS.

—SYNON. *Proctitis* (from *πρωκτος*, anus); *die Afterentzündung*, Germ.

CLASSIF.—III. CLASS, I. ORDER (*Author in Preface*).

21. DEFIN.—*Pain and heat in the anus, extending up the sacrum and pelvis, with continued tenesmus or straining.*

22. Inflammations of the rectum and anus have been most unaccountably neglected by medical and surgical writers, and too generally overlooked in practice, more especially by those empirical physicians who plume themselves upon being "bold" or "active" practitioners, and who are so on inappropriate occasions, "ad captandum vulgus," rather than from a conviction of the benefit derived by those who are subjected to the infliction. *Proctitis*, in some form or other, I have frequently found produced,

either as a sequence or as a complication of some other disorder, by "heroic" practitioners, who claim for themselves a special consideration and notoriety, actually produced by the excessive doses, or frequent repetition, or prolonged use of those substances which irritate the lower bowels. How remarkably indebted must the surgeons of the present day, and, indeed, of the last half century, have been to physicians and others, for their frequent recourse to large doses of calomel and other medicines which have either excited or perpetuated, or in both modes developed, not merely inflammation of the rectum and anus, but also the various organic lesions about to be noticed as consequences of inflammation of these parts.

23. *Inflammations of the rectum and anus* are not of one only type or kind as respects the nature of the morbid action, and the consequences which follow. As I have shown, when treating of INFLAMMATION and of DYSENTERY, proctitis may be *sthenic*, or *asthenic*, or *acute*, *sub-acute*, or *chronic*. The inflammation may commence in the rectum, and extend even to the verge of, and around the anus; or it may begin in this latter situation and mount upward, not merely to the rectum, but also to the colon, and even to the cæcum and small intestines. In all cases, and these by far the most numerous, the disease extends to the colon and cæcum, and often still farther, constituting, according to the character of the constitutional and local symptoms, the forms of DYSENTERY which I have so fully considered, as not even now to admit of any addition, alteration, or correction. When inflammation is confined chiefly to the rectum and anus, although closely allied to dysentery, it is nevertheless more or less distinct from that malady, more especially when it is sub-acute or chronic, and is produced, as I have seen it in numerous cases, by the treatment which has been either adopted on erroneous principles or carried too far. When thus produced by medicinal agents, proctitis may commence in the rectum, or in the lower part of the colon and rectum, or extend from one to either. When it is caused by agents acting externally or locally upon the anus, it may be then limited to this part, if the agents are not contaminating; but if they are infecting or contaminating, the rectum is soon invaded, and the inflammation, always then of an asthenic and spreading character, extends much higher, and to an indefinite extent.

24. i. SYMPTOMS OF PROCTITIS.—The phenomena of this disease vary with the cause, with the constitutional powers of the patient, and with the severity of the morbid action.—A. *Acute sthenic Proctitis* is attended by heat and pain at the anus, shooting or extending to the lowest part of the back or under the sacrum, and by a continual desire to go to stool, with straining, and with the passage merely of mucus, sometimes streaked with a little blood. In some instances an exudation of lymph, similar to that in crop, takes place, and is thrown off in a more or less consistent or membrane-like form. If feculent matter be passed at any time, it is usually with much increase of pain, and after having been retained for a longer or shorter time by the irritable and constricted sphincter; and the passage of pellets of fæces, with the straining or tenesmus, often occasions

\* The temperature of the enema is important, for if often had recourse to, and the fluid employed be warm, the effect will be relaxing, and thus increase the difficulty under which the patient labours. We have in such cases always used cold enemata, and with decided advantage, the astringent influence of the cold tending to give tone and energy to the relaxed tissues.]

a slight prolapse of the inner coats of the bowel, which appears swollen, red, hot, and injected, partially covered with mucus, or with exudations of lymph, and with the mucous follicles enlarged. When the prolapsus is more considerable, and is accompanied with spasmodic constriction of the sphincter, the pain and restlessness are much increased, and shoots upward along the sacrum in severe paroxysms, a distressing aching being constant in this latter situation.

25. The *symptomatic disturbance* varies with the constriction and severity of attack. There may be neither rigours nor chills at the commencement, unless the disease follow the local action of cold, or the cause be of a severe character. But more or less febrile action, with a white or loaded tongue, heat of skin, impaired secretion and excretion; scanty urine of a high colour, voided frequently and with difficulty, owing to the extension of irritation to the prostate gland and neck of the bladder; an accelerated, full, or strong pulse; loss of appetite, but rarely vomiting, unless the disease has been neglected, or fecal matters have been long retained and largely accumulated, and constipation of the bowels.

26. The *terminations* of this form of proctitis are, 1st. Resolution; 2d. In hæmorrhagic exudations, which may resolve the inflammation; or, if the disease be associated with a varicose state of the hæmorrhoidal veins or hæmorrhoids, as often is the case, in a hæmorrhoidal discharge; 3d. In ulceration of the inner coats of the bowel, the ulceration commencing either in the mucous follicles, the ulcers being either few in number or several, or in the abrasion of the villous coat, the ulcer being single, or very few; 4th. Rarely in sphacelation, unless that portion of the inner coats of the bowel which has protruded and been strangulated by the sphincter; 5th. In abscess in the vicinity of the anus, or external to some portion of the parietes of the bowel, or in the connecting cellular tissue between the rectum and neck of the urinary bladder, or between the rectum and vagina, the abscess ultimately terminating in fistula, or in one or more small abscesses in the connecting cellular tissue of the rectum or anus; 6th. In inflammation of the hæmorrhoidal veins, especially when the disease is complicated with hæmorrhoids; and, 7th. In chronic inflammation of the rectum and anus, and the several structural changes consequent upon it (§ 43, *et seq.*).

27. *B. Sub-acute and chronic Proctitis* may be either primary or consequent upon the acute form now described, the symptoms of the latter gradually subsiding to the sub-acute and chronic states successively. If the chronic form become prolonged, various changes of structure and complications may follow, attended by distressing symptoms; and, if the complaint receive not due attention, the life of the patient may be endangered.—(a) *Sub-acute sthenic proctitis* is characterized by similar symptoms to those above enumerated, the chief difference consisting in their milder form, and, if not appropriately treated, in their longer duration. This form is not infrequent in females; and in them the occurrence of the catamenia is often followed by resolution of the inflammatory action. With the exception of sphacelation, the

same *terminations* as I have stated to follow acute sthenic proctitis may also follow the sub-acute form, but generally as consequences of neglect or improper treatment, which often occasion this form to pass into the following and its consecutive organic lesions.

28. (*b*) *Chronic Proctitis*, although often consequent upon the acute or sub-acute states, may also occur primarily, especially in persons who are subject to hæmorrhoidal affections, or who have habitual recourse to calomel or aloetic and resinous purgatives, or who are exposed to the influence of certain noxious agents. This form of the disease may be seated chiefly in the mucous follicles, or in the innuous surface itself, or it may extend, especially when it is of considerable duration, to the connecting cellular tissue, occasioning more or less tumefaction or thickening of the parietes of the bowel. Chronic proctitis is more frequently a complicated than a simple affection; and, when associated with other disorders, as with hæmorrhoids, [the nursing sore-mouth], with leucorrhœa in the female, with spasmodic stricture, or with fissures of the anus, it may be either the primary or secondary affection. It is generally attended by more or less tenesmus or pain and straining at stool; by a sense of aching or pain under the sacrum; by slight prolapsus of the inner coats after alvine evacuations; sometimes by dysuria and frequent micturition, and often by the exudation of mucus from the anus—*Proctorrhœa* of some authors; *Medorrhœa ani* of J. P. FRANK—especially when the irritation is kept up by the presence of ascarides in the rectum, or when the mucous follicles are affected, or when the disorder is associated with leucorrhœa.

29. The *Terminations* of chronic proctitis are, 1st. Resolution; 2d. Ulceration, generally commencing in the mucous follicles; 3d. Fistulous ulceration, with or without abscess or purulent collection in the vicinity of the anus; 4th. Fissures of the anus, generally in connexion with hæmorrhoidal tumours, or spasmodic stricture of the rectum, or with both; 5th. Tumefaction, thickening, and ultimately induration and constriction of the coats of the rectum; and, 6th. Ulceration, associated with thickening, or with induration and constriction, or with all these changes.

30. *D. Asthenic Acute Proctitis* may commence with or without rigours; and, although it occurs chiefly in delicate, exhausted, and cachectic persons, it may affect any temperament or constitution when the contaminating or infecting exhalations which usually produce it are directed against the exposed anus; as when persons frequent privies which contain accumulated feces, and emit an abundant infecting vapour.—a. This form of proctitis is attended by many symptoms of the sthenic acute form; but the symptoms are more severe, the suffering more acute, the spasm of the sphincter is more severe, or occurs in more distinct paroxysms, and the mucous discharge following the straining is more copious, watery, ichorous, or bloody, and more offensive than in the sthenic form. The disease, moreover, is rarely limited to the rectum, unless the treatment be prompt, energetic, and judicious, but extends along the colon, and assumes all the characters of asthenic dysentery, with the constitutional symp-



toms and terminations described when treating of this form of that malady (*see art. DYSENTERY*, § 20, *et seq.*). Asthenic proctitis is generally attended by much fever; a quick, soft, or weak pulse, by much heat of skin; a foul or loaded tongue; by tenesmus, dysuria, or frequent micturition; by retention of faecal matters, and many of the phenomena of adynamic fever. Prolapsus of the inner coats of the bowel is frequent; and, if this be attended by violent or continued spasm of the sphincter ani, sphacelation, foul ulceration, exudations of an offensive sanies, implicating more especially the prolapsed parts, are common results.

31. *b.* The *terminations* of this form of proctitis depend upon the period at which treatment has been adopted, and the nature of the means employed. Besides the terminations already mentioned (§ 26), the passage of the disease into dysentery, especially the asthenic form, contamination of the circulating fluids, vital exhaustion, extensive ulcerations, sphacelation, and the other consequences of dysentery, may supervene.

32. *c.* The *complications* of asthenic proctitis are often serious, and demand careful examination and treatment. The neck, and even the parietes of the urinary bladder, with the prostate and urethra, are not infrequently implicated in the male, causing frequent and painful micturition, or even retention of urine; and the vagina, os and cervix uteri, are even still more frequently affected in the female, occasioning severe paroxysmal pains, referred to the vagina and uterus, and sometimes also much disordering the urinary functions.

33. *E.* *Syphilitic and gonorrhœal proctitis* are occasionally observed, especially in females of a certain class; but these specific forms of disease require no farther notice at this place, than that the practitioner should not mistake their nature. They are more frequent in females than males, chiefly owing to the readiness with which the infecting virus may be communicated, by proximity of parts and by position, from the vagina to the anus. Syphilitic proctitis often speedily passes into ulceration, &c., within and around the verge of the anus, while the gonorrhœal form of the disease is attended with much excoriation, swelling, and discharge at the orifice of the anus, and at the internal surface of the nates adjoining the anus.

34. *F.* *Inflammation*, often with extensive *excoriations of the anus*, is not infrequent in *infants and young children*. In some cases the inflammation seems to originate externally to the anus, or at its external margin; and is either symptomatic of disorder of the digestive canal, caused by the state of the mother's or nurse's milk, or by improper food, or by disordered secretions and excretions; or it is more directly produced by want of cleanliness, and the accumulation of irritating sordes in this situation. In plethoric, gross, or unhealthy children, the inflammation almost threatens the adhesion of the opposite surfaces of the nates. In those cases the disorder is attended by much fever—by a hot, dry skin, and a full, excited pulse. In other instances, the inflammation extends to the anus from the rectum, and then the child has remarkable straining, with very scanty mucous evacuations tinged with blood, and often

also dysuria. This state of the affection is not infrequent during weaning or dentition, and is often symptomatic of disorder of the digestive canal at these periods, or is caused by the nature or the excess of the ingesta. In some cases the disease assumes a sub-acute asthenic form resembling aphthæ, upon which it not infrequently supervenes, or with which it is complicated; more or less disorder or marked lesion, apparently extending along the whole digestive canal, but becoming more developed and apparent at both the entrance and outlet—in the mouth and lips, and in the anus, where the vital action of the parts is modified by the copious accession of sensory and motory spinal nerves (*see art. THRUSH*).

35. *ii.* *CAUSES.*—(*a*) The *predisposing causes* of proctitis are the irritable and sanguine temperaments; an irritable or susceptible state of the intestinal canal; the existence of worms in the intestines; a full habit of body in connexion with hæmorrhoidal affections; venereal excesses and voluntary or involuntary pollutions; diseases of the prostate gland or neck of the bladder; and morbid or long-retained alvine secretions and excretions.—(*b*) The *exciting causes* are chiefly those which act through the medium of the intestinal canal, and those which act externally or locally. Of the former, the ingesta, medicinal and dietetic, are the most frequent and important. Calomel and other preparations of mercury in large or too frequent doses, or in prolonged courses; arsenic similarly prescribed; aloetic and resinous purgatives habitually or frequently taken; hypercatharsis, however produced; the prolonged or excessive use of emmenagogues; substances swallowed with the food, accidentally or otherwise, which irritate or penetrate the coats of the rectum, as fish-bones, or the spiculae of other bones; the husks, seeds, or stones of fruit; and the very hot and least soluble spices, when taken in excess. Other substances accidentally swallowed, which irritate mechanically the rectum or anus; morbid or retained secretions and excretions, accumulated faeces, concretions formed in the bowels, hæmorrhoidal affections, and the irritation of worms, are also occasionally exciting causes of this complaint.

36. The external agents are chiefly injuries, accidents, wounds, or operations, implicating the rectum or anus; the contingencies of parturition and the puerperal state; the administration of acrid or stimulating enemata, injections or suppositories; injury sustained by the bowel during the administration of enemata; abstracted animal heat by sitting on cold seats, on stones, or on the ground; currents of cold air; the application of gonorrhœal or syphilitic poisons, or other infecting agents; and frequenting foul privies where the faecal accumulations are great, and where the foul exhalations rise against and infect the anus during defæcation. Of the influence of this last cause of proctitis I have observed several proofs in the course of practice. The inflammation which has resulted has generally assumed the form of asthenic dysentery (*see DYSENTERY*, § 20, *et seq.*); and when females have been exposed to this cause, not only has asthenic proctitis passing into dysentery been the occasional result, but also asthenic vaginitis, sometimes with asthenic hysteritis, attended by acute pain

and by a copious or an offensive vaginal discharge, this complication appearing most frequently and remarkably in married females.

37. iii. TREATMENT should differ most remarkably with the activity and character of the inflammatory action, and the nature of the predisposing and exciting causes.—*A.* In *sthenic acute proctitis*, local depletions, especially cupping over the sacrum, leeches to the perineum and around the anus; cooling and demulcent aperients; the warm bath, semicupium or hip bath, followed by cooling diaphoretics, and fomentations, with an antiphlogistic regimen, are the most efficacious, and generally remove the disorder in a few days. If much pain and tenesmus continue after depletion, the compound ipecacuanha powder, or simple ipecacuanha, with henbane, extract of hop or of poppy, ought to be given in the form of pill, the ipecacuanha in as large and frequent doses as the stomach will tolerate; and, having allayed the irritability, the bowels should be evacuated by fresh castor or olive oil, or by sulphur and magnesia, aided by confection of senna, or by a glass of lemonade taken soon after the magnesia, or by a demulcent, laxative, or oleaginous enema.

38. *B.* The *sub-acute* and *chronic* states of the complaint generally yield to the same means as just advised, local depletions to a less amount being usually sufficient; but these should vary with the habit of body and circumstances of the patient. Ipecacuanha, cooling diaphoretics, warm baths, and emollient laxatives, with demulcent and anodyne enemata, are generally beneficial. If external irritation, heat, or excoriations are experienced at the anus, a cooling and anodyne lotion, as a solution of the diacetate of lead, with vinum opii and acetic acid, will give much relief, and may be kept applied for a considerable time by means of pledgets of lint. The secretions and alvine excretions, especially the biliary, should be promoted by means of hydrargyrum cum creta, or PLUMMER'S pill, conjoined with ipecacuanha and soap, interposing a dose of castor or olive oil, or a demulcent and oleaginous enema.

39. *C.* *Asthenic proctitis* rarely admits even of local depletions, unless in plethoric persons. As the chief danger in this form of the complaint proceeds from the rapid extension of the disease along the rectum to the colon, the principal indication is to prevent or limit the extension by such means as experience has shown to be most efficient in this mode of operation. I have found the warm bath or hip bath followed by a warm terebinthinate embrocation applied over the sacrum or the hypogastrium, and the following pills, among the most efficacious means. As soon as the more painful symptoms, especially the spasm of the sphincter ani, were relieved, or even without waiting for such relief, the subjoined draught was also administered.

No. 328. R Pulv. Ipecacuanhæ; Quinæ Disulph. Camphoræ, ʒā, gr. j. Extr. Humuli, vel Extr. Gentianæ, gr. iij.; Confect. Aromat. gr. ij.; Mucilag. Acaciæ, q.s. ℥. Fiat Pilulæ, ij., quarta vel quinta quaque horâ sumendæ.

No. 329. R Olei Terebinth., Olei Ricini, ʒā, ʒss.; Aquæ Menthe Virid., ʒvjss.; Tinct. Capsici. m. iij. ℥. Fiat Haustus.

40. Demulcent and anodyne enemata are always beneficial if early employed, or before ulceration or sphacelation of the internal coats of the bowel has commenced; but the utmost

care ought to be taken in administering an enema, lest the pipe of the instrument injure the swollen, softened, and tender parts along which it is passed. In every other respect the treatment should be identical with that advised for *asthenic dysentery*, especially if the morbid action has advanced to the colon and cæcum, or has continued any time. (See art. DYSENTERY, § 88, et seq.)

41. *D.* *Inflammations and excoriations of the anus and rectum in infants and young children* (§ 34) should be treated with a strict reference to this cause. The diet of the infant, and even of the nurse, should be changed or corrected; the secretions and excretions improved and promoted; and, after the warm bath, emollients, &c., the zinc ointment, or lead ointment, or cooling lotions, or other means which the peculiarities of the case require, should be applied. In most of these cases, more or less constitutional disorder is associated with disease of the alimentary canal; and this latter is seldom confined to the rectum and anus, the colon or the digestive organs generally participating more especially in the existing derangement. In these circumstances, the hydrargyrum cum creta, conjoined with ipecacuanha, with small doses of rhubarb, and with absorbent powders or other antacids, will frequently prove most beneficial; and sometimes equal parts of precipitated sulphur and carbonate of magnesia, to which powdered liquorice root and cinnamon are added, in quantity sufficient to render the whole more pleasant, may be taken in milk or in water.

42. *E.* *The specific—gonorrhæal and venereal—forms of inflammation of the anus and rectum* should be treated conformably with the principles which guide the treatment of these maladies in other situations and circumstances. The local affection will, however, require much of the soothing means already advised for other inflammations of these parts; the gonorrhæal especially, local depletions, saturnine or cooling and anodyne lotions, &c.; and, internally, the balsams, especially copaiba, powdered cubebs, or a decoction of the *Achillea millefolium*. Clysters are of doubtful advantage in the specific states of the disease, as they may favour the extension of the specific infection from the anus to the rectum and lower parts of the colon.

43. iv. *ITCHING OF THE ANUS.*—*A.* This is generally a symptom only of diseases of the digestive canal, or of the rectum and parts in the vicinity. It is often, however, so distressing as to form the most prominent disorder, and is then a most obstinate one to remove. It is most commonly caused, at all ages, by ascariides in the rectum, by other intestinal worms, and by chronic eruptions around the anus. It sometimes follows recovery from dysentery. It frequently precedes and accompanies hæmorrhoidal affections; and it often attends and follows the cessation of the menstrual discharge. It is often attended by more or less of mucous discharge from the rectum, or "*medorrhæa ani*." Pathologically, it may be viewed as an indication of either irritation of the intestinal canal, especially of the rectum, or congestion of blood in the rectum or anus, or cutaneous eruptions near the verge of the anus. It is often produced by the accumulation of fæces in the rectum and colon; by the abuse of calomel, or of



aloes, or of other purgatives which act chiefly on the rectum; by various exciting emmenagogues; by irritation or enlargement of the prostate gland, and by self-pollution.

44. *B.* The treatment should be directed to the pathological and exciting causes, and to the complications of the case. Local bleedings are sometimes required, and these are often advantageously followed by cooling lotions, as the acetate of lead, with acetic acid, and the tincture or wine of opium. The yellow wash, or weak solutions of the nitrate of silver, and the other means advised for the chronic cutaneous eruptions affecting this part, should be employed when any one of these is the cause of the itching. In the more obstinate cases, clysters containing turpentine will be found most efficacious; and lotions, or a wash, with a saturated solution of the biborate of soda, will also prove most beneficial and appropriate to all the circumstances in which the symptom appears.

45. *V. MUCOUS DISCHARGE* from the rectum—*Medorrhœa ani*, J. P. FRANK—is often caused by the same pathological states as produce itching of the anus (§ 43). *A.* It may proceed also from a chronic state of inflammation of the lower portion of the rectum, and precede, accompany, or follow hæmorrhoidal attacks, the hæmorrhoidal flux being very frequently followed by this discharge. When caused by inflammatory irritation or congestion, it may prove a substitute for the sanguineous evacuations attending hæmorrhoids. It is distinguished from gonorrhœa affecting the anus, or “venereal blennorrhœa,” by its tenacious state and transparent appearance, which it commonly retains.

46. *B.* The treatment of this discharge depends upon the cause. It is often produced by the abuse of calomel and aloes, and by resinous purgatives and emmenagogues, and is readily cured by relinquishing the use of these. It is a frequent consequence of the congestion or local determination of blood produced by masturbation; and hence it should excite suspicion of this vice, the existence of which will render treatment inefficacious, but the relinquishment of which will alone remove the disorder. When it follows proctitis or dysenteric attacks, or attends hæmorrhoidal tumours, or follows sanguineous evacuations from these tumours, the treatment advised for HÆMORRHOIDS will then be required; and when it is caused by intestinal worms, the treatment prescribed for these parasites is then necessary. In many cases, the means recommended for itching of the anus, or for chronic proctitis, will remove this affection.

#### 47. VI. ABSCESS OF THE RECTUM AND ANUS.—

*A.* Abscesses may form in connexion with the rectum or anus, or with both, either consecutively of some form of inflammation of these parts, or from the extension of disease from adjoining parts, or, secondarily, from phlebitis or from purulent absorption.—(*a*) When either of the forms of inflammation terminate in abscess, the surrounding and connecting cellular tissue is the seat of the purulent formation. If the abscess form near the anus, it is formed in and confined by the surrounding adipose substance. The abscess may be *between* or *external* to the coats of the rectum: if the former, it is generally very small, or several may exist; if the latter, it is much larger, and is generally

single. In cachectic habits it may be very large, and spread to a dangerous extent.

48. Small abscesses, which form in the parietes of the rectum, or superficially near the anus, are generally consequent upon inflammatory irritation in the mucous membrane or its follicles; and in the more healthy subjects, and when the treatment is judicious, they generally terminate without producing any of the consequences to which the larger purulent formations often lead. When the mucous follicles of the rectum or anus are irritated, either by the nature of the excretions which pass over them, or by medicinal excitants, or by the morbid matters existing in the blood that they are partly concerned in eliminating, the irritation may, especially when occasioned by this last cause, rapidly pass into ulceration, which, if it extend to the connecting cellular tissue, may be followed either by purulent collections or by fistula, or, more commonly, by both these in succession.

49. (*b*) Abscesses seldom form externally to the coats of the rectum or to the sphincter ani, independently of inflammatory irritation of the rectum or anus, or of the urinary and sexual passages. A small abscess or boil may, however, appear, independently of irritation of these parts, external to the sphincter, or near the anus, owing to want of cleanliness or to some other cause, and may, if opened early, and otherwise properly treated, in no way implicate the adjoining canals or their outlets; but, if neglected, or if suppressed externally, it may extend upward or along the rectum, especially in cachectic habits, and ultimately perforate the parietes of the bowel above the sphincter, and be followed by fistula. Although an abscess may occasionally thus originate, and with an apparent independence of any irritation or disease of the adjoining canals or of their outlets, I believe that instances are rare in which these affections, either of the mucous surfaces or of the follicles, are entirely absent, these affections proving the exciting cause of the inflammatory action and suppuration external to the rectum or anus.

50. (*c*) Irritation or inflammation passing into abscess in or near the rectum or anus, although commonly originating in those parts, and produced by the causes mentioned above (§ 35, 36), frequently proceeds from disease—from inordinate excitement, irritation, inflammation, or other lesions of adjoining parts. In females the abscess may be a consequence of irritation in the sexual passages, and be seated in the anterior parietes of the bowel, or in the recto-vaginal partition, or in the perinæum, and may point or open into either canal or externally, according to its position. In males, inflammatory irritation or diseases of the urethra, of the prostate gland, or of the neck of the bladder, may extend to the adjoining cellular tissue, and endanger the integrity of the rectum by exciting inflammation of, and abscess in or extending to, this tissue. Even the means used to cure disease of the urinary and sexual organs, in both sexes, may excite inflammation or irritation, which will extend in this direction and terminate in purulent formation, which may open into the rectum. Abscess in the vicinity of the rectum or anus may, moreover, depend upon disease of some one of the pelvic viscera,

or upon disease or caries of a portion of bone in the vicinity; but these are comparatively rare occurrences, or causes of abscess in this situation. It should not, however, be overlooked that an abscess may appear near the anus, or may partially surround or open into the rectum, owing to the extension of disease, and to purulent extension and infiltration from the vertebræ, the abscess being, in such case, merely a variety of psoas abscess, proceeding from inflammation of the intervertebral spaces, or from caries or tubercular disease of the bodies of one or more of the vertebræ.

51. (d) Abscess, or abscesses, may form in the rectum or anus from inflammation of the veins of these parts, or of a hæmorrhoidal tumour, or of a dilated or varicose vein, the purulent collection being more frequently external to the vessel, or in the surrounding cellular and adipose tissues, than within, or involving the coats of the vein. It is not improbable that inflammation of the hæmorrhoidal veins, when commencing in their internal or serous membrane, may sometimes extend more or less along them, and contaminate the blood, or cause coagulation of the fluid in them, or other lesions fully described in the article on the pathology of the VEINS, and be associated with purulent collections in their course, either internal or external, as respects their parietes; but these results are certainly not so frequent as may be expected from the exposure of these vessels to the several causes of irritation and inflammation, which so often act upon the rectum and anus, and influence the circulation through the hæmorrhoidal veins, both in health and in disease. It still more rarely happens that secondary collections of matter form near the rectum or anus in consequence of purulent absorption, the few instances of abscess in these situations which have occurred in the puerperal state being those in which inflammation of the veins of the uterus or of the appendages has extended to the veins and cellular substance adjoining, and has implicated those parts in or near the rectum or anus.

52. B. *The symptoms of abscess* near to or implicating the rectum or anus vary remarkably, in severity and character, with the causes of the inflammation of which this is the consequence, with the severity of the inflammation and the extent of the abscess, in no small degree with the particular situation of the abscess, and with the constitution and habit of body of the patient. The symptoms are often, at first, those of proctitis, especially when the disease commences in the rectum or anus itself. But when the abscess proceeds from inflammation of the adjoining parts, passages, or outlets, or when it is so external to the rectum or anus as at first not to implicate these parts, little inconvenience is experienced there until the outlet is pressed upon, or consecutively inflamed by the progress and distention of the purulent collection.

53. When the abscess is apparently, or even really unconnected with the bowel or sexual or urinary passages, and is at some distance from the anus (§ 49), it generally appears in the form of an ordinary boil, and proceeds with central hardness, swelling, redness of a dusky tint, and throbbing, with symptomatic fever, varying in character and severity with the constitution of

the patient. If the abscess be of a sthenic nature, the attendant fever is more or less inflammatory, and the tendency to point externally is manifest; but if it be asthenic, or the constitution cachectic, the local inflammation and the matter produced by it may be diffused, and isolate a portion of the parietes of the rectum or of the sphincter, and disconnect it from the adjoining parts. In these cases, the constitutional symptoms are always adynamic, and, however frequent the pulse, the vital powers are more or less depressed. In some of these the abscess will hardly point externally, or if it thus point, it will do so imperfectly, or assume the character of carbuncle. When the abscess forms near the side of the anus, and much redness or swelling and pain extend to the buttock, with considerable fever, then the more painful symptoms subside upon the formation of matter, especially in the sounder constitutions, and throbbing, chilliness, followed by a disposition to perspirations, with external pointing of the abscess, are chiefly experienced. If, however, the matter is more diffused, if the disease is more asthenic, if the constitutional powers are weak or exhausted, if the superficial appearance of the abscess is more carbuncular, and if more than one opening have appeared on the surface, both the local and general symptoms may be aggravated, or, at least, not abated, and, with the diffusion of the local lesion, the adynamic fever seriously, if not dangerously increased.

54. The severity of the symptoms and the consecutive evils are much increased when the abscess is consequent upon changes of the coats of the rectum, or upon ulceration of the mucous follicles of the rectum or anus, or upon inflammation of hæmorrhoidal tumours, or of the hæmorrhoidal veins; for, in these circumstances, not only are the local changes more complicated, but the constitutional affection is more severe, and the tendency to terminate in fistula, if not in still more serious changes, much greater. Much, however, in respect of severity of local and general symptoms, will depend upon the constitution and habit of body of the patient, and upon the exact seat of the local change. Integrity of vital power will prevent a dangerous extension of the mischief, while depressed or exhausted energy, and an impure state of the circulating fluids and their several concomitants, will increase the evil. The exact situation of the abscess will also remarkably affect the symptoms. If the matter form on one of the sides of the anus, the symptoms will be much less severe than in any other situation: they will be severer if it forms posteriorly, and still more severe if it collects anteriorly; as in this last situation it implicates parts of greater sensibility than in the other situations; and, in the male especially, it involves parts concerned in very important functions—whether extending merely to or originating in these parts—and interrupts more or less painfully, and even seriously, their offices. The abscess may in this situation involve the prostate gland, or neck of the bladder, or the urethra, or the vesiculæ seminales, either primarily or consecutively, and thus interrupt the excretion of urine, or cause retention of it, with various associated phenomena.

55. In females the symptoms are seldom so severe as in the male, especially when the ab-



cess is anterior to the anus or points in the perinæum; and yet I have seen in two cases, of which strong females of a sanguine temperament were the subjects, both the local and the constitutional symptoms most acute, the abscess having been seated high in the recto-vaginal partition. In such cases, the abscess will not point in the perinæum, but either in the vagina or rectum, according as the parietes of either is primarily or chiefly affected, or as the irritation or cause existed in the one canal or in the other; but when pointing in either direction, perforation of the parietes is generally the consequence, and the risk of fistula being the result is great, especially if the rectum be perforated and the constitution be at all in fault.

56. vii. **ULCERATION OF THE RECTUM.**—4. Ulceration of the coats of the rectum is not infrequent, especially in the course or as a consequence of acute or chronic dysentery, of diarrhœa, especially of colliquative diarrhœa, and of tenesmus. It may take place as a termination of one of the forms of proctitis described above, and it may be either the consequence or the cause of abscess of the rectum or anus. It is frequent in the course of tubercular formations in the lungs, and less so in the advanced progress of organic diseases of the liver. In the former, it is often productive of fistula, having previously occasioned more or less suppuration, or distinct abscess in some cases, or a less obvious collection of matter in others; and it generally commences in the mucous follicles, and is often caused by the state of the blood consequent upon softening of tubercles in the lungs, and the absorption of tubercular matter. Ulceration may also follow the opening of an abscess into the rectum, when the matter proceeds from inflammation of adjoining parts, especially of those already enumerated (§49-51). It may possess asthenic or reparative character, in which case a favourable issue soon takes place; or it may present an asthenic or spreading form; or it may even assume a sloughing or rapidly disorganizing state. It may, moreover, be specific or venereal.

57. *B.* Ulceration of the rectum or anus is more frequently a complication of other maladies, as of those of the lungs, liver, &c., than a primary and simple lesion. It is often associated with other changes in the rectum—with inflammation of the rectum, or of the colon, or of both; with prolapsus ani, with fissure of the anus, with stricture and thickening of the parietes of the bowel, with hæmorrhages from the rectum, of which it is often the cause, and with hæmorrhoidal tumours, internal or external. It is often complicated with, or consequent upon, thrush and excoeriations of the anus in children (§34), chronic dysentery and diarrhœa, at all ages and in all climates, and disease of the mesenteric glands. It is not infrequently associated with lesions of the urinary and genital organs in both sexes, and with tubercular formations in different parts of the body, but more particularly in the lungs.

58. *C.* The causes of ulceration of the rectum are the same as those which occasion proctitis or abscess of the rectum and anus; more particularly the several diseases just mentioned as often associating with them these lesions, as tubercular formations in the lungs or in other parts; disease of the liver and digestive canal;

hectic and other fevers; the several kinds of dysentery and diarrhœa; local irritants, and septic or contaminating vapours directed on the anus and rectum in foul privies; substances lodged in the rectum; operations and injuries implicating the rectum or its vicinity; certain kinds of ingesta, both medicinal and poisonous, taken too frequently or in too large doses, as calomel, arsenic, &c.; scurvy and morbid states of the blood; and excessive sexual indulgences. (See §35, 36.)

59. *D.* The symptoms of ulcerations of the rectum are often those of chronic proctitis, especially tenesmus, the discharge of puriform, or a mixture of purulent, sanious, and mucous matters in the stools; more or less pain during the passage of the fæces, often with partial prolapsus of the inner coats of the rectum, and with more or less blood, sometimes a little only, following the fæcal evacuation. If the ulceration exist near to the anus, it may be associated with some degree of fissure, and a sanious or puriform discharge may either exude constantly or be discharged at intervals from the anus. When the ulcer is considerable, and low in the rectum, it may be felt upon the examination, some degree of thickening, with slight induration of the edges and irregularity of the surface, serving to distinguish it. When it is beyond the reach of the finger, or above the splincter, its existence may be inferred from the history of the case, especially from the appearance of purulent or sanious matter, or of blood, in the stools, but unmixed with the fæces; from the circumstance of these discharges having followed symptoms of proctitis or of abscess, or attacks of dysentery or chronic or colliquative diarrhœa; from the pain under the sacrum or pubis just before or during evacuation of the bowels; and from the partial prolapsus often attending fæcal evacuations. But it is rather from the association of several of these, than from either singly, that this change is to be inferred. (See *art.* HÆMORRHOÏD—*from the Intestines*, &c., §197.)

60. *E.* Syphilitic ulceration of the rectum or anus is a general attendant as well as consequence of syphilitic proctitis. It occurs most frequently in females, owing chiefly to the proximity of the infecting and infected surfaces. The specific characters of the syphilitic ulcer are often, but not always, present. When these are absent, as well as in other circumstances, the history of the case and the conduct of the patient, as far as that is known, will serve to guide the diagnosis. The existence of other syphilitic symptoms, primary and secondary, should also be ascertained.

61. viii. **FISTULA IN ANO.**—*Rectal Fistula.*—Fistula is the consequence of abscess or ulceration of the rectum or anus, and hence it proceeds from the same remote causes—predisposing and exciting—as occasion either or both these lesions. It has usually been divided into three varieties, the last of which, however, is very doubtful. 1st. *Complete fistula*, which has two openings, one in the rectum and the other externally. 2d. *Incomplete internal or external blind fistula*, which has an opening in the bowel, but none externally. 3d. *The incomplete external or internal blind fistula*, which has an external opening, but no internal opening into the gut. The existence, however, of this third variety

has been disputed with much reason. More than one fistula may exist in the same person, and they may be of the same, or of the first and second varieties. They may present various differences; the fistulous canal may extend far up before opening into the gut, may have several external openings, may extend far beneath the external skin, may be attended by spasm of the sphincter, and by callosities, hardening, and disease of adjoining parts, as the vagina, bladder, urethra, prostate, or even of the pelvic bones.

62. The constitutional and pathological relations of fistula in ano—the frequent dependence of this lesion upon important visceral disease—have not sufficiently engaged the attention of surgeons in devising their intentions and means of cure. Hence the necessity of close investigation of the *causes* and *complications* of all cases of anal fistula which come under medical or surgical treatment. The *causes* of rectal fistulæ are those already mentioned in connexion with the diseases already discussed, but more especially injuries of the internal coats of the rectum by foreign bodies, or by retained matters in the bowel, and the suppuration or ulceration of bunches of hæmorrhoids perforating or destroying the inner coats of the gut. Fistulæ, from this latter cause, generally form slowly. The patient has itching at the anus, and a knobby swelling forms near the anus, which often merely empties itself by a small opening, or which has little disposition to break externally, but rather spreads upward, or it may be connected above, with a second opening into the rectum. In some cases the fistula is a consequence of injury, or of the burrowing of pus from some adjoining part, depriving the exterior parietes of the rectum more or less completely of their cellular connexions. These fistulæ are often critical, or, rather, the abscesses in which they originate. But more frequently the fistulæ accompanying constitutional disease, especially *phthisis*, originate in ulceration, frequently affecting the mucous follicles, in the manner already mentioned (§ 56).

63. According to the researches of SABATIER, LARREY, RIBES, and CHELIUS, the internal opening of rectal fistula is most commonly immediately above the part where the internal membrane of the rectum joins the external skin, and rarely higher than five or six lines above this part. Such appeared to have been the result in seventy-five cases examined by M. RIBES. The condition of the fistula is partly shown by the nature of its origin and history of the case, by the circumstances of the discharge being either purulent or fecal, and by the passage of intestinal gas through it, especially after having been examined by the probe.

64. IX. TREATMENT OF ABSCESS, ULCERATION, AND FISTULÆ OF THE RECTUM AND ANUS.—The causes and the constitutional relations of these lesions should determine the indications and means of cure that ought to be adopted. If either lesion proceed from constitutional or general disease, the treatment should be chiefly constitutional and dietetic. If either have arisen from acute or sub-acute proctitis, the means already mentioned as appropriate for chronic proctitis (§ 33) may be employed; but these should be varied with the diathesis, the complications, the duration or the obstinacy of

the disease, and the habit of body of the patient.

65. A. When the *abscess* is of a sthenic character, is apparently only forming, then leeches and soothing applications may be employed; but in all cases, whether sthenic, asthenic, carbuncular, spreading, or burrowing, they ought to be opened as early as matter is formed, and a free external outlet to it be afforded. Afterward, as well as when *ulceration* of the internal coats of the rectum are ascertained upon examination, the treatment, both local and general, should depend entirely upon the features and pathological associations of the case. If the abscess or ulceration has not advanced to the formation of either an incomplete or complete fistula, such means as are most likely to promote the circulation through the portal vessels, and remove obstructions from the liver, ought to be adopted, aided by soothing, stimulating, or astringent and tonic means, locally or constitutionally, according to the peculiarities of the case. With these views, I have given PLUMMER'S pill with soap and inspissated ox-gall, or the precipitated sulphur, with the bitartrate of potash, the confection of senna, and confection of black pepper, or with capsicum, according to the state of the case. If the rectum continue irritable, or if the ulceration be attended by spasm of the sphincter, emollient injections, the local application of the extract of belladonna, with either of the ointments advised for anal fissure, and a recourse to the decoction of the yarrow or millefolium, which was recommended to my attention by Mr. PERKINS, of Mortimer Street, will afford relief. If the ulceration be obstinate, small injections of a solution of nitrate of silver, or of mucilaginous mixtures containing spirits of turpentine, or the balsams, especially the Peruvian balsam; or pills, with ipecacuanha, capsicum, ox-gall, and one of the balsams, will generally remove the disease, if the evacuations and the diet be duly regulated, and if the constitutional powers be duly preserved or increased.

66. B. If the ulceration present a foul, spreading, *asthenic*, or gangrenous character, the treatment, both local and general, should be of an antiseptic and tonic nature. Applications containing one of the chlorides, or creasote, or spirits of turpentine, or the Peruvian balsam, small injections with these, and the internal use of the decoction of cinchona, with alkaline carbonates, camphor, serpentaria, capsicum, aromatics, &c., are indicated in these cases. When the ulceration is considered *syphilitic*, then mercurials, especially the bichloride, in gradually increased doses, or calomel, blue-pill, hydrargyrum cum creta, &c., may be prescribed according to the peculiarities of the case.

67. C. Rectal or anal fistulæ require the adoption of similar principles and means to those espoused above. These fistulæ often require an operation for their cure; but such operations ought not to be undertaken inconsiderately for the following reasons: 1st. The fistula may be symptomatic of disease of the lungs or liver—of the lungs especially—and the discharge from it may have a beneficial influence on the pulmonary malady. No attempts, therefore, should be made to close this safety-valve of the frame in these circumstances until another has been established in some other quar-



ter; besides, an operation in these cases is often followed by a recurrence of the fistula.—2d. *Fistulæ* may occur in weak, irritable, nervous, and susceptible persons, even independently of tubercular formations, or of pulmonary disease; and yet an operation by *incision* or *ligature* may be followed by very painful or even dangerous consequences. The accidents which may thus occur are, severe or fatal hæmorrhage, inflammation, copious suppuration, colic, diarrhœa, peritonitis, retention of urine, constipation, erysipelas, &c. Although these ill effects of the operation are most common in persons constituted as above, yet they may appear also in the plethoric, the cachectic, and even in those apparently the least likely to be thus endangered.—3d. *Fistulæ*, in favourable circumstances, especially during the adoption of means to improve the general health, of a suitable and regular diet, and of a treatment identical with or similar to that just advised (§ 65, 66), will heal up favourably, particularly when no visceral disease remains to perpetuate the symptomatic lesion. In all cases, the visceral disease should be investigated, and the treatment in great measure directed to it.

68. As to the performance of these operations I need only refer the reader to the able writings of A. COOPER, BRODIE, W. FERGUSON, CHELUS, SOUTH, and others referred to in the BIBLIOGRAPHY. But I may here add, that they should not be attempted when the patient is the subject of any form of pulmonary or tubercular disease; or whenever the fistula becomes a vicariously secreting organ, by which other ailments are alleviated or removed; or if it be connected with disease of the pelvic bones, or of the prostate gland, or with incurable disease of the liver. In many of such cases the patient may be relieved by enlarging the external opening of the fistula and by strict cleanliness. The operation, moreover, will often fail in very old *fistulæ*, in those which have several openings, or which are connected with callosities or ruptures, or when the internal opening is out of reach. Even when no visceral disease exists, if the fistula have been of long standing, the operation should not be undertaken until an issue or seton has been prescribed.

69. V. FISSURE OF THE ANUS, SPASM OF THE SPHINCTER ANI, AND NEURALGIC PAIN OF THE RECTUM are more or less connected with each other. I very much doubt the existence of *spasm of the sphincter* independently of either *fissure* or *ulceration* within the verge of the anus; and the *pain*, which is often extremely acute in the rectum, especially after a stool, is generally dependent upon one or other, or upon both, these lesions, and is but rarely of a purely *neuralgic*, or even *rheumatic* or *gouty* nature. Indeed, the pain cannot be viewed as possessing those characters unless it be independent of spasm, fissure, and ulceration, and alternate, as the case may be, with neuralgia, rheumatism, or gout, in other parts.

70. i. FISSURES OF THE ANUS—*anal fissures*—have been well described by BOYER, DUPUYTREN, and BRODIE.—A. *Causes*.—Adults are exclusively subject to this disease. Children and young persons are exempt from it; and it is met with in persons between the ages of 25 and 60; most frequently from 30 to 45. It occurs in both sexes, but more frequently in fe-

males than males, and in those of nervous, hysterical, and irritable temperaments. The most common *exciting causes* are constipation and the irritation and spasm thereby sometimes produced. The passage of hard substances which abrade the mucous surface in the situation of the sphincter; injuries occasioned by the administration of clysters; the existence of hæmorrhoids or hæmorrhoidal tumours, and previous operations for these, and the venereal poison flowing from the female genitals and infecting the anus.

71. B. *Symptoms*.—The disease sometimes commences insensibly, in certain cases more rapidly or suddenly. The passage of stools is attended by heat and smarting, and, as the fissure increases, by violent pain, and a sense of spasmodic constriction at the anus. The pain often continues for hours after passing a stool; and in the worst cases it scarcely ceases. It is often increased by coughing, by micturition, or by exertion. It is generally lancinating or burning, and is attended by restlessness, an anxious expression of countenance, increased nervous susceptibility, and loss of flesh and strength. M. DUPUYTREN states that the disease consists in a lengthy and superficial ulceration in the folds of the mucous membrane of the anus. On separating the orifice and directing the patient to strain, a narrow cleft is observed, with its bottom red, and its edges slightly swollen and callous. It often extends into the rectum, and is more frequently seen at the sides and back of the anus than at its fore part. It rarely extends through the whole thickness of the mucous coat. The most distressing part of the affection is the painful spasm of the sphincter. Sir B. BRODIE remarks, that the constriction of the sphincter at first appears merely spasmodic; but in proportion as this muscle is called into action it increases in bulk, and after the affection has continued for some time it becomes considerably larger. DUPUYTREN and other surgeons consider the fissure or ulceration to be produced by the spasm; but, without denying that the spasm may occasion ulceration, I believe—and I state this from the history of several cases, two of which occurred as early in my practice as 1825—that the fissure or ulceration is commonly the cause of the spasm. The constriction of the anus is often so great as to render the introduction of any body, even the pipe of a syringe, both difficult and most painful.

72. Fissures present various differences according to their situation. When they are entirely *anal*, or are *below* the sphincter, and are external to the verge of the anus, they are much less painful, and the pains are not materially aggravated by the passage of fæces; but there is more or less pruritus; and in this situation the affection is often venereal, especially in females. Fissures may exist *above* or *within* the grasp of the sphincter, or in both situations, extending from the one to the other. When the fissure is above the sphincter it possesses more of the characters of an ulcer. It may be detected there either by means of the speculum or by introducing the finger, to which it feels hard, knotty, or rough; and it is very painful when pressed on by the finger, or when a hardened motion is passed; but the pain ceases soon after, and never continues so long and so

violently as when the fissure is grasped by the sphincter. When a consistent stool is passed, the portion of the faces which passes over the ulcer or fissure is often covered by a puriform mucus, sometimes coloured with a little blood. When the ulcer exists above the sphincter, it does not present the appearance of a fissure, and is not usually attended by spasm, nor by remarkable pain until a motion is passed, but possesses the characters, and, by extending, produces the results already mentioned, especially copious hæmorrhages, abscess, fistula, &c.

73. *C. Treatment.*—Previously to 1825 this affection was generally treated by the operation first recommended by BOYER. At the commencement of that year I was called to a gentleman residing at Wisbeach, who was advised by his surgeon to have this operation performed, conformably with the opinion then entertained by the most eminent authorities. He had been long subject to hæmorrhoids, was remarkably nervous and timid, and had the greatest aversion, notwithstanding the violence of his pains, to undergo an operation. He came to London, and placed himself under my care, having heard that I had expressed the opinion that this affection may often be completely removed without any operation. Notwithstanding the severity and long duration of the case, I believed that it might be removed by medical treatment merely, and prescribed a light and antiphlogistic diet; demulcents with liquor ammoniac acetatis; gentle and cooling laxatives; emollient enemata; and an ointment containing one part in seven of the extract of belladonna, which was applied after each stool, and with which the pipe of the enema syringe was directed to be covered when an enema was administered. Within three weeks he returned home quite well, and never had a return of the disease. In the summer of the same year (1825) I attended a lady residing near Russell Square for the same affection, and for which the same treatment was adopted with the like result. Since then I have not treated more than three cases, but these recovered without an operation, the means having been varied according to the peculiarities of each.

74. M. DUPUYTREN remarks, that fissures below and above the sphincter most commonly heal without an operation; the former with linen or lint spread with simple cerate, opiate cerate, poplar ointment, mercurial preparations; and the latter by soothing and narcotic lotions of decoction of marsh-mallow, poppy-heads, nightshade, henbane, stramonium, &c., thrown up into the rectum. He says that spasmodic constriction is the true ailment, and that the fissure or crack is merely a secondary symptom. This, however, by no means agrees with my observation: The application of belladonna, when judiciously prescribed and aided by a proper general treatment, is commonly most successful in these cases. One part of the extract may be added to seven or eight of a suitable ointment, or the lead ointment or cerate; or one part by weight of the extract, and one part of the acetate of lead, to six parts of any ointment; and this pomade may be applied once or twice daily, or on the surface of a bougie. In cases where a lotion may be preferred to greasy applications, I have found a saturated solution of the biborate of soda, with the ex-

tract of belladonna, or vinum opii, used as a lotion, almost as efficacious as the foregoing; or a lotion with the diacetate of lead and anodyne for the more external fissures. Sir B. BRODIE states that, though he formerly used a suppository with extract of belladonna with manifest advantage, yet he is not in the habit of frequently employing it. "Even used in the form of a suppository, the belladonna sometimes produces very serious symptoms by its influence on the brain." He therefore only gives purgative medicine to prevent hard stools, directs the introduction of a bougie before going to the water-closet, and prescribes an opium suppository at night. But the employment of belladonna in the form of a suppository is not required, and is always objectionable; and much of the success depends upon the selection of laxatives rather than purgatives, or upon the means by which the bowels may be kept gently open, and the irritation in the rectum and anus at the same time soothed—intentions which the experienced physician will readily fulfil.

75. ii. NEURALGIC, RHEUMATIC, OR GOUTY PAINS OF THE RECTUM OR ANUS, are rare, and cannot be admitted to exist, unless they appear connected with neuralgia, rheumatism, or gout in some other part, either before or after the pain had been felt in the rectum. Pains in the gut or in the anus are generally caused by ulceration, or fissure, or spasm of the sphincter, the existence of either of which should be ascertained whenever pains in these situations are experienced, and if they can be referred to either of these causes, the treatment ought to be directed accordingly. If, however, no such source can be detected, or if they are referable to neuralgia, rheumatism, or gout, the means which have been recommended for these maladies should then be prescribed, and aided by narcotic or anodyne suppositories or ointments, as advised for spasm of the sphincter.

76. VI. PROLAPSE OF THE RECTUM.—*Prolapsus ani.*—*Vorfall des Mastdarmes*, Germ.; *Chute du Rectum*, Fr.

CLASSIF.—IV. CLASS, I. ORDER (Author).

77. Prolapse of the rectum or anus appears under different forms: it may be *complete*, the prolapsus consisting of all the coats of the bowel, to a greater or less extent; or it may be *incomplete* or *partial*, and consist only of the inner coats. It may arise from *debility* only, as in children, and in these cases it is generally complete; or from *hæmorrhoidal tumours*; or from *irritation* or *chronic inflammation* of the internal coats; and in these two classes of cases it is generally incomplete or partial, consisting only or chiefly of the mucous and cellular coats. CHÉLUS states that this disease appears under *three forms*: it may be either the rectum with all its membranes, or simply the internal membrane, or an inverted upper portion of the bowel—*volvulus*, or intussusception of the upper part.

78. i. *Prolapse from debility*—*prolapse of all the coats of the rectum*—has been doubted by a few surgeons, who could have had no experience of the diseases of children, among whom this affection is by no means infrequent. Mr. COPELAND says, that "in almost every case of prolapsus ani it is the internal membrane of the intestine only which descends through the



sphincter." No doubt such is the case in the great majority of cases in adults, especially when the prolapse is consequent upon hæmorrhoids and changes just mentioned; but in children, and even sometimes in old persons, especially females, the prolapse is often that of all the coats, and not infrequently to a very great extent; although in them also partial prolapse, or protrusion of the inner coat only, sometimes occurs. It depends upon imperfect tonic contraction of the sphincter, and relaxation of the connexions of the bowel with the surrounding parts. It proceeds from the general debility observed in children reared in unhealthy localities, in the ill fed, and in the offspring of aged and debilitated parents. In some cases both the sphincter and the muscular coats of the bowel seem more or less paralyzed. The tumour is usually of a large size; and if it be allowed to remain for some time unreduced, the coats become congested, livid, and thickened, and much difficulty is experienced in reducing it. Mr. SYME considers that the prolapse, involving the whole parietes of the gut, is owing chiefly to irritation. This may be sometimes the case, especially as irritation is not infrequently associated with debility or want of tone of the parts, especially of the sphincter. The tumour is commonly round or oval, but sometimes cylindrical, varies in size from that of a small egg to that of a large orange, exhibits the slimy surface of a mucous membrane, and affords a secretion similar to red currant jelly. This protrusion is the same as an invagination occurring higher up in the bowels, and differs only in its being so low down as to become external.

79. The *symptoms* of the prolapse vary with the extent of protrusion, and with the habit of body and strength of the patient. They are commonly very severe, and most urgent in young or robust subjects. There are straining and pain at the anus, with obstruction of the fecal evacuations. If the protrusion continue, the pressure of the sphincter retards the return of blood from the protruded part, which then becomes engorged, livid, and swollen. Inflammation may follow if the prolapse be not removed, and increased pain, fever, ulceration, sphacelation, or peritonitis, may supervene. Recovery may follow the sphacelation of the protruded part, or death in consequence of peritoneal inflammation.

80. ii. *Prolapse from hæmorrhoids, or chronic inflammation of the internal coat*, is the most frequent form, and occurs to a much less extent. —(a) When it is consequent upon chronic inflammation or inflammatory irritation, there is generally more or less thickening, seated chiefly in the connecting cellular tissue. The frequent straining, often preceding and attending this protrusion, causes a relaxation and elongation of the internal coat, especially when hæmorrhoidal tumours complicate the affection. At first a little reddish swelling only appears, which gradually enlarges, becomes wider, is rounded below, but narrowed above by the sphincter, and, at its free extremity, has an opening by which the stools pass. The surface of the protrusion varies in appearance with the degree of constriction exercised by the sphincter, and with the duration of the displacement. It is red or livid, soft or slightly tense, often divid-

ed into several lobes, and covered with bloody mucus. Dr. BUSHE justly states that, when this protrusion occurs in children, it presents the appearance of a small pyramidal, red, and coiled tumour; while in the adult it is less red, and generally takes the form, either of two lateral flaps or of a circular fold. "In some of these cases, the portion of membrane protruded comes from the pouch of the rectum, while that within the sphincters remains in situ. When this is the case, the extremity of the little finger may be passed between that portion of the membrane which adheres to the internal sphincter and that which is protruded" (p. 204).

81. (b) Mr. COPELAND observes, that prolapsus ani has so many points of analogy with hæmorrhoids that it may be considered as the same disease in a more chronic and advanced state; and Mr. SYME thinks that the protrusion of the mucous membrane alone should be referred to the head of hæmorrhoids. Dr. BUSHE remarks, as to its *diagnosis* from hæmorrhoidal tumours, that the semilunar form of the flaps, the extent of their base, our ability to glide the folded membrane between the finger and thumb, as well as the absence of erection and hæmorrhage, are sufficient to distinguish this form of protrusion from hæmorrhoidal tumours. He adds, in respect of *intussusception* of the rectum, that, in cases of *protrusion*, a probe or the finger cannot pass higher than the border of the internal sphincter, owing to the doubling of the mucous membrane, while in *intussusception* no resistance is offered to the passage of either the one or the other.

82. iii. The *prognosis* of prolapsus ani varies with the age and other circumstances of the patient. In *children* it is generally soon cured, or becomes less and less frequent as the child advances in age. In adults and old persons it is a much more severe and obstinate complaint, and more readily and frequently recurs. In old prolapses considerable changes take place in the rectum and anus. A discharge of mucus is almost constant; the prolapsed mucous membrane becomes indurated, loses its villous surface, and sometimes ulcerates, especially when the sphincter is relaxed, and when the patient is subject to much straining at stool.

83. iv. The *causes* of prolapse of the rectum in *childhood*, among whom this complaint is most frequent, are the irritation of teething, or of ascarides in the rectum; diarrhoea occurring during or after weaning; insufficient or unwholesome nourishment; attempts to disperse with a healthy nurse; general or local debility and relaxation of the pelvic viscera; violent screaming and straining at stool, especially when produced by purgatives which irritate the rectum, as calomel, &c.; stone in the bladder; sitting on cold seats, and exposure of the loins to currents of cold air, occasioning a partial paralysis of the muscular coats of the rectum and sphincter.

84. The causes which most commonly produce this malady in *adults* and aged persons are those which frequently occasion hæmorrhoids or proctitis (§ 35, 36), and whatever weakens the tone of the sphincter ani and the attachments of the rectum to adjoining parts; the improper or frequent use of relaxing enemata or lavements; the neglect of the sub-acute or chronic forms of proctitis, especially when they

are attended by much straining at stool; residence in hot and unhealthy climates; the several forms of diarrhoea and dysentery, especially the chronic; thickening, induration, and polypous excrescences of the inner coats of the bowels; hæmorrhoidal tumours, and other organic changes of the parts; stone in the bladder or disease of the prostate gland; prolonged costiveness; intestinal worms; protracted self-pollutions; sudden or violent muscular efforts; previous injuries and operations implicating the rectum or anus; and injuries or diseases affecting the dorsal or lumbar spine.

85. v. *The treatment* of prolapse of the rectum should be regulated according to the *cause*, and the *age*, and other circumstances of the patient. The *first* object is to return the protrusion; the *second* is to prevent the recurrence of the prolapse.—(a) The *first* is generally accomplished with ease when the prolapsus is only partial; but when it is complete, or consists of the whole parietes of the bowel, the reduction of the protruded part is often difficult. But by pressing up the parts nearest the opening of the bowel first, and directing the pressure upon and in the direction of the opening, much less difficulty will be experienced. If the swollen, reddened, and inflamed state of the prolapsed part, or spasm of the sphincter, or both, prevent the reduction, the application for a short time of a piece of muslin on the tumour wetted with equal parts of tinctura opii and sulphuric ether, and allowing a rapid evaporation, so as to produce a quick transfer of heat, I have never known to fail in many cases in which I have advised it in cases of the complaint in children.

86. (b) In order to prevent a return of the complaint, the cause should be investigated, and the remote as well as the more immediate causes removed or counteracted. The numerous surgical writers who have entertained this subject have advised various operations, which are more or less painful, and not always devoid of risk; and these operations have not always been preceded by a sufficient trial of those medical and rational means, upon the failure of which only they should be resorted to. Partial prolapse, or that form of the complaint which is consequent upon neglected or prolonged hæmorrhoidal affections, is often complicated with chronic inflammation and thickening of the inner coats of the bowel, or with torpor or obstruction of the liver, and obstinate congestion of the hæmorrhoidal vessels, and unless these be removed by appropriate means, the prolapse will return frequently, and at last become almost constant. In these, as well as in several other circumstances of the complaint, PLUMMER'S pill, with soap and taraxacum, should be given at bedtime, and the bitartrate, tartrate, or acetate of potash in the morning and mid-day, either in a decoction of Achilæa millefolium, or of the taraxacum, or in the compound decoction of scopolarium, in doses sufficient to keep the bowels sufficiently open. After these have been taken some time, and if the excretions have then acquired a natural appearance, cold injections into the rectum, each containing about a drachm of the muriated tincture of iron, or two or three drachms of the spirits of turpentine to half a pint or twelve ounces of the vehicle, will generally be of great service. These injections may be repeated ac-

cording to circumstances; but care should be taken to preserve the secretions and excretions in a healthy and free state.

87. (c) In *children* especially, and when the prolapse is complete, the treatment should be more constitutional than local, or the latter ought to be in aid of the former. The means should be directed to the form of general disorder; and tonics, especially those containing the preparations of iron; cold salt-water, or sea-bathing, the douche of salt-water or weak brine on the loins, followed by active exercise; the cold medicated injections just mentioned; the muriated tincture of iron taken internally, preserving at the same time the bowels gently open, or at least preventing costiveness; and attention to suitable, light, and nourishing diet, avoiding bulky innutritious vegetables, will rarely fail in preventing a return of the protrusion. If the complaint be associated with intestinal worms, the treatment should be directed accordingly, the injection containing the turpentine, or an occasional draught with a moderate dose of this substance, and an equal quantity of castor oil, will produce a very decided benefit. In the more obstinate or prolonged cases, after returning the protruded bowel and adopting the above treatment, the patient should retain the horizontal posture for some time, and after using cold bathing or the cold douche, he may cover the loins with the emplastrum thuris comp., and have recourse to such means, medicinal and dietetic, as will promote the general health. When the above measures are unavailing, then the operations advised by surgeons may be adopted; for an account of which I must refer the reader to the works referred to in the BIBLIOGRAPHY, especially to those by FERGUSSON, BRODIE, DUPUYTREN, BUSHE, CHELUS, and SOUTH.

88. VII. EXCRESCENCES ABOUT THE ANUS AND POLYPI OF THE RECTUM are analogous affections.—A. The former sprout from the skin and mucous membrane adjoining the anus, and assume various forms, to which different names, as sycoma, ficus, mariscæ, cristæ, verrucæ, porrus, condyloma, &c., have been given. These excrescences are *caused* by friction, erosion, the irritation produced by morbid secretions and by neglect of personal cleanliness, and by specific poisons. They are prevented by avoiding these causes; and, when fully developed, they are best treated by the local application of strong solutions of iodine, or nitrate of silver, or of hydrochlorate of ammonia, or of bichloride of mercury, or other appropriate means. If these are inapplicable or are inefficient, excision or ligature becomes necessary.

89. B. *Polypi* are not infrequent in the rectum, and, like the same formations in other situations, they present either a *mucous* or a *sarcomatous* structure.—a. Dr. BUSHE considers the mucous species to be most common; M. SANSON the sarcomatous. M. STOLTZ (*Gazette Médicale de Paris*, 1841, p. 253) states that they are much more frequent in children than in adults; and that, while they occasion protrusion of the rectum, they are often confounded with that complaint. Their intimate structure has not been exactly ascertained. In children they present more of a mucous homogeneous structure, while in adults they have more of a fleshy or spongy structure. In a case which



was removed by my directions, the polypus had a serous-like cavity containing a little clear fluid, the walls being apparently amorphous. I have never observed any possessing a fibrous structure. Polypi of the rectum vary in their size, situation, and insertion. They may vary from the size of a pea to that of an egg: they may have a very broad or a very narrow base or pedicle. They may be seated near the verge of the anus or high in the rectum. These surfaces also vary; but they have generally the mucous aspect, a pale reddish hue, are rounded or oval, and are either smooth or equal, or more rarely lobulated. The mucous membrane appears thickened at or around the point of insertion. More than one may exist in the same case.

90. *b.* The *symptoms* produced by rectal polypi are different according to their seat and size. If low down, the polypus will protrude with faecal evacuations, or even remain protruded. It may be the cause of partial prolapse of the gut, and it may be mistaken for prolapse, whether occurring independently of or complicated with that complaint. When high in the rectum, it may not be recognised until an examination be made. When it is near the verge of the anus, it soon becomes external, and continues in this state. In rare instances the bowel and sphincter contract so forcibly as to strangle and detach it. When it is seated high in the bowel, it may not be readily distinguished from an invagination, although in this latter the aperture of the invaginated part may be felt, if the displacement be within reach. The polypus rarely advances to a considerable size without causing costiveness, and colicky pains in the course of the colon, with tenesmus. The straining is often distressing, but is attended by much less pain than when it is caused by inflammation. The evacuations, when soft, are contracted, flattened, and generally smeared with mucus and blood, or pus, so as to lead to the supposition of stricture of the rectum, an examination, however, readily determining this point. When the polypus increases in size and malignancy, the patient becomes sallow, and loses his appetite; his tongue is coated and his thirst constant. Emaciation, œdema of the lower extremities, and hectic fever supervene. Faecal evacuations are procured with difficulty, are scanty, and commonly not without the aid of clysters. Tenesmus and weight in the rectum increase, and are attended by lancing pains. There is much muco-purulent discharge, and often considerable hæmorrhage. If blood exudes from the surface of the polypus, and if it cannot be readily distinguished, on examination, from an invaginated portion of intestine, the diagnosis between them becomes difficult; but the symptoms of the latter are much more acute, and faecal obstruction much more complete, than those of the former, while polypus in the rectum is a much more protracted malady.

91. *c.* The *treatment* of rectal and anal polypi is the same as that usually adopted for polypi in other situations. Surgeons are divided in opinion as to the propriety of removing them by excision or by ligature: much may depend upon their seats and attachments; and probably, in the majority of instances, they should be removed by both—by ligature, and excision just

below the ligature, but let the surgeons decide this point.

92. VIII. CONTRACTION OF THE ANUS.—(a) This lesion is seldom observed; but it has occurred, owing to the following changes: 1st. By the contractions of a cicatrix either just within or just without, or implicating the verge of the anus; 2d. By the deposition of lymph, which has become more or less organized in the submucous cellular tissue, thereby forming a ring around the anus; 3d. By the production of lymph on the mucous surface of the lower portion of the rectum, which becomes somewhat organized, either forming filamentous bands, or narrowing the outlet both by its thickness, and subsequently by the contraction to which, like other false membranes, it is liable; 4th. By the various changes consequent upon chronic inflammation of the internal membranes, or of hæmorrhoidal tumours, or of veins, especially irregular thickening, induration, and cartilaginous transformation. These changes nearly approach one of those next to be noticed, and differ from it only in implicating the anus, more or less, instead of being seated in the rectum entirely. The *symptoms* of this alteration are those of permanent stricture of the rectum, the nature and seat of lesion being readily ascertained by an examination.

93. (*b*) The *treatment* should be adapted to the change occasioning the contraction; but in every circumstance the bowels ought to be kept gently open, inflammatory action should be subdued, and tumours, hæmorrhoids, or other associated lesions removed. Mechanical dilatation should be cautiously adopted after these preliminaries have been effected.

94. IX. STRICTURES OF THE RECTUM.—The rectum is subject to two kinds of obstruction affecting its parietes and narrowing its canal—the one is *spasmodic*, and occasional; the other is *organic*, and permanent until removed by treatment.—A. Mr. Mayo remarks, as to the part of the rectum which is the seat of *spasmodic stricture*, that no single point is more liable to this affection than another. The cases which he has met with have impressed him that the upper part of the rectum and the sigmoid flexure of the colon are most liable to irregular contractions of their muscular tunics.—(a) This complaint, especially when seated thus high in the bowel, is independent of fissures or ulcers in or near the anus; these lesions, however, frequently produce spasms of the sphincter and lower portion of the rectum, which are most severe or painful during and after the passage of a stool. Spasmodic stricture occurring thus independently of fissure or ulceration near the anus, is most common in debilitated constitutions and in nervous and irritable temperaments, and as a sequela of dysentery. It is apparently *excited* by the vitiated state of the biliary and intestinal secretions and excretions. The frequent or habitual recourse to purgatives, especially to those which excite or irritate the lower bowels, cannot fail of predisposing to this form of stricture, when it does not produce chronic inflammation or hæmorrhoids.

95. (*b*) The *treatment* of spasmodic stricture of the rectum ought to be chiefly dietetic and regimenal. The biliary and intestinal secretions and excretions, with the several digestive functions, should be improved and promoted by

means suited to the existing disorder, and the lodgment of vitiated secretions and fecal matters prevented by means of emollient, anodyne, and antispasmodic clysters. I have found these, and pills consisting of ipecacuanha, Castile soap, inspissated ox-gall, and sometimes also the extract of henbane, or of hop, taken twice or thrice daily, with due attention to diet, and regular exercise in the open air, remove the disorder in a few days or weeks.

96. *B. Organic or permanent stricture of the rectum* results from chronic inflammation, which, however, may have been associated, at one time or other, with additional lesions. — *a.* It consists of a partial thickening of the sub-mucous coat of the bowel and of the connecting or adjacent cellular tissue, through which means a smooth ring is formed, generally from a third to half an inch, more rarely to an inch in depth, which projects into and narrows the canal. Sometimes the thickening does not include the whole circle of the intestine, but a segment only. The ordinary seat of organic stricture is from two and a half to four inches from the orifice of the gut. But sometimes it occurs higher in the bowel, at six or seven inches from the anus; and a contraction of the same nature is occasionally also met with in different parts of the colon. (MAYO.)

97. *b. The symptoms of stricture of the rectum* generally come on slowly, unless the complaint follow acute or sub-acute proctitis. In other circumstances, or when it is, as most frequently, the consequence of chronic irritation or inflammation, the more urgent symptoms are slowly and gradually increased, and the obstruction is often very considerable before the patient has recourse to medical advice. There is always a sense of obstruction and weight in the lower bowel, which are not relieved effectually by attempts at evacuation; uneasiness, distention, and occasional spasmodic or colicky pain in the abdomen; pain in the sacral region, often advancing to the loins and extending down the limbs; itching and heat about the anus; frequent eructations and flatulent distention, with oppression at the præcordia; bearing down in females, and nervous irritability; headache, and dejection of spirits; and a vitiated state of the alvine secretions and excretions. When the disease has continued for some time, the hæmorrhoidal vessels often become congested, and tumours form near the anus, produced by extravasated blood, which in old cases occasion thickening and elongation of the skin about the anus. Owing to the local irritation and determination of blood, inflammation, passing on to suppuration, sometimes attacks the cellular tissue near the anus, forming abscesses, terminating in fistulæ. (BUSHE.)

98. The calls to stool are sudden, inefficient, and often amount to six, eight, or twelve in the twenty-four hours — generally two, three, or more taking place within a very short time. They are attended by much straining, which sometimes, if the stricture is high in the gut, gives rise to protrusion of the mucous membrane. Much flatus, and a small quantity of mucus, occasionally mixed with blood, are often all that is evacuated; but every two or three days fecal matter, in small pellets of hard, and in long, round, angular, or flattened portions, of small diameter, if soft, is discharged. After

each attempt, although the pain is very moderate, a sensation continues as if the bowels had not been emptied; and this being actually the case, several successive attempts, with only slight effect, are usually made in quick succession. When a sufficient quantity of feculent matter and mucus is evacuated to afford some relief, the patient desists with fatigue, until a sense of fullness, weight, and tenesmus requires another effort. Occasionally the accumulation of feces above the stricture, by irritating the mucous surface, causes an increased secretion from this surface, and the feces, being thereby rendered more fluid, pass more readily through the stricture, and the accumulation is thereby either partially or altogether removed. If the stricture be not very high in the rectum, it may be reached by the finger, especially if the patient strains during the examination; but if it cannot be reached, the bowel should be sounded by the instrument recommended by Sir C. BELL, which consists of an ivory ball mounted on a stalk of whalebone.

99. In some instances, many years may elapse without the patient's general health being materially impaired, notwithstanding the fecal retention and daily sufferings. Ultimately, however, he loses his appetite, and becomes pale, emaciated, and hectic. At last purulent matter, so acrid as to excoriate the anus, is discharged in great abundance, and frequently it comes away when he coughs or stands erect. These symptoms increase until life is exhausted. (BUSHE.) — Some patients die before the disease arrives at this stage, owing to the obstruction and fecal accumulation; they become distended with flatus; breathe with difficulty; are distressed by singultus, and all the symptoms of ileus. The pulse is very frequent, small, irregular, or intermittent; the extremities are cold, are seized with cramps; and ultimately the features, which were previously anxious, are collapsed, and cold perspiration, restlessness, &c., usher in dissolution.

100. Dr. BUSHE remarks that, in a few cases, the stricture is partially destroyed by ulceration; but the portion of rectum immediately above it is more frequently thus affected. In these the intestine may communicate, by means of adhesion and ulceration, with the bladder in the male, and with the vagina in the female, thus forming a recto-vesical or recto-vaginal fistula, through which the feces may pass. A much more common consequence, however, of the ulceration, especially when the ulceration is low in the gut, is the passage of fecal matters into the cellular tissue, forming stercoraceous abscess, passing into fistulæ, which may vary in number from one to a dozen, especially in females. The ulceration may also, after causing adhesions to another portion of bowel, open into it; or, failing of producing adhesions, open into the peritoneal cavity, and rapidly terminate by occasioning general peritonitis.

101. *c. The diagnosis of organic stricture of the rectum* is not without importance; for lesions of adjoining parts, as well as other lesions of the gut, may be confounded with stricture. — (a) *Retroversion, or enlargement of the uterus;* disease of the prostate gland; and tumours in the vicinity of the rectum, may simulate stricture by pressing upon and obstructing the canal of the viscus, by rendering defæcation difficult,



causing figured stools, tenesmus, mucous discharge, and fulness or weight in the sacral and perineal regions. In these an examination will disclose the nature of the complaint; and not the less readily, when painful chronic affections of the vagina occasion symptoms resembling stricture of the rectum, owing to the contiguity of situation and nervous communication.—(b) *Ulceration* of the rectum, or *fissure* of the anus, with *spasm* of the sphincter, can hardly be mistaken for stricture, if the state of the stools, and the remarkable pain attending the discharge of them, receive due attention; but these lesions may coexist with stricture, and then a careful examination can alone determine the presence of the complication.—(c) Stricture of the rectum may be mistaken for a *sarcomatous tumour* growing into the bowel, owing to the pressure of the stricture downward by the faeces accumulated above it. A careful examination per anum will generally lead to the detection of an opening admitting the point of the finger, and demonstrating the nature of the lesion.—(d) The *malignant affections* of the rectum will be distinguished from the organic stricture now being considered, by the sallow or leaden and cachectic hue of the countenance and surface; by the lancinating paroxysmal pains, and the rapidity of the ulcerative process.

102 *d.* The *causes* of stricture of the rectum are very frequently only those which have been enumerated in connexion with *proctitis* (§ 35, 36), especially when these causes have been in frequent or prolonged operation. The complaint is very rarely observed before the adult age or after the 60th year, and it is nearly equally frequent in both sexes. Mr. COPELAND thinks that women are oftener affected than men. Dr. BUSHE treated eight cases in females and seven in males. Stricture is obviously the consequence of previous disease—of chronic dysentery, diarrhoea, &c.—of slow inflammatory action, or of the frequently repeated irritation of purgatives on the lower bowels. In some cases the cause can hardly be determined.

103. *e.* The *treatment* of organic stricture of the rectum is chiefly surgical, consisting in great measure of mechanical dilatation. I cannot, however, see wherefore a lesion commencing so frequently in chronic inflammation, consisting principally in thickening of the connecting cellular tissue from the deposition of coagulable lymph, and passing into ulceration, should be so entirely or even chiefly treated by mechanical means. Much certainly depends upon the amount of change existing in the bowel; but the effects obtained from these means are not always satisfactory; and if due discretion as to their adoption, and caution in their employment be not exercised, increased pain and irritation, general distress with shiverings, sickness at stomach, colicky pains, and even peritonitis, may follow a recourse to them. In many instances, where bougies have been injuriously employed, the application of leeches to the anus, and mild laxatives and anodynes, would have afforded more or less relief; for I have no doubt that the constant state of emptiness in which the lower bowels are kept by purgatives, mercurials, and injections, in the usual treatment of those affections so generally ascribed to stricture, and the irritation produced by bougies, are no mean agents in actu-

ally producing or aggravating the complaint which they are intended to remedy. The *nimidia diligentia* is commonly too conspicuous, with whatever intention it may be dictated. There can be no question as to the impropriety of preventing the lower bowels from experiencing that state of healthy distention necessary to antagonize the contractions of their circular fibres. All hollow canals contract inordinately, even to the extent of obliteration, when they are deprived of the natural antagonism produced by their contents. I have generally found that persons who were subject to stricture of the rectum had been, for a long period previously, in the habit of taking purgatives, which kept the lower bowels almost constantly in an empty and irritated state. At an early stage of the complaint, more benefit will arise from the use of such means as will remove inflammatory irritation, and allow the faeces to become the natural and daily dilator of the incipient constriction, than from those measures which are commonly recommended, and often too officiously employed. Nevertheless, those measures are frequently requisite, and are often successful in experienced and cautious hands.

104 In early stages of the complaint, after prescribing the treatment advised for the chronic states of *proctitis* (§ 38), an evacuation from the bowels should be obtained every day, or every other day, by mild aperients taken by the mouth, or by enmata. The laxatives which I have preferred in these cases have been castor oil, olive oil, manna, magnesia with sulphur, the confection of senna, the bitartrate of potash with bicarbonate of soda, or the compound infusions of senna and gentian. The injections should not be too frequently administered unless the obstruction be such as to occasion dangerous faecal accumulation above the stricture, and they ought to consist chiefly of emollients and laxatives, as soap with olive oil, the biborate of soda in the decoction of marsh-mallows, and similar relaxing and soothing substances.

105. When it is determined upon to have recourse to instruments for the removal of contraction of the rectum, the fact should not be overlooked that these contractions generally result from chronic inflammation, and that the change thus produced, unless it has gone on to fibro-cartilaginous induration, disposes the part to laceration when even a slight dilating force is used, the sound adjoining parts readily yielding, while the contracted parts are as readily torn. Nor should it be forgotten that there is an intimate consent between the mucous canals of the pelvis and the peritoneum, injury of the former, especially mechanical injury, not infrequently exciting peritonitis, although the violence is sustained at a part of those canals which is not covered by peritoneum. A recourse, therefore, to bougies and other mechanical means of dilatation should be had with caution. As to this topic, and as to recourse to division of the stricture, I must refer the reader to the surgical authorities contained in the BIBLIOGRAPHY.

106. X. INVAGINATION OF A PORTION OF THE UPPER PART OF THE RECTUM, WITH OR WITHOUT CONTRACTION, occurs in rare instances.—*a.* When stricture takes place at or near to the junction of the rectum and sigmoid flexure of the colon, the pressure above may carry the

obstructed part down into the relaxed and dilated portion below, and thus produce either an incomplete or a complete invagination, although the stricture of the invaginated part be very slight. When the rectum is much dilated, or is in that relaxed or paralyzed state described above (§ 12, *et seq.*), the upper part, or a portion of the sigmoid flexure of the colon, or both, may thus be forced downward, or invaginated, even although no actual stricture of these parts exists. This state of disease has been noticed by Mr. CHEVALIER, Mr. EARLE, and Mr. MAYO. The last of these writers remarks, "that it originates in great laxity and dilatation, which is liable to be produced by frequent large accumulations of fecal matters in the rectum." When the bowel is in this condition, the upper part of it is liable to be invaginated, or to form a prolapsus within the lower. The prolapsed part, whether consisting merely of a fold of the internal membranes, or of the whole parietes of the bowel, soon becomes inflamed, thickened, or indurated, and the opening through it contracted, so that the symptoms and distress are thereby greatly aggravated.

107. *b.* The *symptoms* of this lesion are often ambiguous. But imperfect action of the bowels, frequent and ineffectual efforts to void the feces, discharges of puriform mucus, and aching pain, weight, and tenesmus in the sacral region, are most commonly complained of. As there is generally a capacious sac below the invaginated or contracted part, feces may accumulate there, the watery portion being absorbed, and the fecal part thereby rendered more consistent. The stools may thus be discharged nearly of their natural quantity and appearance, and the nature of the complaint may hence not be ascertained, unless an examination by the finger or speculum be properly made.

108. *c.* The *treatment* consists of the exhibition of gently aperient medicines, or, rather, of the combination of tonics with aperients, as of the compound infusions of gentian and senna, or of rhubarb and inspissated ox-gall, and of oleaginous enemata. In this, as well as in other affections of the rectum, the decoction of *Achillea millefolium* may be taken as follows, and may even be administered as an enema, omitting the tinctures and salts :

No. 330. R *Achilleæ millefolii*, ʒij.; *Aquæ*, ʒxxiv. *Coque* partem horum quartam, et cola. *Liquori colati* adde Bitart. Potassæ, ʒij.; *Sodæ Bi-boratis*, ʒi.; *Tinct. Aurantii* et *Tinct. Cardamom.* co. aa, ʒss. *M.* *Fiat Mist.*: *cujus* *capiat* *coch. iij. vel. iv. ampla, bis terve in die.*

Subsequently astringent injections, especially those with the terebinthines or balsams, may be prescribed, and such mechanical means as the case may require be resorted to, more especially properly adapted bougies or tubes.

109. XI. CANCER OF THE RECTUM.—*Scirrhus contracted Rectum.*—*Carcinoma of the Rectum.*—*A. Malignant disease* may attack the rectum only, or both it and the anus, or it may commence in or affect chiefly the anus. Dr. BUSHE states that it presents chiefly the cartilaginous, lardaceous, and encephaloid forms. The cartilaginous degeneration may commence either as hard tubercle on the mucous coat, or in the muscular tunics of the bowel, this latter being the most common. The muscular fibres become pale and firm, and the connecting cellular tis-

sue undergoes a similar process of condensation, without alteration of colour. As the morbid process goes on, this tissue often becomes lardaceous; and the walls of the bowel increase in thickness, and the cellular and muscular coats are sooner or later softened and confounded each with the other. Sometimes the mucous tunic is studded with lardaceous and encephaloid vegetations, while the serous coat presents cartilaginous tubercles. The lardaceous degeneration is thus superadded to the cartilaginous, but the one may occur without the other; and the muscular and cellular coats may be lardaceous, while the mucous tunic throws out encephaloid growths. The encephaloid degeneration is sometimes primary, commencing in the cellular tissue or mucous coat, but more commonly it is consequent upon the cartilaginous or lardaceous.

110. Any portion of the rectum may be first attacked, but the junction of the rectum with the sigmoid flexure of the colon, that immediately above the pouch, and the anus, are the parts most commonly affected. Adjoining organs are also frequently involved in the disease, especially the recto-vaginal septum, the os and cervix uteri, and the urinary bladder. The malady, instead of being seated in the rectum, may attack the colon, either in or near the sigmoid flexure, or considerably above that part, or in some other portion of the bowel. It may even coexist in the rectum with malignant disease in some other situation, as in the stomach or pylorus. The physical changes in the parts are, according to Mr. MAYO, contraction, a peculiar induration of the parietes of the bowel, thickening, and ulceration of the mucous surface. The induration results from the scirrhus degeneration of the muscular and cellular coats, the diseased parts assuming different appearances, according to the quantity and character of the morbid formation. In one variety, "the thickening is inconsiderable, but the mucous membrane is abraded, the muscular coat is hard, firm, gristly, and the canal of the bowel is narrowed. The muscular fibre is partly converted into, partly contained in, firm, gristly, fibrous substance." This form of the disease does not generally extend to the anus, but commonly begins from one inch to one inch and a half within this part, and occupies from four to five inches of the bowel, terminating abruptly upward, and more gradually toward the anus. Another or fungoid variety is characterized by considerable thickening, caused by a greater amount of scirrhus deposit than in the preceding. The scirrhus stricture is gray, fibrous, not quite opaque, much looser, and more succulent and lardaceous or fungous in parts than in the former kind. Fungoid cancer, at its commencement, generally occupies a portion only of the circumference of the bowel, and is felt as a hard tumour situated about three inches within the gut, and commonly upon its anterior surface, with the mucous membrane as yet unbroken. The morbid growth extends in each direction, upward to the flexure of the colon, and downward so as to implicate the anus, and to throw the anal integument into hard knots. This form of the disease is that which is most frequently found in parts of the large intestines above the rectum. In either form, the adipose tissue external to the rectum



becomes firmer and more crisp, as seen in the same tissue around a cancerous mamma.

111. According to the view of this malady taken by M. CRUVEILHIER, cancer may commence in any part of the rectum, and may assume any form of the cancerous degeneration, from the scirrhus induration to the soft medullary fungus, or encephaloid, or any, or even every form, may be blended in the same case. In women, among whom it is most frequently seen, it is often a mere extension of cancer of the uterus, or, rather, of the vagina, the disease affecting the recto-vaginal septum in such a manner as to render it difficult to determine in which canal it had commenced. It very rarely thus appears to commence simultaneously in the rectum and urinary bladder in men. M. CRUVEILHIER thinks that cancer of the rectum is mostly a local disease; but this is the case only at its commencement, or at an early stage, before the cancerous contamination of the blood and frame generally has taken place.

112. *B. Symptoms.*—Malignant stricture of the rectum is more frequently met with than the simple thickening and induration already noticed (§ 96, *et seq.*). Whatever may be its particular characters—whether scirrhus, sarcomatous, lardaceous, fungoid, or encephaloid—it encroaches upon and narrows the canal of the rectum, so as more or less to obstruct faecal evacuation, and occasion great and constant distress. The patient complains of a dull, fixed, or aching pain at the upper part of the sacrum, with severe shootings, or sharp exacerbations, extending down the limbs, with violent tenesmus, and a sense of weight or bearing down in the part, especially after evacuations, or whatever may cause irritation of the part. Bloody purulent matter, or a puriform sanies, is passed with the stools, which are thin and frequent. In the fungoid variety, discharges of blood may be large and often. Mr. SYME remarks, that though in the early stage difficulty may be experienced in passing the faeces, owing to the thickening of the coats of the gut, yet there is for the most part ultimately rather an inability of retention, from the action of the sphincter being impeded by the progress of the disease.

113. At an advanced stage, the countenance and general surface display more or less of the appearance of malignant cachexia, or a sallow, leaden, or greenish-yellow hue; and flesh and strength are lost, the blood also becoming deficient. On examination per anum, the bowel is found contracted, thickened, and irregular on the surface. The affected parietes are hard and unyielding, and morbid growths are felt projecting into the cavity, in some places in the form of rounded tubercles, in others with rough or ulcerated depressions. These changes may not feel very different to the touch from those which attend simple stricture, excepting in their greater degree; and hence more reliance is to be placed upon the symptoms indicative of malignancy, than upon the sensations furnished by the examination. The acute, lancinating, and paroxysmal pains, extending to the loins, pubis, and thighs; the sense of weight, aching, and numbness in the sacrum, loins, hips, &c.; the aggravation of these upon standing or walking; the irritability of the bladder, or incontinence or retention of urine; the more frequent and larger discharges of blood than in

simple stricture; the bearing down sensation, especially in females; and the general cachexia and anæmia, as the disease advances, sufficiently indicate the malignant nature of the malady. Ultimately hectic, exhaustion, abdominal tenderness, hicough, vomiting, &c., usher in dissolution.

114. *C. Causes.*—This disease may occur at almost every age. Mr. MAYO has seen it as early as twelve years of age. It is most frequently met with between the ages of thirty and sixty. The encephaloid is the variety which is met with early in life; the scirrhus and lardaceous at more advanced periods. Women are certainly more subject to the malady than males, and more especially after the cessation of menstruation. Some local injury, as a blow on or near the part, has sometimes appeared to excite the disease, but generally the particular cause has not been recognised; and it is not improbable that the tendency to the complaint has arisen out of a constitutional vice or tendency.

115. *D. The treatment* of this malady is very unsatisfactory. But, although it admits not of cure, unless in those rare cases in which the anus only is affected, and even in these most rarely, and at an early stage, much may be done in palliating the symptoms, and even in prolonging life. The encephaloid or fungoid variety generally runs a rapid course, especially when it is attended by frequent discharges of blood; while the more cartilaginous, scirrhus, or lardaceous form may last for years. Diluent, emollient, and anodyne injections are generally requisite in this state of disease, in conjunction with those means, internal and constitutional, which I have advised for cancer in other parts. (*See art. CANCER, § 29, et seq.*) Sir B. BRODIE recommends opiate injections, and injections of linseed oil, either in a pure state or conjoined with lime-water, with the view of allaying irritation; he gives alkalies internally, with balsam of copaiba; and he very justly considers the preparations of opium to be indispensable, notwithstanding the inconveniences attending the use of them. Suppositories of conium or of henbane, or of both conjoined, or of opium with camphor, Peruvian balsam, or zinc ointment; mucilaginous injections, containing the chloride of zinc or creasote, with the solution of opium or sirup of poppies; and such laxative, emollient, and anodyne enemata as the state of the case may suggest, especially those with warm olive oil, with small quantities of camphor or balsam, will generally afford considerable relief. According to Mr. CALVERT, much benefit is derived from “carefully introducing a hollow tube of elastic gum, through which the faeces are drawn off by injecting tepid water.”

116. Of internal remedies, I can add nothing to those recommended for cancer in another place. (*See art. CANCER, § 29, et seq.*) The preparations of iron with narcotics, especially the *mistura ferri comp.*, with liquor potassæ, *tinctura conii*, or *tinctura opii*, or *tinctura camphoræ comp.*; or the iodide of iron in sirup of sarza; or the *pilula ferri composita* with the *pilula saponis cum opio*, may be prescribed and varied according to circumstances. As to resorting to excision of the part when the disease is limited to the anus or lower portion of the

rectum, the determination should depend upon the peculiarities and complications of the case. This subject is well discussed in the surgical works referred to, and in Mr. COOPER'S *Surgical Dictionary*.—(For other diseases connected with the rectum and anus, see articles DIGESTIVE CANAL, INTESTINES, HÆMORRHOIDS, HÆMORRHAGE from the Bowels, and DYSENTERY.)

BIBLIOG. AND REFER.—Oribasius, Synopsis, i. ix., c. 17.—Aetius, Tetral., ii. s. ii., cap. 36.—Paulus Ægineta, i. iiii., sect. 59.—Ruyssch, Observat., No. 95.—Vaughan, in Philosoph. Transact., No. 281.—Payne, in ibid., No. 391.—Madden, in ibid., No. 442.—Siermann, in ibid., No. 453.—F. Hoffmann, Consultationes, cent. ii., No. 23.—Wisemann, Chirurg. Treatises, &c., 3d edit. Lond., 1696, p. 234.—Mémoires de l'Acad. de Chirurgie, t. i., p. 540; t. ii., p. 620.—Morgagni, De Sed. et Caus. Morborum, epist. xxxiii., sect. 7.—L. H. J. Duchadoz, De Proctostomia, eust. de morbo Intestini Recti Angustia, 4to. Montsp., 1771.—Sandiford, Museum Anatomicum, t. i., p. 255.—De Haen, Rat. Med. Contin., vol. ii., p. 314.—Graham, in Edin. Med. Commentaries, vol. i., p. 464. (The first to employ *Belladonna* in Dis. of Rectum and Anus).—Péti, Traité des Mal. Chirurg., t. ii., p. 83.—Monteggia, Fasciuli Pathologici. Turin, 1703, p. 91.—Lettsom, in Mem. of Med. Society of London, vol. ii., art. 25.—Sherwin, in ibid., vol. ii., art. 2.—Hodges, in ibid., vol. v.—White, in ibid., vol. vi., art. 17.—M. Baillie, Morbid Anatomy, &c., and Series of Engravings, &c., fascic. iv., t. 4.—J. P. Frank, De eundem Nom. Morbis, &c., i. ii., p. 239.—Reil, Fieberlehre, b. iii., p. 551.—B. Goock, in Edin. Med. Comment. vol. ii., p. 373.—Obersteuffer, in Stark's N. Archiv., b. ii., p. 679. (Carcinoma).—Hey, Practical Observat., chap. ii. (Excision).—Horn, in Archiv der Pract. Heilk. für Schlesien, b. iii., st. 4, n. 2.—W. Hey, Practical Observations on Surgery, 2d ed., 8vo. Lond., 1810.—A. Portal, Cours d'Anatomie Médicale, t. v., p. 250.—Chevratier, in Transac. of Med. and Chirurg. Society, vol. x., p. 401.—E. Home, Observat. on Cancer, &c., 8vo. Lond., 1805, p. 129.—H. L. Thomas, in Med. and Chirurg. Transact., vol. i., p. 129.—Nasse, Die Schleichende der Entzündung des Mastdarms, in Horn's Archiv für Med. Erfahr., b. i. 1817.—A. Monro, Morbid Anatomy of the Gullet, 8vo, p. 347.—J. Henshaw, Practical Observat. on the Symptoms, Discrimination, and Treatment of some of the common Diseases of the Liver, Intestines, and Anus, 8vo. Lond., 1820, ch. iv.—Desault, Œuvres Chirurgicales, &c., vol. iii., p. 380.—Boyer, De la Fissure ou Gerçure de l'Anus, accompagnée du Resserrement spasmodique du Sphincter, in Traité des Maladies Chirurgicales, t. x., 8vo. Paris, 1825.—Beclard, Revue Médicale, &c., t. i. 1825, p. 309, 479. (On the Treatment of Fissure of Anus).—Dupuytren, in ibid. Mars, 1826; et Journ. des Progrès des Sciences Médicales, &c., t. xv., p. 225. (Recommends Ext. of *Belladonna* for Fissure of Anus).—Detzmann, Dissert. de Fistula in Ano, 4to. Jenæ, 1812.—F. Reisinger, Darstellung eines Verfahrens die Mastdarmfistel zu unterbinden, Augs., 8vo, 1816.—T. Copeland, Observ. on the Principal Dis. of the Rectum and Anus, 8vo. Lond., 1814.—W. White, Observations on the contracted Intestinum Rectum, 8vo. Bath, 1822; and Observations on Strictures of the Rectum, and other Affections which diminish the Capacity of that Intestine, 8vo. Bath, 1820.—Richerand, Nosog. et Therapeutique Chirurgicales, 4 vols., 8vo. Paris, 1821.—R. Allan, A System of Pathology, and Operative Surgery, vol. iii., p. 488. Edin., 1824.—G. Calvert, Practical Treatise on Hemorrhoids, Piles, Strictures, and other Important Diseases of the Urethra and Rectum, 8vo. Lond., 1824.—P. F. Blandin, art. Rectum, in Dict. de Méd. et Chirurg. Pratiques.—A. Jukes, A Case of Carcinomatous Stricture of the Rectum, in which the descending Colon was opened in the Loins, 8vo. Lond., 1822.—Köthe, in Rust's Magazine, b. i. pt. ii., p. 259.—Schroger, Ueber die Unterbindung der Mastdarmfisteln, n.s.w. Chirurgische Versuchen, b. ii., pt. i. Nürnberg, 1818.—Larrey, Mémoires de Chirurg. Militaire, t. iii., p. 415.—F. Ribes, in Revue Médicale Histor. et Philos., &c., 1820, livr. i., p. 174.—Mém. sur la Situation de l'Orifice interne de la Fist. en l'Anus, &c., in Mém. de la Soc. Méd. d'Emulation, t. ix.—C. Bell, A Treatise on the Dis. of the Urethra, Vesica urinaria, Prostate, and Rectum, 3d edit., 8vo. Lond., 1832.—Piedagnel et Velpeau, in Dict. de Médecine, t. iii., p. 328.—J. Syme, On Diseases of the Rectum, 8vo. Edin., 1833.—A. Cooper, Lectures on Surgery, vol. ii., p. 333.—Dupuytren, De la Fissure à l'Anus; in Leçons orales, t. iii., p. 282. Paris, 1831.—H. Mayo, Observations on Injuries and Diseases of the Rectum, 8vo. Lond., 1833.—W. Hedenus, Ueber die verschiedenen Formen der Verengerung des Afterdarms und deren Behandlung, 8vo. Leip., 1828.—A. Collis, on Dis. of the Rectum and Anus; in Dublin Hospital Reports, vol. v., p. 131.—R. Liston, Elements of Surgery, 8vo. Lond., 1832, p. 73.—Sanston, Nouveaux Elé-

ments de Pathologie, l. v., p. 152. Paris, 1833.—L. Lisfranc, Mém. sur l'Excision de la Partie Inférieure du Rectum, &c.; in Mem. de l'Acad. Roy. de Méd., 1833, t. iii., p. 291.—A. Costallat, Essai sur un nouveau Mode de Dilatation appliqué au Rétrécissement du Rectum, 8vo. Paris, 1834.—S. Tanchou, Traité de Rétrécissements de l'Urèthre et de l'Intestinum Rectum, 8vo. Paris, 1835.—Langier, art. Rectum, in Dict. de Médecine, 2d edit.—A. Lepelletier, Des Hémorrhoides et de la Chute du Rectum, 4to et 8vo. Paris, 1835.—F. Salmon, Pract. Observat. on Prolapsus of the Rectum, 8vo. Lond., 1831; and Pract. Essay on Stricture of the Rectum, &c., 4th ed., 8vo. Lond., 1833.—J. Houston, in Dublin Hospital Reports, vol. v., p. 158.—B. C. Brodie, Lectures on Diseases of the Rectum, in Lond. Medical Gazette, vol. xvi, 1835, and vol. xviii., 1836.—G. Bushe, A Treatise on the Malformations, Injuries, and Diseases of the Rectum and Anus, 8vo; illustrated by Plates in 4to. New York, 1837.—A. Vidal, Du Cancer du Rectum et des Oper. qu'il peut réclamer, 4to. Paris, 1841.—Velpeau, Leçons orales de Clinique Chirurgicale, t. iii.—J. M. Chelius, System of Surgery. Translated by J. F. South, 2 vols., vol. ii., 328, p. 123. Paris, 1841.—J. W. Ferguson, A System of Practical Surgery, 3d edit., 8vo. Lond., 1846, p. 592.

[AMER. BIBLIOG. AND REFER.—E. A. Vanderpool, Stricture of the Rectum, New York Jour. Med., vol. vii., p. 405.—W. H. De Leon, Case of scirrhus contracted Rectum, &c., Amer. Jour. Med. Sciences, vol. ii., p. 330.—S. Parkman, Case of imperforate Rectum, Amer. Journ. of Med. Sciences, vol. xlii., p. 306.—Alexander H. Stevens, On Fissure of the Rectum, New York Medical Journal, vol. iv., p. 242.—J. W. Heustis, Case of Prolapsus Recti, successfully treated by Excision, Amer. Journ. of Med. Sciences, vol. xi., p. 411.—B. Atkinson, On Diseases of the Recto-vaginal Wall, Boston Med. and Surg. Journ., vol. xlii.; New England Journal, vol. xlii., p. 119.—T. Harris, Lectures on Stricture of Rectum, Medical Examiner, vol. i., p. 79.—A. H. Stevens, Lecture on Diseases of Rectum, in New York Lancet, edited by J. A. Houston, 1842.]

RHEUMATISM.—SYNON.—'Ρευματισμος, a defluxion—from *ρευμαρίζω*, to be affected by a fluxion, from *ρεύμα*, a fluxion, and that from *ρέω*, I flow; *Rheumatismus*, Pliny, Sydenham, Vogel, Juncker, Sauvages, Cullen, Pinel; *Dolores Rheumatici*, Hoffmann; *Myositis*, Sagar; *Myitis*, Chrichton; *Arthrodymia*, Cullen; *Febris Rheumatica*, Auctor. Var.; *Arthritis Rheumatica*, Swediaur; *A. Rheumatismus*, Parr.; *Causa rheumatismus*, Young; *Arthrosia Acuta et Chronica*, M. Good; *Gliederfluss*, *flusskrankheit*, Germ.; *Rhumatisme*, Fr.; *Rheumatismo*, Ital.; *Rheumatism*, *Rheumatic fever*, *Rheumatic pains*.

CLASSIF.—Class 1st. Febrile diseases; Order 2d. Inflammations with fever (Cullen).—Class 3d. Diseases of the sanguineous function; Order 2d. Inflammations (M. Good).—III. CLASS, II. ORDER (Author in Preface).

1. DEFIN.—Severe pains preventing, or remarkably aggravated by, motion of the affected parts; apparently seated in the fibrous structures, chiefly of the large joints, the aponeurotic expansions, and the fibro-serous surfaces; arising from external or manifest causes, and assuming various forms and complications—being sometimes remarkably acute, febrile, or inflammatory, and shifting their situations, often sub-acute, and oftener still less acute, non-febrile, unattended by heat or swelling, of chronic duration, and accompanied with debility or stiffness of the affected limb.

2. Although rheumatism is, owing to geographical and social circumstances, one of the most prevalent diseases in the British Isles, yet is it one respecting the nature and treatment of which there exist the greatest diversity of opinion and the least amount of undisputed knowledge. The remarkable prevalence of the malady, this diversity of doctrine, and the several very important pathological relations suggested to the thinking physician by every man-



ifestation of rheumatic affection, are sufficient to direct investigation to the subject with greater energy than has hitherto been bestowed on it, and with more success than has hitherto signalized it.

3 Rheumatism was not described, or even noticed as a recognised malady, by the ancients, either by this term or by any other, to which the assemblage of symptoms thus denominated can be traced. Yet the word is sometimes found in their writings, although it does not altogether represent the disorder to which the moderns have applied it, this name having been given by the former to affections, to which they attached the idea of a humoral defluxion, conformably with its derivation, especially to those characterized by mucous or pituitous discharges.\* One of the earliest writers among the moderns, who employed this term according to its modern acceptation, treated of the subject in connexion with *catarrh*, an affection to which rheumatism is closely allied, and with which it is often complicated. (See J. VIGIER, *Tract. de Catarrho Rheumatismo*, &c. Geneva, 1620. In HALLER's *Biblioth. Med. Pract.*, t. ii., p. 376.) SYDENHAM, however, was the first to treat fully of rheumatism, and to distinguish it from gout, with which it had been frequently, if not generally, confounded by former writers under the name of *Arthritis*. Subsequently BOERHAAVE, HOFFMANN, and JUNCKER described the disease with tolerable accuracy; but it was not until the end of the last and the commencement of the present century that the various metastases and pathological relations of rheumatic affections received even a partial notice.

4. I. DESCRIPTION.—Various forms of rheumatism have been described by authors, or, rather, several states of disorder, more or less intimately allied to each other, have been ranked as varieties of this disease, although certain of them might have been placed, with greater propriety, under a different category: thus the pains in a limb or limbs caused by organic disease of the nervous centres, and the sympathetic pain produced by hepatic congestion, &c., have been often mistaken for rheumatism, and described and treated as such. Since, or at least soon after, the first notice of rheumatism as a distinct disease, two remarkable forms of it have been admitted—the *acute* and *chronic*. Recent observation has recognised the varieties of the complaint and the pathological distinction between certain of its states with greater accuracy; but there has been a greater disposition also among observers to multiply distinctions than to point out alliances and pathological relations. The division most generally adopted of the forms of rheumatism has been that founded upon the severity and duration of the attack. It is almost identical with the foregoing, the term *sub-acute*

being employed to mark intermediate states of severity. If the division into *acute*, *sub-acute*, and *chronic* be not arbitrary, it is at least conventional; but it has this recommendation, that it is simple, and involves not theoretical or pathological doctrines, nor necessarily suggests ideas as to the seat and extent of morbid changes, which vary remarkably in their associations and concomitants, in different cases, and even in the same case at different periods.

5. More recently, a pathological division has been attempted, in which distinctions are based on conditions that are contingent, varying, and uncertain; and qualitative or adjective terms have been applied as distinctive of varieties, derived from the names of the tissues, which are assumed to be the seats of the particular forms of the malady; thus we have had rheumatism denominated *capsular*, *muscular*, *periosteal*, *neuralgic*, &c., the meaning implied being that the capsules of the joints, the muscles, the periosteum, &c., are the seat of disease in each of these varieties which are respectively thus designated—an assumption at the best, and requiring proof even as respects the partial affection of these tissues, as will appear in the sequel. Instead, however, of adopting a division which is more specious than real, I shall take the one already very generally employed, and which is the most convenient for practical purposes, namely, the *acute*, the *sub-acute*, and the *chronic forms of rheumatism*.

6. I. ACUTE RHEUMATISM.—*Febrile Rheumatism*.—*Rheumatic Fever*.—*Inflammatory Rheumatism*.—This form of the disease is generally ushered in with rigours, or shiverings, or chilliness, followed by increased heat, and the usual febrile symptoms of an apparently inflammatory or sthenic character. Co-ordinately, and often contemporaneously, with chills or rigours, severe pains, impeding or altogether preventing motion, are felt in the limbs, affecting chiefly the joints or aponeurotic expansions, or tendinous sheaths, and sometimes extending in the course of the muscles, &c. As febrile reaction is established, the tongue becomes furred or loaded; thirst urgent; the pulse quick, open, bounding, and full; the bowels confined; the skin hot, at first dry, but afterward perspiring freely; the urine scanty, high-coloured, depositing no sediment, and very acid; the appetite impaired; and sleep prevented by the aggravation of the pain during the nocturnal exacerbation of fever. The seat and character of the pain vary in different cases, and even in the same case in different periods. Generally, at first, the pain is confined to the large joints, as the knees, ankles, elbows, shoulders; or to the aponeurotic expansions covering the large muscles; or it extends to both the joints and these expansions, attacking them either simultaneously or in quick succession. Less frequently parts of the trunk of the body, as well as one or more limbs, are so severely affected as to render the patient helpless and almost motionless. The pain, according to its situation, is most acute, severe, plunging, tearing, burning, gnawing, girding, tense, or lancinating; it is more or less constant, but exacerbated at intervals, and during the night, and by the slightest movements of the affected parts, or even by touching or pressing them, so that the pressure of the bed-clothes is hardly endured.

\* "Si HIPPOCRATEM, GALENUM, ARETÆUM, PAULUM-QUE ÆGINETAM GRÆCOS, sive CELSUM, AURELIANUMQUE SCRIPTORES ROMANOS accuratè evolveris, quod hunc morbum indubitè designat, nihil dilucidè enodatèque descriptum invenies. PLINIUS (l. xxii., 47, 68; l. xxv., 39, 47) quidem Rheumatismum nominavit, in morbum eo nomine non omnino attingit. Sunt tamen apud eos loci, qui tamen invaliditatem quasi obiter indicant, quippe qui ei πυρετον κοπιωδως et διαβεβαιον φερονται, et alia hujusmodi nomina indicant. Quæ res quidem, hunc morbum antiquioribus nec prorsus ignotum fuisse, nec dum tam frequentem, quam hodie, ob oculos venisse, nobis plane demonstrat."—(J. Copland, De Rheumatismo, 8vo. Edin., 1815.)

When the joints are chiefly affected, the acute pain is often followed by increased heat, and after a time sometimes by an erythematic blush of inflammation, but more generally by swelling, rendering the joint fuller, rounder, and more manifestly swollen. The swelling is owing either to serous effusion and capillary fulness of the cellular tissue external to the fibro-serous tissues of the joint—the chief cause of it in acute rheumatism, or, more rarely, to serous effusion within the cavity of the joint, which more frequently occurs in the sub-acute form of the complaint. Neither the redness nor the swelling is followed by suppuration, unless in cachectic or scrofulous habits of body, and even in those not until erosion or ulceration of the cartilages of the affected joint takes place—an event most probably produced by changes in the fluid effused into the cavity during low grades of vital power or reaction.

7. In acute rheumatism, the fever is sthenic or inflammatory, more in appearance than in reality, and generally presents the usual concomitants of this fever, with remarkable severity of pain, which is always disposed to shift its place; this disposition even being the greatest, or occurring most frequently, when the exacerbation is the most severe. All the febrile symptoms, and even the pain itself, manifest more or less of a *remittent* character. This circumstance is of importance as respects both the nature and the treatment of the malady. The pulse is excited, broad, open, bounding, compressible, and sometimes full, varying commonly from 84 to 100 during the day, but rising generally to 96 or even up to 112 during the night. In some cases slight chills usher in the evening exacerbation of fever, and occasionally the symptoms are more severe on alternate days, especially in some localities. The veins are generally full, and blood taken from them furnishes a firm coagulum covered by a firm, thick, buffy coat, which, by its contraction from the circumference, renders the upper surface of the coagulum more or less cupped. This state of the blood continues, notwithstanding the frequent repetition of blood-letting, the coagulum becoming smaller in relation to the amount of serum. (*See* § 60, *et seq.*)

8. The secretions are all impaired or changed at the commencement. The tongue is either loaded or furred, or both; the mouth is clammy and dry; and thirst is generally experienced and increased during the night. The bowels are confined, unless fecal accumulations have formed from neglect, when they may become loose from the irritation thus produced. The urine continues scanty and high-coloured until the febrile action begins to subside, when it deposits a copious sediment, of a brownish-red colour, resembling brick-dust. The skin is dry at first, and generally continues dry during the day and early part of the night; but as the nightly exacerbation of pain remits towards morning, the skin becomes moist, and a profuse perspiration breaks out, but without any remarkable or permanent alleviation of the pain. The perspiration is generally unctuous, emitting a peculiar acid odour, and continues profuse for a considerable time, especially if the patient is placed between blankets or partakes freely of warm diluents. In this case the perspiration may throw out a milinary eruption on the skin.

9. These symptoms, if not affected by a perturbing treatment, or if no internal metastasis occur, generally continue about fourteen days, or even longer, when some mitigation of their intensity occurs. Although the pains have subsided, still the patient feels them when he moves the affected parts, and they generally return, but in a less severe form than before, during the night. The parts affected, even when the pain has disappeared, continue very weak, and the patient is indisposed to use them, from a feeling of inability to exert them. The frequency of the pulse and the other symptoms subside; the urine is more abundant, paler, and more turbid on cooling, and deposits a sediment; but the perspiration often still continues unctuous and offensive, and more or less profuse. If the fecal evacuations and biliary secretions now become copious and natural, the urine more abundant, less acid, the sediment more copious, and the sweats more free, less unctuous, and have less of an acid and offensive odour, the nightly exacerbations being more slight, or nearly disappearing, the disease subsides favourably, and debility chiefly characterizes convalescence, which is the more rapid and the less likely to be followed by the sub-acute or chronic states of the disease, or by relapse, the more fully the several secretions are restored; the cleaner and more natural the tongue, and the more completely the primary and secondary assimilating functions are discharged. If, on the contrary, the amendment stops half way—if it be arrested, the tongue continuing loaded or furred; the urine acid or scanty, or much loaded; the perspiration offensive, enfeebling, and unsatisfactory; and the pulse still frequent, this state of the disease will generally pass into the *sub-acute* or *chronic*, or into both in succession, and in either these forms continue an indefinite period.\*

\* The following description is more minute, as respects certain points, than the above:

"*Illic morbus ab horribus plerumque sensuque lassitudinis; interdum et a frigore incipit. . . . Antequam febris, et ulla ejus indicia accesserint, agroti plerumque per triduum quadriduove, loca certa aliquantum dolent. Indicia tamen febris unum aut alterum diem dolores constantes nonnunquam præveniunt. Dolor, qui alios alio pacto, nec eundem eadem ratione semper occupat, febre ingravescente excurrit. Partes tamen quibus nervi, vi movendi e voluntate præditi, suffunduntur, et cæli mutationibus objectas, potissimum infestat. Quapropter membrorum superiorum inferiorumque, ut et dorsi et cervicis musculi articuli que, maximè Rheumatismo laborant. . . . Articuli majores plerumque dolent: dolor aliàs unum et alterum, aliàs plures quoque angit; nec in articulos solum, verum etiam in musculos aponeurosesque tendinosas imperium exerceat: movendo adaugetur: et partis dolentis rigiditas sentitur. In hoc morbo dolor nunquam constans, nisi ubi nulla neu minima quidem febris calore comitata adsit: nec eo tempore nisi quandam certum locum obtinet. Veruntamen, et notæ febris augentur, hæc illac ex alio in alium per musculos locum transiliunt dolores, alium ex alio appetentes, et unde exorti, eodem recepti domicilium figunt suum.*

"Febris ejusque habitus huncce morbum comitans, sub vesperem ingravescit; dolor per noctem pene opprimit, quo tamen tempore sedem mutare assolet. Nec vero dolor semper nec pyrexia se invicem ex æquo subsequuntur: signa enim febris, et e plurimis exemplis liquet, nequaquam augeri videntur.

"Inter agrotandum sudores sæpè partes, rari quidem et raro totum perfundunt corpus; nec sublevant angorem nec *xplov* proferunt; verum enim verò dum cæterum corpus multo perfunditur sudore, pars, quæ dolet, sæpè numero siccatur; sæpè tamen inter morbi dissectionem, articulus discruciatu sudoribus plurimis suffunditur. Postquam dolor aliquamdiu duraverit, pars corporis parum sincera tumescere, nec ita multò post, rubescere incipit. Plurimum tamen tumoris sub specie oedematisa



10. ii. SUB-ACUTE RHEUMATISM.—*Rheumatismus sub-acuteus*; *Semi-acute rheumatism*, *Rheumatismus semi-acuteus*, FOWLER.—This variety of the disease may be merely a sequence of the acute, or it may occur primarily. In either case it is a state of disease intermediate, as respects severity, duration, &c., between the acute and chronic, the term sub-acute being used conventionally to mark the grades or phases between the more extreme forms of the complaint. When the sub-acute state appears primarily, it is very seldom ushered in by either chills or rigours; nor is it attended by well-marked fever, unless at night, when more or less often, only a slight degree of fever and heat of skin are experienced, generally commencing in the evening and going off with perspiration in the morning; and during this febrile period the pains are generally most severe. The pains are felt in either the extremities, the trunk, or head; most frequently at first in one limb, and then in another, or in two or more joints of the same limb; as the knee and the ankle, or the elbow and wrist; more rarely both knees, or both ankles, or elbows. In some instances the pain flies from one joint to another, affecting different articulations, or aponeurotic expansions, in quick succession, as at an early stage of acute rheumatism; but in other cases it is stationary for some time, either in the joint or the limb, or the part of the trunk in which it is either at first or soon afterward seated.

11. This form of the disease, although differing from the acute, chiefly in the mildness of the symptoms generally, is not altogether without fever. During the evening and night, the pulse generally rises from 70 to 80 or 90 beats, becoming also fuller and broader, and the heat of the skin is increased. During the night thirst is often complained of, and the mouth is somewhat dry and clammy. The tongue is white, or loaded, or furred. The alvine excretions are scanty and morbid; the urine is scanty, dense, high-coloured, very acid, and deposits a pink or brick-dust sediment. When the patient falls asleep, or towards morning, the skin becomes covered with a warm unctuous perspiration; and he is remarkably susceptible at all times of cold, even when he is hot in bed; and if he be at all exposed to currents of air, the pain often is aggravated, or it shifts its seat, or the joints become more stiff and painful. Although the bowels may not be remarkably constipated, the biliary secretion is seldom healthy, the liver evincing more or less torpor, with retention of the secretion in the ducts and gall-bladder.

sine ullo rubore, frequenter adest. Partes, in quas rheumatismus acutus imperium exercet, semper dolent, tactuque refugiant. Inflammatio tumorem, de quo meminimus, subsequuta, haud exiguum doloris partem sæpe submovet. Sub hac forma statque, hicce morbus in circiter decimum quartum diem durat; nec exempla desunt, in quibus modò in alteras atque etiam paulò amplius extenditur, modò plures nundinas superat.

“Terminatio.—De illa Rheumatismi acuti forma, quæ felicissimè decedit, nihil est, cur multum moremur; autem observandum est febris indicia, plerumque sub diem decimum quartum sensim decrescere: dolorem ipsum obtusiorum et constantiorem faciem minus mordere: unum et alterum articulum tantummodò afficere, et paucis post diebus ex toto quiescere: hoc pacto Rheumatismus nonnunquam, sæpe febrem ultra destitit. Dolorem, nullà medicorum ope adhibita, rariùs abire: in uno et altero etiam exemplo dolorem febrilemque sub idem tempus inveniri desinere: illum autem febris signa longè frequentius subsequi.”—(J. Copland, De Rheumatismo, p. 7-9.)

der. The appetite is somewhat impaired, and digestion slow or difficult, and attended by flatulence. Even when the patient is able to move about during the day, the aggravation of the pain, and the presence of fever during the night, may be such as to deprive him of sleep, or to allow him only broken slumbers, especially towards morning, for a long or indefinite time—generally for a period prolonged beyond that of acute rheumatism, or for several weeks. At last the disease is either subdued or it lapses into the chronic, but it is rarely superseded by an acute attack.

12. Sub-acute rheumatism is seldom accompanied by redness of the affected part. More frequently there are heat and swelling; often swelling without marked heat of the part; and then the patient complains of stiffness, and even of coldness of the joint. It is not often that more than two parts are simultaneously affected with this form of the disease, and it is more fixed in a part than acute rheumatism, and is much less disposed to metastasis. It is often, however, remarkably obstinate, and seldom evinces any disposition to amendment until the excretions are improved and the tongue becomes clean. In this form of rheumatism, also, the blood taken from a vein is often more or less capped or covered by a buffy coat.

13. The sub-acute is one of the most frequent forms in which rheumatism occurs in the dark races, whether in the eastern or in the western hemispheres, the disease rarely assuming in them the truly acute character. It is one of the most prevailing diseases among the natives of the various countries of the East, and among the native troops in the service of the East India Company. The symptoms and progress of this form of the complaint are the same in these races as they have been now described. Mr. MACCOLLSON, whose remarks on this disease, as observed among the sepoys, are very instructive, states that “the pains are worse in bed; but, whatever may be the case in Europe, it is not the heat of the bed-clothes that causes this, as they come on frequently when the sun gets low, and continue for the early part of the night.” This remark confirms what has been stated above, that the exacerbations of the pain are intimately associated with the return or aggravation of the febrile symptoms; this connection admitting of a ready explanation when the causes of the disease come under consideration, especially those which are dependent upon locality and climate.

14. iii. CHRONIC RHEUMATISM.—*Rheumatismus Chronicus*; *R. Diuturnus*; *R. Longus*, Author.—This form of the disease may follow either the acute or the sub-acute, these gradually lapsing into the chronic state; or this last state may be the primary disease, proceeding directly from the causes usually producing either of the forms of the complaint already described. I have remarked that the term sub-acute is merely conventional, and is intended to convey the idea of some intermediate state between the acute and chronic; hence, while it may be difficult to distinguish between the acute and sub-acute conditions in many cases of the disease, it may be equally difficult to distinguish many instances of the chronic from the sub-acute. There cannot, owing to the nature of morbid actions in relation to peculiarities of

constitution, be any line of demarcation drawn between either. If it were possible to Daguerreotype disease, the likenesses even of the same malady, taken in the numerous cases and phases in which we observe it, would hardly furnish two or three of them quite alike, however numerous might be the portraits obtained. How strenuous soever may be our endeavours to state the truth—to describe with accuracy phenomena which vary not only in different cases, but even also in the same case at different periods—we can only approach to the truth; and, even to make a tolerable approach, numerous circumstances, states, changes, and things must be mentioned, which to the superficial and unthinking may appear unnecessary or irrelevant. The terms *acute*, *sub-acute*, and *chronic*, in relation to rheumatism, must not be viewed as marking either *dynamic conditions*, or *peculiarity and limitation of seat*, or *duration of disorder*, local or constitutional, or certain *qualifying properties*; but these collectively, in connection also with *grades of severity*, between which grades, thus associated, and otherwise *variously complicated and characterized*, no line of demarcation can be drawn, however minute and conventional may be the subdivision; each state, condition, variety, or form insensibly passing into that which is the nearest to it in the scale of morbid action or structural change.

15. A. When chronic rheumatism succeeds to the acute or sub-acute, the febrile symptoms attending these forms have subsided, and with them the severity of the pain. The secretions and excretions, especially the alvine, have, however, not returned to a natural or healthy state; and the tongue and mouth are generally dry and clammy in the morning, the former being also more or less loaded. The pains\* in the limb or joint assume more of an aching, gnawing, or boring character; and sometimes, instead of being aggravated at night, as is most frequently the case, they are often relieved by

the warmth of bed. They are commonly now more fixed and continued, or less remittent, but much less severe, and are most frequently experienced in the shoulder, elbow, knee, and ankle; in the occipital or cervical region, in the lumbar or dorsal region, and in the ischio-gluteal region, in the wrists, and in various other parts, according as they may have been most affected previously, or exposed to external causes. Frequently, however, the pain remits in the morning or during the day, and returns with evening or night; but this, in some measure, depends upon the causes or circumstances of the case. If the part had previously been the seat of increased heat, redness, or swelling, these, especially heat and redness, have entirely disappeared before the chronic state had supervened, although slight swelling may still remain. As the disease continues, the pains generally abate or intermit; exacerbations, or returns of them, occurring frequently from vicissitudes of temperature, weather, or slight exposures. The parts, however, still remain for some time stiff or weak, especially if the biliary and intestinal secretions be scanty or disordered.

16. B. When chronic rheumatism appears primarily, and often, also, after acute or sub-acute attacks, there is neither redness, nor increased heat, nor swelling of the affected part; sometimes there is even greater coldness than natural. The pain is dull, aching, or gnawing; often but slight, generally increased on motion, and attended by a feeling of weakness of the part. Frequently it is described as gnawing, boring, or merely a soreness, seated deeply, and affecting the bones. It is often remittent or intermittent; but it is often also continued, or almost constant, for a time. When it presents the former states, it is generally mitigated or removed by the warmth of bed, especially in the morning, and by a free perspiration. In some instances the pain is slight, rarely becoming severe; but, although slight, it is attended by pain on motion, or a feeling of weakness, or inability of motion when first attempted; and yet, when the attempt is made energetically, and continued so as to accelerate the circulation and promote a free perspiration, the pain is relieved or altogether removed for a time.

When chronic rheumatism is thus primary, it is generally alleviated by pressure and by warmth; and it most frequently attacks, unless in cases where currents of cold air or other causes have acted directly on the affected parts, those joints or places which had previously been the seats of dislocation, contusions, or other serious injuries.

17. C. *Chronic Rheumatism of Joints; Chronic Rheumatic Arthritis; Chronic Rheumatic Gout. —Arthrodynia, CULLEN.—Rheumatic Nodosities of the Joints, HAYGARTH.*—The causes of rheumatism, when acting chiefly upon a joint or extremity, often occasion a chronic state of the disease remarkable for its obstinacy, and often serious as respects the consequences. After exposure to cold and humidity, or to currents of cold, humid, and miasmatic air, a joint, especially the knee-joint, the ankle, the hip-joint, elbow, or shoulder, is attacked by a sense of gnawing, aching, of soreness, fulness, stiffness, and an incapacity of moving without acute pain, or an increase of these feelings. The

\* "Dolor obtusè angit: movendo exardet: articuli ipsi obtusam et perpetuam molestiam sentiunt: frigent; neque cætero corpore sudoribus diffulente, sudant; sin sudent, sudoribus frigidis et tenacibus perfunduntur. Verum in eodem loco dolor plerumque constat, frigore multum adauctus, calore vel tepore quoque imminutus; præsertim si lecto æger recumbat. Rheumatismus longus premendo levatur, degravatur acutus.

"Longus plerumque maximos corporis articulos, humeros scilicet et coxas, nec dorsum raro invadit: Quum his in corporis partibus aliquamdiu permansisset, in alias transit. Pars, quæ doluerit, morbo amoto, imbecilla et rigida perdū manebit, et in superiorem dolorem, eam si intemperies quidquam moveatur, facillè incidet. Rheumatismus etiam longus, statas remissiones si exicipias, aliquot menses, vel annos, immo et maximam vitæ partem, hoc pacto exercubitat.

"Partes dislocationibus, luxationibus et contusionibus antea laborantes, vel prioribus ægrotationibus debilitatas, partibus antea integris prætermisiss, infirmare solet. Rheumatismus dorsi coxæque musculos aggressus, ne amoveatur, in multum renititur, et tunc quidem sexum masculinum quam muliebrem sæpius aggreditur.

"Dici non potest ut longus in acutum permuteur. Quidam, qui istuc sæpius inciderint, ibique diu laboraverint, ad articuli hydropem sæpè perveniunt. Manifesta quidem res est, membri imbecillitatem affecti, et remissionem exhalentem que in ligamenta capsularia ferant, necessarium inde exortam eam excitare. Hydarthrum quoque in scrofulosorum articulis sæpè gignit. Rheumatismus prælongus prægravisque articuli ἀρχυλωσιν nonnunquam afficit.

"In sectis horum cadaveribus, qui diu sæpiusque hoc morbo laboraverint, quique eodem (qui quidem perpauci sunt) obierint, articularum membrane crassescunt et adherescunt; quasi glutinamentum tendinum thecis infunditur."—(*Op. cit.*, p. 10–13.)



complaint generally continues for weeks, and, if neglected during this time, often for months, either without alleviation, or becoming much worse; the patient ultimately being unable to extend the affected limb, at least without extreme pain. The soreness, stiffness, and pain generally extend from the joint, along the fibrous structures, to a greater or less extent, the limb thus becoming the seat of severe pain. This form of rheumatism may continue for months, and at last give rise to disease of the cartilages of the joint, and its usual consequences. One of these is absorption of the cartilages, and the deposit of a smooth, ivory-like substance. Dr. CRAIGIE observes that, although this form of the disease commences in the aponeurotic expansions, it is disposed to pass from these to the periosteum, and to produce chronic morbid action both in it and in the interior of the articulations. This action occasions the removal of the synovial membrane and cartilages, and deposits in their place a porcelain-like substance, polished, but devoid of the elasticity of cartilage and of secreting power.

18. This is one of the most common forms of the rheumatic disease. It has been most ably treated of by Dr. TODD. Mr. ADAMS has denominated this affection "*Chronic Rheumatic Arthritis*," and has given a minute description of the lesions produced by it. Dr. COLLES, Mr. WILMOT, Mr. CUSACK, Mr. R. SMITH, and M. CRUVEILLIER have also devoted much attention to this very important form of chronic rheumatism. Dr. TODD justly remarks, that this affection of the joints, even when most severe, rarely causes immediate destruction of the articular textures: suppurative or ulceration seldom occurs, and when they do, he thinks that they proceed from a venous inflammation coming on in the course of the disease. The joints, however, do not always escape without serious change; for not only may the disease run on, uninfluenced by any mode of treatment, but exertions of the limb, and the painful use of the affected joint, may induce inflammation in its usual form, if it had not even previously existed, and all the effects which commonly follow it.

19. The immediate effects of the rheumatic complaint are commonly confined to the ligament of the joints, to the periosteum of the articular ends of the bones, and to the tendons of the muscles inserted into them; but these effects sometimes extend to the fibrous fasciæ. These textures, as Dr. TODD very correctly observes, become thickened, lose more or less of their natural flexibility, and I may add that they are impaired in their tonicity and vital cohesion. They are also more opaque. The synovial membranes are also thickened, evidently by an effusion of lymph in the synovial areolar tissue. In some cases the affection of the joints is followed by effusion of fluid into the synovial cavities, the pain being aggravated by pressure, but more by motion. If the effusion be moderate, it may alleviate the pain; if it be very great, the pain is chiefly the result of distention, but is then rarely so severe as previously to the effusion. This affection is most common and most marked in the knee-joints; but although it sometimes is seated in both knees simultaneously, it is rarely equally severe in both. Dr. TODD very justly observes that these changes are seldom the result of a single

paroxysm, but generally ensue from frequent attacks, or upon the long continuance of the rheumatic diathesis. In these respects, the analogy with gout he considers obvious. "And, although we have no evidence of such deposits in rheumatism as the chalk-stones of gout, there are abundant indications that rheumatic matter cannot be attracted to the joints in any quantity, or with frequency, without impairing, to a material extent, the nutrition of their textures." (P. 164.) Without, however, disputing at this place the existence of a "rheumatic matter," the alternative of a modified vital action—a morbid or altered condition of organic nervous influence and sensibility, and a consequent change of vascular action and of nutrition—ought not to be left entirely out of view.

20. The change of the articular cartilage, which I have briefly noticed above, is very fully described by Dr. TODD, who states that it consists of a process of absorption, taking place slowly, during the commencement of which this tissue appears to divide into a number of fibres, vertical to the surface of the bone. This change resembles that produced by long maceration of articular cartilages; and depressions or grooves may be seen which gradually enlarge, unite, and leave portions of the bone uncovered. As the articular surfaces of the bones are thus deprived of their cartilaginous coverings, the pressure and friction sustained by them cause them to assume a smooth and polished surface and appearance, resembling that of very dense polished ivory. While the absorption of the cartilage, and the consequent change in the articular surface of the bones are proceeding, the bones themselves near the affected joint become enlarged, chiefly by an exuberant ossific deposit around and near to the articular extremity, causing both some deformity and a mechanical obstacle to the movements of the joint. These osseous deposits are seen irregularly about the joint, and vary in shape and size. The alterations in the synovial membrane are also remarkable. This membrane is thickened and prolonged at various points into fringes or villous processes, which are soft, and of a red colour, and dip into and completely occupy depressions around the neck of the bone. Small cartilaginous bodies, of an irregular shape and size, are sometimes found in rheumatic joints. They are either loose in the cavity of the joint, or attached by pedicles formed by the synovial membrane to the inner surface of the ligaments or to the articular surfaces. These changes cannot, I conceive, be ascribed to inflammation, but rather to a morbid nutrition, consequent upon altered organic nervous sensibility and influence in the joint, and upon the morbid state of the synovial secretion.

21. This disease of the joints, generally consequent upon prolonged and repeated attacks of chronic rheumatism, is most prominently manifested in the hip-joint; and, as occurring in this situation, it has been described by SANDFORD, BOYER, B. BELL, and more recently by Mr. ADAMS, Mr. R. SMITH, Mr. CANTON, and Dr. TODD; but, as the last-named writer remarks, this disease does not spare any of the joints. It affects all the large joints; and it has been met with in the hands and feet, in the temporomaxillary joints, and in some of the vertebral articulations. It may show itself in early

life, as well as at more advanced periods; but it is most common after thirty years of age, and among the labouring poor who are much exposed to vicissitudes of season and weather.

22. This form of the disease may affect several joints, but whether one or more joints, it is more rarely even remotely consequent upon acute or sub-acute rheumatism than upon repeated attacks, or it has followed several returns of the more chronic affection. The painful symptoms characterizing this form are aggravated at night, and by vicissitudes of weather, especially by easterly winds, by cold and humid states of the air, and by derangement of the biliary and digestive organs; and they often extend to adjoining parts.

23. When the *hip-joint* is the seat of this disease, both the acetabulum and the head of the femur become altered in shape, the former being deeper and wider than natural, the latter being flattened and expanded, and assuming a turnip-like shape, or being lengthened into the form of a cone. "Both surfaces are deprived of cartilage; the fatty body, which in health occupies the non-articular portion of the acetabulum, and the ligamentum teres, disappear; and the churning is apparent to a greater or less extent over both articular surfaces. There is more or less of the exuberant osseous growths around both the acetabulum and the head of the femur; but the most remarkable feature is, that the neck of the femur is shortened, so that the position of its head with respect to its shaft is sometimes considerably altered. So remarkable is the change in the general shape of the upper extremity of the femur, that a bone thus altered has been not infrequently mistaken for an example of united fracture of the neck of the femur." (TODD, p. 174.)

24. In this disease of the hip-joint the affected limb is much shorter than the other, and the patient appears lame. Sometimes he merely rests the toes on the ground; and if he comes down on the sole, he appears the more lame. The foot is wasted, as in fracture of the neck of the femur. As rotation is so painful as to be almost impossible, walking is attended with circumduction of the pelvis with the affected limb, the muscles of this limb being more or less wasted, and the nates of the same side flattened. The weight of the body on the affected joint occasions much pain in it; while the reclining posture affords ease. Mr. ADAMS states that this disease, when fully established in the hip-joint, rarely or never extends to the other articulations, and doubts its rheumatic origin in some instances. Dr. TODD remarks, that in some of the cases traces of rheumatism have not been apparent in the previous history; but that he has not himself met with a case in which complaint has not been made of pains of a rheumatic character in some of the other joints, although further signs of disease of the articular textures were wanting. Mr. ADAMS admits that this disease may have a rheumatic origin; but that falls on the great trochanter often give rise to the first symptoms. This, however, is no proof of the independence of the disease of the rheumatic diathesis; for the fall may be only the exciting cause or determining agent of the local affection. This form of rheumatism of the hip-joint attacks much more frequently the male than the female sex; while

chronic rheumatism of the hands most frequently affects females.

25. Chronic rheumatism of the hands often produces much deformity of them. All the joints are liable to be affected, and the fingers are generally most deformed. "Besides the wearing away of the cartilages, the ossific growths, and the ivory-like surfaces, the joints become dislocated, and the fingers are drawn more or less out of their natural position; they are generally drawn forcibly over towards the ulnar side of the hand, overlapping each other, the innermost fingers being in a state of flexion." The extremities of the metacarpal bones are often much enlarged, and the carpus preternaturally convex in the dorsal aspect, owing to thickening or distention of the synovial bursa. Both hands are generally affected, and sometimes, also, other joints. Dr. HAYGARTH states that the disease is almost peculiar to women, and commonly appears about the period of the cessation of the menses. Out of thirty-three women in whom he observed it, only three had it during the period of regular menstruation. It first appeared, in most of the cases, between the ages of fifty-one and sixty; he observed it only in one man. (See *Op. cit. on Nodosity of the Joints*, p. 152.) I have, however, seen three instances of this affection of the hands in females between the ages of thirty and forty-five, and in all these the catamenia were irregular, generally scanty and difficult.

26. IV. OF THE LOCAL AND STRUCTURAL STATES, OR THE SPECIAL SEATS OF ACUTE AND SUB-ACUTE RHEUMATISM.—It has been already contended by Dr. F. HAWKINS, and more recently by Dr. MACLEOD, that rheumatism presents certain differences, according as it is seated in the *fibrous* or in the *synovial tissues*. Dr. HAWKINS thus distinctly states this doctrine, and in so lucid a manner as to deserve especial notice. In the *first class* of tissues, he ranks, 1st. Those which serve to connect parts together, as the tendons and ligaments, and the aponeurotic expansions of tendons; and, 2d. Those which divide and envelope particular organs, as the muscular fasciæ and enveloping aponeuroses; the periosteum; the fibrous coats of the nerves; the membranes which have on one side a serous lining, as the dura mater and pericardium; also the fibrous sheaths of the tendons and capsules of those joints which are provided with fibrous capsules, and the ligaments surrounding other joints; and the membranes which have a mucous covering spread over them, &c. In the *second class* he includes, 1st. The sub-cutaneous hursæ, to which the epithet *mucosæ* has been improperly added; 2d. The synovial sheaths of the tendons; and, 3d. The synovial capsules of the joints.

27. A. In the *first class* of structures the fever and constitutional disturbance are much greater in proportion to the degree of local inflammation than in the other; and Dr. HAWKINS considers that the heart and pericardium are chiefly prone to sympathize with the affection of the fibrous structures.

28. B. Rheumatism of the *second, or synovial class* of textures, is indicated by the situation, the degree, the character, and the form of the swelling, which is much greater, and occurs earlier, than that which is caused by rheumatism of fibrous structures. The swelling in



rheumatism affecting chiefly the synovial membrane is that of a circumscribed fluctuating tumour, modified by the surrounding ligaments. There can be no doubt of rheumatism being more acute, and more disposed to associate with it disease of the heart, where the fibrous tissues are its chief seat, than where the synovial structures are chiefly attacked, in which latter case the disease usually assumes a sub-acute form.

29. Dr. Todd remarks, that "some practical physicians have endeavoured to make a distinction between what they call synovial or bursal rheumatism and fibrous rheumatism. The natural history of the disease, however, does not warrant this distinction; for in no instances of rheumatic fever are the synovial membranes free from irritation, as evinced by the existence of effusions; and the synovial membranes can scarcely be affected without involving the fibrous tissues which surround, support, and convey the blood-vessels to them." There is certainly much truth in this remark; yet the distinctions made by Dr. HAWKINS are not without some foundation; for, although there is generally an extension of the morbid action from one tissue to another, or even co-ordinately to both, in some instances, nevertheless there is often a predominance of it in the one over the other. Viewing the rheumatic disease as altogether constitutional, although expressed more especially in particular structures, it cannot be denied that the disease assumes a more acute form, and peculiar and even more extensive associations, when predominating in non-secreting fibrous tissues, where no portion of the *materies morbi*, admitting this to exist, is effused, than when chiefly affecting a secreting surface allowing the effusion of a portion of the fluid, which fluid, when retained in the circulation, probably serves to aggravate, perpetuate, or even to complicate the attack; but, when effused, tends chiefly to aggravate or perpetuate the local affection.

30. That the fluid which is effused in the cavities of joints, during acute or sub-acute rheumatism, abounds in materials of an injurious tendency if they were retained in the blood: that it contains more of a morbid material than in some other circumstances, is manifested by the sensible qualities of the secretions and excretions generally in this disease; and it is by no means improbable that the morbid effusion, especially when long retained in the cavity of the joint, and thereby rendered still more morbid, exerts an injurious effect upon the synovial membrane, upon the cartilages, and even upon the capsules and more external structures of the joints. One of the great errors of modern writers on rheumatism is the attempt to ascribe its several forms to a special affection of certain tissues; to view the several varieties of the disease as resulting from their respective local affections; to consider a local and contingent manifestation of a constitutional malady as the malady itself, a local manifestation which is always various, constantly varying, differently associated, often singularly complicated, and which, however severe in any of its seats or complications, is the painful result of pre-existent morbid conditions of a much less sensible and obvious kind; the local and more external expression of a constitutional malady to which

our pathological investigations, as well as therapeutic indications, should be more particularly directed.

31. When the *synovial membrane* of the joints is the chief seat of acute or sub-acute rheumatism, the symptoms are not so acute, but more persistent than when the fibrous tissues are mainly affected. Although two, three, or more joints may be at first attacked, a more limited number, or only one, becomes the principal seat of the disease, and the effusion into the joint is often increased. It is extremely probable that the fluid then effused is not merely an increased quantity of synovia, but that this fluid is more or less altered from the healthy state, which alteration is increased by the retention of it in the affected joint. To this circumstance, and to the irritation thereby produced in the retaining and surrounding tissues, are to be imputed not merely the obstinacy and aggravation of the complaint, but also the structural changes in the capsule, in the cartilages, and even in the ends of the bones themselves, with the inflammation which either attends or follows those changes, especially in scrofulous, cachectic, or broken-down constitutions. When the effusion is within the capsule, there is more or less projection, owing to distention, of the more yielding parts, as shown when the knee-joint is affected, the swelling being more limited than when the more external parts, as the ligaments, tendons, and aponeuroses, are the chief seat of the disease, and often fluctuating; this phenomenon never occurring unless the effusion is within the capsule.

32. I have seen this form of rheumatism most frequently in the knee-joint. In more recent and in the more sub-acute cases, the structural changes produced by the disease may not extend much beyond an increased quantity of synovia, and more or less vascular injection and thickening of the capsule, especially of the synovial membrane. In a case alluded to by Dr. MACLEOD, which terminated fatally from another disease while subject to a first attack of this form of rheumatism, the alterations in the joint were very similar to the above. When, however, the attacks have been frequent, or when the disease has been persistent, or the constitution in fault, or when the patient has aggravated the attack by exertion or exposure, the changes in the capsules, the ligaments, the cartilages and the ends of the bones are much more serious, owing to superinduced inflammation and the contingent consequences, as respects not merely these parts, but also those more external to the capsule and in the vicinity. That suppurative disorganization of the joint is sometimes met with during, or consequent upon, acute or sub-acute rheumatism, cannot be denied; but there is great reason to infer that the inflammation, of which the disorganization is the effect, has been superinduced, as just stated; and that that issue is not limited to rheumatism attacking the capsule or more internal tissues of the joint, but is occasionally extended to those cases in which it is difficult to determine whether or not the amount of the rheumatic affection was greater externally or internally to the capsule. In two cases, in private practice, attended by Mr. FERGUSSON and myself, suppuration of the knee-joint supervened; but this result was owing to the operation of the causes

of inflammation subsequently to, or at least during the rheumatic attack, to unusual exertion of the affected limb, and to exposure. This termination of acute or sub-acute rheumatism of the joints should not be confounded with the *suppurative disease of the joints*, which is secondary of phlebitis, and which is not infrequent in females after delivery.

33. *C. Rheumatism affecting chiefly the Periosteum.—Periosteal Rheumatism.*—This state of the disease usually presents itself in a sub-acute or in a chronic form, more especially the latter; and is met with most commonly in impaired constitutions, in the cachectic, and in the serofulous. It affects those parts of the periosteum which are most exposed to the vicissitudes of temperature and weather, as those covering the tibia and ulna, the sternum, the cranium, and bridge of the nose. The disease is either attended by a slight degree of fever and aggravation of the pains at night, or is prolonged indefinitely in a chronic and non-febrile state. The pain is dull, constant, deep-seated, and referred to the bone. It is unattended by redness or evident swelling; but sometimes a slight fulness or thickening may be perceived upon a careful examination, and the pain is increased by firm pressure. The tongue, in these cases, is either loaded or furred, and the excretions are more or less disordered. The pulse is generally accelerated, often weak and compressible. That more or less thickening of the periosteum actually takes place, has been demonstrated on dissection of some of these cases. Dr. HAWKINS remarks, that this form of rheumatism is often allied with deep-seated pains, which sometimes continue fixed in the shoulder, and occasionally affect the hip. They are aggravated by any motion in the joint in any direction; which renders it probable that the fibrous capsules with which these joints are provided are here the seat of pain, and these capsules are closely interlined with the periosteum.

34. It is often very difficult to distinguish rheumatism affecting the periosteum from pains occasioned by *syphilis* or by the abuse of *mercury*. The previous history of the case should guide the diagnosis; but it may be inferred that the affection is rheumatic when the pains and the periosteal affection are decidedly local, or confined to a single limb, or to defined portions of one or more limbs. Whereas the pains from the other causes now assigned are more dispersed or wandering, affect a greater number of places, and are seldom confined to one part until nodes are being, or have already formed. The nocturnal exacerbations are also much more severe when the disease is syphilitic than when it is rheumatic; and they moreover are generally associated with other signs of secondary syphilis. If the pains have been produced by the abuse of mercury, the swellings or enlargements of the periosteum are more remarkable, more numerous, and more defined than when the disease is rheumatic.

35. *D. Rheumatism may affect chiefly the Fibrous Envelopes of the Nerves.—Neuralgic Rheumatism—Rheumatism of the Nerves.*—This form of the disease is met with in the rheumatic diathesis, from the same causes as produce rheumatism, and often in alliance with rheumatism of other fibrous structures. Yet, although pains following the course of certain nerves, and pro-

duced by exposure to cold, may be viewed as being very closely allied to rheumatism, they should not be viewed as being altogether identical with it; but, in many instances, as more intimately connected with neuralgia or with neuritis. Nevertheless, the connections of these pains with either may obtain in different cases, the one affection passing into the other by insensible degrees. Neuralgic rheumatism is observed chiefly in the *sciatic nerve* and its branches. The attack generally commences in the loins, affecting one side chiefly or solely, extending down the corresponding limb, and occasionally reaching the foot. It occupies the posterior aspect of the limb, and follows the course of the nerve. The suffering is generally very severe, and is commonly increased at night; but it is seldom so distinctly periodical as neuralgic affections are; nor is the pain so sudden in its invasion and cessation, nor so transient as that of neuralgia. The symptoms often resemble those of incipient ulceration of the cartilages of the hip. (*See articles NEURALGIA, § 35, and NERVES, Affections of.*)

36. Neuralgic rheumatism is sometimes seated in the nerves of the face, usually in consequence of exposure to currents of air; is often associated with other rheumatic complaints, and sometimes even alternate with rheumatic affection of the sciatic or other nerves. This form of rheumatism is often attended, at its commencement, by a foul or furred tongue, by acceleration of pulse, by disorder of the secretions and excretions, and by biliary congestions or accumulations. It may present a *sub-acute* character; but it is most frequently *chronic*, and often very prolonged, being of several months' duration.

37. *E. Rheumatism affecting chiefly the Aponeuroses, Muscles, or fibrous Tissues of the Loins and Back.—Lumbago.*—This form of the disease may be either *primary*, or *consecutive*, or *simple*, or *associated*. When it is *primary* it is sometimes *sub-acute*, but it is more frequently *chronic*, especially when it is *consecutive* of other forms of the complaint; and in this latter case especially it is often complicated with some other form of rheumatism, as neuralgic or sciatic rheumatism. Lumbago is often confounded with other complaints; these complaints, especially congestion of the venous sinuses of the lumbar vertebrae and its consequences, congestions of the kidneys, &c., being mistaken for lumbago. This form of rheumatism is sometimes but little painful unless the muscles of the loins are called into action, more especially if the action be sudden. Owing to this remarkable increase of pain on motion, the patient either remains at rest in his bed, or on a sofa, or he walks bending forward, and is unable to raise himself quite erect.

38. When the pains in the loins are truly rheumatic, the lower limbs and joints are seldom affected; but when they depend upon congestion of the venous sinuses of the lumbar vertebrae, or upon congestion of the kidneys, there are, in addition to more marked disorder of the urinary excretion, symptomatic pains, numbness, cramps, or pricking, or lancinating pains in the limbs, usually in both limbs, when the venous sinuses of the spine are congested; and in one limb, if only one kidney is thus affected.



39. Rheumatism sometimes affects not only the *lumbar region*, but also the *dorsal portion* in some instances, and in others it apparently extends to, or has advanced from, the *ischial* or the *gluteal aponeurosis* to the *lumbar* or *dorso-lumbar aponeurosis*. It is doubtful, in these cases, whether the muscles or the aponeuroses are the seat of pain. I believe that the latter are chiefly affected, the contractions of the muscles inducing pain by stretching the affected aponeurosis.

40. *F.* There are various *other parts* of the body in which rheumatism sometimes appears, independently of those more *internal parts* which it sometimes attacks either contemporaneously with, or consecutively upon, an affection of the external structures. (See § 47, *et seq.*) Of the manifestations of rheumatism in these external parts, little notice is required at this place, as the more important topics connected with them are discussed under other heads. It is necessary only to mention what these localities are, and the usual forms in which the disease affects them.—(a) *Rheumatism of the head*—*Cephalalgia rheumatica*—*Epicranial rheumatism*.—The rheumatic affection may appear either primarily or consecutively in the head, in a chronic or sub-acute, very rarely in an acute form. It may affect either side of, but very seldom the whole head; and it may be seated in the frontal and temporal regions, or in the occiput. It appears to be seated in the epicranial aponeuroses of these situations, and not in the periosteum. (See art. HEADACHE—*Rheumatic and Arthritic*, § 29, *et seq.*)

41. (b) *Rheumatism of the Neck*—*Cervical Rheumatism*—*Torticollis*—*Crick in the Neck*.—This, as well as the preceding local form of the complaint, generally follows the action of currents of cold air, or other kinds of exposure to cold, or to cold and moisture. The pain affects chiefly either the back or one side of the neck; and in this latter case the head is held to one side, or held awry, and is always inclined so as to relieve the suffering part. The neck is sore, stiff, and incapable of motion, unless with great increase of pain. This form of the complaint is often complicated with the preceding, and is apparently seated in the cervical aponeuroses.

42. (c) *Rheumatism of the Face*—*Facial Rheumatism*—*Facio-temporal Rheumatism*.—This form may be associated with either of the foregoing, and especially with rheumatism of the head (§ 40). The pains may commence in either the temples or in the face, on one side, or in both at the same time. It is liable to be confounded with *tic douloureux*, or *neuralgia facialis*, or with toothache, with which latter it not infrequently alternates, or even is associated, the same exciting causes producing either or both. It is sometimes, also, complicated with severe attacks of catarrh, or with catarrhal fever, and, in rarer instances, it either is seated chiefly in, or extends to, the sclerotic coat of the eye, forming *rheumatic ophthalmia*. (See EYE, *Diseases of*, § 96, *et seq.*)

43. (d) *Rheumatism of the Chest* may likewise be seated in, or extend to, the *aponeurotic investments* of the *intercostal muscles*, or these muscles themselves, according to the opinion of some writers. It has, in this situation, been usually denominated *pleurodynia*, or spurious pleurisy,

under which head it has been considered. It may also affect the aponeurotic expansions, or fibrous tissues of any part of the *abdominal parietes*, although the disease is seldom observed in these parts. Its affection of, and metastasis to, *internal organs or structures* are considered in the sequel.

44. II. GONORRHOÆAL RHEUMATISM—*Specific Rheumatism*.—Rheumatism affecting chiefly the capsules of joints and the synovial membranes not infrequently occurs in the course of other constitutional and cachectic diseases, especially *gonorrhœa*, the venereal or mercurial cachexy, or other states of general taint. It is, however, only in connexion with gonorrhœa that I have to view the complaint at this place.—a. The rheumatic affection generally supervenes upon gonorrhœa about ten days, or a fortnight, or three weeks from the first appearance of the urethral discharge, which usually is very much diminished, or has entirely disappeared, when the former is developed; and the one affection may alternate with the other, and become remarkably obstinate, especially when neglected at first, or injudiciously treated. The cause of rheumatism thus supervening upon, and more or less superseding, the gonorrhœal discharge, is not very manifest. The operation of the usual causes of rheumatism upon a constitution affected by gonorrhœa, and previously exhausted by seminal discharges, seems the chief source of the malady; but in some instances the exciting causes are not evident, the gonorrhœal infection both predisposing to and determining the rheumatic disease. Probably diathesis is much concerned in producing the attack, the gonorrhœa imparting the peculiar conditions by which this form of the complaint is characterized.

45. b. The *symptoms* of gonorrhœal rheumatism generally appear before the urethral discharge has altogether ceased. A severe aching is complained of in one or more joints. Of four cases which were under my care, three had the knees affected; the other the ankles, and bursæ of the adjoining tendons; but the affection was severer on one side than on the other. The pain soon becomes acute and burning, and affusion rapidly appears within the capsules and bursæ, which become much distended. The external surface is rarely or never reddened or inflamed. Motion aggravates the pain, which is much exasperated during the night, causing watchfulness. The affected limb is usually kept in a semi-flexed position, and either stretching or bending it greatly aggravates the pain. This form of the disease assumes either an *acute*, *sub-acute*, or *chronic* character, the last generally following the first or second. The *acute* is always attended by fever. In a case which I lately attended, the pulse rose above 120; but more commonly the febrile symptoms are less severe than in the usual form of the complaint, and assume more of a sub-acute character, and a truly remittent form. The tongue is loaded, the bowels confined, but not so obstinately as in other states of rheumatism; and the urine is loaded with lithates. The perspiration is copious, and somewhat offensive. Dr. MACLEOD states that the skin presents a pulverulent deposit, which may be scraped off in sufficient quantity to be tested, and which consists of the lithate of

soda. I have not observed this. In no instance which I have seen has the urethral discharge entirely disappeared, a very scanty gleety fluid still exuding from the urethra. Several surgical writers have noticed the alternation, or the succession of gonorrhœal ophthalmia and gonorrhœal rheumatism. I have seen it only in one instance. I have not met with a case in which this form of rheumatism was complicated with, or succeeded by, cardiac or any other internal affection. In one instance there appeared a slight delirium during the acute stage.

46. The course of this complaint is very prolonged, according to the usual mode of treating it. M. RICORD states that it generally continues many months. Although the more acute symptoms may soon subside, the sub-acute and chronic stages are most obstinate. Even when it has apparently disappeared the complaint is apt to recur, generally in a chronic form, the urethral discharge returning during the intervals. In this way it may continue a long time, and even induce serious organic changes in the affected joint.

47. III. OF THE COMPLICATIONS, EXTENSIONS, OR METASTASIS OF RHEUMATISM.—Rheumatism, especially in its acute and sub-acute forms, is a more or less *external* manifestation of a constitutional malady, during the existence of which *internal* determinations, also, of morbid action may appear in similar tissues and structures; or, in other words, the constitution, being affected in an acute or sub-acute form, will throw the morbid action on the periphery of the frame, without any internal complication in persons of strong vital resistance or unimpaired power; but in those of diminished energy or vital resistance, a somewhat similar state of morbid action is apt to appear in internal fibrous and serous tissues and surfaces, either contemporaneously with, or consecutively upon, the external affection. In these latter, the vital energy is insufficient either to throw off the morbid action on distant or peripheral parts, or to protect more central structures from the invasion of this action.

48. A. Of the several associations, complications, and metastases of rheumatism, there are none of greater importance, and of more frequent occurrence, than those in which the heart and pericardium are concerned. The *endocardium*, in certain of its reflections especially, and the *pericardium*, are particularly liable to be affected, either contemporaneously with, or consecutively upon, acute and sub-acute attacks of rheumatism—the acute more especially. Of this complication or metastasis I have fully treated when considering the diseases of the HEART and PERICARDIUM (§ 129, 132, 133), and to that article I must now refer the reader. That many cases of this *complication* present the heart as the primary seat of the disease is by no means improbable, especially in young subjects, inasmuch as I have often observed a fully developed state of cardiac affection at an early period. Dr. TOWN takes a similar view of this association of the internal and external disease, and believes that it is less frequently a metastasis than is usually supposed; and states that the occurrence of the cardiac affection “is inexplicable by the doctrine of metastasis, which supposes that the

cardiac inflammation has been transferred from the limbs to the heart. The truth is, that the cardiac inflammation may be primary: it frequently exists at the same time with the articular affection, and dates its origin from the same period, as it derives it from the same cause.” (P. 116.) This remark is confirmatory of what I have stated at another place (*see art. HEART*, § 129), and agrees with what I shall have to notice in the sequel.

49. Dr. GRAVES even believes that the rheumatic disease may exist without its external manifestation, and that the cardiac affection may precede the articular swellings, or may exist without any disease of the joints being manifest, especially in persons who have been formerly the subjects of acute rheumatism. Such cases as these are comparatively rare; but I have met with two cases, both in fish-mongers, in which the symptoms were identical with acute rheumatism, with many of the symptoms of endocarditis, but without the external rheumatic affection. These cases were viewed and treated as internal rheumatism of the heart, and terminated favourably.

50. B. The head is variously affected in rheumatic cases. It may, as stated above (§ 40), be the primary seat of sub-acute or chronic rheumatism in either of the parts there designated; or it may be implicated consecutively, or in the course of either of the forms of the disease. The usual states of rheumatism of the head have been considered in the article on HEADACHES (§ 29, *et seq.*, 50). But the head may be differently affected from either of the modes there mentioned. *First*, head affection, delirium, or mental disorder, in some form or other, may occur in the course of acute rheumatism, without any abatement, or with slight abatement, either of the fever or of the local disease. In these cases the head affection is chiefly nervous, and contingent upon the febrile condition, in connexion with depression of nervous or vital power. The affection of the nervous system may, however, be produced by too large or repeated bleedings, by a rapidly-induced anæmia, or by colchicum, or by antimony, or by narcotics, and other depressing and perturbing agents. In all these cases the head affection is independent of any inflammatory action within the cranium.

51. *Secondly*, the symptoms referred to the head may appear at an advanced stage of acute or sub-acute rheumatism, most frequently of sub-acute and capsular rheumatism, attended by effusion into the cavity of the joint, and is generally followed by the subsidence of the disease of the joint. In this class of cases, always the most unfavourable, and generally occurring in persons of exhausted or depressed vital powers, or of a cachectic habit of body, the head symptoms are more or less indicative of inflammatory irritation of the brain or its membranes, often passing into effusion of serum into the ventricles or between the membranes. Although the affection of the head is attended by the partial or entire subsidence of the disease of the joint, yet it cannot be conceded that the subsidence has produced the disease within the cranium. It should rather be considered that, during the course of the rheumatic disease, owing to the existing states of the nervous and vascular systems, influen-



ces acting on the brain or its membranes develop a morbid action in these parts which supersedes, or partially or entirely removes, that which previously existed in the joints; and that this form of head affection is superinduced most frequently by causes acting on the mind, or on the brain and membranes, through the media of the senses, or still more directly and locally during states of vital depression, consequent either upon the duration or intensity of the disease, or upon an injudicious mode of treatment.

52. *C. Disease of the membranes of the spinal chord*, probably commencing in, or at least implicating the theca of the chord, is occasionally observed either complicated with, or immediately consecutive of, an attack of acute or sub-acute rheumatism. A case occurred to me in 1820, in which acute rheumatism of the joints, complicated with *pericarditis*, was followed by *chorea* and inflammation of the membranes of the spinal chord, soon passing into effusion of lymph, and terminating in complete general *palsy*. This case was not only demonstrative of this complication and succession of local affections, and of the appearances after death (see *London Med. Repos.*, vol. xv.), but it also evinced the connection subsisting between rheumatism and inflammation of internal fibro-serous surfaces on the one hand, and between atonic spasmodic affections, *chorea*, and *paralysis* on the other.

53. When treating of the forms of paraplegia and general paralysis (see art. PARALYSIS, § 70, *et seq.*), I described certain states of that disease which depended upon inflammation of, followed by the effusion of lymph upon or between, the membranes of the spine, and which often commence in a very slight form or degree of palsy, the movements of the limbs being at first uncertain, tremulous, irregular, or spasmodic, in many respects resembling *chorea*, and gradually becoming still more imperfect, until they are altogether lost, sensation still remaining unimpaired. This affection, in rare cases, is consequent upon acute or sub-acute rheumatism, appearing as a transference of the morbid action from the more external parts to the theca and membranes of the spinal chord. I have met with five cases of this description, two of them in children under twelve years of age; and in three of the cases I had an opportunity of examining the spine after death. In all three, coagulable lymph was effused within the theca, and pressed upon the chord and origins of the nerves; and the venous sinuses of the vertebræ were remarkably congested. It ought not, however, to be overlooked that inflammation of the membranes of the chord, occasioning effusion of lymph and palsy, is generally attended by severe pain in the limbs, and a girding sensation around the abdomen, which may be mistaken for rheumatism, but which is owing to the irritation at the origins of the nerves supplying the pained muscles, and may be quite independent of pre-existent rheumatism, or of the rheumatic diathesis. (See art. SPINE, ITS CHORD AND MEMBRANES.) [Occasionally rheumatic inflammation attacks the intervertebral substance, ossific matter is effused, and complete ankylosis follows. Such a case recently fell under our observation in a gentleman who had long laboured under chronic rheumatism, and

who resorted to a water-cure establishment for treatment. The vertebræ of the spinal column all became firmly soldered together, so that flexion of the back became impossible, and even any motion of the head could not be executed without movement of the whole body.]

54. *D. The pleura* may be affected either in the course or consecutively of an attack of acute or sub-acute rheumatism; but not so frequently as may be expected. In one case the pleura was implicated very soon after the complication of the rheumatism with *pericarditis* was ascertained, pleuritis with effusion rapidly supervening. The earliest writer who noticed the internal or visceral complications of rheumatism was probably BOERHAAVE (*Aphorisms*, § 1491). He mentions the viscera in general terms, but particularizes only the brain and lungs. VAN SWIETEN, in his excellent and practical commentaries, is more explicit; although even he fails in duly recognising the frequent complications of cardiac disease with rheumatism, if, indeed, this complication was as frequent in those days as in the present, which admits of some doubt,\* although certain symptoms of this complication are not entirely overlooked by him; yet, in noticing these, we are surprised that more particular attention had not been directed to the state of the heart and pericardium. It is not improbable, although such cases are not frequently detected, or are often overlooked or mistaken, that rheumatism, affecting the intercostal muscles, or the fibrous tissues in the vicinity, may extend to the pleura, and be there followed by inflammation or effusion, in

\* "Verum quandoque contingit, ut materies rheumatica admodum vaga sit, et, mox externas, mox internas, partes occupet; unde tales ægri in majori versantur periculo. Aliquando enim dolor in membris disparat, oritur pectoris anxietas, eordis palpitatio, pulsus intermittens, et, redeunte ad membra dolore, hæc symptomata disparant, pulsusque, paulo ante tremulus et intermittens, de novo aequalis et liberrimus est. Alibi describuntur plures similes morbi, qui mense Novembri, 1759, in *Nosocomio Pasmanniano* aderant, quorum initium fuit horror per totum corpus, dein languor; postea dolor rheumaticus, partim vagus, partim fixus, qui omnia membra obsedit, et subinde post unam alteramve horam cessavit, tuncque pectus oppressum fuit, et ægri inceperunt tussitare. Caput etiam doluit vario modo. Quandoque post plures horas dolor rheumaticus de novo per omnia membra diffusus est; et tunc illico desit dolor capitis, pectoris oppressio, et tussis evanuerunt. Illæ autem mutationes in eodem ægro sepius contigerunt.

"Hæc materies rheumatica, quandoque adeo mobilis et vaga, nisi bona curatione, dissipari possit de corpore, vel expelli, in unum locum confluat aliquando, et ingentes tumores lymphaticos producit; de quibus eadem hæc paragrafo dictum fuit, quomodo in externa corporis superficie apparent, et illis pertusis, exivertit semper serum flavum viscidum, quod leni calore potuit inspissari. Cum ergo pateat, eandem hanc materiam ex artubus derivari posse ad caput, ad pectus, si nec inde salutari metastasi redeat ad artus, nec curatione expellatur de corpore, poterunt tales tumores in interioribus colligi, et pessima mala producere, imo mortem, uti cadaverum hoc morbo defunctorum sectio docuit.

"Tres ægri, in quibus serum, per universum corporis superficiem antea dispersum, subito interiora occupavit, rheumatismo perierunt. In binis cadaveribus reperiebatur copiosissima flava gelatinosa materia inter membranam pulmones ambientem et ipsos pulmones; totaque pulmonum substantia in admodum parvam molem compressa erat. Talis materies valde copiosa quoque inter pianam matrem et cerebrum atque cerebellum hæsit; anteriores cerebri ventriculi simul gelatina pleni erant. In tertio ægro disparuit tumor artuum, secuta fuit difficilis respiratio, et tussis convulsiva, quæ nullis remediis obediit; unde miser intra quatuordecim dies, omnibus viribus exhaustus, periit. In medio pulmonis dextri detegebatur sacculus, qui quinque libras seri flavi subacris reclusit. Cætera fuerant sana."—(VAN SWIETEN, *Commentaria in II. BOERHAAVE Aphorismos*, t. v., p. 654.)

more numerous instances than generally supposed.

55. *E.* The *diaphragm* and the *peritonæum* are, as far as my experience permits the remark, more frequently affected in connexion with, or consequent upon, rheumatism than the pleura. When rheumatic diaphragmitis is observed, either the pleural or the peritoneal surface presents the most evident indications of change, although the crura, or the tendinous parts of the diaphragm, may be the chief seat of disease. When this viscus is implicated, the symptoms vary not materially from those mentioned in the article on its diseases, where, also, the connection sometimes existing between rheumatism and inflammation of the diaphragm is pointed out, conformably with the results of my observations, and with my subsequent experience. (*See art. DIAPHRAGM, § 9, et seq.*)

56. Although rheumatism may affect the *diaphragm* either alone, or in conjunction with one or other of its serous surfaces, or both, as a complication, extension, or metastasis of the disease, yet the *peritonæum* may be chiefly or even solely affected; the external disease either subsiding or entirely disappearing upon the development of the peritoneal affection. Rheumatic peritonitis is probably most apt to occur either during the puerperal states, or when rheumatism affects the aponeurotic expansions and fibrous structures of the abdominal muscles and parietes; but it is of comparatively rare occurrence. (*See art. PERITONÆUM, § 128.*)

57. *F.* Rheumatism or rheumatic inflammation may attack the *ovaria* or the *uterus* generally upon the subsidence or disappearance of the disease from more external parts. Cases of this kind are rare. An instance of metastasis of rheumatism to the *ovaria* has been adduced by me at another place. (*See OVARIA, § 7, note.*) The *testes*, either one or both, may be also similarly affected; the pain being very severe, and the swelling considerable. Three instances of well-marked metastasis of rheumatism to the *testes*, of which I have preserved notes, have come under my care.

[We are inclined to believe that rheumatic affections of the uterus are not as rare as our author supposes, having not unfrequently met with cases of this description. Indeed, what is often considered and called neuralgia of the uterus, is nothing but rheumatic inflammation transferred to this organ. There is scarcely an organ of the body which may not occasionally be the seat of the same morbid action, called rheumatic.]

58. *G.* Of the more pure complications of rheumatism, there are none so frequent as those with catarrhal fever, or simple catarrh. I shall have to show hereafter that exposures to cold and humidity are more likely to produce attacks of rheumatism when malaria, even in slight grades, is superadded to these states of atmosphere, the catarrhal affection resulting equally with the rheumatism, which may assume either of its forms, but most commonly the sub-acute, slight, and chronic, from the combination of malaria with cold and humidity. Many writers, from BOERHAAVE to STORCK, VAN SWIETEN, and others, have noticed the frequent association of rheumatism with *ague*, during some seasons, with *scurvy* in other seasons, and even with *dysentery*—complications manifestly depending

upon the combination of atmospheric conditions, upon weather, season, &c.; and more especially upon exposure to cold, in conjunction with an impure or malarious atmosphere, or with exhalations of decayed vegetable and animal matter, and often with unwholesome or improper food.

59. *H.* Rheumatism is not infrequently complicated with *disorder of the catamenia*, or of the catamenial discharge. This subject has been recently noticed by Dr. TODD, who remarks that he “has been strongly impressed with the idea that the secretions of the uterus, if of an unhealthy character, and not duly thrown off, may be absorbed into the circulation, and contaminate the blood, producing symptoms of greater or less urgency;” and he adds, that he “cannot do more than propose as a query whether, under certain circumstances, the uterus may not be regarded as a source of rheumatic or arthritic matter.” (*Op. cit.*, p. 148.) I believe that in no circumstances is the uterus productive of such matter; but that it is, as I have contended in various parts of this work, a most influential agent in depurating the blood when it fully discharges its functions; and that it thus may prove, in the full exercise of these functions, the means of preventing attacks of both rheumatism and gout; while the imperfect discharge of the catamenial function, and of the depurating process thereby produced, may favour the development of either rheumatism or gout, the former especially before the forty-eighth or fiftieth year, especially in the rheumatic diathesis, or where the hereditary predisposition to either of these diseases exists. Hence interrupted, scanty, imperfect, or otherwise disordered states of the catamenia may be an efficient or a concurrent cause of rheumatism; and thus catamenial disorder may be complicated with either of the forms of this disease. Hence, moreover, arises the frequency of chronic arthritic affections in females when the catamenia become difficult, scanty, and altogether cease.

#### 60. IV. OF THE STATES OF THE BLOOD AND EXCRETIONS IN RHEUMATISM.—I. OF THE BLOOD.

—It becomes a matter of some interest to consider the states of the blood in rheumatism, seeing that the disease is considered by several recent writers, as it was by BOERHAAVE, BAYNARD, VAN SWIETEN, and many others, during the commencement and middle of the last century, to depend upon a *matricis morbi* existing in the blood. I shall, therefore, give the results of observations and examinations of the blood; and when I come to consider the nature of the disease, I shall then notice in how far the changes observed in the blood are the pathological conditions constituting the malady, or are merely the results of the influence of the disordered organic nervous system on the blood—whether the alteration of the blood is the proximate cause, or is the result, of the disease.

61. BAYNARD had long since asserted that the saline and acid ingredients found in the blood and urine are present in the former in excess, owing to the non-elimination of them by the kidneys and skin; and that the excessive accumulation of them in the blood caused the rheumatic disease. It is obvious to common observation, even if not shown by NASSE, SIMON, and ANDRAL, that the blood contains more



fibrine in *acute* rheumatism than in the normal state, and that the corpuscles decrease in proportion to the excess of fibrine. The fat is also increased. In proportion to the increase of the fibrine and fat, and the decrease of the corpuscles, the whole solid residue is diminished—this state constituting what SIMON has termed *hyperinosis*, for a principal part of the science of German pathologists consists in the coining of terms. In rheumatism, especially in the febrile states of the disease, the physical conditions of the blood, rather than its chemical constitution or its microscopic appearances, are most important to the practitioner, who cannot carry a chemical laboratory, nor even a modern microscope in his pocket, and who cannot shape his treatment according to the reports furnished by these sources, however they may aid him in forming an hypothesis. In the acute states of the disease the clot is rather small, consistent, cupped, and covered by a strong buffy coat; the cupping and thickness of the buffy coat depending much on the deepness and shape of the vessel in which the blood is received, and upon the rapidity and size of the stream. NASSE states that the coagulum is firm, but that when the buffy coat is very strong the consistence of the lower part of the clot is much less. JENNINGS, according to ANCELL, maintains that the clot under the buffy coat is so loose as to fall to pieces on the slightest touch. Both are right in different cases and in different stages of the disease; at least such is the result of my observations. The serum is always clear, and of a deep yellow hue. With the frequency of blood-letting the size of the clot diminishes in proportion to the amount of serum, and the cupping and buff either continue, or even increase, however far depletion may be carried.\*

\* Many years ago a remarkable illustration of this fact occurred in a case, which was attended by a surgeon in Walworth, to which Dr. W. and I were called at advanced stages of this disease. A man, aged about fifty, of a leucophlegmatic appearance and corpulent, had a severe attack of rheumatism of the lower extremities, for which he took, of his own accord, a large dose of croton oil. Violent hypocaethasis was the consequence, and the pain in the limbs suddenly ceased; but he was as suddenly seized with excruciating pain in the region of the heart, with extreme anxiety and palpitation. The surgeon instantly saw him, and bled him largely about the middle of the day. When he was seen again at night, he was found in no way relieved; the blood which was taken was very much cupped and buffed; and this appearance, in connexion with the continuance of the distress, induced the surgeon to bleed him again the night of the same day—twice largely on the day of the occurrence of metastasis. The following morning he was no better. The second quantity of blood taken was more buffed than the first. Dr. W. was sent for, and he was bled a third time largely on the second day. The coagulum was now small, but still remarkably cupped and buffed. On the third day he was no better, and constant jactitation had supervened. He was bled the fourth time. I was requested to see him on the evening of that day: I saw the third and fourth quantities of blood taken away, the clots of which were very small, but remarkably cupped and buffed; the first and second quantities were described in consultation. The anxiety, action of the heart, and jactitation were extreme. The lips, gums, and surface were remarkably anæmied, and he presented all the appearances I have described, as indicating extreme losses of blood. (*See art. BLOOD, § 53, et seq.*) Having heard the history of the case, and observed his existing state, I expressed my belief that he could not live twelve hours. He died within that period. The surgeon and I opened the body about twenty hours after death. Adipose matter was very abundant in the usual situations; and all the tissues presented the most remarkable pallor, very much resembling the appearance of veal. There was no fluid effused in any of the cavities, and the large vessels and cavities of

62. According to SIMON, ANDRAL, and GAVARRET, the quantity of fibrine and of fat is always much increased during the acute form of the disease, and that of hæmato-globulin much diminished; the proportion of blood corpuscles diminishing, and that of serum increasing with the quantity or frequency of depletion. The first part of the following table exhibits the maxima, minima, and mean of forty-three analyses of the blood of fourteen persons in this disease; the second part, the analyses of the blood in four peculiar cases.

	Water.	Solid residue.	Fibrin.	Blood corpuscles.	Residue of serum.
Maxima . .	839.6	228.4	10.2	130.0	104.8
Minima . .	771.6	160.4	2.8	70.1	76.9
Mean . . .	805.4	194.6	6.7	101.0	86.0
Healthy blood }	790.0	210.0	3.0	127.0	80.0
Case 1st . .	826.8	173.2	4.8	79.0	89.4
Case 2d . .	818.3	181.7	4.6	89.1	88.0
Case 3d . .	815.4	184.6	4.0	82.6	98.0
Case 4th . .	741.1	259.9	2.6	154.3	102.0

63. The blood in the first of the cases (the second part of the table) was taken from a colour-mixer under the influence of lead, to which M. ANDRAL attributes the deficiency of the corpuscles. The blood was taken in the second from a person who had been bled six times, and had had 200 leeches applied. The third was the blood from a person with incipient chlorosis; and in the fourth, the blood was taken from a vigorous person, twenty years of age.

64. The blood of ten persons suffering *chronic and sub-acute articular rheumatism*, furnished, according to the analysis of ANDRAL and GAVARRET, no striking results. The proportion of fibrine in no instance exceeded 5.0, and in two cases was as low as 2.9 and 2.6. The blood corpuscles in one amounted as high as 154.3, and the solid constituents to 259.1. In the other cases the corpuscles were below the healthy average. As rheumatism loses its acute, febrile, and severely painful character, so the fibrine diminishes and the blood approaches, or altogether returns to the healthy state. As these forms of rheumatism are more frequently aggravated than relieved by blood-letting, I have very rarely had an opportunity of observing the state of the blood in connexion with them; but in two cases, the chief change from the healthy state, observed in sub-acute rheumatism of the head, was an increase of the fat in both; the serum having been of a very white or milky hue in one case.

65. ii. THE URINE, in rheumatism, requires constant observation, as upon its varying states modifications of treatment are often indicated. —A. In *acute* rheumatism the colour of the urine is generally high, sometimes of a purple-red, or thin claret. Its acid reaction is very decidedly marked; and very bulky fawn-coloured, or lateritious sediments, consisting of urate of ammonia, and occasionally of crystallized

the heart contained very little blood, which was coagulated into fibrinous, stringy clots, which contained a very small proportion of red globules. The internal cavities, and the valves, and columnæ carneæ appeared deeply red. The pericardium was natural, but pale, and contained no fluid. The appearances generally were similar to those of an animal bled to death. (*See art. BLOOD, § 50-64.*)

uric acid, are deposited. Acetic and phosphoric acids have also been found in the urine in this form of the disease by HENRY and VAUQUELIN. In eighteen cases, in which the urine was examined by BECQUEREL, it always presented the characters usually observed in inflammation, as long as the fever continued. The deep colour and the acid reaction were always observed. The mean specific gravity was 1022.6. In cases which threw down a spontaneous sediment it was 1025.2 to 1027.0. He found that after large bleedings the urine assumed the characters of that in cases of anæmia. Albumen was detected in seven of the eighteen cases. Oxalate of lime is of frequent occurrence. The other constituents vary somewhat; but as the urine of persons in sound health varies in different individuals, and in the same person at different times, no precise inference can be drawn respecting them.

66. *B. In chronic rheumatism*, and when the pains are not very acute, the urine often retains its normal characters. Of thirty-seven cases, BECQUEREL found the urine unaffected in twenty; in seventeen it assumed the inflammatory character, and in nine of these it threw down a spontaneous sediment. If the complaint be very long continued, and much debility exist, the urine may, without being red or high-coloured, present a turbid, thick, or even fœtid appearance. I have generally found the urine to have an acid reaction in the chronic as well as in the sub-acute states of the disease. In some cases, and especially when the membranes and sheath of the spinal chord are implicated, the urine has contained the phosphates; and it has never been alkaline unless much debility or vital exhaustion exists.

67. *iii. THE PERSPIRATION* has not received due attention in the different forms of the disease, as respects either its chemical constitution or its quantity and sensible characters. When the perspiration is profuse in *acute rheumatism*, minute vesicles, or sudamina, are often observed on different parts of the surface, especially the breast or trunk. The perspiration has generally an acid or peculiar offensive odour, which is less remarkable, or becomes so, when any internal complication or metastasis supervenes. Lactic acid, the ordinary free acid in sweat, is usually increased; and SIMON states that, when there is an acid odour, acetic acid is present. Persons subject to *chronic rheumatism* have these pains removed by a free or copious perspiration; and those thus subject, who do not take sufficient exercise, are generally liable to have a return of the complaint, if a sufficiently perspirable state of the skin be not preserved, the cessation or sudden suppression of this discharge often sufficing to reproduce the disorder, without any exposure or other exciting cause.

68. *V. DIAGNOSIS.*—Rheumatism may be confounded with gout, with scurvy, and, in the form of lumbago, with nephritic affections, or with inflammation of the membranes or substance of the spinal chord. Various affections of the joints, of the periosteum, and of the nerves, especially neuralgic affections, may also be mistaken for rheumatism.—*A. Rheumatism* is often not easily distinguished from *Gout*.\*

\* "In rheumatismo discernendo a podagra chiragrave, æpidis falluntur medici. Sunt tamen, quæ distinguant.

In general, however, the large joints are first attacked by rheumatism, and the small joints by gout, the former disease appearing, after chills or rigours, in the acute form, and at an earlier age than the latter; and, unless at a very early period of life, gout is more disposed to affect internal organs than rheumatism, and it is generally preceded by, and sometimes associated with, more marked disorder of the stomach, liver, and kidneys. It should not, however, be overlooked, that both diseases are so nearly allied, especially in certain of their forms, as not to admit of diagnosis, the arthritic form of rheumatism, especially when affecting the small joints, and occasioning nodosities (§ 25), nearly resembling chronic gout, and justifying the popular appellation of "*rheumatic gout*."

69. *B. From simple or scrofulous inflammations of the joints* rheumatism is often distinguished with difficulty. Rheumatic inflammation of the joints may, however, affect scrofulous persons, or inflammation of these parts may attack either the rheumatic or the scrofulous diathesis; and, although closely allied to rheumatism, as affects the former diathesis, it cannot be viewed as an instance of rheumatism of the part. In acute or sub-acute rheumatism not one joint only is commonly affected, but several, and the affection moves from one to another, and along the aponeurotic expansions; or if it be permanent in one, or intra-capsular, the distention gives the joint the appearance noticed above (§ 28, *et seq.*). When inflammation and its consequences supervene upon the rheumatic affection, then the local disease presents the changes usually consecutive of simple inflammation of the joint, while the constitutional disturbance still preserves many of the rheumatic characters, and both one and the other often are influenced by atmospheric states and changes.

70. *C. Rheumatism* may approach the characters of *neuralgia*, or be associated with it. It may even affect, as stated above (§ 35), the fibrous sheath of a nervous trunk, as in *sciatica*, or the *ischias nervosa* of COTUNNIUS. When

Medicus igitur primum omnium, utrum ægri corpus arthritidi proclivius sit, necne, animo diligenter perpendat. Deinde quæ indicia ante apparuerint, præsertim an ventriculus affectus sit, quod quidem in rheumatismo simpliciter perquam raro fit: perturbatio autem ventriculi sive *dyspepsia*, arthritidis accessionem biduum triduumve antevenit. Qualis febris et rheumatismum et arthritidem comitatur, talis postea animadvertenda est. Ille enim a frigore et horrore incipit, nec remissionem habet; hujus verò febris status temporibus remittit, et interdum omnia febris symptomata ex toto cessant. Tum ex ratione, quæ dolor accedit, et ubi resideat facillè dignoscitur: Rheumatismus plerumque tardè advenit, et statim ab initio articulos majores occupat: si quando minores occupet, nunquam nisi in longinquioribus morbi exemplis fieri videmus. Contrà æ tamen Arthritis multo frequentius minores, quam majores torquet; qui quidem articuli eò magis rubescunt et tumescunt. Podagra denique ætate provectiores, juniores verò rheumatismum, victimas excruciat.

"A doloribus scorbuticorum facile discriminatur. Scorbuticorum arteriæ non nisi permodicè inequaliterque niant; interdum et subsiliunt. Scorbutus etiam specie in terdum livida, quam urina præ se fert; specie et putrescendi, quæ per totum corpus hic illic conspicitur, sese haud raro prodit.

"A nephritide satis distinguuntur: dolor in regione renis, sæpe ureteris iter sequens, vomitus, cruris stupor, testiculi ejusdem lateris retractio aut dolor; et dolor renum ex statu pronè nunquam adaugendus.

"Non est, cur hac in re, dolores, qui debilitatem et lue vcnerea enatam consequuntur, nos in rheumatismo distinguendo fallant. Prior *syphilis*, et rerum inde ortarum cognitio, satis discriminat."—(*J. Copland, Op. cit.*, p. 20.)



rhenmatism is complicated with that form of neuralgia which depends upon an affection of the sheath of the nerve, they may be both viewed as almost the same complaint, and differing only as implicating different seats or parts; and they generally both arise from the same cause. True neuralgia, or *tic-douloureux*, however, depends more upon some change affecting the origin or roots of the nerve than upon any alteration implicating its trunk or branches, and occurs in very violent paroxysms, between which there is a complete immunity from pain; whereas, when the sheath of a nerve is attacked, there is more continued affection, more of the symptoms of neuritis, and often numbness of parts below the seat of pain, with a sense of burning heat in the part affected.

71. D. Although the pains experienced by persons suffering from secondary symptoms of *syphilis* have been ascribed by some to that malady, and by others to the mercury used for its cure, yet there is reason to believe that these, or either of them, may be only a chief cause, cold and other causes concurring with them to produce the distressing pains experienced during the night, generally in the periosteum of the more exposed bones. These pains, instead of affecting the joints or extremities of the bones, as in rheumatism, are seated chiefly in the superficies of the bodies or shafts of the bones, and depend on a specific form of inflammation of the periosteum with thickening and nodes. The history of the case, the previous treatment, the seat of pain, the elevation and irregularity of the part affected, the absence of fever, and the great severity of the pain during the night, generally indicate the nature of the complaint, especially when the flat surface of the tibia, or the outside of the ulna, or of the radius, or the sternum, or the frontal or parietal bones, are affected; or when eruptions, sore throat, &c., accompany the disease; or when large quantities of mercury have been prescribed.

72. VI. PROGNOSIS.—SYDENHAM places the prognosis of rheumatism in a too favourable point of view when he says that it is rarely fatal; and VAN SWIETEN very justly remarks, that this is only the case when it is fixed in the joints; for, when acute rheumatism changes its place, it is apt to seize upon some internal viscus, and place the patient in the most imminent danger. The justness of this remark will be readily acknowledged at the present day, when the frequency of complicated and metastatic rheumatism is considered, and the influence of age, and of various states of predisposition, in favouring the complications and metastasis of the disease is recollected. The risk of cardiac complication is especially great; indeed, the existence of it may be inferred in the great majority of cases under the age of puberty; and both this and other complications and metastases, already noticed (§ 47, *et seq.*), may occur at all ages. VAN SWIETEN observes that, when an internal affection commences after the subsidence of external rheumatism, and terminates fatally at a more or less remote period, the result is too often considered as due to the internal disease, and not to the rheumatism, which is actually the cause. While, therefore, acute rheumatism is attended by fever, if it occur very early in life; if the pulse be very rapid, open,

and compressible; if the patient have experienced a depletory or lowering treatment, and is the subject of mental anxiety; or if the pain continue to change its place, there still exists more or less contingent risk, even although the sounds and impulse of the heart be found natural upon a careful examination, and the functions of the brain be undisturbed; if internal complication is detected, or metastasis occurs, then the patient should be considered in a state of great danger, although recovery may take place in such circumstances, or the changes which have already supervened may only remotely tend to shorten life.

73. Even the *sub-acute* and *chronic forms* of the disease may be followed by prolonged suffering, or, if seated in the joints, may be followed by irremediable or partially remediable changes, as ankylosis, if neglected or improperly treated; and still more frequently by relapses, or by more or less suffering for months, or even years. In all cases of acute, sub-acute, or chronic rheumatism, an immunity from the disease, or from a relapse or return of it, should not be relied upon until the tongue becomes clean, the biliary and intestinal secretions are natural, the alvine and urinary excretions are healthy, and until the perspiration is free and equable.

74. VII. REMOTE CAUSES.—i. *Predisposing Causes*.—A. *Temperament and diathesis* have some share in producing a state of predisposition to one or other of the forms of rheumatism. The disease may affect any constitution or temperament, but the bilious, melancholic, and bilio-irritable temperaments are apparently most liable to it. That there is a rheumatic diathesis—a *diathesis rheumatica*—has been asserted by most medical writers; this diathesis being hereditary. I have certainly observed numerous instances which seemed to support this opinion; but I shall give it a more particular attention in the sequel.

75. B. The most remarkable source of predisposition exists in the several *digestive, depurating, or eliminating organs*, especially the *stomach and the skin, kidneys and liver*, and even, also, the intestinal canal. In very few cases are the functions of the *stomach, duodenum, and liver* duly discharged, either for some time previously to or during the attack. The stomach is weak, or the food unwholesome and insufficient; and the liver is torpid in function, or retentions of the secretion in the ducts and gall-bladder have taken place, until primary and secondary assimilation has been impeded or disordered, and excrementitious materials have accumulated in the blood. While this state of the hepatic functions, especially when accompanied with biliary congestion or accumulation, occasions merely wandering or fixed symptomatic pains in some persons, it is often followed by attacks of either gout or of rheumatism, both in them and in others, when the predisposition to either is more fully developed, and the respective exciting causes come into operation. The functions of the other depurating organs, especially of the *kidneys, skin, and digestive mucous surface*, and even of the *uterus*, when imperfectly discharged, are also more or less concerned in predisposing to some form or other of this complaint, and even also in determining the particular states or complications in which it is often observed.

76. C. *Sex* has manifestly but little influence

in predisposing to rheumatism; for so much depends upon exposure to the exciting causes, that those classes, whether males or females, which are thus most exposed will present numerically the greatest predisposition. HOFFMANN is certainly not correct in considering females more predisposed than males. Rheumatism is, perhaps, more frequent in the former, in a chronic form, after the age of fifty; but before that age it is certainly more frequent in males. VAN SWIETEN justly remarks that men, being more exposed by occupation, by irregularities, and by dissipation, and their numerous concomitants, are more liable than females to rheumatic affections. HAYGARTH states, that he found the disease more frequent in males than in females, in the proportion of 98 of the former to 73 of the latter.

77. *D. Age* has also no very marked influence after 15, or after puberty, if the proportion of persons living at certain ages be taken into the account. The greatest number of cases is met with between the ages of 15 and 30; but the proportion of those living at that age is greater than at a more advanced age. M. CHOMEL found that, in seventy-three cases, thirty-five were first attacked between the ages of 15 and 30; twenty between 30 and 45; seven between 45 and 60; and seven after 60. Two only were attacked before 15, one at 8, and the other at 9 years. I have seen several cases between the ages of 5 and 15; but hardly one at that early age that was not complicated with either endocarditis or pericarditis, or with both, and even also with inflammation of the membranes of the spinal cord.

78. *E. Depressed, impaired, or exhausted organic nervous energy* is most influential in predisposing the frame to the invasion of every form of rheumatism; and by whatever causes this energy may be weakened or exhausted, by none is this effect more manifestly induced than by prematurity or excessive venereal indulgences, and masturbation or self-pollution. By these, more, perhaps, than by other causes, is organic nervous power depressed, and the tone or healthy condition of the fibrous tissues subverted, thereby occasioning imperfect assimilation and excretion, and favouring the morbid influence and operation of causes which alter organic sensibility, and vital tone and contractility.\*

79. ii. *EXCITING CAUSES.*—*A.* Of these, *cold* has been viewed as the most influential, in whatever way it may be directed on the frame. In many cases, however, it is not the mere abstraction of the animal caloric from the whole or part of the frame, but the combinations of this with other influences or agents.—(*a*) Of these combinations the most common depend upon the modes of *warming and ventilating houses and chambers* in this country. Although

these modes, viz., by open fire-places and coal fires, admit of a free and healthy ventilation, provided that the air thus supplied be pure, still the body is unequally heated by them; and while the parts opposite the fire are inordinately excited by the radiated heat, the other parts are exposed to, and depressed by, the currents of cold air proceeding from the doors and windows to the fire-place.\* To this cause, more especially, may be imputed the prevalence of the several forms of rheumatism in this country. Still more injurious are insufficient clothing, especially if it be connected with unwholesome or insufficient aliment; exposure to cold conjoined with humidity, and to currents of cold and moist air; riding in open carriages, especially at night and without sufficient protection, and more particularly if the cold and humid air contain malaria, or exhalations from decayed vegetable matter; and living in tents, or lying and, still worse, sleeping on the ground, or on cold, damp, or wet places. This last cause is more especially injurious, inasmuch as it abstracts the animal heat, changes the natural electrical states of the body, and exposes the frame more completely to terrestrial exhalations at a time when it is most predisposed to be affected by them. In addition to these, wet clothes, the sudden suppression of perspiration, the living in cellars or on the ground-floor, or where the exhalations from the soil or sources of vital depression are given out constantly, and even solicited by fires and ventilation.

80. The *causes* now enumerated, both predisposing and exciting, are such as depress the organic nervous energy, and weaken the functions of those organs which are actuated by the organic nervous system—the digestive, the assimilative, the secreting, and the excreting functions—thereby changing the condition of the blood, as well as more directly affecting the circulating fluids through the heart and vessels themselves, and giving rise to morbid states of the secretions and excretions, more especially of the cutaneous and urinary excretions.

[Rheumatism is a disease which, from its frequent occurrence in the United States, its painful and protracted course, and the many evils that follow in its train, has especial claims upon the attention of the American practitioner. The following table, for which we are indebted to the able work of Dr. FORRY, on the "Climate of the United States" (p. 273), exhibits the annual and quarterly ratios of rheumatic cases treated per 1000 of mean strength, on an average of ten years, among the United States soldiers, in each system of climate :

\* "Inter causas ejuscemodi, quæ patria in nostra rheumatismum longum excitare solent, enumerari debet ratio domiciliorum calefaciendorum, quæ conclavia et cubilia nostra calore radiante temperantur. Nam ad hoc inæqualiter facit ignis, ut una ex parte corpus calefaciat, ex altera frigeat. Huc forsitan adnumeranda sunt crebra vestium mutationes, vel potius ratio vestes induendi frequenter mutata. Rheumatismum longum et excitant eorum intemperies, tempestatumque anni assidua mutabilitas. Ubi vel hiemis vel æstas incipiat, et ubi desinenda sit, certissimè distinguere prorsus æquum. Hiemem in media æstate et æstus interdum haud mediocrem frigorebus in mediis non raro vidimus: quin immo intra diem unicum temperatūra aëris xxx gradus sæpe percurrit. Cælum nostrum humidum est, quippe qui insulam incolamus, cui Zephyrus et Caurus, e regione calidâ exorti, perque oceanum magnum peregritantes, madidis incubat aliis; et eundem, qui corpus leniter perfundat, subito reprimat: ideoque morbum sopitum resuscitat, aut in iis, qui antea vacabant, progignit."

\* "Inter hodiernos et nostrates potissimum ad luxuriam et incontinentiam nimiam referendus est, et ad artes operæ sedentariæ egentes, quæ corpus intra parietes retentum et occupatum infirmit. Eos certè, qui sedentarii victum querunt, quique sub dio ferè nunquam morantur nec ibi ad sudores mediocres exercentur, citò infirmari; nimium admodum sentire, quique irritantur justò procliviores esse; idcirco e causis extra afficientibus facilius in valetudinem incidere, ex omnium experientia satis constat. Nec igitur latet, quamobrem nautas rheumatismo vacare, etiamsi præter ceteros homines, crebriores cœli mutationes, et causas omnes excitantes, subeunt. Ex hoc quoque liquet fœminas quàm marces, imbecillos quàm robustos, et antea affectos quàm immunes, sibi sapius mancipare."



RATIO OF RHEUMATIC DISEASES.

Systems of Climate.	Ratio treated per 1000 of Mean Strength.				
	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Annual Results.
NORTHERN DIVISION.					
First Class. Coasts of New England . . . . .	24	28	29	30	110
Second Class. Posts on northern chains of lakes . . .	41	37	36	38	151
Third Class. Posts remote from the ocean and inland seas . . . . .	45	48	37	34	166
MIDDLE DIVISION.					
First Class. Coast from Delaware Bay to Savannah . .	37	36	27	24	126
Second Class. Southwestern stations . . . . .	36	31	20	27	112
SOUTHERN DIVISION.					
First Class. Posts on Lower Mississippi . . . . .	28	16	22	23	90
Second Class. Posts in the peninsula of East Florida . .	38	23	90	26	119
Average . . . . .	36	31	29	29	125

From these results Dr. FERRY concludes that those affections which are generally ascribed to sudden variations of temperature, conjoined with excess of moisture, are less under the influence of atmospheric agency, as exciting causes, than is usually supposed, but that they are in some measure controlled by the same laws which govern pulmonary diseases. He very justly remarks, that if cold, moisture, and sudden alternations of temperature were the chief causes, the highest ratio should be given on the New England coast, and the northern chain of lakes; but that, on the contrary, it is found that, like pulmonic diseases, rheumatism is most rife on the dry and cold atmosphere of the interior (the Third Class of the Northern Division), characterized by the extreme range of the thermometer, and by seasons strongly contrasted. Among 6257 cases registered, only one death is reported. Were these affections, as Dr. FERRY observes, very much under the influence of meteorological causes, we should find, as in pulmonic lesions, a great contrast in the ratios of the seasons. Taking the mean of the four seasons, as shown above, the first and second quarters give the highest averages; but, contrary to the law which governs pulmonary diseases, the ratios of the third and fourth are the same. Viewing the whole subject, however, it is found that a similarity obtains in the general laws which, on the one hand, govern rheumatic, and, on the other hand, pulmonary, but especially catarrhal diseases.

The same results are arrived at by the recent reports upon the medical statistics of the British troops, as will appear from an inspection of the table at the head of the next column.

These results show that rheumatic diseases are more prevalent in the Mediterranean than in Canada and Nova Scotia, and that, as the British Reporter observes, "though some of the pro-

Admissions from Rheumatic Affections annually per 1000 of Mean Strength.	Jamaica.	Nova Scotia and New Brunswick.	Bermudas.	Malta.	Ionian Islands.	Gibraltar.	Canada.	Mauritius.	Windward and Leeward Command, West Indies.	United Kingdom.	Cape of Good Hope.
	29	30	33	34	34½	38	40	46	49	50	57

inces of the Cape of Good Hope have occasionally been without rain for several years, these diseases are more frequent in the dry climate of that command than in the West Indies, where the condition of the atmosphere is as remarkably the reverse; yet have extreme cold and atmospheric vicissitudes, coupled with excess of moisture, been assigned as satisfactory causes for their prevalence." Dr. FERRY notices the fact, that between the ratio of Canada and that of Nova Scotia and New Brunswick, the former being one third higher than the latter, the same law obtains as in the United States; for while "in Canada the cold becomes so intense that the mercury, congealed in the thermometer, serves no longer to indicate the extreme reduction of the temperature, in Nova Scotia, on the contrary, the mercury is seldom lower than 6° or 8° below zero in winter, or above 88° in summer. Notwithstanding the atmosphere, in consequence of the same causes which modify its temperature, viz., its insular character and intersection by lakes and bays, is exceedingly moist, and fogs are, along the coast, common throughout the year—a circumstance regarded as most favourable for the production of rheumatism—yet it is seen that the ratio is lower than in the dry and intensely cold climate of Canada." Dr. FERRY explains this fact, on the ground of the predisposition induced by the extremes of the opposite seasons, and maintains that rheumatic affections, like those of the lungs, obey in some measure the inflections of the isothermal and isocheimnal curves. He also observes, that the term rheumatism is generally so loosely applied that a host of ailments, with no character in common save that of pain, are classed under it; and hence that, were this investigation confined to cases of the acute form, the result would be modified. "Of the fact," he adds, "that the application of cold, more especially when combined with moisture, to the body, when unusually heated, is the chief exciting cause of acute rheumatism, there can be little doubt; but when we reflect that, for every instance of rheumatism so induced, numbers continually endure a much greater exposure to the alleged causes with impunity, it follows that still more depends on the predisposition, how this predisposition is said to be given by many circumstances, as age, temperament, climate, and even hereditary liability. As regards the influence of climate, it would appear that acute rheumatic affections, like those of the lungs, are less dependent on mere variations of temperature than upon its extreme range as connected with the seasons, the former being an exciting, and the latter a predisposing cause." ]

81. VIII. THE NATURE OF RHEUMATISM has been much discussed during the last and present centuries. It was formerly imputed, by BAYNARD, BOERHAAVE, VAN SWIETEN, and others, to a *materies morbi* existing in the circulation, which affected particular parts in a promi-

ment and painful manner, according to their predisposition or morbid tendency. More recently, it was viewed by STOLL and LATHAM as an inflammation of a peculiar form, or affecting a particular series of vessels, namely, those only admitting the colourless parts of the blood, although the existence of such vessels had not been demonstrated. CULLEN, C. SMITH, and BICHAT considered acute rheumatism as an inflammatory state of the muscular fibres, which assumed a peculiar form, owing to the cause and the nature of the structure affected. BICHAT, however, considered that this affection implicated more particularly the fibrous tissues of the joints and the aponeurotic expansions. These latter opinions were generally received, when I ventured to suggest the view taken in the subjoined passage.\* Since then, Sir C. SCUDAMORE, HILDENBRAND, and TODD have advanced different views as to the pathology of this disease. The first of these writers has regarded rheumatism as pain of a peculiar character, with or without inflammatory action, affecting several tissues at the same time, but chiefly the white fibrous tissues of the joints and muscles. "In acute rheumatism, he conceives the morbid action to be seated in the ligaments, the tendons, the aponeurotic membranes, and the bursæ, but in the ligaments most frequently. In the sub-acute form, though any of these textures, and even the nerves, may be affected, the disease is most frequently confined to the bursal, that is, the synovial texture surrounding the tendons. In the chronic form, though the disease may occur in the ligaments and tendinous tissues, he represents it as most common in the sheaths of the tendons and the aponeurotic membranes."

82. HILDENBRAND is more elaborate in his consideration of this subject than any recent writer. He views it as a specific form of inflammation, affecting fibrous, or serous, or fibro-serous membranes, and differing from other

specific inflammations proceeding from atmospheric conditions and changes, from catarrhal inflammations which affect mucous surfaces, from erysipelatous inflammations which attack the skin, and from phlegmonous inflammations which appear in any structure. Pain he considers to be the chief characteristic, or eminent παθος of the complaint, the other characters of inflammation either being absent or contingently present. He considers that the imponderable agents, light, heat, and electricity, are chiefly concerned in the causation of the disease; states of the air, alterations of the temperature, and conditions of the surface of the body, &c., subverting the equilibrium of the circulation, and occasioning efforts to recover the harmony subsisting between the different systems. These efforts he believes to be concerned in, or to constitute, the more immediate cause of rheumatism. I cannot refer to the numerous arguments by which he supports his views, but many of them are fallacious, and are founded on postulata. (See *Institut. Medico-Practica*, t. iii., p. 360, et seq.)

83. Dr. TODD, one of the most recent writers, has adopted a similar theory to that contended for by early writers in the last century. He observes that, on reviewing the leading phenomena of the rheumatic paroxysm, it is impossible not to perceive a resemblance of the most marked kind to some of those diseases which are confessedly due to the introduction of a morbid material into the blood; and that, as in those diseases, the fever is not relieved "until the morbid element which gives rise to it has, as it were, spent its fury on the textures to which it is attracted." He next inquires into the nature of the morbid matter, which he considers "to be the cause of the rheumatic diathesis, as well as of rheumatic fever;" and he proceeds to observe that "the two most remarkable excretions in the rheumatic diathesis, or fever, are the urine and the sweat. Both these are distinguished by the presence of an unusual quantity of free acid. The urine contains a large proportion of lithic acid; and those highly coloured deposits take place in it, which Dr. PROUT supposes to arise from the formation of purpurates. The lithic acid diathesis, however, is by no means so strongly marked in the rheumatic as in the gouty state, and these excessive deposits of lithates are more to be regarded as belonging to the paroxysms than as constant concomitants of the diathesis. The high colour of these deposits is more marked in rheumatism than in gout. The sweat of rheumatism is much more copious than that of gout, and is evidently much more acid. In the latter disease, indeed, sweating is generally absent." Lithate of soda is never found in the rheumatic paroxysm, nor in the diathesis; and those derangements in the biliary system, which so often occur in gout, are not so apparent in rheumatism. If, with these considerations, we take into account the most frequent causes of the rheumatic diathesis and paroxysm, we shall obtain a farther clew to the determination of the problem we have proposed. These causes must be admitted to be imperfect assimilation and vicissitudes of temperature; and hence the ill-clad and badly-fed children of the poor are the most numerous victims of rheumatism. Hard work, exposure to cold and wet, bad food, are

\* "Quidam e scriptoribus antiquioribus de rheumatismo discrepantes, quales hypotheses explicaturi sumus, tales fingebant: fluidiorum scilicet lentorem esse, qui partis affectæ vascula obstruat; quidam verò, materiam morbidam in corpore generatam, et ibi per totum corpus circulentem, donec maturerit, ut medicatricibus naturæ viribus, per vascula emunctoria expellatur; et hujusce materiæ morbide expulsionem perquam necessariam ad *κρίσις* vel sanationem proferendam conducere. Hincce morbum in vasculis articuli dolentis *lymphaticis* sedem habuisse, apud quosdam hodiernos hypothesis tenet. Frigus tamen cui corpus, corporisve pars obicitur, vasculorum subter cutem dispositorum contentionem, h. e. spasmum efficere, indeque partium intertionem et articulum et fibrarum musculorum et aponeuroscōn tendinosarum inflammationem necessariò oriri, opinio jam propè universa est. Hæ hypotheses jam memoratæ, eorum quæ in rheumatismo occurrant partem tantum explicant, itaque simul ac editæ sunt, obsolescunt.

"Ab iis tamen, qui nihil nisi musculorum fibrarum et aponeuroscōn tendinosarum statum inflammatum esse rheumatismum affirmant, quæri possit: Quare inflammationem gaingræna aut suppuratio consequi nunquam reperitur? quæ res quidem in reliqui corporis affectionibus, quæ ex inflammatione oriuntur, sæpius accidit. Et quæri potest: Cur dolor hujusce morbi a cæterarum inflammationum cruciatibus tantum differat?

"Nihil quidem, nostro judicio, obstat quò minùs rheumatismum affectionem nervorum, præcipuè ad partem affectam pertinentium, singularem, hisque inseparabilem; et ex nihilo alio nisi adauctorio corporis, ut excitetur proclivitate (vel ut vulgò dicimus ex irritabilitate, vel sensibilitate adauctâ), nasci existimemus. Quare inflammationem, non rheumatismi causam; sed hujusce affectionis singularis nervorum, sive systematis vel ad partem affectam pertinentium, effectum esse arbitramur."—(*Op. sup. cit.*, p. 17.)



strongly contrasted as causes of the rheumatic diathesis, with the ease, comfort, and excess which give rise to the analogous one of gout. If now we remember that the skin is the great emunctory of lactic acid, and that bad food, or too little food, may give rise to its undue development, as well as too much food, it is no wonder that, as lactic acid is imperfectly excreted through its natural channel, in consequence of the influence of cold in checking perspirations, and is too freely developed in the alimentary canal, it should accumulate in the blood and become eliminated at every point. Moreover, the long continuance of the causes which produce the defective cutaneous secretion, and the deranged gastric one, will give rise to the undue development of the lactic acid, in the secondary destructive assimilating processes; thus infecting the blood from every source, and tending to perpetuate the diathesis." (P. 142-4.)

84. There is much that is manifestly true in the above view taken of this disease; but the changes described are merely a part of the successive morbid conditions consequent upon the remote causes. They are, however, important changes, and have been always insisted upon by me in my lectures, and have furnished the basis for one of my chief indications of cure for many years, as shown in a work published some time ago, in which the author states this doctrine and the treatment founded on it. He there remarks that, "in this species of fever the perspiration, urine, and saliva will be found invariably acid, and the use of alkalies beneficial;" and he adds, that "this employment of alkalies, and the observation upon which it is founded, I derived a long time since from Dr. J. COPLAND."—(*The Simple Treatment of Disease*, by J. M. GULLY, 8vo; Lond., 1842, p. 133.) But, as I shall have to state hereafter, these are not the only changes which either constitute or prove a *matrices morbi* existing in the blood, and directly causing or perpetuating rheumatism; there are other alterations which are both antecedent to, and concomitants of, these changes, and some of which are the causes of those which are more prominently manifested in the blood and in the excretions. There is every reason to infer, from the nature of the predisposing and exciting causes, and from the more immediately resulting phenomena, that the earliest changes which take place in the economy are depression of the organic nervous or vital energy, imperfect assimilation and impaired excretion; and that the resulting retention of effete and excrementitious materials (*see art. DISEASE*, § 99-102, *et pluries*) is followed by morbid excretions, chiefly from the kidneys and skin. But, perhaps, the most important of the consecutive changes—consecutive especially of the morbid condition of the organic nervous system—is the increase of the fibrine of the blood and diminution of the red globules; states which, under the influence of this system, are manifestly concerned in producing the complications and metastases which so frequently occur in acute rheumatism, and especially in those cases in which these changes in the blood are the most remarkable. After the most attentive consideration I have been able to devote to the subject, I believe that the *pathology of rheumatism* may be stated as follows:

85. *a.* The remote causes or occasions of rheu-

matism are principally of that kind which either directly or indirectly depress the organic nervous or vital energy of a part or of the whole body, altering the sensibility and other vital conditions and functions thus partially or more generally; and these causes, whether intrinsic or extrinsic, as respects the economy, affect, through the medium of the organic nervous system, the vascular system, and the blood, and ultimately the secretions and excretions.

86. *b.* These causes, especially such as impair the power of the constitution to generate animal heat, or rapidly transfer this heat from the surface, and are connected with changes in the electrical conditions of the body in relation to those of the atmosphere—more particularly insufficient nourishment and clothing; low, humid, and cold localities; living in cellars, or upon or near the surface of cold, damp, or clayey soils; the proximity of marshes and other sources of malaria; seasons in which the quantity of rain has been excessive, and east or north-east winds prevalent, &c.—are such as produce the most remarkable effects upon the organic, nervous, and vascular systems, thereby developing, according to peculiarity of constitution and concurrence of causes, the several forms of rheumatism and their characteristic phenomena.

87. *c.* Owing to the greater prevalence of these causes in some districts, or countries, than in others, rheumatism is so prevalent in these as to be *endemic* as respects them; and owing to unusually wet seasons, and the prevalence of east or northeast winds, or to remarkable vicissitudes of weather and temperature, this disease has been not merely prevalent in a single district, but also so very generally diffused as to have been *epidemic*, endemic and epidemic prevalences of the complaint having been generally overlooked by writers, and hence not referred to their respective causes.

88. *d.* The nature and operation of the remote causes—the effects produced by them on the organic, nervous, and vascular systems, and consecutively upon the blood, the secretions, and excretions, and the nature of these effects, especially in acute and sub-acute forms of the disease, serve to explain the frequency of the complications and metastases of these forms; the constitution of the blood manifestly favouring the supervention of disease of internal serous or fibro-serous surfaces, and the effusion of fibrinous lymph on the affected surface.

89. *e.* There is no satisfactory proof of the lactic or acetic acids, found in the perspiration during acute rheumatism, or of the uric acid found in the urine, having existed in the blood previously to their excretion from it, and there forming a *matrices morbi*. It is, on the contrary, more reasonable to infer that the elements of these acids accumulate in the blood, owing to the operation of the predisposing and exciting causes upon the organic, nervous, and vascular systems, and upon the organs which these systems actuate; and that the accumulation or condition of these elements gives rise to these acids in the excretions as well as to the other changes in them and in the economy; and that these acids are probably the effect, rather than the cause, of the disease. The excess of fibrine, and diminution of red globules, in the blood, are most probably owing to the same mode of oper-

ation of the remote causes. Even granting that these acids are in part formed in the digestive canal, and in the blood during the disease, it is not unlikely that they are also partly formed by the excreting organs, especially when their large amount in some cases is considered.

90. *f.* The great importance of the primary effects produced in the organic nervous and vascular systems, and of the consecutive changes in the blood and excretions, should direct a more intimate reference to these effects, when devising the indications and means of cure, than has hitherto been attempted. These effects, primary and consecutive, are such as require the organic nervous energy to be duly supported and developed, the exuberance of fibrine to be diminished, the tendency to the exudation of fibrinous lymph on serous surfaces to be counteracted, and the morbid conditions of the secretions and excretions to be removed by means appropriate to the respective conditions.

91. *g.* The frequency of complications and metastases of rheumatism is owing, 1st. To pre-existing tendency, lesion, or disorder of some organ or part; 2d. To exposure to some energetic cause during the rheumatic disease, as violent mental emotions, causing affections of the heart or brain; 3d. To depletory, depressing, or exhausting means of cure, thereby lowering the vital resistance, and favouring the extension or metastasis of disease from the periphery to the centre of the frame; 4th. To the neglect of the morbid states of the blood, especially of the exuberance of fibrine; 5th. To the neglect of the physical and chemical states of the secretions and excretions, and of the means which these states should suggest; 6th. To measures which act locally, and which, by suppressing the local manifestation of a general or constitutional disease, tend to the production of it in other parts, or in internal organs.

92. *h.* Rheumatism is attended by phenomena, which, however nearly allied to gout in many cases, are different as respects, 1st. The seat and character of the pain; 2d. The state of the blood, particularly in regard of the abundance of fibrine, and the diminution of red globules in the former disease; 3d. The nature of the excreted acids and salts, and the state of the excretions from the skin and kidneys (§ 65-67); 4th. The seat and nature of the consecutive local changes, which in arthritic rheumatism are chiefly within the capsules and at the ends of the bones, but which in gout are external to the capsules, and are often attended, in chronic cases, by the peculiar gouty concretions; 5th. The remote causes, predisposing and exciting; those of rheumatism chiefly causing a deficiency of red globules and poorness of blood; those of gout, an exuberance of globules and richness of blood.

93. *i.* The pain in rheumatism, whether affecting the fibrous tissues of joints, or of tendons and aponeurotic expansions, does not proceed from inflammation of these parts or of the muscular fibre; and the increased pain on motion, or the inability of motion, is not dependent on affection of the muscles themselves, but are chiefly owing to the change in the functions and sensibility of the ganglial or organic nerves supplying these structures. When inflammation supervenes, it is owing to the influence of these nerves upon the capillary

circulation of these tissues, and to the irritation of the morbid fluid exuded from them, either internally or externally, to the capsules.

94. *k.* That the disease actually originates, and continues mainly seated, in this part of the nervous system, is shown, 1st. By the nature and operation of the remote causes; 2d. By the transition of the morbid sensibility from one part of the periphery of this system to another—from one side or joint to that on the other—from a superior to an inferior extremity, &c.; and, in cases of exhaustion, from the periphery to more central parts, and not in the course of the cerebro-spinal nerves. The changes in the vascular system, in the blood, and in the secretions and excretions, are the consequences of the morbid condition and excited sensibility of the ganglial nervous system. Inflammatory irritation or action, when it supervenes, either internally or externally, is owing to this cause, or to the irritating nature of the fluid effused from the affected tissues, or to a combination of these causes; and the augmented pain, on motion, of an affected joint or limb, is also owing to the exalted sensibility and tenderness of the affected fibrous or fibro-serous tissues, manifested more especially when these tissues are stretched or brought to a state of increased tension.

95. *l.* The treatment of the several forms of rheumatism, especially the acute and sub-acute, has been conducted by me since the subject first engaged my mind in 1814, upon the pathological basis now stated, and always with a successful issue, and without internal complications and metastases, if they were not present previously to the employment of the means which this view suggested.

96. IX. TREATMENT.—The indications and means of cure advised for the several forms of rheumatism have been as different, or even opposite, as the views which have been entertained of the causes and nature of the malady; and even at the present time very opposite doctrines respecting the pathology and treatment of the disease are promulgated by able authorities, each one appealing to facts—too often false facts—as demonstrative of success, without giving due consideration to the influence of vital resistance or constitutional power—the *vis medicatrix nature*—in withstanding injurious influences and agents, and to the manifest disposition of the economy to return to a normal condition, where injurious causes no longer continue to operate, and where no organic injury calculated to impede or interrupt the vital functions has been produced.\*

\* "Apud antiquiores de rheumatismi curatione nihil certi repertum: quippe qui morbum, sicut supra memoravimus, penè ignorare, et cum arthritide confundere, viderentur. Veruntamen, ut e scriptis Græcorum patet, sanguinem mittere, movere alvum, et tepida perfundero solebant. Romani de rheumatismo curando nihil meminerunt; neque dubium, quin podagræ chiragræque speciem duxerint.

"E GALENI temporibus usque ad seculum decimum sextum, de hoc morbo, deque curatione ejus, nihil prorsus repertum; nec apud Arabes quidem, ubi, Europæ ignorantique barbarique nebulis obumbrata, omnes Æsculapii filii discipulique concesserant. Sub finem seculi decimi sexti, rheumatismum ab arthritide et catarrho, quibuscum tam sæpè confusus esset, discriminavit BAL-LONUS, eique iterum rheumatismi nomen, forsàn parùm feliciter, indidit. SYDENHAMUS hunc morbum ex artis medicæ regulis submovere, et sub morbi accessione ante omnia sanguinis missioni fisis videtur. Ferè nullus alius morbus est, cujus in curatione plura medicamentis



97. *i.* TREATMENT OF ACUTE AND SUB-ACUTE RHEUMATISM.—Having taken a view of the modes of treatment and means of cure which have been recommended for these forms of the disease, and having given my opinion respecting them, I shall next state the treatment which I have employed for these forms of rheumatism since the earliest period of my practice, and which I have found most beneficial in the simple forms of the disease, when no complication nor metastasis had supervened. It may, however, be remarked that the treatment of the several forms of rheumatism must necessarily vary with the locality in which persons who are the subjects of them reside, according as the patient resides in the country, in a healthy and dry atmosphere, or in a humid and malarious air; or in a close, low, crowded, and large town, and as he has been well or ill fed and clothed. Neither should it be overlooked that a somewhat different treatment may have been required by our ancestors, who drank malt liquors, and not tea, and spirituous liquors, as in modern times. These latter, taken even in moderation, especially when taken habitually, impair more or less the primary and secondary processes of assimilation, impart more of a nervous character to diseases, and contra-indicate the employment of vascular depletions, unless with caution and in moderation.

98. *A. Blood-letting* was recommended by SYDENHAM at an early period of his practice, and certainly to an extent which could not fail of being injurious in many instances. Of this he appeared to have been afterward convinced; for, in a letter to Dr. BRADY, he admits that it impaired the strength, and favoured attacks of other diseases. He therefore trusted, at a later period of his practice, to a diet consisting chiefly of whey. SYDENHAM had probably been induced to adopt frequent bleedings for this disease at the commencement of his practice by the advice of DE BAILLOU or BALLONIUS, and RIVERIUS, who had advised this practice. BOERHAAVE also recommended large blood-letting early in the treatment; but his very able and learned commentator, VAN SWIETEN, and about the same time STÖRCK, saw reason to be more cautious, and advised it only for the young and plethoric, and when the pulse is strong and full. TISSOT, PRINGLE, D. MONRO, and STOLL, also recommended free or repeated blood-letting, aided by diluents; and the practice was followed by THILENIUS and BANG, and adopted by CULLEN with more reservation, he bringing to its aid local bleedings, diaphoretics, and purgatives. HEBERDEN was still more cautious, and contended that venesection was not suited to the majority of cases, and ought to be prescribed only for robust persons. Dr. FORDYCE had at first recourse to blood-letting; but his experience led him to infer that it favoured the occurrence of internal metastasis, and he therefore abandoned the practice. Dr. FOWLER resorted to bleeding in 41 out of 87 cases, and found that only three were cured, seven much relieved, seven partially relieved, twenty very

little relieved, and four not at all benefited. Dr. LATHAM regarded blood-letting as not required, although he did not object to local bleeding by leeches, as advised by Dr. FOWLER, and trusted chiefly in diaphoretics, diluents, laxatives, and rest. Ultimately, Dr. WELLS and WILLAN came nearly to the same conclusion, as respects the treatment of the disease in London and large towns, namely, that blood-letting is either unnecessary or injurious, by enfeebling the patient and favouring internal translations of the malady. More recently, Mr. BEDINGFIELD and Dr. CRAIGIE have advocated early and large blood-letting. But the former wrote when venesection was a common remedy, and was certainly less prejudicial, as respected the prevailing epidemic constitutions (from 1810 to 1825), than it has been subsequently. Doctor CRAIGIE, practising in Edinburgh, has declared in favour of blood-letting, aided by diaphoretics and cathartics, and contends that, "in order to be beneficial, it ought to be performed early in the disease, and carried to a considerable extent." He considers that the best time is within the first three or four days, or, at all events, within the first week. It should be carried, he adds, "to twenty, twenty-five, or thirty ounces at once, and within twenty-four hours to as much more;" and he attributes the want of success of FOWLER and others to the smallness of the quantity taken. M. BOUILLAUD has advocated a somewhat similar practice to the foregoing; but, instead of abstracting at once the quantity advised by Dr. CRAIGIE, he has adopted the abandoned method of SYDENHAM, and has advised a smaller quantity, on more frequent occasions, to be drawn.

99. I believe that the treatment of any form of rheumatism by blood-letting, as a general principle of practice, however early in the disease, to be productive of injury in some cases—of rheumatic inflammations of the internal and external membranes of the heart, of the peritoneum, pleura, synovial membranes, &c.; of delirium, prolonged convalescence, and of the degeneration of the more acute into the chronic states. I will not deny that the robust, or those in the prime of life, who live well and enjoy a wholesome air, will bear full or even copious depletion at an early period of the disease, generally without detriment, and possibly with advantage; but I am convinced that in large cities or towns, in persons employed in warm, ill-ventilated factories, or those living in crowded rooms, low apartments, cellars, &c.; in the very young, and in the old especially; wherever there is any indication of deficiency or poorness of blood; and, *à fortiori*, in the ill-clothed and ill-fed, vascular depletion in any form is often most injurious, and always unnecessary—rarely required, even for the apparently robust, unless it be conjoined with the method of cure which I shall recommend in the sequel (§ 115, *et seq.*).

[We fully agree with Dr. COPLAND in the opinion that blood-letting is not adapted to the treatment of rheumatism as a general rule, and that much injury has resulted from its indiscriminate employment. In very robust habits we have found one venesection early in the disease of considerable advantage, especially when conjoined with antimonials, nitrate of potash, or DOVER's powders; but we have seen so much

rum genera medici neoterici adhibuisse videntur. Nec mirum, quoniam unusquisque eorum, prout ipse de proximis morbi causis judicat, vel hæc remedia vel illa adhibet. Eventus felices quos a remediis quæ absolutoria existimaverint, affici sibi gratulentur, ἀποκρίετα ποτίους, sive viribus nature medicatricibus posse attribui, haud medicis suspicio habenda est."—(*Op. cit.*, p. 22.)

injury from its repeated use that we never resort to its repetition except under very urgent circumstances. When complicated with endocarditis, as it often is, blood-letting, conjoined with mercurials freely administered, is indispensable to control the disease in limine, and prevent those cardiac organic lesions which lead to a fatal result. But even here free cupping and leeching over the præcordial region, aided by a succession of blisters, dressed with mercurial ointment, will often suffice to arrest the inflammatory action and produce speedy resolution. The choice of remedies must, as in all other cases, be determined by the age, constitution, habits, &c., of the patient, and especially by the period and severity of the disease. No rule can be given to meet all cases. American practice in rheumatism, as it seems to us, is more bold than judicious, more haphazard than discriminating, and in many cases more injurious than beneficial.]

100. *B. Mercurials* alone, or with opium, have been advised for the acute and sub-acute forms of rheumatism, since the benefit produced by them in inflammations of serous membranes was shown by Dr. HAMILTON. The practice was adopted by NIEMANN, and by many modern writers, with the view of preventing the effusion or formation of coagulable lymph, especially in the internal extensions or metastases of the disease. But there is every reason to believe that mercurials, prescribed so as to produce their specific constitutional effects, will exert but little influence either in removing rheumatism, or in preventing the affection of internal parts; although they, especially calomel, will be of service in removing biliary accumulations and congestions, in rousing the torpid functions of the liver, and, when conjoined with opium, in promoting the excreting functions of the skin: an intention always necessary to be accomplished in rheumatism. But there is another preparation of mercury which, when conjoined with other medicines, is often of service in certain forms of rheumatism, viz., the bichloride; this, when taken in minute doses with the compound decoction, or fluid extract, of sarsa, or with the decoction of cinchona or infusion of serpentaria, &c., is often of great service in some sub-acute and chronic states of rheumatism of the joints. Attempts to cure the more acute forms of rheumatism by salivation, as suggested by some writers, while by no means preventing, if not increasing, the risk of internal metastases, always render convalescence prolonged, and favour the degeneration of the acute and sub-acute into the chronic forms.

101. *C. Emetics*, followed by cholagogue purgatives or ecoprotics, were much praised by LENTIN, THILENIUS, and STOLL, at a very early period of the disease, and more especially in that state of acute rheumatism which they denominated bilious, or in which biliary disorder was manifestly present. CLOSSIUS recommended the repeated exhibition of emetics. There can be no doubt of the propriety of the practice, in the circumstances just stated, and if the treatment be not otherwise depressing. Emetics have been rarely given in rheumatic fever in recent times; but I have prescribed them in a few cases at the commencement of the attack, conjoining them with warm cardiacs, or aromatics, or stimulants, so as to produce not

only full vomiting, but also copious perspirations, as early in the disease as possible.

102. *Purgatives*, especially cholagogues, are generally required early in the disease, although they have been but little insisted on by writers, excepting BOERHAAVE and a few others. But they should be prescribed only so as to procure a free alvine evacuation and discharge of bile, without occasioning severe catharsis; for a too violent action on the bowels, and more especially if it be conjoined with vomiting, will remarkably risk the suppression of the local affection, and cause some internal complication or metastasis of the disease, as in the very remarkable instance adduced above. In the more acute states of the disease I have usually prescribed, as early as possible, a moderate or full dose of calomel, with ipecacuanha or JAMES'S powder at bed-time, and a purgative draught, as the compound infusions of gentian and senna with the sulphate and carbonate of magnesia, in the morning; the satisfactory operation of these being introductory to other more efficient means. In some instances I have preferred half an ounce each of spirits of turpentine and castor oil, taken on the surface of milk, or of some aromatic water; and when the bowels do not act copiously, an enema, containing about an ounce of turpentine, with ten grains of camphor, or half a drachm of asafoetida, and some common salt, will always be most serviceable. The evacuations ought to be carefully examined; and if, from their appearances, there is any reason to infer either the retention of disordered intestinal excretions, or retention or disorder of the biliary secretion, the purgatives now mentioned, or such other as the peculiarities of the case may suggest, avoiding violent measures, should be repeated occasionally, until the motions present a more healthy character. This end is not always attained by prescribing cold saline purgatives; but it will be more certainly and speedily reached by conjoining stomachics and bitters with the purgatives.

103. *D. Diaphoretics* have been recommended by many for all forms of rheumatism, but they are not equally beneficial in all, nor are all diaphoretics equally efficacious. The medicines of this class which are most serviceable are the preparations of *antimony*, either alone or with opium; *DOVER'S powder*, or *ipecacuanha* and *calomel* with opium; the *liquor ammoniac acetatis* with *sesquicarbonate of ammonia*, in full doses, and with the *spiritus ætheris nitrici*; *guaiacum*, in the form of decoction or tincture, with *ammonia*; and *camphor* with *nitre* and *opium*, or *camphor* with *JAMES'S* or *DOVER'S powder*, or with *antimony*, or with preparations of *ammonia*. Although the most acute states of rheumatism are generally attended by abundant sweats, which produce no relief, yet these do not contra-indicate a recourse to diaphoretics. If this course of treatment be adopted, there are certain points which should receive due attention in connexion with it: 1st. All retained, accumulated, or morbid biliary and intestinal excretions should be previously removed by the means already noticed, so that the patient may not be chilled, during the diaphoretic operation, by getting up to the night-stool. 2d. The patient should be enveloped in, or have next his skin, a long flannel night-gown; or, in default of this, a cotton one; and he should sleep in soft woollen or flannel



nel blankets, or in cotton sheets. 3d. A sufficient supply of warm antacid and saline diluents, and especially an abundance of fresh whey, or of very weak, but fresh mutton or veal tea, or barley water, should be always ready, which may be made the vehicle for diaphoretic or other medicines, and which, taken abundantly, may promote diaphoresis.

104. *a.* The *antimonial diaphoretics* are the tartar emetic in small doses; JAMES'S powder or antimonial powder, either alone or with other substances, as with alkalies, opium, camphor, &c. The alkalies and magnesia, in the state of carbonate, aid the effect of these, and neutralize the acids present in the *prima via*. Opium increases or insures a sudorific effect, and is generally of more or less service when thus conjoined, if biliary and intestinal accumulations and retentions have been removed, and when the symptoms are very acute, and when vital power and vascular fulness have not been too much reduced. When, however, the patient has been too freely depleted; or when there is much exhaustion, and especially if the urine indicate much free acid; or if the perspirations have an acid smell, &c., then other diaphoretics are indicated, and antimonials should be relinquished.\*

105. *b.* The preparations of *ammonia*, with or without *guaiacum*, or the *spiritus atheris nitrici*, or *camphor*, or other medicines, are then, I believe, the most beneficial. If the *liquor ammonia acetatis* be prescribed, it should be conjoined with full doses of the sesquicarbonate of ammonia and the spirits of nitric ether; or, if *guaiacum* be preferred, it may be given with ammonia or camphor. *Guaiacum*, either alone or with ammonia, was formerly much employed in rheumatism, and much praised by Dr. FOWLER, and more recently by Dr. SEYMOUR, the former preferring the simple tincture, the latter the mixture of the pharmacopœia. I have prescribed either, but generally in conjunction with large doses of the carbonate of ammonia, or some other alkali, for reasons which will appear hereafter. The gentle operation which it often exerts on the bowels, when given in a sufficient dose, is also advantageous, but its free diaphoretic effect should always be aided by diluents, and by the regimen advised above (§ 103).

106. *c.* DOVER'S powder has been very generally employed in the several more acute states of rheumatism; but it should be prescribed either in its original form, the nitrate of potash being substituted for the sulphate, or the ipecacuanha should be given in larger doses in the form of pill. One grain of ipecacuanha, with one of opium and eight of nitre, should be given in the form of pill every two hours, until three or four doses are taken; and then this dose should not be given oftener than every tenth or twelfth hour, the operation upon the skin and urine being promoted by a copious use of diluents, containing nitre and the sub-carbonate of soda or potash, that may be rendered pleasant by the addition of the usual spices and aromatics. At the commencement of the attack, the ipecacuanha, in doses of two or three grains, may be given with an equal quantity, or somewhat more, of calomel, and a grain of opi-

um, and be followed, after three or four doses, by a stomachic purgative, or by either of those already mentioned (§ 102); and after the howels have been evacuated, the ipecacuanha, opium, and nitre may be taken, so as to procure a copious perspiration, which should be promoted by the regimen and medicated diluents already recommended. In some cases I have preferred a combination of ipecacuanha, camphor, and opium, the camphor in doses of three or five grains, with the same quantities of the ipecacuanha and opium as already advised, nitre and carbonate of soda or potash being taken freely, in large quantities of diluents or demulcents.

107. *d.* Calomel and opium have been recommended for their diaphoretic and alterative effect; but they should be given only at the commencement of the disease, and should then be combined, at first, with full doses of ipecacuanha, and afterward with camphor; but after a few doses—not more than three or four—a purgative should be taken, and its operation promoted by an enema (see § 102).

108. *E.* The *nitrate of potash* was much employed for acute rheumatism by BROCKLESBY, RANOE, and THILENIUS, who gave from one ounce to an ounce and a half in the twenty-four hours, copiously diluted, and continued thus to exhibit it for five or six days, when the disease generally began to subside. I have prescribed it for many years, but not in so large doses, using it chiefly in the drink of the patient with the carbonate of potash or of soda, or prescribing it in the decoction of bark, either combined thus, or with the liquor ammonia acetatis, and spiritus atheris nitrici. The intention of these writers was to excite the skin and kidneys to the due elimination of hurtful materials from the blood; my object being to rouse all the emunctories to increased action, to develop organic nervous energy, and to counteract the morbid disposition and condition of the blood.

[We have known the nitrate of potash used with much benefit in acute rheumatism, in doses of i., ij., or even  $\text{z}\text{ij}$ . in twenty-four hours, largely diluted. In most cases the pulse remains unaffected, the digestive functions do not suffer, and the urinary secretion is slightly increased in quantity, and has a high specific gravity. The most obvious effect is the abatement of the heat, pain, and swelling in the affected joints, while the tendency to cardiac complication is materially lessened, or, if it exists, is rendered more controllable. It is very probable that the beneficial effects of nitre in this disease may be owing to its property of diminishing the amount of fibrine and increasing the saline constituents of the blood. A solution of the *nitrate*, and also of the *iodide of potash*, has been found extremely useful when applied tepid to the affected parts by means of a linen roller or other cloth kept moistened by the solution.]

109. *F.* The treatment of acute rheumatism has been confided chiefly to opium by BRUGNATELLI, and more recently by Dr. CORRIGAN. It has been recommended, also, by other writers in large doses, but generally with antimony, ipecacuanha, calomel, &c. I have given as much as seven or eight grains in the twenty-four hours, in the form of the *pilula saponis*

\* [A very good formula in these cases is *Vin. Tart. Ant.*, f.  $\text{z}\text{ij}$ . *Tinct. opii*,  $\text{z}\text{ss}$ . Dose,  $\text{z}\text{j}$ . every hour, if the stomach does not reject it.]

comp. of the pharmacopœia ; but I have considered the free use of opium most advantageous in conjunction with ipecacuanha or with camphor. In the most acute states of the disease large doses of opium are easily tolerated, especially when conjoined with warm spices or aromatics, or with ipecacuanha and capsicum, and are often indispensable and most beneficial in conjunction with the alkaline and tonic treatment which I have long employed.

110. *G. Peruvian* or *Cinchona bark* was first recommended for acute rheumatism by MORTON. It was, however, objected to by CULLEN, while PRINGLE and HEBERDEN gave only a somewhat favourable, but an undecided, opinion respecting it. HULSE, FOTHERGILL, and SAUNDERS wrote more decidedly in favour of it, and HAYGARTH entered upon an elaborate defence of the use of it for this disease ; and his inferences received the support of FORDYCE and WILLAN, although Dr. PARRY offered certain objections to it, which can have no weight when duly examined by the physician who has had any experience of the operation of this medicine in acute rheumatism. I have always employed cinchona for this disease, in various states of combination, since 1819, and have, up to the present day, preferred the decoction of the cinchona cordifolia, in full doses, conjoining it with other remedies which the stage and peculiarities of the case have suggested. But the bark should be prescribed as early in the attack as possible ; and if the alvine evacuations have not been sufficient, or if biliary and intestinal colluvies still remain, it may be preceded by an emetic, and by a dose of calomel and JAMES'S powder at night and a purgative draught in the morning ; or these means may be occasionally resorted to without materially interfering with the due employment of the bark. At an early stage of the more acute cases, I have generally prescribed the decoction of cinchona with the liquor ammoniæ acetatis and nitre, often also with full doses of the spiritus ætheris nitrici, the patient having been allowed a large supply of diluents, consisting either of whey, or of water gruel or barley water containing nitre and the spirits of nitric æther. If the disease was not soon afterward mitigated, the decoction was taken with the liquor ammoniæ acetatis, with sesquicarbonate of ammonia in full doses, and sometimes also, especially if the disease had been of some duration, with the tincture of serpentaria. In cases where the perspiration was copious and the urine scanty, the decoction was prescribed with the carbonate of potash or soda, to which the ammonia and spirits of nitric æther were often added. The patient's drink generally contained an alkali instead of nitre ; and the weak animal tea, mentioned above (§ 103), was often given thus medicated, and rendered palatable by spice or aromatics ; and while it quenched thirst, it furnished all the nourishment required. In some cases the decoction of bark was given with a preparation of colchicum, but very rarely, unless ammonia in full doses was conjoined with it. (See § 105.)

111. Since the introduction of *sulphate of quina* into practice, the other preparations of cinchona have been much less employed. Yet in rheumatism, as well as in several other diseases, I have preferred the decoction, or the

compound tincture, especially in the combinations just mentioned. In some instances, however, of the sub-acute and chronic disease, I have given the quina with much benefit, especially in conjunction with camphor, in the form of pill ; and where there has been much evidence of anæmia, the sulphate of iron has also been added. In some such cases, or when certain peculiarities of the case suggested a combination of tonics and purgatives, then the quina, either alone, or combined as now stated, has been given, in the form of pill, with the purified extract of aloes, or with the compound rhubarb pill, or the aloes and myrrh pill, two or three grains of either acting freely when thus combined.

112. *H. Colchicum* has been much employed in acute and sub-acute rheumatism since 1815 or 1820, but not always with sufficient caution. I have rarely given it, even in the most acute states of the disease, unless in conjunction with cinchona and an alkali ; or in the evening and at night, these other medicines having been taken in the morning and during the day. One or two grains of the powder of the cormus, or of the extract, have been thus conjoined with an equal quantity of the powder of capsicum, and with three to six grains of the soap and opium pill ; the smaller doses having been taken at six and ten P.M., or the large dose at nine P.M. only ; the morning and middle of the day, when the remission of fever is generally observed, having been devoted to the administration of the preparations of cinchona and of the alkalies. The following has been found very serviceable.

No. 331. R. *Magnesia Carbon.*, gr. xij. ; *Ammonia Carbon.*, gr. vj. ; *Vini vel Tinct. Seminum Colchici*, ℥ xx. ad 3ss. ; *Tinct. Cinchonæ Comp.*, 3jss. vel ʒij. ; *Tinct. Capsici*, ℥ iij. ; *Tinct. Opii*, ℥ v. ; *Aquæ Cinnam. vel Carui*, et *Aq. distil.*, aā, ʒvj. *Misce. Fiat Haustus bis terve in die sumendus.*

113. *I. Aconite*, in the form of expressed juice, extract, alcoholic extract, or tincture, has been recommended by many in rheumatism, since it was first employed by STORCK, especially by THILENIUS, RANOE, GESNER, and LENTIN. I have tried it in several cases, both simple and complicated, having always preferred the extract or tincture prepared with rectified spirit, and according to the formula recommended by Dr. PEREIRA. Of the former, from one sixth to a fourth or half a grain may be taken every sixth or seventh hour, or from three to five drops of the latter ; but either preparation should be given with caution, and the effects duly watched. I have usually prescribed the tincture in distilled water only ; and the extract, in the form of pill, intimately mixed with liquorice powder and simple sirup ; and directed whichever was prescribed to be taken in the intervals between the administration of the other medicines employed. I have considered the aconite, when cautiously used, as a powerful agent in removing the morbid sensibility and excited vascular action in acute rheumatism ; but I have employed it chiefly in aid of the other means already mentioned, especially the decoction of cinchona in the states of combination noticed above (§ 110). In the cardiac or pericardiac complications of the disease it is a valuable auxiliary to other remedies, as will be mentioned hereafter.

114. *K.* A method of cure, which Dr. TODD



has called "*the treatment by elimination*," has very recently been recommended by this physician. "It is probable," he observes, "that the *materies morbi* in rheumatic fever is lactic acid. We know that the natural emunctory of this is the skin. Many chemists maintain that it will also escape by the kidneys; and if it ever does so, perhaps this is more likely during rheumatic fever than at any other time." The indications he suggests, in conformity with this view, are "to promote the action of the skin, the kidneys, and the bowels; to use antacid remedies, and to give large quantities of fluid for the free dilution of the *materies morbi*, and in aid of the drainage by diaphoresis and diuresis."—(*Lond. Med. Gaz.*, vol. xlii., p. 573.) To obtain these ends, he recommends Dover's powder, and the other means usually employed. But I may remark that this acid is not the only *materies morbi*: there is an increase of fibrine and colourless corpuscles in the blood, as shown above (§ 62), and when treating of rheumatic inflammation of the surfaces of the heart (§ 20, 129-133), with a disposition to their exudation on the serous surfaces, especially those of this organ, while the quantity of red globules is diminished. The predominance of acid has been long ago contended for; but whether the acid is formed in the stomach, as Dr. Todd supposes, or by the emunctories from the constituents of it existing in the blood, or partly by both, has not been satisfactorily shown. However this may be, the treatment it suggests has been long employed in acute rheumatism, as already noticed (§ 84). The means of cure, however, should not be limited to this single morbid material, but be extended so as to comprise other changes in the blood and nervous system, which, as Dr. Todd very judiciously argues, and as was shown above, and when describing the treatment of *rheumatic endocarditis and pericarditis* (see art. HEART, § 144, *et seq.*), can never be removed by blood-letting alone. Indeed, in many cases of the disease, especially in those of some duration, and when there is a deficiency of red globules inferred, I have prescribed the preparations of iron, as the oxides or carbonates, with the carbonate of some one of the alkalies.

115. ii. TREATMENT ADVISED BY THE AUTHOR. —This may be partly inferred from the remarks already made; but it depends much on the duration, seat, and form of the disease, and upon the means which have been already resorted to. The indications or intentions of cure should be directed to the removal of the morbid conditions which constitute the disease, as far as these are known, and as far as experience may have proved the efficiency of the means recommended for this purpose. We should more especially endeavour to develop organic nervous energy, so as to promote the assimilating, the depurating, and excreting functions; to diminish morbid sensibility; to counteract whatever disposition may exist to form acid in the *prima via*; to remove from the blood, or to neutralize the materials from which acid is formed, as well as whatever acid may be present; to increase the quantity of red globules in the blood when these are deficient; to correct the morbid condition of the liquor sanguinis; and to prevent the exuberance of fibrine and the tendency of it to concrete, and to exude in the

form of a fibrinous plasma or lymph, on serous surfaces. As a prelude, however, to the administration of such means as may seem most efficient in attaining these ends, disordered or accumulated secretions and excretions should be evacuated by appropriate agents; by medicines which moderately evacuate without occasioning vital depression or exhaustion.

116. A. If the patient be seen by the physician early in the attack, and if the symptoms are *acute*, he should be placed in a strong flannel night-gown, or between flannel or soft woollen blankets; the other parts of the regimen specified above (§ 103) being also observed. If there be no cardiac complication, if bilious colic be inferred to exist, if the tongue be loaded or covered by a yellowish fur, and if the alvine excretions have not been hitherto natural or free, an *emetic*, consisting either of ipecacuanha or sulphate of zinc, with two or three grains of capsicum, should be given, and its operation promoted by drinking a warm infusion of chamomile flowers. Soon after the emetic action has ceased, especially towards evening or night, four or five grains of *calomel*, and one and a half or two of *ipecacuanha*, and an equal quantity of *opium* and *capsicum*, should be taken, and be repeated in five or six hours, if a free perspiration or some action on the bowels has not resulted from the first dose. If the bowels continue insufficiently open four or five hours after the second dose, or the stools offensive or morbid, a *purgative* draught may be given; or an *enema*, containing an ounce of *turpentine* and two of *sweet oil*, with a scruple of *asafoetida*, ten grains of *camphor*, and a little salt, may be administered. Fæcal and bilious accumulations having been evacuated by these means, the decoction of *cinchona* ought then to be given in such combinations as the existing state of the patient will suggest; with liquor ammoniac acetatis, spiritus ætheris nitrici, and nitras potassæ, if the febrile action is great and the urine scanty and high-coloured, and at an early stage; with the carbonate of the alkalies, or with ammonia or magnesia and colchicum; or with either of the alkalies and serpentaria, if the disease is farther advanced. During the liberal use of cinchona, of alkalies, &c., the states of the bowels and of the urine and perspiration should be carefully watched. If the bowels are not sufficiently open, a dose of calomel, ipecacuanha, and opium may be given at night, and a draught, with half an ounce each of turpentine and castor oil, in the morning. If the biliary and intestinal excretions are sufficiently free, two grains each of opium and of ipecacuanha, with five of nitre, or three of camphor, may be taken in the evening. If the excretions manifest much acidity, the alkalies should be given liberally, both in the patient's medicine and in his drinks; and if the pain continue severe, notwithstanding the liberal employment of them, either an increased dose of opium should be given at night, or ammonia and colchicum, as noticed above (§ 110, 112), ought to be added to the cinchona and the alkali. I have rarely found the above means fail of producing a very decided relief in the course of three or four days, when commenced early, and when no cardiac or other complication exists. But when a joint is attacked, some external means, especially such as I shall here-

after suggest, may also be employed with advantage.

117. *B.* In more prolonged cases, and when the disease had not been seen during its early stage, instead of the colchicum I have prescribed the *aconite*, as noticed above, in the intervals between the taking of the cinchona and alkalies; and in those cases where the patient has been reduced by the duration of the disease, or by vascular depletions, or where a deficiency of the red globules of the blood was inferred, I have employed with marked advantage the *iodide of iron* in the sirup of sarza, and the compound decoction or fluid extract of sarza. This medicine was of the most remarkable and immediate service in the case of a medical officer from India, which presented features of the greatest severity and obstinacy, no other substance, excepting an occasional purgative, having been required to effect a cure, which took place in a very short time.

118. In the class of acute cases now being considered—in the prolonged, neglected, or injudiciously treated, where the red globules appear to be deficient, but where no internal complication or metastasis can be detected—the preparations of *iron* with the carbonates of the *alkalies*, especially the *mistura ferri composita*, with the addition of the carbonate of potash or soda, will be found of great service. The following pills will also be most beneficial. If the bowels be confined, from five to ten grains of the extr. *aloes purificat.* may be added to the mass.

No. 332. R Ferri Sulphatis, gr. xij.; Quinæ Disulphatis, gr. xvij.; Camphoræ rasæ, gr. xij.; Pulv. Capsici, gr. vi. Pilulæ Galbani comp., ʒj.; Sirupi Tolutani, q. s., misce, et contunde bene. Divide massam in Pilulas xxiv.; e quibus sumantur binæ vel tres, ter in die.

119. *G.* When the disease attacks the large joints in the *capsular* or *sub-acute* form, the application of leeches has been advised, especially if external redness or swelling is observed. The practice is of service in recent attacks, and in young or robust persons, more particularly if the internal treatment be such as I have already recommended, or am about to suggest. The number of leeches\* should depend upon

the circumstances of the case; but the benefit derived from them will be only temporary, unless the internal means used at the same time be appropriate, and unless the rest of the external treatment following the application of leeches be suitable to the local affection. After fecal accumulations and disordered secretions and excretions have been evacuated, the means already prescribed (§ 116, *et seq.*) should be employed; and if the more acute symptoms lapse into the sub-acute, or if a joint becomes especially affected, or if effusion within the capsule takes place, the decoction of cinchona may be given with the *iodide of potassium*, and the solution or the sub-carbonate of potash. In these cases, it is important to procure as speedy absorption of the effused fluid as possible, and thereby to prevent the irritating effects of this fluid on the membranes inclosing it. This end will be best obtained by subduing, by the internal means already advised, the morbid action in the joint, by correcting the altered state of the circulating fluid, and by procuring a free discharge from the external surface of the joint. After the operation of leeches, in such cases as may appear to require them, or without having recourse to them in other cases, where they are contra-indicated by the local or constitutional symptoms—when there is little or no local redness, and no marked increase of heat, but considerable intra-capsular swelling—small or moderate-sized blisters may be placed near each side of the joint, as when the knee is affected, and these may be repeated, or kept discharging, according to the effects produced. In other respects, the treatment of this form of the disease, as well as of the other sub-acute states, may be conducted conformably with the views already entertained. It may, however, be remarked, that the preparation of iodine, conjoined with cinchona, alkalies, &c., or with iron, sarsaparilla, &c., when there is a deficiency of red globules, are more especially indicated in these forms of the complaint; and that colchicum, conjoined with the iodide of potassium, the alkalies, and cinchona, in these forms, is often very beneficial, especially in the more active states. When the disease attacks the more superficial joints, leeches and blisters should not be placed immediately over the joint, but at a short distance from it, so as to occasion a derivation of the morbid action from the affected parts.

120. In some cases of acute and sub-acute rheumatism, I have employed the *oil of turpentine* differently from the manner noticed above. After having evacuated disordered alvine secretions and excretions, and given a few doses of the decoction of cinchona, with an alkali and nitre, I have occasionally prescribed this oil in the following, or in a similar manner; endeavouring, however, at the same time, to preserve the bowels sufficiently open, and to prevent the irritating action of the oil on the kidneys, by a liberal use of demulcents containing nitre and an alkaline carbonate:

No. 333. R Olei Terebinthinæ, ʒj.; Sodæ vel Potassæ Bicarbon., ʒj.; Tinct. Cinchonæ Comp., ʒjss.; Tinct. Capsici, ℥ v.; Aquæ Menthæ Piperitæ, ʒjss. Misce. Fiat haustus bis terve in die sumendus.

121. *iii.* THE CHRONIC FORMS of rheumatism, when they appear primarily, more especially in an *active form*, or with nocturnal exacerbations,

\* The mode in which *local blood-letting* is practised in the Shetland Isles is curious. I here adduce the description I have given of it in another place. I have seen a similar mode adopted by the native Africans on the Grain, Ivory, and Gold Coasts; the only difference being that, instead of a ram's horn, the chief instrument in the operation among the native Zetlanders, a small gourd is employed by the Africans, as it was from the earliest times in countries bordering on the Mediterranean.—“Mentio hujus rei, quæ quidem in insulis Zetlandicis mihi contigit vidisse, ea mihi in mentem reducit. Scarificat et sanguinem ab ultimis usque temporibus hoc modo eliciunt: Quam partem volunt scarificare, hanc aquâ calidâ fovant. Qui medici partes agit, is cutem sexies aut septies novacula perquam leviter perstringit, et cornu arietinum modicè recurvum, quod cucurbitulæ vice fungitur, apice perforato, et corio molli circumdato, partem leviter resectam applicat. Tunc foramine labia admoveat, et quantum fieri poterit, ætra inclusum exsugit. Quum cornu exinanisset, corio torquendo et in foramen linguâ protrudendo aëris irruentis impetum prohibet. Postquam cornu partem scarificatam arripit, deinde pannos ex aqua calida paulum exsiccatos circa inam cornu superimponit, qui sanguinem ad partem provocat. Quum sanguinis semiplemum sit, cornu tum cutem relinquat et decidit. Eadem res iterum et iterum repetitur, donec satis sanguinis mittatur. Mulieres et mares, scarificatione et cornu hujusmodi uti videntur. Res memoratu forsitan digna est, ut enim Romani antiquiores cucurbitulis, sic Getæ (sive qui eos Gothos nominare malit), et omnes eorum posterî, cornibus ad sanguinem eliciendum uti videntur.”



should be treated very nearly on the principles now stated.—(a) After evacuating morbid accumulations and excretions, the decoction of *cinchona*, or the *guaiaicum* mixture, may be given with *alkalies* and with *colchicum*. The preparations of *guaiaicum*, especially when thus combined, and after the biliary and alvine secretions have been duly evacuated and promoted, I have always found more or less beneficial in this state of the disease, as well as in the sub-acute and in the more *passive* conditions. The good effects of these are more certainly secured if free excretion by the several emunctories be promoted by a liberal use of diluents, more especially those already mentioned (§ 103).

122. (b) In the states of the complaint now being considered, as well as in the advanced stages of the acute, and in the sub-acute and arthritic forms, manifest advantage will accrue from the *iodide of potassium* in such combinations as the experience and tact of the physician will suggest, more particularly when given in the decoction of bark or in the *guaiaicum* mixture, with the solution of potash, or of carbonate of potash, or with *colchicum*, or *aconite*. Besides the forms of the disease just mentioned, both the active and passive states of chronic rheumatism will be remarkably ameliorated by these means, which may be aided by the external measures about to be noticed, and by a suitable diet and regimen. In these states of combination I have found the *iodide of potassium* extremely beneficial, and while less than two grains, given thrice daily, were rarely prescribed, more than five grains were as rarely taken at one dose, a free use of diluents being always allowed.\*

123. c. The cod-liver oil once enjoyed a considerable reputation for the cure of the sub-acute and chronic forms of rheumatism, and was much employed in Manchester since 1766, when it was first introduced by Drs. KAY and PERCIVAL. Owing to the writings of this latter physician, and the reports of Dr. BARDSLEY, it came into use in Germany, where it is now one of the most commonly used medicines for the chronic forms of the disease. The work of Dr. HUGHES BENNETT on this oil has revived the credit of this remedy for rheumatism; and it is now very generally prescribed for some obstinate states of the complaint. It has from time immemorial been employed as a popular remedy for this and some other chronic disorders, both in Norway and in the Shetland Isles; the liver of the torsk, the *Gadus brosme*, being, however, preferred to that of the cod, the *Gadus morhua*. The oil prepared in the manner described by my friend Dr. EDMONDSTON, of Shetland, in his communication to Dr. HUGHES BENNETT, is that which I believe to be the best. This latter physician has adduced the opinions of the earlier writers on this oil, and added his own, which are both discriminating and judicious. Dr. PERCIVAL remarks, that he had the fullest evidence of the successful exhibition of it in rheumatic complaints, and considered it

superior to the preparations of *guaiaicum*. Dr. BARDSLEY, much later, 1807, states that he is enabled to speak of it, from long experience, "as a medicine of efficacious but limited powers. In some instances, where every means has proved unsuccessful, it has operated in a manner so decidedly beneficial as to excite astonishment." The circumstances under which he found it most advantageous were, 1st. In the chronic rheumatism of elderly persons, when the muscles and tendons have become rigid, and the joints nearly inflexible, owing to excessive labour, dampness, hard fare, and cold; 2d. In women whose constitutions have been worn out by repeated rheumatic attacks after parturition, and more especially in the decline of life. Dr. HUGHES BENNETT states that, judging from the mass of observations published in the German periodicals, and from what he has heard and seen connected with this subject, he considers this oil to be more especially indicated in three distinct forms of chronic rheumatism and gout, which may be denominated the general, erratic, and local.

124. I have prescribed the cod-liver oil in several cases of rheumatism since 1844, and chiefly in similar cases to those mentioned by Dr. BARDSLEY, and certainly with nearly similar results, the quantity having been from two to three or four table-spoonfuls in the course of the day. It was commonly taken on the surface of milk, of cold coffee, or mint-water, or of some aromatic water; and, in some cases, on the surface of the infusion of orange peel, to which a small quantity of the *iodide of potassium* was added. In two cases of sciatica in elderly persons it was quite successful; but in two cases of erratic chronic rheumatism, for which the patients had been, and still continued, in the habit of resorting to opium, the oil had no effect. Was this result to be ascribed to the influence of opium on the system? Much useful information on this subject will be obtained from Dr. H. BENNETT's treatise, referred to in the BIBLIOGRAPHY to this article.—(*Op. cit.*, p. 70-92.)

125. (d) The compound decoction of *sarza*, or the fluid extract of *sarza*, largely diluted, especially when conjoined with the solution of potash or the sub-carbonate of potash and the *iodide of potassium*, I have found one of the best medicines for the cure of the chronic and sub-acute forms of rheumatism. In order, however, to secure the good effects of this combination, the functions of the skin should be freely promoted by regular exercise in the open air; and the other secretions and excretions ought also to receive due attention. I have preferred the compound decoction of *sarza* to other preparations, in doses of about six ounces or half a pint, twice or thrice daily, as it produces a much more decided effect upon the skin, especially when taken in a tepid or warm state.

126. (e) The decoction of *senega* is also often extremely beneficial, when conjoined with the *iodide of potassium* and potash, and with some aromatic water, which will enable the stomach to tolerate this decoction in full doses. In the complications of rheumatism with endocarditis or pericarditis, the combination of this decoction with the substances just mentioned is often most beneficial. It was found most efficacious in several cases of this complication

\* [The *Iodide of Potash* is a more valuable remedy in rheumatism than might be inferred from the slight mention made of it by our author. We have used it for many years with the most decided benefit in this disease, giving it to the extent of 3j. or more in twenty-four hours. In some cases it is found to arrest or control the disease very promptly. This is preferable to any of the other preparations of iodine in these cases.]

which came under my care, two of these cases having occurred in medical men. While this decoction, especially as thus combined, promotes the excretions, it also tranquillizes the increased action of the heart. It may be given in the sub-acute, as well as in the several forms of the chronic disease.

127. (f) The *Datura stramonium*, or thorn-apple, first employed for rheumatism by STORCK, and subsequently by WEDENBURG and ODHIELIUS, and by COOPER and BARTRAM in America, has been found of service in the chronic and sub-acute forms of the complaint, and especially in sciatica and other cases of nervous rheumatism. It may be given in the form of extract, thrice daily, commencing with a quarter or half a grain, and increasing the dose until dilatation of the pupil and giddiness are produced. I have prescribed this medicine in a few cases; but although it had considerable effect in alleviating the pain, the benefit derived from it was generally transitory. The *Rhododendron chrysanthum* has been recommended for the sub-acute and chronic forms of rheumatism by PALLAS, HOME, KOELPIN, LOEFFLER, WILLI-MET, and others. I have no experience of its use in this disease, but Dr. CRAIGIE remarks, that two drachms of the dried leaves may be infused in ten ounces of boiling water all night, and the strained liquor may be taken either at once or in divided doses during the day; and that a repetition of the remedy for three or four days in succession generally effects a cure in the forms of the complaint just specified. Very probably this infusion, as well as the extract of stramonium, may prove much more beneficial when conjoined with alkaline medicines, or with other substances already mentioned, than when given alone; but under any circumstances the effects should be carefully watched.

128 (g.) *Arsenical preparations* have been recommended for the more chronic states of rheumatism by JENKINSON and others. Dr. BARDSLEY considered them to be of essential service in these states of the disease when conjoined with opium. I have recently given, in a very few instances, the combination of the iodide of arsenic and mercury—the liquor iiodidi arsenici et hydrargyri as prepared in DONOVAN's solution, both with and without opium; and in these this solution appeared of service; but it requires a further trial before a decided opinion as to its merits in this disease can be given.

129. (h) *Naphtha* was prescribed for chronic rheumatism by THOMANN, and several forms of *bitumen*, *rock-oil*, or *Barbadoes tar*, or *petroleum*, have also been employed, most frequently as popular remedies. The petroleum is used both internally, as a sudorific, in doses of from ten minims to half a drachm, three or four times daily, and externally as a liniment or embrocation. The substance called *British oil*, procured by distillation from the stone-coal of Shropshire and Wales, and the empyreumatic oil obtained during the formation of coal gas, are also popular remedies for this complaint. Of these I have had no experience, but I have seen very decided benefit produced by the use of *tar-water*, and of the Norwegian *tar*, this latter being taken in the form of pill with liquorice-root powder and magnesia. The exaggerated accounts of the virtues of tar and tar-water, which appeared at the commencement of the last centu-

ry, and the ridicule to which the use of it was soon afterward subjected, have led to the disuse of a substance which is calculated to produce very salutary effects when judiciously employed, not only in chronic rheumatism, but also in several chronic and cachectic diseases.

130. (i) Besides the cod-liver and empyreumatic oils just mentioned, several *vegetable* or *essential oils* have been recommended by writers, both internally and externally, for rheumatism. I need not here add to what I have already stated in favour of *turpentine*. It was many years ago praised by KOELER and myself as an internal and external remedy for this disease; and the *cajeput oil*, much used in the East, and brought to the notice of European physicians, is often a useful adjunct to turpentine, especially in the external use of this latter substance. It should not be overlooked that *olive oil* was recommended, both internally and externally, for chronic rheumatism by BROCKLESBURY; and, when taken frequently, or in sufficient quantity, and so as to preserve a regular state of the intestinal secretions and excretions, it is certainly of considerable service.

131. (k) *Sulphur* has long been employed as a popular remedy in both the active and passive states of chronic rheumatism, although it has been overlooked by writers with reference to this complaint. The precipitated sulphur may be taken nightly, either alone or with the carbonate of magnesia, this combination being preferred when, with a dry or harsh state of the skin, there is flatulence or acidity of the prima via. It exerts a very decided effect upon the functions of the skin, both promoting and altering the excretions from this surface, an intention of the greatest importance in the chronic and sub-acute forms of this complaint. I have usually prescribed the following every night, exhibiting occasionally, or once in the week, a purgative draught in the morning, consisting either of the compound decoction of aloes, or of equal parts of the compound infusions of senna and gentian with sulphate of magnesia, &c.

No. 334. R Sulphuris præcipit., ʒvj.; Magnesie Carbon., ʒss.; Pulv. Rad. Glycyrrh., ʒjss.; Pulv. Zingiberis, ʒj. Misce. Capiat æger cochl. j. vel ij. minima, in aquæ vel lactis pauxillo, omni nocte.

[We have for several years past treated rheumatism on the plan of *elimination*, or the removal from the system, through the several emunctories, of the *materies morbi*, which, with Drs. WILLIAMS, TODD, and others, we hold to be chiefly *lactic acid*. This is the product of vitiated digestion, as well as of the decomposition of the tissues, and under ordinary circumstances of health it is carried off through the medium of the skin, though a portion also escapes through the intestinal canal and the kidneys, as stated by Dr. TODD. The indications then are, as this writer suggests, to increase the natural functions of the skin, kidneys, and bowels; to use antacids and fluids in large quantities, to dilute the morbid matters and aid the operation of diaphoretic and diuretic remedies.

One of the best modes of effecting elimination and removing the disease is, in conjunction with the vapour bath, to give a powder composed of opium, ipecacuanha, and nitrate of potash, in variable quantities, every two, three, or six hours, according to the urgency of the



symptoms, increasing the quantity of opium if there is much pain present, or if a full anodyne effect is desired. It is important to allay the erethism of the nervous system, while at the same time we operate upon the skin and kidneys. In many cases a mild mercurial, as calomel or blue pill, may be substituted for the nitre with advantage. The bowels are to be kept, in the meantime, freely open by small doses of a solution of the sulphate of magnesia, in which a portion of calcined magnesia is blended. We generally aim to procure two or three evacuations in twenty-fours, being careful, however, not to lower the vital forces by purging too freely, nor by depressing doses of antimony, as is too often witnessed. We have never derived much benefit from leeching the swollen and painful joints in these cases, as the inflammation is pretty certain to recur, or to attack other joints, when the same results follow on a repetition of the local treatment. The best plan is to envelop them in a large quantity of cotton batting, over which a piece of oiled silk is carefully bound, to prevent the access of the atmospheric air; by which means, if the patient be quiet, the limb is steeped in a pleasant vapour bath, the perspiration which is thus elicited having a strong acid smell. The same treatment is found most beneficial also in gout. If the pain is aggravated by the heat, thus confined, the cotton is to be removed and a lighter covering substituted. The continuance of the treatment must depend on the nature and persistence of the symptoms. The food is to be nutritious, and liberal in quantity, remembering to enjoin the free use of diluents containing a small quantity of bicarbonate of soda. Pure air, suitable clothing, absolute rest, and a cheerful mind are powerful auxiliaries in accomplishing a speedy cure. Since we have adopted the above plan, which is in substance that advised by Dr. Todd, we have rarely failed in controlling attacks of acute rheumatism in a very few days.]

132. iv. OF VARIOUS OTHER MEDICINES WHICH HAVE BEEN ADVISED FOR THE SEVERAL FORMS OF RHEUMATISM.—Having noticed the plans and means of cure most appropriate to the principal forms of rheumatism respectively, I shall briefly mention some others which have been employed more indiscriminately, especially by some writers, and remark upon their application to certain states of the complaint, *before I proceed to notice those external measures and regimènal means which have at sundry times and by numerous authors been recommended to the profession and the public.*

133. (a) *Of purgatives*, little mention may be here made beyond what has been stated when treating of acute rheumatism (§ 102). This class of medicines was much employed in the several forms of the disease by RIVERIUS and BUCHNAVE, and in the bilious complications by STOLL and others. They are certainly required in all circumstances, especially early in an attack, but only to the extent of completely evacuating all fecal accumulations, and morbid secretions and excretions, and of preserving and promoting a free discharge of these. If employed beyond this intention, they may reduce vital power and resistance without producing any beneficial effect on the disease in any of its forms. The choice of purgatives and aperients

in this complaint is always a matter of importance. I have already remarked on this topic (§ 102), but I may here add, that the stomachic, warm, or cardiac should be preferred, and that these may be conjoined with alkalies or other deobstruents.

134. (b) *Emetic tartar* was much employed in small doses by BROCKLESBURY, and much more recently by BALFOUR, in all the forms of the complaint; but it has most commonly been conjoined with opium or with other diaphoretics. Unless JAMES'S powder, it is the only preparation of antimony on which reliance should be placed in this complaint. It is most appropriate in hot, dry, or harsh states of the skin; when the pulse is tolerably strong and full, and when the cutaneous excretion has been suddenly suppressed; but attempts at the restoration of this excretion should be made by other diaphoretics, when constitutional power is much depressed, and the pulse is very rapid or compressible, more especially by the liquor ammoniæ acetatis, with excess of ammonia, with camphor, and with the spiritus ætheris nitrici in full doses.

135. (c) Various *narcotics* and *sedatives*, besides those already noticed, have been advised for the several forms of rheumatism. Of the preparations of *opium*, *morphia*, &c., as well as those of *colchicum*, I may here remark that they should rarely be confided in alone, or given, unless in such combinations as will promote their excreting operations—the former by the skin, the latter by the intestines and kidneys—and at the same time prevent, especially as regards *colchicum*, their depressing influence on the nervous system, the combination with ammonia being one of the best which can be employed. In chronic forms of rheumatism, the preparations of *colchicum* are productive only of temporary benefit, and are often prejudicial, unless conjoined with cinchona, or quina, or with guaiacum, or with camphor or alkalies. *Aconite* is most appropriate to the more acute states of the disease, and to certain complications about to be noticed. *Conium*, which was praised by STOERCK, has comparatively little influence, unless continued in considerable doses. It is most serviceable in the forms of rheumatism which occur in females, and which are consequent upon suppression, interruption, or difficulty of the catamenia; and in these circumstances the *stramonium*, and even *digitalis*, are often of service, especially when conjoined with aloetic aperients, or with the iodide of iron, or with the biborate of soda, or with capsicum, according to the peculiarities of the case.

136. (d) Several *stimulants* have been advised for the more chronic states of the disease.—*a. Phosphorus* was recommended by BUCHNER and HUFELAND; but it is a too hazardous medicine to deserve adoption unless with great caution. The phosphoric acid, which may be employed with safety, has not been hitherto prescribed for this complaint. Probably neither this acid nor the mineral acids may be appropriate in rheumatic cases, unless in as far as they may promote the digestive and primary assimilative functions, and may thereby prevent the generation of the lactic and uric acids.—*β. Asafatida* was praised by THEDEN in the chronic states of the disease; and certainly both it and several other of the *gum-resins* and

*balsams* are not devoid of efficacy in these states, especially when used as adjuncts to other appropriate means. I have prescribed the *Peruvian balsam* in some instances with very decided success.—*γ.* *Mezereon* has been employed by some writers; but it is in combination with *sarza* and *sassafras* and *guaiacum*, as in the compound decoction of *sarza*, that it is most serviceable.—*δ.* The *Geum urbanum* has been recommended by BUCHAYE; the *Solanum dulcamara* by LINNÆUS, PRESSAVIN, and VIEUSSEUX; and the bark of the *Magnolia glauca*, which is tonic and aromatic, by BARTON. An infusion of either of these may be made the vehicle of other medicines, may promote the cutaneous functions, and, by this operation, as well as by their stimulant and tonic action on the organic nervous system, may remove attacks of the disease.—*ε.* The *Trifolium fibrinum* was praised by AASKIEM and BROCKLESBY in the form of infusion, with the volatile tincture of *guaiacum*.—*ζ.* The *Phytolacca decandra* was prescribed by BARTON. My friend, Professor DUNGLISON, remarks that it is celebrated as a remedy for chronic rheumatism, and is given in the form of tincture of the ripe berries. An infusion and an extract of the leaves of the *Taxus baccata*, or yew tree, have been given in this complaint, but I am not acquainted with the results.—*η.* The powder or extract of *nux vomica* has been recommended by OBERTEUFFER in chronic rheumatism, and for the removal of the stiffness and partial palsy of the limbs often attending the complaint. I have tried the alcoholic extract in a few instances, in doses of a quarter of a grain increased to a grain, twice or thrice daily, preferring it to strychnine. It will be found of service in very chronic cases, when aided by other means; but it is apt to produce headache, which, however, may sometimes be prevented by conjoining it with aperients, as the purified extract of aloes, soap, and the ox-gall.—*Capsicum*, or Cayenne pepper, was praised by ADAIR. It is the common resource of many of the dark races, especially the Negro, in all the chronic and sub-acute states of rheumatism; and while they use it abundantly internally, they apply it externally over the pained part. I have frequently had recourse to it, but chiefly as an adjunct to other means, and it has in this way always appeared to be of service.—*Mustard seed* has also been given by ADAIR. About 1825 it was an almost universal popular medicine, not only for rheumatism, but for all diseases. It soon, however, fell into disuse; most probably because it really possessed some claims to attention in chronic rheumatism.\*—The *æthers* and *æthereal preparations* have been prescribed for the several forms of rheumatism, but chiefly as adjuncts to other means; and probably *chloroform* will soon be added to the list of means available in the

more acute or neuralgic states of this complaint, and be exhibited either by the mouth or by inhalation, the former being obviously the safest method.

137. V. OF VARIOUS EXTERNAL MEANS RECOMMENDED BY WRITERS.—All external means of cure, unless employed as adjuvants of internal remedies, and judiciously prescribed, are attended, either immediately or remotely, by more or less risk. Rheumatism, in all its forms, is an external manifestation of a constitutional malady, in which the organic nervous and vascular systems and blood are chiefly affected; and if this manifestation be suppressed in one quarter, before the evil is removed in the systems more especially implicated, it will most assuredly appear in some other quarter, and not improbably in some important or vital organ. External means, excepting such as promote the depurating functions of the skin, ought therefore never to be resorted to unless in aid of, and contemporaneously with, or consecutively of, appropriate internal or constitutional treatment.

138. (a) Of the numerous external means and applications which have been recommended for the different varieties of this disease, the selection is most difficult, and it should be guided entirely by the peculiarities and duration of the attack. The number of these means, although not so great as that of internal remedies, is almost sufficient to distract the inexperienced when an attempt is made to employ them appropriately to the circumstances of the case. Yet will a due knowledge and recognition of these circumstances and peculiarities prove the best guides to the selection of them, and to the periods of having recourse to them, this knowledge constituting the best kind of experience; for without it experience is only gross empiricism. The enumeration of this class of means may in itself appear somewhat formidable; but it will furnish, with the remarks which I shall append to each, an imperfect guide upon which the reflecting practitioner will make the required improvements when he comes to apply them to practice.

139. (b) *Acrid topical applications* of various kinds, and *irritating plasters*, have been employed empirically as domestic means, and prescribed professionally. LENTIN and others have recommended them; but BANG, the very practical writer of Copenhagen, considers them not devoid of risk, unless they are prescribed in aid of judicious internal remedies. Sinapisms, the moistened bark of the *mezereon*, and various similar applications have been resorted to, and often with benefit, *when vital energy is duly supported, and when the exerting functions are promoted at the same time*: a principle of cure which ought never to be overlooked in the treatment of diseases caused by depressing causes, and attended by pain and impaired power as well as by morbid states of the circulating fluids.

140. (c) *Acupuncture*, or the gradual introduction of a sharp and fine needle or metallic wire through the integuments down to the seat of the complaint, in very painful cases of muscular or aponeurotic rheumatism, has been practised for many ages in the Far East, especially in Japan and China. It was treated of, and the safety of the practice shown, as well as the temporary efficacy of it, by Mr. CHURCHILL;

\* A credulous disposition to believe in quackeries of some kind or other—religious, political, and medical—is inseparable from the English character; and the more absurd the doctrine, the more ridiculous the means, the more gross the humbug and imposture, the more credence such impositions acquire, and the more generally are they adopted, not by the ignorant only, but by the elevated in rank and social position more especially. The public resemble a flock of sheep, of which, when one breaks off in an eccentric direction, all run the same way. A factious contemporary would be inclined to impute this tendency to the quantity of mutton annually devoured by our countrymen.



and it was also frequently employed in France. I have seen it resorted to in several instances with some success, but I am not aware of much permanent benefit having been produced by it. The practice has fallen into its deserved disuse.

141. (d) *Artificial eruptions* have been resorted to in rheumatism, more especially in chronic and sub-acute cases, by THILENIUS, LENTIN, PIDERIT, VICAT, ANTENRIETH, and JENNER; and emetic tartar, added to an ointment or plaster, has been commonly used to produce these eruptions, which, however, especially when plasters have been employed and allowed to remain too long, or when the constitution has been cachectic, has sometimes been followed by foul, spreading, and obstinate ulcers. If resorted to at all, they should be watched; and they ought not to be produced immediately over a joint, although they may be brought out in the vicinity in obstinate cases. I tried them many years ago in dispensary practice, in several internal complications of rheumatism, with but little or doubtful advantage.

142. (c) *Baths, warm, vapour, and medicated*, have been long recommended for the more chronic cases of the disease. Of thermal mineral baths mention will be made hereafter, but considerable advantage will often be derived from warm baths, which may be prepared at any place, under due direction, and which may be general or local, according to the peculiarities of the case. *Warm baths*, at a high temperature, or *vapour baths*, are generally most beneficial in chronic, passive, or cold states of the complaint, and for these the addition of salt or mustard, or both, to the warm bath, whether general or local, will be of service. Even when *sea water* is used for a warm bath these additions are often of service, especially when the regimen and internal treatment are judicious. But baths are not confined to chronic cases only. Even in the sub-acute and acute states benefit will be derived from warm baths of a somewhat lower temperature, or tepid baths, containing an *alkali*, or *alkaline sub-carbonate*. Indeed, *warm alkaline baths* will be found useful in both states of the disease, and more particularly when the skin is hot, dry, and harsh, during the evening and early part of the night. — *Vapour baths*, both general and local, have been much recommended by DU MOULIN, BARDSLEY, and BLEGBOROUGH, and their efficacy is undoubted in chronic cases, especially when the joints are affected, and when aided by a restorative treatment and regimen, and due exercise in the open air. — *Sulphur baths* have been employed with marked benefit in similar cases, and warm baths containing the sulphuret of potash have also been resorted to. These baths, general or local, or in whatever way they may be *medicated*, should be employed chiefly in aid of judicious internal treatment, and of a proper regimen.

143. (f) The *warm douche* and *vapour applied locally* have been found of service in many cases; but the remarks just offered are equally applicable to the use of these. To obtain advantage from them, they ought to be daily employed, to be followed by friction, exercise, and warm clothing, and accompanied by the internal treatment recommended above.

144. (g) *Blisters* have been generally employ-

ed as external or local aids of constitutional means; but unless these latter means are appropriate, the benefit derived from blisters is only temporary. FOWLER, ROUPPE, and others have advised them; but HUFELAND, finding the advantage procured from them by no means permanent, recommended them to be kept open by the substances usually employed for this purpose. Blisters are seldom of use early in acute attacks; they are most useful towards the decline of the disease, and when the action of the several emunctories has been duly promoted. They are more beneficial in sub-acute cases, and when the joints are affected; but they should not be employed immediately over superficial joints, but only near to them. The repeated application of blisters is generally preferable to keeping them open.

145. (h) *Embrocations, liniments, and rubefacients* of various kinds have been employed, both empirically and with rational intentions, as aids in the cure of the several forms of rheumatism. They have been even resorted to as the only means, and often as popular remedies and without medical advice. Several nostrums are employed in the form of embrocation or liniment; and, although relief has often been procured by them, yet their inappropriate use, and the application of them while the morbid conditions of the nervous and vascular systems remained unabated, have been followed in some cases by dangerous and even fatal consequences—by internal complications, or by the super-vention of disease of internal surfaces or organs, with effusions or adhesions. A few instances of these results have come under my observation, and have demonstrated the danger of having recourse to means which may suppress the local manifestation of a constitutional evil, without having prescribed judicious internal remedies for that evil, and without having employed agents calculated to throw off or to resist the tendency to internal complications. It would be endless, and of doubtful advantage, to enumerate the various embrocations, liniments, and rubefacients which have been praised for the several forms of the complaint. Most of the *formulae* comprised under the head *Linimenta*, in the APPENDIX (Form. 295–314), may be used also as embrocations and rubefacients in this disease with great advantage, when a judicious internal treatment has preceded or accompanies the use of them. Under such circumstances, warm *rubefacient poultices* and *rubefacient plasters* will also be found of service, more especially in chronic cases.

146. (i) *Frictions, shampooing, percussion, and flagellation* have been much employed in the more chronic and obstinate states of the complaint; but these means, especially frictions and shampooing, are most serviceable after warm salt-water or medicated baths. The frictions may be only simple, as with the hand, or with sweet oil, or with variously prepared oils or liniments, or with the hard Indian glove, or with the hair-brush, or with any of the liniments prescribed in the APPENDIX. *Percussion* not infrequently relieves for a time the chronic pains of muscular or aponeurotic parts; and *flagellation* may have a similar effect; but it has been little used since the practice of medicine was rescued from the hands of monks in the

dark ages, although it was employed by the ancients.

147. (k) *Galvanism* and *electricity* have had numerous advocates in the chronic forms of rheumatism, and they are sometimes of service, especially *electro-magnetism*, in the more passive states of the chronic disease. Several recent writers have furnished evidence in favour of the use of magnetic electricity in these forms of the complaint; but I am unable to give an opinion respecting it from my own experience. I have, however, seen benefit derived in a few instances from galvanic electricity.

148. (l) *Insolation*, or exposure of parts affected with chronic rheumatism to the sun's rays, has been advised, and I have prescribed it with benefit in the passive or cold form of the complaint. The effect probably depends not merely upon the warmth thereby produced, but also upon the electrical agency of the sun's rays. Much of the benefit derived from migrating to a warm climate in cases of obstinate rheumatism arise from this cause; but the change should be made to a dry climate and a clear atmosphere; for if the situation abounds in humidity or malaria, however warm it may be, the rheumatism will still continue, or even be aggravated.

149. (m) *Issues* and *setons* have been mentioned favourably by some of the writers who have recommended the production of artificial eruptions for this complaint. They are rarely required, or submitted to, in cases of simple chronic rheumatism; but I have prescribed them with marked advantage in certain of the complications, or internal extensions of the disease, more especially during, or subsequent to, rheumatic endocarditis or pericarditis, or when the spinal membranes have become affected. They are also of use in sciatica, and when the large joints are implicated, and in these cases they have been recommended by BARDSELY; but they should be prescribed in a suitable situation, so as to produce a derivation from the part or joint itself, and yet not be far removed from it. Two, or even three issues may be required in some cases.

150. (n) *Moxas* have been recommended, from the most remote times in the Far East, for chronic rheumatism, especially when seated in the joints; and they have been praised by THULENIUS, BESE, PASCAL, NAUDAU, and more recently by LARREY, DUNGLISON, and BOYLE. They are often of service when applied in the situations advised for issues, and when a puriform discharge from the parts cauterized by them is obtained. They, as well as issues and setons, are suitable to the more chronic cases, or, rather, to the effects of rheumatism than to recent attacks.

151. (o) *Mineral waters* and *mineral baths* are among the most beneficial and popular remedies for the several states of chronic rheumatism. Much of the benefit derived is, however, due to the change of climate, air, scene, and occupation consequent upon visiting watering places. The natural thermal springs have been most generally recommended for the more chronic and obstinate states of chronic rheumatism, and for sciatica, especially those of Bath and Buxton, in this country; of Wisbaden, Baden-Baden, Karlsbad, &c., in Germany; of Baresges, in France and of several in

Italy. The chemical composition and temperature of these several springs will suggest the propriety of having recourse to them in the circumstances of each case; and it is chiefly with a strict reference of this composition to the peculiarities of individual cases, that a selection of both thermal springs and of other mineral waters should be made. Much information will, however, be obtained on this topic from the writings of FALCONER and BARLOW on the Bath waters; from those of ROBERTSON and SCUDAMORE on the waters of Buxton; from those of GRANVILLE, OSANN, LEE, and GAIRDNER on the German thermal springs; and from CARMICHAEL's account of the water of Baresges and Bagneres de Bigorres. Not only may these waters be taken internally, but they are still more beneficial when used as general or local baths, or in the form of douche. The duration of these baths should depend upon the strength of the patient. It should be short at first, and prolonged with repetition; but benefit will seldom be derived until a number of baths have been taken. The circumstances of the case should, however, suggest both the duration and the frequency of them. The same remark applies to the use of the douche. Immediately after the bath or the douche, the surface should be rubbed with dry hot towels, and the patient wrapped up in flannel or in blankets, so as to promote, for several hours, a copious perspiration. The use of warm chalybeate baths in chronic states of the complaint was much insisted upon by BRANDIS; of the waters of Reiburg by ALBERS; of sulphureous waters and baths by many writers; and of numerous mineral springs by authorities of every kind, some of which will be found in the *Bibliography*.

[Much benefit has often been derived in this disease from the use of the sulphur waters of Virginia, or of Avon, Richfield, or Sharon, New York, in connexion with the pure country air, and the freedom from care and anxiety, and the agreeable society met with at these watering places. The *White Sulphur Springs* of Virginia are perhaps the most celebrated in the cure of rheumatism, although the same ingredients are substantially found in several others, as the Red and Salt, Sulphur, and the Avon Springs. That they are curative in this and other chronic diseases, independent of the other adjuncts above named, is fully established, and what we might *à priori* be led to believe, when we reflect that they are cathartic, diuretic, tonic, and alterative. They are to be used both internally and externally in this and other diseases in which they are indicated, and their employment be persevered in for a considerable period. The ioduretted and carbonated saline waters of Saratoga have also been found efficacious in relieving chronic forms of this disease, and are well worthy of a trial.]

152. (p) A form of *physical training* has lately come into vogue for chronic rheumatism and other chronic ailments, more especially such as result from dissipation, excesses, irregularities, &c., of various kinds; and this training, conjoined with change of air, occupation, scene, and mode of living, forming part of the system, and with bathing, the copious use of diluents and exercise, so as to produce a very free eutaneous discharge, is often productive of marked benefit, which is the more striking in those



obstinate cases, which have often become obstinate from the fault and neglect of the patient, and from recourse having been had to many physicians in succession without allowing any one of them time or opportunity to employ the salutary resources of science. What, however, is denied the honest advice of a physician, is readily accorded by the patient to the confident humbug of the charlatan, especially when it is sought for at a distance, and acquired at an expense which is felt as a recommendation, although the only one. Regular modes of living, active and regular exercise, temperance, and a copious use of diluents, a free excretion from the skin, procured by baths, diluents, and exercise, and change of air, of occupation, and of scene, have been recommended by physicians in all ages for many chronic complaints; but they have generally been imperfectly followed out, or partially adopted, or altogether neglected by those for whom they were prescribed. When, however, they were ushered to the public, sane and insane, as the results of inspiration; were surrounded by appliances calculated to excite the senses of the weak-minded, to attract the credulous, to allure the idle, the frivolous, and the intriguing, and to strike those whose consciousness reaches but little farther than their sensations, and who are incapable of observing and of reasoning on facts and occurrences; and when they were moulded into a plan, and popularized under the name of "*water-cure*," and were thus recommended by every means of publicity to that largest class of the community now specified as a universal remedy, beyond all remedies the most efficacious, then were the results such as might have been anticipated by the philosophic observer of human nature, and of the constitution of the human mind as influenced by existing states of society. The most remote of these results already appear in a more accurate estimation of this universal "*cure*," and in the recognition of the fact that, of all the "*vanities under the sun*," the greatest and the shortest lived are those by which charlatans gull the public, and jeopardize not only the lives of the credulous, the thoughtless, and the worthless, but also the most important interests of families.

[These very judicious remarks on hydropathy (*water disease*, correctly translated) will meet with a willing response from every reflecting and candid mind. If we abstract from this system of cure all the adventitious aids of change of air and scene, freedom from care, anxiety, and labour, a properly regulated diet, regular and abundant exercise, the gentle exhilaration of spirits caused by the bold promises of amendment or cure, and the cheerfulness produced by the agreeable society of the better classes of both sexes: if all these be abstracted, we fear there would be little for water-cure establishments to boast of, certainly nothing which could for a moment commend them to the notice of any rational being. The dishonesty of their proprietors and supporters consists in claiming in behalf of *water* what more justly belongs to other agencies. Indeed, we have often been led to believe, from personal observation, that greater and more frequent cures would be accomplished at these establishments if the water part of the treatment were entirely omitted, while the other influ-

ences remained the same. But this would be the tragedy of Hamlet, the part of Hamlet omitted by request. There would be no chance to glorify and deify *WATER* at the expense of the other good things of God. Othello's occupation would be gone, and men, who might have made useful mechanics and labourers, would have to go back to their original calling, the humbug being exploded, and their business at an end. From a personal examination of most of these institutions in the Northern States, we are fully satisfied that, notwithstanding cures are sometimes accomplished at them, yet that very great injury is often caused by the hap-hazard and indiscriminate use of cold water. We have seen patients reduced to great debility, and with feeble recuperative powers, subjected to the douche and the plunge, both with the effect of prostrating their strength still more, and in some cases with a speedily fatal result. We have nowhere found cold water used with that caution and discrimination which so powerful an agent requires; nowhere have we found any rational or scientific rules for its employment; a blind routinism prevailed in them all, and the results, of course, were such as might have been anticipated. All this the enlightened members of the profession well understand: the public would not believe it were an angel, trumpet-tongued, to proclaim it in the sky.]

153. (q) *Sulphur*, in the form of sulphur fumigation, the oil of sulphur of former times, and the *carburet of sulphur*, have been locally or externally employed for the more obstinate forms of this disease. OTTO, of Copenhagen, recommends, either alone or in conjunction with vapour baths, two drachms of carburet of sulphur in half an ounce of rectified spirit of wine, four drops of which are to be taken internally every two or three hours, and the parts affected to be rubbed with a liniment consisting of two drachms of this carburet and half an ounce of olive oil. This treatment is most suitable to those cases in which the secretions and excretions have been duly improved and promoted by the appropriate means before it is entered upon.

154. (r) *Urtication*, or stinging, or flagellation with nettles, has been advised for chronic rheumatism, as well as for some forms of palsy, by many of the older writers, and it has in more recent times been prescribed by HUFELAND. It may be resorted to with advantage after warm or vapour baths, or in similar circumstances to those in which other rubefacients and external derivatives have been recommended, as warm terebinthinate embrocations, &c.

155. vi. TREATMENT OF THE COMPLICATIONS OF RHEUMATISM.—A. It has been stated above that acute rheumatism may extend to the *membranes of the brain*, the disease either continuing in its more external seats, or subsiding in, or disappearing from these (see § 50 and 51). When head symptoms occur in the course of acute or sub-acute rheumatism, the chief object is first to ascertain the cause and nature of this complication; to determine in how far it may be caused by the treatment; and to observe the evidence for or against the existence of inflammatory action in the membranes, or of simple nervous disturbance, or of a combination of both. Delirium, if slight, wandering, and nocturnal, the external disease continuing but lit-

tle or not at all ameliorated, may arise from the narcotics prescribed, or from too lowering or depressing agents, or from the exacerbation of the fever (see § 50), and in these circumstances the indications are obvious. Violent or distracting pain in the head may also depend on the same causes, and be removed by similar means to those which these indications suggest, or by such as are prescribed for this form of headache at another place. (See *art. HEADACHE*, § 50, *et seq.*) But when the head affection appears to be dependent chiefly upon inflammatory action in the membranes, then the subsidence of the external disease, especially that of the joint, will indicate its nature and the danger of effusion. In these circumstances, while active revulsion or derivation should be attempted by sinapisms applied to the parts affected previously, local depletions should be ordered, and be followed by blisters on the nape of the neck and occiput, or behind the ears. Calomel and antimony, purgatives and terebinthinate enemata ought also to be administered; and if somnolency, or sopor, or coma be threatened, the head should be shaved and surrounded by a cloth which has been just soaked in spirit of turpentine, or which is imbued with an embrocation consisting of equal parts of the terebinthinate and compound camphor liniments.

156. *B. The complications with the several forms of cardiac and pericardiac inflammations and their consequences* are the most frequently met with in practice (§ 48 and 49). The nature and treatment of these complications have been so fully discussed when treating of diseases of the heart, that I have left nothing to add respecting them at this place. I may, however, remark that further experience has proved the accuracy of the opinions I then stated, and the propriety of employing the means of cure there advised. Rheumatic endocarditis and pericarditis, so common in children and young subjects, especially in cold, humid, and variable climates, depend chiefly upon the fashions in clothing; upon low, damp, and ill-ventilated places of abode; upon modes of living; and more especially upon the unnatural practice of hardening children by exposure and by fashions in dress. Hence the necessity of avoiding these causes, and of pursuing a treatment calculated to diminish or remove morbid effusion or change of structure, and at the same time to improve the constitution of the blood, and to promote vital action and constitutional powers—objects which may be attained when these complications occur in young subjects, although they may be only partially or contingently accomplished in older subjects. (See *Treatment of Rheumatic Endocarditis and Pericarditis*, in *art. HEART and PERICARDIUM*, § 144, *et seq.*)

157. It is not unusual to meet with cases in which this complication has occurred in early life, or has appeared at some previous period, the acute rheumatic attack having been entirely removed, but the cardiac or pericardiac affection continuing either with or without detection. In some cases which have come under my observation, for very many years after the rheumatic fever, complicated as now stated, had occurred, and even after every rheumatic symptom had disappeared, little or no ailment had been experienced, until shortness of breath

on exertion, or dropsical effusion evinced the mischief produced in the heart. In other cases, however, attacks of acute, or sub-acute, or chronic rheumatism, have followed at periods more or less remote from that attack in which this complication first appeared, generally aggravating the cardiac or pericardiac lesion, but not having always this effect; for I have met with instances, one of them in a medical man, in which an attack even of acute rheumatism has not increased the organic disease of the heart which had taken place during a previous seizure.

158. A reference to the histories of cases of this complication, which have come under my care in the course of a practice of thirty years, and of which I have preserved notes, suggests their classification as follows: 1st. Cases in which rheumatic fever complicated with cardiac disease had been experienced in early life, but many years had passed without any ailment having been experienced, until shortness of breathing on exertion and dropsy ultimately supervened, the patient dying of the cardiac disease, no second attack of rheumatism having occurred. In a case now under my care, twenty-three years elapsed between the rheumatic fever thus complicated and the present developed state of the organic disease of the heart, no rheumatic disease or other ailment having been experienced during all these years, although the cardiac affection had been slowly progressing until it has reached its present state. 2d. Some years after the occurrence of this complication, the cardiac disease still existing, latent or detected, another attack of acute rheumatism has supervened, and has aggravated the cardiac complication, or even diminished the physical signs and symptoms of this complication, these different effects depending much upon the treatment and constitution of the patient. I have thus seen two attacks of rheumatic fever take place after intervals of years, the cardiac complication at last destroying the patient. In the case of a medical man, two such attacks, after intervals of some years, have left the cardiac disease, in respect of both the physical signs and the symptoms, much less extensive and severe than when I first saw him, fifteen years ago. 3d. Much more frequently the patient who has experienced an attack of cardiac disease in the course of, or consequent upon, rheumatic fever, has suffered recurrences of the rheumatic affection in a slight or chronic form, without any very manifest aggravation of the cardiac disease, which, however, has either slowly advanced, or has proceeded more or less rapidly according to his habits, modes of living, constitution, and treatment. 4th. In several instances rheumatic fever has occurred in early life, accompanied or followed by a cardiac complication, and no second attack of rheumatism has appeared, or merely slight or chronic rheumatic affection; but the cardiac symptoms, as well as the physical signs of cardiac disease, have gradually subsided, until they have, after several years, nearly altogether disappeared, or have been attended by little inconvenience.

159. It is obvious that, in these several states of complication, the exact nature, and extent, and consequences of the cardiac and pericardiac lesions, demand the chief attention, and that the



treatment of whatever rheumatic affection may be present should be a secondary object. Fortunately, however, the very means in which I have for many years confided for the several forms of rheumatism, are also such as are most serviceable in the cardiac lesions most commonly associated with them. After what I have stated, when treating of diseases of the HEART and PERICARDIUM (see § 144, *et seq.*), I need only enumerate some of the most efficient means which may be prescribed in these complications, and which moderate powers of observation will enable the physician to apply to the peculiarities of particular cases. Upon the approach, or in the early stage of the cardiac complication, *calomel* with *opium*, or with *aconite*; or the tincture or extract of *aconite* with *biborate of soda* or with *alkalies*; spirits of *turpentine* given by the mouth; alkaline *aperients* with *colchicum*; *camphor* with *digitalis* and *henbane*; the *alkalies* in large doses with demulcents and diluents, and external revulsion, are most efficacious in preventing the deposition of lymph or fibrine, and the effusion of fluid. At an advanced stage, when either fibrinous lymph or serous fluid has been effused, or when hypertrophy has followed obstructive or other changes of the valves and orifices of the heart, then the *iodides* of mercury or potash; *borax* in camphor mixture; the *iodide of potassium*, and the solution or carbonate of *potash*, with the compound decoction of *sarza*, or the decoction of *senega* and an aromatic water; *camphor* with *digitalis*, and with either of these decoctions, or with the infusion or tincture of hops; the *iodide of iron* in the sirup of *sarza*; and an issue or seton near the margin of the ribs, are the means in which I have most confided.

160. *C.* When the membranes of the spinal chord are affected (§ 52, 53), the treatment should depend much upon the duration of the disease in this situation. If the patient be seen early, local depletion, chiefly by cupping, followed by *calomel* and *opium* with *colchicum*; by purgatives and terebinthinate enemata; by terebinthinate embrocations in the course of the spine, and by blisters, are most serviceable. If the case come under treatment at a more advanced period, or if the above means have failed, partial palsy or paraplegia, or other symptoms of increasing congestion, effusion of lymph or pressure on the chord appearing, issues or setons in the back or loins, the bichloride of mercury, or the iodide of potassium in the decoction of *sarza*, and the other means advised in the articles on PALSY and SPINAL CHORD, will then be appropriate.

161. *D.* When the *diaphragm*, or either its pleural or peritoneal surfaces are implicated, or when the costal *pleura*, or the *peritoneum* (§ 54, 55, 56) reflected over the abdominal parietes, is attacked, the lymph thrown out soon excites inflammatory action in the opposite parts of these membranes, and agglutination of the surfaces soon follows. This complication not infrequently came under my notice many years ago in public institutions, the affection of these surfaces having been an extension of disease from the adjoining parts the tenderness and pain of which often masked the more internal mischief. When, however, the diaphragm is implicated, the symptoms of diaphragmitis are generally present in a very manifest form (see

art. DIAPHRAGM, § 9, *et seq.*). In these associations of the disease, the means already advised, especially local depletions, *calomel*, *colchicum*, and *opium*; terebinthinate embrocations, blisters, issues, &c., and various other means recommended in the articles on inflammations of these surfaces and on their consequences, may be resorted to. In many instances these forms of disease are not brought before the physician until they have arrived at advanced or chronic states; until effusion, adhesion, &c., have taken place; and then a judicious and persevering treatment will be required to produce any amelioration, aided by change of air, by suitable diet, and by whatever may promote the general health and constitutional power. In many cases, however, the iodides already mentioned, taken in suitable vehicles; bichloride of mercury in small doses with *sarza*; alkaline solutions with iodides; PLUMMER'S pill with soap and *taraxacum*; repeated applications of the terebinthinate embrocation; repeated blisters and issues, when aided by proper regimen, will be productive of some benefit. These external means are more efficacious than the application of the tartar-emetic ointment, which I have not found of much service in these cases.

162. *E.* The association of affections of the sexual organs with rheumatism, or the superintention of the former upon the latter (§ 57), requires means adapted to the states of sexual disorder, such disorders being duly considered under their respective heads. But, in respect of these, as of other associations of internal disease with rheumatism, it should not be overlooked that it is not only such internal disease which requires appropriate treatment, but also the rheumatic diathesis—the constitutional affection, whether depending upon or seated in the organic nervous system, or in the blood, or in both—and to this diathesis, and to the conditions constituting and indicating it, our means of cure should also be directed; using means calculated to support the vital power of this system, and to remove the morbid conditions of the blood—objects which are more certainly attained by the remedies I have advised for the treatment of rheumatism than by any other. Rheumatism in females being so frequently connected with suppression, or irregularity, or difficulty, or the cessation of the catamenia, or with leucorrhœal affections, due attention in the treatment should therefore be devoted to these disorders.

163. *F.* *Gonorrhœal Rheumatism*, or the states of rheumatism consequent upon gonorrhœa (§ 44, *et seq.*), is one of the most difficult to remove. A severe case of it occurred in my practice very lately, and presented the mixed form of capsular and aponeurotic rheumatism, the knees and limbs generally having been severely affected. The iodide of potassium and solution of potash, in the decoction of bark, or in the *guaiaacum* mixture, and frequently with *colchicum*, were the medicines chiefly prescribed. The case proceeded favourably, and after a few weeks the patient was able to have change of air, and to take regular walking exercise. In more obstinate cases, I have given the spirit of *turpentine* internally until the urinary organs were affected with success; or bark with *alkalies* and the iodide of potassium, while terebinthinate epithems, or blisters, were

applied on or near to the affected joints. In this form of the disease, a full dose of calomel, colchicum, and opium, taken at night, and a draught with castor oil and spirit of turpentine the following morning, in addition to these means, and repeated at intervals of one, two, or three days, will generally be of great service. I have seen the tinctura lyttæ and capsicum given with the medicines now mentioned until some degree of irritation was produced in the urinary organs by the former, and until heat or smarting at the anus followed the latter, prove most beneficial in this form of the complaint. If the affection of the joints become chronic, the internal use of the iodides, and the repeated application of blisters, or the formation of issues near the joints, and recourse to thermal springs, are among the most efficacious means of cure. If this form of the disease be neglected at an early stage and becomes chronic, it is not only removed with the greatest difficulty, but organic lesion of the joint is very apt to supervene.

164. *G. Rheumatism is often associated with influenza or catarrhal fever, or with ague, or with a remittent form of fever, and I have already shown that the complication is due chiefly to the presence of malaria in the humid and cold air to which the patient has been exposed, or to his having previously been the subject of ague (§ 58). In cases of either of these associations the treatment which I have recommended for the rheumatic affection is equally appropriate to the associated disorder, the lowering means too frequently prescribed for the former aggravating not only it, but also the complication, and favouring the supervention of still more serious internal disease, especially of the fibrous or serous surfaces.*

165. *H. If Pneumonia or pleuro-pneumonia supervene in the course of acute rheumatism, a moderate general or local vascular depletion will be prescribed with advantage, if the patient be strong or plethoric; and calomel or antimonials with opium, and saline diaphoretics, will generally be required. Blisters will also be of service. In a case which was under my care, caused by removal in an unfavourable state of weather and season into a damp house, rheumatism, in a sub-acute form, disappeared from the arm after two doses of the wine of colchicum, of ten drops each, had been taken, and was immediately followed by asthenic pneumonia with rusty expectoration. A small cupping on the chest (seven ounces), and camphor with ammonia, small doses of the decoction of senega and terebinthinate rubefacients, and due attention to the several secretions and excretions, especially to those from the skin and kidneys, were soon followed by recovery. Pneumonia and pleuro-pneumonia associated with, or consequent upon rheumatism, have but rarely come under my observation; and the association of scurvy with rheumatism is not more frequent, although these complications appear to have been of more common occurrence during the early part of the last century, according to the best practical writers on medicine in that period. More recently, lemon-juice, which has been found so beneficial for the prevention and cure of scurvy, has been said to have been serviceable in rheumatism, but I have had no experience of it in this latter complaint.*

[There is a rheumatic affection not infrequently met with, which may be termed *hepatic*, in which we find pains in the back, shoulders, breast, and superior extremities, and even of the larger joints, as mentioned by Sir W. PHILIP. Dr. JAMES FOUNTAIN, a distinguished practitioner of West Chester county, New York, called attention to this complication in an article on "Diseases of Irritation," published in the New York Medical and Physical Journal in 1826. Dr. FOUNTAIN describes these pains as the effect of nervous irritations, symptomatic of the internal hepatic affection, and states that he has known people labouring under slight hepatic derangements, who for years have seldom been free from these pains wandering from one joint to another. "Some," he remarks, "enjoy a degree of health, while others are feverish. Like sub-acute hepatitis, these pseudo-rheumatic pains may exist an indefinite length of time without inducing organic derangement. But where, from any cause, they become aggravated, a real inflammation is developed, and from an effect they become a cause. Instead of an irritative symptomatic, we have now an inflammatory affection to encounter, frequently involving in the excitement the whole vascular system, producing a symptomatic fever. The former pains are supplanted, and a new feature is given to the primary disorder of the joints; and on the principle of counter-irritation the original hepatic disease is sometimes wholly removed. Now it must be evident that this complication, from beginning to end, must be totally different from ordinary rheumatism from cold. This form is quite common; and the ill success of the means ordinarily employed has contributed not a little to strengthen the prejudices of people against the use of medicines in that disease." Dr. FOUNTAIN divides the means of cure in hepatic rheumatism into two classes, those required during the irritative, and those during the inflammatory stage. During the irritative stage, the indication is, of course, to remove the exciting cause—the hepatic derangement. For this purpose he recommends mercurials and laxative medicines. Four or five grains of blue pill, with the same quantity of rhubarb, should be administered twice every day, and as much sulphur, magnesia, and senna as will open the bowels fully, is to be given every second morning. After using these remedies for a week or ten days, an infusion of quassia or colombo may be taken every morning, using at the same time some moderately stimulating embrocation to the painful parts. During the second or inflammatory stage we have hepatic derangement, universal debility, and local inflammation to encounter. Moderate venesection is here recommended by Dr. FOUNTAIN, for he thinks that rigorous depletory measures are unsafe, in which opinion we agree with him. The bleeding is to be aided by the administration of ten or twelve grains of a powder consisting of one part of calomel, two of antimonial powder, and four of nitrate of potash, every three hours from mid-day till nine in the evening, followed next morning by an operative dose of sulphate of magnesia and infusion of senna. Dr. MOORE, in his New York Hospital Report, has noticed the same hepatic complication, and derived much benefit from the cathartic plan. The whole body, and the



oints especially, are to be carefully enveloped in flannel.

The *Phosphate of Ammonia* is strongly recommended in rheumatism by Dr. T. H. BUCKLER, of Baltimore, under the belief that it tends to eliminate uric acid from the blood, by forming with it a soluble urate of ammonia, the phosphoric acid being neutralized by the soda with which the uric acid may be combined in the blood. Dose ten to twenty grains, from three to six times in twenty-four hours, in all forms of rheumatism. (*American Journ. of Med. Science*, N. S., vol. xi., p. 108.) Dr. RUSCHENBERGER, of the United States Navy, has derived much benefit in this disease from *cold water dressings* to the joints, and the use of from three to six grains of opium at night, with an equal quantity of sulph. quinine. (*American Journal of Medical Science*, N. S., vol. xiv., p. 263.) Professor Wood, of Philadelphia (*A Treatise on the Practice of Medicine*, 2d ed., vol. i., p. 435), speaks favourably of bleeding once or twice in acute rheumatism, followed by active purging with salts, jalap, and bit. potassa, calomel, or colchicum and magnesia, with refrigerant diaphoretics, as a combination of tartar emetic and nitre, from one twelfth to one sixth of a grain of the former and five to ten grains of the latter in water, at intervals of one, two, or three hours; or nitrate of potash in the form of an effervescing mixture, and the occasional use of the warm bath. Pain is to be alleviated and sleep procured by full doses of DOVER'S powder at night. If the powder be rather feeble, pulverized guaiacum, in doses of ten to twenty grains, is to be combined with the DOVER'S powder. Should the disease not yield to these measures in ten days or two weeks, then calomel is recommended, with a view to its alterative influence, but not previous to a decided reduction of the general excitement. It is seldom necessary to carry it to the point of salivation. At this period, also, Professor Wood thinks the colchicum most beneficial with one of the salts of morphia, and it may be given before or in aid of the mercurial. If an adynamic condition of the system supervene, then the sulphate of quinia, in doses of one grain every hour, is strongly recommended as highly beneficial. If the heart or brain become seriously involved, venesection is to be carried as far as it can be borne with leeches or cups, succeeded by a large blister, while calomel is pushed to speedy salivation, and attempts are made, by sinapisms, &c., to invite the disease back to its original seats. In chronic rheumatism, Professor Wood recommends mercurial alteratives as by far the most successful remedies, often carried so far as to induce ptyalism. The attention of the profession in this country was first strongly called to this mode of treatment by the late Dr. ORTO, of Philadelphia (see *Eclectic Repertory*, vol. ix., p. 528). Dr. CHAPMAN speaks strongly of *savine* as a remedy in chronic rheumatism; others have found great benefit from *cimicifuga*, *phytolacca*, and the *xanthoxylum* or prickly ash. That a course of hydropathic treatment often breaks up the disease no one will deny, although it is not unattended with danger. In one instance we knew it bring on universal and severe inflammation in all the joints of the body, attended with long-protracted confinement to bed, and total inability of motion for several

months, from which the patient has not yet entirely recovered, nor does he enjoy as much exemption from suffering as before subjection to the water cure. Such cases are by no means of rare occurrence, while in other instances great benefit has resulted from this powerful alternative treatment.]

166. vii. REGIMEN, DIET, AND CHANGE OF AIR.—There are few diseases which require greater attention to these than rheumatism. During an attack of the acute form of the disease, the regimen and diet should be antiphlogistic. Such articles as are the least likely to occasion acidity should alone be taken. Saccharine substances ought to be avoided. As soon as convalescence has proceeded sufficiently far to admit of removal, *change of air* should be recommended, more particularly to a warm and dry air, or to a place where warm salt-water baths may be procured, or thermal springs may be used, especially to Bath or Buxton. If the attack has not been complicated with, or followed by, any affection of the heart, regular and active exercise in the open air ought to be taken as soon as the patient is able, so as to preserve a free excretion from the skin. If any cardiac affection is present, an issue should be kept freely discharging near the margins of the ribs. In more chronic or mild cases, the regimen and diet ought to be regulated according to the peculiarities of individual cases; but, in every instance, change of air, active exercise in the open air, when it can be taken without detriment to the affected part, flannel clothing nearest to the skin, a diet regulated conformably with the state of the complaint, and due regulation and promotion of the several secretions and excretions, are most important aids to a permanent recovery, and to the prevention of a future attack.

BIBLIOG. AND REFER.—*Arctæus*, De Caus. et Sig. Morb. Diurnum, l. ii., cap. 12. (*Considered by him as a disease of the joints, intimately allied to gout, sciatica, &c.*)—*J. F. Gier*, Tractatus de Catarrho, Rheumatismo, &c. Genæv., 8vo, 1620, in *Halleri*, Biblioth. Med. Pract., vol. ii., p. 376.—*G. Ballonius*, Lib. de Rheumatismo et Pleuritide Dorsali, 4to. Paris, 1643; et Consil., l. iii., No. 67; Opera, t. iv., p. 313.—*Riverius*, Observat., cent. iii., No. 22, 41.—*J. Catier*, De Rheumatismo ejus Naturæ et Curatione, 12mo. Paris, 1653.—*Glisson*, De Ventriculo et Intestinis, t. ii., c. 25. (*Diagnosis of Rheum.*)—*T. Sydenham*, Opera Omnia, Editio G. A. Greenhill, 8vo. Lond., 1844, impensis Societatis Sydenhamianæ, p. 255-261, 299-303, 556.—*E. Baynard*, Of the Causes of Pain in Rheumatism, in *Philos. Transact.*, abridged, vol. iii., p. 265.—*R. Blackmore*, Discourses on the Gout, Rheumatism, and King's Evil, 8vo. Lond., 1726.—*Molineux*, in *Philosoph. Transact.*, No. 209.—*Dumoulin*, Nouveau Traité du Rheum. et des Vapeurs, 12mo. Paris, 1710.—*D. Bottoni*, Febris Rheum. Historia Medica, 8vo. Messina, 1712.—*J. Cam*, Essay on Rheumatism, Gout, and Stone, 8vo. Lond., 1722.—*Dover*, Legacy, &c., p. 148.—*Hoffmann*, Consult., cent. ii. et iii., No. 147, et seq.—*Juncker*, Dissert. de Congestionibus vulgo Catarrhis et Rheumatismis. Halæ, 1748, et De Rheumatismo Artuum. Hal., 1759.—*J. Cheshire*, A Treatise on the Rheumatism, 8vo. Lond., 1735.—*J. N. Stevens*, An Essay on Diseases of the Head, with a Dissert. on Gout and Rheumatism, 4to. London, 1758.—*H. Boerhaave*, Aphorismi de Cognoscendis et Curandis Morbis, § 1490, et seq. (*Boerhaave was himself the subject of a most severe attack of rheumatic fever.*)—*G. B. Van Swieten*, Commentaria in H. Boerhaavi Aphorismos de Cognosc. et Curandis Morbis, vol. v., p. 635. (*These Commentaries convey an excellent account of the opinions and modes of treatment of Rheumatism entertained by writers down to the middle of the last century.*)—*Maitland*, A short Essay on that tormenting Disorder, the Rheumatism, &c., 8vo. Lond., 1764.—*G. Ponsard*, Traité Méthodique de la Goutte et du Rheumatisme, 12mo. Paris, 1770.—*J. Armstrong*, Essays on Gout, Rheumatism, &c., 4to. London, 1773.—*Smith*, An Apology to the Public concerning the Rheumatic and Hysterical Cases, &c., 8vo. 1775.—*M. Stoll*, Rat. Med., pars iii., p. 122; pars v., p. 420.—*Chandler*,

- Treatise on the Disease called a Cold, &c., 8vo. London, 1762.—*Anon.*, Essay on the Nature, Causes, and Cure of Rheumatism, 8vo. London, 1776.—*Brookesby*, Economical and Med. Observations, p. 131.—*Bang*, in Acta Reg. Soc. Med. Haun., vol. ii., p. 43; vol. iii., p. 108.—*Ranoe*, in *ibid.*, vol. ii., p. 395; vol. iii., p. 342; vol. iv., p. 34, 74, 244.—*H. Plover*, Observations on the Gout and Rheumatism, with the Treatment of the Indians, 8vo. London, 1776.—*T. Dawson*, Cases in Acute Rheumatism and Gout, &c., 5th edit., 8vo. London, 1781.—*T. Sanden*, Strictures on Dr. Dawson's Treatise of Acute Rheumatism, 12mo. 1782.—*M. Stoll*, Rationis Medendi. Pars Quinta, 8vo. Vienn., 1789.—*Menz*, Pathologia Rheumatismi in Morbis Puerperarum. Witteb., 1788; in *Doering's* Tract., vol. i., p. 254.—*Ploucquet*, in *Doering's* Tract., vol. i., p. 149.—*T. Skeete*, Experiments and Observations on Bark, with Remarks on Fevers, Rheumatism, &c., 8vo. London, 1786.—*Sherson*, in Mem. of the Med. Society of London, vol. i., art. 15.—*T. Fowler*, Medical Reports of the Effects of Blood-letting, Sudorifics, and Blistering in the Cure of Acute and Chronic Rheumatism, 8vo. London, 1793.—*William Falconer*, Of the Use, Application, and Success of the Bath Waters in Rheumatic Cases, 8vo. Bath, 1795.—*Brydson*, in Philosoph. Trans., vol. i., p. 695.—*Brookesby*, in *ibid.*, vol. xlix., p. 240.—*Thilenius*, Medie. und Chirurg. Bemerkungen, p. 271.—*Thomann*, Annales Wurceburgenses, &c., vol. i., p. 5; vol. ii., p. 126.—*J. Jones*, A Treatise on the Gout and Acute Rheumatism, 8vo. London, 1793.—*D. Price*, in Mem. of Med. Soc. of Lond., vol. iv.—*J. Latham*, A Letter to Sir G. Baker on Rheumatism and Gout, 8vo. London, 1796.—*W. P. Whyte*, Observations on the Nature, Causes, Prevention, and Cure of Gout and Rheumatism, 8vo. London, 1800.—*G. L. Thaden*, Vom Rheumatismus und der Gicht. Erlang., 1803.—*J. Tweedie*, Hints on Temperance and Exercise in Dyspepsia, Rheumatism, &c., 8vo. London, 1799.—*Latur*, Essai sur le Rheumatisme, 8vo. Paris, 1803.—*J. Livingston*, in Duncan's Annals of Medicine, vol. vi.—*E. Peart*, Practical Information on Rheumatism, &c., 8vo. London, 1802.—*J. Haygarth*, A Clinical History of Diseases, 8vo. London, 1805, el. vii.—*J. Parkinson*, Observations on the Nature and Cure of Gout, Nodes, Rheumatism, &c., 8vo. London, 1805.—*R. Kinglake*, Strictures on Mr. Parkinson's Observations, with Letters on Rheumatism, &c., 8vo. Taunton, 1807.—*S. A. Bardsley*, Medical Reports of Cases of Chronic Rheumatism, &c., 8vo. London, 1807.—*X. Bichat*, Anatomie Générale, t. iii., p. 174.—*Reil*, Fieberlehre, b. iv., p. 203.—*Cassan*, in Mém. de la Société Médicale d'Emulation, t. v., p. 114.—*Leutin*, Beyträge, p. 292; in *Umfeld Journal der Præct. Heilkunde*, b. i., p. 162, 170.—*Adair*, in Edinburgh Med. Commentaries, vol. ix., p. 19.—*Hamilton*, in *ibid.*, vol. ix., p. 9.—*Mufeland*, in Journ. der Præct. Heilk., b. xi., st. 3, p. 115; st. 4, p. 178.—*Blegborough*, Facts and Observations respecting the Air-pump Vapour Baths in Gout, Rheumatism, &c., 8vo. London, 1803.—*Ward*, in Lond. Med. and Phys. Journal, vol. i., 1799.—*Marcus*, Ephemeriden der Heilkunde, b. ii., heft. 3.—*Barthez*, Mém. de la Société d'Emulation, t. ii., 8vo. Paris; et Traité des Maladies Goutteuses, 8vo. Montpel., 1802.—*Louis*, Considér. Générales sur les Fluxions, 8vo. Montp., 1808.—*J. P. Frank*, De Curandis Hominum Morbis, l. vii., sect. 3.—*D. G. A. Richter*, Die Specielle Therapie, &c., b. ii., p. 20.—*V. N. Ab. Hildenbrand*, Institutiones Practico-Medicæ, &c., t. iiii., p. 536; et en Journal des Progrès des Sciences Médicales, t. v., p. 106.—*Valké*, in *ibid.*, t. x., p. 260.—*Rodamel*, Traité du Rheumatisme Chronique de Lyon, 8vo. Lyon, 1808.—*Frank*, Acta Institut. Clin. Vindob., vol. i., p. 131, et vol. ii., p. 48. (*Nitre as a remedy*).—*A. Freahe*, Cases of the Use of Humulus in Gout and Rheumatic Affections, 8vo. London, 1810.—Additional Cases, 8vo. London, 1811.—*Benedict*, in Horn. Archiv., 1811, p. 207.—*D. Dundas*, in Trans. of Med. and Chirurg. Soc. of London, vol. i., p. 37.—*A. F. Chomel*, Essai sur le Rheumatisme, 4to. Paris, 1813.—*J. Haygarth*, On the Discontinuation of Chronic Rheumatism, in Med. Trans. of Coll. of Phys., vol. iv., p. 294.—*A. Marcet*, in Trans. of the Med. and Chirurg. Society of Lond., vol. iii., p. 310.—*J. Copland*, De Rheumatismo, 8vo. Edin., 1815.—*C. G. Stoermer*, Differentiæ inter Rheumatismum et Arthritidem Adumbratio, 4to. Lips., 1814.—*W. C. Wells*, On Rheumatism of the Heart, in Trans. of a Society for Improv. Med. Knowledge, vol. iii., p. 373.—*W. Balfour*, Observations on a New Mode of curing Rheumatism, &c., 8vo. Edin., 1816.—*W. Hickman*, A Familiar Treatise on Rheumatism, 8vo. London, 1816.—*W. Norman*, Observations on Dr. Kinglake's Treatise on Gout and Rheumatism, 8vo. Bath, 1816.—*R. Grautan*, Chronic Rheumatism treated by Bandages, in Transactions of the Association of King's and Queen's College of Physicians of Ireland, vol. i., p. 167. Dublin, 1819.—*J. S. Baer*, Abhandlung ueber Rheumatalgie und Arthralgie, 8vo. Prag, 1817.—*Zollieckoff*, On the Sanguinaria Canadensis in Acute Rheumatism, in Philadelphia Journal of Medical Sciences, vol. vi., p. 295.—*W. Balfour*, Illustrations of the Power of Compression and Percussion in the Cure of Rheumatism, 8vo. Edin., 1819.—*C. A. Meyer*, Versuch einer Darstellung des Unterschieds zwischen Gicht und Rheumatismus, 8vo. Ham., 1820.—*Smerdon*, in Lond. Med. and Phys. Journal, vol. xliii., p. 102. (*Metastasis to the Stomach*).—*Villeneuve*, Diet. de Sci. Méd., t. xlviii., 8vo. Paris, 1820.—*Venturi*, in Lond. Med. and Phys. Journal, vol. xlv., p. 252. (*Metastasis to Spinal Chord and Membranes*).—*E. Barlow*, An Essay on the Medical Efficacy and Employment of the Bath Waters in the Treatment of Gout, Rheumatism, Palsy, and Eruptive Diseases, 8vo. Bath, 1822.—*T. Cox*, Observations on Acute Rheumatism, and its Metastasis to the Heart, 8vo. London, 1824.—*A. Cadet de Vaux*, De la Goutte et du Rheumatisme, 8vo. Paris, 1824.—*L. Bucciellati*, Gota ed ogni Specie di Dolori Reumatici, Metodo per cognoscerla e guarire in pochi Giorni, 8vo. Milano, 1821.—*J. Boyle*, On the Application of Moxa in Contracted Joints, Rheumatism, &c., 8vo. London, 1826.—*Grimaud*, in Nouveau Journal de Médecine, t. iii., p. 390. (*Treated by Camphor, Henbane, and Guaiacum*).—*Dunapguier*, in Revue Médicale, t. ii., 1826, p. 218. (*Camphor recommended for Rheumatism*).—*Peyron*, in *ibid.*, t. ii., 1826, p. 275. (*Acupuncture for rheumatism attacking the heart*).—*Vilpeau*, in Archives Générales de Médecine, t. xiii., p. 190.—*Varlos*, in *ibid.*, t. xiv., p. 223. (*On Compression in Rheumatism*).—*O. Henry*, in *ibid.*, t. xx., p. 135.—*J. B. H. Dance*, in *ibid.*, t. xix., p. 485, and *ibid.*, t. xx., p. 2. (*On the employment of Tartar emetic in large doses in Acute Rheumatism—The practice shown to be injurious*).—*Blanc*, in *ibid.*, t. xxi., p. 280.—*Genest*, in *ibid.*, t. xxii., p. 68.—*Trousseau et Bonnet*, in *ibid.*, t. xxvii., p. 293; t. xxviii., p. 28 et 157. (*On the use of the preparation of Morphia in Rheumatism*).—*Grisolle*, in Journ. Hebdomad. des Sci. Méd., 1836, t. i., p. 293, et t. ii., p. 244.—*V. Cazeneuve*, Recherches sur la Coïncidence de l'Endocardite et la Périocardite avec le Rheumatisme Artériel, in Gazette Médicale de Paris, 1836, p. 611.—*Corrigan*, On the Treatment of Acute Rheumatism with Opium, Dublin Journal of the Medical Sciences, Nov., 1839, p. 266.—*L. A. Gosse*, Des Maladies Rheumatoides, 8vo. Genève, 1826.—*F. Hawkins*, Rheumatism and some Diseases of the Heart considered, 8vo. London, 1826.—*C. Scudamore*, A Treatise on the Nature and Cure of Rheumatism, 8vo. London, 1827.—*Ferrus*, Diet. de Médecine, vol. xviii., art. Rheumatism.—*J. Brown*, Medical Essays on Fever, Inflammation, Rheumatism, &c., 8vo. London, 1828.—*E. Barlow*, Cyclop. of Præct. Medicine, vol. iii., p. 597.—*J. G. Malcolmson*, Observations on some Forms of Rheumatism prevailing in India, 8vo. Madras, 1835.—*C. Scudamore*, A Treatise on the Composition and Medical Properties of the Mineral Waters of Buxton, Matlock, Bath, &c., &c., 2d edit., 8vo. London, 1833.—*M. Guiraud*, Essay on the Natural History, Origin, Composition, and Medicinal Effects of Mineral and Thermal Springs, 12mo. Edin., 1832.—*E. Lee*, An Account of the most frequented Watering Places of the Continent, and of the Medicinal Application of their Mineral Springs, &c., 12mo. London, 1836.—*W. H. Robertson*, Buxton, and its Waters, 12mo. London, 1838.—*R. Carmichael*, Observations on Sciatica and other Neuralgic Affections, with an Account of the Water of Bagnères de Bigorres, and Barèges, in their Treatment, 8vo. Dublin, 1838.—*Wigan*, On Rheumatic Gout, in British and Foreign Quarterly Review, vol. vi., p. 556.—*J. Hope*, in London Medical Gazette, Feb. 25, 1837, vol. xix., p. 812.—*R. Macleod*, in *ibid.*, Oct. 21, 1837, p. 117.—*A. F. Chomel*, Leçons de Clinique Médicale faite à l'Hôtel-Dieu de Paris.—Fièvre Typhoïde, Rheumatisme, et Pneumonie, &c., 3 vols., 8vo. Paris, 1837–40.—*J. Bouillaud*, Traité Clinique du Rheumatisme Artériel, et de la Loi de Coïncidence des Inflammations du Cœur avec cette Maladie, 8vo. Paris, 1840.—*G. F. Griener*, Die Rheumatischen Krankheiten nach ihrem Wesen, &c., &c., 8vo. Leipzig, 1841.—Rev. in Brit. and For. Med. Review, vol. xiv., p. 412.—*Lee*, in Dublin Journal of Medical Sciences, March, 1837, p. 157.—*R. Macleod*, On Rheumatism in its various Forms, and on the Affections of Internal Organs to which it gives Rise, &c., 8vo. London, 1842.—*R. B. Todd*, Remarks on Gout, Rheumatic Fever, and Chronic Rheumatism of the Joints, 8vo. London, 1843.—*J. Robertson*, On Spinal and Nervous Diseases, Rheumatism, 8vo. London, 1841.—*S. Forry*, Statistical Researches relative to the Etiology of Pulmonary and Rheumatic Diseases, &c., &c., 8vo. Philadelphia, 1840.—*D. Craigie*, Elements of the Practice of Physic, &c., 2 vols., 8vo. Edin., 1840, vol. ii., p. 535.—*A. B. Granville*, On the Spas of Germany, &c., 2d edit., 8vo. London, 1839.—And on the Spas of England, &c., 3 vols., 8vo. London, 1841.—Several interesting facts and observations connected with Rheumatism will be found in the following *Modern Periodical Works on Medicine*: The Edinburgh Medical and Surgical Journal, vol. i., p. 151, p. 480; vol. ii., p. 236, 391, 448; vol. iv., p. 93, 97. (*Cod liver oil*); vol. v., p. 248; vol. vi., p. 146; vol. viii., p. 523; vol. ix., p. 205; vol. x., p. 18, 353, 437; vol. xii., p. 163; vol. xiii., p. 251; vol. xiv., p. 343; vol. xv., p. 14; vol. xvi., p. 374, 578; vol. xix., p. 399; vol. xxviii., p. 395.—The Medical-Chirurgical Review, vol. xxix., p. 657.—*Ibid.*, April,



1838, p. 538.—*Ibid.*, July, 1836, p. 82, p. 252.—*Ibid.*, October, 1836, p. 341.—*Ibid.*, April, 1837, p. 511.—*London Medical Gazette*, 23d Jan., 1836; 21st October, 1837, p. 117.—*Seymour*, in *ibid.*, 22d October, 1836; 29th October, 1836; No. 464, p. 119; No. 469, p. 310; No. 474, p. 510.—*Lancet*, No. 601, p. 820; No. 607, p. 72; 25th June, 1836, p. 444; 23d July, 1836, p. 572; No. 675, p. 634; 1st October, 1836, p. 61. (*Gonorrhœa*).—*The British and Foreign Medical Review*, Octo., in vol. ii., p. 252.—*Brera's Pathology*, of vol. i., p. 566.—*Bene*, vol. i., p. 7.—*Malcolmsen*, vol. v., p. 130.—*Piorry*, vol. vi., p. 147.—*Chomel*, vol. vi., p. 373.—*Todd*, vol. xvi., p. 460.—*Bouillaud*, vol. v., p. 230.—*Bonnet*, vol. xxii., p. 63; vols. v., p. 130; vi., p. 354; viii., p. 325, 523; xiii., p. 449; xiv., p. 336, 412, 581; xvi., p. 468; xviii., p. 522; xx., p. 124, 268; xxi., p. 372; xxii., p. 427; xxiii., p. 126.

[AM. BIBLIOG. AND REFER.—*Surgical Cliniques* of the University of the City of New York, in *New York Lancet*, vol. i., p. 11, 27, 219, 235, 251, 268, 284, 300, 315.—*James B. Pindley*, On Combination of Antimony and Opium in Rheumatism, in *North Am. Med. and Surg. Journ.*, vol. x., p. 167.—*Charles Drake*, Cases of Rheumatism, in the *New York Med. Repository*, vol. viii., p. 326.—*James Küchen*, Antimony in large Doses in Rheumatism, *North Am. Med. and Surg. Journ.*, vol. v., p. 292.—*J. Trenor*, in *ibid.*, vol. i., p. 245.—*M. Sage*, in *Med. Recorder*, vol. x., p. 1.—*N. Chapman*, Lectures on Rheumatism, Medical Examiner, vol. i., p. 137, 153, 409.—*W. F. Gerhard*, Lecture on Acute Articular Rheumatism, *ibid.*, vol. i., p. 147.—*A. Kellogg*, On Gout and Rheumatism, *Bost. Med. and Surg. Journ.*, vol. xxv.—*S. W. Williams*, On Scarlatina, *Am. Jour. Med. Sciences*, vol. xxxv.—*James Jackson*, Rheumatism of the Heart, Eyes, &c., *Bost. Med. and Surg. Journ.*, vol. v.—*J. K. Mitchell*, Observations on Rheumatism, *ibid.*, vol. xii., p. 360.—*J. E. Taylor*, Rheumatism of Uterus and Ovary, *Am. Jour. Med. Sciences*, vol. xxxvi., p. 45.—*G. C. Monell*, Rheumatism, Acute and Chronic, a Prize Essay, 8vo. New York, 1845.—*Samuel Boyd*, Remarks on Rheumatism, in *New York Journ. Med. and Surgery*, vol. v., p. 194.—*J. K. Mitchell*, On a New Practice in Acute and Chronic Rheumatism, *Am. Journ. Med. Sci.*, vol. viii., p. 55.—*Samuel W. Moore*, Report of Diseases received in New York Hospital, 1844, *New York Med. Journ.*, vol. iv., p. 73.—*David Hosack*, in *ibid.*, vol. iii., p. 37. See works on practice under "Scarlatina.")

RICKETS.—*SYNON.*—*Rhachitis* (from *ῥαχις*, the spine, or *ῥαχίτης*, spinal), Glisson. *Rachitis*, Suavages, Vogel, Boerhaave, Cullen. *Tabes Pituitosa*, *Morbus Anglicus*, *Osteomalacia*, *Mollities ossium*, *Osteosarcosis*, Auct. *Innutritio ossium*, Darwin. *Osteomalacia*, Swediaur. *Scrofula rachitis*, Young. *Cytosis rachia*, Good. *Tabes pectora*, *Spina nodosa*, *Rachitismus*; *Rachite*, *Rachitisme*, *Riquets*, Fr. *Englische krankheit*, Germ. *Rachitide*, Ital. *Rickets*, softening of the bones.

CLASSIF.—*Class 3d.* Cachectic diseases; *Order 2d.* Swellings (Cullen).—*Class 5th.* Diseases of the Excrement Function.—*Order 1st.* Affecting the Parenchyma (Good). IV. CLASS, IV. ORDER (Author).

1. DEFIN.—Softening and curvature especially of the long bones, and swelling of their extremities; the head being large, the spine bent, the abdomen enlarged, the flesh emaciated and flabby, with all the signs of general debility and impaired assimilation.

2. This disease was first described by Dr. DAVID WHISTLER, in his inaugural dissertation (*De Morbo Puerili Anglorum dicto "the Rickets."* Lugdun. Batav., 1645.) GLISSON, who soon afterwards wrote on this complaint, states that he was induced to give it the name of *Rhachitis*, because the spine was so often affected in its course, and because the term nearly resembled *rickets*, the name by which it was commonly known in England before the time at which he wrote. Dr. CUMMIN remarks that the works of WHISTLER, GLISSON, BATE, and others procured a currency for their opinion that the disease made its first appearance in the western parts of England towards the middle of the seventeenth century, and that it hence was called the *English malady*. The first of these writers published in 1645; the second edition of GLIS-

son's treatise appeared in 1650; and hence it may be inferred that the complaint at first appeared at a much earlier period. FLOYER, indeed, states that "Rickets first appeared in England about the year 1620." These, as well as other contemporary writers, contend that the disease was considered of recent date; that it first appeared in the southern and western parts of the island, and that it had spread to the eastern and northern counties by the time when GLISSON wrote.\* Softening of the bones, although most frequently observed in the young of the human species, is not confined to the species; for it has been observed in monkeys, in the several domestic animals, in the ox, the horse, and in pigs; and even in poultry, especially when exposed to cold, humidity, unwholesome air, and to improper diet. [It has also been observed in the bear, the dog, calves, lambs, the cat, rat, mulc, lion, and the porcupine.] Viewing rickets as consisting chiefly of an imperfect assimilation, in which the bones suffer more especially, and evince more or less softening, I shall first and chiefly consider it as it appears in *children*, as common or true rickets; and next, very briefly as it occurs in *adults*, or as the *mollities ossium* of writers

3. I. RICKETS AS AFFECTING INFANTS AND CHILDREN.—Rickets have been observed in the fœtus by several writers; but it is doubtful whether or not the imperfect ossification, and consequently softened state of the bones, observed congenitally, should be viewed as rickets, as in this disease there is, as will be shown hereafter, a change in the state of the affected bones different from a mere delay or simple imperfection of osseous formation. The complaint has been met with from the earliest months until approaching puberty; but it is most commonly observed to commence during the first dentition, or from six or seven months to three years of age. M. GUÉRIN states that, of 346 cases, 209 were affected from the age of one to three years. Three cases only were congenital, and 34 only occurred from four to twelve years. Of the 346 cases, 148 were males, and 198 females.

4. i. DESCRIPTION.—The course of the disease has been divided by MM. GUÉRIN and GUERSENT into three stages, 1st, that of incubation; 2d, that of deformity; and 3d, that of restoration or of irremediable atrophy, as the termination may be. From considerable experience of the complaint, I believe the division to be useful, and to be based on sound observation.—A. The *precursory* or *incubative* period does not constitute the complaint; but consists chiefly of that impaired state of the organic nervous or vital functions which occasions those changes constituting the malady; and that state

\* [There is no proof whatever that this disease originated in England, or that it is a new complaint. The kinds of deformity which it produces are described by both Grecian and Roman authors as existing in ancient times. It was not until the seventeenth century that the disease was distinguished by any particular name from other affections which occasioned deformity of the limbs: there is no doubt whatever that it has existed in all ages, especially in cold, variable, and humid climates, like that of Great Britain. We have records of its very extensive prevalence in England long before the period mentioned by Dr. COPLAND, and also of the great mortality which it occasioned. We know that some of the English medical historians represent it as having originated in Dorsetshire and Somersetshire, and from these counties to have spread over the world; but there is no foundation for such a belief.]

may be associated with a variety of ailments of the digestive and assimilating organs. The transition from apparent health to the incipient state of the disease is always gradual, and consequently more or less slow; but it may be masked by some other disorder, and hence not be recognised until this period has made considerable progress. The impairment of vital power originating the malady is most frequently associated with indigestion, or with chronic irritation of the gastro-intestinal mucous surface, or with bronchitis, or with whooping-cough, or even with lobular pneumonia, and with more or less change of the urine, which, however, has generally been imperfectly examined. Nevertheless, cases occur in which but little or no ailment, or merely slight debility of the digestive and assimilating functions, has been remarked up to the time of the manifest appearance of the complaint.

5. With the approach of rickets, the child is dull, or sad, or peevish; is averse from play or any action; prefers to sit or lie, appears feeble or indolent, or complains of inability to use exertion, and of pains in the joints and along the bones; the appetite is impaired or is capricious; the bowels are irregular or relaxed, and the stools morbid, or pale, or deficient in healthy bile; the face is pale, and the flesh becomes soft and flabby; perspiration is free on slight exertion, and is weakening and colliquative during sleep, and the skin often moist during the day. The pulse is quick, soft, and broad or open, the external veins are large, and the jugular veins much dilated. Thirst is generally present; emaciation becomes evident, and the abdomen tumid. With all these symptoms, however, no evidence of rickets may exist; for they may accompany or usher in other maladies; but when with these the urine is more abundant than in health, and when it deposits a copious calcareous sediment, or abounds in the phosphates, then the early or precursory stage of the complaint may be considered as already present; and it is in this stage especially that the salts are most abundant in the urine (§ 16).

6. The *duration* of this period necessarily varies with the number and severity of the symptoms now enumerated, with the age and constitution of the patient, and more particularly with the quantity of phosphates contained in the urine. It may thus vary from one or two months to six or seven; but when the head is very large, and the bones of the head imperfectly developed, or the sutures not closed, when the abdomen is very tumid, the bowels lax, the stools pale and deficient in bile, and the urine abundant, the second or developed state of the complaint appears early. The continued operation of the causes, neglect or injudicious treatment, and the occurrence of some local intercurrent affection, may shorten this period; while a proper treatment and regimen may remove all the symptoms, and prevent the development of the disease. In some cases, also, the precursory stage may be hardly apparent, the first indication of the complaint being the actual deformity of the limbs constituting the second stage; the child may have appeared, up to the detection of the flexure of the long bones, in good health; although closer observation and an examination of the urine would have detected more or less evidence of disorder.

7. *B. The second period* is that which is characterized by more or less deformity of the bones. The extremities of the long bones, especially those of the ankles and wrists, and the sternal ends of the ribs, are the parts which first evince this stage, by their swollen or knobby appearance; and the lower portions of these bones now begin to yield, especially those of the lower limbs, when the child is so old as to attempt to walk. The increasing softness and yielding of the bones are now apparent in the gradual change of their forms. The lower extremities are usually curved by the weight of the body, while their bones yield more or less to the action of the most powerful of the muscles. They generally present the convexity of the curvature outward, and the concavity inward. The femurs are sometimes curved forward, but more frequently outward, as are the tibiae. The knees are sometimes bent inward, and the feet thrown outward, so that the knees press against each other, and the patient rests on the inside of the foot; and as often the knees are separated to an unnatural distance by the continued curvature outward of both the thighs and legs, the whole of the lower extremities forming irregular curvatures, with the convexities outward and greatest at or near the knees. In some cases the angle formed between the neck and shaft of the femur is changed from an obtuse to a right or an acute angle. Much of the deformity which takes place in this stage is owing either to the manner of carrying or placing the child, or to the weight of the body and head upon the lower extremities when attempts are made to stand or walk, and upon the upper extremities also, when the child crawls about on its knees and hands.

8. The head of the rickety child is generally unusually large. The vertex is often flattened; the forehead is prominent and broad; and the centres of the parietal bones expanded. The fontanelle is wide and unclosed; and, if the child be very young, the sutures expand or remain open. The bones of the face are imperfectly developed, or are partially arrested in their growth; and the under-jaw is often elongated. The process of dentition is arrested or delayed; or, if they have been formed, they soon decay, owing to softening of the fangs, and of the alveolar processes. The clavicles are, after the bones of the lower extremities, the most frequently deformed. The long bones of the upper extremities are much less frequently curved than those of the lower. The spine is generally also curved, owing as much to yielding of the ligaments as to softening of the bodies of the vertebræ. The curvature is commonly outward, but it is sometimes also lateral-outward in the back or between the shoulders, where the curvature is also to one side, and to the opposite side in the lumbar region, where also there is sometimes a curvature inward. The curvatures of the spine, especially outward, are generally connected with a flattening of the ribs laterally. The ribs are turned inward, and their sternal extremities, at their connections with their cartilages, are swollen into knobs. While the sides of the chest are thus compressed, the dorsal spine is pushed outward, and the sternum also outward, the diameter of the chest, from right to left, being thus much diminished, and the "pigeon breast" formed. (*See art.*



CHEST, *Deformities of.*) The flat bones, as those of the shoulder and pelvis, are also sometimes affected. The shoulder-blade is, in a few instances, so deformed as to embarrass more or less the movements of the shoulder; but when the bones of the pelvis are softened, the deformity is of the utmost importance, especially to the female, in after life. The change of form in the pelvis is often remarkable, and is extremely various, the sacrum and pubis being carried either backward or forward, the ilia directed inward or otherwise altered, the lower part of the sacrum pushed upward, and the outlet of the pelvis variously altered in form and diminished in diameter. The progress of deformity is generally from the extremities to the center of the frame, and more especially from below upward, particularly after the first year.

9. The relative proportion of the alteration of the different bones in rickety patients has been stated by M. GUÉRIN. But it should not be overlooked that, as the bones nearest the centre of the frame are the last affected, or are liable to deformity only at an advanced stage, and in neglected or ill-treated cases, the statistics he has furnished are open to the objections which may be urged against the statistics of other diseases; whether the relative proportion, or numerical calculations, be applied to symptoms, or to organic changes, or to remedial results; objections based on the differences of disease owing to varying combinations of predisposing and exciting causes; to endemic and epidemic influences; to seasons and weather, to modes and manners of life, and to numerous circumstances, to which it is needless here to advert. M. GUÉRIN states that, of 496 cases of rickets, 11 only had swellings of the extremities of the bones without curvature; and of the 485 with curvatures, 59 had at the same time deformity of the thorax, 48 deformity of the spine, 17 enlargement at the same time of the cranium, and 14 only deformity of the upper extremities simultaneously with these alterations.

10. During this stage, the deformity of the bones is not the only change. The alterations mentioned in connexion with the first stage continue during this. The abdomen continues tumid, or increases in size, and is more tympanitic, the limbs more emaciated and flabby; the child more languid and weak; the perspiration free and readily increased; the thirst increased; the pulse quick, small, and weak, with slight hectic symptoms; and pains are complained of in the bones and joints. The bowels are irregular, or loose, and the stools pale or almost devoid of healthy bile. The general emaciation and change in the bones allow the head to appear larger than usual, while it is often only large in proportion to the rest of the body; and while all other parts of the frame, the bones especially, cease to grow, during this stage, the head appears even to enlarge, and the faculties of the brain to be developed, sometimes precociously.\* The cessation of growth, particularly

of the bones, during this period, is most remarkable in the lower extremities, and less so from below upward. M. GUÉRIN states, that his comparisons of the skeletons of rickety subjects with those of the same age and sex who had not been rickety gave the following per centage of reduction in the different bones: in the fibula, 26 per cent.; in the tibia, 25; in the femur, 22; in the cubitus, 19; in the humerus, 15; in the clavicle, 9; in the sternum, 8; in the spine, 5; and in the pelvis, 17 per cent.

11. The duration of this stage necessarily varies with the persistence or removal of the causes during treatment, with an early or delayed recourse to judicious means, with the diet and regimen, and with the local affections which may complicate the disease. In the more rapid states of the complaint this stage may not continue longer than two or three months, while in more chronic forms, and when the complaint has been long neglected, and unfavourable circumstances continue their influences, this period may extend even to several years, the deformity and its attendant symptoms either very slowly increasing or remaining nearly stationary.

12. *C. The third stage, or period of restoration,* or that attended by either a favourable or unfavourable change, is marked by no very sudden alteration from the state above described; it appears gradually, but rarely rapidly, unless some intercurrent disease or local affection supervene; and this is not infrequent.—(a) If the disease does *not tend towards recovery*, the emaciation increases, the abdomen is more distended, and the bowels more disordered, while the secretions and excretions are still more morbid than before. The deformity of the bones continue or increase; and ultimately the child is carried off by disease of the lungs or of the abdominal viscera, or several lesions of the thoracic and abdominal organs may coexist in the same case and terminate life, as congestion of the lungs with effusion into the pleura; general bronchitis with gastro-intestinal irritation; lesions in the digestive canals with enlargement of the mesenteric glands; crude tubercular formations in the lungs, with tubercles in the membranes of the brain, and effusion in the ventricles or between the membranes, &c. If the child is not carried off by one or more of these, and continues deformed, without any amendment of the symptoms, the softness of the bones is much diminished, their flexibility is lost, they are more atrophied, and they are more readily broken; the deformity often still increasing. Recovery then rarely takes place; a complication of internal disorders, consequent upon structural changes, and upon a morbid state of the blood, ultimately terminating life.

13. (b) *A favourable change from the second stage* is evinced at first by the states of the secretions and excretions. The urine assumes a more natural appearance and composition (§ 16); the stools are more healthy, and coloured

\* Mental precocity is not, however, always seen; for sometimes the child continues dull, taciturn, or stupid, or even idiotic. These opposite states have been explained by supposing that the openness of the sutures has allowed the circulation and development of the brain to advance at an increased rate, and the faculties of the mind to expand; while the closure of the sutures, and the consequent unyielding state of the cranial bones, have confined and embarrassed the functions of the brain, and occa-

sioned the opposite state of the mental powers. But, as far as I have observed, precocity has not always existed in connexion with openness of the sutures, nor stupidity with their closure. Perhaps the chemical pathologists, who attempt to explain all by chemical changes, will account for the different phenomena by ascribing them to the state of the blood and to the excess of phosphates in it, during their passage from the bones to the kidneys, by which they are eliminated.

more deeply by bile; the abdomen appears less tumid and less tympanitic; the pulse is less frequent, and pains in the limbs are not so much complained of. The countenance presents more animation, and the hectic or remittent febrile symptoms and thirst subside gradually. The appetite is less capricious and more natural; and, with the continuance of these changes, the flesh becomes firmer, and voluntary motion is made with greater activity. The growth of the limbs, which had been suspended until now, proceeds with remarkable vigour; the bones are gradually restored, and, if the deformity is not very great, it disappears by degrees; the curvatures are either diminished or altogether removed; the swellings of the epiphyses of the bones subside, and ossification proceeds with great rapidity, the affected bones acquiring greater density and strength than usual. The muscles also acquire a more powerful development, so that persons who have been rickety in childhood have afterward become remarkable for strength.

14. (c) During *recovery* an excessive ossific action often occurs, more especially in the parts which had been swollen and softened during the stage of deformity. Not only are the sound bones more dense, but, in some instances, a state of hyperostosis or exostoses more or less numerous, especially near the epiphyses and sutures, is observed. I have seen this occur most remarkably at the terminations of the ribs and commencement of the cartilages, the whole being more or less soldered together, and also with the sternum. Occasionally slight accessions of fever are observed during recovery, and either advance the process of restoration, or are the mere concomitants of the change taking place in the bones and system generally. If the complaint occur in children about the second year of age, or later, although it may be of considerable duration, amendment is generally rapid when it commences; and even when the growth is stunted, and the deformity is still considerable, still the period of puberty may remarkably develop growth and diminish the deformity, especially when the advantages of a favourable change of air and out-door exercise are enjoyed.

15. When the disease is attended by an outward or lateral curvature of the *spine*, or with flattening of the ribs and protuberance of the sternum (*see art. CHEST, Deformities of*), recovery is imperfect and protracted, and the more so the greater the deformity arising from the curvatures of the spine and the flattening or bending inward of the ribs. In these cases the functions of the lungs are impaired, and the more advanced parts of the assimilative processes are impeded. In many of these cases, especially in those which are the most deformed, and when the spinal curvature is so extreme as to form a dorsal hump, the deformity continues through life, the duration of which it may considerably abridge, by favouring the supervention of congestion of the lungs, or bronchitis, or pneumonia, or even asphyxia, by pressure on the origins of the spinal nerves. In some the curvature diminishes with the restoration of health, aided by suitable treatment and regimen; but in others it increases, sometimes after having been long stationary, owing to some change in the general health, or to de-

bility, or to disease, when ultimately a fatal termination takes place in the way now stated.

16. *D. The urine in rachitis* presents more or less change from the healthy state. Generally it is much more abundant than might be expected, considering the free transpiration from the skin. It is commonly pale, but it is sometimes of natural colour. The urea and uric acid are diminished, while the salts are increased. A free acid is sometimes observed, which has been said to be the phosphoric, but this requires farther investigation. The phosphates are more abundant than in health, and more especially than in healthy children; and a considerable sediment of oxalate of lime is not infrequent; and it has been observed that urinary calculi are frequent in rachitic children. As far as my own observation enables me to state, the increase in the fixed salts is most considerable during the advance of the first stage, and when the deformity begins to appear in the bones: it is less remarkable when the disease is far advanced, and the softening and flexures the greatest. The phosphate of soda and the earthy phosphates are most abundant. In a case examined by MARCHAND (*Lehrb. der Phys. Chemic.*, p. 338), the urine contained much lactic acid and lactates, and a great excess of the earthy phosphates. In a case by Mr. SOLLY (*Transact. of Roy. Med. and Chirurg. Soc.*, &c., vol. xx., p. 448), three or four times the usual amount of phosphate of lime existed in the urine. The exact composition of the urine during the third stage, especially during a return to the healthy state, has not been shown.

17. *E. Various complications* often occur in the course of this complaint. These may be either of an acute or chronic nature. Rickety children may be the subjects of the usual diseases of childhood, as whooping-cough, measles, scarlet fever, small-pox, &c., or of bronchitis, pneumonia, inflammatory irritation of the digestive canal, enlargement of the spleen, scrofulous enlargement of the glands, tubercular productions in the lungs and other organs, cutaneous eruptions, &c. Most of these are accidents by no means necessarily consequent upon the rickety constitution; but when the disease is far advanced, or is attended by deformity of the spine or chest, then the affections of the lungs, pulmonary congestion, effusions into the shut cavities, and disorders of the digestive organs, may be favoured by such deformity. The complications now mentioned, which are not specific, and which result not from infection, are often produced by certain of the causes which combine to produce this malady, or by influences to which children in this state are often exposed, more especially to various endemic influences, as a close, cold, and humid air, and injudicious diet. M. GUERSENT remarks that he has seldom found rickety children the subjects of tubercles, although he has observed two thirds of children who have died of other diseases present tubercular formations in some of their organs. M. RUVZ also states, that in twenty rickety subjects he found tubercles only in six. There can be no doubt of these complications having the effect of aggravating and accelerating the unfavourable progress of the disease in most cases, the only exceptions being when the eruptive fevers occur in a mild form, and then, in a few cases, they



have appeared to impart a new and favourable state of vascular action to the frame. In the most severe and advanced cases, other complications than those already mentioned often occur, and, in the weakened state of constitution, frequently terminate life. These are chiefly colliquative diarrhoea; hectic with colliquative sweats; congestion of the brain, with or without effusion, and attended either by coma or convulsions, fractures of the long bones on sudden motion, retention of urine, complete or incomplete palsy, chiefly in the form of paraplegia, and loss of one or more of the functions of sense.

18. *F. The appearances after death* possess interest, not merely as respects the state of the internal organs, and the lesions in them to which death is more directly owing, but as regards the changes observed in the bones themselves. These latter changes can be observed in the early periods of the disease only when the patient is carried off by some complication or intercurrent disease. M. GUÉRIN has observed the alterations which take place in the bones during the three periods of the disease, and from his researches I am enabled to give the following account: (a) When death is caused by some acute disease affecting a rickety subject during the *first stage*, as sometimes happens, the long bones, when quite fresh and not previously exposed to the air, are congested with a large quantity of dark blood, which exudes from all parts when the bone is divided either longitudinally or transversely. This blood appears not to be contained in blood-vessels, but to be effused on each side, in the medullary canal between the medullary membrane and bone, in all the areolæ of the spongy structure of the diaphyses, of the epiphyses, and in the intermediate tissue which unites these two portions of bone, and under the periosteum, which is evidently injected and thickened. Blood is also interposed between the lamellæ of the compact structure of the bones, these admitting of an easy separation, and allowing this fluid to exude in numerous minute points. The blood is at first very fluid, and is readily removed from the surfaces on which it exudes; but, at a more advanced stage, it loses its dark colour, becomes gelatinous and semi-transparent, and adheres firmly to the surface of the osseous tissue. It then presents the rudiments of minute capillary vessels. During these changes in the blood the vessels of the bones acquire an increased development; the openings through which the vessels pass to and from the interiors of the bones are much dilated, and the osseous system is the seat of a remarkable sanguineous congestion, in which the small and flat bones also participate more or less.

19. (b) In the *second stage* the osseous tissue is manifestly more or less softened, admitting of flexures according as the weight, pressure, position, or muscular actions of the body may direct them. On examining closely the structure of the long bones, the swellings of the diaphyses and epiphyses are found to be owing to the development of a very fine spongy tissue, of a new formation, which M. GUÉRIN has named the "*spongoid tissue*," to distinguish it from the ordinary spongy structure. This tissue consists of very fine irregular areolæ, which replaces the sanguinolent fluid charging the bones in the first

stage, and is found spread out underneath the periosteum, forming a coat from one to two lines in thickness. It is found also between the lamellæ of the bones, where it may be detected by its darker color, and between the bone and the medullary membrane; but it is abundant around the epiphyses. It is also abundant, and more dense, at the concavities of the flexures than at the convexities; and it is found in both the long and flat bones. The periosteum is more or less vascular and thickened.

20. (c) The *third stage* presents changes in the bones very different from each other, according to the termination it assumes. When recovery and consequent re-ossification take place, the *spongoid tissue* of the new formation is nearly altogether transformed into a compact structure, especially in the concavity of the curvatures; and it is so abundant toward that part where the medullary canal is most contracted, as to invade the greater part of the canal by osseous lamellæ. While the compact structure acquires a very great density, it becomes the whiter the longer the duration of the consolidation, until it assumes the hardness and appearance of ivory. Disseminated through this structure in the diaphyses, and in the epiphyses as well, irregular open spaces are sometimes observed, apparently resulting from a partial absorption or from a retraction of the solid parts. When re-ossification does not take place, the compact structure is thin, fragile, dry, or compressible, especially around the epiphyses. The areolar tissue found within this thin osseous shell consists of large unequal or irregular cells, which extend throughout the whole of the medullary canal, which is filled with very fine osseous lamellæ surrounded by an oleaginous fluid. This alteration, which is found also in the epiphyses, M. GUÉRIN has named "*Rickety consumption of the bones*."

21. (d) It must be evident from these alterations that the bones will present important chemical results upon analysis, and that the chemical changes will vary with the amount of softening and of the alterations just described, and as these latter vary in different cases, in the same case at different periods, and in different bones in the same subject. According to BOSTOCK and BECQUEREL, the earthy constituents of the bones are remarkably diminished during the early stages of the complaint. In two children who died of pneumonia during the early period of rickets, the bones of the cranium presented but a slight diminution of the earthy phosphates, while the femur, the tibia, and the sternum contained only from a fourth to a twelfth part of the proportion usually observed in health.

22. (e) The complications of the disease above enumerated will suggest many of the visceral lesions observed in fatal cases of rickets, for to these death is generally more immediately owing. The brain is found more or less large relatively to the rest of the body; and fluid is often effused within the ventricles and between the membranes, which in a few cases have presented small or crude tubercular formations. Effusion of serous fluid is sometimes found in the pleural cavities, and the lungs often are pushed downward by the lateral pressure of the ribs. The bronchi are often inflamed or congested, the lungs are congested,

or in parts resemble the structure of the spleen, or contain, in some instances, tubercles in various stages of development. The heart is often paler than natural, and, in a few instances, has presented incipient organic lesions, especially when the complaint has been of long duration and the deformity of the chest has been considerable. The liver and spleen are often pressed downward by the thoracic deformity; and both organs are sometimes found more or less enlarged—the liver frequently paler than natural. The alimentary canal is generally very much distended by flatus, and the mesenteric glands are more or less enlarged, and occasionally contain crude tubercles. The different series of glands contained in the digestive villous surface are either enlarged or ulcerated, particularly when the disease has been complicated with intestinal disorder. The muscles are generally very flabby, pale, and wasted; the adipose tissue is wasted by absorption; and what remains appears soft and almost fluid. The whole of the structures, visceral and external, present a state of flabbiness or softness.

23. ii. DIAGNOSIS AND PROGNOSIS.—A. The *Diagnosis* of this complaint is sufficiently easy, excepting in the precursory stage, and then it is often as difficult as it is important to detect the approaching mischief. In this stage the complaint may be mistaken for several incipient diseases, especially for tubercles in the lung, for tubercular peritonitis, for tubercular disease of the brain or of the cerebral membranes, or of the spine. A short time and an attentive observation of the symptoms will soon show whether or not they agree with those described as characterizing the first stage (§ 4, *et seq.*); and when enlargement of the ends of the long bones, and especially when these become at all deformed, the diagnosis will be manifest. If any mistake should be made, or any difficulty of diagnosis between the incipient states of these maladies should arise, but little evil need result, as the treatment would not be inappropriate to either of them. It is evident from the changes observed in the bones, especially those evincing re-ossification, that the softening of the bones of children, or *true rickets*, is, in very essential points, a distinct disease from the *softening of the bones* sometimes observed in adults, especially in females, although I have considered it at this place as a species of rickets, from the softening and deformity attending it. This latter, the true osteomalacia, or mollities ossium, is never followed by re-ossification, especially when it is consequent upon chronic or malignant diseases, or the puerperal state. Curvatures of the spine supervening in the course of rickets should not be confounded with those curvatures caused by tubercular or scrofulous disease of the vertebræ on the one hand, or by relaxation of the ligaments, &c., on the other. (*See art. SPINE.*) Nor should it be overlooked, that the curvatures of the spine, so frequently observed connected with deformity of the chest, may exist in children as well as in adults, or young persons about the age of puberty, without the least degree of rickety change in the bones; that this curvature, as well as the deformity of the chest and sternum (described in article CHEST, *Deformities of*), may exist, on the one

hand, either separately or together, both in children and in adults, no other deformity of the bones being present; that either or both deformities may, on the other hand, supervene in the progress of true rickets, and of mollities ossium, or the rickets of adults; and that, when curvatures of the spine are thus associated with true rickets, or with mollities ossium, the bones of the pelvis are generally also deformed or contracted in various directions, more especially when the lower extremities continue much bent and shortened by true rickets, and when the softening occurs in adult age. It is worth noticing, also, that the extremities, especially the lower, not only cease to grow during the disease, but also continue much shorter during life, although they have acquired remarkable strength.

24. B. The *prognosis* depends not only upon the progress and severity of the complaint, but also upon the combination or persistence of the causes, and upon the effects produced by treatment. If the child be not remarkably debilitated, if the disease be not far advanced, and if the deformity have not invaded the spine, or pelvis, or parietes of the chest, a favourable result may be expected from treatment; but when vital power is much reduced, when the deformity is great, and has extended to the spine, or to the chest, or to the pelvic bones; still more especially when it is complicated with serious visceral disease or lesion, and when the deformity is such as to impede the respiratory functions, or when the head is affected, and sopor, coma, or convulsions supervene, or when the urinary functions are disordered, then complete recovery should not be expected; and, although life may in many cases be indefinitely prolonged, yet it may be very rapidly terminated, particularly in the latter circumstances. An unfavourable issue is the more likely to occur the earlier in infancy the complaint appears, the more serious the disorders which usher it in, and the more manifest and marked the predisposing causes existing in the parents.

25. iii. CAUSES.—A due recognition of the remote causes of rickets is of the utmost importance in preventing and in curing the disease.—A. The *predisposing causes* are not merely those which act externally on the child, but those also, and often especially, which are derived from the parents and the nurse—these latter sources, which have been too much overlooked at the present day, but to which BOERHAAVE and his commentator have directed attention: “Maxime autem infestus habetur proli, cujus parentes laxa et debili conditione corporis, otiosi, molles, opipara mensa, cibis pinguibus, saccharatis, pauca pane, vinis dulcissimis, et aqua multa calida, usi, morbis chronicis, venere, ætate, exhausti, tabi inprimis veneræ, et iteratis gonorrhæis, multum obnoxii, effectam ferme genituram impenderunt generandis liberis.” (§ 1482).—There is much truth in this enumeration of the predisposing causes derived from the parents. In respect of the influence to be ascribed to the exhaustion produced in the parents by chronic diseases, venereal excesses, and age, VAN SWIETEN remarks: “Tales parentes, debiles, morbosos, languidos, infantes gignere, nemo dubitat. Unde inter signa sanitatis optimæ numeratur, si quis



natus sit parentibus sanis, vegetis, plenæ ætatis, rara sed fervida venere utentibus. *Lycurgus* qui validis exereitiis firmabat virginum corpora, antequam viris jungerentur, voluit, ut recens nupti non cohabitarent, sed elam et fictiva quasi venere uterentur tantum, adeoque rara et fervida. Talem curam gessit robustæ et bellicosæ posteritatis. Facile patet, qualis proles expectanda sit a decrepitis, uti et ab illis, qui, in ipso ætatis vigore, libidine ac perditissimo vivendi genere exhausti, conjugia ambiunt, dum, ante trigessimum annum jam imbelles senes, lectissimas virgines turpiter deipiunt." (Vol. v., p. 587.)

26. There can be no doubt that these causes, so strongly insisted upon by BOERHAAVE and VAN SWIETEN, predispose to this disease in the offspring, by imparting an innate or congenital debility to the infant constitution, although they cannot be viewed as imparting a more especial tendency to it than to scrofula, or to other diseases of debility to which this is more or less closely allied. The children of parents who have married at a premature age, or who have indulged in sexual excesses, or who have been guilty of self-pollution, or who have become debilitated by other causes of exhaustion, as by living in unhealthy localities, or in the foul air of crowded factories, or by sleeping in close or crowded sleeping-chambers, are predisposed to this, among other maladies, which are allied more or less to each other, as respects their causes, rather than as regards their forms or seats. Certain of the predisposing causes existing in the parents, to which BOERHAAVE imputed a considerable influence, and which probably did, at the time he wrote, and still more so when rickets first became a frequent disease, possess this influence, namely, the taint or constitutional debility consequent upon venereal or gonorrhœal affections, may not, in the present day, produce this effect upon the offspring in so remarkable a manner as in those times; still I am convinced that they are not without some effect, although I believe that they are more influential in developing a scrofulous diathesis than in predisposing to rickets.

27. The effect of *leucorrhœa* upon the offspring, more particularly as predisposing to rickets, may admit also of doubt; still some of the best medical authorities have insisted upon the influence of this complaint in the parent. STORERCK contends that females who are subject to leucorrhœa are liable to suffer abortion, or to have rickety children. "Monebat, tales mulieres, nisi integre curentur antequam nubant, facile abortiri, si conceperint. Dum felici arte cavebatur abortus ita, ut fœtus ad maturitatem perveniret, notavit sequentia. *Tales autem fœmina pariunt plerumque infantes crassos, pingues, robustos, et hi tales manent per plures menses: postea vero emaciuntur, lassi fiunt et membra pendula gerunt; tandem subsequitur pessima rachitis, quæ raro huc usque sanari potuit.*"

28. The predispositions referable to the children themselves have not been sufficiently investigated. Rickets have been observed in all constitutions: in the dark, the fair, the delicate, and the apparently robust; but most frequently in the delicate, in the sickly, in the soft and flabby, and in infants with large heads, whose fontanelles remain open, and whose dentition is delayed. Insufficient nourishment, unhealthy

milk, early weaning, or "bringing up by tac hand," a watery farinaceous diet after weaning, a too exclusive use of vegetables, and the want of animal diet in cold and damp localities, and the periods of the first and second dentition, favour the occurrence of the complaint, especially in the constitutionally or hereditarily predisposed. Indeed, whatever debilitates the frame not only predisposes to rickets, but also sometimes more directly develops it.

29. *B.* No particular exciting cause can be adduced in some cases to account for the appearance of the disease, besides those which I have enumerated as being occasionally predisposing influences. But when these act in combination, and when other fortuitous circumstances aid their operation, they produce a more direct and exciting effect. Probably, however, residence in a cold and damp locality has a still more direct influence in developing rickets, even than those causes already mentioned, although without their aid this cause may not produce this effect. Indeed, the disease is even endemic in those places which are cold and damp, and where the poor are insufficiently fed and clothed. I believe that the abuse of spirituous liquors by either parent is not only a predisposing, but also an exciting cause of the complaint, and that it is more especially such when the vice is indulged in by the mother during the period of lactation. The murderous practice of giving narcotics to infants, so notoriously prevalent among many of the physically and morally degraded of the manufacturing population, may produce a similar effect where it fails of causing a more rapid extinction of life.

30. *C.* The proximate cause of the change in the bones, of which rickets is the result, is still unascertained. No satisfactory explanation of the changes which take place in this part of the frame has hitherto been adduced. It has been suggested that a superabundance of acid in the blood may cause the removal of the phosphates from the bones; but there has been no analysis of the blood in this disease, and the existence of an acid, and still less the kind of acid, in the blood have not been shown.\* If the change were owing to the state of the blood entirely, it might be expected that the bones would undergo the same amount of softening and of chemical alteration throughout the frame. But this is found not to be the case, for the bones of the lower extremities experience these alterations in a much more marked degree and much earlier than those of the head or trunk. It may, therefore, be inferred that whatever agency the blood may exert must be directed or influenced by the vital or the organic nervous influence, to which the nutrition of the several structures is chiefly to be imputed. We only know that

\* Although the existence of lactic acid in the blood has not been demonstrated, it may probably exist; for it is not unlikely that this acid is formed in excessive quantity in the digestive canal during the early stages of the disease, owing to the nature of the ingesta and the state of the primary assimilation, and that, being carried into the circulation, it there affects the functions of nutrition, and impairs organic nervous energy, although its accumulation in the blood, in a large or very sensible quantity, will be prevented by the depurative actions of the skin and kidneys. It may also be remarked, that the formation of lactic acid in the digestive canal, and its excessive excretion by the emunctories, are phenomena of familiar occurrence in rheumatism, in the puerperal state, and in several diseases, during which softening or other changes in the bones have sometimes taken place.

the disease results from many depressing causes, acting in various combinations, but always producing a constitutional debility, depressed organic nervous energy, imperfect assimilation and nutrition, and consequently a morbid state of the blood, with all the consecutive changes observed first in the softer structures, and ultimately in the bones; but our knowledge has advanced no farther than this, either in amount or in precision.

31. iv. TREATMENT.—A. The *prophylactic treatment* of rickets consists chiefly of the avoidance of the causes which occasion it, and of the adoption of those hygienic means which are requisite at all periods of early life, and more especially during the epochs of infancy and childhood. A healthy nurse, a warm and dry atmosphere, change of air, due ventilation, the animal warmth communicated by a healthy mother or nurse, suitable food—suitable as respects the periods of lactation, of weaning, and of dentition; attention to cleanliness, to dryness of the clothes, and to the warmth of the lower extremities, are the most efficacious measures, as far as concerns the child itself, that can be adopted for the prevention of this malady.

32. B. The treatment of the *successive stages* of the complaint depends much upon the visceral and constitutional disorders attending them. These disorders, especially when neglected or improperly treated in the first stage, tend to develop the rickets; and, in the second, either to retard recovery or to endanger the patient.—(a) When any of the affections which have been mentioned as complicating the *first stage* appear in conjunction with those symptoms or indications of incipient rickets, more particularly with an excess of the phosphates in the urine, the treatment of them should be conducted with much caution; for they have been too frequently viewed and treated as inflammatory, when they have been only the results of irritation, or consequences of the presence of irritating materials circulating in the blood, and of an asthenic state of organic nervous power. When, therefore, any of the disorders noticed above (§ 17) are observed to complicate this stage of the complaint, they should then be removed by means directed more especially to the improvement of the secretions and excretions, to the mitigation of both local and constitutional irritation, and to the promotion of vital power. In order that these intentions should be fulfilled with due success, the states of the perspiration, of the urine, and of the intestinal discharges should be carefully and almost daily examined. The urine particularly ought to be tested and chemically investigated, and upon the states of these excretions the choice of medicinal agents, as well as of diet and regimen, should mainly depend. The primary processes of assimilation especially require attention, and these are generally most efficiently promoted by a suitable diet, and by a warm and dry atmosphere.

33. When the *urine*, although abounding in phosphates, nevertheless presents an acid reaction, and when it does not become rapidly offensive, then alkalies may be given with tonics, sedatives, or alteratives. The irritative fever and quickness of the pulse, frequently attending the first stage of the disease, have oft-

en induced the physician to prescribe lowering means when a restorative treatment was actually required. But the attendant fever being characterized by nervous asthenia, by copious or colliquative perspirations, by pale phosphatic urine, by general pallor, and by the softness of the pulse, these furnish sufficient indications for restorative remedies. The alkalies most serviceable in these circumstances are the carbonate of potash, the liquor potassæ, or BRANDISH's alkaline solution, or magnesia, with infusion or decoction of cinchona, or infusion of cascarrilla, with aromatics. If the carbonates be prescribed, small doses of the dilute hydrocyanic acid, or of the extract or tincture of conium, will be of use. If the urine present only a slightly acid reaction, or if it be already, or soon become alkaline, the mineral acids, especially the hydrochloric and the nitric, or the combination of both, may be given with aromatics, or with small doses of the hydrocyanic acid, or of opium, or of conium.

34. If the *bowels* be confined, they should be sufficiently opened, and all fecal accumulations and morbid secretions evacuated by means of stomachic aperients, especially the compound decoction of aloes, or equal parts of the compound infusions of gentian and senna, or rhubarb with aromatics. When the stools are devoid of bile, it will be preferable to attempt to procure an increased secretion by means of the nitro-muriatic acids, given internally, or used externally at a warm or tepid temperature, than to administer mercurials, which tend to depress still farther the already impaired organic nervous power. Occasionally, however, the hydragryum cum creta will be given with benefit in conjunction with rhubarb, and cinnamon or ginger. If the patient be so old as to swallow a pill, these will be most advantageously combined with the inspissated or purified ox-gall. If the bowels be relaxed, or the stools yeasty, and the patient much griped, or pained generally, the alkaline medicines (§ 33) may be given in lime-water and milk, with minute doses of tinctura opii, or of tinctura camphoræ composita, or of tinctura lupuli; and an enema, containing the same ingredients, may be occasionally administered. In these latter circumstances, liniments or embrocations containing either of the balsams or turpentine, or camphor, applied over the abdomen, are of essential service. The terebinthines and balsams are severally of use, when given internally, but they ought to be prescribed only occasionally, and in small doses, so as not to irritate the urinary organs. Emetics have been advised, but they are of service only when this stage is complicated with hooping-cough or bronchitis, and even then chiefly with the view of procuring a discharge of accumulated secretion from the bronchi, when there is difficulty in expectorating it. During this period, as well as in the second, when there are marked pallor of the surface, and frequent sweats, the *mistura ferri composita*, made agreeable with liquorice powder, is eminently beneficial; and if any pulmonary symptom exist, conium should be added. If the bowels are torpid, this mixture may be conjoined with the decoctum aloes compositum.

35. In this stage, as well as in the next, sponging the back, loins, and thighs with a tepid solution of bay salt, or with tepid sea-wa-



ter, is generally of service, especially when followed or preceded by active friction of the surface. The complaint in this stage is often quickly arrested by change of air, especially to a warm and dry situation, and more particularly to such a situation near the sea-coast. In the cases of infants at the breast, due attention should be paid to the states of health and of the milk of the nurses; and the treatment of the infant should be partly conducted by directing such means to the mother or nurse as will correct or improve this secretion. If this object cannot, or is not likely to be attained, a healthy nurse should be procured. If the complaint appear about or after the period of weaning, a sufficient quantity of ass's milk should be given daily; or the farinaceous articles of diet may be allowed with mutton, veal, or beef broth or tea; or warm jellies, or the yolk of an egg, may be taken once or twice daily.

36. *C.* In the *second or deformed stage*, the treatment should be in many respects the same as now described. The febrile irritation sometimes observed is still more remarkably the result of debility, conjoined with a morbid state of the blood, than in the first stage; and hence it ought not to interfere with the adoption of tonic and restorative medicines, which, when duly selected, will be the most efficient means of improving the various secretions and excretions. As in the former stage, so in this, a particular attention should be directed to the urine; and according to the states of this excretion, as well as of that from the skin, the decoction or infusion of cinchona may be given with the nitric or muriatic acid, or with both, or with the solution of potash, or with BRANDISH's alkaline solution, or with a preparation of ammonia and some warm aromatic. The sulphate of quina with sulphuric acid may be substituted for the above, especially when the skin is flabby and covered with perspiration, and if there be obvious anæmia, or even in other circumstances, the compound steel mixture may be given as above (§ 34), or the muriated tincture of iron in the infusion of calumba or quassia, or the iodide of iron in the sirup of sarza. This is the best preparation of iodine for this disease; although the iodide of potassium, taken in a tonic decoction or infusion, is often of service. In this stage, and not less so in the first, the cod-liver oil will be found very remarkably beneficial. I have prescribed it for every case of this complaint which I have seen since 1844. This oil is now prepared by the principal chemists in the metropolis from the fresh livers, and, thus prepared, it is a much less unpleasant medicine than in the state in which it was formerly procured. But of the several fish oils which may be prescribed—those of the cod, of the ling, of the skate, &c.—the oil from the liver of the torsk is certainly to be preferred, according to my observation; and it may be readily procured from the Shetland Isles, the only place in this kingdom where this fish is abundant.

37. In this stage more particularly several earthy preparations have been recommended with the view of furnishing the materials for the re-ossification of the bones. But as the disease is not so much the result of any deficiency of the elements of bone in the nutriment as in the failure of organic nervous or

vital energy, whereby these elements form and unite in the tissues during the processes of assimilation and nutrition, so it may be inferred that much less importance may be attributed to the administration of substances containing the constituents of bone than has been attached to it by some writers. Nevertheless, as several of these substances are useful in controlling certain of the symptoms, or in exciting the actions of assimilating organs, or in rousing organic nervous power, they may be given with advantage, especially lime-water charged with fixed air, magnesia similarly charged, or effervescing, or either of these conjoined with other means; the muriates or chlorides of lime, or of baryta in minute doses, and the phosphoric acid and certain of the phosphates; but it is doubtful whether these latter are beneficial or injurious in any stage of rickets. I have prescribed the chlorate of potash with other tonics in several instances with benefit; and when the liver is torpid, small doses of mercury with chalk and rhubarb; or, when the stools are frequent, acid, and yeasty, with the compound cretaceous powder, or with this powder and minute doses of opium. In these latter circumstances, the treatment above recommended when colliquative diarrhœa is present (§ 34) may be adopted, or powders may be given containing small doses of powdered cascarilla bark, cinnamon, and the carbonate or sulphate of iron. Most of the preparations of iron are beneficial in this stage, more especially those already mentioned, and the citrate of iron, the tartrate of iron and ammonia, and the vinum ferri, either of which are readily taken by children.

38. In this stage, the same *external means, diet, and regimen* as was prescribed for the first should be observed, varying each according to the effect and the peculiarities of the case. BOERHAAVE, VAN SWIETEN, and others have advised, and I am confident that the advice is judicious, that the utmost care should be taken to preserve the beds and bed-clothes clean, fresh, and perfectly dry; and to dust the surface of the body with tonic, astringent, and aromatic powders, especially when the perspirations are colliquative or weakening, and after warm salt-water bathing or sponging, or after the tepid salt-water douche on the back, loins, or limbs. In this state of the complaint, tepid chalybeate baths, variously medicated baths, and the thermal springs, recommended for chronic RHEUMATISM (§ 142), may be employed, as well as the Tunbridge waters, and the natural or factitious mineral waters recommended for that disease (§ 151). The child should be kept as much in the open air as the temperature and weather will permit, and in the sunshine. The utmost care ought to be taken that the position, either when lying, or when being lifted or held up, should be such as not to bend the bones from their natural direction. As the weight of the trunk and head is apt to bend the long bones, when the patient is allowed to stand or walk, either too early or in this stage; and as the weight of the head is liable to produce curvatures of the spine, when the patient is allowed to sit too long or too much, a recumbent or reclining position should be adopted at intervals, or for a considerable period during the day. A properly constructed couch or bed, on which the patient may lie either on the back or

on the abdomen, and use his arms and hands without difficulty, will prove of great benefit; and a recourse to frictions of the surface, especially over the back and abdomen, will at the same time be of service. Galvanic or magnetic electricity will be productive of much advantage in this disease, especially if aided by judicious treatment, regimen, and diet. When the legs are chiefly or only affected, standing or walking should not be allowed. In these cases, particularly when the curvatures are outward, I have often directed the legs to be tied together, or confined by a broad band, bandage, or handkerchief, so as to prevent walking, and to resist the curvatures, or press the flexures in a proper direction. For this and other kinds of curvature, various mechanical modes of treatment have been employed; and iron, or steel, or metal supports, or implements of different kinds and shapes, have been adopted. But these means, although sometimes of service in diminishing superincumbent pressure, or in resisting the disposition to flexure, are often injurious by preventing the muscular actions, and by embarrassing the circulation of the parts or limbs. Moreover, all metal supports are injurious, however carefully they may be covered, by conducting the animal heat, and the electricity always circulating through the frame, and favouring the passage of both into the surrounding air. When the complaint is either so severe or so extensive as to implicate the vertebral column or the parietes of the chest, or both the one and the other, the remarks I have offered on deformities of the CHEST, as well as those of the SPINE, are altogether applicable to those more extensive forms of rickets. (See CHEST AND SPINE).\*

39. II. RICKETS IN ADULTS.—SYNON.—*Mollities ossium*; *Osteomalacia*; *Malacosteon*, softening of the Bones in Adults, &c.—This complaint, although resembling in many respects the rickets of children, is in others a different disease, more especially as respects the changes which take place in the texture and fibrous membranes of the bones. It is more frequently observed in females than in males, and it oftener affects the pelvis and spine than other bones; but it may extend to nearly all the bones, such cases, however, being very rare. I can add nothing at this

place to what I have adduced respecting the causes, nature, and treatment of *mollities ossium*, or the softening of bones in adults, in the article OSSEOUS SYSTEM (§ 27, et seq.).

BIBLIOG. AND REFER.—D. Whistler, Dissert. inaug. de Morbo Puerili Anglorum, dicto "the Rickets," Lugd. Batav., 1645.—T. de Garancières, Flagellum Angliæ, seu Tabes Angliæ, numeris omnibus absoluta, 4to. London, 1647.—F. Glisson, Tractatus de Rachitide, sive Morbo Puerili, Rickets dicto, 8vo. Lond. 1650.—(12mo. La Haye, 1682. Editio cum Observat., G. Bate et A. Rugemortier).—Ibid., Translated into English by P. Armin, 12mo. Lond., 1751.—J. Mayow, Tractatus duo, alter de Respiratione, alter de Rachitide, 8vo. Leyd., 1671.—W. SURY, A Tract on the Rickets, 12mo. Oxf., 1635.—Chuden, Methodus novæ curandi Atrophium Infantum, et, per consequens, morbum sic dictum Anglicum, 8vo. Leipzig, 1726.—H. Boerhaave, Aphorismi de cognoscendis et curandis Morbis, &c. 1480.—Hoffmann, Med. Rat. System., t. iv., p. iv.—Storck, De Cicuta, l. ii., cas. 23, et seq.—J. P. Buchner, De Rachitide perfecta et imperfecta. Strasb., 1754; et in Halleri, Disput. Med. vol. vi.—J. M. North, De Rachitide, in Smellie's Theses, vol. iii.—G. B. Van Swieten, Commentaria in H. Boerhaavi, Aphorismos de cognosc. et curand. Morb., t. v., p. 584.—Lecacher de la Feutrie, Traité du Rakitis, ou l'Art de redresser les Enfants contrefaits, 8vo. Par., 1772.—W. Farrer, A particular Account of the Rickets in Children, 12mo. Lond., 1773.—W. Bromfield, Chirurgical Observations and Cases, 2 vols. Lond., 1773, vol. ii., p. 25.—G. V. Zeviani, Trattato della Cura di Bambini attaccati della Rachitide, 8vo. Nap., 1775.—G. Varardi, Della Rachitide, 8vo. Nap., 1775.—A. Magny, Mém. sur le Rakitis ou Maladie de la Colonne vertébrale, 8vo. Paris, 1780.—C. Pouteu, Mém. sur le Rakitis, et Spécialement sur la Gibbosité, sur les Causes de cette Maladie, et sur les Remèdes propres à la combattre, in Œuvres Posthumes, 8vo. Par., 1783, t. i., p. 537.—J. C. Isenflamm, Versuch einiger praktischen Anmerkungen ueber die Knochen, 8vo. Erlang., 1782.—Ranoe, in Acta Reg. Soc. Med. Haun., vol. iii., p. 377.—Lentin, Beyträge, b. iv., p. 341.—Truka de Krowitz, Historia Rachitidis omnium Ævi Observata Medica continens, 8vo. Viena, 1787.—J. F. L. Cappel, Versuch einer vollständigen Abhandlung über die s. g. Englische Krankheit, 8vo. Berl., 1787.—De Haen, Rat. Med. Pr., pars ix., cap. 6.—J. P. Frank, Discursus de Rachitide acuta et Adultorum, in Opuscul. Med. Argum., 8vo. Leipzig, 1790.—Sommering, De Morbis Vasorum absorbentium, p. 92.—Bonhomme, in Duncan's Annals of Medicine, vol. ii., p. 396. (Adolesce the Phosphas Soda internally and alkaline lotions externally).—J. Veirach, Abhandlung ueber die Rachitis, oder Englische Krankheit, 8vo. Stendal, 1794.—A. Portal, Observations sur la Nature et le Traitement du Rachitisme, &c., 8vo. Paris, 1797.—Darwin, Zoonomia, vol. ii.—L. Moncourrier, Essai sur le Rachitis ou Osteomalaxie, 8vo. Paris, 1803.—M. A. Salmade, Précis d'Observat. pratiques sur les Mal. de la Lymphe, ou Affections Scrophuleuses et Rachitiques, 8vo. Paris, 1830.—J. P. Jancea, Essai sur le Rachitis et l'Atrophie Mesentérique, 8vo. Paris, 1808.—Morel, Sur les Causes que contrib. à rendre Cachectiques et Rachitiques les Enfants de la Ville de Lille, Par., 1812.—F. Carrel, Considerazioni sulla Rachitide, 8vo. Padov., 1817.—Malfalcone, Diction. des Sciences Médicales, t. xl., vi., art. Rachitis.—Giuliani, Sul Rachitismo, 8vo. Naples, 1819.—G. W. Weatherhead, A Treatise on Infantile and Adult Rickets, 12mo. Lond., 1820.—T. Wilson, Lectures on the Bones, &c., 8vo. Lond., 1820.—D. A. G. Richter Die Specielle Therapie, b. v., p. 675.—Romberg, De Rachitide congenitale. Berol., 1827.—A. Monro, Elements of Anatomy, vol. i., p. 27.—J. G. Fieber, De Rachitide Morbique ex eadem oriundis Comm. Med., 4to. Paderb., 1821.—Otto, Seltene Beobachtung, sam. i., tab. i., fig. i.—M. Good, Study of Medicine, vol. iv., p. 250.—Lobstein, Anatomie Pathologique, t. i., p. 54. (The Thyms gland much enlarged in some rickety infants).—C. F. Satorius, Rachitidis congenitæ Observationes, 4to. Leipzig, 1826.—F. M. J. Siebold, Die Englischen Krankheit, 4to. Wurtzb., 1827.—Stanley, in Trans. of Medical and Chirurg. Soc. of London, vol. vii., p. 399.—A. Shaw, in ibid., vol. xvii., p. 434.—Rufz, Recherches sur le Rachitisme, &c., in Gazette Med. de Paris, 1834, p. 65.—J. Guérin, Mém. sur les Caractères Généraux du Rachitisme, 8vo. Paris, 1839; et Gaz. Méd. de Paris, 1839, p. 433, &c.—W. Cummin, Cyclop. of Pract. Med., vol. iii., p. 615.—Guerstein, Diction. de Médecine, 2d edit., art. Rachitisme. (See, for further notices of Rickets, PLOUGUET's Medicina Digesta, art. Rachitis).

[AM. BIBLIOG. AND REFER.—The Medical Repository, by Mitchell, Pascalks, and Akery, N. S., vol. New York, 1812-13.—Grass, Path. Anatomy.—Various Articles in Am. Jour. Med. Sciences; Bost. Med. and Surg. Jour.; New York Jour. Med. and Collat. Sciences; North Am. Med. and Surg. Jour., &c., &c.—Also, Am. Pract. of Med., by Dewees, Wood, and Hosack's Notes to Thomas, Stewart Candie Meigs, and Dewees, on Children.]

\* [With respect to the use of instruments it is proper to remark, that they should never be applied to the limbs in young children, as they can neither be necessary nor useful, and by their weight, and by preventing exercise, they must tend to increase the general debility, and thus do much injury. If used at all, they are to be deferred until the bones of the trunk possess some firmness, and then be made only in cases where the larger bones of the limbs, as well as those of the trunk, are hard enough not to be injured by their additional weight and the pressure necessarily made by them in correcting the distorted shape of the bones below. Incurvations of the spine are so frequent, and in females are productive of so much more serious consequences than mere deformity, that the commencement of such affection, in that sex particularly, should be carefully guarded against; and when it has begun, the mode of treatment intended to remove it should be most attentively considered, and, when approved of, should not be delayed. In this disease, we believe the incurvations of the spine will generally be lateral, while, from curves of bodies of the vertebrae, the bend is forward. Indeed, there may be several of these lateral curves, from the attempts made to support the weight more favourably by counteraction, giving to the spinal column the shape of the Italian f. I have, however, seen instances where the spine has been bent forward in this disease, accompanied by a posterior angular projection, as in curves, several examples of which I observed in the splendid Dupuytren Museum in Paris.]



**ROSE-RASH.**—**SYNON.**—*Roseola* (from *rosa*, a rose; or from the Italian *Rosso*, red), Willan, Bateman, &c. *Rossalia*, *Rossania*, Auct. *Exanthisma roseola*, Young. *Ecanthisis roseola*, Good. *Rubcola spuria*, Frank. *Rossellina*, Auct. *Roseole*, *Eruption*, *rosacée*, *Fausse rougeole*, Fr. *Rothlen*, *Rother hund*, Germ. *Red-rash*, *False Measles*.

**CLASSIF.**—3d. Order, Exanthemata; 4th. Genus, *Roseola*; Rose-coloured efflorescence (Willan). III. CLASS, III. ORDER (Author).

1. **DEFINIT.**—An eruption of small rose-coloured patches, of irregular forms, very slightly elevated, not papular, transient, and passing into a deeper roseale hue as they slowly disappear; the patches being either limited to a part, or to the limbs, or dispersed over the body, preceded and attended by slight fever, and non-infectious.

2. Under the term of *roseola*, modern writers have described several forms of eruption, which are chiefly symptomatic, and which, in appearance, are intermediate between erythema and urticaria, but more closely allied to the former than to any other eruption. Indeed, RAYER doubts as to the propriety of considering *roseola* as a distinct genus, and of not viewing it as a variety of erythema. Although approaching the appearances of the milder forms of measles and scarlatina, yet the severer, the specific and infectious characters of these, can suggest neither resemblance to, nor alliance with this eruption.

3. **I. DESCRIPTION.**—This eruption is generally preceded by slight fever and disorder of the digestive organs, for two, three, or even four days, rose-coloured patches then appearing either on parts or over the body. The patches are larger, paler, and less uniform than the spots of measles. They are also more distinct, and are separated from each other by intervals of healthy skin. They are attended by itching and tingling, and frequently disappear in twenty-four or thirty-six hours; but they sometimes subside, and return alternately for seven or eight days. The varieties of this eruption have been divided into the *idiopathic* and *symptomatic*—the latter accompanying or complicating other diseases; the former depending upon less obvious changes, although frequently proceeding from disorder of the secreting and excreting functions.

4. **i. *Roseola æstiva*** is the most severe of the more idiopathic varieties. It is preceded and attended by constitutional disorder, and generally appears first on the arms, face, and neck, spreading in the course of a day or two to the rest of the body, and causing itching and tingling. The patches present the appearances just described, and are at first of a lively red, but soon acquire a deeper tint. The pharynx often presents the same hue, and a roughness or dryness is felt on swallowing. The eruption continues fully out on the second day, but immediately afterward begins to decline; slight patches of a dull red often continue to the fourth day, and disappear entirely on the fifth, with the constitutional disturbance. Sometimes the efflorescence is limited to parts of the face and neck, or breast or shoulders, and is very slightly elevated. The patches itch very much, but are without the prickings or stinging of urticaria. They last at most a week;

but they occasionally appear and disappear again and again, either owing to violent moral affections, or to spiced food or heating beverages, or to no very manifest cause. The recession of the eruption is often attended by disorder of the digestive organs, or by headache, or by lassitude, which are relieved by the return of the efflorescence. This variety is met with in summer, most frequently in females of irritable temperament, and in delicate persons with an irritable state of the skin. It is often connected with disorder of the digestive canal, and in its external characters is intermediate between erythema and urticaria.

5. **ii. *Roseola autumnalis*** attacks children in the autumn. It appears in the shape of distinct circular or oval spots, of a dusky red colour, that gradually increase until they reach the size of a sixpence or shilling, and are observed chiefly on the arms and legs. The patches sometimes end in desquamation, are not attended by itching or tingling, and rarely continue longer than a week. This variety is evidently very closely allied to, if not a form of, erythema.

6. **iii. *Roseola annulata*** is attended in some cases by febrile symptoms, and is then of short duration; but in others there is little or no constitutional disturbance, and the eruption continues much longer. It appears nearly on every part of the body in the form of rose-coloured rings, of various sizes, the centres of which are of the natural hue of the skin. The rings at first are only a line or two in diameter; but they gradually enlarge to half an inch, or even more. They are less vivid in the morning; but they revive toward evening or night, and are attended with itehiness and tingling. As they vanish or fade, the stomach is disordered, and languor, pains in the limbs, and vertigo are complained of. In the chronic state of the eruption, the rings have a sallow or discoloured hue, and often recede and recur alternately, thus enduring for weeks, or even months. I agree in the opinion of M. RAYER, that this is merely a modification of *erythema annulatum*.

7. **iv. *Roseola infantilis*** presents spots of small size, and more closely grouped together, so that, looking only at the eruption, and without reference to other, especially the catarrhal symptoms, it may be mistaken for measles; but there is less roughness of the surface than in this latter. This mistake has, however, been often made. This variety of *roseola* attacks children during dentition, or during febrile affections or disorders of the digestive canal. It may occur only for a single night, or it may come and go alternately for several days. It may also appear in succession in different parts of the body. It is accompanied with febrile symptoms, and more or less disorder of the digestive organs. As respects the extent of eruption, and the sensations experienced, this variety closely resembles *roseola æstiva*.

8. **v. *Roseola variolosa*** is symptomatic of the natural and inoculated small-pox. M. RAYER states that it precedes the former more rarely than the latter, in which it is calculated to appear about once in fifteen cases, in the course of the second day of the eruptive fever, which corresponds with the ninth or tenth day after the inoculation. The efflorescence is first perceived on the arms, the breast and face, and on

the following day extends to the trunk and extremities. The long, irregular, and diffused patches leave numerous intervals between them. This variety of roseola is, in a few cases, characterized by an almost generally diffused efflorescence, slightly prominent in some points. It lasts about three days; on the second and third, the variolous pustules may be distinguished amid the roseola efflorescence, by their roundness, prominence, and hardness, and the whiteness of their summits. As soon as the pustules appear the roseola declines. This variety has been regarded as indicative of an eruption of distinct small-pox; but this is generally not the case, more especially when the roseola is of a deep or dusky tint, and the eruptive fever severe, the small-pox eruption becoming then confluent. The earlier writers mistook this variety of roseola for measles, and concluded that measles were sometimes converted into small-pox. This variety occurs chiefly in persons having a delicate and irritable skin, and is very closely allied to erythema.

9. vi. *Roseola vaccina* is sometimes observed in children from the eighth to the tenth day after the insertion of the vaccine virus. It appears as small confluent spots or patches, or is diffused like variolous roseola, commencing when the areola is formed around the vaccine vesicle, from whence it extends irregularly over the surface of the body. It is accompanied with frequency of the pulse, anxiety, and general disturbance; but it occurs less frequently than the variolous variety. It rarely continues longer than two or three days, affects chiefly those of a delicate and irritable skin, and, like the preceding, is intimately allied to erythema.

10. vii. *Roseola febrilis* and *R. miliaris* are merely modifications of erythema, and are, in rare instances only, observed in the course of fevers or accompany miliary vesicles, especially when those are attended by much perspiration. The patches are of a bright rose colour, of an oval shape, slightly prominent and smooth, and occur chiefly on the chest and insides of the arms. There is seldom itching. The patches usually disappear after two or three days.

11. viii. *Roseola arthritica* is the appearance of a rose-coloured rash in connexion with attacks of *gout* or *rheumatism*. This, however, is only a rare occurrence in this country, the efflorescence either preceding or attending the arthritic disease. Dr. SCHÖNLEIN has described this variety under the term *Pelliosis rheumatica*; and Dr. FUCHS states that the rheumatism which is thus complicated is endemic in Würzburg; that it attacks adult males most frequently during winter and spring, when the air is cold and moist; and that the eruption is then oftenest met with. The pains are usually experienced in the articulations and extremities; remit, change their place, are increased by cold, and diminished by the warmth of bed. Gastric symptoms, shiverings followed by febrile reaction, dry and hot skin, loss of appetite, and furred tongue, usher in the eruption, which appears on the second, third, or fourth day after the commencement of these symptoms, usually at first on the legs, and sometimes going no farther, but more frequently coming out on the arms and shoulders at the same time, very rarely on the trunk, and never on the face. The

eruption consists of small, distinct spots, varying from the size of a millet seed to that of a lentil, rounded, and of a deep red or violet red hue. The spots are not so numerous as the vesicles of miliaria, or as the spots of measles. Upon the occurrence of the eruption the fever ceases, and the rheumatic symptoms abate. The spots, whose numbers may be increased by successive crops, grow pale, and terminate by a slight furfuraceous desquamation. The arthritic roseola described by PETZOLD and HEMMING is similar to that just noticed; but the exanthematous rheumatic fever, which was epidemic in the West Indies in 1827 and 1828, and which was described by STEDMAN, NICHOLSON, and COCK, and supposed by RAYER to have been this variety of roseola, was more nearly allied, as regards the eruption, to scarlatina than to roseola; and it, moreover, appeared to have been, in the opinion of, and according to evidence by these and other writers, an infectious malady.

12. ix. *Rubeola cholericæ* is one of the forms of eruption which occasionally appears on the surface of the body during the consecutive fever of the *choleric pestilence*. This variety was first noticed by Dr. KEIR at Moscow, and more fully described by Dr. BABINGTON and MM. DUPLAY and RAYER. But the eruption observed in some cases of this pestilence does not always present the rubeolar characters; for I have observed it to possess, in different cases, more of the appearances of scarlatina, of measles, of nettle-rash, or erythema, and even of erysipelas, with the attendant tumefaction, than of roseola. M. RAYER describes the eruption as occurring most frequently in women, appearing first on the hands and arms, and extending to the neck, breast, abdomen, and lower extremities. At its commencement the spots were of an irregularly circular form, of a bright red colour, elevated above the surface, and but slightly itchy. They were most numerous on the hands, arms, and chest; and in some places they were crowded, or almost confluent, more especially on the chest, where they sometimes formed, by their confluence, patches as large as the hand, somewhat raised, and well defined. The eruption then presented a dirty pink or rose colour. About the sixth or seventh day the epidermis cracked, and was thrown off in large scales, where the eruption had existed. M. RAYER has seen this eruption complicated with inflammatory affection of the fauces and tonsils, and its disappearance followed by an aggravation of the symptoms, and sometimes even by death.

13. II. DIAGNOSIS.—a. Roseola, especially the varieties autumnalis and annulata, is distinguished with difficulty from *erythema*. In both kinds of eruption the patches are irregular and uniform in tint, but are generally smaller in roseola than in erythema. When the febrile disturbance of the former is well marked, and the patches of eruption dispersed over the body, then the diagnosis between it and the latter will not be difficult.—b. *Roseola æstiva* and *R. infantilis* most closely resemble the eruption of *measles*, for which they have been often mistaken; but the absence of catarrhal symptoms, the less degree of fever, the larger size and more irregular form of the patches, the progressive advance of the patches from the ex-



tremities to the trunk, and their uniform redness, distinguish these varieties from the punctiform appearance of the eruption of measles. The infectious and often epidemic nature of the latter should also be taken into account. SYDENHAM considered roseola to be a variety of measles, and several other writers believed that the former was only a spurious variety of the latter. HOFFMANN, BORSIERI, and SELLE pointed out the difference, and contended that roseola was an exanthem sui generis, and distinct from the other exanthemata.—*c.* Roseola may be distinguished from *scarlatina* by some of the circumstances just adduced; but more especially by the severity of the constitutional symptoms, and the state of the throat and tongue.—*d.* The light-coloured and raised spots and wheals of *urticaria* can hardly be mistaken for the more uniformly red patches of roseola. The itchings, prickings, and stings are much more severe and generally experienced in the former than in the latter.

14. III. CAUSES.—Roseola occurs chiefly in children, in females, and persons of a delicate constitution or irritable temperament. It is generally occasioned in infants and children by teething and irritation of the digestive canal. In adults it is most frequently caused by errors of diet or regimen, especially during summer and autumn; by hot spices; by overheating the body by exercise or exertion; by drinking cold fluids, or exposure to cold air when the body is perspiring; by eating shell-fish or other indigestible substances; by acid fruits, pickles, preserves, &c.; by heating or exciting beverages; and by whatever irritates the stomach or bowels. It may be symptomatic of a morbid state of the blood consequent upon impaired or interrupted secretion and excretion, especially from the skin, liver, or kidneys, and in females from the uterus.

15. IV. TREATMENT.—This eruption requires but little treatment beyond the removal of the causes, remote and pathological, as far as they may be manifest, and the due promotion of the secretions and excretions. When the eruption occurs in the course of acute or constitutional disease it should be viewed as critical, and be interfered with as little as possible. When it affects children, small doses of hydrargyrum euni creta, soda, and rhubarb, or simply the gray powder and magnesia, followed, after two or three doses, by a little castor oil, will generally be sufficient to remove it; and if the gums be hot or swollen, and the state or period of dentition suggest the operation, scarifying the gums will be of service. In some cases the liquor ammoniæ acetatis with spiritus ætheris nitrici, in camphor water, or in any other suitable vehicle, will be of farther benefit. In adults, after duly evacuating the bowels and promoting the alvine secretions, tonic infusions or decoctions, with nitre and alkaline subcarbonates, will be taken with immediate advantage. When there is much itching and tingling of the skin, a tepid or warm bath will give relief. When any of the excretions are disordered—whether the biliary, the intestinal, or the urinary—the treatment should be directed accordingly; and if menstruation is difficult, painful, or scanty, the biborate of soda may be given with an aloetic preparation and the compound galbanum pill, and when the eruption

has disappeared, the *misturi ferri composita*, or other preparations of iron, may be taken in such combinations as the peculiarities of the case will suggest. The more obviously symptomatic varieties of roseola should be treated according to the nature of the disease, of which it is merely a sympathetic, and generally a not very important manifestation, unless when it assumes a deep or dark hue, and then there is a manifest indication for the employment of tonic and restorative means. The diet should be light, chiefly farinaceous, and moderate, and the regimen in other respects antiphlogistic.

BIBLIOG. AND REFER.—*T. Sydenham*, Opera Med. sec. v., cap. i.—*F. Hoffmann*, Opera, vol. ii.—*Bursarius*, Institut. Med. Pract., vol. i.—*Selle*, Pyretologia, p. 171.—*Dimsdale*, Present Method of inoculating for the Small-pox, 8vo. Lond., 1767.—*Walker*, Inquiry into the Small-pox, 8vo. Edin., 1790, ch. 8.—*Pearson*, in Lond. Philosoph. Magazine, Jan., 1809.—*Bateman*, Pract. Synopsis, &c., by A. T. Thomson, p. 143.—*Fuchs*, in Bullet. des Sciences Méd. de Ferussac, t. xviii., p. 274.—*Babington*, in London Medical Gazette, vol. x., p. 578.—*Duplay*, in Gazette de Santé, 4to. Paris, 1832, p. 583. See, also, the works of RAYER, WILSON, PLUMBE, DENDY, CAZENAVE, and SCIEDEL, on Diseases of the Skin, referred to in other articles on Cutaneous Eruptions.

RUBEOLA.—SYNON. — *Morbilli scarlatinosi*, *Scarlatina morbillosa*, *Scarlatina hybrida*; *Morbilli*, *Scarlatina*, *Roseola*, *Rossania*, Auct. Var. *Rougeole*, *fausse rougeole*, Fr. *Rötheln*, *Feuermasern*, Germ. *Rosalia*, Ital. *Bastard measles*, *Bastard scarlatina*, *hybrid measles* or *scarlet fever*.

CLASSIF.—III. CLASS, III. ORDER (Author).

1. DEFIN.—Fever attended by coryza, redness and watering of the eyes, redness and soreness of the throat, pains in the head, back, and limbs, attended on the third or fourth day by the sudden and general eruption of a red efflorescence, which terminates about the tenth day in desquamation; the disease presenting the characters of measles and scarlet fever conjoined.

2. It is doubtful whether or not this should be viewed as a distinct or specific form of disease, or merely a variety of either measles or of scarlet fever, in which many of the characters of either the one or of the other predominate. I have, as will already appear, considered it as a hybrid, combining the chief characteristics of both these exanthemata. Since the days of the Arabian writers, until recent times, certain of the exanthematous fevers were considered as being merely modifications of the same disease; and it was only as late as the close of the last century that the distinctions between scarlet fever and measles were fully determined and generally recognised. More recently still, the differences have been more absolutely believed in than an extended and diversified experience warrants; for the medical writings of the 17th and 18th centuries contain the histories of epidemics, which, according to the descriptions they furnish, present characters which belong both to measles and to scarlet fever. The experience of physicians, also, that has been prolonged through a number of years, or been extended to different countries, has furnished instances of either sporadic cases or of prevailing and malignant epidemics, in which some, if not the majority, of the cases have presented the mixed features of measles and scarlatina. Even the notices of measles contained in the works of RHASES and other Arabian physicians furnish indications that this

form of disease, to which the term rubeola has been applied by myself and others, was actually known to them, they viewing it as a variety of measles; although they afford no distinct proofs of an acquaintance with scarlatina.

3. From the description which J. FRANK has given, it is evident that he misapplies the term rubeola to the more general and severe forms of roseola; and M. RAYER appears to entertain a similar opinion. Indeed, the French writers use the word rubeola either with reference to measles or to roseola, to the former especially, and have not recognised this hybrid malady, which has engaged the attention of so many German writers since the commencement of the present century, and whose existence clears up many of the difficulties which present themselves on reading the accounts of epidemics that have possessed the mixed characters of this malady. RICHTER and HILDENBRAND have defined rubeola to be a species between measles and scarlet fever. The latter writer states "that rubeola holds a place between measles and scarlet fever, the name being derived from its deep red colour. Authors differ much as to its nature, and have applied the term indiscriminately to measles and to other species of exanthem. Neither in France nor in Italy are these names appropriate to measles and to rubeola individually; *rougeole* in the former country, and *rosolia* in the latter, being applied indiscriminately to both." The Arabian writers viewed the eruption to which recent German writers have applied the name rubeola as a variety or modification of measles; and at a much later period, INGRASSIAS, FORESTUS, BALLONIUS, SENNERTUS, and others, have so confounded rubeola with scarlet fever, as that the accounts they have given are equally applicable to either species of disease, owing both to their short and imperfect descriptions, and to their arbitrary or indiscriminating use of the terms rubeola and scarlatina. Towards the close of the last century, SELLE described measles (*morbilli*) and rubeola as distinct affections, and during the commencement of the present century several German writers, especially ZIEGLER, REIL, FIELITZ, JAHN, HUFELAND, SCHAEFFER, FORMEY, FLEISCH, and HEIM, have given correct descriptions of epidemic rubeola.

4. I. DESCRIPTION.—(a) During the febrile stage, rubeola furnishes most of the catarrhal and febrile symptoms observed at the commencement of measles and scarlet fever: a defluxion from the nostrils, redness of the eyes, frontal headache, cough, watering of the eyes, great heat and dryness of the skin. Sometimes rheumatic pains, retchings, somnolence, dull headache, itching of the eyes, are observed to precede the eruption. Inflammatory redness of the fauces, tonsils, and pendulous velum of the palate, is never absent unless in the slightest cases. According to HEIM, patients emit a similar odour to that exhaled by those affected by scarlet fever.

5. (b) On the third or fourth day an eruption or exanthem breaks out over the whole body, as if at a single effort. It is, however, more scanty on the face; and it presents two forms, the one consisting of red spots, with irregular margins, varying from a line to a line and a half in diameter, and remaining distinct throughout their course; the other of red spots, of the

size of millet seeds, possessing no distinct margins, and becoming paler from the centre to the circumference. In mild cases the efflorescence is discrete; but in the severer cases it is much more abundant, and the spots larger, being about two lines in diameter; so that, on the second day of the eruption, it imparts to the whole surface a deep and almost equal red colour. Rubeola may now be readily mistaken for scarlatina; but it may be distinguished by the circumstance of the red spots being different from the scarlatinous exanthem, those pressed on by the finger becoming pale, but very quickly regaining their red hue from their centres to their circumferences. The general redness of rubeola, which equals that of scarlatina, fades after two days, the spots still remaining, and small miliary phlyctenæ appear and impart a roughness to the skin, and become filled with a little whitish and thick fluid. During the eruption the constitutional symptoms of the first stage are increased, and others often supervene, as hoarseness, or loss of voice, severe cough, oppression in the chest, vomiting, delirium, or convulsions in young subjects. After the eruption has come fully out, which takes place within twenty-four hours, it continues from six to ten days, retaining its assigned form, and the anginous and febrile symptoms undergo a marked diminution, unless when the affection of the throat becomes aggravated, which sometimes occurs.

6. (c.) About the tenth day from the commencement of the disease, the eruption becomes pale and disappears, *desquamation* supervening in proportion as this change proceeds, the anginous and febrile symptoms equally subsiding with the progress of desquamation. This change is often connected with a critical evacuation, as sweats, hypostatic urine, epistaxis, &c. Desquamation proceeds from the centre of each spot, the scales presenting a round or stellated appearance, and without any unpleasant sense of itching.

7. (d) In the most unfavourable cases, rubeola either terminates in death, owing to the same circumstances and changes as are observed in measles or scarlet fever, or occasions those visceral affections and their consequences, which are described in connexion with these maladies, and which often render the ultimate issue doubtful. Of these consecutive affections, the most frequent are those of the respiratory passages and lungs; of the glands, and of the digestive and urinary organs; and dropsy, especially anasarca. Rubeola, although frequently a mild, is sometimes a most severe or even dangerous malady, especially when it is epidemic. The epidemics described by SELLE presented a malignant character, and were fatal to many; and that noticed by FORMEY was of a putro-adyndamic kind, and was very fatal in Berlin.

8. II. NATURE.—Several authors believe rubeola to be a specific contagious disease, and therefore belonging to the class of pestilential fevers. Some, however, consider it a variety of one or other of the diseases which it so closely resembles—of either measles or scarlatina. HILDENBRAND states "that some consider it, with HUFELAND, SCHAEFFER, FORMEY, and HEIM, as a variety of scarlatina; and that KAPP, WICHMANN, and REIL view it rather as allied to measles; while UEBERLACHER, JAHN, and



FLEISCH believe that no essential difference exists between measles, rubeola, and scarlet fever." According to this last opinion, rubeola should be viewed as the connecting link between measles and scarlet fever. That rubeola, on the one hand, is very nearly allied to scarlatina, is shown by the affection of the throat, by the intense redness of the skin, by the mode of desquamation, by the peculiar odour proceeding from the patient, by the contemporary existence of both forms of exanthem in different persons in the same locality, and by the consecutive appearance of dropsy in some instances; but that rubeola, on the other hand, is equally allied to measles, is shown by the catarrhal symptoms—by the coryza, cough, watering of the eyes, and hoarseness; by the form of the segregated spots, forming a part of the eruption, and by the occasional prevalence of it at the same times and places as measles, as HILDENBRAND states that he had himself observed. Many writers farther allege, as proofs that rubeola is merely a variety of measles, the belief in scarlatina being a comparatively recent disease, while notices of rubeola are found in connexion with measles in the writings of the Arabian physicians. I believe that rubeola is not a disease, *sui generis*, nor yet a modification merely of either measles or of scarlet fever, but a hybrid of these two fevers, presenting sometimes a predominance of the symptoms characteristic of the one, at other times of those distinguishing the other, and not infrequently an equal combination of the features of both. In this opinion I differ little from that held by HILDENBRAND. REIL believed rubeola to be a species of exanthem between measles and scarlet fever; while MARCUS considered it to hold the same relation to both these exanthems as exists between true and spurious small-pox. But it may be asked, to what cause can this hybrid state of disease be imputed? Can the copulation of measles and scarlet fever be assigned to epidemic states of the air, or epidemic constitution, or to the conditions of season or weather? Or may it be considered an accidental combination, or a coincident appearance of both maladies, in an epidemic form, at the same time and among the same population, the characteristic features of either malady predominating according to the predisposition, constitution, &c., of the individuals affected? This latter view appears by no means unreasonable, although the dogma of JOHN HUNTER, so long believed in, but now disproved, that two diseases cannot exist in the human economy at one time, may still appear to some, but without sufficient reason, to militate against it. (See MEASLES, § 48.)

9. III. TREATMENT.—The treatment of rubeola must entirely depend upon the type or character it assumes, either sporadically or epidemically; and hence the principles of treatment assigned to such types of the diseases of which it is the hybrid—of measles and of scarlet fever—should guide the physician in his treatment of this mixed malady. When the disease is mild, then our means should also be mild, and be directed chiefly to the promotion of the secretions and excretions, and consist chiefly of cooling diaphoretics and aperients, and of diuretics; avoiding at the same time all causes, both intrinsic and extrinsic, that may

favour the supervention of internal complications or of unfavourable sequela, and restoring and promoting the functions of the skin by external warmth and other means which circumstances may require. When the type of the disease is truly inflammatory, then antiphlogistic measures should be prescribed, but with the recollection that, however inflammatory it may appear, it is generally characterized by more or less asthenia, and by an obviously morbid state of the blood, pathological conditions requiring much circumspection as well as decision in the choice and administration of our means of cure. If, on the other hand, the disease assumes adynamic, nervous, septic, or putrid characters—features of more or less malignity—as observed in some of the epidemics which have appeared on the Continent, remedies of a tonic, restorative, astringent, stimulant, antiseptic, or alterative nature should be prescribed; combining, varying, or adapting each and several of these to the pathological conditions of individual cases, as I have attempted to illustrate when discussing the treatment of MEASLES and of SCARLET FEVER.

BIBLIOT. AND REFER.—See the works of *Rhases, Ingassias, Sennert, Baillon, &c.*—Orlow, *Programma de Rubeolarum et Morbillorum Diserimine*. Königsb., 1758.—*G. F. A. Ziegler*, *Beobachtungen aus der Arzneywissenschaft*, &c. Leips., 1788, p. 81.—*Selle*, *Medicina Clinica*, 2d ed., p. 171.—*Jahn*, *Neues System d. Kinderkrankh.*, p. 446.—*Fleisch*, *Handb. ueb. d. Krankh. der Kinder*, b. ii., p. 200.—*D. A. G. Richter*, *Die Specielle Therapie*, &c., b. ii., p. 517.—*Formey*, *Topographie von Berlin*, 1796.—*Reil*, *Memorab. Clinica*, vol. ii., p. 12.—*Strohmayer*, *Dissert. de Rubeolarum et Morbillorum Differentia*. Götting., 1806.—*Hufeland*, *Ueb. die Röheln*, in *S. Journ.*, 1811, st. 6, p. 15.—*Fieitz*, *Beobacht. einer Röheln-epidemie*, in *ibid.*, b. iv., st. 2, p. 199.—*Heim*, *Bemerk. über die Verschiedenheit des Scharlachs, der Röheln u. Masern*, vorzüglich in diagnostischer Hinsicht, in *ibid.*, 1812, b. vii., st. 3, p. 60.—*P. ab Hagen*, *Dissert. de Rubeolis*. Götting., 1812.—*J. J. Schneider*, *Beobacht. einer Röheln-epidemie*, in *Adversaria*, &c., b. i., p. 180–203.—*V. N. ab Hildenbrand*, *Institutiones Practico-Medicæ*, &c., t. iv., p. 412.—*Gallisch*, *Tractat. de Rubeola*. Wien, 1823.—*D. Wömpner*, *Dissert. de Rubeola*. Rostock, 1827.—*F. Krausse*, *Dissert. de Rubeolis*. Berl., 1828.—*Wagner*, *Die Röheln als für sich bestechende Krankheit*, in *Heckers*, *Litterar. Annalen*, 1829, Hft. 4, p. 420.—*M. E. A. Naumann*, *Handbuch der Medicinischen Klinik*, b. iii., abth. i., p. 818.

[AM. BIBLIOT. AND REFER.—*W. W. Gerhard*, *Lectures on Rubeola*, in *Phil. Med. Examiner*, vol. i., p. 162.—*N. Chapman*, *Lectures on Rubeola*, in *ibid.*, vol. i., p. 345, 361.—*W. W. Gerhard*, *Am. Journ. Med. Sci.*, vol. xiii., p. 20. Cases of Rubeola followed by Death.—*Stewart, Condie, Meigs, Eberle*, and *Devees*, *On Diseases of Children*.—*Am. Jour. Med. Sci.*—*Boston Med. and Surg. Jour.*—*Med. Repository*.—*New York Journ. of Med. and Collat. Sciences*.—*Am. Med. Recorder*.—*New Orleans Med. and Surgical Jour.*—*Med. Examiner*.—*Western Jour. Med. Sci.*, &c.]

RUMINATION.—SYNON.—*Ruminatio humana*; *Human rumination*; *Merycismus* (μυρικήσις, *ruminatio*); *Mérycisme*, Fr. *Das Wiederkauen*, Germ.

CLASSIF.—I. CLASS, I. ORDER (Author).

1. DEFIN.—*The regurgitation of food which had passed into the stomach, and which is remasticated and again swallowed.*

2. This affection is of rare occurrence, especially in a simple and complete form. It is much less rare as an occasional, incomplete, and associated occurrence, and in alliance with some form or other of dyspepsia.

3. I. HISTORY OF.—It is difficult to determine whether or not this affection—for it may not be called a disease, seeing that it is attended by considerable enjoyment—was known to the ancients. When we consider the habits and luxurious indulgences of the civilized and wealthy

among the Greeks and Romans, and the means which the most notorious gourmands, in their respective eras of luxury, employed to unload the stomach in order that a second gratification of the palate should be entered upon, it may be inferred that this affection would have been viewed as a source of supreme gratification, and as one to be indulged in or cultivated, and not one to be got rid of. And probably the enjoyment would not have been marred even if a similar opinion had been entertained by their physicians to that promulgated by honest FABRICIUS AB AQUAPENDENTE, who believed that the human subjects of this affection are endowed with a double stomach, and that other bestial endowments might, in process of time, appear in them or in their descendants.

4. GALEN must have had ample opportunities of observation among the cases of indigestion he could not fail of having met with in the luxurious but peaceful court of the ANTONINES, yet he does not furnish us with a single instance of rumination; and amid the various stomach-aches and affections of MARCUS AURELIUS, which both puzzled the brain and caused the anxiety of this immortal physician to such a degree as to make him afraid that a glass of spiced wine might be too hazardous a remedy for the good emperor, the faculty of regurgitating his food for a second mastication appears not to have entered into the number; unless we suppose that, this not being considered a disease, the interference of GALEN was not required, upon the ground that matters of taste, in the animal as well as in the mental application of the word, give a heightened enjoyment by their deliberate rumination.

5. FABRICIUS has furnished two of the earliest instances of human rumination on record. The first was that of a nobleman, in whom it generally took place an hour after his meals, which, whether solid or fluid, were always returned to undergo a second and more deliberate mastication. FABRICIUS has thought it just to mention that the father of this person had a horn growing from his forehead; and with great good faith has added, "*ex quo forte datur nobis intelligi, parentis semen aliquam habuisse cum cornu geris animalibus, neque mirum fuisse genitum filium simile, quid a parente contraxisse*"—that, although the son did not inherit his father's horns, yet he possessed the accompanying faculty of rumination.

6. The second instance with which honest FABRICIUS has favoured us was in a monk, who, although possessed of a most ravenous appetite, died of marasmus. This monk combined the bestial attributes of both the father and son just mentioned; for, in addition to his faculty of rumination, he had his forehead adorned with two horns, which, in a monk, he avers was the more singular. JOHN BURGOWER, who visited this monk in the company of JOSEPH PREVOT and THOMAS MINADOUS, wrote a volume on this very illustrious person, and furnished FABRICIUS with the particulars which are inserted in his works. BURGOWER also adds that the brother of this monk was also adorned with two budding horns, "*duorum cornuum vestigia gestasse*," as a striking feature of family likeness; or, as this author will have it, "*quod enim fratris erat, id monacho ruminanti simul gratis impertiunt.*" But this interesting

individual did not ruminate, unhappily for the argument of THOMAS BARTHOLIN, who, from these two instances, has hastened to the conclusion, with true medical logic, and with faithful dependence upon the obvious analogy of the "*cornu geræ pecudes*," that all human ruminants are adorned with horns; and has also averred, with equal truth, that they will be found, on dissection, to be possessed of a double stomach. This interesting doctrine cost the laborious CONRAD PYER no small trouble to refute; and he has concluded, in his turn, taking his honour to witness (for he has treated the subject with great gravity) that this did not agree with his experience, for there are many horned individuals who do not ruminate.

7. DANIEL SENNERT has furnished an account of a man of forty who possessed the ruminating faculty from a child. He found no difficulty in accounting for the existence of this affection in that instance, when he learned that this individual, when an infant, had lost his mother, and been fed during his nonage with the milk warm from a cow. SENNERT accordingly, more soberly than legitimately, concludes, that he sucked it in with his nurse's milk: "*Quomobrem deficiente educatione, cum orbus infans, et institutionis humanæ inops nutricem vaccam observaverit tuereturque attentius, ipse ruminationi paulatim assuevit, sodalitiū familiaritate degenerans!*" &c. PHILIP SALMUTH has adduced a case of human rumination which he observed, and stated a fact illustrative of its cause, that is met with in most human ruminants. The subject of the affection ate ravenously, swallowed his food after very imperfect mastication, and ruminated about a quarter of an hour after leaving table.

8. JOSEPH FABER LYNCEUS has immortalized the highly respectable ANTHONY RECCHI, who, dinner being concluded, and seated over his cups with his friends, was always obliged to retire, about half an hour after the meal, into a remote corner of the apartment, and there ruminated the ingesta, undisturbedly, and as quickly as possible; which having done, he enjoyed uninterruptedly the society of his friends. "Having been asked how he became obliged to indulge this propensity, he answered that from a boy he had been subject to acid eructations; and that, after having reached his thirtieth year, he found it impossible to resist admitting into his mouth the food that constantly regurgitated from his stomach. Being farther interrogated whether the second mastication of his food afforded him any gratification, 'Indeed,' he replied, 'it is sweeter than honey, and accompanied with a more delightful relish.' This affection might be said to have been in the family of the distinguished RECCHI; for he was blessed with two grown sons, the elder of whom was also endowed with this delightful faculty, but had it more under control than the father, as he could prevent it altogether when in company. The younger son had not then come to its possession."

9. G. H. VELSCH has recorded the case of an inhabitant of London, who, in the fortieth year of his age, and of sound health, always returned his food to undergo a more deliberate mastication. Rumination always took place in this person from one to two hours after a meal; and even at the second hour it still preserved



a pleasant taste, and was without any degree of acidity. This, however, was not the case with a young woman seen by DANIEL LUDOVIC, for she returned her food with insufficient pleasure, and the regurgitated matters were often possessed of a disagreeable taste. He states that bitters and stomachic purgatives did not remove this affection, which, however, was not always regular in its occurrence; and although emetics and cathartics prevented it for a short time, it soon returned. With all due respect for DANIEL LUDOVIC, I consider this affection more allied to apepsy than to rumination, or as a state intermediate between them.

10. JOSEPH CONRAD PYER has recorded three cases of this affection, one of the subjects of which was idiotic, one was a female, and the three were rusties; and he sagely endeavours to prove, from the circumstance of these persons having been rusties and cowherds, that the frequent sight of the ruminating process had impressed their brains with a similar propensity, which, although at first imperceptible, had nevertheless ripened into maturity. SLARE has recorded, in the *Philosophical Transactions*, at a time when the Royal Society was less fastidious as to the publication of papers, the case of a Bristol man who ruminated not only the more solid ingesta, but also fluids, as milk and soups. But, amid such imperfect information as philosophers in those days were quite satisfied with, I find it stated that his victuals always seemed to descend imperfectly into the stomach, and to lie in the lower part of the throat. However, the portion first taken was the first ruminated. Nevertheless, I suspect that this case was one of sacculated œsophagus, similar to those which have been more recently published by my friend WORTHINGTON and others.

11. More recently, several cases of human rumination have been recorded by MM. TARRES, PERCY, LAURENT, CULLERIER, and still more recently by M. RICHE, SCHMIDTMANN, and myself. The first case which came under my observation was treated in 1819 and 1820, and the history of it fully detailed in the forty-fifth volume of the *London and Physical Journal*. The subject of it is still (1848) alive and in good health. Since the publication of that case, two others, one of them in a medical man, have been treated by me; and I have had reason to believe that instances of partial or occasional rumination are not so rare in the human subject as is generally supposed.

12. II. SYMPTOMS.—The cases of this affection which I have seen were of several years' duration before they came under my care. The affection was stated to have been partial or occasional at first, and had become more constant and complete by neglect and indulgence, and by the habit of quick or voracious eating. The symptoms of the fully developed case, which continued for some time under my care, were as follows: The patient was a married man of about twenty-seven or twenty-eight years of age. Rumination took place after all his principal meals. His appetite was always good, and his food was taken in large mouthfuls, was masticated hastily and imperfectly, and swallowed eagerly, chiefly in order to resume his avocations. There was no thirst. His bowels were habitually costive. His sleep was sound.

13. Usually rumination commenced from a quarter of an hour to an hour after a meal. At its commencement, a sense of fullness was felt at the cardia, followed by a fuller inspiration than usual. As soon as inspiration was completed, a bolus of the unchanged food rose rapidly from the stomach, during the expiratory act, or preceding this act; and so rapidly did expiration succeed to regurgitation of the alimentary bolus, that the latter appeared as part of the expiratory act. The ruminating process was never accompanied at any time with any degree of nausea, nor with pain or disagreeable sensation. The returned alimentary bolus was attended by no unpleasant flavour, was in no degree acidulous, was equally agreeable, and was masticated with greater pleasure and much more deliberately than when first taken.

14. The whole of the food taken at any one meal was not thus returned for remastication, only the part which had undergone this process insufficiently, and which often constituted the greater part of the aliment. That taken at the commencement of a meal was generally first disgorged; but this order was sometimes not observed, much depending upon the articles partaken of, and their comparative degrees of comminution and digestibility. The more fluid portions of a meal were not always returned unless along with the more solid or imperfectly masticated parts; and it was often then observed, if a considerable time had elapsed from their deglutition, that the former was more or less acid, while the latter possessed the same taste and flavour as when first swallowed. When the stomach was distended suddenly by a large meal, the fluid as well as the more solid contents were generally regurgitated, and again swallowed after more or less inastication.

15. In this case, as well as in the others, this affection appeared to have been partially under the control of the will; for, although it sometimes took place when the mind was merely unconscious of the process, yet it never occurred when the individual was sound asleep. If sleep supervened soon after a meal, either it was broken by the occurrence of the ruminating process, or it prevented this process, particularly if it continued for some time. In this latter case, acrid eructations, flatulence, &c., took place, owing to the gastric juices being insufficient for the imperfectly masticated ingesta. Sometimes, when the ruminating process was thus prevented, or voluntarily suppressed, the ingesta were not returned until after some hours; but were then acid, often acrid and bitter, and were occasionally regurgitated in so large a quantity as to fill, or even more than fill, the mouth. This, however, was unattended by cardialgia, or gastrodynia, or by any feeling of nausea; and even these disgorged matters were attempted to be remasticated, although more generally thrown out on account of their disagreeable taste. In a case related by M. CULLERIER, the subject of it ruminated only when he was urgently pressed by his occupations, and ate his meals in a few minutes, with little mastication. On becoming more at leisure, and being able to pass an hour at table, he ceased to ruminate. Human rumination is to a certain degree an involuntary act, and yet the individual has certainly the pow-

er of hastening or suspending it to a certain extent.\*

16. *Dissections* have not thrown any light on this affection. Nor can it be expected that, even in the event of sudden death taking place in a ruminating subject, any very manifest alteration of structure would be found. FABRICIUS and BARTHOLINUS were confident of finding two stomachs at least in ruminating persons, from the analogy of the cornuted animals! PYER and MORGAGNI justly ridiculed the idea, and argued that there were animals which ruminated without a double stomach. The first instance in which inspection after death was made was in the case of the monk already alluded to. It was made by FRANCIS PLAZZONI, and is related by RHODIUS and BONET, the former of whom states: "Monachus cum voluptate eibum ruminavit. Medici brutorum more genuino ventriculo prædium putabant. Ipso defuncto, F. PLAZZONUS œsophagum reperit undique carnosum instar musculi, reliquis universi corporis partibus se recte habentibus." The physicians of the seventeenth century were not much enlightened by the opening of this monk, but their dreams of the existence of two stomachs were henceforth dissipated. J. P. FRANK mentions the case of an old hypochondriacal pharmacist who ruminated for forty years. He died greatly emaciated, and on dissection the pancreas was found scirrhus. In a case noticed by BONET, the only change observed after death was the very great size of the stomach and the rough or corrugated state of its villous surface.

17. III. CAUSES.—The *predisposing causes* of this affection in man are manifestly debility of the stomach with increased organic sensibility, and an insufficient secretion of the gastric juices for the quantity and state of the ingesta. The *exciting cause* is manifestly an imperfectly divided and insufficiently masticated and insalivated condition of the more solid food, together with a too rapid distention of the stomach. Probably the former would be insufficient to excite the affection without the latter, otherwise the numerous persons who are incapable sufficiently to masticate their food, owing to the state or the want of their teeth, would be much more liable to this disorder than we find to be the case. It is not unlikely that more depends upon the state of the organic sensibility and contractility of the stomach, especially at its cardiac opening, than upon the other conditions singly now mentioned. It is most probable that, as the more digested and digestible matters are propelled towards the pylorus, the least divided or masticated aliments irritate the cardia, and thus, by a reflex action, originating in the stomach, or rather in this region of the stomach only, regurgitate or propel a portion of the unmasticated contents upward and along the œsophagus to the mouth, for

their better preparation. As digestion commences and proceeds and the stomach contracts, the clyme or more altered parts are propelled to the pylorus, and the least prepared or least soluble parts are thereby placed nearer the cardia, whence they are simply regurgitated and remasticated, or where they occasion, according to the states of the organ, or the states of their preparation in the mouth, or their nature, if not rumination, partial or complete, acrid eructations or cardialgia, or any other form of indigestion.

18. IV. TREATMENT.—This affection should be treated simply as a form of indigestion, due attention being paid to the state of the biliary secretions, and, indeed, to all the secretions and excretions. But the means of cure will frequently fail if the patient neglect to take his meals deliberately, and masticate his food sufficiently, or if he take more than his digestive powers can duly dispose of. In the cases which occurred in my practice, a grain of ipecacuanha, with a sufficient quantity of the pilula aloës cum myrrha, or of the extractum aloës purif., to preserve the bowels open, was given twice daily, and a tonic draught about an hour before dinner; or only the pills prescribed in the Appendix (*Form* 558). These were aided by warm salt-water bathing, followed by frictions of the surface; by cold sea-bathing, or the cold shower-bath; by attention to diet, by eating in moderation, and by masticating deliberately. In other respects, and according to the associations which this affection may present in practice, the treatment is altogether the same as is recommended in the article INDIGESTION.\*

BIBLIOG. AND REFER.—*Fabricius ab Aquapendente*, Op. Anat. Physiол., Pars ii, p. 137.—*J. Burgover*, Dissert. de Ruminacione humana. Basil, 1626.—*Horstius*, Opera, t. ii, p. 162, 167.—*Civius Rhodiginus*, Antig. Lect. i, xi, cap. 16.—*Delrio*, Disquit. Mag., l. ii, quest. 14.—*Rhodius*, Cent. ii, obs. 39.—*Genathius*, Dissert., De, vii, No. 3.—*Salmuth*, Cene. i, obs. 100.—*T. Bartholinus*, De Unicornu, cap. ii; et Anatom. Hist., cent. i, No. 39.—*Peyer*, Merycologia, l. i, cap. 6, p. 62, 220.—*D. Sennert*, Med. Pract. l. iii, p. 1, sect. 11.—*J. F. Lynceus*, Exposit. Histor. Nardi Antonii Recchi, p. 630.—*G. H. Nelschius*, Observat. Med., Episag. xxxvi.—*D. Ludovici*, in Ephemerides Nat. Curios., Decur. i, Anno ix. and x., Observ. 160.—*Slare*, in Philosoph. Transac., No. 193.—*Schurig*, Chyologia, p. 381.—*Bauhinus*, De Hieromorphoditis, l. i, cap. 10.—*Derner*, Æger Ruminans cum Asthmate Hypoch., &c. Halle, 1709.—*Bonet*, Sepulchretum, &c., l. iii, l. v, obs. 9–10.—*Blankard*, Collect. Med. Phys., cent. v, No. 38.—*Morgagni*, De Sed. et Caus. Morb., epist. xxix., art. 4.—*Ackord*, Diss. de Ruminacione Humana, Singulari Casu illustrata. Halæ, 1783.—*Sauvages*, Nosolog. Methodica, vol. ii, p. 339.—*Goldhagen*, Diss. de Rumin. Hum. Halæ, 1783; in *Doering's* Tracts, vol. i, p. 100.—*Meyer*, Dissert. de Rumin. Hum. Erl., 1792.—*Buzio*, Dissert. enarrans Ruminacionis humanæ Casum. Gocff., n. 1802.—*J. P. Frank*, De Curandis Hominum Morbis, l. v., pars ii, p. 551.—*Vogel*, Anthropologische und Medic. Erfahrungen, No. iii.—*Rouviere*, in Journ. de Med. Contin., t. xiii, p. 361.—Et Annales de Méd. de Montpellier, 1807.—*Hogenhies*, in Horn, Archiv., Sept., 1809, p. 107.—*Tarbes*, Journ. Génér. de Médecine, No. 286.—*Percy et Laurent*, in

\* [Three cases of this rare affection have come under our knowledge, one of which was connected with a sacculated œsophagus. The others corresponded exactly with the cases above described, the food having been returned to the mouth a short time after eating, when it was remasticated and reswallowed without farther difficulty. The habit, for it was partly, at least, a voluntary act, seemed to have been brought on, in both cases, by swallowing the food hastily and without chewing. There was no cardialgia or nausea, nor was there any gastrodynia in either case.]

\* SAUVAGES adduces an interesting case of human rumination which occurred in a rustic, who accelerated and promoted the ruminating process, or, rather, the regurgitation of his food for remastication, by pressure over the stomach. After thus promoting at will this process, and resorting to it for several years without any detriment to his health, his confessor admonished him against it. But rumination continuing, notwithstanding the means employed to promote it were laid aside, he was told to reject the regurgitated food. He did so for a fortnight, but he became so debilitated that he had recourse to medical aid. His physician advised him to instantly re-swallow the substances which were regurgitated, without submitting them to a second mastication, and prescribed for him tonics, stomachics, and aperients, and after a few days he was freed from his rumination and all his ailments.



Diet. des Sciences Médicales, t. xxxii., p. 526, 8vo. Paris, 1829.—*Toggia*, Della Ruminazione e Digestione dei Ruminante. 8vo. Torino, 1819.—*J. Copland*, History of a Case of Human Ruminatation, with an inquiry into the nature of the process, and into some of the Phenomena of Digestion; and with an historical relation of similar affections; in *Lond. Med. and Physical Journ.*, vol. xiv., p. 362, 8vo, 1821.—*L. J. Schmidtmaun*, Summa Observationum Medicarum ex Praxi Clinica Tringinta Annorum depromtarum, &c., vol. iii., cap. viii., p. 182. Berol., 1826.—*M. Riche*, in *Archives Génér. de Médecine*, t. xvii., p. 266.

**RUPIA.**—**SYNON.**—*Ulcus atonicum*, (*Ecmphlysis Rhypia* (Good). *Rhypparia*; *Rupia* (from *ῥῆπος*, fith). *Phlyzaica*, Alibert. *Atonic ulcer*.

**CLASSIF.**—**Order** 6th. Vesicular eruptions. **Genus** 4th. Offensive vesicular eruption (Willan and Bateman). **IV. CLASS, IV. ORDER (Author).**

**1. DEFIN.**—*An eruption of small, flattened, and distinct bullæ, surrounded by inflamed areolæ, filled with a serous, puriform, sanious, or dark bloody fluid, and followed by thick, prominent, dark-coloured scabs, covering unhealthy ulcers.*

**2. I. DESCRIPTION.**—This eruption is observed chiefly in delicate, debilitated, or cachectic constitutions. It is so closely allied to *Pemphigus* as to justify the arrangement of both as species of the same genus. Most of the recent writers on diseases of the skin have described three varieties of rupia, namely, *R. simplex*, *R. prominens*, and *R. escharotica*.

**3. i. *Rupia simplex*** commonly appears on the legs, sometimes on the loins or thighs, and seldom on other parts. It commences with one or more flattened, isolated bullæ, varying from the size of a sixpence to that of a shilling, that contain at first a transparent serous fluid, which soon becomes turbid and purulent. This fluid grows consistent, and is finally changed into scabs of a chocolate colour, thicker in their centres than in their circumferences, the outer layer being continuous with the epidermis, which appears detached at the margins by the fluid underneath. Under the scabs, which are detached within a few days, the skin is found excoriated or ulcerated superficially. The sore, if left to itself, either heals up, or is more frequently covered by another scab, which is thrown off at a later period; and thus the process may be repeated for several times. When the ulcer heals, the part retains, for a very long time, a livid or deep red hue.

**4. ii. *Rupia prominens*** presents larger bullæ than the preceding, and the scales are thicker, and the ulceration underneath is deeper. Each bulla is preceded by a circular red spot, over which the cuticle is detached and slowly raised by a dark thick fluid, which soon concretes into a scab, the thickness and size of which increase for some days afterward. The circumference of the scab is surrounded by a reddish border, a few lines in breadth, the epidermis of which is raised by a serous fluid, which forms a new incrustation, adding to the extent of that already produced. The areola also increases in breadth around the base of the scab, which itself increases in breadth and thickness during three or four, or even during seven or eight days. When the diameter of the scale is large it resembles the outer surface of the convex shell of an oyster; but in this variety the incrustation projects in the same degree as it spreads, becomes conical, and resembles the shell of a limpet. The scab adheres firmly, and generally requires emollient applications to fa-

cilitate its removal. When it is removed, the surface underneath the scab appears ulcerated more or less in extent and depth. If the part remain exposed to the air, either a new crust or scab is formed, or ulceration extends more deeply and spreads until it approaches the breadth of a half-crown or crown-piece. The ulcerated surface is pale and readily bleeds. The atonic ulcers thus produced heal very slowly; and the cicatrices which they leave retain for a long time a brownish livid hue, and are liable to break open afresh.

**5. iii. *Rupia escharotica*** occurs chiefly in cachectic children and infants, and occasionally in aged persons, or in adults who have suffered severely from chronic rheumatism or constitutional syphilis. It commonly appears on the legs, the thighs, the scrotum, the abdomen, the upper part of the chest and neck, but it rarely is seen on the upper extremities. This variety, in infants, is almost, if not altogether, identical with *pemphigus infantilis* (see *PEMPHIGUS*, § 9). It begins by one or two red and livid spots, over which the cuticle is soon raised, by the effusion underneath it, of a serous or sero-sanguinolent fluid. The bullæ thus formed go on increasing in an irregular manner; the serum they contain becomes turbid, and of a blackish hue; they afterward break, and the dermis, left exposed, appears ulcerated, softened or gangrenous in different points. A bloody and an offensive sanies bathes the surface of the sore, the edges of which are livid, but not very painful. In infants the bullæ do not generally reach so large a size as those in adults, but they follow each other in greater numbers; the sores becoming painful, causing fever and sleeplessness, and even fatal exhaustion in the course of two or three weeks. In adults, this variety sometimes acquire the dimensions of rupia prominens, and small portions of skin and cellular substance often sphacelate, and are detached slowly from the ulcerated surfaces. In every instance cicatrization is tardy, restoration being often arrested or stationary for a time. This variety is always attended by marked constitutional disturbance.

**6. *Rupia* is sometimes complicated.** *R. simplex* is frequently associated with *ecthyma*, or with *scabies*. The other varieties are occasionally complicated with *purpura*, or with the cachexia produced by very chronic rheumatism, by constitutional syphilis, and by long-neglected disorder of the digestive, assimilating, and excreting organs.

**7. II. DIAGNOSIS.**—*Rupia* can be confounded only with *ecthyma* and *pemphigus*.—(a) *Ecthyma* differs from rupia in being a pustular eruption from its first appearance. The highly inflamed areola surrounding the pustules, and the hardness, small size, the embedded position, and the closer adherence of the scabs, farther distinguish *ecthyma*.—(b) *Rupia* is distinguished from *pemphigus* by the smaller size and flatness of the bullæ; by the turbid and sanguinolent contents, as contrasted with the usually limpid and transparent fluid of *pemphigus*; by the thick, rugous, and imbricated scabs; and by the ulcerations of various extent and depth.

**8. III. CAUSES.**—Scrofulous children, the offspring of debilitated, drunken, or dissipated parents, and persons who have been weakened or exhausted by depressing causes, by sickness,

and unwholesome food, are the most frequently the subjects of this eruption. It appears, especially during the winter, among the insufficiently clothed and fed, and among those who neglect personal cleanliness, and who live in low cellars, or in close, crowded, and ill-ventilated places or apartments. It is also liable to occur during convalescence from small-pox, scarlatina, measles, &c.; and in both young and aged, who are the subjects of some degree of some anæmia in connexion with impaired excretion. Its association with cachexia, especially as an effect of this state of the frame, and of constitutional syphilis, in some other instances, is a circumstance of great importance in forming our intentions, and in selecting our means of cure.

9. IV. PROGNOSIS.—Rupia is not in itself a dangerous, although often an obstinate, and, when the eruption is abundant, a serious disease. When it appears on the legs, the ulcers are always intractable. The duration of rupia cannot be stated with precision; but it is always chronic, and often very protracted; much, however, depends upon the age and constitution of the patient; the number, the size, and the situation of the bullæ; on the states of the consequent sores; upon the character and amount of the constitutional disorder; or of the cachectic taint, or of existing visceral disease when this is present.

10. V. TREATMENT.—The intentions of cure are *first* to improve the state of constitutional power by suitable diet, regimen, and medicines; and *next* to improve the state of the ulcerated parts.—(a) The various remote causes should be removed, and the excreting functions of the skin and the assimilating actions promoted by means of warm, or warm salt-water, or alkaline baths; by a generous, nutritious, and digestible diet; by a fresh, dry air; by tonic decoctions or infusions, as those of cinchona, cascarilla, gentian, absinthium, &c., with alkalies, or with the nitro-muriatic acids; and by the preparations of iron, when indications of anæmia are observed. But while these objects are pursued, the alvine secretions and excretions ought to be promoted by stomachic aperients; or by a combination of mild purgatives with tonics, or vegetable bitters, or other restoratives. If these means should fail, a course of the cod-liver oil should be prescribed, as I have lately found it successful in two obstinate cases. When this eruption appears in children, the health and state of the milk of the nurse require attention. A healthy nurse should be selected for the child, and change of air recommended if this may be accomplished. When rupia occurs during or after weaning, a nutritious and wholesome diet should be prescribed, and asses' milk, diluted, or fresh whey allowed for drink; but change of air, especially to a dry and open situation, or to the sea-coast, ought to be most strenuously insisted upon.

11. (b) The local treatment of rupia consists chiefly of puncturing the bullæ early, and allowing the morbid secretion to escape, and of having recourse to such applications as will exclude the air and restore the healthy action and tone of the vessels of the part. When the scab is formed over the sore, with the natural intention of protecting diseased surface from the action of the air, then the morbid secretion there-

by confined underneath or around the scab perpetuates the irritation, and the healing process is prevented. Hence the necessity of having recourse to such applications as will at the same time exclude the air and restore the healthy state of the parts. The water-dressing, by excluding the air, is beneficial, as well as by allowing the immediate escape of the irritating secretion from the surface of the sore; but it does not restore the tone of the affected vessels. Strappings, insinglass plasters, and similar means, does not allow the escape of the irritating secretion, and hence, if not often renewed, they fail of being of service; but when frequently renewed, after the parts are stimulated by suitable application, they are then very beneficial. Lotions containing the nitrate of silver, or nitric acid, or the bichloride of mercury, or tincture of iodine, or the sulphate of zinc, or alum; or sponging the surface with spirits of turpentine; or ointments containing either of the balsams, especially the balsam of Peru, or one of the turpentine, are generally of service. Biett recommends an ointment containing the proto-ioduret of mercury (3j. to an ounce), or deuto-ioduret (gs. xii. to 3j.). Rayer advises the surface of the ulcers to be dusted with cream of tartar. A cretaceous powder, containing the oxide of zinc, is preferable to this. An ointment consisting of one third or a half part of the unguent. hydrarg. oxido-nitricum is often of service.

BIBLIOG. AND REFER.—Lorry, *De Morbis Cut.*, p. 76.—S. Plumbe, *A Pract. Treatise on Diseases of the Skin*, 8vo. Lond., 1824, p. 156.—A. Cazenave, in *Dict. de Med.*, 2d edit., art. *Rupia*. See the *Bibliography and References* to the article PEMPHIGUS. [See Am. ed. of Cazenave on the Skin, with Notes, by H. D. Bulkeley, M.D.]

SALIVATION.—See *Mercurial Salivation*, and other forms of *Salivation* in art. POISONS, § 580, et seq.

SCABIES.—See *ITCH*.

SCARLATINA RHEUMATICA.—SYNON.—*Febris Exanthematica articularis*; *Exanthesis Arthrosia*; *Plantaria*; *Dengue*; *Demga*; *Febris peculiaris epidemica*; *Giraffe*, Bouquet, Fr. Dandy; *Eruptive articular fever*; *Epidemic eruptive rheumatism*, Cock. *Epidemic anomalous disease*, Stedman. *Peculiar epidemic fever*.

CLASSIF.—III. CLASS, III. ORDER (Author).

1. DEFIN.—*Severe pain commencing suddenly in the small joints, followed by local swellings and chilliness, or shiverings; to these succeed heat of skin, intense pain in the head and eyeballs, which soon become general; and on the third or fourth day a scarlet efflorescence appears on the palms of the hands, spreads rapidly over the body, and continues two or three days, after which the symptoms subside, the malady being infectious and epidemic.*

2. The epidemic fever, which has been variously named, but which may be justly called an *eruptive articular fever*, or *eruptive arthritic fever*, has been somewhat differently described, and probably it has presented modifications with the climate, season, locality, and circumstances in which it appeared, and with the treatment prescribed for it. But wherever it has occurred it has prevailed almost universally, few persons having been exempt from it. It has in every place, however, presented distinct characters, which constitute it a disease *sui generis*—different from others, in combining an exanthematous eruption, ushered in by fever, with



most severe rheumatic or neuralgic symptoms—the course of the malady being so divided by intervals or remissions as often to give rise to the idea of relapses having been a common feature in its progress. The first account of its existence was brought from Rangoon in the East Indies, in May, 1824, and it appeared in Calcutta in June. It extended in various directions to the different presidencies. Dr. MOUNT states that it prevailed not only in Berham-pore, but in many other places in the vicinity, in March, April, and May, 1825. The secretary of the Medical and Physical Society in Calcutta says that it was particularly severe in the populous towns of Patna, Benares, Chunarghur, and numerous other places. Dr. MOUNT describes it as “an epidemic fever,” which was characterized by “the suddenness of its attack, the redness and watering of the eyes, the acute pain in all the joints, rendered excruciating on the slightest touch, the scarlet or crimson efflorescence on the surface, and its sparing neither age, sex, nor habit of body.” The accounts furnished by the East Indian physicians of the symptoms and treatment of this epidemic fever agree in the essential characters, but are desultory and very imperfect in many respects, and are mixed up with speculations, as usual, as to the influence of too much rain or of too little rain, of electrical conditions, of terrestrial emanations, and of other supposititious causes in producing it, while the most obvious and true cause is entirely overlooked. The physicians who have written from their experience of the epidemic in the West Indies and North America, two years after the prevalence of it in the East, have given the fullest account of its symptoms and treatment, but without being acquainted with its previous appearance in the East Indies.

3. This disease made its appearance in the Island of St. Thomas, in the West Indies, in September, 1827, and soon extended to the rest of these islands and to the southern states of America. It advanced westward among the islands during the winter, and spread to the ports on the Gulf of Mexico. Thence it travelled northward, and reached New Orleans in the ensuing spring. During the summer Savannah and Charleston were severely visited by it. A few cases of it appeared in Philadelphia and New York; but it did not extend farther north. It has been described by the several writers referred to hereafter, but with much difference in many particulars; and it does not clearly appear whether or no the difference was owing to the influence of climate and locality, or to the treatment adopted by the writers. Dr. STEDMAN, who practised in the Island of St. Thomas, where it first appeared, and Dr. DICKSON of Charleston, have given good descriptions of it. The former states that, of a population of 12,000 in the principal town of St. Thomas, scarcely one escaped. It appeared so suddenly, and spread so rapidly, as to have caused great alarm; but it soon was discovered that although a most painful, it was not a dangerous malady; yet it often left much suffering, and even disease, after the decline of the more severe symptoms.

4. I. DESCRIPTION.—Dr. STEDMAN divides the course of the disease into *three stages*.—(a) In the *first*, the invasion was somewhat different

in different cases. Usually a person in perfect health was suddenly affected with stiffness and pain in one finger, commonly the little finger. The stiffness and pain increased and extended up the hand, along the arm to the shoulder. The fingers of both hands became swollen, stiff, and very painful, and incapable of being bent. Sometimes the affection commenced in the lower extremities, always in the small joints, and extending to the large, and to the trunk. These symptoms were followed in a short time by restlessness, depression of spirits, by nausea, in some cases by vomiting, and by chilliness or shivering. But Dr. DICKSON states that shivering was either slight or wanting in the disease, as it prevailed in Charleston. To these succeeded fever, with great heat of skin, intense headache, acute pain in the back, knees, ankles, and in every joint, with violent pain in the eyeballs, which felt to the patient as too large for their sockets. In some cases, while the extremities were cold at first, the rest of the body was intensely hot. As the fever and heat of skin were developed, the whole body, particularly the head, eyes, back, and joints, was racked with pain. In some the features were swollen and distorted, especially the eyelids; in others, with swelling of the face and distortion of the fingers, soreness of the mouth, or pyralism occurred. Patients often complained in this stage, as well as in those which followed, of a feeling of great cold, even when the skin was very hot to the touch. When Dr. STEDMAN had the disease, he covered himself with three blankets, although the weather was sultry at the time. The severe pains, restlessness, and nausea rendered this stage the most distressing of any form of fever excepting rheumatic fever. These symptoms generally continued with more or less severity for twenty-four or thirty-six hours. The fever then abated, and with it also the pains. The patient, however, continued in a state of languor, irritability, and restlessness for three days, but without fever; and generally without hunger, thirst, and altogether without taste, the tongue being loaded, and the mouth presenting small aphthous sores. The pulse was in this stage much accelerated, the urine high coloured, and the bowels confined.

5. (b) The *second or eruptive stage* commenced the third or fourth day after the primary fever, generally the third, with a return of fever, and with an efflorescence which appeared on the hands and feet, and rapidly spread over the body. This eruption is differently described, both as to its characters and time of appearance, and probably it was modified in different cases; but in this, as in other respects, the descriptions are loose, devoid of scientific precision, and by no means creditable to the writers. Dr. STEDMAN describes the eruption as that of “a blotch or wheal of red-coloured skin, between that of scarlet fever and that of measles.” Others state the eruption to resemble that of scarlet fever; others that of measles; some that of roseola or erythema; and some the nettle-rash. It was attended, “in the severer cases, by swelling of the feet, hands, and face, particularly the eyelids, and by a distressing tingling, which, as the eruption disappeared, became an intense itching. The efflorescence generally began to fade on the second day, and

was entirely gone before the third morning of its existence. This was followed in almost every case by some degree of desquamation," which, in a few instances, gave rise to troublesome consequences. After this eruptive stage, many patients began to recover their spirits and strength, a complete want of taste often remaining for some days; but many patients also became subject to the next stage.

6. (c) The *third, or rheumatic stage*, sometimes immediately followed the eruptive stage, but often not until one, two, three, or four weeks, or more had elapsed; and however early or late it appeared, it was generally of considerable duration, the pains and paralysis being greater than at first. "These pains were not accompanied with fever; and they generally fixed themselves in one or two joints, and continued to excruciate the patient for weeks." They were always severest in the morning, and wore off in some degree towards evening. Some were tormented, in addition, by most distressing itching of the skin; and in others the joints, particularly those of the fingers, were painful, stiff, and swollen so as to produce deformity. The secondary pains were chiefly in the fingers, toes, wrists, ankles, and knees; confined persons to their beds, and were so aggravated, on motion, as to call forth groans and shrieks from those who suffered this stage severely. Except these pains, and the irritation they occasioned, "no other symptom of disease remained; the appetite was good, although the sense of taste was blunted." "In a period varying from three to four, or six days, the pains began gradually to subside, deserting one joint after another until they remained fixed for some time in one. This process occupied several weeks, and was often attended by relapses." This description, however, applies only to the severest form of the malady, endless grades of severity, as well as differences in the stages, having been observed; "for while some, who underwent the primary fever with the utmost mildness, had the eruptive attack with great violence, others, who had passed gently through both, and were congratulating themselves on their escape, were suddenly crippled by the secondary pains." It was remarked that those whose unavoidable occupations forced them to exertion, or who had resolution enough to exert themselves, got sooner rid of the pains than those who gave way to them.

7. (d) The *differences or modifications* mentioned by those who have described the disease were numerous. Dr. STEPMAN remarks that the negroes were much less severely attacked than the white inhabitants; and yet the only three fatal cases which occurred in the island were negroes. Dr. DICKSON, of Charleston, states that excessive determination of blood to the head was frequent, and that delirium was present in several instances; but that it went off with the fever of the first stage, which did not remit, but subsided in a short time—on an average, in about thirty-six hours. The skin at this stage was at first hot and dry; but an abundant perspiration was thrown out, attended occasionally by a rash or miliary eruption. This eruption appearing in the first stage (not the characteristic eruption), was very various, and not the regular or true one. Children were often thus affected by it, and in several adults

a thick crop of pimples was the first token of disorder. On the third or fourth day, little or no fever being present, the tongue became coated with a yellowish fur; the stomach uneasy or distressed; the patient low-spirited, impatient, fretful, and restless at night. Frequently there were great lassitude and debility, nausea, vomiting, and a distressing feeling of oppression. About the sixth day of the disease "these symptoms were more or less relieved by the coming out of an abundant eruption, which must be regarded as an essential or characteristic part of the malady. It consisted of irregularly-shaped patches, red and elevated; the feet and hands swelling with thickening and numbness. There were much itching and burning of the skin, and at this period a second febrile paroxysm often came on; and the pains of the joints were in many aggravated to their former severity." In some cases the first stage of the disease had passed over with very little notice or complaint, and yet in them this eruptive or second stage was very violent. "Many became sensible, on the third or fourth day, of an inflammation and enlargement of the glands in the groin, axilla, neck, &c., and these glands continued swollen and painful a long time after convalescence was established.

8. Very young *children* were liable to the disease, even from a few days after birth: some were supposed to be born with it. In these the skin was of a scarlet red, and the tongue and lips smooth and fiery. The infant could not hear to be disturbed; it screamed violently when lifted or when any of its limbs were moved. Below five years of age convulsions very commonly attended the invasion, and sometimes continued with great frequency throughout the whole of the attack. *Pregnant women* were very liable to abortion, instances of miscarriage having been numerous. They were usually seized at the very commencement with violent pains in the back and loins, extending into the thighs, occasioning the expulsion of the fœtus. In old persons the disease occasioned excessive prostration of strength; and in several of these it left behind it an erysipelatous inflammation of one or both legs. There was often soreness of the mouth; looseness, lividness, and sponginess of the gums, with slight salivation. Ulcers sometimes formed in the mouth, which were occasionally painful, irritable, and difficult to heal. Very few died in Charleston; but the aged, the intemperate, and corpulent were severely shaken by the malady, and remained long debilitated and emaciated; few persons above the age of sixty had absolutely recovered from it after two or three months from the attack.

9. II. CAUSES.—Nearly all who observed this epidemic in the Western hemisphere have considered it infectious. Drs. STEPMAN and DICKSON, who have given the fullest account of it, concur in this opinion. The introduction of the disease from one island to another, and the propagation of it from persons and places to others, were so frequently and so incontrovertibly proved, that no doubt as to the fact of its infectious nature was entertained. But how did it originate? for there was nothing in the medical topography, the season, the weather, or the climate of St. Thomas, where it first appeared, in the West Indies, to account for the occurrence. Dr. STEPMAN states, in his very dis-



jointed, although tolerably full account of the epidemic, that it was supposed to have been brought to the island by a vessel from the coast of Africa, but that this fact was not satisfactorily ascertained; nor, indeed, does it appear that any trouble was taken to determine the matter. Dr. Dickson states that the disease was imported into Charleston by the captain of a ship who brought it from the Havana and communicated it to his family, and that the transmission of the disease was traced from one subject to another. Dr. D. considered it a contagious eruptive fever, and remarked that in a few cases in which the eruption in the second stage did not take place, the patient was liable to a second, third, and an indefinite number of returns of the disease, while those "*who were properly covered with the eruption about the sixth day were protected from any future attack.*" He states this to have been a rule to which there was no exception in his practice, and that this protection had particularly attracted his attention.

10. III. NATURE.—The descriptions which have been given of this disease show it to have been an infectious eruptive fever, *sui generis*, attended by severe arthritic, or rheumatic, or neuralgic pains, to which all were predisposed who were not protected by a previous attack. In this it agreed with scarlet fever, measles, small-pox, &c.; and with these diseases it also agreed in its specific eruption appearing at a definite stage of its progress. The eruption itself has not been described with precision; but it appeared to have more closely resembled that of scarlet fever than any other, or to have been intermediate between it and measles. It appeared to have consisted of large scarlet blotches, which were smooth and slightly elevated, owing to the congestion of the minute sub-cuticular vessels, and which terminated in desquamation. The violent articular pains, swelling, and stiffness were evidently results of a remarkable alteration of the organic sensibility, with a consequent change of the capillary circulation in the synovial and other tissues of the joints, as well as in the vascular rete of the skin. While the cutaneous eruption, occurring at a certain period, and continuing only a short time, entitles the disease to rank among the exanthemata, the painful state of the joints imparts to it the rheumatic character. That it was not a form of scarlet fever is shown by the severity of the rheumatic or neuralgic symptoms; by its having attacked persons who had previously had scarlet fever; by the absence of the nephritic disease and dropsy so often consequent upon scarlet fever, as well as of the internal affection so frequently complicating this fever. That it was not a rheumatic fever was shown by the undoubted propagation of it by infection, by the character and time of the appearance of the eruption, by the course of the disease, by the absence of any cardiac or other internal complication, and by the protection which a full evolution of the eruption afforded from a second attack. Dr. Dickson doubts that this was a new disease, and believes it to have resembled a form of remittent fever observed and described by Dr. Rush in 1780; but the differences between them are too remarkable to admit of any resemblance, and he was unacquainted with the accounts of the prevalence

of the epidemic in the East, contained in the Transactions of the Medical and Physical Society of Calcutta. According to these accounts, as well as to those given of it in America, the disease appears to have possessed an asthenic character; as those who were bled, especially in large quantity, were long in recovery, although a moderate bleeding was beneficial in the plethoric or those lately arrived from Europe; and it seemed to have pursued the usual course, particularly as respected the first and second stages, whatever means were used—to have been incapable, like the other exanthemata, of being cut short by any treatment, however much its violence was mitigated—a mitigation which was best accomplished by an emetic, followed by mild purgatives and diaphoretics. The very few deaths which occurred during this epidemic appeared to have arisen either from pre-existent organic lesion, or from some coincident or intercurrent disease produced by its usual causes, and presenting no necessary connexion with this malady.

11. IV. TREATMENT.—Dr. STEDMAN states that the first cases which appeared at St. Thomas were so mild that he prescribed only purgatives, the warm bath, pediluvium, and diaphoretics. When the pains were severe patients refused purgatives, owing to the distress occasioned by the least motion. As the cases became more severe in the course of the epidemic, he had recourse to blood-letting during the establishment of the febrile excitement of the first stage, taking away from twelve to twenty ounces, but never more, nor ever repeating the operation. After bleeding and purging, he gave DOVER'S powder at bed-time. During the eruption he gave cooling aperients and cooling beverages, and prescribed the usual washes for the soreness of the mouth. Dr. COCK adopted a similar plan of treatment to that of Dr. STEDMAN. Dr. DICKSON states that he, as well as others, at first prescribed bleeding, purgatives, and warm diaphoretics; but the great severity of the pains induced him to give large doses of opium, and the relief and success following the practice induced him to persist in it and to relinquish blood-letting, as he believed that not only was the vital fluid thus husbanded, but the subsequent sufferings were lessened in severity and duration. He considered that, beyond the preservation of an open state of the bowels, cathartics effected very little benefit, and that an emetic was less objectionable, but was in most instances unnecessary. In addition to a free recourse to opium, he employed camphor, æther, and sinapisms externally. Restoratives appeared to have been required at an advanced stage of the disease, especially in aged and delicate persons.

12. In the East Indies, the softness of the pulse and the general depression deterred many medical men from bleeding from a vein; but some had recourse to the application of leeches, and others considered that bleeding in any form was prejudicial. The most successful practice appears to have consisted of the administration of an active emetic, followed by purgatives, so as to freely evacuate the bowels; and these by opiates or anodynes with diaphoretics; restoratives and tonics having been given after the subsidence of the eruption of the second stage.

BIBLIOG. AND REFER.—J. Mellis, Remarks on the In-

Inflammatory Fever or Epidemic lately prevalent in Calcutta and its Environs, in Transactions of the Medical and Physical Society of Calcutta, 8vo. Calcutta, 1825, vol. i., p. 310.—*W. Twining*, Observat. on the Fever which prevailed in Calcutta, in June, July, and August, 1824, in *ibid.*, vol. ii., p. 1.—*H. Cavell*, Observations on the Epidemic of June, &c., in *ibid.*, vol. ii., p. 32.—*J. Mouat*, On an Epidemic Fever at Burhampore, &c., in *ibid.*, vol. ii., p. 41.—*G. W. Steadman*, Some Account of an anomalous Disease which raged in the Islands of St. Thomas and Santa Cruz, &c., in Edinburgh Medical and Surgical Journ., vol. xxx., p. 227.—*F. Nicholson*, On a peculiar Arthritic Exanthem which prevailed in the West Indies in 1827 and 1828, in *ibid.*, vol. xxxi., p. 115.—*W. H. Cock*, Observations on the epidemic Eruptive Rheumatic Fever of the West Indies, &c., in *ibid.*, vol. xxxiii., p. 43.—*J. Furlonge*, Remarks on the Dandy which prevailed in the West Indies, &c., in *ibid.*, xxxiii., p. 51.—*S. H. Dickson*, Account of the Dengue as it appeared in Charleston, S. C., during the summer of 1823, in the American Journal of the Medical Sciences, vol. iii., p. 3.—*G. F. Lehman*, Account of the Disease called Dengue, &c., in *ibid.*, vol. ii., p. 477.—*J. Hays*, On Dengue, in *ibid.*, vol. iii., p. 233.—*J. Squar*, On a singular Description of Disease which prevailed in the Island of St. Christopher, &c., in London Medical and Physical Journal for July, 1823.—*D. Osgood*, Remarks on Dengue, in Boston Medical and Surgical Journal, vol. i., no. 36.—*P. J. Dumaresq*, in *ibid.*, vol. i., no. 32.

**SCARLET FEVER.**—**SYNON.**—*Scarlatina* (from the Italian, *Searlatto*, scarlet, a deep red), Sauvages, Vogel, Juncker, Cullen, J. P. Frank. *Morbilli confluentes*, *M. igni*; *Rubecola conflens*; *Febris purpurata*; *Rosalia*, *Rosalia*, *R. squamosa*, Auct. *Morbus scarlatinus*; *Febris scarlatinosa*; *Febris scarlatina*, Sydenham. *Purpura scarlatina*, Burserius. *Gutteris morbus epidemicus Foresti*; *Febris rubra*, Heberden. *Typhus scarlatinus*, Crichton. *Typhus scarlatina*, Young. *Exanthesis rosalia*, Good. *Febris scarlatino-miliaris anginosa*; *Porphyrimus*; *Porphyrisma*, Ploucquet. *Fièvre rouge*, *P. pourprée*, Fr. *Scharlach*, *Scharlachfieber*, *Scharlackkrankheit*, *Scharlachschlag*, Germ. *Scarlattina*, Ital. *Searlet fever*, *Rash fever*.

**CLASSIF.**—1st CLASS, Febrile Diseases.

3d Order, Eruptive Fevers (Cullen).

3d CLASS, Diseases of the Sanguineous

Function. 3d Order, Eruptive Fevers

(Good). III. CLASS, III. ORDER (Author in Preface).

1. **DEFIN.**—An infectious continued fever; on the second day of which, or sometimes later, a scarlet efflorescence generally appears on the fauces and pharynx, and on the face and neck, spreads over the body, and commonly terminates in desquamation from the fifth to the seventh day; the fever being accompanied with affection of the kidneys, often with severe disease of the throat, or of some internal organ, and sometimes followed by dropsy, and occurring only once during life.

2. There is reason to doubt that the Greeks and Romans were acquainted with this disease, and the doubt applies equally to the Arabians, although a few passages in RHazes might support the idea that scarlatina was confounded by the Arabian writers with measles. The first writer who distinguished the disease is stated by HILDENBRAND and J. FRANK to have been INGRASSIAS, who remarks that before the period at which he wrote it was called *Rossalia* or *Rossania*, from *rosso*, red; and that, although it was generally considered as the same malady as measles, yet he was convinced, by his own observations, that the one was different from the other. J. COYTTAR, a physician of Poitiers, published an account of an epidemic which prevailed in 1557, having the characters of this malady; and FORESTUS states that the

epidemic at Amsterdam in 1557, described by TYENGNIUS, was this malady. According to WIERIUS and SCHENK, this fever appears to have been prevalent in Lower Germany in 1564 and 1565; and BALLONIUS states that it was epidemic in Paris in 1581. DE HEREDIA describes it by the appellation of "*Angina maligna*." The disease which was epidemic in Naples in 1620, and of which accounts were published by CARNEVALA, NOLA, and SGAMBARTI, was probably scarlatina anginosa, which was then variously denominated, but most frequently as "epidemic phlegmonous angina," "a pestilential affection of the fauces," &c., although HILDENBRAND entertains a different opinion. From this period accounts of several epidemics of scarlatina were furnished by writers, the symptoms and characters of which appear to have varied then as in more recent times. D. SENNET was the first to give a true description of scarlatina, in 1619. Subsequently, WINKLER, in 1642, WELSCH of Leipsic, and SCHULZE in Poland, observed severe epidemics of this malady, and described it by the name of "malignant purpura," by which it was then known. The epidemic described by SYDENHAM, from 1667-73, appears to have been comparatively mild, while that observed by MORTON, from 1672 to 1686, seems to have been much more severe; but he has noticed it as differing from measles, chiefly as respects the character of the eruption. During the eighteenth century this malady became more and more frequent, and the general prevalence and the great fatality of its epidemic visitations roused medical attention to its nature and treatment. STORCH, HUXHAM, STOERK, FOTHERGILL, HEBERDEN, DE HAEN, BICKER, BLACKBURNE, GRANT, SACHSE, KREYSIG, WITHERING, RUSS, and many others have described these visitations. During the early part and middle of that century scarlet fever was variously named, and not only distinguished from other diseases attended by efflorescence, but more especially from measles and roseola. The writings of HEBERDEN and FOTHERGILL in this country were the first to show the distinct nature of this malady; and those of WITHERING placed this fact beyond dispute. At the present day scarlet fever is never absent, either in a sporadic or epidemic form, from any country in Europe, although in different degrees of severity and of prevalence. In warmer countries it appears chiefly as an epidemic, and generally after considerable intervals of immunity from its devastation.\*

\* [The scarlet fever has prevailed in the United States, at times, from its first settlement. We find it prevailing during a wet, cold season in May, 1735, in New Hampshire, under the name of the "throat distemper," which proved extremely fatal to children. The symptoms were a swelled sore throat, with white or ash-coloured specks, an efflorescence on the skin, great debility of the whole system, and a tendency to putridity. Of the first forty patients attacked it is said not one recovered. Very few children escaped. Although the disease was considered as very infectious, yet it attacked the young in the most sequestered situations, and without a possible communication with the sick. Many families lost three and four children—many lost all. Since that period it has occasionally prevailed as an epidemic in various places all over the country, under the name of "throat distemper," "putrid sore throat," "angina maligna," "scarlet rash," &c., &c. Noah Webster states,\* that "scorbutic people and those who lived on pork, and, of course, the poor, suffered most. In some families it was comparatively

\* [A brief History of Epidemic and Pestilential Diseases, &c., 2 vols. Hartford, 1799, vol. I., p. 234.]



**3. I. DESCRIPTION OF REGULAR OR NORMAL SCARLATINA.**—The course of scarlatina has been divided into *three periods*, or stages, by some writers, and into *four* by others; these latter dividing the second stage into two. 1st. That of invasion, or that preceding the eruption; 2d. That of the eruption (comprising the periods of eruption and efflorescence); and, 3d. The stage of desquamation. When scarlet fever proceeds in its more regular or usual course, these periods are generally very distinct; but when it assumes certain varieties, forms, or complications hereafter to be noticed, they are often indistinct, or even not altogether observed.

**4. A.** The first stage of regular or normal scarlatina—*stadium invasionis, s. irritationis*—is attended by general uneasiness, lassitude, headache, or giddiness; by a sense of depression, and loss of strength. The patient dislikes food, nauseates animal food, and complains of chills, horripilations, shiverings, or rigours. These are succeeded by heat of skin, great acceleration of pulse, by urgent thirst, by increased headache, by pain and redness in the throat, with difficulty of swallowing. The eyes are often red, and intolerant of light. These symptoms are the most constantly observed; but in severer cases nausea, vomiting, violent pain in the head, with aching of the back and limbs; augmented sensibility, sleeplessness, occasionally delirium, or even convulsions, in very young subjects, are also observed. Fever is always present, although often slight, and either exists alone or precedes or accompanies the angina. It is often severe, the pulse being very rapid and full, the skin dry and burning, and the face congested, tumid, or slightly suffused. The redness of the fauces and pharynx is frequently great on the first day, sometimes in the course of a few hours, and the tonsils are swollen. The redness and congestion sometimes extend to the posterior nares, causing a stuffing sensation in the nostrils, and occasionally there is hoarseness. The tongue is covered at its base with a whitish or yellowish coating, is red at its edges and point, and its papillæ are erect or excited. The bowels are costive or irregular; and the urine is scanty, high-coloured, voided frequently, and is sometimes albuminous, or soon afterward presents these characters. In most cases these preürinary symptoms continue but one day; in others they are prolonged, the eruption not appearing until the third or even the fourth day: in some the febrile symptoms are either so slight as not to attract attention, or are so instantaneous and brief as to appear as if merely ushering in the angina or efflorescence. The perspiration possesses a peculiar odour, which has been variously described by Hæm and others.

milid; in others it was malignant, like a plague. This disease gradually travelled westward, and was two years in reaching the River Hudson, distant from Kingston, N. H., where it first appeared, about 200 miles in a straight line. It continued its progress westward, with some interruptions, until it spread over the colonies. Few adults were affected: its principal ravages were among persons under age, or, rather, under puberty. For many years after it was epidemic, it frequently broke out in different places, without any apparent cause, but did not spread; a striking proof that such diseases will not become epidemic by the sole power of infection, but that some general cause must aid its propagation, or it will perish in its cradle. This is probably true of every species of pestilential disease"]

**5. B.** The second stage commences with the eruption, which appears generally about the second day—sometimes on the evening or night of the first day, and occasionally not until the third, or even fourth day. The efflorescence appears first on the neck and face, especially the cheeks, the tint of which is commonly deeper than that of other parts of the countenance. Sometimes the chest or trunk, or the extremities, or even the hands and feet, first exhibit the eruption, which extends more or less over the body. The eruption consists of an infinite number of minute red points, which appear in a rose-coloured ground, and are not visibly or sensibly elevated. These points, which are finer, redder, more regular, and more confluent than those of measles, are transformed into patches, which are not elevated, and appear smooth or continuous with the surrounding surface. The patches, at first distinct, enlarge, and thus coalesce; ultimately imparting a scarlet tint to the skin, which disappears momentarily from the pressure of the finger. The skin is now very hot, dry, and somewhat rough to the touch. It is sometimes diffusely tumefied, from the cutaneous and sub-cutaneous congestion, especially in the neck, face, feet, hands, and flexures of the joints, and is often the seat of a disagreeable stinging or pruritus.

**6.** The redness of the fauces and pharynx, and the swelling of the tonsils and adjoining glands, are now considerable, often occasioning occlusion of the throat, and, externally, more or less tumefaction. The swollen tonsils are covered by a thin, soft, and whitish exudation of lymph. The tongue sometimes retains its coating, but as frequently it is gradually deprived of it from the edges to the middle, and it then presents a deep red hue, and appears as smooth as if varnished: occasionally the elevation of the papillæ gives it a strawberry appearance. About the third or fourth day the eruption has reached its height. It is usually most vivid about the groins, the insides of the thighs and lower parts of the abdomen, and on the inner flexures of the joints, and it continues the longest in these situations. It is redder during any excitement, or when the child cries, and is paler in the morning, and deeper in the evening and night, when the fever is highest. The redness of the skin, at its greatest pitch, has been likened by P. FRANK and others to that of a boiled lobster, and by others to scarlet cloth. It is the most continuous, general, and deep in the most severe cases, and when the febrile symptoms are the most acute. The skin is remarkably hot, varying from 104° to 108° of Fahrenheit's scale; but not so hot as reckoned by CURRIE.

**7.** During the eruption, the countenance expresses anxiety and suffering when the disease is thus severe. The eyes are animated and brilliant; delirium and restlessness often occur at night; and a sleeplessness, which resists the usual means of procuring rest, is caused by the heat and stinging of the surface, and the affection of the throat. This affection is sometimes so severe, the swelling of the subjacent cellular tissue, and the exudation of soft lymph from the inflamed surface of the tonsils, fauces, and pharynx so considerable, and the secretion from the salivary glands so viscid and scanty, as to materially increase the distress of the

patient. Thirst is now urgent; respiration is accelerated, somewhat difficult and laboured, and the breath is hot. The pulse is very rapid, full, broad, and compressible. In some cases slight sopor is observed; in others a sense of sinking is felt. The bowels are generally costive; but a slight diarrhœa occasionally supervenes, with colicky pains. The urine is scanty, frequently voided, and high-coloured, sometimes albuminous. The patient exhales the peculiar odour already noticed, which is difficult to be described, although readily recognised by the experienced observer. After five, six, or eight days' duration—generally after a longer period than in measles—the efflorescence fades, at first assuming a violent tint, and afterward a pale rose or coppery hue. Generally the mucous membrane of the mouth and throat continues still red; and often it is not until now that the tongue is deprived of its coating and shows its characteristic redness and prominent papillæ. The swelling about the neck and throat now diminishes, and the next stage supervenes.

8. *C. The third stage*, or that of *desquamation*, commences at various periods in the different forms and complications of the disease; and even in the more regular type it varies remarkably as to the time of its occurrence. If the fever and eruption are slight, desquamation may follow the fourth or fifth day. If both the fever and the eruption are intense, it generally is not observed until after the seventh day, or not until the eighth or ninth. With the subsidence of the fever and of the redness of the surface, the furfuraceous desquamation commences. Occasionally this change is ushered in by a slight perturbation or exacerbation of the various febrile symptoms, followed by slight diarrhœa, or by epistaxis, or by the catamenia in adult females, or by a copious discharge of turbid urine, depositing a whitish or rose-coloured sediment, or by a free perspiration, having a strong and peculiar odour. The affection of the throat in this regular type of the malady becomes less severe, although, in some cases, it is not ameliorated until a later period; and the external swelling continues somewhat longer, the internal exudations still remaining, or proceeding for a short time. The pulse evinces less irritative excitement; is less full, less quick, but still accelerated, and soft or weak. The tongue is clean, but red and flabby; and it does not regain its natural hue until after the guttural affection is removed. As desquamation proceeds, the surface becomes paler; the epidermis exfoliating in small furfuraceous whitish scales on the trunk of the body, and in large scales or lamellæ where the epidermis is thicker, as in the extremities, and in the hands and feet. With the desquamation the function of cutaneous transpiration is gradually restored, and convalescence commences. But the pulse often continues accelerated or weak, or very compressible; the urine sometimes albuminous, or the bowels disordered; and convalescence becomes interrupted, delayed, or entirely arrested by some serious consecutive affection hereafter to be mentioned, and which should be anticipated and guarded against. In some instances the desquamation does not occur for several days after the redness of the skin has disappeared, or not until a fortnight or three

weeks have elapsed; but it usually follows the same order as that observed by the progress of the eruption.

9. II. OF THE TYPES AND IRREGULAR FORMS AND COMPLICATIONS OF SCARLET FEVER.—The *types, forms, or varieties of scarlatina* vary remarkably, not only in individual sporadic cases, but even in different persons of the same family in the same epidemic. The forms are remarkably modified as respects, 1st. The characters and duration of the eruption; 2d. The type or character of the constitutional affection—the nature of the fever; 3d. The seat and nature of the complication; and, 4th. The nature and prevalence of the sequelæ, reliquæ, or consecutive diseases. The irregularities, or anomalous forms (as they have been usually termed) of this malady require a much more serious attention than the more regular states; for these latter are not more frequently met with than the former, and are seldom attended with danger, unless they are neglected or mismanaged; while the former are for many years the most prevalent forms of the disease, and are much more frequently attended by danger—sometimes the most imminent danger—as regards either their invasion and progress, or their sequelæ. Like measles, but still more remarkably than that malady, scarlet fever presents the utmost diversity of form, severity, and complication—a diversity depending upon epidemic constitution, upon local or endemic causes, upon the accumulation of morbid exhalations, and upon undue crowding and the absence of sufficient ventilation.

10. Of these several circumstances tending to modify the nature and form, or to extend or limit the prevalence, or to complicate the character of scarlet fever, there is none more influential than the prevailing *epidemic constitution*—the "*Constitutio morborum stationaria*," first insisted upon by SYDENHAM, and recently by AUTENREITH, and by one of our best and most practical writers, Dr. GRAVES. There is no kind of fever which displays a greater diversity in its nature and complications, according to the prevailing epidemic constitution, than scarlet fever, or which manifests the character of such constitution more remarkably than it. Upon whatever cause this stationary epidemic constitution may depend—whether or not it may be connected with the long prevalence of dry, or of wet, or of cold, or of hot seasons, either of which has been observed to occur for several years in succession, giving rise, accordingly, to either inflammatory, or adynamic, or gastric, or other forms of the malady; or whether or not it may be aided by prevailing states of the electricities influenced by these conditions of the seasons—there can be no doubt of its influence: an influence which has been duly recognised by those whose experience has been of sufficient duration to have observed the changes of those epidemic constitutions, or whose learning has made them acquainted with the experience of other observers. The *forms and complications* of the disease, therefore, which will require an especial notice at this place, are, 1st. Those which respect more particularly the appearances of the eruption; 2d. Those which consist chiefly of the state of vascular action and vital power; and, 3d. Those predominant affections which arise either in the course of



the disease, or as a consequence or consequela of it.

11. i. THE APPEARANCES OF THE ERUPTION OR EFFLORESCENCE are always deserving of attention, for the purpose not only of diagnosis, but also of furnishing indication of the state of vital power.—A. The eruption may be *partial*; in this case it is observed chiefly in the neck or chest, or on the trunk, or on the flexures of the joints, or on other parts, in the form of red patches, of variable extension. Sometimes the redness is excessive, deep, and extensive, or general; at other times it is slight or pale. Frequently redness is uniform throughout. Occasionally a number of small violet-coloured points are dispersed through the reddened ground; these points differing, however, from the punctuated form of eruption. In some cases a miliary eruption, or miliary vesicles—the *scarlatina miliformis* of P. FRANK—more or less abundant, appear at the commencement, more frequently than at the decline of the efflorescence, and are found most frequently on the neck and chest, and on the insides of the thighs and arms. These vesicles are sometimes interspersed with sudamina, or with papulæ, but very rarely with true pustules. Owing to the existence of these secondary or intercurrent eruptions, scarlatina has been termed *miliformis*, or *papulosa*, or *phlyctenosa*. These irregularities are not indications of any departure from the usual course of the disease, nor of an unfavourable result.

12. REUSS, RAIMANN, and HILDENBRAND have observed, in rare instances, the eruption on the second day of the efflorescence, of *bullæ* of a dark red colour, above the size of a nut, containing a yellowish serum, and resembling that produced by a blistering plaster. The cuticle breaks, and, the fluid being discharged, a sore remains, which follows the course of the constitutional malady—*scarlatina pemphigodes*, HILDENBRAND. The few cases in which this state of eruption has been observed have been characterized by a remarkable degree of heat of skin, with a disposition to a septic or putrid condition. The only instance in which I observed this appearance of the eruption was that of a man of middle age, referred to hereafter, who accidentally allowed the discharge from the throat of his child shortly before death from malignant scarlatina, to remain on parts with which it had come in contact for some time. In the more malignant or dangerous states of this fever, the eruption assumes a deep, or dark, or livid appearance, or an almost violet tint, the darkness of the hue being great generally in proportion to the malignancy or putro-adenia characterizing the malady, to the depression of vital power, and to the change in the blood. In some of these cases, petechiæ or ecchymoses are found more or less abundantly interspersed in the deep red or livid surface. In rarer instances the skin exhibits, in patches, altered dark blood effused between its layers—*Scarlatinal purpura*. This hæmorrhagic tendency, arising from extreme deficiency of vital power in connexion with a poisoned or altered state of the blood, in which the fibrine has lost its power of vital cohesion, is remarkable in some epidemics, especially in those of a malignant or putro-adenic character.

13. B. Besides irregularities in the form and

appearances, the eruption may be abnormal in its *course* and *duration*. It may be long in appearing, the fever continuing three, four, or five days before any eruption breaks out. This not infrequently occurs in the more dangerous and complicated cases. On other occasions the eruption is remarkably early, especially in very favourable cases, when it sometimes almost immediately follows the fever, the symptoms of which may be so slight as to escape detection, or may be masked by some antecedent or existing affection. The efflorescence having made its distinct or early appearance, may either disappear prematurely or suddenly, or it may continue an unusually long time. The *retrocession* of the eruption may be occasioned by cold or by an internal complication, or intercurrent affection. Occasionally the eruption disappears on the first or second day, and reappears again after two, three, or more days. In rare cases I have observed it continue nearly its usual time, and reappear after seven or eight days, and then proceed the usual course. In other cases the efflorescence comes out freely, then fades, and soon afterward is again abundant, thus assuming a remittent form, the remissions appearing chiefly on alternate days, the eruption being most abundant when the febrile action is highest. The eruption may, moreover, be of unusually long duration—may be prolonged to the ninth or tenth day. This is most apt to occur when it is general and intense, the persistence being longest in the extremities.

14. C. The *absence of eruption* in true scarlet fever has been doubted, but has been admitted by HUXHAM, FOTHERGILL, AASKOW, STOLL, BANG, RANOE, RUMSEY, DANCE, GUERSANT, TROUSSEAU, BERTON, and others. The circumstance of individuals having the constitutional affection, either with or without sore throat, during the epidemic prevalence of the disease, and the existence of it among the other members of the same family, in its more usual forms, are proofs of this affection being actually scarlet fever, although unaccompanied with eruption; and the propagation of the malady from cases of non-eruptive scarlatina farther confirms this opinion. Some epidemics are remarkable for the number of cases in which the eruption is not observed, the disease being characterized by the other usual symptoms, especially by the sore throat, by the appearances of the mouth and tongue, occasionally by the desquamation of the cuticle, especially in adults; and by consecutive dropsy, these cases communicating the eruptive disease. Sometimes, however, the eruption appears in so slight, partial, or evanescent a form as to escape observation. In these cases, the state of the mouth, fauces, and throat, and the constitutional affection, are the chief proofs of the presence of this malady, especially when viewed in connexion with the prevalence of it in the vicinity, or in the same house or family. It should not, however, be overlooked that sore throat with fever, both the local and constitutional affections being characterized by remarkable asthenia, amounting even to putro-adenia, may occur sporadically or endemically, or even epidemically, independently of any connexion with scarlatina, and among persons and families who have already been the subjects of scarlatina. Of these

occurrences I have met with several instances, the greater part of a family, all of which had previously had scarlet fever, having been thus attacked. (See *art.* THROAT.)

15. But a child in the same house or family in which scarlet fever is unequivocally present, may have the constitutional affection not only without the characteristic eruption, but even without the sore throat also, both these essential features of the malady being either entirely wanting, or so slight, or so evanescent as to escape detection. Is the fever which is alone present—without the usual local affection—truly scarlet fever in these cases? and is it, admitting the affirmative, capable of propagating the true and characteristic form of that disease? That the fever—the constitutional affection—is scarlet fever, notwithstanding the absence of the eruption and of the sore throat, I believe for the following reasons, namely: 1st. Its occurrence in individual members of a family, the rest of which are about or near the same time the subjects of scarlatina; 2d. Its occasional complication with the internal affections, sometimes complicating scarlatina; and, 3d. The very frequent appearance, in these cases, of renal affection, of albuminous urine and consecutive dropsy or inflammation. This form of the disease may be justly called *latent scarlet fever*.

16. ii. THE FORMS OF SCARLET FEVER DEPENDING UPON THE STATES OF VITAL POWER AND VASCULAR ACTION.—Upon the Type or Character of the Constitutional Affection.—It is of the utmost importance to estimate with tolerable accuracy the states of constitutional disturbance existing in individual cases, and constituting in the aggregate of cases the prevailing epidemic character. In no disease is more discrimination requisite than in this, in determining both its type or diathesis, and the nature of its existing complications; and as to none besides has more misconception existed, or has more false and mischievous doctrines been promulgated. "The blind have too often attempted to lead the blind;" and the credulous and docile many have submitted to the guidance of those who formed and promulgated their opinions from insufficient experience, or from an acquaintance with a single epidemic only, and who, estimating with as little modesty as accuracy their own opinions, denounced or ridiculed the greater experience and the juster views of their enlightened predecessors and contemporaries.

17. The constitutional character of scarlet fever is dependent upon several circumstances which are fully stated hereafter, and which combine to produce the pathological condition observed even in sporadic and mild, although most remarkably in extensive and fatal prevalences of the malady. The states of season, weather, and stationary and prevailing epidemic constitutions; animal exhalations, putrid effluvia, and every form of malaria, especially when aided by warmth, humidity, and imperfect ventilation; and crowded, low, or close habitations are the chief causes of the several dangerous constitutional forms and complications which the disease assumes—causes, however, existing in intimate connexion with the concentration or dose of the poisonous emanation—of the specific animal poison, and with

the states of vital power or resistance of the infected. The combinations, conditions, and operations of these causes are especially concerned in the epidemic occurrences of the more malignant types or states of the disease which are to be particularized in the sequel.

18. A. SCARLATINA MITIS.—*S. simplex*.—Mild or simple scarlet fever may prevail either in a particular district or season, or still more extensively, and for several seasons. It may even be the most general form of an epidemic during successive seasons. It is met with in all circumstances and seasons, and even in some of the members of the same family, in which malignant and complicated cases exist, and in the regular form above described; the disease being characterized chiefly by the mild or moderate degree of fever; by the efflorescence, which generally appears early, or on the second and third day, and disappears with desquamation of the cuticle, from the fifth to the seventh; and by the slight affection of the mouth and throat, which, in many cases, is but little complained of, although, on inspection, the edges of the tongue, the fauces, pharynx, and Schneiderian membrane and internal surface of the eyelids present more or less redness. However mild the constitutional affection or slight the affection of the throat, and however free from internal complication the complaint may be during its course, nevertheless the sequela may be serious, but chiefly as respects the disorder of the kidneys and the consecutive dropsy. Indeed, when very slight or mild attacks occur during the more severe or malignant prevalences of the malady, then these mild cases are the most apt to be followed by dropsy, unless the treatment during convalescence be most judicious, and even although the requisite care be taken.

19. B. SCARLATINA ANGINOSA.—*S. inflammationis*, HILDENBRAND and NAUMANN.—This variety presents every phase from the mild to the malignant, and the most varied and serious complications. In this the fever is generally severe or intense, even before the eruption appears, and is ushered in by rigours, stiffness, and soreness of the throat, by intense redness of the fauces and pharynx, and painful deglutition. The tonsils are swollen, and a viscid secretion from the salivary glands and mucous follicles adhere to the inflamed surface, with patches of lymph of a grayish or whitish-gray hue, which covers the tonsils and pharynx, and often also the fauces, but very rarely the larynx. The papillæ of the tongue are enlarged, and rise through the whitish or yellowish-white fur or mucus. The eruption is generally delayed to the third or fourth day; but it occasionally appears earlier, or even as early as the first day; then subsides prematurely, and does not return; or it reappears in various grades; or continues with great and general intensity even beyond the usual period. These irregularities of the eruption depend much upon the nature and severity of the internal complication when this exists, and upon the violence of the fever, which is often greatest on the second or third day. The heat of the skin is then very remarkable, varying generally from 104 to 108. Thirst is urgent; the pulse is very much accelerated, full, and strong, but not hard or constricted. The affection of the throat is now severe, and



the swelling so great as to impede or even prevent deglutition. The inflammation frequently extends along the Eustachian tube to the ears. The fever is aggravated towards evening and night, and delirium then supervenes. During the third or fourth day, especially if the eruption fades or suddenly disappears, some internal complication of an inflammatory nature frequently occurs; or an internal affection of an inflammatory or actively congestive kind may have commenced with the appearance of the sore throat, or with the febrile action, and have entirely prevented, or delayed, or rendered irregular, the eruption. In some of these a dark efflorescence continues for three or four days, or even longer, on the backs of the hands, and on the legs and feet. In this state of the disease internal complications are frequent; the gastro-enteric mucous surface, or the membranes of the brain, or the lungs, or pleura, or even the pericardium, or the peritoneum, evincing a predominance of morbid action; the kidneys being also more or less implicated, although not so manifestly as during convalescence. The patient has complained of, and still experiences pain or aching of the loins and limbs; and the urine is very high coloured, turbid, or even bloody in some cases, and generally scanty, and voided frequently. The inflammatory action in all these complications is modified more or less from the sthenic condition characterizing the primary inflammations occurring in persons whose vital influence and circulating fluids are not contaminated by an animal poison or infectious agent. The poisonous emanation which has infected the frame, and is multiplying itself to an indefinite extent, so as to propagate the malady to all who are predisposed to it, re-enforced by obstruction of the several emunctories, so changes the states of vital power, of vascular action, and of the circulating fluids, from the healthy sthenic conditions, as very materially to modify the local complications, as respects both the state of vascular action and the morbid products or consequences of that action; so that these complications, although inflammatory in their nature, or as regards the disordered vascular action of the part affected, are imbued by a certain vice or diathesis appertaining to, and imparted by, the specific poison contaminating the frame, and are farther affected by the interrupted functions of the kidneys and skin, so as to modify them remarkably from primary, sthenic, or pure inflammations; and the modification is great in proportion to the depressing and contaminating action of the poison, and to the accumulation of excrementitious matters in the blood—to the adynamic, putro-adynamic, or septic character of the fever—the same relations subsisting between the constitutional and local morbid conditions in this disease as were shown to subsist in other fevers. (*See art. FEVER*, § 109, 110.) Although this type or form of the disease is often complicated, and irregular as respects the eruption, yet it frequently assumes the regular form described above (§ 4), the febrile action being generally more intense.

20. *C. SCARLATINA MALIGNA*; *Pestilens faucium affectus* of SGAMBATI; *Angina puerorum epidemica* of BARTHOLIN; the *Garotillo* of ZACUTUS LUSITANUS; the *Padanchone loimodes* of

SEVERINUS; the *Angina maligna* of DE HEREDIA; the *Malignant ulcerous sore throat* of HUXHAM; the *Purpura epidemica maligna* of SCHULTZ; the *Malignant sore throat* of JOHNSTONE; the *Cynanche maligna* of CULLEN; the *Putrid sore throat* of various authors.—The type of the disease which has been last described passes into this by insensible gradations, not only as respects different cases occurring during the same season, in the same locality, but even in the same family. Sometimes even the attack may present an inflammatory character at its outset, and soon afterward assume an adynamic, typhoid, or malignant form. But it usually commences in an adynamic or asthenic form, especially in autumn and winter, and in delicate, relaxed, or exhausted subjects, in those debilitated by other diseases, and in weak female children, or those living in low, damp, and close situations. The patient is first affected with languor, lassitude, weakness, and vague pains through the body. These are succeeded by giddiness, chilliness, or shivering, followed by great heat. These latter alternate for several hours, until at last the heat becomes more constant and intense. The patient then complains of faintness, great pain in the head, and of violent sickness with vomiting, or purging, or both, especially in children, more rarely in adults. Heat and soreness are felt in the throat, and stiffness and tenderness in the neck. The face soon appears red or flushed, swollen or bloated, occasionally pale and sunk; the eyes are red, watery, heavy, or suffused. There are great fretfulness, restlessness, anxiety, leipothymia or faintness, and remarkable dejection of spirits.

21. The pulse from the first is quick, small, and fluttering; in some soft and full, but weak and irregular, but always without that firmness and strength observed in inflammatory diseases. Dr. JOHNSTONE remarks, that if blood be taken from a vein soon after the attack, instead of forming a firm crassamentum, "it continues in the state of a gelatinous texture." The urine at first appears crude like whey; as the disease advances it becomes yellower, as if bile were diluted with it; or turbid, scanty, high-coloured, and sometimes it contains dissolved or decomposed blood-globules. At the same time as, or soon after the attack, the fauces, uvula, tonsils, and pharynx become red and swollen; and soon afterward covered in parts by ash-coloured or dark exudations, which appear as sloughs. The tongue is now deep red or brown, dry and glazed, and sometimes so tender and chapped as to readily bleed. The throat soon acquires a dusky-red, brown, or livid hue, and the exudations on the fauces and tonsils are darker, and often cover gangrenous ulcers. The febrile or constitutional disturbance presents an extremely typhoid or asthenic character, or putro-adyamia. The skin is hot; but there is little thirst, although the mouth is dry; and the teeth and lips are covered by sordes, or by an acrid fluid from the excoriated or ulcerated throat. The breath is remarkably fetid and contaminating.

22. The efflorescence often appears on the second or third day of the disease, and the hands seem as if they were stained by the juice of raspberries. It frequently soon recedes and recurs, and is generally irregular. When it is

abundant, it is often dark, dusky, or even livid; and it is often accompanied with petechiæ, more rarely with œdema. The breaking out of the eruption sometimes relieves the vomiting and purging often ushering in the disease. The parotid and sub-maxillary glands swell and become painful. The neck and throat are œdematous, the swelling sometimes extending to the breast. In this case suffocation is threatened, the breathing being rattling, as if the patient were being strangled. A viscid secretion, scanty and adhesive, is produced by the salivary glands; and an acrid, thin discharge exudes from the nostrils and from the angles of the mouth, the lips and cheeks exhibiting an aphthous appearance. The affection of the throat often extends along the tubes to the ear; and not only does gangrenous ulceration affect portions of the velum or fauces, but the tympanum and bones of the ears are destroyed, and an offensive acrid discharge flows from these parts. When the patient swallows the excoriating fluid exuded by the affected throat, diarrhœa, with exoriations of and about the anus, is of frequent occurrence. In these cases the pharynx occasionally is remarkably affected, and is covered by deep sloughing ulcers, extending in some instances to the cellular, muscular, and ligamentous structures anterior to the cervical vertebræ and intervertebral substance. The larynx and trachea, the former especially, are not infrequently implicated, occasioning sudden suffocation and death. The lesion of the throat often extends farther than the pharynx, and even implicates the upper part of the œsophagus, deglutition being difficult or painful, or the fluids being rejected forcibly through the nostrils.

23. The febrile action is often in young children attended by coma, and generally in older subjects by delirium, which often lapses into coma. The delirium is commonly low or muttering, but it is sometimes violent or phrenesied. If it ceases in the morning, it generally recurs in the evening, or is even constant. In the more violent cases, the efflorescence either suddenly disappears or becomes livid; the fauces are black, and the breath most offensive; the eyes lose their lustre, and the swelling of the neck increases. The stools and urine are evacuated involuntarily, the former being frequent, watery, and most offensive, sometimes bloody; the latter turbid, brownish, or suppressed. The surface becomes cool; the countenance bloated, cadaverous, or œdematous; the parts pressed upon excoriated or sphacelated; the tongue brown, hard, or dry; the breathing laboured or interrupted by singultus; and death follows, with insensibility, congestion of the lungs, and great alteration of the state of the blood, and of all the circulating and secreted fluids. This result may appear very early—on the second, third, or fourth day. I have seen it occur on the second day, owing, in some instances, to the extension of the affection of the throat to the larynx, the patient dying asphyxied; in others, to a sudden coma, caused, probably, by serous effusion and alteration of the blood, and, in some, to congestion of the lungs, the depression of organic nervous influence produced by the poison, and the morbid state of the blood, occasioning or increasing these local changes, and consecutively abolish-

ing the vital functions, especially those of the brain, lungs, and heart.

24. *D. SCARLATINA SINE EXANTHEMATE.*—S. *eruptione*, R. WILLIAMS.—Scarlet fever may occur without any eruption, cases of this kind appearing chiefly during severe or fatal prevalences of the malady, and often in the same family in which it pursues a regular course. In this variety the nature of the disease is indicated by the morbid affection of the mouth, fauces, and throat, and by the febrile action, which is generally of an asthenic or low character. Dr. JOHNSTONE remarks respecting the malignant angina, prevalent shortly before the time at which he wrote, that “in some cases people have been seized with a severe angina of this kind without any eruption at all; yet even in these cases a great itching and desquamation of the skin have come on. This, however, has always happened among adults, not at all in children.” (P. 33.)—This variety is not always so limited, for I have observed it on several occasions in children, but in them the absence of the eruption appeared to be owing to the internal complication so frequently attending it in them. Dr. WILLAN observes, that “it is evidently a species of scarlatina, because it affects some individuals of large families, while the rest are labouring under some form of scarlatina, and because it is capable of communicating by infection all the varieties of that disease.” Dr. SIMS, RANOE, EICHEL, HAGSTROM, and STRUVE, on the Continent, noticed this variety; and FILTER, SPEUN, and others remarked that desquamation of the cuticle frequently occurred during convalescence nevertheless. Dr. HEBERDEN says that he has seen the eruption so partial as to be limited to the back of the left wrist. J. FRANK, that both he and others have seen many cases of scarlatina without any eruption at all. Mr. MURRAY mentions the occurrence of twenty cases without any eruption, when the disease prevailed at Aford, in Aberdeenshire. Mr. WOOD adduces sixteen cases which he observed during the occurrence of the disease in 1832 and 1833 at Edinburgh, in which no eruption was observed, and he considers these cases to have been those of scarlet fever, because none of these patients became afterward affected with the fever and eruption, though very freely exposed to contagion in the sick-rooms and convalescent wards. Dr. R. WILLIAMS remarks, that “there is seldom a year in which scarlatina has been in any degree epidemic; that cases have not occurred in which patients, not having previously had the scarlet fever, are seized with severe fever and sore throat, unaccompanied by any eruption; and on subsequent exposure to the contagion of scarlatina, they have been found insusceptible of the action of that poison; and hence it is fairly inferred that the disease they have passed through must have been a variety of scarlet fever.” During the many opportunities I have had of observing scarlatina, cases of this variety have come before me, but on no occasion have they been so numerous as in 1848. But it should not be overlooked that cases of most severe fever and sore throat, with all the indications of malignity, or putrid adynamia, may occur, as I have observed in several cases, in persons who have already had scarlet fever; and they may thus appear in sev-



eral members of the same family, probably owing to the existence of endemic contaminating causes, to which I have had occasion to impute them. It may appear singular, as, indeed, Dr. WILLAN has observed, that the slightest and the most violent cases of eruptive fevers—cases which vary as much in fatality as a flea-bite and the plague—should be associated together and spring from the same origin. Experience has, however, proved that scarlatina simplex, the anginosa, the maligna, and the scarlet sore throat, without the efflorescence on the skin, are merely varieties of the same disease, and that all of them proceed from, and communicate the same infection.

25. There are certain points respecting this variety of the disease which have not been sufficiently investigated, namely, 1st. Is the non-appearance of the eruption owing to the idiosyncrasy? 2d. Is this occurrence owing to the existence or severity of some internal complication? 3d. Is it more frequently followed by affections of the kidneys or other sequelæ than the forms of scarlatina already considered?—(a) It is difficult to determine the degree of influence exerted by *idiosyncrasy* in this or in other maladies, as the reference of an anomaly to this cause is merely an attempt to escape from a difficulty, and even when the most confidently asserted it is often no more than an unsubstantiated opinion.—(b) As to the *second* point, my experience induces me to conclude that this variety of the disease is frequently complicated, or followed by dangerous sequelæ; but I am unable to state the exact frequency or the numerical amount of these morbid associations, more particularly in comparison with the other varieties of the malady. I may add, that the fever characterizing this variety is most frequently of an asthenic or adynamic kind, even although the affection of the throat may not be very severe or malignant, which, however, it often is, especially in some epidemics; and that complications are frequently found at an early period, upon close examination, but that they are often more or less latent, or masked, until they have reached a formidable height, or they often escape observation until they are seriously advanced, or are displayed by a *post-mortem* inspection.—(c) As to the *third* question, I believe that affections of the kidneys are not merely occasional sequelæ, but are either concomitants or early complications of some cases of this form of scarlatina; for I have observed that the urine has been more or less albuminous in most cases, and even during, as well as after the disease, although dropsy has not supervened. It may be farther remarked, that obstructions of the functions of the kidneys in the course of the malady, and the consequent accumulation of morbid matters in the blood—the deficient depuration of the blood—are the causes not only of the consecutive dropsy, but also of the more immediate complications, or inflammatory congestions and sequelæ observed in the course of this and other forms of scarlet fever.

26. *E. SCARLATINA LATENS.*—*Latent Scarlatina.*—*Suppressed Scarlatina.*—*Masked Scarlet Fever.*—*Scarlatina without Eruption and without Sore Throat.*—Both in public and private practice, chiefly the former, rare instances of dropsy, especially anasarca, have for many years

back come before me, commonly in children, and in families or localities where scarlatina prevailed; and I have been told by the parents that neither eruption nor sore throat had been complained of previously to the appearance of the dropsy. I generally disbelieved the report, knowing that the mildest forms of scarlatina are most frequently followed by anasarca; and inferred that either sore throat or efflorescence had existed, but in so slight and evanescent a form as to escape detection. It was not until early in this year (1848) that I became fully convinced of the actual existence of this variety—of a latent scarlatina, and that the constitutional affection may be produced by this specific poison without developing its two principal or characteristic features—the eruption and the sore throat; the infection causing, nevertheless, lesion of the kidneys, with other concomitant sequelæ of a most dangerous kind. To one of these very serious and complicated cases of scarlatina I was called in this year by my friend, Mr. JOSEPH HOULTON, who had also recognised the scarlatinous nature of the disease, the case having occurred in a house where this malady existed. During 1848, other cases of the same kind came under my notice, all of those which I then saw having been of a complicated nature, and I have heard of several similar instances from other practitioners. Judging from the cases which I have seen, the dropsy consequent upon this latent form of scarlatina is more severe, complicated, and fatal than when it follows the more regular or usual forms of the disease. Is this owing to an early or premature affection of the kidneys resulting from the scarlatinal poison having prevented the manifestation of the disease in the skin and throat, the predominant lesions in this variety occurring in the urinary organs and serous membranes, and not in the usual situations? And is a certain amount of vascular action, with affection of either the throat or skin, or both, requisite to prevent the consecutive obstruction or lesion of the kidneys, productive not merely of dropsy, but also of other concomitant or consecutive lesions? If it be admitted that the morbid effects of the scarlatinal infection or poison are exerted primarily and chiefly on the kidneys and serous membranes or other internal parts in these cases, it may be reasonably inferred that the usual manifestation of the infection on the skin and throat will be thereby prevented and suppressed, and that the danger of the disease will be greater when these important organs and parts are attacked than when the skin and throat are moderately and not malignantly affected. Upon referring to authors respecting this variety of the disease, I can find no notice of it excepting in the clinical lectures of Dr. GRAVES, where he states that some years ago scarlatina attacked all the children in the family of a medical practitioner, with the exception of one young lady, who, when the children were convalescent, was attacked by anasarca. Her father was much struck with the occurrence, and felt convinced that it was the result of latent scarlatina. One topic as to this variety is worth consideration, viz., the relation subsisting between the infection, the fever caused by it, and the renal and other consecutive affections, as to whether the disease of the kidneys and the often associated

affections of serous surfaces, and of other parts, are the immediate effects of the poison in these cases, no eruptive fever, either with or without its usual concomitants of sore throat and efflorescence, having existed; or whether this fever and these concomitants actually preceded the renal and other affections, but in such a slight and evanescent manner as entirely to have escaped observation. From what I have myself observed, especially during 1848, I conclude that scarlatina may be prevented from being developed on external parts, owing either to the state of the constitution of the person affected, or to the primary operation of the scarlatinal poison on the urinary organs and serous or other structures. That the state of the recipient has something to do with this irregularity, or latent form of the disease, is indicated by the circumstance that most of the patients in whom I have seen it were cachectic or anæmied, their vital energies appearing insufficient for the development of the characteristic local and external manifestations of this malady. It is not unlikely, however, that the primary fever, consequent upon the infection, may have been so slight in all its phenomena as to have escaped detection; and yet, as in the slight but more obvious cases of eruption, to be followed by severe consecutive disease, these latter cases being admitted to be the most liable to such consequences.

27. *iii. COMPLICATIONS OF SCARLATINA.*—The complications, or predominant affections of vital organs or parts, constitute the most important topics in the history and pathology of scarlet fever. It may be remarked generally, as regards them, that their nature and tendency depend chiefly on the character of the constitutional disturbance; on the states of vital or nervous power, and of vascular action, in connexion with the condition of the blood; and that they may be inflammatory, or actively or passively congestive, or either of these associated, with so remarkable a loss of vital power and cohesion as to be rapidly followed by disorganization. In all complications occurring in the course of scarlatina, or of other specific infectious maladies, the local affections should be viewed as prominent lesions only, the whole frame being more or less infected or poisoned by the animal miasm, rather than as independent morbid conditions requiring a special treatment. However inflammatory, or however congestive the complication or prominent disorder may seem in these maladies, it should never be viewed, either pathologically or therapeutically, in the same light as inflammation or congestion occurring primarily or independently of a specific infection. The former has a peculiar character imparted to it by the specific poison, lowering and modifying organic nervous power and contaminating the fluids, while the latter is devoid of these poisonous influences and changes, and of their progressive consequences. Accordingly, we find that the same means as are successfully employed to remove inflammation, or congestion or effusion taking place primarily or independently of a specific infection, would be either quite inefficient or even injurious, if employed against these, when supervening as complications or prominent disorders in the course of scarlet fever or other infectious maladies. These latter are imbued with the con-

stitutional characters of these diseases, and partake of the type and diathesis which they manifest. The most important of the *complications* or *prominent affections* observed in the course of this malady are, 1st. Congestion or other lesions of the urinary organs. 2d. Diffusive or asthenic inflammation, extending from the throat to parts in the more immediate vicinity. 3d. Diffusive or asthenic inflammation of the gastro-intestinal villous surface. 4th. Affection of the membranes or substance of the brain. 5th. Asthenic pleuritis or pericarditis, or both. 6th. Asthenic pneumonia, or congestions of the lungs. 7th. Affection of the synovial membranes with effusion into the joints. Other organs or parts may be seriously affected, or even disorganized in the course of, or during convalescence from, scarlatina; but certain of these will be comprised under the head of sequelæ; and two or more of the affections now enumerated may even exist in the same case, either coetaneously or in rapid succession.

28. *A. The kidneys* may become affected in a very prominent manner early in the course of the disease; indeed, I believe them to be always more or less affected at an early period, although this affection has been overlooked at this period, and recognised only during the processes of desquamation and recovery. It is chiefly at certain seasons and during certain prevalences of the distemper that this early obstruction of these organs is most remarkable. I have met with it on many occasions; very few authors have mentioned the occurrence even of its usual consequences at this period. JOHNSTONE, however, observes, that "in some the face is much bloated and very sallow, the whole neck much swelled, and has a cadaverous look, and the whole body œdematous to such a degree that an impression made with the finger will remain fixed. The breath, towards the fourth or fifth day, becomes more and more fetid, and the patient spits up a large quantity of stinking purulent mucus, sometimes tinged with blood and of a livid colour." (P. 38.) In the cases attended by more or less œdema, or anasarca, during the period of the eruption, or associated with a deep or dark-coloured eruption, the patient, if not delirious or comatose, generally complains of much aching in the loins and pains in the limbs; and the urine either is very scanty, very high coloured, of a muddy brown, or dark-red colour from the mixture of blood globules, sometimes albuminous; or it is more or less or altogether suppressed. The importance of ascertaining the existence of this complication during the early stages of the disease is extremely great, inasmuch as the issue will depend much upon the treatment adopted for it. I cannot hesitate to state my conviction that, in many cases which terminate fatally at an early period of the disease, whether the eruption be abundant or scanty, or altogether suppressed, this issue is in great measure owing to the early implication of the kidneys having been overlooked; for I have remarked, in many instances, as respects both the symptoms during life, and the appearances of the kidneys after death, sufficient evidence to convince me that *these organs are remarkably congested, and their secreting and tubular surfaces are the seats of a similar vascular injection or efflorescence to that existing in the*



vascular rctc of the skin; and that this efflorescence on the surfaces of the uriniferous tubes, &c., and the associated swelling and congestion of these organs during the early stages of the malady, either impede, or interrupt, or altogether suppress the function of urinary excretion, and thereby occasion an accumulation of excrementitious and contaminating materials in the blood, and consecutively an increase of the poisonous action of the infected blood upon the nervous system and on vital organs and parts, thereby producing farther complications, more especially those about to be described.

29. In this early period of the disease, the interrupted functions of the kidneys, produced in the manner now stated, has the effect not merely of preventing the discharge by these emunctories of the usual excremental matters in the blood, but also of arresting the evacuation of those morbid materials evolved in the blood from the action of the infectious miasm upon the nervous and vascular systems. The obstruction of the kidneys, arising, as just explained, during the early stage of the disease, produces a more immediate and a more intense or acute effect, than the obstruction so frequently caused subsequently, and during or after the process of desquamation, by the accumulation and infarction of the epithelium scales thrown off from the uriniferous tubes. The obstruction in the uriniferous tubes, caused by the accumulation of epithelium scales in them during this latter period, is entirely the result of a species of desquamation, as respects these tubes, consequent upon the vascular action, congestion, and tumefaction of which they, with other parts of the kidneys, are the seat in the eruptive or early stage, and which in this stage frequently becomes, as just stated, the source of the most acute and fatal complications. The obstruction of the kidneys in the early stage, arising, as now shown, is often more complete and rapid in its accession than that which follows in the last stage as a process of desquamation; and hence the consequences are generally not so severe nor so fatal in this last stage, especially when due precautions are used during the period of desquamation.

30. *B. Inflammation of a more or less asthenic or diffusive kind* may extend in more than one direction from the throat, especially in the more malignant states of scarlet fever; and this complication may be more frequent in certain seasons and epidemics than in others.—(a) The most dangerous and rapidly fatal of these extensions of the local affection are *laryngitis* and *tracheitis*. When the angina attending scarlatina is not of a malignant kind, and when the pulse and affection of the throat do not indicate much vital depression or malignancy, the epiglottitis and larynx very rarely betray any disorder. But in malignant cases, and in adults, especially those who have been addicted to the use of spirituous liquors, or whose constitutions are broken down, this extension of inflammation to the larynx and trachea, and consequent asphyxia, are not rare. In most of these cases the larynx is only or mainly affected; but in others, especially in children, the trachea is also implicated. In the more malignant cases, death may occur in little more than twenty-four hours from the commencement of the attack, owing to this complication. Of this I

have met with two or three instances in adults, one in a man aged between fifty and sixty. In the cases of this kind which I have had an opportunity of examining after death, there was much firm lymph exuded over the tonsils and pharynx, extending into the larynx, the tissues underneath being swollen, injected, and œdematous.

31. (b) *Pharyngitis* is generally present in a greater or less degree in most of the severe cases of the anginous form of scarlet fever, and more especially, and in a most asthenic form, in the malignant variety. In many of these, especially in certain epidemics or seasons, the morbid action extends to the posterior nares, the nostrils and fauces, on the one hand, and to the upper portion of the œsophagus on the other, and is accompanied with the exudation of grayish lymph, which coagulates on portions of the affected surface, and imparts the appearance of sloughs. In some cases, instead of this exudation, an acrid or sanious discharge of an excoriating nature is observed, with sloughing ulcers; but these latter are more frequently found in some epidemics of this malignant malady than in others. In most of these cases attempts at deglutition are either very painful and difficult, or altogether abortive, matters being thrown out through the nostrils on attempting to swallow them. Sloughing ulceration is most frequently observed in the tonsils, and is more rare in the fauces, pharynx, or its vicinity; but this and other changes in the throat vary much in different epidemics. They are observed chiefly in the most malignant cases; and even in more rare instances of this kind which recover, the morbid action has extended posteriorly to the tissues and parts between the pharynx and bodies of the cervical vertebræ, until these latter, and the intervertebral substances and ligaments, have become implicated, and dangerous, if not fatal, sequelæ have followed the pharyngeal complication. Of this I have met with several instances in the course of practice (§ 47).

32. (c) The extension of the anginous affection along the *Eustachian tubes to one or both ears*, is a frequent and most distressing complication of the more severe states of this fever, and is not infrequently attended by destruction of portions of the soft palate, and of the small bones and membrana tympani of the ears. In some instances, caries of a portion of the temporal bones, and the extension of irritation and inflammation to the membranes, and even to the substance of the brain, have followed, either immediately or remotely, upon the occurrence of an *asthenic otitis* in the course of malignant or severe scarlatina. In these cases, a discharge more or less copious, and always offensive, takes place from the ears, and in rare instances even *hæmorrhage* from the ears occurs. I have not observed any instance where the hæmorrhage from the ear has been excessive; but Dr. GRAVES has adduced a case in which it was so great as to prove fatal; and it has also been noticed by FOTHERGILL.

33. (d) *Epistaxis* may occur in the course of scarlatina from very different pathological states. It may attend, or appear early in, the stage of eruption, especially in plethoric children, in those accustomed to epistaxis, or in those of a sanguine temperament and hæmor-

rhagic diathesis. If it be moderate, or even considerable, it may alleviate the cerebral symptoms, and be even critical or beneficial. This, however, occurs chiefly in the more inflammatory states of the disease; but when it is excessive, or when it accompanies the malignant form, it may be only one of the modes in which a fatal issue takes place. Even in the more inflammatory or sthenic forms of scarlatinal angina, an intercurrent epistaxis may be so excessive as to lower the power of vital resistance, and the patient may sink either from exhaustion, and from the want of correspondence between the capacity of the vascular system and the amount of blood contained in this system; or he may suffer another complication, favoured, if not more directly caused, by the hæmorrhage, namely, the extension of inflammation, in an asthenic or diffusive form, to the cellular tissue and glands of the neck. When epistaxis occurs in the course of malignant scarlatina, and is preceded by an offensive discharge from the mouth, nostrils, or ears, it may be viewed as a consequence of gangrenous or sloughing ulceration of the fauces, pharynx, or posterior nares, and, generally, it then hastens or causes dissolution. Epistaxis and bleeding from the throat, in these circumstances, are not rare, and have been noticed as more frequent occurrences in some epidemics than in others. These complications have been mentioned by HUXHAM, FOTHERGILL, GRAVES, and others. FOTHERGILL remarks that "the sick sometimes bleed at the nose towards the commencement of the disease; and the menses very often appear in those of the female sex who are of an age to have them." (*Works*, vol. i., p. 375.) And at another place he states that "it has happened in this distemper that hæmorrhages from the nose and mouth have suddenly carried off the patient. I have heard of the like accident from bleeding at the ear. But these fatal discharges most commonly happen after the patient has been ill several days; and it seems more probable that they proceed from the separation of a slough, rather than from a fulness of the vessels, or an effort of nature to relieve herself by a salutary crisis." (P. 376.)

34. (e) *Diffusive or asthenic inflammation of the cellular tissue of the neck* is one of the most dangerous complications of scarlatina, and is apt to occur when the throat is most malignantly affected. Dr. JOHNSTONE has remarked upon the frequency of this complication in the epidemic scarlatina of 1778. "The parotids also swell," he states, "grow hard and painful to the touch, and, when the disease is violent, a large œdematous tumour surrounds the neck, extends to the breast, and greatly increases the danger. The breathing then becomes more difficult, with a kind of rattling noise as if the patient was suffocating." This extension of the disease to the glands and cellular tissue of the neck is frequent during the prevalence of malignant scarlatina. I have often observed it, and it has been rarely remarked upon by Dr. KENNEDY, GRAVES, OSBREY, CHARLTON, and others. This diffusive state of inflammation may be greatest on one side, or it may surround the whole neck and throat and descend to the pectoral muscles. It may accelerate or cause death before passing into gangrene or suppuration, into either of which it may rapidly lapse;

and it may exist with the eruption or without it, or the parts affected only may present a dark or dusky erysipelatous hue. It is evidently the result of local contamination, spreading from the ulcerated and infected throat; and it may supervene either as a complication or sequela of the distemper; but, however it may appear, it requires the intentions and means of cure described in the article on diffusive inflammation of the CELLULAR TISSUE.

35. *C. Asthenic or diffusive gastro-enteric disorder* is a very frequent complication or prominent affection in the more malignant cases of this malady. It may occur either with or without vomiting, or it may only commence with this symptom; and it may be attended by an eruption of a more or less deep tint; or it may cause the sudden suppression, or the non-appearance of the eruption. It may be caused by the passage of the excoriating discharge from the throat into the stomach, especially in children, who seldom spit out the discharge, the gastro-enteric surface being irritated or excoriated by this morbid matter; or it may arise primarily as a prominent phenomenon of this fever, and by its increase, or general diffusion over the digestive mucous surface, prevent the evolution of the efflorescence on the cutaneous surface. Dr. JOHNSTONE remarks, that the acrid matter passing from the throats into the stomachs of children is "one reason why they are attacked with those violent gripings, dysentery, and excoriations of the anus and buttocks which sometimes attend the distemper, and show that the sanies retains its virulence throughout the alimentary canal." (P. 39.) The same statement had, however, been made by Dr. FOTHERGILL thirty years previously, and nearly in the same words (*see his Works*, vol. i., p. 374). HUXHAM, also, remarks that a sudden stoppage of the discharge from "the mouth and nostrils actually choked several children; and some swallowed such quantities of it as occasioned excoriations of the intestines, violent gripings, dysentery, &c.—nay, even excoriations of the anus and buttocks." (*On Fevers*, p. 280.) Dr. GRAVES adduces a case in which these excoriations were observed around the anus, but in it the cutaneous eruption was intense. In most of the cases in which I have observed irritability of stomach and diarrhœa, with or without excoriations of the anus, in the course of scarlatina, the eruption was either suppressed, or partial and scanty, or prevented from appearing; the throat, however, being more or less affected. In the first two cases of this complication which came under my care, and which I attended with Dr. CLUTTERBUCK in 1821, the eruption disappeared, diarrhœa occurred, and profound coma, with unconscious evacuations, supervened and farther complicated the disease. Nevertheless, both cases recovered. When diarrhœa complicates this distemper, especially in children, coma, or convulsions, or insensibility from vital exhaustion, not infrequently supervenes. When the diarrhœa is moderate and not attended by vomiting, and when the evacuations are bilious or feculent, then it may be salutary, or at least not injurious; but when it is consequent upon severe affection of the throat, or is attended by œdematous swelling of the neck, or is severe, the stools being watery or slimy, muddy, and very



offensive, it is liable to be followed by coma or fatal exhaustion.

36. *D. Convulsions, coma, and tremours* are frequently observed in the course of the more severe cases of scarlatina, and in the more nervous form of the disease; or in children of a nervous and susceptible temperament, convulsions, delirium, coma, and tremours may occur in succession. These complications, like many others, may appear either when the eruption is very full and general, or when it suddenly or prematurely fades, or when it becomes partial or recurrent; but generally the skin continues hot and dry.—(a) In very young children, *convulsions* may take place at or during the commencement of the distemper—and in this case they generally usher in a malignant or severe attack—and they may not appear afterward; but they may occur at any period, or not until near the fatal termination of the disease. They are seldom attended by squinting, and the pupils of the eyes are rarely dilated; generally they are contracted.—(b) Coma may supervene very early; but in children above five or six years of age it is generally preceded by delirium, and, in children under this age especially, it is often attended by partial convulsions. When coma takes place early in the disease, it can not be imputed to serous effusion between the membranes or in the ventricles of the brain, but rather to congestion or to a loss of cerebral power; and even when it supervenes at a more advanced period, it is to be attributed rather to these states than to effusion, although vital exhaustion and the morbid state of the blood may also be concerned in causing it. In most instances, and in whatever stage of the disease in which it occurs, the pupils are generally contracted. Although a dangerous, it is not a fatal complication, for I have seen several patients recover from it.\* When, however, it is attended by disappearance of the eruption, by a glassy state of the eyes, pallor and sinking of the features, tremours or startings of the tendons, and other signs of sinking of the powers of life, a fatal issue soon follows. Coma, convulsions, and other nervous symptoms, may occur also as *sequelæ* of scarlet fever, but generally in connexion with renal obstruction and anasarca (§ 41, *et seq.*).

37. *E. Congestion of the lungs, bronchitis, congestion, or asthenic pneumonia*, and even combinations of these, with or without *pleuritis*, are frequently prominent affections in the course of the more severe forms of scarlet fever. In most instances both lungs are affected, and bronchitis and lobular pneumonia are not infrequently associated, or are rapidly consecutive of each other. In the most severe cases, the general diffusion of disease through both lungs, added to other existing morbid conditions, has terminated life in from thirty to forty hours, or even in a shorter time, after the first appearance of the pulmonary complication. In

\* HILDENBRAND observes: "Insignem vero, et quasi innatam, febris scarlatinæ miasma ad membranas serosas, et in primis ad membranam arachnoideam encephali habet proclivitatem, ita quidem, ut non solum exanthemate derepente represso vicariæ in cerebro libentissime subsuscitantur reactiones, verum etiam lætissime florente manifestæ evolvantur congestionis cephalicæ, aut veræ encephalitiidis, indicia. Quod autem arachnoidea, et non alia patitur meningis, effusiones serosæ in preemortuo cadaveribus conspicuæ evincunt."—(*Institut. Pract. Med.*, t. iv, p. 383.)

these cases the substance of the lungs soon becomes solidified, especially in parts, and infiltrated with a bloody serum; the state of congestion insensibly passing into asthenic solidification or splenization, especially in the posterior or depending parts. The complications now mentioned may also occur in the milder or less malignant states of the disease, but generally either in an advanced stage or as *sequelæ*; and in these circumstances they approach nearer to the usual character which these affections present, although more or less modified, and requiring, owing to the state and nature of the constitutional disturbance and contamination, a peculiar mode of treatment.

38. *F. Pleuritis and pericarditis* may take place either separately or in combination, or in connexion also with affection of the lungs. The occurrence or association of these varies much in different epidemics and seasons, whether appearing as complications or as *sequelæ* of scarlatina. As *complications*, they are met with chiefly in severe or irregular cases, in which the eruption either is suppressed or does not appear; and, as *sequelæ*, they most frequently follow mild cases, and in connexion with anasarca and disorder of the urinary excretion; and, in these circumstances, they are soon followed by effusion, especially into the pleural cavities. These prominent lesions may exist and escape detection, either until they are far advanced, or until disclosed by a post mortem examination. This is particularly the case with respect to pericarditis, and even as regards pleuritis. A very careful and frequent examination is required to determine its presence in young children during the severer states of the malady.

39. *G. Peritonitis* may appear as a complication of scarlatina, either consecutively of diarrhœa and vomiting, or independently of these. I have, however, rarely met with it during the stages of the eruption; but more frequently as a *sequela* of the malady, and in connexion with obstruction of the kidneys and anasarca. It may generally be recognised, at whatever period it occurs, by the tenderness, fulness, and tension of the abdomen; by vomiting, and the heat and dryness of the surface of the trunk; and most frequently by the disappearance of the eruption. It usually soon terminates in effusion and in death, if not early detected and treated by means which will arrest the morbid action without depressing the vital energies, an intention which on a few occasions may be accomplished.

40. *H. Affections of the joints, erysipelas, gangrene, &c.*, may occur during an advanced stage of the more malignant states of the distemper, or even as *sequelæ*, during the period of desquamation, and, with the rest of the complications already noticed, are to be attributed chiefly to the following pre-existing changes: 1st. To the change produced by the infectious miasm upon the organic nervous influence and vascular system. 2d. To the alteration of the blood arising from this primary change, and from the action of the miasm on the constitution of the blood itself. 3d. To the active congestion, obstruction, and consecutive changes taking place in the kidneys at an early stage, as well as during the periods of desquamation and convalescence, whereby the blood is farther

changed by the accumulation of excrementitious elements or materials in it, owing not only to the obstruction of the kidneys, but also to suppression of the functions of the skin—two of the chief emunctories, by means of which effete and hurtful materials are carried out of the circulation—these two chief organs of depuration being more or less obstructed or interrupted in their functions during this disease. Owing to these consecutive series of changes, serous effusions take place not only in the larger shut cavities, with more or less irritation or asthenic inflammation of serous membranes, but also into the cavities of the joints, irritating the synovial membranes and eroding the cartilages. Owing to these changes, also, the internal surface of the blood-vessels, in predisposed parts, become inflamed or obstructed, and eliminating surfaces irritated or diffusively inflamed; the affected parts, owing to the depressed state of organic nervous power, and to the morbid condition of the blood circulating in it, soon losing their vital cohesion, and passing into sphacelation—changes readily accelerated and increased by pressure and the contact of morbid secretions or excretions.

41. III. THE SEQUELÆ OF SCARLATINA.—Having given the complications or prominent local affections of scarlet fever that amount of consideration which their importance demands, and which has not been accorded to them by previous writers, and having pointed out the sources or causes of their origin, of their severity, and of their fatality; and having stated that an attentive examination of the early as well as of advanced phenomena of scarlatina, and the lesions observed after death, show these sources or causes to be chiefly, or in great measure, the changes which take place in the kidneys at a much more early period of the distemper than has hitherto been believed, I now proceed to consider the more important sequelæ of the malady, and with due reference to their sources. If the inferences at which I have arrived from an attentive observation of the phenomena of scarlet fever be received, the sequelæ as well as the complications of the disease may be assigned to nearly the same sources. The primary obstruction of the kidneys is chiefly concerned, as shown above (§ 28, 29), in rapidly developing or increasing the complications, aided, however, by obstruction of the functions of the skin; and the secondary or consecutive obstruction of the same organs is equally concerned in producing the sequelæ, as already stated (§ 29), and with the same aid. The very same organs, surfaces, or parts, which are the seats of the complications or prominent affections, may also be seats of those lesions which constitute the sequelæ. Indeed, the local changes described above as complications may appear so late in the disease as to be considered with propriety as sequelæ, while those usually denominated and viewed as sequelæ may supervene so early as to deserve the former appellation.

42. It has been stated above that the complications are most apt to occur in the more severe states of the distemper, whether inflammatory or malignant; and that the early affection of the kidneys—as early, probably, as the occurrence of horripilations, faintness, vomiting, pains in the back and limbs, &c., ushering in the attack, or soon after this period—by ob-

structing the functions of these organs, and thereby augmenting the contamination of the blood, increases, in the first place, the intensity and malignancy of the febrile action—of the constitutional disturbance; and, with such increase, next develops local lesions of a severe or fatal character. The state of the skin probably aids, also, in producing these effects. If this be admitted in respect of the more severe cases, it follows that the milder cases of the malady are attended by a much more slight affection of the kidneys, and that the urinary secretion does not manifest so much disorder or obstruction in these latter cases as in the former. Now this is exactly what is usually observed. But it has been very generally stated that these milder cases are most likely to be followed by renal disease and dropsy. This is partly true, and is observed to obtain in some seasons more than in others, and more especially in certain epidemic prevalences of the distemper. It may be inferred, from what I have stated, that the sequelæ should be the most severe after the most malignant cases; but the obstruction of the urine in many of these is such as fatally to increase the malignancy; and those who recover very frequently experience a general and profuse perspiration, or copious discharges from the alimentary canal or other parts, which are somewhat vicarious of the obstruction of the kidneys, or which derive from these organs and diminish the consecutive affection. Besides, the amount of the consecutive obstruction may not be always great in proportion to that of the primary affection; for this may be rapid in its accession, and great in its amount, in respect both of the secreting structure and of the uriniferous tubes, and yet the obstruction caused by the desquamation of the epithelium, or the accumulation or infarction of the desquamated epithelium in the tubes, may not be so great as to cause any serious change either in the blood, or, through it, in other parts. When the functions of the skin are restored, and determinations of blood towards the kidneys, and congestion of these organs, by exposures to cold and other causes, are prevented, the desquamation of the uriniferous tubes may take place gradually and without obstructing the urinary excretion, while such obstruction would very probably occur if the kidneys were the seats of vascular determination or congestion, caused by constriction of the cutaneous surface, and by the arrest of the cutaneous excretion.

43. The frequency of sequelæ arising out of the obstruction of the kidneys, and the severity of these sequelæ, often are greatest after very mild cases, and in the latent states of the disease (§ 26). So very remarkably is this the case, as respects the latent form, and so dangerous are the associated affections sometimes attending this form, that I have had reasons to doubt whether the obstruction of the kidneys was, in this form, actually consecutive of an antecedent febrile attack, unattended by eruption or sore throat, or whether it was the primary change produced by the infectious miasm, which, instead of developing either a cutaneous eruption or a sore throat, had affected the kidneys in so severe a manner as to prevent the more external evolution of the disease, and to obstruct the urinary excretion, thereby increas-



ing the contamination of the blood and the amount of its watery constituents, and occasioning other dangerous consequences, more especially the several forms of dropsy, with or without irritation or inflammation of vital organs or of serous membranes. However the renal obstruction may arise—whether *secondarily*, as usually admitted, or both *primarily* and *secondarily*, as now first contended for, or sometimes *primarily only*, as just suggested—the consequences of its existence upon the state of the blood must be most serious. The blood necessarily becomes altered, both as respects an increase of its watery constituents and of its saline and solid ingredients, and as regards the formation of injurious materials from the elements furnished by the processes of ultimate assimilation, of absorption, and of imbibition or endosmose, even independently of, and in addition to, the more special changes produced by the poisonous miasm, or infectious ferment, in the progress of the development of its effects and of the multiplication and dissemination of its kind. The more manifest consequences as regards the blood are an increase of the serous portion, and a diminution of the vital crasis, of the fluid and of the cohesion of the crassamentum. The globules or molecules which concrete into fibrine, either partially or altogether cease to cohere in such a manner as to form this substance, causing an apparent deficiency of fibrine, although these globules or materials which form it are actually not deficient, or are even in excess. The depression of organic nervous or vital influence, and the primary and secondary changes of the blood, diminish or otherwise affect the fibrine by depriving the globules, or the material principle constituting this substance, either partially or completely, of the power of cohering so firmly as to produce it, with its characteristic properties, more especially in the advanced stages of the distemper.

44. The consequences of an excess of the watery portions of the blood, and of the other excrementitious matters, and of the existence of other injurious products, which may be reasonably inferred to be present, although not admitting of demonstration, may be briefly stated as follows: 1st. The development of irritative fever, the pulse becoming very rapid, vital power depressed, and the skin burning, &c. 2d. Over-distention, oppression, or congestion of the vascular system, more particularly of the veins and capillary vessels in predisposed and weakened organs. 3d. With the continuance or progress of these states, asthenic irritation or inflammation, with more or less effusion, serous or sanguineous, into serous cavities, or into cellular or parenchymatous structures, according as pre-existing conditions, or previous lesions or predispositions may favour their occurrence. Thus we observe, not only as *complications* of the several stages of scarlet fever, but also as *sequelæ* during desquamation and convalescence, various modifications and associations of the pathological conditions just stated—modifications and associations caused by states of predisposition, by the dose or amount of the infecting animal poison, and by the grade and kind of alteration produced in the circulating fluids, and consecutively in serous, mucous, and cellular parts.

45. Having shown the origin of the chief *sequelæ* of scarlet fever to be obstruction of the kidneys, frequently aided by constriction of the vessels, and obstruction of the functions of the skin, but as frequently arising without such aid, it is unnecessary to add more than to briefly notice the chief affections which supervene, either from this cause, or from the disease of the throat, during desquamation and convalescence. Certain of these require merely an enumeration at this place, although they are most important as respects the amount of lesion which attends them; but these lesions, when thus produced, are more fully considered under those heads to which they more legitimately belong, namely, as consecutive alterations or diseases of the structures or organs in which they are seated. Although obstruction of the functions of the kidneys and skin, with more or less of structural change of the former, is productive of a large proportion of the sequelæ of this malady, still the lesions, which were situated in the throat and its vicinity during the early stages, either by their continuance, their extension, or their severity, or by their recrudescence, owing to obstruction of the depurating functions, or to exposure to cold, or humidity, or currents of air, sometimes deserve to be ranked among the most serious sequelæ of scarlatina.

46. A. The most important of the sequelæ which are produced chiefly by the affection of the throat are, the *extension of disease to the ear*, with the consequences of this extension, especially destruction of the small bones of the organ; inflammation, ulceration, and perforation of the tympanum; chronic otitis, with offensive discharge; inflammation and ulceration of the membrane lining the cochlea and semicircular canals; caries of the petrous portion, or mastoid process, or other parts of the temporal bone; and even the extension of inflammation, suppuration, or ulceration, to the membranes and substance of the brain, may supervene, and, as respects these latter changes especially, not infrequently at remote periods from the primary affection of the throat and the extension of lesion to the internal ear. When disease of the ear is so far advanced as to implicate the bone in which the organ is lodged, the consequences are serious, not only as respects the organ itself, but also as regards adjoining vital parts, the affection of which often occasions great and protracted suffering, and ultimately fatal results. (*See arts. BRAIN AND ITS MEMBRANES*, § 58, *et seq.*, and *EAR*, § 20, *et seq.*)

47. B. The extension of inflammation, and even of ulceration, from the posterior *pharynx* to the *cellular, muscular, and ligamentous tissues interspersed between this part and the base of the cranium and upper cervical vertebrae*, has been noticed above in connexion with the advanced course of the malady (§ 31). But this lesion is met with not only as a complication, but also as a sequelæ of scarlet fever. In either form, in the latter more especially, it is often attended by spasm, contraction, or painful distortion of the head or neck; and in this state, the lesion has often been viewed as merely consisting of irritation, or of simple "crick in the neck," or of rheumatism from cold, and been overlooked until it has advanced to disease of the intervertebral substance, to destruction of the ligamentous or cartilaginous structure, and even to *ca-*

ries of the bones at the base of the skull, or of one or more of the cervical vertebrae, with thickening of the ligaments and of the theca of the canal, and complete or incomplete, partial or general paralysis. Of this sequela I have seen several instances, and two of complete recovery, with much shortening and stiffness of the neck from destruction of one or two of the cervical vertebrae, and ossific adhesion of those adjoining.

48. *C. The parotid glands, the lymphatic glands, and the adjoining cellular tissue, are not infrequently enlarged, congested, or inflamed after an attack of scarlatina, especially in scrofulous subjects, and in delicate persons residing in low, damp, or unwholesome situations. These are often merely the persistent or exacerbated states of the same affections which commenced at an early period of the fever; but they sometimes do not appear until much later, and although the connecting cellular tissue may be somewhat swollen, it is much more rarely the seat of diffusive inflammation than in the early stages of the malignant form of the disease. Whether existing merely as the remains of an early complication, or as a more or less remote sequela, these affections are often troublesome, especially when they advance to chronic supuration or abscess, as most frequently is the case in these circumstances; enlargement of the parotids often accompanying the other sequela of the disease.*

49. *D Affection of the Kidneys after Scarlatina, and its Consequences.*—(a) When the pulse continues very quick or sharp after scarlatina, for a longer time and in a more marked degree than may be attributed to debility merely, or to some degree of anæmia, the continuance of irritation in an internal organ or part, or the existence of obstruction of a depurating or excreting organ, may be inferred; and the same inference may be drawn, although the febrile symptoms had subsided, from the recurrence or supervention of this state of the pulse, during or after desquamation, especially if there be also present languor and pteevishness, heat and dryness of the skin, nausea or vomiting, pain or aching in the loins and limbs, drowsiness or stupor. When these symptoms appear, or if, with these, the tongue is loaded or furred, the bowels costive or irregular, and thirst increased, with or without horripilations, then should the urine and the region of the kidneys be carefully examined, and the approach of œdema or anasarca be expected, if, indeed, either be not already present. In many cases the symptoms which precede the anasarca are so slight as to escape observation, until œdema or fulness of the face, or indications of commencing anasarca evince the nature of the affection. In other instances the febrile commotion, with the symptoms now mentioned, are more or less manifest for a short time before, and contemporaneously with, the first appearance of anasarca. In every case the urine is at first scanty, often high-coloured, or turbid and albuminous; it is more rarely bloody, or of a pale red colour; sometimes it resembles water in which flesh has been washed, and there is always a frequent desire to pass it. In the less severe cases the urine is more copious, but is still turbid, and sometimes it contains numerous small fibres, consisting chiefly of epithelium, floating in it. After the

face, the feet, ankles, wrists, and hands first become œdematous; and in some instances the dropsy may not advance much farther; but more frequently the trunk and body generally become anasarcaous; and in the more severe cases, or when the urine is very scanty, bloody, and albuminous, or altogether suppressed, either contemporaneously with the incipient anasarca or during its progress, symptoms of effusion on the brain, or in the cavities of the chest, or in the abdomen, or even in all, make their appearance, and sometimes rapidly terminate life. These rapid and complicated cases of effusion are, in some epidemics, more frequent than in others, and are more especially so in the latent form of the disease (§ 26), or when there has been no antecedent eruption or sore throat, or when the disease is apparently attacking the kidneys and serous surfaces primarily, the evolution of its more external features being thereby prevented. The vascular excrementitial plethora produced by the obstruction of the kidneys occasions effusion into cellular parts, effusion from serous membranes, and asthenic or diffusive inflammation or œdema of parenchymatous organs, which, with the morbid state of the blood produced by the urinary obstruction, become the more immediate causes of death, but chiefly in the severer forms and more complicated states of the disease.

50. (b) *Anasarca and its morbid associations* may occur at any period after the eruption, as well as more rarely, but occasionally, in some epidemics, even during the eruption; but commonly from the fourteenth to the twenty-eighth day from the commencement of the disease, the 21st, 22d, 23d, and 24th days being those in which it most frequently appears. The proportion of instances in which these sequela or reliquia of scarlatina are observed differs much in different seasons and prevalences of the distemper. The dryness or humidity and temperature of the air, the weather, the prevailing epidemic constitution, and the treatment, must necessarily cause considerable differences in the ratio of these sequela at different times. Dr. WILLIAMS states that at Heriot's Hospital, in 1832 and 1833, nine cases of dropsy occurred in forty-five; and that in the London Foundling Hospital only three were affected with dropsy out of 100 cases of scarlatina. Mr. HAMILTON says, that a larger proportion of the numerous cases of scarlet fever which he attended in Edinburgh in 1832 and 1833, became dropsical. According to my observations, dropsy from obstructed kidneys, in all its forms and associations, has been a common consequence of scarlet fever for several years up to 1843, during which year it was most frequent and most complicated. But it appears to have been more or less frequent in all epidemics of this fever which have been fully described; the two occasions of its rare occurrence just mentioned being the most remarkable with which I am acquainted.

51. (c) *The origin of this dropsy was formerly ascribed to the state of the skin, and especially to obstruction of transpiration from this surface, in connexion with loss of tone of the capillaries supplying the parts in which the effusion occurred. More recent researches have shown that, however these states may aid in the production of these sequela, the affection*



of the kidneys should be viewed as the chief source of the effusion, and even also of the asthenic or diffusive inflammation and irritation of one or more vital organs sometimes associated with effusion into the shut cavities, whether occurring as complications during the eruption or as sequelæ (§ 28, 41).

52. (d) In the most favourable cases, œdema, or slight anasarca, may only occur and be ushered in, as already stated (§ 49), with acceleration of the pulse, scanty urine, and other febrile symptoms. But the anasarca may be excessive; or, even without being excessive, effusion of serum may also take place in the *brain*, in both *cavities of the chest*, in the *pericardium*, or in the *peritoneal cavity*. It more rarely is confined to one cavity than extended to nearly all, although in different degrees. As far as I have observed, when it takes place into the pleural cavities, a slight effusion is not infrequent into the pericardium also; and the *lungs* and *pleura* are then sometimes *inflamed*, but more frequently *congested*; inflammation rarely advancing farther than the state of splenization, but usually evincing the appearances of congestive or diffusive inflammation.

53. (e) Effusion into the ventricles, or between the meninges of the *brain*, may take place without effusion into any other cavity, and even without anasarca; but it may also be associated with one or more of such affections. When it occurs as a sequela of scarlatina it is generally not so rapid or acute as when it appears as a complication, nor is it so frequently attended by convulsions; although the stupor or coma may be as profound, and the organs of sense as much affected.

54. (f) Effusion into the *cavities of the chest* is generally preceded by anasarca, by congestion or inflammation of the lungs or pleura, or of both; and is sometimes attended by œdema of the lungs, and by effusion into the pericardium. The affections of the lungs and pleura, with effusion, are the most frequent internal complications of the anasarca, or remote consequences of the renal obstruction, effusion into the peritoneum being very much less common. The associated affections of the lungs and pleura are generally far advanced before they are fully manifested—are more or less latent in their early stages, and are seldom confined to one side, although one lung or pleura may be more diseased than the other. Dropsical effusion into the *peritoneal cavity* is generally preceded by œdema or anasarca, being in some instances an association of the latter; or by diarrhœa. It is occasionally attended by signs of inflammatory irritation of the membrane, but these signs may have been wanting or obscure, although indications of general peritonitis with effusion are found upon dissection; the early supervention of effusion probably removing the more severe local symptoms, as well as partially resolving the attendant inflammatory state.

55. (g) *Renal disease and dropsy*, as sequelæ of scarlet fever, may occur in patients of any age, but much more frequently in children from two or three years of age up to thirteen or fourteen. They are most common in the ill-clothed and ill-fed, and in those who live in low cellars or on ground floors, and in cold, damp situations, or who are exposed to cold or vicissi-

tudes of weather soon after or during desquamation. They are much more rare in the children of parents in comfortable circumstances than among the poor; from a fourth to a third or even more of the cases of the latter being probably thus attacked, especially in some epidemics, and late in autumn and beginning of winter. There is probably hardly a case of dropsy after scarlatina, or of inflammation of an organ or serous surface, particularly when associated with dropsy in connexion with this disease, that has not its origin in renal obstruction, although the interrupted functions of the skin, and the antecedent states of the blood, caused by the infectious miasm, may be admitted as concurrent causes. The kidneys are, however, so generally implicated, as I have contended above (§ 24, 28, *et seq.*), in all the stages of scarlatina, both primary and secondary, as to allow the inference, that the affection of these organs may exist in a grade sufficient to occasion indications of its presence, if attentively inquired after, and especially the symptoms mentioned above (§ 49), with more or less alteration of the quantity, appearances, and constituents of the urine, without producing such obstruction of this excretion, or such change of the constitution of the blood, as to be followed by dropsical effusion, this result supervening chiefly in the more acute and complete states of the affection of these organs. The consecutive inflammations, so frequently associated with the dropsy, also chiefly depend upon the renal obstruction, aided, however, as just stated, and as already more fully shown (§ 44, 45), by the states of the skin and antecedent alterations of the blood.

56. (h) The renal and dropsical affections consequent upon scarlatina, especially when severe, are often followed, during convalescence from them, by more or less *anæmia*; the alteration of the constitution of the blood—the contamination of the blood, directly and indirectly, by the infectious miasm, and consecutively by the obstructed emunctories—not only impairing the vital crasis of this fluid, but also hastening the changes in, and the destruction of, the red globules or hæmato-globulin, while the primary and secondary functions of assimilation—the formation of healthy chyle and the conversion of chyle into blood, or of the chyle-globules into blood-globules—are slowly and imperfectly accomplished, owing to the debilitated state of the several assimilating organs.

57. (i) *Inflammation*, generally of a diffusive or asthenic kind, and attended with more or less effusion of a turbid serum when the serous surfaces are implicated, not infrequently is associated with the consecutive dropsy; but it also, although much more rarely, occurs independently of any antecedent or attendant œdema or anasarca. When thus complicated, and even when occurring simply, it is generally owing to the state of the blood, arising, as shown above (§ 43, *et seq.*), from the primary and consecutive changes of this fluid, and the existing disturbance of the urinary and cutaneous excretions. The organs and surfaces which are most liable to be thus secondarily inflamed, either in connexion with, or independently of, dropsical effusion, are the *membranes of the brain*, the *lungs* or *pleura*, or *both*, the *pericardium*, the *peritoneum*, the *synovial membranes*,

the *parotid glands* and the *integuments*; and it is not rare to find not merely one, but two or more of these to be affected in the same case, more especially when the affection is associated with *dropsy*, and with manifest disorder of the *kidneys*, and with *albuminous* or otherwise *morbid urine* (§ 60, *et seq.*).

58. (k) Enlargement and chronic inflammation of the *parotid glands*, with effusion of serum, lymph, and puriform matter into the surrounding *cellular tissue*, and engorgement or inflammation of the *lymphatic glands*, are among the most frequent sequelæ of scarlet fever, and are often associated with *œdema* or *anasarca*, or with inflammation of the organs and parts just enumerated, and not infrequently with chronic disease of one, or of both ears, producing offensive discharge, perforation of the tympanum, and caries of the bones of the ear. *Chronic otitis* following scarlatina is generally of long continuance, sometimes occasioning caries of the mastoid cells and process, and even more extensive disease of the temporal bone. In some cases the disease extends to the membranes and sinuses of the brain, and even to the brain itself, as shown at another place (*see art. BRAIN*, § 58, *et seq.*); but these results seldom supervene until after several months, or even years.

59. IV. STATE OF THE BLOOD IN SCARLET FEVER.—Notwithstanding the chemical analyses which have been made in Germany and France, of the blood taken from the subjects of scarlet fever, it is doubtful if any real or useful progress has actually been made in this department of pathological research during the last century and a half. The analyses, especially as regards this fever, have been few, and the results, in connexion with the visible appearances and physical states of the blood, and with the stages and state of the disease, have not been stated with the least degree of precision. As regards the appearances and physical states of the blood, it may be remarked, that these depend upon the type of the fever, or the states of vital power and vascular action, and vary most remarkably with these states, as observed in other fevers and maladies attended by contamination of the circulation, and as described in the articles BLOOD (§ 115, *et seq.*), FEVER (§ 93, 110, 520), and PUERPERAL FEVERS (§ 215, *et seq.*). It is chiefly in the more inflammatory types of scarlet fever that blood has been taken and its appearance observed. In the more malignant forms blood has rarely been taken from a vein, and on the few occasions on which this has been done it has presented similar characters to those stated above (§ 43, 56), and to those mentioned in connexion with the fevers just referred to, and in the article BLOOD (§ 78, *et seq.*). ANDRAL and GAVARRET analyzed the blood of three persons in scarlet fever, and LECANU in two cases; but the results which these analyses furnish are not materially different from those obtained from the analysis of the blood of a healthy person. It is chiefly in the more malignant, or putro-dynamic type, and in the advanced course of the malady, that the blood presents morbid appearances such as are stated in the articles referred to; but in these circumstances it has not been chemically examined.

60. V. THE URINE.—The urine in scarlet fe-

ver presents the most important changes as respects the pathological states characterizing the several stages of the disease, and as regards the treatment of these states. These changes are various, not only in different cases, but also in the same case at different periods, and even in the course of a few hours, and hence have arisen the opposite or varying statements respecting this excretion which have hitherto appeared. The appearances and constitution of this fluid, moreover, have been very imperfectly investigated during the early stages of the malady, and the symptoms connected with the kidneys at these periods very insufficiently investigated, if not entirely overlooked, by most observers and writers on this disease.

61. The urine is always paler in children than in adults, and hence the deep colour of it in the former should attract more particular attention when observed in them, the most frequent subjects of scarlatina.—(a) The urine at the commencement, and during the early stages of scarlatina, is always scanty and very high coloured, and often of a deep red hue when there is much fever. It generally has an acid reaction in the mild and inflammatory or sthenic forms of the disease. In the septic or asthenic types, and especially when the affection of the throat or the eruption presents malignant characters, the urine is either neutral or alkaline and very turbid; sometimes it contains blood-globules; and is always very scanty, although in these, as well as in the more sthenic forms, it is voided frequently, or is attended by dysuria or scalding. In most instances, even very early in the disease, it rapidly becomes ammoniacal; but in the more malignant states it deposits a viscid, whitish sediment at an early period, consisting of the earthy phosphates and mucus, and it contains urate of ammonia and uric acid. When the urine is of a dark brown colour and turbid, or deposits a loose sediment of this hue, the presence of partially decomposed blood-globules in it may be inferred. Albumen is also sometimes present in the early stages, but in various or slight quantity; and it may be detected, or even be considerable, at one period, and not be found some hours afterward, and yet be soon again present.

62. (b) During the advanced stages of the mild and more sthenic forms of scarlatina, the urine becomes more abundant, of greater specific gravity, from the abundance of saline matters, and presents the characters usually observed during the decline of inflammatory and continued fevers. In asthenic, septic, or malignant cases, the urine becomes, with the progress of the malady, of a dark brown or yellowish colour, is very scanty, and of a specific gravity varying from 1020 to 1025. It has an alkaline reaction, with a disagreeable ammoniacal odour, and it occasionally contains blood and mucus, or partially-dissolved hæmato-globulin, either diffused or in flocculent deposits, but rarely any or much albumen. It throws down a dirty white sediment, consisting of earthy phosphates, urate of ammonia, urate of soda, and mucus, with other animal matters. In these cases particularly, and less rapidly in others, the urine becomes more decidedly ammoniacal and offensive.

63. (c) When the disease is complicated in the early stages or in its advanced progress, the urine



is even still more changed from the natural state than above stated. If the attack be malignant or complicated from the commencement, and more especially if there be coma, or signs of inflammation of the lungs, pleura, or other internal organ or surface, with or without effusion, or external œdema, or if these complications occur in the *latent* and *non-eruptive* forms of the disease, the urine will be either *bloody* or *albuminous*, and scanty, or it will be found to have been for some time previously either altogether *suppressed* or remarkably scanty, and high-coloured or bloody. Sometimes it appears like to the washings of meat, and is voided either frequently or involuntarily; and in others *hematuria* is decidedly present. In some cases urine has not been passed for many hours, and yet little or none has appeared to be retained in the bladder, indicating an arrest of the secreting function, owing either to suspension of the organic nervous influence of the kidneys, or to extreme congestion, or to both. In these cases, aching in the loins and lower limbs, nausea and vomiting, with general turgescence or œdema, headache, &c., may or may not be present, with one or more of the complications described above (§ 27, *et seq.*); but the pain and aching of the loins and limbs are not so great as usually observed in acute suppurative nephritis, although sufficiently indicative of suspended function and congestion of the kidneys, especially when viewed in connexion with the state of the urine and the sympathetic phenomena. The connexion of the renal affection, of the morbid and deficient urine, of the states of the blood and of vascular action, and of the consecutive inflammatory irritation, serous effusion, &c., with each other, and even the usual procession of these diseased states, in the course of scarlet fever, will be more readily understood by a due and practical consideration of this topic, and of what I have already said respecting it (§ 28, 41).

64. (*d*) During *desquamation* the urine generally contains albumen. SIMON remarks, that observations regarding the presence of albumen during this period are so contradictory as to render it a matter of interest to have the matter settled by farther researches. "We have dropsical symptoms with albuminaria, dropsical symptoms without albuminaria, and albuminaria without dropsical symptoms. SOLOX found albumen in the urine in twenty-two out of twenty-three cases of scarlatina. On the other hand, PHILIPP observed in Berlin at least sixty cases in which albumen was not detected."

65. In most cases, the urine is of a straw colour in this stage, contains mucus-corpuseles, and is turbid, owing to this circumstance, and to the quantity of epithelium, either in single scales, or in fragments of a connected series of scales, swimming in it. The sediment contains much epithelium, occasionally formed by lymph into cylindrical, fibrinous casts of the tubes, and crystals of lithic acid. These changes arise from the desquamation of the uriniferous tubes, and are sometimes antecedent to the desquamation of the cuticle. This early desquamation of these tubes furnishes a proof of the earlier and more constant affection of the kidneys than has hitherto been supposed, and is evidence of the important part performed by the pathological conditions of these organs at the

commencement of the malady for which I have contended (§ 28, *et seq.*). In favourable circumstances, no albumen is found in the urine, in most cases, during desquamation and convalescence, or the quantity is slight. But it is found in small or moderate quantity, in a few instances, without either inflammation, or œdema, or dropsy in any form being present. In some of these a slight febricula is observed, and soon passes off without either of these results. When, however, dropsy or inflammation follows scarlatina, the urine becomes albuminous generally with, or previously to, the febrile symptoms ushering in, during convalescence (§ 49), the dropsy or inflammatory affection, and continues to present this state, more or less manifestly, during the persistence of these sequelæ. It is often most remarkable in those cases of dropsy or inflammation which are consequent upon the latent and non-eruptive forms of the disease; and is sometimes farther attended by disease of the glands of the neck. When the urine becomes very albuminous during desquamation and convalescence, then acute febrile symptoms, and inflammation of some internal organ or part, or dropsical effusion, or both, either pathological state preceeding the other, soon supervene, and rapidly assume a severe or dangerous form. The urine, during this stage, often contains an increased quantity of the animal extractive matters usually existing in this excretion.

66. VI. APPEARANCES AFTER DEATH.—These differ remarkably, according as this issue takes place at an early or an advanced stage, and more especially according to the nature of the local affections complicating or following the disease. In the malignant form, decomposition follows dissolution sometimes with remarkable rapidity.—A. When death occurs at an *early period*, (*a*) the *surface* of the body appears either of a livid or of a violet coloured hue, generally in patches, when the eruption was present; but not infrequently all traces of the exanthem have disappeared. Upon dividing the integuments, the vascular rete is usually found more than commonly injected, and the subjacent cellular tissue is less turgid than during life.—(*b*) Generally, also, the redness of the *mouth* and *pharynx* disappears after death. The *tonsils* present different states, according to the prevailing type of the disease. They are frequently enlarged, softened, pultaceous, or gangrenous; and sometimes they are covered by a soft, membranous exudation. The mucous surface of the *pharynx* and *œsophagus* is considerably softened, and that of the former is occasionally ulcerated, softening and infiltration of the adjoining parts being manifest. The *palate* sometimes is partially destroyed by sphacelating, or septic ulceration, especially when the tonsils are gangrenous, or the pharynx ulcerated and softened.—(*c*) The *digestive mucous surface* varies with the character of the fever. In the more asthenic or malignant cases, it is softened, discoloured, and readily detached. Generally, BRUNNER's glands are more developed than natural, and the agminated glands of Peyer more tumid. The *mesenteric glands* are only occasionally enlarged and more vascular. The *spleen* is frequently enlarged, softened, and friable; sometimes it is almost pultaceous. The *liver* and *lungs* are often more or less congest-

ed, and the *blood* found in the auricles of the heart and veins is dark, semi-fluid, or grumous; and, in the malignant cases especially, this state of the blood is still more remarkable. The bronchial mucous membrane is injected with dark blood, and the *bronchi* often contain some mucus.—(d) The *kidneys* are always congested, tumid, and often of a dark mottled hue externally; while an increased vascularity, varying in degree, in the different structures, is found at this period of the disease, upon dividing the organ longitudinally. The urinary bladder is commonly contracted, and contains little or no urine.

67. B. When scarlatina presents any of the *primary complications*, or prominent affections mentioned above (§ 27, *et seq.*), during the second stage especially, the appearances are very different from those just stated; for, while those exist more or less manifestly, others are superadded.—(a) If the patient have been the subject of cerebral complications, the *membranes*, and even the *substance of the brain*, present increased vascularity, with some serous effusion between the membranes, especially at the base of the brain and in the ventricles, particularly in those cases in which the urine has been very scanty or suppressed.—(b) When the patient has been suddenly destroyed by the extension of the pharyngeal disease to the epiglottis, *larynx*, and *trachea*, considerable œdema of the glottis, between the chordæ vocales, &c., and general tumefaction of these parts, sometimes with the effusion of a dirty friable lymph upon the surface, partially detached, or but slightly adherent, and occasionally spreading down a portion of the trachea, are observed. This state of parts was seen by me, at an early period of my practice, in a man, aged about sixty, who died of scarlatina with sore throat in twenty-four hours from the commencement of the disease, owing to the extension of the local affection to the larynx. In these cases, the *lungs* are always found remarkably congested with black fluid blood, and the surfaces of the *bronchi* are dark or livid, and injected, the tubes often containing a bloody mucus.—(c) When the *parotids* are much enlarged, and the neck tumid, and the surrounding *cellular tissue* is the seat of asthenic or spreading inflammation, then these glands, and generally the lymphatic glands, are found enlarged, injected, and softened, and the adjoining cellular tissue is infiltrated with a sanguineous serum, or lymph, or puriform matter, each of three several kinds of morbid effusion predominating in different parts of the neck in the same case. If the patient have lived a few days, the morbid fluids infiltrating the cellular tissue have sometimes contaminated, and ultimately destroyed the vitality of this tissue; until the sphacelation which results has left the muscles and vessels of the neck almost as if dissected, and has even spread to the sternum. In a case to which I was called, the gangrene advanced as far as the pectoral muscles; but death generally takes place before disorganization proceeds so far as this. The changes observed in the *car* and its vicinity have been already noticed (§ 32, 46); but these are chiefly of the nature of spreading inflammation along the Eustachian tube to the internal ear, and sometimes also to the mastoid cells, cochlea and semicircular ca-

nals, and are occasionally remotely followed by disease of the bone containing these parts.

68. (d) When *pneumonia* complicates the disease both lungs are generally affected, although in different degrees, and the appearances vary somewhat with the type of the fever. Most frequently the lungs present in various grades, in different parts, but most remarkably in the posterior aspect, congestion, with effusion of a serous or fluid lymph, or with a more firm lymph in some places, giving rise to varied grades of splenization, death or recovery taking place before the change can proceed farther. The *pleura* is frequently either decidedly inflamed, or contains fluid with or without manifest inflammatory changes, and often in connexion with pulmonic congestion or inflammation. In the more sthenic forms of the disease, lymph, in some instances, is exuded, with or without, most frequently with, serous effusion, and sometimes with adhesion of the opposite surfaces by bands of fibrinous lymph, or more continuously.—(e) In the asthenic or malignant states, the marks of inflammation are less obvious, but the effusion into the pleural cavities is greater; and similar changes are sometimes observed, also, in the *pericardium*.—(f) Inflammatory appearances, generally with a turbid, serous effusion, and occasionally with slight or partial adhesions, are sometimes found in the *peritoneum*.—(g) The synovial membrane of the *joints*, in a few instances, has presented marks of inflammatory action, with more or less effusion into its cavity.

69. C. When death occurs during desquamation, or subsequently, owing to either of the *sequela*, or secondary complications, noticed above (§ 41, *et seq.*), the appearances differ but little from those just mentioned, with reference to their respective affections, excepting that they either consist, in great measure, of dropsical effusion of greater or less extent and amount, or are associated with other lesions of an inflammatory, congestive, diffusive, or of a mixed kind.—(a) The most frequent changes exist in the *kidneys*, and in the *slut cavities* and *cellular tissue*, in the form of effusion, often with inflammatory appearances. The *kidneys*, in the more rapidly fatal cases, and in those which occur at an early period of desquamation, are frequently injected, or congested, mottled or marbled externally; and internally, the constituent tissues present various appearances, certain of them being very vascular, others pale or anæmic. Hence the substance of the organ often is mottled, and generally not much increased in bulk, unless when the congestion and vascularity predominate. On examination by the microscope, the Malpighian bodies are often seen to be pale, and the surrounding capillaries injected, while the tubuli are filled with epithelium cells or scales. In those cases in which dropsy occurs later in the course of recovery, and which are of longer duration, the *kidneys* generally present somewhat different appearances, which more nearly approach those observed and described in the articles DROPSY (§ 13) and KIDNEY (§ 23, *et seq.*), when treating of the changes connected with *albuminaria*. Although the surfaces of the organs are sometimes mottled, and more or less congested, their structures, on division, are pale, especially in spots, as if anæmic, or from the deposition of



lymph or albumen, and approach the characters of granular degeneration. The Malpighian bodies and the surrounding capillaries appear pale and bloodless under the microscope, and the tubuli are filled, in various places, with epithelioid cells, and in others with what appears to be a mixture of albuminous matter or lymph, and oil-globules, or of these with detached epithelium.\*—(b) As respects the *cellular tissue*

\* After this article was sent to, and while it was passing through the press, Dr. G. JOHNSON's very excellent article on the kidney, in the *Cyclopædia of Anatomy and Physiology* (art. REN), was brought to my notice, as well as his valuable paper in the Transactions of the Medico-Chirurgical Society (vol. xxx.), in both which places the morbid anatomy of the kidneys after scarlatina is ably described. Dr. G. JOHNSON, who was the first to detect oil or fat in the kidneys, in granular disease of these organs, states that he has not found oil in the urinary tubes after scarlatina. I observed some oil-globules in two cases of a more than usually chronic duration, as stated above; but Dr. JOHNSON, who has examined more of these cases than I have, without meeting with this change, justly considers the scarlatina affection of the kidneys as very distinct from the granular disease of the kidneys described by Dr. BAIGT; and while he denominates the former "*acute desquamative nephritis*," he terms the latter "*fatty degeneration of the kidneys*." I believe that the more acute or rapidly fatal cases of dropsy or inflammation after scarlet fever rarely present any oil-globules in the urinary tubes; but that, when the scarlatinal nephritis becomes chronic, and is followed by change of structure, then oil-globules are found in the tubes. In one of the cases in which I observed them after scarlatina, the man who was its subject was between thirty and forty years of age, and was probably irregular in his habits, the consequent anasarca having been of considerable duration.

"*Acute desquamative nephritis*" of Dr. G. JOHNSON occurs frequently as a consequence of scarlatina, and is occasionally produced by other animal poisons, as that of typhus fever, small-pox, or measles. I have noticed, in the article KIDNEYS (§ 56, *et seq.*), the connexion of this form of nephritis, which I have named "*consecutive or secondary asthenic nephritis*," with febrile and other diseases, and the various circumstances of this connexion. In relation to scarlatina, I have contended above that it occurs either *primarily or secondarily*; and that often there is thus a "*primary scarlatinal nephritis*" and a "*secondary scarlatinal nephritis*" (see, also, art. KIDNEYS, § 56), or inflammation of these organs either associated with the scarlet fever or occurring as a consequence of this fever. Dr. G. JOHNSON describes the nephritis *consequent upon scarlatina* as follows: "The kidney in these cases is enlarged, apparently by the deposit of a white material in the cortical substance; the vessels in the cortical portion where they are not compressed by this new material are injected, and of a bright red hue; the medullary cones are of a dark-red colour, in consequence of the large veins which occupy these portions of the gland being distended with blood. The appearance of the entire organ is quite that of a part in a state of acute inflammation."

"When the kidney has been in a softened condition before the occurrence of the inflammatory disease, as often happens in elderly persons, the lobules on the surface appear larger and coarser than natural; the veins, being less compressed than when the natural texture of the kidney is firmer and more unyielding, are much distended with blood, so that the entire organ is of a dark slate colour."

"On a microscopical examination, the convoluted tubes are seen filled, in different degrees, with nucleated cells, differing in no essential character from those which line the tubes of the healthy gland. The Malpighian bodies are for the most part transparent and healthy, but the vessels of the tuft are sometimes rendered opaque by an accumulation of small cells on their surface. Some of the tubes contain blood, which has doubtless escaped from the gorged Malpighian vessels. There is no deposit exterior to the tubes."

"The condition of the urine in these cases is clearly indicative of the process going on in the kidney. After it has been allowed to stand for a short time, a sediment forms; and on placing a portion of this under the microscope, there may be seen blood-corpuscles, with epithelial cells in great numbers, partly free and partly entangled in cylindrical fibrinous casts of the urinary tubes, and very commonly numerous crystals of lithic acid are present."

"As the disease subsides, which, under proper treatment, it usually does in a few days, the blood, fibrinous casts, and epithelial cells diminish in quantity, and finally disappear; but traces of the casts may be seen some days

and the *serous cavities*, it need only be added that the former is generally more or less loaded with serum; the latter sometimes contain effused fluid, with or without slight or marked inflammatory appearances, although these latter are not so frequent or so marked as in the primary complications noticed above (§ 27, *et seq.*). The effusion, as well as inflammatory changes, may exist only in one of the cavities, or may extend to two or more. Both pleural cavities are generally implicated, but sometimes in different degrees; and the *parotid* and *lymphatic glands* are often enlarged, and the *joints* occasionally inflamed.—(c) I have likewise seen the *vertebrae* of the neck, their ligaments and intervertebral substance seriously affected, caries of the former with chronic inflammation, thickening, &c., of the *theca* supervening, and occasioning cervical paraplegia or general palsy (§ 47).

70. VII. DIAGNOSIS.—Scarlatina can be confounded only with measles (*Morbilli*), or with the mixed or hybrid disease which I have described by the name of *Rubcola*.—A. Dr. R. WILLIAMS has stated that the earlier appearance of scarlatina after exposure to infection, and of the eruption after the primary fever, may serve to distinguish this disease from measles. But, although these circumstances frequently obtain, and may be viewed as the law, still the exceptions furnished by different epidemics and by individual cases are so numerous, that but slight importance should be attached to them. This will be still more apparent upon referring to what I have adduced respecting the periods of *latency* in these maladies in the article on INFECTION (§ 31, 32). The appearances of the efflorescence in both maladies, and the signs furnished by the inlets to the digestive and respiratory passages, and the states of the urinary functions, are chiefly deserving attention in establishing a diagnosis between *scarlet fever* and *measles*. In the former, the tongue presents redness of the point and edges and strawberry surface, and the fauces more or less redness at an early period, while the tonsils are enlarged, or soon afterward are ulcerated. There is seldom, or very rarely, sneezing or coryza, both which usher in measles; and in the latter the affection of the throat is either altogether absent or very slight, while cough is often severe. The *period* at which the *eruption* appears differs much with the constitution of the patient, the season, and character or type of the prevailing epidemic, as regards both maladies; and although deserving of mention as respects the description, cannot be depended on in the diagnosis. In scarlatina the patches are large, and the surface covered by them generally ample; but in measles the eruption consists of small circular dots like flea-bites, and when most confluent the patches or clusters are small. The colour of the rash is that of a vivid red in scarlatina, while it approaches a raspberry hue in measles. The former can hardly be mistaken for *roscola*, which is preceded by very little fever, and rarely by any affection of the throat, and the rose-coloured and irregular spots of which differ much from the large patches of scarlatina. In most cases, the

after the urine has ceased to coagulate, on the application of heat or nitric acid.—(*Cyclop. of Anat. and Physiol.*, art. REN.)

eruption of scarlet fever is more general than that of other exanthematous diseases, while the fever is more persistent, and does not abate with the development of the eruption, and but slightly, or not at all, with the disappearance of it, but often continues many days, or even some weeks afterward, or is sometimes considerably exacerbated after having abated. In measles the fever usually subsides with the appearance of the rash.

71. *B.* The kidneys are not nearly so liable to be affected in measles as in scarlet fever, in which they are remarkably disordered, both primarily and secondarily, and the urine is either partially or altogether suppressed, or otherwise morbid. The infectious miasm of scarlatina has a special influence on the states of the kidneys, as shown above (§ 28, *et seq.*), and thereby often induces several secondary affections not observed to follow, or very rarely, the other exanthematous fevers, more especially dropsies, diffusive or congestive inflammations with serous effusion, &c., affections of the joints, gangrenous erysipelas, &c.

72. *C.* The diagnosis of the *primary fever* of scarlatina is often difficult or impossible, if the anginous affection be absent, and if no eruption have appeared. The circumstance of the disease being in the same family, house, or immediate vicinity; the states of the tongue, throat, flexures of the joints, and urinary excretion, and the character or type of the fever, will sometimes aid the diagnosis, although the severity of the disease, the affection of the head, the convulsions or delirium, the vomitings and thirst may lead to the belief that the first stage of meningitis is actually present. In most cases, however, of this period of scarlatina, the severity of the vomiting; the pains in the back and loins; the remarkable scantiness and morbid appearances of the urine; the burning heat and dryness of the skin; the enlargement of the parotids, or the existence of some complication; the great rapidity of the pulse, and the acuteness of the attack, should induce suspicions of scarlatina, especially in the circumstances just mentioned, although neither eruption nor throat-affection is present (see above, § 4, and *art.* MEASLES, § 48).

73. VIII. PROGNOSIS, &c.—It has been attempted by some writers to impart an *ad captandum* precision to the prognosis of scarlet fever that the subject does not admit of, by calculating the proportion of deaths in this disease; but it is obvious that the rate of mortality will vary with the several forms, types, complications, &c.; with the combinations of predisposing causes, and with the treatment.—*A.* In the simple, mild, and more sthenic types of the malady, the prognosis is favourable, although the contingency of secondary disease should be taken into account, yet this may be generally guarded against and prevented. When the malady is complicated, irregular, malignant, or asthenic, then the danger is considerable, although numerous circumstances may indicate either a diminished or an increased risk. It is chiefly from the existence of certain symptoms that danger is to be inferred; but there are *circumstances* connected with the pre-existing state of the patient which often increases the risk, as the first period of *dentition*, the period of *weaning*, the *cachexia* produced by

unwholesome or insufficient food; a bloated, leucophlegmatic or plethoric habit of body, and the *pregnant* and *puerperal states*. In some epidemic visitations, and in some seasons more than in others, pregnant and especially puerperal females are liable to be attacked by scarlatina; but the liability is not so great as the danger to those who are infected; for the *pregnant* are prone to abortion, and when this occurs the disease often assumes a most dangerous form; and if the disease occurs soon after *parturition*, recovery rarely takes place, more especially as observed in some epidemics. In these latter circumstances the scarlatina often assumes the appearance of, and can hardly be distinguished from, the most malignant form of puerperal fever. Scarlatina thus occurring soon after *parturition*, has been described as follows by MALPATTI: "It usually attacked patients immediately after delivery, and caused the utmost prostration of strength and slight pain in the throat. The eruption assumed either the milliform or levigated character, and was of a dark violet hue. The strength of the patient now sank rapidly, and to a burning heat succeeded coldness of the extremities, and a very frequent and small pulse. To these symptoms were added great anxiety, hæmorrhage from the nose, and a fætid and copious lochia." He adds, that the infected in this state all died, "*qualiscumque adhibita fuerat medela.*"

74. *B.* The *symptoms* which more especially indicate danger are the occurrences of convulsions at or soon after the attack, or of delirium on the first and second day. In these cases the child often dies, as remarked by Dr. R. WILLIAMS, on the third or fourth day, and the adult on the eighth or tenth; but this issue sometimes in these takes place even earlier, more rarely later. A severe affection, or sphacelating or foul ulcerating state of the fauces and tonsils; a brown state of the tongue, or a clean, raw tongue, or a glossy state of the tongue or throat, with a rapid, fluttering pulse, are very unfavourable symptoms, as also is a sudden fading of the eruption, or the changing of it to a livid hue, or the appearance of petechiæ or of purple spots. The supervention of coma, or of pericarditis, or of double pneumonia, or pleuritis, or peritonitis is unfavourable, but not necessarily fatal; but the danger of these, as well as of all the other primary and secondary complications of the malady, is remarkably heightened by suppression of *urine*, or by a very scanty or bloody state of this excretion, and by other indications of serious affection of the *kidneys*. Persistent vomiting; a severe or obstinate diarrhœa; acrid or excoriating discharges from the mouth, throat, and nostrils, with or without hæmorrhages; hæmaturia or melæna; the association of two or more of the complications or local affections already described, especially in a severe form; the appearance of diffusive inflammation of the cellular tissue in the vicinity of the parotids, and extending down the neck, or of extensive abscesses, or sphacelation, in this situation, are very unfavourable occurrences. The same may be said of affections of the joints, erysipelas or local gangrene, and affection of the cervical portion of the spine, with consecutive caries of one or more cervical vertebræ. But these are not necessarily fatal, although very dangerous; even



from the last of these lesions recovery may take place, a result which was obtained in two cases which were under my care, both of which are now alive and quite well, excepting a stiff and shortened neck.

75. *C. Dropsy*, in the form of anasarca, or taking place in any of the cavities, in connexion with scarlatina, varies much in danger with the season and the prevailing epidemic, with the seat of effusion, with the nature of other associated morbid states, and more especially with the states of the kidneys and urinary excretion. The occurrence of anasarca *during the eruption*, or of effusion in any shut cavity at this period, with or without inflammation, is an indication of danger, more especially if the urine be very scanty, very deep-coloured, or suppressed. Anasarca occurring alone *during desquamation or convalescence*, although the urine is albuminous, is generally cured if no farther complication take place, and if the urine is not very scanty, or very albuminous, or bloody. But if the urine assume either of these states in a remarkable degree, the supervention of most dangerous internal effusion or inflammation, chiefly of the meninges of the brain, of the pleura, pericardium, or peritoneum, or of the lungs, &c., may be expected. The danger and the frequency of these secondary complications of scarlatina, as well as of the primary associations, vary much in different epidemics, and with the numerous causes or occasions concurring to render the infection intense, or to re-enforce the operation of the poisonous miasm, and with those more especially which are about to be mentioned (§ 84, *et seq.*).

76. IX. CAUSES.—i. THE SPECIFIC CAUSE OR POISON.—A. Scarlet fever is *caused* by a *miasm* or *emanation* from a person already the subject of this disease; but the exact and intimate nature of the miasm, and the origin of it, are unknown. We know only the effects or phenomena which this cause produces, and most of the circumstances which favour its operation; and we farther know that, however these effects vary in severity, in form, or in character, they are always of a specific nature, the seminum attending them multiplying and disseminating itself, and spreading its kind whenever circumstances favour the propagation. Upon these circumstances the prevalence of the malady chiefly depends; for they favour the operation of the specific poison or infectious miasm which produces it: 1st. By predisposing the system of individuals to the invasion of this miasm. 2d. By concentrating and increasing the dose or quantity of the poisonous emanation invading the frame. During many ages, and especially when the earlier accounts of the malady were furnished, either the combinations of these predisposing circumstances were greater at distant intervals, or their absence was more complete in these intervals than at the present day, or the infectious or poisonous miasm was entirely absent, or remained latent or concealed for prolonged periods. Either of these conditions may have existed; or the infection, having produced its effects on all who had come within its sphere, had ceased to spread, and had ultimately disappeared from a place for a longer or shorter period, until it was introduced by a poisoned or infected person, or by contaminated articles or fomites. This latter

circumstance—this reappearance of the malady in a place long entirely exempt from it—suggests the following questions as to its origin: 1st. Whether the disease is caused only by a specific seminum which had originated at some unknown period, and, having infected one and more persons, and subsequently all who were predisposed to the infection, had then ceased to produce its effects, but was retained by substances capable of preserving it under certain favourable circumstances until it was again brought to act on those predisposed to its influence? 2d. Whether the disease is always thus perpetuated by the preservation of the infectious seminum by individual, or rare, or scattered cases, and by fomites; or is it produced, *de novo*, by the combination of those causes in an intense form which are usually viewed as concurrent and predisposing causes, and, being thus produced anew, is then propagated by the infectious emanation proceeding from those thus attacked?

77. I incline to the first of these opinions, because we have no sufficient evidence of the reproduction of this malady by the combination of the causes usually favouring it, predisposing to it, and rendering attacks of it malignant or complicated; and because an infectious seminum, as in the case of small-pox, may be preserved, propagated, and become epidemic—may almost disappear for a time, and then unexpectedly break out—without the means of its preservation, the sources of its infection, or the causes of its prevalence and of its multiplied effects being made manifest, or even admitting of solution on many occasions. But the difficulty of tracing infection to its sources on all occasions, in this and in other infectious maladies, is by no means an argument against its existence; for causes are often inferred from their effects with greater certainty than from some other proofs upon which firmer reliance is often placed. The laws of infection, and the numerous circumstances connected with the sources, the preservation, and the dissemination of infectious semina, admit not of a rational doubt of the perpetuation of these semina, although their effects may be sparingly or rarely disseminated, or even developed, after long intervals. Indeed, much of what is known of these favours a firm belief in this source of scarlatina, as well as of measles and small-pox, on all occasions and in all instances. We know that the vitality of several kinds of seed may be preserved for many ages; and why should not the poisonous properties of an animal fluid or miasm be preserved for months, or even for years, when exclusion from the air and other circumstances favour the preservation? Admitting this, allowing also that the seminum often requires many days to take root and to develop itself into full efflorescence, knowing, moreover, the diversified media by which the morbid or poisonous emanation may be preserved, conveyed, and brought even into unrecognisable operation, it cannot be a matter of surprise that the source of infection frequently admits not of demonstration. Two powerful circumstances in favour of the existence and operation of a specific infection or poison have too frequently been kept out of view, namely, 1st. The non-existence or non-appearance at any time of this disease in several secluded or isolated localities and islands, although the sev-

eral causes tending to favour the dissemination and malignancy of the disease—those very causes which have been believed by some to be capable of originating the malady *de novo*—have been there present in the most pregnant forms of union and association; and, 2d. The fact that, when the disease has made its appearance in such places, it has always been traced to the introduction of infection, and, having exhausted itself on all the predisposed to it, has entirely ceased and disappeared for years, until again introduced by the infected or by fomites.

78. If we refer to what is known (and our knowledge in this and in other allied topics is very imperfect) respecting the statistics of disease in most of our cities and large towns, we shall find that at no time are cases of scarlatina altogether absent. I believe, moreover, that cases often occur which are either not recognised at all, or not as cases of this disease. Hence sources of infection are rarely absent from these localities, irrespective of the chances of transport to and transmission from them; or, if absent for some time in one place, they are present in other places, from which they are transmitted to those which have been for a longer or shorter time exempt from them, and which, from this circumstance, furnish subjects predisposed to infection.

79. *B. The media* by which this disease is transmitted from those affected to the healthy are generally the atmosphere surrounding the sick, and substances which imbihe the miasms emanating from those who are or have been recently attacked, and which retain it for a time, but soon impart it to the air—*fomites* (see *art. INFECTION*, § 16, 17). It has not been demonstrated, nor, indeed, does the matter readily admit of precise demonstration, how far the miasm of scarlatina may extend by means of the atmosphere from a person sick of the disease. Much will depend upon the state of the air as to humidity, motion, &c., and upon the predisposition of those exposed to it. It has been supposed, that the appropriation of a room in schools for such children as may be seized with either scarlatina or measles may prevent the spread of the disease among the healthy. This has been attempted in many instances; and by myself, in respect of these diseases, on several occasions, and on two occasions with complete success, in others with partial but very considerable success. Much depends upon the size and construction of the building, and the strictness of the seclusion, and of the precautions as to fomites. This measure failed in Heriot's Hospital, Ackworth School, and the London Foundling Hospital, where the buildings furnished excellent means of isolating the infected. But I suspect that the precautions taken failed in preventing the transmission of the infecting miasm by persons or clothes. Besides, when a school is large, some of its inmates may have been so long the subjects of the eruptive fever before the disease is recognised as to have infected others previously to their removal. When the building furnishes the means of complete isolation, the attempt at thus preventing the spread of the disease should be made; for it is better that the infected should receive due attention in such circumstances at the place of infection than that they should be returned to their friends, where they may trans-

mit the disease to many others; and it is even better that those in the infected school, who have not yet sickened, should not be allowed to leave it, inasmuch as they may convey the disease in their persons or clothes to the families to which they would return.

80. *C. Fomites*, or substances impregnated with the miasm exhaled by persons sick of scarlatina, are frequent media by which this disease may be transmitted to the healthy, either in the vicinity of the sick or in places at a great distance. The *duration* of the period in which the capability of infection is possessed by fomites is uncertain, and it has not been ascertained. It may be inferred to be very short when the impregnated substances have been exposed to a free current of air, and much longer when they have been shut up and entirely prevented from imparting or losing the retained miasm. Feather-beds and woollen bed-clothes retain the infection for the longest period, especially when undisturbed or shut closely up. The duration of the power of infection, in respect of these articles and of woollen body-clothes, has not been and is not likely to be determined; for various circumstances will either shorten or prolong the period. Dr. SIMS remarks, that "the infection seemed to remain in a house some, but not many, weeks after all the family were recovered." In large, airy houses, where ventilation and means of purification are adopted, a very few weeks may be considered sufficient to remove the infectious property, especially if the beds and bedding are subjected to a high range of temperature, as advised in the article on *the prevention of PESTILENCE* (§ 77). But where these means are neglected, and in close, dirty, and low apartments and houses, and in crowded localities and houses where the beds, bed-clothes, hangings, &c., are foul and insufficiently aired, the power of retaining and transmitting infection may exist for several, if not for many weeks. When fomites are shut up and excluded from imparting the retained miasm, the disease may be thereby conveyed to distant or remote parts, and even without the source of infection or the media of transmission either being recognised or admitting of recognition.

81. *D. The propagation of the disease by inoculation*, and by the contact of the morbid secretions of the disease, has been demonstrated. Sir B. HARWOOD and others have tried to inoculate healthy children with the fluid from vesicles sometimes intermingled with the eruption of scarlatina in hopes of producing a milder disease, as in small-pox; but although the disease was thus communicated in many instances, no mitigation of its type was thereby obtained. In a case which came under my care, the disease was produced by the contact of a small portion of the discharge from the throat of a person with malignant anginous scarlatina, and the patient thus infected had the disease in the most severe form, and recovered with difficulty.

82. *E. The susceptibility to the infection or contagion of scarlatina* is exhausted or annihilated after the disease has run its course, after the scarlatinal poison has produced its specific effects. This law obtains as remarkably in respect of scarlatina as of small-pox. The impossibility of being infected by this malady a second time has been fully ascertained by Dr.



WILLAN and many others; but a very few exceptions to the law have been recorded, so few as not to amount to more than one instance among two or three thousands constituting the law. This immunity from a second attack may be viewed as a proof that the disease is not merely one of the blood alone, but is also, if not chiefly, one primarily affecting and changing the susceptibility of the organic nervous system, the blood being altered by the state of this system, on the conditions of which this fluid is so intimately dependent.

83. *F. The coexistence of scarlatina with measles, with the vaccine disease, with erysipelas, and with small-pox has been contended for by some and denied by others. I believe in its coexistence with measles, and in the production in consequence of the hybrid disease described under RUBEOLA; and its coexistence with the other eruptive maladies just mentioned, especially vaccinia, is not unlikely to occur under circumstances favouring the operation of their respective poisons upon the frame at the same time.* Dr. GREGORY states that he has seen at the Small-pox Hospital "several unequivocal cases of the simultaneous existence of small-pox and scarlatina anginosa." And Mr. MARSON, surgeon to that hospital, remarks, that, in the course of eleven years, "he has seen seven persons who had variola and scarlatina simultaneously."—(*Med. Chir. Transact.*, vol. xxx., p. 121.)

84. *ii. PREDISPOSING CAUSES OR CIRCUMSTANCES.—The causes predisposing to the infection of scarlet fever are numerous, and may be referred to the states of individuals exposed to infection, and to the circumstances or conditions favouring the concentration and the invasion or operation of the poisonous miasm.—A.* As the mode in which this disease is generally infected, whether the infectious emanation proceeds directly from the sick or mediately, or by means of fomites, is by the inspiration of air contaminated more or less with the poisonous miasm, which affects, nearly at the same time or in quick succession, the organic nerves of the respiratory surfaces, and the blood distributed to these surfaces—morbidly impressing the former, and passing by endosmose through the latter—it follows that the susceptibility to infection must depend much upon the states of the organic nervous power and of the vascular system, and that, when the energy of the one is impaired, and the action of the other is lowered, the frame will be more liable to be invaded by the poisonous influence. Hence some individuals are more prone to infection than others, and hence the same person is more predisposed at one time than at another, according to the varying states of nervous tone and vascular action. The conditions of the atmosphere, as powerfully modifying these states, have considerable influence in predisposing to infection; but to this and to the immediately preceding topic, I can add nothing to what I have stated in the article on INFECTION (see § 44–55).

85. *B.* There is no cause of predisposition more generally manifested than the *age of childhood*. The susceptibility of infection appears to be greatest from the period of weaning to fully adult age. After thirty or forty years of age the susceptibility is remarkably diminished; but although I have seen several cases from thirty-

five to fifty years of age, I have met with one only between fifty and sixty, and he died in twenty-four hours, owing to the extension of the disease to the larynx. As the susceptibility of infection is greatest in childhood, and as the proportion of those who have had the disease at this epoch is very great, it follows that the number of non-infected at adult and advanced age is comparatively small. Although cases of the disease at these ages are thus few, yet they are generally of a most severe character, especially about and after forty years of age, as respects not merely the complications, but also the type of the eruptive fever from its commencement, and the danger is thus increased with advanced years. According to my experience, the younger the child the milder is the attack; but there are numerous exceptions to this law, arising out of the aggravating circumstances connected with weaning and dentition, and the numerous *concurring predisposing causes* observed among the poor, of which the most influential are, ill clothing; insufficient and unwholesome food; low, ill ventilated, and malarious abodes; exhalations from cess-pools, privies, and sewers, and inattention to cleanliness, with various others tending to lower the constitutional powers and the vital resistance to the invasion of infection, to concentrate the infectious emanation, and thereby to increase the dose of the poison.

86. Infants during the period of suckling very frequently escape the disease, although every other member of the family may be attacked. I have seen, on several occasions, every one of a family of eight or nine children affected in a very short period of each other, and the infant at the breast to escape. The cause of this *comparative immunity* is not very apparent. Probably infants at this period are less exposed to the infectious emanation; but this depends much upon the circumstances of families; among the poor the exposure is not materially less. It is rather to be imputed to a less susceptibility of infection at this period, depending, probably, upon the circumstances of the infant being then nourished by a secretion directly from the secreting organs of the mother, and thus possessing some measure of an invigorating vital emanation, thereby enabling the infant to resist the infection. I have observed, in many instances, that persons who have experienced a very severe attack of measles have escaped the infection of scarlatina, although much exposed to it. This circumstance is deserving of farther observation; but, from whatever cause, some persons resist this infection, although frequently exposed to it from an early age. Out of 2614 cases recorded by Mr. FARR in his fourth report, 2419 were children, 182 adults, and 13 aged persons. Scarlatina may attack the *fetus in utero*. Instances of this have been furnished by several writers. Dr. GREGORY states, that "on the 28th of April, 1839, his youngest child was born, evidently suffering from fever. The throat was affected the following day, obviously from angina maligna. Eruption was never developed. The infant drooped and died on the first of May." (P. 146.)

87. *C.* Scarlet fever affects both *sexes* in equal proportions, and very remarkably so. In London it destroyed, in 1838, 747 males and 777

females; in 1839, 1241 males and 1258 females; and throughout England and Wales, in 1840 (exclusive of the metropolis),\* 8927 males

\* The following will show the comparative prevalence in the metropolis of scarlet fever, measles, and small-pox, from 1838 to 1848, both years included, during the last eleven years. It must be manifest that the numbers assigned can be an approximation only to the true amount, as the causes of death are in many instances arbitrarily assigned in the returns, but they are sufficiently accurate to convey useful information:

Years.	Scarlet Fever.	Measles.	Small-pox.
1838	1524	583	3817
1839	2499	2036	634
1840	1954	1132	1235
1841	663	973	1053
1842	1224	1293	360
1843	1867	1442	438
1844	3029	1182	1804
1845	1085	2318	909
1846	928	747	257
1847	1433	1778	955
1848	4756	1143	1617
During 11 years,	20,962	14,632	13,079

During the last eleven years the deaths in the metropolis from scarlet fever have been greater than from measles, or from small-pox, or from hooping-cough, or from continued fever. In only three of these years have the deaths by measles been greater than those by scarlatina, and in only two has the mortality from small-pox exceeded that of scarlet fever. In 1841 and 1846, the mortality of scarlatina and measles was low, and in the latter year that of small-pox was the lowest. In 1839, 1843, 1844, the mortality of both scarlet fever and measles was high. During 1848, the deaths from scarlatina were about three times greater than the average of the former years. The maximum mortality from measles occurred in 1845, and from small-pox in 1838.

The greatest number of deaths from scarlet fever occur among the poor, owing to the circumstances which both predispose to infection and render the disease more malignant; and even those causes which develop the sequelæ of the disease and render them fatal (see § 42), are also most prevalent in the lower classes. If the above amount do not comprise the deaths from dropsy, or other diseases consequent upon scarlatina, the mortality from this malady must have been greater than here stated. The above results will show that there are few diseases—perhaps none—from which the general amount of mortality and of danger is greater than in scarlet fever, and yet there is not one of which the pathology and treatment has received less attention and elucidation in modern times than it.

The proportion of malignant to mild cases of scarlatina cannot be truly estimated, as it differs in different seasons, in different localities, and in different epidemic prevalences. Dr. WILLAN found it to be one of the former to four of the latter; and Dr. CLARK one to two; and one of six had dropsy during convalescence. The rate of mortality must necessarily also differ with the above causes—the fluctuation sometimes observed being remarkable—being from one in forty to one in six cases. Dr. GREGORY considers that the average mortality is about six per cent.; and that, while throughout England and Wales 19,816 deaths occurred in 1840 (a year of average mortality for London), the total number of seizures must have amounted, according to this calculation, to about 330,266 in that year for the whole of England.

[This disease, as our author correctly states, first appeared in this country, in an inland town of New Hampshire, Kingston, in May, 1735. The first child attacked died in three days. In one week afterward three children in another family, four miles distant, were successively seized, and all died. In August following it appeared at Exeter, six miles distant; and in September it broke out in Boston, fifty miles distant, though it did not appear at Chester, six miles west of Kingston, till October. It spread very gradually west and south, and was two years in reaching the Hudson River, two hundred miles west. NOAH WEBSTER states that "it attacked the young in the most sequestered situations, and without a possible communication with the sick, although the disease was very infectious." He also remarks, that "for many years after it was epidemic, it frequently broke out in different places without any apparent cause, but did not spread—a striking proof that such diseases will not become epidemic by the sole power of infection, but that some general cause must aid its propagation, or it will perish in its cradle. This is probably true of every species of pestilential disease" (on PESTILENCE, vol. i., p. 231). WEBSTER'S philosophy of epidemics is, indeed, very

and 8935 females. This disease appears to be most prevalent in temperate climates. It is stated to be comparatively rare in Bengal. Dr.

comprehensive. "When observation and philosophy," he remarks, "shall prevail over the prejudices of men, in regard to the origin of these diseases from infection, it will be found that the *angina*, in its various forms, is only a particular stage or modification of the pestilence which spreads over the world at certain unequal periods. The milder forms of the pestilence appear in catarrh, measles, and chin-cough, which usually appear together, or nearly so, at the beginning of the more violent general contagion; the later and more fatal stages are marked by anginas, cynancha maligna, petechial fever, bilious and glandular plague in summer, and pestilential pleurisies in winter. There are certain times when the constitutions of men in all parts of the world contract a poison, which nature makes an effort to expel; and the different epidemics that accompany or follow each other in rapid succession, appear to be the different modes by which nature strives to rid the human body of the virus. These modes depend on the season of the year, the constitution or age of the patient, and a multitude of subordinate circumstances. Whether this poison is a positive substance inhaled by the lungs and pores, or is the effect of mere deformity, which unfits the vital parts of the body to perform their functions, is a question of a curious nature."—(Loc. cit., p. 215.)

The scarlet fever prevailed extensively in Boston in 1735–6; about 4000 persons were attacked with it, of whom 1 in 35 died. It spread very generally over New England at this period, carrying off whole families. In Kingston, where the usual annual mortality was not above 9 or 10, it rose in 1735 to 102, and an equal degree of mortality was not unusual in other places. It was computed that 500 children in Maine died of this disease in 1735, out of a population of 9000 whites. We read that the prominent symptoms were "swollen throat, with ash-coloured specks, efflorescence on the skin, distress in the head, great debility, and strong tendency to putrefaction." In Kittery 122 children died of it. In 1736 it was not so general or mortal. In 1737 it broke out afresh: 75 died in North Yarmouth, 49 in Falmouth, and in some places not one attacked survived. Mr. SHATTUCK remarks (on *Vital Statistics of Boston*, in 27th volume of *Amer. Journ. Med. Sci.*, p. 373), that "it is somewhat singular that, after the lapse of just about a century, scarlet fever should have prevailed again as one of the most fatal diseases of New England."

The following table shows the comparative prevalence in Boston of scarlet fever, measles, and small-pox, from 1811 to 1839, inclusive:

Years.	Scarlet Fever.	Measles.	Small-pox.
1811	1	0	2
1812	0	0	0
1813	0	1	0
1814	1	0	0
1815	21	0	4
1816	3	6	0
1817	1	0	0
1818	0	0	0
1819	12	0	0
1820	10	0	0
1821	4	149	4
1822	1	3	0
1823	1	0	0
1824	0	2	1
1825	4	77	1
1826	16	10	0
1827	8	0	3
1828	3	0	2
1829	4	78	0
1830	5	13	1
1831	84	2	4
1832	200	70	2
1833	90	2	0
1834	39	1	4
1835	73	188	7
1836	31	31	6
1837	50	23	13
1838	106	20	3
1839	222	3	60
Total..	924	368	105

The deaths in Boston from the eruptive fevers, from 1811 to 1830, were 64, being 7.5 per 1000 of all diseases; from 1820 to 1830, there were 402 deaths from the same class of diseases, or 35.1 ratio per 1000; and from 1830 to 1839, there were 1402 deaths from eruptive fevers, being a proportion of 96.2 per 1000 of deaths from all diseases. During the same periods the total deaths from epidemic and endemic disease were, for the first period, 1193; for



GREGORY remarks, that Dr. JACKSON, formerly

the second, 2037; for the third, 3622, being a ratio of 140.8, 177.7, and 248.6 per 1000 of all the deaths. The same increase of mortality from the eruptive fevers has been observed in every part of this country.

The following table shows the comparative prevalence of scarlet fever, measles, and small-pox in the city of New York, from 1819 to 1849, inclusive:

Years.	Scarlet Fever.	Measles.	Small-pox.
1819	5	10	0
1820	5	74	0
1821	3	109	0
1822	1	1	0
1823	2	117	18
1824	3	100	394
1825	10	53	40
1826	24	31	58
1827	4	172	149
1828	11	28	93
1829	188	91	16
1830	246	22	176
1831	258	39	224
1832	224	290	89
1833	179	38	25
1834	408	212	233
1835	174	82	351
1836	202	443	173
1837	579	238	164
1838	257	79	91
1839	158	133	68
1840	391	186	232
1841	366	113	209
1842	416	60	181
1843	223	118	117
1844	225	51	29
1845	63	136	425
1846	114	71	141
1847	142	275	53
1848	93	77	544
1849	266	125	326
Total..	5240	3500	4619

For the following tables and remarks relative to the comparative prevalence of scarlatina, measles, and small-pox in Boston and Massachusetts, we are indebted to LEMUEL SHATTUCK, Esq., one of the ablest writers on medical statistics in our country.

"STATEMENT showing the total number of deaths from all causes in Boston, in different periods, and the number and proportion per cent. from scarlatina, measles, and small-pox during the same period.

Causes of Death.	Ten years. 1811-20.	Ten years. 1821-30.	Ten years. 1831-40.	Nine years. 1841-49.
All causes . .	8,470	11,470	16,414	27,137
Specified causes	7,522	9,554	15,077	26,796
<i>Special Causes.</i>				
Scarlatina . .	30	48	972	1,468
Measles . . .	28	332	341	587
Small-pox . .	6	8	214	342
<i>Per Centage.</i>				
Scarlatina . .	.40	.50	6.46	5.43
Measles . . .	.37	3.48	2.26	2.18
Small-pox . .	.08	.08	1.42	1.28

It appears from this statement that thirty deaths only occurred from scarlatina in the ten years, 1811-20, being four tenths of one per cent. of the known causes of death, while in the nine years, 1841-49, there occurred 1468, or 5.43 per cent., from the same cause! Other zymotic diseases, especially fevers and those affecting the digestive organs, increase during the same period, and lessen the apparent increase which would otherwise appear in some of the above-named diseases.

The following table exhibits the same facts relating to the deaths, returned under the registry laws, from all the counties in the state except Suffolk (Boston), for the years specified.

CAUSE	1842.	1843.	1844.	1845.	1846.	1847.	1848.
All causes . .	7,496	8,305	8,250	8,715	9,211	10,816	11,346
Specified causes	6,149	7,177	7,076	8,070	8,741	10,317	9,954
<i>Special Causes.</i>							
Scarlatina . .	396	561	328	538	516	418	176
Measles . . .	86	30	32	44	46	136	43
Small-pox . .	13	12	11	5	32	12	21
<i>Per Centage.</i>							
Scarlatina . .	6.44	7.81	4.63	6.67	5.90	4.05	1.77
Measles . . .	1.40	.42	.45	.54	.53	1.32	.43
Small-pox . .	.21	.17	.16	.06	.37	.12	.21

of Calcutta, could not recall to mind any cases which he had seen in India deserving the name of scarlatina. I never met with a case within the tropics. I believe that the disease has not yet been imported into Australia, Van Diemen's Land, and New Zealand. It was brought to North America in 1735, and its progress was very slow, but very fatal. The epidemic in 1736 in that continent was most pestilential. "Villages were depopulated by it, and parents had to bewail the loss of all their children."

88. D. As to the *complete immunity* consequent upon an attack of this malady, it may be remarked, that this is to be imputed to the exhaustion of susceptibility produced by this poison, as by several other animal poisons, as respects their several specific effects. That the poisonous emanation or material should fail of producing any effect upon a person who has, at

STATEMENT showing the influences of the age and season of the year on scarlatina.

Age.	Four years. 1845-48.		Seven years. 1842-48.	Month.	Four years. 1845-48.		Seven years. 1842-48.
	M.	F.			M.	F.	
Und. 1	140	113	412	Jan.	79	85	280
1 to 2	133	142	456	Feb.	72	76	281
2 to 5	288	309	1178	Mar.	95	93	328
5 to 10	172	152	645	April	58	86	266
10 to 20	37	68	210	May	68	66	269
20 to 30	7	35	70	June	57	69	268
30 to 40	7	4	19	July	73	52	244
40 to 50	3	2	13	Aug.	89	67	273
50 to 60	3	3	9	Sept.	65	58	241
60 to 70	1	7	14	Oct.	58	70	233
70 to 80	1	—	6	Nov.	41	63	212
80 to 90	1	—	4	Dec.	44	64	204
Not stated	5	14	157	Not stated			94
Total	799	849	3193	Total	799	849	3193

The above table contains the returns of all the counties in the state excepting Suffolk. In four years the sexes as distinguished; for the whole seven years they are added together."—(Letter to the Editor, April, 1850.)

On examining the medical statistics of Philadelphia, as furnished by Dr. EMERSON (in the first volume of the *Am. Jour. Med. Sciences*), the same increased prevalence of the eruptive fevers is observed in that city. Beginning, for example, with the year 1807, there were not over three deaths annually reported by it until 1820, when there were thirty deaths by it; from this it gradually declined to 1826, when it amounted to only four; since which it has again increased in a still higher ratio. From 1807 to 1827 there were reported 1080 deaths from small-pox, 667 from measles, and 102 only from scarlet fever; the greatest mortality from the latter disease, as well as small-pox, being between the second and fifth year, while that from measles was between the first and second year.

In my paper on the "Medical Statistics of New York" (in the nineteenth volume of *Am. Jour. Med. Sciences*, p. 25-52), I have observed, "It is a singular fact, that while there has been a gradual and constant diminution of deaths from other fevers, especially typhus and bilious remittent, which were formerly quite fatal, there has been for several years a constant increase from scarlet fever, amounting, within the last six years (Nov., 1836) to 1500. The largest number of deaths from this disease for any one year was in 1834, when there were 418. In the year 1829, 188 fell victims to it within a few weeks. Until that year, from its commencement in 1817, the average mortality from it was only seven or eight per cent. Since that time its ravages have been truly distressing; whole families of children having been swept off by it in a few days. In 1834, the deaths from all other fevers, scarlet excepted, were 252, while those from the latter were 418; in 1833, 192 from the former, and 179 from the latter; in 1832, the year of the cholera, 237 from the former, and 221 from the latter. In the six years from 1828 to 1833, in which were reported 1103 deaths from scarlet fever, an estimate for all the months gives the following result, commencing with the lowest:

"In the month of June, from scarlet fever, 53 deaths; May, 62; April, 66; August, 70; September, 71; March, 74; October, 98; February, 100; January, 117; November, 124; December, 191; thus showing that its fatality is greatest during the coldest months."]

some more or less remote period, been affected by it, is a most important law in this and other exanthematous and pestilential maladies, especially as respects the safety of the species. The protection thus obtained is the chief means of preventing the depopulation of districts where any of these maladies break out; and, accordingly, it has been observed, that where scarlet fever, or measles, or small-pox has been introduced for the first time, or after the lapse of very many years, the whole, or a large proportion of the population being susceptible of infection, the destruction of human life has been there most terrific. That the immunity obtained by an attack of those diseases which infect the constitution only once, cannot be imputed to any change in the blood consequent upon such an infection, may be inferred, 1st, from the impossibility of a permanent change in this fluid that could prevent the recurrence of any alteration in it which had taken place on some former occasion; and, 2d, from the gradual and entire renewal of this fluid after longer or shorter periods, a renewal of susceptibility inevitably supervening if this property resided in the blood. We must, therefore, refer the immunity from a second infection to the organic nervous system, and view the susceptibility of this system to have been so affected or specifically changed by the first operation of the poison as no longer to be capable of being roused by any subsequent application of the same species of poison as previously affected it to a similar series of morbid changes and actions.\*

89. *E. The Period of Latency or Incubation—the precursor or formative Period.*—The time which elapses between exposure to infection and the commencement of the febrile action may be expected to vary much, as it actually does vary, according to the susceptibility of the individual, either from constitution, or from the influence of predisposing causes, or from the concentration or dose of the poison. I have stated much of what is known as to this matter in the article on INFECTION (§ 32). All that can be advanced is, that the period is very uncertain. It may be only a few hours, or it may extend to ten or twelve days. Dr. MATON has recorded some cases in which he considered this period to have been prolonged to twenty-four or twenty-five days. The most common period is most probably three or four days, it being rarely shorter than two days, or longer than eight. In a case referred to by M. ROSTAN, in which the disease was induced by inoculation, seven days elapsed before the appearance of eruption.

90. *X. PATHOLOGICAL INFERENCES.*—It may be useful to conclude this view of the *pathology* of scarlet fever with certain inferences as to those topics connected with the nature of the malady that have an important relation to the treatment of it, and that should furnish the ba-

sis of our intentions of cure.—*a.* The *cause* of scarlet fever appears to be an animal miasm or poison of a specific kind—a specific animal seminum reproducing itself to an indefinite extent.—*b.* It is not proved that this *seminum*, or specific form of fever, is generated or appears *de novo*, from the combination of circumstances or states shown above to favour the extension of the malady; but, on the contrary, it is much more probable that the disease occurs only from the operation of this seminum or specific infectious agent proceeding either directly from a person labouring under the malady, or mediately by fomites which retain, convey, and communicate the seminum.—*c.* The *origin* or *source* of this seminum is not known; but very probably, like small-pox, the disease was first generated by the lower animals, or occurred among them as a pestilence or epizooty, and not unlikely among the equine race, and was thence communicated to man—the seminum formed among these animals having affected the human species in circumstances favouring the extension of it from the former to the latter, among whom it has been preserved ever since.\*—*d.* The spread of the disease is favoured by certain *conditions of the air*, but what these conditions are is chiefly a matter of inference: a humid, close, and malarious atmosphere appears to favour the extension and operation of the poison; and all the other conditions shown in the article INFECTION to favour or to restrain the extension of infectious agents exert similar influences in respect of this. Extremes of temperature seem to diminish the spread of the malady, and to render attacks of it more mild.—*e.* The states of those exposed to the morbid poison proceeding from the affected appear either to favour or to resist the action of this poison, and, when favouring it, very remarkably to modify its operation and effects (§ 84, *et seq.*), conformably with predisposition, susceptibility, diathesis, temperament, and existing constitutional or visceral conditions, the susceptibility of a second infection by the seminum of the malady being annihilated by an attack.—*f.* The poisonous material infects the frame of the healthy in the *manner* fully explained in the article on INFECTION (§ 44, *et seq.*), and develops its *effects* in the course of a period varying in duration from two to twelve days, or even in a shorter, but very rarely in a longer time, according to the susceptibility and predisposition of the recipient, and the concentration or dose of the poison (§ 76).—*g.* The effects of the poison, like those of all morbid poisons, are exerted *primarily* upon the organic nervous system, and consecutively upon the

\* [We apprehend that the same objections may apply to this theory as to that which imputes the immunity of a second attack to changes in the blood; for if this fluid is "gradually and entirely renewed" from time to time, so also are the solid textures of the body, though not with equal rapidity and frequency. Moreover, we can almost as readily conceive of permanent changes in the one as in the other; the fact is, that the cause of this exemption from second attacks of disease is one of those mysteries which will probably always elude our grasp, being one of those ultimate facts of science the causes of which cannot be detected.]

\* [If the disease was first generated by the lower animals, the question naturally occurs, why, under similar circumstances, may the virus not be generated *de novo*, and reproduced as often as the conditions for its manufacture exist? While we admit that the disease is always propagated by an animal poison or virus of a specific kind, we see no reason for believing it to originate among the lower animals, nor for supposing that it has never been generated except on one occasion, and that unknown; on the contrary, we hold that, like syphilis, itch, and other acknowledged contagious diseases, it may be produced *de novo* whenever favouring circumstances are present. We have seen that the scarlet fever was first observed in this country in an interior town of New Hampshire, in 1735, from whence it gradually spread over the country. There is no proof of its importation, but, on the contrary, very urgent and satisfactory reasons could be urged against such a supposition.]



vascular system and the blood; and as respects this malady especially, *secondarily* upon the *kidneys*, the *throat* and *skin*, either of these parts, or any two of them, or even all of them, evincing these effects in a more or less manifest manner, these latter or local effects constituting the specific characters of the disease. —*h.* The early affection of the *kidneys* in this disease, especially when the affection is such as to impede or to interrupt, or to altogether arrest the *urinary excretion*, produces a change in the blood, in addition to that already occasioned by the infectious agent acting either directly upon this fluid or through the medium of the organic nervous system, the change in the blood thus produced often occasioning asthenic or diffusive inflammation of serous surfaces, or of predisposed organs, with serous, or sero-albuminous, or sero-fibrinous infiltration or effusion of a watery lymph—causing the several *primary complications* described above (§ 27, *et seq.*), and already more fully explained (§ 41, *et seq.*)—*i.* After this malady has run its usual course, it is more liable than any other exanthematous fever to be followed during desquamation and recovery—during a period varying from seven or eight days after the fading of the eruption, to four, or even six weeks at the utmost—by a consecutive affection of the *kidneys*, indicated by scanty, albuminous, or even bloody urine, and by the presence of epithelial cells in this fluid, sometimes moulded in the fibrin or lymph into the form of the urinary tubes, and consecutively by *œdema*, *anasarca*, or *inflammation of internal parts*, or *by effusion into serous cavities*. —*k.* These *sequelæ* or *secondary complications* result from the consecutive affection of the *kidneys* (§ 42, *et seq.*), which appears to consist chiefly of an obstruction caused by the accumulation of exfoliated epithelium in the tubuli and of a deposition of albuminous lymph in the structure of the organ, this latter obstructing the circulation in the capillaries by its pressure, while the accumulated organic detritus in the tubuli obstructs the passage of the secretion along these canals, and impedes or interrupts the function of the organ. —*l.* The consequences of the affection of the *kidneys* at an early stage of the disease, and of the consecutive obstruction of these emunctories at a much later period, are, as shown above (§ 41, *et seq.*), morbid or contaminated states of the blood—a state of *excrementitial plethora*, consisting of an excess of watery elements, and of effete, deleterious, and irritating materials and saline ingredients. The accumulation of these *excrementitial matters* in the circulation, as well as of *those usually eliminated by the skin*, occasions the several complications—whether inflammatory or dropsical—observed in the course of the malady, or subsequently as *sequelæ* or *reliquiæ*. —*m.* Not the least important of these latter is the *anæmia* observed not infrequently to follow the renal and dropsical affections during or consequent upon scarlet fever. —*n.* The occurrence of the usual *sequelæ* of scarlatina is favoured by several physical causes, to which the patient is liable to be exposed during the process of desquamation and recovery; and it is often prevented by measures calculated to restore the functions of the skin, and to prevent vascular determination to, or congestion of the *kidneys*, and to diminish these, with the

other consecutive or associated causes of obstruction of these organs.\*

\* [M. BILLARD treats of this disease under the usual forms of *simplex*, *anginosa*, and *maligna*, and states that it is always accompanied with violent fever, very often with angina or ophthalmia, and sometimes with pneumonia, gastro-enteritis, or encephalitis; while of all complications, that of the *throat* he regards as the most frequent and serious. He states that inflammation of the larynx or tonsils exists in a greater or less degree in almost every case of scarlatina, either at the commencement or in the course of the disease, while the other complications are only observed in such as are exposed by a particular predisposition to inflammations of the encephalon or of the alimentary canal.

The table which I have given from Mr. SHATTUCK (p. 750) shows also the truth of BILLARD's statement, that scarlet fever prevails more particularly during second infancy and in youth than during the period of suckling, and when it does attack in the first infancy it does not affect children in the same manner as those of a more advanced age. See STEWART'S BILLARD, ed. 1850, p. 104, and Appendix, p. 556. From this I quote the following remarks, furnished by request for that work:

"I regard the local inflammation which attends scarlatina as a specific affection, identical with the diphtheritis of BRETONNEAU and other French writers, and characterized chiefly by a membranous exudation on the surface of the mucous membrane of the mouth and fauces. We see this tendency, also, after the application of a blister, and, indeed, wherever the cuticle has been removed by any cause whatever. We sometimes, though rarely, find it extending down the trachea and bronchiæ, giving rise to all the symptoms that attend an attack of croup.

"It is, however, important, when speaking of scarlatina, to keep in mind the two very different forms which it assumes; namely, the *anginose*, or purely inflammatory, and the malignant, or *congestive* form, in which we have a frequent, feeble pulse, cold extremities, extreme prostration, and great determination of blood to the head. In the latter, patients often die after a short illness, sometimes before reaction is established, and in such cases the scalpel reveals nothing. The citadel of life has been invaded by an invisible foe, and its forces have succumbed, leaving behind no vestiges of the attack.

"In treating of the pathology of scarlet fever, my remarks will naturally fall under two divisions, namely, 1. Lesions of the Solids; and, 2. Lesions of the Fluids.

"1. *Lesions of the Solids.*—In scarlatina there is hyperæmia of the mucous membranes generally, and of the mouth and fauces in particular, which constantly tends to terminate, either by a membranous deposit of coagulable lymph or by ulceration; and the ulcerative process, when once established in any part, is very apt to extend its ravages to the neighbouring parts of analogous structure. This inflammation, we have reason to believe, is of a specific character, depending probably on the peculiar impression made on the nervous system by the epidemic influence. At a very early period in the disease, indeed, before any constitutional symptoms appear, we shall perceive, on examining the fauces, that the vessels of the mucous membrane are highly injected, and upon the surface of the tonsils and soft palate gray patches of lymph, often mistaken for ulcers, which increase in extent as the disease progresses. Preceding, or accompanying this appearance, we sometimes see small vesicles of a purple or whitish colour, and these are sometimes found also upon the skin. In severe cases the fauces assume a deep modena red or purple suffusion, and when this is the case ulceration is sure to follow. Floculi of lymph appear scattered over the surface in irregular patches, resembling in appearance the purulent secretion of an ulcer, from which they can at first scarcely be distinguished. In a short time, however, unless removed by galingol or some other means, these patches assume a dark or black colour, attended with a peculiarly oppressive fetor. On removing them the surface beneath appears red, spongy, and somewhat swollen. The tonsils are more or less enlarged from the commencement, and in severe cases are almost uniformly the seat of extensive ulceration.

"*Autopsic examination* by no means reveals the same appearances. In many cases where I expected to find extensive local ravages, there were scarcely any marks of disease present; and in others, where the constitutional symptoms were comparatively light, I have found the most frightful vestiges of disease. You will doubtless recollect the case of the child in Amos Street, whose dissection you witnessed a short time since. In this case the disease assumed a very mild form, yielding kindly to medicine. In a few days the patient was apparently well, with the exception of a slight cough, and the physician in

# 91. XI.—TREATMENT.—*The treatment of scarlet fever has hitherto been unsatisfactory, and*

attendance ceased his visits. In about a fortnight afterward he was again called in, and found her labouring under an incessant cough of a croupy character, though at this time she was playing about the house. In two or three days afterward she died from suffocation during a coughing fit. On examination, I found a great portion of the larynx destroyed by ulceration, and the fauces were completely honey-combed. Numerous perforations existed in the tonsils, palate, &c., of various sizes, while the mucous lining of the trachea was either softened or abraded through its whole extent. There was a vast collection of frothy, muco-purulent matter collected in the larynx and trachea, which doubtless was the cause of the suffocation. The other organs were healthy.

"In another case, which happened not long after, you also was present at the examination, and can bear testimony to the great difference in the appearances, on dissection, from those above given. The patient was a boy five years of age; at an early period there was considerable redness about the fauces, and the tonsils were somewhat swollen. The breath was hot and offensive, and the pulse ranged from 120 to 140. There was extreme restlessness and jactitation throughout the whole course of the disease, with frequent moaning and screaming, a wild expression of the eyes, irregular and often laboured respiration, temperature of the body very unequal, head generally hot, and extremities cold. As the disease progressed, his mouth and lips became incrustated with a dark brown sordes; the tongue was swollen, fiery red, and cracked; the throat became filled with a thick, glutinous, tenacious mucus; the stomach was extremely irritable, and the epigastrium tender on pressure. There was more or less delirium throughout the whole sickness. He sunk into a stupor, and died on the sixth day from the attack.

"*Autopsy eight hours after Death.*—Body emaciated; a few black spots on the posterior part of the body; a yellowish mucus discharging from the mouth and nose in considerable quantity. The lungs were found healthy, and remarkably free from blood; no marks of inflammation about them; and, on cutting into them, we found but very slight effusion into the air-cells. The mucous surface of the trachea and bronchia was covered with a white mucus, which, on being removed, the membrane presented a healthy appearance. The liver was healthy; the gall-bladder full of bile; the heart natural; and the pericardium contained the usual quantity of serum. There was no ulceration about the fauces, tonsils, or palate, and the whole lining membrane of the mouth was perfectly healthy. It is proper, perhaps, to remark, that this patient had been very freely bled and leeches.

"We, however, generally find in this disease ulceration about the glottis and tonsils of greater or less extent, though the hyperæmiæ of the mucous membrane, so constant during life, is very apt to disappear after death. The same is also true of the vascularity of the mucous coat of the stomach and small intestines. The air-passages very often present pathological alterations. We sometimes see merely a vascularity of the lining membrane, at other times a thickening, and occasionally ulceration. It is not uncommon to find the trachea and bronchæ filled with a thick, tenacious matter, of a muco-purulent character. In a few cases I have discovered marks of inflammation about the lungs and pleura; but this is by no means of frequent occurrence, and, when present, are to be viewed as an accidental complication. Where leeching and venesection have not been practiced, the lungs will frequently be seen gorged with blood. In those cases attended with an acrid, sanious discharge from the nostrils, and where there is a tendency to the formation of a glutinous, brown sordes on the mouth and teeth, I have invariably found more or less extensive marks of disease about the brain; and the former symptom, particularly, I have been led to consider as a highly dangerous one, from its indicating with great certainty such a complication. In these cases the vessels of the brain will be found injected, particularly the membranes, and there will be found an effusion of turbid lymph between the arachnoid and pia mater, and also more or less serum in the ventricles. In the highly congestive cases, where death has speedily resulted, we find few marks of disease about the throat; but the blood-vessels of the larger organs, particularly the brain, lungs, and liver, will be distended with dark-coloured blood. Dr. ARMSTRONG, in his work on scarlet fever, remarks, 'From the examination of several bodies after death, I am warranted in affirming that the brain, the liver, the stomach, the intestines, and the lungs are the parts most often inflamed, and that the inflammation in these parts is generally the cause of death, together with the affection of the throat.' But I have examined many cases where

in the worst forms of this disease most unsuccessful. This has arisen chiefly from our imperfect knowledge of the successive pathological changes produced by the scarlatinal poison, and from the varied character of these changes with the dose of the poison, with the constitution and circumstances of the recipient, with the season and weather, and with the prevailing epidemic constitution. It must be obvious that, if the earlier changes produced by the infecting or poisonous agent be either misunderstood or not recognised, the consecutive alterations will be very imperfectly, if not most injuriously combated, and that our means of cure will be either inappropriately selected or misdirected. When treating of FEVERS, I have insisted in several places upon the importance of promoting the secreting and exerting functions in all our attempts to *preserve from*, as well as to *cure*, these maladies; for it is chiefly by such measures as promote the depurating action of the emunctories on the blood, through the medium of the organic nervous system, as shown in several parts of this work, that these great ends of practical medicine can be attained.

92. i. PRESERVATIVE TREATMENT.—The fatality of the more malignant types of this malady induced physicians to recommend means for the protection of those exposed to infection; and these means were more frequently advised, and more generally adopted in former times than at present. The uncertain efficacy or

death could not be said to have resulted from either of these causes, for in two of them the patient died within nine hours of the attack, and nothing but congestion of the larger organs could be discovered. In some of these cases of congestive scarlet fever, the symptoms bear a striking resemblance to those produced by the narcotic poisons; there is the same abolition of sense, and the power of motion, frequently combined with convulsions, a contracted pupil, and laboured, or even stertorous respiration. The appearances on dissection are also the same. Hence I have been led to conclude that the contagious principle occasioning the disease is a specific virus of a gaseous nature, which, being introduced into the system through the medium of the blood-vessels of the lungs, acts, as narcotics also do, either upon the brain or spinal marrow, or both. These notions are in a great degree assumptions, it is true; but if any one can invent a more satisfactory hypothesis, I should be very glad to adopt it.

"2. *Lesions of the Fluids.*—With respect to lesions of the fluids in scarlet fever, so little progress has hitherto been made in animal chemistry that but little can be said with any degree of certainty. You are doubtless acquainted with NAUMANN'S\* hypothesis, which supposes that some change is wrought by the epidemic influence upon the properties of the blood, rendering its albuminous constituents incapable of being held in solution by the serum, in consequence of which the former exude upon the surface of the mucous membranes in form of a deposit, as we see about the throat and fauces in this disease. Again, it is the opinion of DONNE that in scarlet fever the secretions become highly acid; and, as GEDDINGS remarks, if we admit as valid the opinion of RASPAIL that fibrin is merely albumen coagulated by an acid, we thus acquire a reason why the serum loses its power of holding the albumen in a state of solution. But however this may be, there is most obviously a deterioration of the secretory and nutritive functions, owing, doubtless, to an impairment of the nervous energy. There is, consequently, a change in the constituents of the blood, either as to quantity or quality, or both, and a derangement of the vital forces, which renders them incapable of speedily repairing such lesions as are the result of the inflammatory engorgement, or even of throwing off the disease when violent in its attack. Owing to this same impairment of nervous power, there is a strong tendency to dissolution, both in the solids and fluids, manifested both by the rapid changes which occur after death as well as during life.

"The above remarks apply to scarlet fever at every age."

\* Handbuch der Medicinischen Klinik.



frequent failure of these means, and the hopes of escaping the more dangerous forms of the malady, probably induced a want of confidence in them, of which they are not altogether deserving, especially in some circumstances in which the disease presents itself.

93. Dr. WITHERING remarks, that during the prevalence of the malignant form of the disease in 1778, when every one was alarmed for himself or his connexions, means of prevention were anxiously inquired after. "Some smoked, some chewed, and others snuffed tobacco: some daubed their hands and faces with *thieves' vinegar*; many wore camphor at the pit of the stomach; and still more swallowed bark and port-wine. But those who were much conversant with the disease had too ample occasion to observe that none of these methods were effectual." But Dr. WITHERING had his own notions of prevention, based upon a supposition as to the mode in which the poison invades the frame. He believed that the scarlatinal poison "first makes its lodgment upon the mucus separated by the pituitary membrane lining the nose and fauces," and that those who are exposed to the infection should frequently spit out the mucus that collects in the fauces and promote the discharge from the nostrils. He farther advised those who already had imbibed the poison, and had experienced the premonitory symptoms, "immediately to take an emetic, frequently to wash their fauces with soap-leys diluted with water, and to snuff something up the nose that will make them sneeze." After the operation of the emetic he directed the patient to go to bed, and drink plentifully of wine whey with spirits of hartshorn. He states that a large experience enables him confidently to assert that, if these precautions be attended to, the infection will be either altogether prevented, or else very trifling in its consequences.

94. In the latest edition of Dr. WITHERING's treatise, and after an extensive experience, he adds, that the progress of infection may be stopped by precautions which may be adopted in almost every house. He had observed that, when boarding-schools were infected and the children were sent home, the disease was more widely spread; and that he, therefore, adopted the suggestion of Dr. HAYGARTH, and had for several years past never thought it necessary either to break up a school or to disperse a private family. "Allotting apartments on separate floors to the sick and the healthy; choosing for nurses the older parts of the family, or those who had already had the disease, and prohibiting any near communications between the sick or their attendants and the healthy, with positive orders instantly to plunge into water all the linen, &c., used in the sick-chambers, have universally been found sufficient to check the farther progress of infection." These recommendations are deserving of adoption, and confirm the opinion which I have stated above (§ 79). [I have in many instances adopted these or similar precautions where this disease has appeared in boarding-schools, and with the result of preventing its spread when early practiced. Free ventilation, however, is essential to its success. Where a person has been exposed, I have reason to believe that the liberal use of spirits of nitre, with magnesia or spirits of mindereri, will prove very successful in pre-

venting a severe attack, and, in some instances, of arresting it altogether. The depurating organs should all be kept active, if we seek to avert a severe attack.]

95. Dr. SIMS remarks, that the best preventive of the disease was found by him to be rhubarb, taken in the morning, in such quantity as should produce one loose motion in the day. He did not see one who used this confined afterward to bed, though several persons began it after they were infected, but before the time of their sickening. Dr. R. WILLIAMS considers Dr. SIMS's authority to be quite as veritable as that of HAHNEMANN, and his charm even more valuable than that of the latter. Probably any single *prophylactic*, of whatever kind, owes much of the influence it may exert to the confidence reposed in it by the person who has recourse to it. As fear favours, so does confidence resist infection; and when the object of confidence is such as promotes the several assimilating, excreting, and depurating functions, without lowering vital resistance, it combines the virtue of a *charm*—of a mental agent, with its physical operation.\* The hypothesis of HAHNEMANN is, that diseases are best combated by remedies which produce morbid actions similar to those constituting the diseases themselves; and, consequently, as belladonna is capable of producing an efflorescence similar to scarlatina, that it is a preservative against this disease. He asserts that one eightieth part of a grain of belladonna, given twice a day, will preserve a susceptible person from an attack of scarlatina; or that three grains of the extract dissolved in an ounce of distilled water, and three drops of the solution given twice daily to a child under twelve months old, and one drop more for every year above that age, will be sufficient for this purpose. It is possible that belladonna, by its irritant and alterant effects (*see art. POISONS, § 537, et seq.*), may render the system insusceptible of the scarlatinal infection, independently of the principle or law for which HAHNEMANN has contended, empirically and absurdly, and in defiance of both reason and argument. It may possess this particular virtue, by producing its specific effects, without furnishing any support to the irrational doctrine, the monstrous absurdity, and the most nefarious practice, which he has originated and promulgated—a practice which knaves alone can adopt, and to which fools only will submit. It is obvious that belladonna can exert no protective influence until it produces, by the continuance of its use, or by its dose, its specific effects, and hence that, even admitting its efficacy, in virtue of these effects, it must frequently fail when it is not given in due season. As to its efficacy, opinions, even in Germany, are much divided; some, with ETTMÜLLER, SPEUN, BERNDT, KOREFF, HUFELAND, &c., confiding in it; others, with SALZER, and several besides, stating that they have found it inefficacious; while many agree with HILDENBRAND in treating it with ridicule. [We believe that our author has conceded too much in allowing that belladonna may, by its "specific" effects, prevent an attack of scarlatina. We would almost as soon believe in HAHNEMANN's absurd-

\* As this disease chiefly occurs among children, it cannot be supposed that fear or confidence have any great influence either in promoting or warding off an attack.]

ties as in that of the *specificity* of remedial agents, in the sense in which the term is generally used. Such a belief is the corner-stone of the homeopathic doctrine, and neither consonant to reason nor facts. Belladonna may, like other active perturbing and depurating agents, prevent an attack of scarlet fever after exposure, either by a powerful impression on the nervous system, or by promoting the activity of the secretory and excretory organs: in no other mode is such a result even conceivable by a rational mind. It is by virtue of its alleged "specific" effects, that HAHNEMANN supposes belladonna to be a preventive of this disease; but the mode in which this charlatan introduced this "specific" to the world as a secret preparation, sold at a *Louis d'or* per ounce, ought of itself to stamp it as one of those base attempts at imposition which from time to time appear, to disgrace not only our profession, but our common humanity. As to the efficacy of belladonna as a preventive of scarlet fever, there is but one opinion in this country, and that is of entire incredulity. Where the degree of contagiousness of a disease is subject to so many contingencies as this, and so little settled, it is unnecessary to attempt to show the fallacy of experiments made with this drug, as heretofore published. We have used it extensively for this purpose, but have never seen any good reason to believe that it possessed any more virtue than a hundred other articles in warding off an attack.]

96. Calomel was recommended by KREYSIG and SELIG as a prophylactic, and as tending to lessen the severity of the attack, when it failed of averting it altogether. THEUSSING advised the calomel to be conjoined with the golden sulphuret of antimony. EICHEL believed in the efficacy of emetics, as advised by WITHERING, especially when they are followed by diaphoretics. Several writers have recommended the mineral acids. I have reason to believe that the nitro-hydrochloric acids are not devoid of efficacy as a prophylactic, and that capsicum may be placed in the same category, especially when conjoined with small doses of camphor and quinine. The most certain prophylaxis is, however, to be found in the adoption of those measures which I have fully detailed in the article INFECTION (§ 55, *et seq.*), when treating of its prevention and counteraction, and in that on PESTILENCE, PROTECTION FROM.

97. ii. CURATIVE TREATMENT.—It is obvious from what has been advanced, that the treatment of scarlet fever should be directed with strict reference, 1st. To the type and form of the disease; 2d. To the character of the prevailing or stationary epidemic constitution, as insisted on above (§ 10); and, 3d. To the pathological conditions, primary and secondary, to which I have endeavoured to direct special attention. With these objects in view, I shall first describe the means which are most appropriate in the different forms of the malady; and next remark upon the several remedies which have been recommended by the best authorities, and the circumstances in which they may be most beneficially resorted to. Without failing to give these authorities their due weight, I shall be guided chiefly by the results of my own observation and experience.

98. A. Simple Scarlatina.—*S. mitis*—*S. sim-*

*plex*.—Mild or simple scarlet fever (§ 18) may require but little treatment beyond attention to ventilation and diet, and to the several excreting functions, especially if the febrile symptoms be slight. If, however, the pulse is quick, sharp, or rapid, or the skin hot, the quantity, appearance, and character of the urine should be carefully examined, and if this excretion be scanty, and the fever considerable, although the disease may appear simple and regular, yet it may assume, even in the course of a few hours, a much more severe form. If there be vomiting at the commencement; and more especially if the retchings be attended by pain in the loins or limbs, and scanty or suppressed urine, an emetic should be exhibited, and its operation be promoted by demulcent diluents and warm diaphoretics, and the functions of the skin be promoted by the tepid bath. The action of the emetic tends both to remove the congestion of the kidneys either already existing or apt to supervene in these cases, and to determine to the surface of the body. If the patient be strong or plethoric, and if the prevailing epidemic constitution do not contra-indicate this measure, a small or moderate cupping over the loins; and, in different circumstances, dry-cupping in this situation, may be practiced if the symptoms are not mitigated by these means. The bowels should be evacuated by suitable aperients—by one or two doses of calomel and antimony, followed by saline aperients, as the phosphate of soda, &c., taking due care merely to promote and to evacuate the secretions and excretions without causing unnecessary irritation.

99. The chief intentions directing our practice, in the milder cases of the disease, are, 1st. To prevent the increase of febrile action; 2d. To promote the excreting and depurating functions; 3d. To remove local congestions and determinations, whenever and wherever they occur; and, 4th. To preserve or to restore the functions of the skin and kidneys after the subsidence of the eruption, and during the process of desquamation. If we fail in the complete fulfilment of these intentions, the indications and means about to be described should be adopted, appropriately to the phases through which the disease may pass, and to the complications which may supervene. Although the mild and regular form of the disease generally proceeds favourably, yet, owing to many disturbing causes, and not infrequently in consequence of the *nimia diligentia medicorum*, it may assume a serious or complicated form, more especially when vital power is suddenly reduced, when excreting functions are interrupted, or when local determinations are favoured or occasioned.\*

\* [We must caution the American practitioner against the use of active cathartics, as the saline aperients, senna, jalap, &c., in this form of scarlet fever, and especially against the use of antimony, which is an absolute poison in every form of this disease. Owing doubtless to a change in the diathesis of this as well as other exanthematous affections, active cathartic or emetic substances are now known to exert a very deleterious influence upon their progress, and should therefore be sedulously avoided. We have known senna develop intestinal irritation, followed by diarrhoea, recession of eruption, and fatal collapse in numerous instances of simple scarlatina, which doubtless only required a mild, cooling regimen to have carried them to a successful result. And so also of antimony, which is extremely deleterious unless given in very minute doses and with great caution. Castor oil, lemonade well sweetened, and sponging the skin with



100. *B. Scarlatina anginosa*—*S. inflammatoria*.—The more inflammatory types or states of scarlet fever generally require prompt and active measures. But it ought not to be overlooked, that the terms here employed to designate the more *sthenic forms* of the malady are altogether arbitrary—that many mild, as well as all the malignant states of the disease, are anginous; and that, whether simple, regular, mild, anginous, or malignant, it may also be inflammatory; the great and essential difference being the degree in which *sthenic* or *asthenic* action is present—in the amount of organic nervous or vital power, and in the state of the circulating fluids. This type or form of the disease requires a modified, or even very different treatment, according to the phases it may assume, and the grades of vascular action and vital power, as different or individual cases pass through the various phases from the mild to the inflammatory, or from the simple and regular to the complicated or malignant (§ 20).

101. (a) In the more *sthenic diathesis*, or *inflammatory* type, of this fever, an *emetic* of ipecacuanha, or of ipecacuanha and antimony, is generally of service, especially at an early period; and its operation should be promoted by warm diluents. It is not the less beneficial when vomitings are already complained of, and the urine is scanty, and pains in the loins are present. In these latter circumstances, especially when the pulse is full or strong, the abstraction of blood from the loins by *cupping*, the quantity taken being such as the age, habit of body, and peculiarities of the patient will warrant, is generally beneficial; but *bleeding* from a vein is seldom of service—more generally prejudicial, unless in the more *sthenic diathesis* and robust constitutions. If generally adopted, blood-letting is a destructive practice, unless in rare epidemic visitations, when the prevailing epidemic constitution admits of the practice, with such limitations and cautions as the nature of the disease and the peculiarities of the case suggest. During the stationary epidemic constitution, from about 1810 to 1820 or 1825, blood-letting, even in this disease, especially in its more inflammatory types, was much better tolerated than subsequently; and some writers considered their recommendations of it as sufficient to constitute it the chief remedy, in all circumstances, and for all time; denouncing those who had preceded them for advising different means, although more appropriate for the types of the disease for which these means were employed. More recently, and since late writers have ascertained that blood-letting should be most cautiously employed, even in the most inflammatory type, cupping on the nape of the neck, or the application of leeches behind the ears, has been advised for the more *sthenic anginous* form of the malady, and often practiced by myself for many years. But when pain in the loins and limbs, and scanty, high-coloured, or otherwise morbid urine, or suppression of urine, are present, I then have preferred the abstraction of blood by cupping over

the regions of the kidneys, to an amount dictated by the peculiarities of the case, and have prescribed the following *embrocation*, to be applied by means of flannel or spongio-piline around the neck and throat; or either of the *liniments* in the APPENDIX (see FORM. 295, 296, 307, 311) to be thus employed. If either of these applications produce external inflammation or discharge from the surface, the consequences are never troublesome, as sometimes observed when blisters are used.

No. 335. R Linimentum Terebinthine, §ij.; Linimentum Camphoræ Comp., §j.; Olei Olivæ, 3iij.; Olei Cajuputi, 3j. m. Fiat Embrocatio more dicto utenda.

102. When the emetic action has subsided, the bowels should be gently or moderately evacuated by means of *calomel*, either alone or with rhubarb or jalap, or with the addition of magnesia or the dried subcarbonate of soda; and followed by manna, salts, &c., in the infusion of roses or of senna; or by castor or olive oil, according to circumstances; or by equal parts of the compound infusions of gentian and senna, with the carbonates of soda and ammonia.

103. The great heat of skin in this state of the disease suggested a recourse to the *affusion of cold water* on the surface, as too strenuously and indiscriminately advised by Dr. CURRIE. When I commenced practice I adopted this treatment in scarlet fever, and extended it to several other diseases, and certainly with more benefit in them than in this; for, in the more *sthenic forms*, it was soon followed by an equal, or even by an increased heat of the surface, and in the more *asthenic* conditions it appeared to favour the development of internal complications: in most of the forms of the malady, it contingently favoured congestion of, or determination of blood to, the kidneys, and thereby aggravated the disease. I therefore relinquished the practice, and substituted the *tepid bath*, or the *cold or tepid sponging* of the surface, using simple or medicated fluids for this purpose, according to existing states of the fever, and preferring of the latter such as were emollient and alkaline.

104. After moderate evacuations from the bowels, saline mixtures or draughts, of a *diaphoretic and diuretic kind*, in a state of effervescence, will always be agreeable, and tend to moderate the febrile action, as the acetate or citrate of potass, with the acid in excess, in the more *sthenic* cases; or the acetate or citrate of ammonia, with the ammonia in excess, in the more *asthenic*; and with the spirits of nitric ether with either, will be generally appropriate. In this form of the disease, *gargles* have been very generally recommended, and are sometimes of service when their composition is such as suits the state of the case. Those which are cooling, or which contain the nitrate of potass, or the hydrochloride of ammonia, are the most grateful and beneficial. Children can use them only as washes for the mouth; but they are useful as such; and they may be injected into the mouth and throat of younger children; or a clean sponge, attached to a piece of whalebone, may be moistened with them, and be employed to cleanse the mouth and throat from time to time. The infusion of roses or of cinchona, or decoction of cinchona, or red wine and water, or camphor or rose water, may be employed as the vehicle for these

cool or tepid vinegar and water, and guarding against cerebral determination by cool applications to the head, and occasionally a mustard pediluvium, with the spirits of nitrous ether internally, will be found all the treatment necessary in the mild form of this disease, great attention, of course, being paid to ventilation and cleanliness.]

salts, or for the other substances which may be used in this manner. (See FORM. 158-167, in the APPENDIX.)

105. A prompt recourse to the means now advised will generally prevent the occurrence of the complications (§ 27, *et seq.*) often met with in this form of the disease, more especially if these means secure a free excretion of urine. But if any local determination or complication arise notwithstanding; or if it have taken place before the treatment was commenced, the agents used for combating it should have strict reference to the existing state of vital power. *Local depletion* will often be of service when power is not much reduced; but we must not expect that the complication, however inflammatory it may seem, is to be removed by depletions only or even chiefly. The pathological source of these complications, as already explained (§ 28, *et seq.*), will show the futility of the expectation. While the local depletion may tend to reduce the vascular fulness, local and general, means should be employed to rouse the action of the kidneys, to determine to the cutaneous surface, and to promote the secretions and other depurating functions. In the circumstances now being considered, there are no means more efficacious, especially in restoring the functions of the skin and kidneys, and in deriving from the seat of local affection, than flannel cloths coming out of hot water, freely sprinkled with the spirit of turpentine, or with the embrocation just prescribed (§ 101), and applied either over the epigastric and abdominal regions or over the loins. This *epithem* should be covered with oiled silk or with a warm napkin, so as to confine the fumes from it as much as possible to the surface of the body. In most of the complications of this form of the disease, the bowels should be preserved in a moderately open state, by the means already mentioned (§ 102), or by castor or olive oil; and their action may be promoted by the occasional administration of an *enema*, containing either or both these oils, with spirit of turpentine. The cooling diaphoretics and saline medicines advised above (§ 104) may also be given from time to time in a state of effervescence, or otherwise. If the bowels be irritated or too much relaxed, the liquor ammoniæ acetatis may be given with the ammonia in excess, and with the tinctura comphoræ composita or the sirupus papaveris; and the epithem or embrocation already prescribed should be assiduously applied over the abdomen.

106. (*b*) When the anginous or inflammatory form of scarlatina assumes more of the *asthenic* diathesis or type, and according as it approaches the malignant form, the treatment should be modified. In these states even local vascular depletion is either inefficacious or injurious. But *emetics*, especially early in the attack, are generally beneficial. The other means already stated are also of service, more particularly the terebinthinated *epithem* or *embrocation*, and the saline diaphoretics; and, if congestions of internal parts take place in this state of the disease, the epithem or embrocation should be energetically employed. If an aperient be required, a moderate dose of the spirit of turpentine should be added to the oils, advised above (§ 105), and be administered by the mouth, or as an enema, as the circumstances

of the case will suggest. In the less urgent or dangerous cases of this form, and in the complications which may supervene, the internal and external means already recommended will generally be appropriate; but the urinary excretion should always receive attention; and when it becomes scanty or suppressed, an ipecacuanha emetic should be given, and the terebinthinate epithem or embrocation be applied over the loins, and the spiritus ætheris nitrici and liquor ammoniæ acetatis be prescribed in sufficient quantity. In proportion as the case assumes, either primarily or consecutively, a malignant character, so ought the means about to be advised for the next form of the disease to be employed.

[The treatment of this form of scarlatina, as above directed, appears to us far more active than the disease often requires or will safely bear in this country. More die in this malady from the *nimia diligentia* of the physician than from the disease itself, and we therefore deem it our duty especially to caution the young practitioner against active medication; the experienced physician needs no such advice. With regard to general blood-letting, we have met with no cases for several years which would justify its employment, and leeches and cups for the throat affection prove, according to our experience, far less efficacious than local applications of a solution of nitrate of silver frequently repeated. We must protest entirely against antimonial emetics, or cathartics of "jalap," "senna," or "salts"—none of these can be safely administered in any form of scarlet fever, as it prevails at present, or has for several years past. Twenty years ago, we found the disease would bear bleeding and these active medicines far better than at present, and in an extensive dispensary practice were in the habit of resorting to them, until from change of diathesis, or some other cause, we were compelled to adopt a milder and less perturbing course of treatment. The inflammatory complications, which so often exist, do not yield to depletion as they formerly did, but, on the contrary, are aggravated by it. The injection of the capillary system, occasioning most of the phenomena of inflammation, is doubtless owing to depressed nervous energy, leading to loss of tone in the vascular system, and is to be combated by a mild cordial and supporting course, and not by means calculated to lower the nervous power, and thus indirectly augment the existing local congestions. As above noticed, the local application of nitrate of silver will, when practicable, be found one of the most important modes of meeting this indication, to be aided, of course, by mild stimulants, diuretics, and diaphoretics, and other secretory excitants. *Gargles* can hardly ever be employed with much effect in diseases of children, and we must therefore trust to applications made by the physician. Tepid sponging will prove equally beneficial with cold affusion, without being attended with any of its dangerous consequences. If the excitement is very high, one fourth of a drop of the saturated tincture of aconite may be given in water every hour to a child of three or four years, until the arterial action, heat, &c., have somewhat abated, which will generally be the case after a few doses; where a gentle cordial is needed, the *chloric ether* will be found one



of the most agreeable, as well as efficacious. Both these articles may be given with great facility to children of every age, and they will be found sufficient to fulfill two of the most important indications in the disease. If the disease assumes an asthenic type, we should not dare to resort to active *emetics*, as advised by our author, but would trust to wine whey, ammonia, chloric ether, quinine, and the turpentine embrocation.]

107. *C. Scarlatina maligna*—*Malignant Scarlet Fever* (§ 20, *et seq.*), is often so sudden in its seizure and so rapid in its progress as to require the most efficient means with the utmost promptitude; and, if the means be either inefficient or delayed, the extension of the affection of the throat to the adjoining passages, and the supervention of complications, which vary or differ in different cases, are common results. The severity of the affection of the throat, in these cases, has frequently induced the practitioner to apply leeches to the neck or behind the ears; but they are generally injurious, more especially when the pulse is very rapid and compressible. Even local depletions, in this form of the malady, are rarely of service; and when leeches are applied to the neck or throat, diffusive inflammation of the cellular tissue, in connexion with enlargement of the parotids, &c., either extending from the internal parts, or excited more externally by the leeches, is not an infrequent result. Whatever may be the state of the urine—however morbid or scanty this excretion may be, as it usually is in these cases—an *emetic*, consisting either of ipecacuanha or of sulphate of zinc, or of both, to which a little pulvis capsici may be added, should be given without delay, and its operation be promoted by drinking a warm infusion of chamomile flowers, or of bark—the latter made weak in proportion to the quantity to be taken—and the terebinthinate embrocation or epithem ought also to be applied over the loins in the manner advised above. The throat should also be surrounded by either the embrocation or the epithem. In a very short time, the relief which the patient will experience, especially as respects the state of the throat, will be remarkable; but, to render the relief permanent or progressive, further means should be employed.

108. In this state, the decoction of *cinchona* should be given every three or four hours, with the carbonates of *soda* or *potash*, or *ammonia*, either in a state of effervescence, the alkali being in excess, with acetic or citric acid, or with the carbonate of the alkali only. If the decoction be not taken with the acid, the fixed and volatile alkalies may be given at the same time, with the addition of the spiritus ætheris nitrici and tincture of serpentaria. It is often difficult to determine whether or not the decoction should be combined with an *acid* or with an *alkali*, in the more malignant states of scarlatina. The choice should depend, in some measure, on the state of the urine. If this excretion be not suppressed, and if it be alkaline or contain phosphates, the *cinchona* should be conjoined with *hydrochloric acid* and *hydrochloric ether*; or the *sulphate of quina* may be given, in the infusion of roses, with dilute *sulphuric acid* and *sulphuric ether*, or the compound spirit of ether. When, however, the urine is suppress-

ed, or nearly so, and when it presents an *acid* reaction, or is albuminous, or bloody, after having recourse to emetics and terebinthinate epithems over the loins, I have generally preferred a combination of the decoction of *cinchona* with the liquor ammoniæ acetatis and the carbonate of ammonia; or with either of the alkalies, in a state of effervescence with a vegetable acid. (See APPENDIX, FORM. 385, 388, 416, 437.) More than half a century ago Dr. GARNETT recommended the *chlorate of potash*, with or without the decoction of bark, in malignant scarlatina; and Dr. CLUTTON the *hydrochloric ether*. I have often prescribed them both since 1820, in public and private practice, and with marked benefit, in the malignant or putro-adynamic states of the disease, appearing either primarily or consecutively. If the symptoms are not ameliorated, an emetic should be again administered, and even repeated, but it should be conjoined with capsicum, or some other stimulant; and the decoction of *cinchona*, combined as above, should be continued afterward, with the addition of either the compound tincture of serpentaria or of capsicum, the embrocation or epithem being repeated, and the bowels moderately evacuated by the means already suggested (§ 102, 105).

109. In the more putro-adynamic or malignant states of the disease, *chlorine* and the alkaline *chlorides* have been given with benefit, either alone or conjoined with the means already mentioned; but the external applications advised above, and the evacuation of morbid secretions and excretions by emetics and the aperients already prescribed, should not be neglected. Frequent and considerable doses of powdered *carbon*, or charcoal, have also been given, and on several occasions by myself, conjoined with *quinine*, or powdered *cascarilla* and *cinnamon*, or with the addition of *camphor*, *creasote*, and two or three drops of the tincture of *capsicum*. These, mixed in treacle, have a good effect in correcting the morbid action and secretions in the throat and fauces, especially when aided by the application of the terebinthinate embrocation around the throat. When the throat and fauces are much affected in this form of the disease, as is generally observed, not only should these substances be taken, either in treacle, or in sirup or conserve of roses, or such other vehicle as would form them into a *linctus*, but the *gargles* mentioned above (§ 104), or those referred to in the APPENDIX, should be employed, in the manner there particularized, in the intervals between the administration of the other means. Gargles, however, are often unavailing, and in children can be employed only as washes in the manner already noticed. In the more severe and malignant affections of the throat and fauces, the application, by means of a brush, or sponge attached to a piece of whalebone, of a strong solution of *nitrate of silver* (3j. or 3ss. to an ounce of water), or of *alum* in *acetic acid*, will be much more efficacious, especially when early adopted. In this very malignant state of the disease, it may be necessary not to rest satisfied with *quinine*, or preparations of *cinchona* or *serpentaria*, *capsicum*, *camphor*, *ammonia*, *chlorine*, &c., as severally above prescribed, but also to give *wine*, or even *brandy*, with various farinaceous or dictetic substances, as sago, arrow-root, yolk

of eggs, &c., or with certain beverages, as Seltzer water, soda-water, or ginger-beer, or spruce-beer. [With regard to the malignant form of scarlet fever, we believe that there is great uniformity of practice among well-informed American physicians, and that their treatment is eminently judicious and successful. Depletion, in every form, is discarded; active emetics and cathartics are deemed exceedingly dangerous; while great caution is used not to weaken the already prostrated vital forces by harsh, active, or violent medication—wine, brandy, chloric ether, ammonia, quinine, with external revellents, and the local application of nitrate of silver, are the remedies on which our main reliance is to be placed. Simple enemata and castor or olive oil are all that will be required to remove morbid excretions from the alimentary canal. We have derived more advantage from chloric ether in this form of scarlet fever than from any other single remedy. It should be given as a depurative cordial and tonic, in small doses, and frequently repeated. Its effects on the capillary circulation are prompt, and of the most marked and beneficial character. Capsicum tea, containing a small quantity of ammonia in solution, is also an admirable remedy in the low and sinking cases of this dangerous malady. External revulsives are of very great value, tending as they do to equalize the circulation and remove local engorgements. The enlightened practitioner, however, knowing the indications, can select his remedies as the circumstances of the case demand.]

110. *D. Scarlatina sine Exanthemate*.—Scarlet fever without eruption should be treated with strict reference to the character of the attendant fever and to the state of the throat. Some of these cases present more or less of an inflammatory diathesis, while others are remarkably asthenic, or are attended by extreme depression of vital power. According as these different states occur, so should the treatment be directed, conformably with what has already been advanced. When vascular depletion is indicated in this form, the evidence which I have observed of congestion of the kidneys and the state of the urine have induced me to direct *cupping* on the loins, followed by the terebinthinate *epithem* or *embrocation*, in that situation; and around the neck and throat, if the fauces are much affected. I have already contended that the primary affection of the kidneys, in this form of the malady, very often prevents the development of the cutaneous eruption, and that the consequent imperfect depuration of the blood by these organs causes various internal complications. The removal of this congestion or affection of the kidneys should, therefore, be a primary intention of cure; and when the state of constitutional power does not admit of vascular depletion, as now advised, it should be attempted by the exhibition of *emetics*, by *dry-cupping* on the loins, and by the terebinthinate application already mentioned. *Purgatives*, especially those already mentioned, administered by the mouth or in enemata, and the other means specified above, according to the character of the fever and state of vital power, are generally also required. In this form, various complications are apt to appear, either at an earlier or at an advanced stage, generally owing

to the pathological cause already assigned. The head, the lungs, the pleura, or the digestive mucous surface, &c., or even two or more of these, may manifest the most serious and even the most rapidly disorganizing change, and require the most efficient and prompt measures. If the morbid action approach, and according as it possesses a sthenic character, local vascular depletions are necessary; but no dependence should be placed on those alone. The functions of the kidneys should be strictly examined, and the treatment be directed to them. Cupping or dry-cupping, followed by the terebinthinate applications, in that quarter, emetics, saline diaphoretics conjoined with diuretics, warm medicated baths, especially warm baths containing salt or carbonates of the alkalies, with mustard, are among the chief means of cure in these and similar cases. When vital power appears extremely depressed or exhausted, the tonic and restorative remedies advised above (§ 108, 109), must be prescribed in order to resist the tendency in these circumstances to contamination of the circulating fluids and to fatal sinking.

111. *Blisters* have been recommended by many as derivatives, especially when internal complications occur in this form of the malady; and in adult subjects they are often of service, although not so immediately and generally beneficial as terebinthinate epithems and embrocations, when these latter are judiciously employed. In children, blisters, even when cautiously managed, are often dangerous applications in scarlatina. Mustard poultices are preferable, but are much inferior in efficacy to the terebinthinate embrocation.

112. When the affection of the throat is very malignant or threatens to extend to the adjoining passages, especially if it advances to the *larynx*, then emetics, especially such as have been advised above (§ 107), should be administered, and the constitutional powers fortified by tonics, so as to resist the extension of the local mischief; and the throat and neck should be surrounded by a terebinthinate epithem or embrocation. Blisters in these cases are generally more injurious than beneficial; and the same may be said of *mustard poultices*, when applied to the throat. Emetics consisting chiefly of mustard have been given in these cases, but they often irritate the throat too much during deglutition, and are not so immediate or certain as the sulphate of zinc or *ippecacuanha*, or as a combination of these. When an ichorous or excoriating discharge proceeds from the throat, fauces, &c., or when these parts indicate or manifest a sphacelating state of ulceration, then the application of *pyroligneous acetic acid* with *creasote*, or the strong solution of *nitrate of silver*, prescribed above (§ 109), by means of a sponge, to the affected surface, or the use of *gargles* containing these substances, with the addition of the tinctures of *myrrh* and *krameria*, and the administration of *tonics* and *restoratives* internally, are chiefly to be confided in.

113. *E. Scarlatina Latens*.—*Latent, suppressed, or masked Scarlet fever*, in which neither eruption nor sore-throat appears, is comparatively rare, but it is a most serious, and often a fatal form of the disease when it occurs (§ 26). It would seem, as above stated, that the scarlati-



nal poison or infection primarily affects the kidneys in this form, or both the kidneys and serous membranes, primarily and chiefly; the affection of these parts preventing the development of the disease in the throat and skin, and rapidly increasing the contamination of the blood, and the effusion into serous cavities. In these cases, the disease has proceeded to effusion either into the cellular tissue, or into a serous cavity, before medical care is required. In all the instances which I have seen, the urine was either suppressed or very scanty, albuminous and sometimes bloody, from the earliest period of the recognition of the nature of the affection; and there were, moreover, febrile symptoms, with sickness and vomitings, and pain in the loins and limbs, for at least one, or two, or even more days, before any indications of œdema or internal local affection had appeared. When, therefore, these phenomena are observed in susceptible persons, in the same family, house, or locality in which scarlet fever prevails, then should energetic measures be instituted to remove the active vascular congestion manifestly existing in the kidneys, and not infrequently also in other parts, and rapidly inducing farther and most irremediable changes. But these measures should, as in other circumstances of the malady, have strict reference to the existing states of vascular action, in connexion with constitutional power or resistance.

*Cupping* over the loins, or even a repetition of it, and immediately or soon afterward procuring full vomiting by *emetics*, are the means which should be first and promptly employed. When blood cannot be farther abstracted without risk, then *dry-cupping* may be substituted; and terebinthinate *epithems* or embrocations should be applied over the loins, or over the region of the prominently affected organ or part, and repeated or persevered in, according to the effect produced on the system and on the local affection, and more especially on the functions of the kidneys. In some cases it will be most advisable to cause the patient to be placed in a *tepid* or *warm bath* after the cupping and operation of the emetic; and the effect of the bath may be increased by adding either the carbonate of potash or the carbonate of soda, or common salt, and the flour of mustard to the water, so as to determine to the surface of the body, and procure a free cutaneous exhalation. This intention will be promoted by applying, immediately after the patient is removed into bed, the terebinthinate epithem or embrocation, as just advised, and by prescribing *saline diaphoretics* and *diuretics*, especially such as contain the liquor ammoniæ acetatis and spiritus ætheris nitrici. The state of the bowels also requires attention. A full dose of *calomel*, either alone or with an *antimonial*, should be given after the operation of the emetic, and even repeated after a few hours; and some hours afterward, either of the *purgatives* mentioned above (§ 102) ought to be administered, and be followed by the terebinthinate *clyster*, if the evacuations be not sufficiently free; or if a purgative be subsequently required, without interfering with the exhibition of the diaphoretics and diuretics indicated by the state of the case. As this form of the malady is usually more or less complicated (§ 26), the means about to be farther suggested in respect of the

complications of scarlatina are equally applicable to it as to the other forms of the malady.\*

114. *F. The complications of scarlatina* are often the chief causes of danger, and hence require the most active and best devised means. The remedies which most of these complications require have been in great measure anticipated by my remarks on the curative treatment of the several forms of the malady, for it is inconsistent with the due consideration of the subject to separate the complicated, and hence the most severe states of these forms from those states or phases into which they insensibly pass. There remain, however, a few prominent topics, or pathological conditions of importance, which occasionally present themselves as dangerous emergencies, and which require a more especial notice.—(a) I have already insisted sufficiently on the prominent *affection of the kidneys* (§ 28), which may be detected at an early stage of many of the more severe and complicated cases of scarlatina, and have fully stated the means which I believe to be most efficacious in removing it, viz, cupping, or dry-cupping, or both, on the loins, followed by emetics, terebinthinate applications, the tepid or warm bath, simple or medicated, diaphoretics and diuretics, &c.

115. (b) The extension of an asthenic or *diffusive form of inflammation* from the throat and pharynx to the *larynx*, or along the *Eustachian tube to the ear* (§ 30–32.), is to be prevented chiefly by emetics; by the application of terebinthinate epithems around the throat; by tonics or restoratives, in order to increase the vital resistance to the spread of the local mischief; and by antiseptic and astringent gargles, washes or similar applications tending to correct or arrest the local morbid action (§ 104, 109). *Hæmorrhage* from the nose, throat, or ears requires consideration. If it take place from the nose—*epistaxis*—and especially if the patient be subject to this occurrence, it may prove critical, especially in the more inflammatory or sthenic cases, and should not be prematurely interfered with. But an intercurrent epistaxis, even in these cases, if too profuse, but still more readily in the malignant or asthenic, may so reduce vital power, as shown above (§ 33), as rapidly to sink the patient. Therefore, in this latter state of the disease, and especially when the blood proceeds from the mouth, throat, or ears, the hæmorrhage should be arrested, if possible, as soon as may be, by the astringent gargles or washes for the mouth already mentioned (§ 104, 109), especially those containing the pyroligneous acetic acid and creasote. The difficulty of arresting the bleeding is always the greatest in the most malignant cases, owing to the state of both the blood-vessels and the blood circulating in them. In these

\* [The diagnosis of this variety of the disease is very obscure, and probably its true nature is generally not understood. In these marked forms of disease our investigation should be carefully conducted and our treatment cautious, but based on the existing general indications. The name of the affection is of no value, therapeutically considered, and we shall seldom go amiss if, indifferent to nosological terms, we keep a steady eye upon the pathological states of the nervous and vascular system. Such knowledge will often supply, and more than supply, extensive experience when unenlightened and undirected by true science. The directions of our author are marked by enlarged views and correct pathology, and are no less in accordance with the experience of the best observers and practitioners.]

eases the attempt to arrest it should be made early; and if the means already indicated, aided by tonics and astringents taken early, should fail, the administration of the spirits of turpentine internally, either in considerable or frequently repeated doses, ought not to be delayed; for this is one of the most energetic anti-hæmorrhagic medicines which can be prescribed, if, indeed, it be not the one chiefly to be relied upon in these and similar cases.

116. (c) *When diffusive inflammation of the cellular tissue of the neck or throat occurs* (§ 34), then the most active tonic and stimulant remedies are required, in connexion with antiseptics, both internally and externally. The selection of these should be made, as already advised (§ 108), with reference to the state of the excretions, and more particularly of the urine, the same indications guiding the choice as have been there mentioned. The means which have been already advised for the most malignant form of this malady (§ 107, *et seq.*), and for *diffusive inflammation of the cellular tissue* (see *CELLULAR TISSUE*, § 34, *et seq.*), are also appropriate in this complication.

117. (d) *Gastro-enteric disorder with diarrhœa* (§ 35) is a frequent occurrence, and requires an early recourse to astringents, antacids, and aromatics, especially when it is consequent upon malignant affection of the throat, and is attended by suppression of the eruption. In these circumstances coma soon supervenes from exhaustion, if vital power be not duly supported by suitable tonics and stimulants. The warm bath, containing salt and mustard; terebinthinate embrocations over the abdomen after coming out of the bath; the infusion of eascarilla or of cinchona, or the decoction of the latter, with lime-water, or with ammonia, camphor, compound tincture of camphor, capsicum, or other aromatics, or aromatic confections; wine or brandy, with spices, in farinaceous preparations, as advised above (§ 109); or the means which are recommended in the enteric complications occurring in continued fevers (see *FEVERS*, § 549, *et seq.*) and in *MEASLES* (§ 75, *et seq.*), are severally beneficial. I have recently prescribed *salicine* in this complication with great advantage, in doses varying with the age and severity of the bowel affection, and in conjunction with the substances just mentioned in the more obstinate cases. The bark of willow may be given in decoction, infusion, or powder (from 5 grains to ℥ij.); or the *salicine* in doses of one grain to five or six.

118. (e) *Convulsions, coma, &c.* (§ 36), are most unfavourable complications, although not necessarily fatal. The former occur chiefly in young children, sometimes on the accession of the disease; the latter in both children and adults. They are both, even when occurring early, often consequences of obstruction of the urinary excretion, although the cause is generally overlooked. When these affections appear early, and manifestly from this circumstance, cupping over the loins, or the application of a few leeches in this situation in young children, the warm or tepid bath, terebinthinate embrocations on the back, and active purgatives, are generally required. When the symptoms in other respects display no putro-adyndamia, and when the pulse retains some strength as well as fulness then vascular depletion is more ben-

eficial than in some states in which it is more commonly resorted to. Calomel, with antimony or jalap, and followed by other purgatives, especially by castor oil and spirit of turpentine, and by terebinthinate enemata, are generally necessary. When coma is obstinate, then a full dose of spirit of turpentine, according to the age of the patient, with asafetida and camphor, should be administered as an enema; and, as soon as the bowels are freely evacuated, saline diaphoretics and diuretics may be given. In some severe cases of this complication, I have directed the head to be surrounded, and the vertex to be covered by flannel moistened with turpentine, or with the terebinthinate embrocation prescribed above (§ 101). During the treatment the state of the urinary function should be carefully ascertained, and if it be suppressed or scanty, endeavours should be made to restore it, and at the same time to excite other emunctories or depurating organs to increased action, especially the skin and bowels. The existence of coma or convulsions should not prevent the administration of emetics, when the measures just advised have failed; for the emetic action both rouses the action of the kidneys and determines to the surface of the body, while it procures a discharge of fluid from the digestive mucous surface, thereby relieving the vascular system from a portion of the serous fluid over-distending it, and congesting the vessels of the brain.

119. (f) The appearance of either of the *affections of the lungs, bronchi, or pleura* (§ 37, 38), or even of the *peritoneum* (§ 39), which often complicate the severer cases of scarlatina, especially the forms unattended by eruption, requires both judicious and prompt measures. If either occur during the eruptive stage, and more particularly if it be followed by the sudden disappearance of the eruption, local blood-letting is generally necessary; but the quantity of blood which may be taken, and the propriety of taking any, as in all other circumstances, should depend upon the state of the pulse, upon the existence of deficient vital power, or of putroadyndamia, and upon the state of the urinary function. Cupping, or the application of leeches, followed by dry-cupping, and the terebinthinate embrocation or epithems, assiduously or repeatedly applied, are the principal means of cure. But we should not confide too much in vascular depletion even in these complications, especially in some epidemics, and in certain localities which depress vital power and render the disease either malignant or complicated (§ 85). The external applications just mentioned are often more beneficial than any other means, especially when aided by appropriate internal remedies, as the liquor ammoniæ acetatis, spiritus ætheris nitrici, and moderate doses of camphor. It sometimes becomes a question as to the situation in which local depletion and external applications should be employed. If in these complications, as not infrequently observed, the urine is either suppressed or very scanty, or bloody, or albuminous, the local affections being the consequences of obstructed elimination and depuration by the kidneys, the loins are the situations in which these means should be applied, especially in the first instance; but otherwise over or near the chief seat of local complication. In other



respects the treatment may be the same as just advised for coma or convulsions (§ 118).\*

120. *G. The sequelæ of scarlatina* are sometimes more dangerous than the primary disease. The consecutive affection is generally caused by errors in diet or regimen during the process of desquamation, and during recovery; and the treatment should, therefore, be directed with reference to these causes. During early convalescence the digestive functions are weak, and the primary processes of assimilation are imperfectly performed, unless the nature and quantity of the aliment be such as will be readily and perfectly disposed of. As the appetite during convalescence is greater than the power of digestion, food is often taken of a kind and quantity furnishing a chyle unsuited, owing to imperfect digestion, to the state of the blood, and which, in conjunction with the large proportion of effete materials, absorbed from the various tissues and surfaces, and carried into the blood during the advanced stages of the disease and during convalescence, renders the blood either too irritating or otherwise injurious to the excreting structure of the kidneys; and this effect upon these organs is heightened by the interruption to the eliminating or depurating function of the skin during early convalescence, the kidneys thus sustaining, during this period, the whole burden of depurating function, at a period, moreover, when the blood most remarkably and unusually abounds in hurtful and irritating materials derived from imperfect assimilation, and from the absorption and accumulation of effete molecules and structural elements derived from the several tissues—these elements or materials constituting the urea, uric acid, animal extractive matters, &c., forming the products of a destructive assimilation, or the ultimate products of animalization. It must be further manifest that if the blood, thus loaded with effete or irritating materials, be determined in unusually increased quantity to the kidneys by exposure to cold, by damp clothes, or insufficient clothing or other causes, even by great humidity of the air, these organs will sustain, as respects their minute excreting structure, more or less irritation or other injury, interfering with or interrupting their eliminating function, the blood thereby becoming still more impure, and consisting of an increased proportion of watery and extractive constituents, as already more fully contended for (§ 28, *et seq.*). These causes and their effects upon the frame—the primary effects now shown, and the secondary effects, constituting the several sequelæ of the malady—being manifestly and certainly those just stated, it follows, that the means most appropriate to the removal of the secondary effects or sequelæ are such as will most efficiently re-

move the causes and primary changes which produce the secondary effects or sequelæ, whatever these latter may be.

121. Conformably with these pathological principles, the treatment should be directed, 1st. To the state of the kidneys, as indicated by the condition of the urinary function and excretion, and by other signs or symptoms; 2d. To the causes, extrinsic and intrinsic, remote or pathological, of the state of these organs; and, 3d. To the secondary affection, or sequelæ, resulting generally either from the persistence of some lesion which originated during the course of the malady, or from the affection of the kidneys caused as just shown (§ 120).

122. (a) *The prevention of the affection of the kidneys*, upon which the most frequent of the secondary diseases or sequelæ of scarlet fever chiefly depend, should be a principal object in the treatment of this malady. During desquamation and early or advanced convalescence—for a month at least after the disappearance of the eruption—the patient's diet and regimen should be strictly prescribed, however mild the disease may have been. The food should be bland, light, and digestible, chiefly farinaceous, so that as little as possible of the irritating materials to the kidneys should accumulate in the blood. The beverages of the patient ought also to be of a bland or demulcent kind, and consist chiefly of soft or distilled water, wine and malt liquors being avoided. Exposures to cold, currents of air, to humid and cold states of the atmosphere should be carefully prevented, and the clothing ought to be warm. The due restoration of the functions of the skin should be attempted early in the stage of desquamation by recourse to tepid or warm baths, in which a quantity of the sub-carbonate of soda or potash, or bichloride of soda is dissolved; and the secretions and excretions duly promoted by purgatives or aperients, and by diaphoretics. By attention to these, the sequelæ of scarlatina proceeding from obstruction of the kidneys will rarely be observed.

123. (b) If, notwithstanding these precautions, or owing to the neglect of them, the state of the urinary excretion or other symptoms indicate congestion or obstruction of the kidneys (§ 49), the treatment should be directed chiefly to these organs. Unless the constitutional powers have been, or still are, extremely depressed, the antiphlogistic regimen, medicinal and dietetic, ought to be adopted. As this affection is so often the result of overfeeding during convalescence, or of a too early recourse to animal food and exciting beverages, these causes should receive due attention; and if the mischief can be referred to them, not only ought they to be prevented, but the removal of the disorder should be attempted chiefly by means of local depletion from the loins, of purgatives and diaphoretics, by the tepid and warm bath, and by terebinthinate epithems or embrocations applied over the regions of the kidneys. The vascular depletion may even be repeated, for it is not unusual to find the sequelæ of scarlatina to require, and the patients affected by them to tolerate, the bleeding more than in any of the previous stages of the malady.

124. (c) When anasarca or effusion into any

\* [It is scarcely necessary to add anything to the very full history above given of the treatment of the various forms of this singular malady. It is impossible to give directions of uniform application, owing to the infinite shades of difference it assumes in different cases. Everything must therefore depend on the judgment of the practitioner and his skill in meeting existing indications. The congestion of the kidneys is a feature in the affection too much overlooked or disregarded in this country, and we would therefore call particular attention to the pathological condition of these organs in the treatment. Cups and leeches to the loins, as enjoined by Mr. COPLAND, should more frequently be resorted to in addition to the other means already recommended.]

serous cavity, or from any serous surface (§ 50–55), is consequent upon this disease, in the manner now shown, the effusion, in whatever situation it may occur—between the membranes, or in the cavities of the brain, in the pleura or pericardium, in the peritoneum, or in the capsules of the joints—is the consequence of active determination of blood to, or of irritation of, these membranes, caused by vascular excrementitious plethora, as above contended for (§ 28, 120); and if it should occur independently of these states of vascular action, it may be admitted as a very likely means to excite these states, owing to the morbid or irritating properties possessed by it, especially when it is retained long in any of the cavities formed by these membranes; so that upon post mortem examination it may be difficult to determine whether or no such inflammatory appearances as are found are actually the cause or the effect of the effusion: it is not improbable that they are in some measure both the one and the other. But it is not merely effusion into shut cavities which may follow upon obstruction of the urinary and cutaneous excretions after scarlatina, but a form of *congestive inflammation* of parenchymatous organs (§ 57), characterized by more or less *œdema* or serous infiltration of the affected organ, may supervene, or this latter affection may be associated with serous effusion into the adjoining serous cavity—an association which is frequent, and although the extent of the internal lesion may escape detection during life, or the one part of the mischief may mask the other, examination after death discloses the combination. I have on several occasions found, on inspection of cases of this description, the lungs condensed more or less by the infiltration of a watery lymph, and serous effusion in both pleural cavities; and in other cases the substance of the brain vascular, watery, or *œdematous*, although there existed also serous effusion into the ventricles and between the membranes. These are among the chief lesions which destroy life after attacks of scarlatina, and are merely the remote effects of the arrest of the eliminating or depurating functions, to which I imputed so great importance many years since, in the articles on the BLOOD, DISEASE, FEVER, &c.

125. It is obvious that the *treatment* of these affections ought not to be directed to them only or chiefly, but to the pathological causes or states of which they are the effects—to the obstructions of the kidneys and skin. However much blood-letting may be indicated by the state of the pulse and other circumstances of the case, a chief dependence ought not to be placed on it, even when apparently most required, but other active agents should be brought into operation, more especially purgatives, the tepid or warm bath, medicated as above (§ 122), terebinthinate epithems or embrocations over the loins or seat of local affection, after local depletions in either or both situations, and diaphoretics, followed by diuretics. These means are appropriate in the several sequelæ of scarlatina, the chief differences as respects either sequelæ being the extent to which each of them may be employed, and the succession in which they may be prescribed so as to obtain the greatest amount of benefit. After vascular depletions have been carried suffi-

ciently far, dry-cupping will then be of service; and after terebinthinate epithems have been applied, oleaginous purgatives and enemata may be administered, containing spirit of turpentine in sufficient quantity to excite the organic functions, to restrain effusion, and to stimulate the kidneys. In most respects the treatment of the sequelæ of scarlatina is the same as that of the complications (§ 114, *et seq.*); and it should be based on the same pathological and therapeutical principles.

126. (d) I have noticed among the sequelæ of this malady, the *extension of disease to the ear*, to the *cervical vertebrae*, &c., to the *parotid glands*, the *surrounding cellular tissue* and *lymphatic glands*, &c. (§ 46–48), giving rise to more or less chronic disease of these parts; but it is unnecessary to add, at this place, anything to what has been stated respecting these lesions in the articles CELLULAR TISSUE (§ 34, *et seq.*), EAR (§ 29, 30), PARALYSIS (§ 29, *et seq.*), PAROTIDS (15, *et seq.*), and SPINE. It has also been remarked that affections of the large, but more frequently of the small *joints* (§ 57), or even of both, may occur at any period after the subsidence of the eruption; and that *erysipelas*, or even *gangrene* of an extremity, may thus supervene. When the *joints* are affected, the synovial membranes are the chief parts implicated, and generally in consequence of the same pathological conditions as have been shown to originate with the emunctories; and these conditions, by contaminating the blood, affect these parts in an analogous manner to the affection of the serous membranes; and in some instances, and in certain epidemics especially, give rise to severe pains, resembling those of gout or rheumatism of the joints. In these cases the treatment should not vary much from what has been advised for articular rheumatism or gout. Generally warm anodyne fomentations, or a combination of these with terebinthinate embrocations, and the use internally of the means already advised, and particularly of such as the state of the urinary excretion will suggest, are sufficient to remove this consecutive affection. If erysipelas or either of its consequences should appear, the treatment for that disease ought to be adopted.

127. iii. REMARKS ON CERTAIN REMEDIES ADVISED FOR SCARLATINA.—After the full exposition of the *treatment of the several forms, complications, and sequelæ of scarlet fever*, which I have endeavoured to give, my remarks on this head will be brief, and be confined to those means which are most important.—(a.) *Blood-letting*, either general or local, or even both, have been recommended by BORSIERI, SCHRAEDER, GRUNDMANN, ARMSTRONG, CRAIGIE, and many others; but the impropriety of having recourse to it generally, or even frequently, in some epidemic prevalences of the malady, has been demonstrated by very numerous authorities. It would be improper to decide categorically either in favour or against the practice; for the character of the prevailing epidemic constitution, of the existing form or type of this fever, and the several circumstances of the case and of the patient, may render vascular depletion either most beneficial or most injurious. The propriety of the practice and the benefit resulting from it must necessarily depend upon the judgment of the physician, as respects not



only the peculiarities of the case that especially require it, but also the extent to which it should be carried, and the period and mode in which it should be resorted to. If the practice be adopted sufficiently early in the attack, and be aided by judicious means, *local bleeding* by cupping over the loins will be sufficient. A quantity of blood, as large as the exigencies of the case can require, may be taken in this way, and with a more decided effect as respects the organ which is most concerned in developing the most serious complications and symptoms of the malady, and in producing those changes which are usually termed malignant. In very young children a few leeches may be substituted, but the quantity taken by cupping is correctly ascertained, and hæmorrhage is prevented from being troublesome. The loss of blood in this way is also less felt, and less injurious than by venesection, in doubtful cases; and even when early employed in those cases or epidemics which seem to contra-indicate the propriety of it, much less injury results from this mode than by any other.

123. (*b*) *Emetics* have been strongly recommended by FOTHERGILL, WITHERING, STOLL, JOHNSTONE, CLARK, LENTIN, HUFELAND, and many others; but they have been unaccountably neglected in modern practice. I can assert that there is no remedy more generally appropriate—so suitable to all forms of the disease, if the substance be duly selected, and the periods of exhibition altogether proper. In most instances an emetic should be given as early as possible, and when given thus early, and before the type or character of the disease has fully declared itself, then ipecacuanha, or this with sulphate of zinc, may be preferred. When the disease is more fully developed, and assumes a sthenic or inflammatory character, then emetic tartar, or a combination of this with ipecacuanha, may be prescribed, and cupping over the loins to an amount indicated by the symptoms and its effects may precede the emetic. When the disease presents malignant characters or manifest adynamia or putro-adynamia, then sulphate of zinc with capsicum, &c., may be preferred, and dry-cupping only be employed. An early recourse to emetics frequently prevents the occurrence of inflammatory symptoms on the one hand, and of malignancy on the other. But the exhibition of them, especially of the one last named, should not be confined to the earlier periods of the malady. The state of the throat, or the extension of disease to the larynx, may require a recourse to this practice oftener than once during the course of the disease; and in the low or advanced states of the malady the combination of the emetic, whether ipecacuanha or sulphate of zinc, with stimulants and hot spices, will be of advantage. When tartar emetic is prescribed as an emetic in divided doses for children in scarlatina, it sometimes fails of producing this effect, and if the exhibition of it be persisted in, even for a short time, it may produce dangerous or even fatal sinking, although the form of the disease may have been more than usually sthenic or inflammatory when it was first prescribed.

129. (*c*) There are few remedies which require more judgment in their exhibition and selection in scarlatina than *purgatives* and *aperi-*

*ents*; for if they be given at the period of eruption, especially when the efflorescence is being evolved, they may interrupt the regular course of the disease; and if they be too long omitted, the retention of morbid secretions and excretions may be equally detrimental. If, again, they are of a too irritating kind they may develop an enteric complication, or, in the more asthenic forms, seriously depress or exhaust the patient. They are often exhibited with much benefit, as already advised (§ 102, 165), after an emetic has operated, when the patient is first attacked, and before the eruption begins to appear. After this period, or during the eruption, if the disease assumes a regular course, mild aperients, sufficient merely for the prevention of accumulations of the excretions, are only required. If, however, determinations to the head or suppressed function of the kidneys supervene, then the more active purgative, conjoined with calomel, terebinthinate enemata, &c., already mentioned, are of service. When the disease assumes an asthenic or malignant form, the purgatives should be conjoined with tonics, stimulants, and aromatics, as with cinchona, cascarilla, gentian, ammonia, spices, &c. In the more regular forms, purgatives are generally of greater service upon the disappearance than during the continuance of the eruption, and in every circumstance the combination with them of the alkaline carbonates or sub-carbonates is most beneficial. The indications for or against a recourse to purgatives, and the choice of them, depend upon the type, form, and complication of the disease, and upon the states of the alvine functions and evacuations, which ought to be always carefully examined.

130. (*d*) Preparations of *cinchona* and other *tonics* have been much employed in the treatment of the malignant and asthenic scarlatina; and in these forms especially, after the exhibition of emetics and after morbid secretions and excretions have been duly evacuated, and after cupping or dry-cupping has been employed, in cases requiring either or both, these medicines are most beneficial; much, however, depending upon the selection and combination of them with other means. Vascular depletion early in the disease may be beneficial, and yet the exhibition of tonics may be imperatively required at a more advanced period. But a recourse to the latter should very much depend upon the state of the urinary function. Most of the earlier writers on the disease since the time of MORTON, and especially those who observed chiefly the more malignant types, have insisted much upon the necessity of recourse to *cinchona*, in the forms either of powder, decoction, or tincture, especially HUXHAM's tincture. But even in these types this medicine is best prescribed as just advised; and if the urine be suppressed, bloody, very scanty, and very high-coloured, cupping even in these ought to precede the administration of this remedy. In cases which suggest doubts of the propriety of having recourse to it, the infusion or decoction, conjoined with the liquor ammoniæ acetatis, with the acid or with the alkali in excess, or with nitrate of potash, according to the peculiarities of the case, and with spirit of nitric ether, will never be injurious, but most frequently very beneficial. When symptoms of malignancy are unequivocal, and the urine not

suppressed, the decoction with the compound tincture of cinchona, or with tincture of serpentaria and carbonate of ammonia, and sometimes also with the bicarbonate of potash or soda, will be of service; or the mineral acids, especially the *hydrochloric* or *nitro-hydrochloric acid*, with the ethers, may be given in the decoction of the cinchona when the urine indicates the propriety of exhibiting these in preference to the alkaline carbonates. If the bark affect the bowels, the *cascarilla* or *willow bark* may be substituted, or *salicine* may be employed. Other tonics, or tonic febrifuge preparations, may be prescribed in mild cases; but in the malignant type, these just mentioned, or the sulphate of *quina* conjoined with camphor, and other substances noticed when treating of the malignant form of the malady (§ 107, *et seq.*), are most deserving of adoption.

131. (e) *Stimulants* are required in the asthenic forms of the disease, and often at an advanced stage of the more sthenic type, but generally in conjunction with other means. The *sesquicarbonate of ammonia* was strongly recommended by PEART, and is certainly often most beneficial when combined, as above advised, according to the peculiarities of individual cases. It is frequently prescribed in too small, and consequently in inefficient doses; and the same remark applies to the *ethers* and their preparations. When a tonic and antiseptic effect is desired, ammonia should be conjoined with the preparations of cinchona and camphor; and when a diaphoretic action is indicated it should be given with the solution of the acetate of ammonia and spirit of nitric ether. The ethers are most useful when the patient complains of sinking faintness, or leipthymia. With quinine and compound infusion of roses, *sulphuric ether* may be preferred; and with the decoction of bark and hydrochloric acid, or the nitro-hydrochloric acid, *hydrochloric ether* may be prescribed. The *chlorate of potash* may be conjoined with tonic infusions or decoctions, or with alkaline carbonates and ether; and in the more malignant states of the disease these medicines should be ordered in frequently repeated doses, and be farther aided by *camphor*, *musk*, *serpentaria*, or *capsicum*. The combination of camphor with spirit of Mindereri was much confided in by HUFELAND in this class of cases. A recourse to *wine*, or even to *brandy*, in the forms mentioned above (§ 109), may not only be of service, but even indispensable, in the more asthenic and malignant states of the disease.

132. (f) *Diaphoretics* and *diuretics* are medicines of great importance in this disease. The functions of the skin and kidneys are interrupted by the active vascular congestion, and by the alteration of the organic nervous influence of these parts, and therefore, while means are being used to equalize the circulation and to relax the cutaneous surface, medicines should be prescribed to aid these intentions, and to rouse the secreting and depurating actions of these organs. In the more sthenic or inflammatory types, and at the commencement of the disease, the antimonial diaphoretics, conjoined with the solution of the acetate of ammonia and spirit of nitric ether, or with nitrate of potash, will generally be of service, even although they may fail of materially promoting the functions in question. But, in other states of the malady,

diaphoretics of a warm and restorative nature, or a combination of the more common diaphoretics with stimulants and antispasmodics, as with ammonia, the ether, &c., especially after the tepid or warm bath has been resorted to, will be found most beneficial.

133. *Diuretics* should be given in similar combinations to those now advised, in the asthenic or malignant form of scarlatina; but in this form, and in the advanced stages more especially, the most certain diuretic is the spirit of turpentine administered in an enema, or the terebinthinate epithem or embrocation applied over the loins, as already mentioned. During desquamation, when the kidneys are frequently congested or the tubuli obstructed by the desquamated epithelium, the supertartrate of potash and biborate of soda, or the acetate or citrate of potash with either the acid or the alkaline carbonate in excess, or any of the saline diuretics, or others mentioned in the article Dropsy (§ 135, *et seq.*), when describing the treatment of *anasarca*, will be appropriate.

134. (g) Besides the above, *various means* have been recommended by writers, in the treatment of scarlatina, as either empirical remedies or as antiseptics and stimulants. The most serviceable of these, when judiciously employed, are the mineral acids, the alkalies, and certain vegetable acids and products. Of the *mineral acids*, the most beneficial are the hydrochloric and the nitro-hydrochloric, either in simple dilution, or conjoined with the decoction or infusion of cinchona, or with camphor, or with these and the hydrochloric ether. Of the vegetable acids, the *acetic* and the *citric* are the most useful. The former has been frequently employed both internally and externally, since the earliest irruptions of the malady in an epidemic form, chiefly on account of its antiseptic property; and with reference to this virtue I have often employed it; but more recently I have preferred the *pyroligneous acetic acid*, either combined as above, or given with creasote or other antiseptic agents, in the more malignant states of the disease. *Citric acid* is also beneficial in similar circumstances; but while I have considered it as preferable to the common acetic acid, I have believed it inferior to the pyroligneous. Either of these acids is often beneficial; but the vegetable acids now recommended should be given more liberally than they usually are.

135. *Chlorine* and the *chlorides* are also very excellent remedies in the more malignant states and advanced stages of scarlatina, their influence being aided by other restorative means, as cinchona, serpentaria, camphor, musk, capsicum, &c. *Chlorine* was first prescribed by BRAITHWAITE; and its excellent effects in the more malignant states of the disease have been acknowledged by many British and foreign authorities. The *chlorine-water* of the Dublin Pharmacopœia may be given in doses suitable to the age of the patient, in camphor mixture, or in any other proper vehicle. *Alkaline carbonates*, both the volatile and the fixed, have been recommended by many authorities in scarlatina. They may be prescribed with the remedies just named, and in the states of the disease, and in the combinations mentioned above (§ 108). *Nitrate of potash*, in full and frequent doses, has been advised by FRUNK; and it is



often of service when associated with other means which are appropriate to the peculiarities of the case, more especially with camphor and others already noticed. The use of *colchicum* has recently been recommended; but it is a hazardous agent even in the more sthenic forms of the malady, as its injurious operation is liable to be confounded with the unfavourable course of the disease. It should be given only in similar states and circumstances of the case to those for which I have admitted that the tartrate of antimony may be prescribed.

136. (*h*) *Gargles*, or, preferable to these, stimulating *lotions* or *washes*, with a strong solution of the *nitrate of silver*, or of powdered *alum* in the pyroligneous acid, are often extremely beneficial, when employed early in the anginous form of the malady, especially when the affection of the throat assumes an asthenic, malignant, or offensive character. Either of these solutions, or others already mentioned (§ 109), should be applied early by means of a camel's-hair brush, or of sponge, in the manner already pointed out; and the solution should be strong in proportion to the malignancy of the affection. At the same time as these means are being used, the external applications to the throat, about to be noticed (§ 140), should be resorted to, and the tonic, restorative, and antiseptic medicines mentioned above ought to be administered. A strong solution of the *bichloride of mercury* has been recommended by Dr. SAUTER to be used as a gargle in the more asthenic affection of the throat; and, judging from my experience of it as a gargle in analogous affections of this part, it is very likely to prove of service. In some of the more prolonged cases, and when the tonsils are much enlarged, I have directed the parts to be pencilled with the *tincture of iodine*, and if there be, as often observed, much external swelling after the eruption has disappeared, I have prescribed the same application externally. In less malignant cases, the chloro-sodaic solution of LABARRAQUE, in the proportion of an ounce to five of camphor water and half an ounce of honey, is a very useful gargle; or the decoction of *contrayerva* with hydrochloric acid and tincture of capsicum; or a filtered solution of the confection of roses with the same acid and tincture, or the tincture of myrrh, and camphorated spirit, may be employed in still less severe forms of the disease.

137. (*i*) *Cold*, in various modes of application, has been resorted to for the removal of the pungent heat of the surface, which is believed to increase not only the distress of the patient, but also the vascular action and the exhaustion of organic nervous power. It may always be safely applied when the skin is very hot and dry. Various modes of employing it have been advised. BEDDOES directed a free current of *cold air* to pass over the patient. But in resorting to this mode of reducing the temperature of the surface, the respiratory passages and organs may suffer, and the complications described above, especially bronchitis, pneumonia, pleuritis, or peritonitis, may thereby be occasioned; or the eruption may be suppressed. The obvious benefit resulting from treating the patient in a large, airy apartment, where the temperature is cool rather than very cold, and in which the air is being continually

renewed, should never be overlooked; and the bed and bed-clothing ought to be cool and light, especially during the eruptive stages; but subsequently both the one and the other ought to be so regulated as to favour the restoration of the cutaneous functions, and to equalize the due distribution of the blood.

138. The *affusion of cold water* over the surface of patients in scarlatina, so strenuously advised by Dr. CURRIE, and so generally and indiscriminately practiced during the commencement of this century, has been found beneficial early in the more sthenic and regular forms of the disease. But an injudicious recourse to this practice in asthenic, malignant, and complicated cases has brought it into disrepute. In the hands, however, of a discriminating physician—of one capable of interpreting aright existing pathological states, and of selecting and applying judiciously medicinal agents for the removal of these states—the cold affusion is still deserving of estimation. I have, however, preferred in most circumstances *cold* or *tepid sponging* of the surface, adapting the temperature, and the fluids employed, to the peculiarities of the case—*cold* or *cool fluids* at an early stage and in sthenic cases, and *tepid*, or even *warm fluids*, at an advanced period, and in the asthenic or malignant forms, whenever the skin is hot and dry. These are in many respects preferable to affusion, for they may be more frequently resorted to, and may be employed for a longer time, without exhausting the patient. The fluids which may be selected for this purpose deserve some notice. I have usually directed equal parts of vinegar and water, or of spirit of Mindereri and water, or camphor water, during the early stages; but have subsequently employed a weak alkaline solution, or a solution of borax, as being more likely to facilitate the restoration of the functions of the skin during the advanced stages, and to prevent the affection of the kidneys and the dropsy often supervening as sequelæ of the disease. Frequent sponging of the surface with a solution of the *nitro-hydrochloric acids*, of a tepid or warm temperature, according to the state of the case, will be found of much service in the malignant and asthenic forms of the malady.

139. (*j*) *Baths*, *tepid* or *warm*, according to the period of the disease and the peculiarities of the case, are often beneficial. The tepid bath, in the earlier stages, generally lowers the heat of the skin, mitigates the uneasiness and burning attending the eruption, and relaxes the surface. When the disease is farther advanced, especially if it be complicated, then the *warm bath* may be preferred; and when the eruption has suddenly or prematurely disappeared, salt and mustard may be added to the water. If a warm bath be required during desquamation, or if any of the sequelæ of the disease supervene, the alkaline sub-carbonates, or the borate of soda, will be a very useful addition; and if the complication be of a very serious character, mustard may be added. A frequent recourse to warm baths, during desquamation, will generally prevent the sequelæ of scarlatina, especially if the alkaline additions just mentioned be made to the baths.

140. (*k*) *Embrocations* and *external applications* of various kinds have been employed; but they

are required chiefly for the severer states, and internal complications of the malady; or when the eruption either does not come out, or prematurely disappears. *Blisters* are most hazardous applications for children in this disease, and are generally so in proportion to their youth.\* In the mild and regular forms they are not required, and in the malignant or complicated may produce gangrene of the part. They are sometimes of service in adults, especially at an advanced stage, and when due reference is made to the state of the urine. *Mustard poultices* are often of use in the circumstances just mentioned; but in the more malignant type of the disease, in very young subjects, they may be followed by effects almost as dangerous as those produced by blisters, if they be too long or injudiciously applied. The *embrocations* and *epithems* prescribed above (101) and in the APPENDIX (FORM. 295, 296, 307, 311) are the most efficacious, and are attended by none of the risks and ill effects often produced by blisters, and other external derivatives and counter-irritants. When properly employed, especially soon after a warm or tepid bath, they powerfully promote the functions of the skin; and, by the absorption of their fumes, chiefly by the lungs, they tend to restore the secreting and excreting functions generally. The application of these, in the several states of the disease, has been pointed out in the remarks already offered.

141. (1) The *diet* and *regimen* of the patient must depend, in some measure, upon the type and the stage of the disease, upon the peculiarities of the case, and the circumstances of the patient. In the more regular, sthenic, or inflammatory forms, and in the more complicated cases, especially if the complications occur at an early stage, the *diet* and *regimen* should be antiphlogistic. Barley-water, thin water-gruel, &c., are generally sufficient during the earlier periods; but afterward, and from the commencement in the more asthenic or malignant types, Seltzer or soda water with milk may be given; and as the disease proceeds, or begins to assume putro-adynamic or malignant characters, spruce-beer, soda-water, or Seltzer-water with wine; sago, arrow-root, or tapioca with wine, or even with brandy in some cases, may likewise be prescribed; beef-tea, chicken or other broths being also allowed, according to circumstances. Due ventilation should always be insisted on, avoiding, however, currents of air, especially during desquamation; the bed and bed-clothes being regulated according to the type, character, and stage of the disease, as above advised (§ 97, *et pluries*). In order to prevent the usual sequelæ of the disease, during desquamation and recovery, the diet and regimen of these periods ought to be strictly prescribed, conformably with the advice already given (§ 120-123); and if *anemia* or much *debility* be observed, the treatment prescribed for these, in the places referred to, should be adopted. (See *arts. Blood, Deficiency of* (§ 48), and *Debility* (§ 35, *et seq.*).

BIBLIOG. AND REFER.—*J. B. Carnevali*, De Epidemico stragulario Adfectu, 4to. Neap., 1620.—*F. Nola*, De Epidemico Plegmona Anginosa grassante Neapoli, 4to. Venet., 1620.—*J. A. Scgambati*, De pestilenti Faucium Af-

fectu Neapoli saviente, 4to. Neap., 1620. *A. Tamayo*, De Morbo garotillo, 8vo. Madrid, 1622.—*M. A. Sverinici*, De Pedanchoni, seu pestilenti ac præfocanti Pueris Abscessu, Diatriba singularis, 4to. Neap., 1641.—*Pueri Seneriti*, Medicina Practica, t. ii., De Febrilibus, cap. xii. Viterb., 1651.—*T. Sydenham*, Opera Omnia, Edid., *G. A. Greenhill*, p. 243, 553.—*Schultz*, In Miscellanea Naturæ Curiosorum, Ann., vi. et vii., p. 206.—*De Gorter*, Prax. Med., t. ii., p. 196.—*Morton*, Opera, Exercit. i., cap. 2, p. 41; Exercit. iii., cap. 5, p. 53.—*W. Douglas*, Practical History of an Epidemic Fever, with an Angina ulcerosa, 8vo. Bost., 1736.—*J. Storck*, Practischer und Theoretischer Tractat vom Scharlachfieber, 8vo. Gotha, 1742.—*J. B. L. Chomel*, Dissertation Historique sur le Mal de Gorge gangréneux en 1748, 12mo. Paris, 1748.—*J. Fohergüll*, An Account of the Sore Throat attended with Ulcers, 8vo. Lond., 1748.—*Nath. Cotton*, Observations on a particular Kind of Scarlet Fever, 8vo. Lond., 1749.—*J. Huxham*, Dissertation on the Malignant Ulcerous Sore Throat, 8vo. Lond., 1751.—*N. Tarrano*, An Historical Dissertation on a particular Species of Gangrenous Sore Throat (Transl. from Chomel), 8vo. Lond., 1753.—*Schmidt*, Epist. de Febre Scarlatina, Hanover, 1753.—*C. Colden*, Letter concerning the Throat Distemper (Medical Obs. and Inq., i.), 8vo. Lond., 1755.—*Ch. Bisset*, Essay on the Medical Constitution of Great Britain, with an Account of the Throat Distemper, 8vo. Lond., 1760.—*J. Chandler*, A Treatise on the Disease called a Cold; also, on the Putrid Sore Throat, 8vo. Lond., 1761.—*M. A. Plenck*, Tractatus de Scarlatina (Wasserberg Opp. Minor. Fasc. ii.), 8vo. Vindob., 1775.—Vom Scharlachfieber, in *Mohrenheim's* Beyträgen, b. ii., No. 2.—*W. Grant*, A short Account of the Fever and Sore Throat in London in 1776, 8vo. Lond., 1777.—*Sauvages*, Nosolog. Methodica, Cl. iii., Gen. 8, Sp. 6.—*R. Saunders*, Observations on the Sore Throat and Fever in the North of Scotland in 1777, 8vo. Lond., 1778.—*J. Johnston*, A Treatise on the Malignant Angina, 8vo. Lond., 1779.—*W. Wühering*, An Account of the Scarlet Fever and Sore Throat in 1778, 8vo. Lond., 1779.—*Aaskov*, in Acta Reg. Soc. Med. Haun., vol. ii., p. 91. *Bang*, in ibid., vol. ii., No. 3.—*J. Clark*, Observations on Fevers, Scarlet Fever, &c., 8vo. Lond., 1780.—*J. M. Aeppli*, Beschreibung eines Epidemischen Scharlachfiebers, 8vo. Winth., 1785.—*De Meza*, in Acta Reg. Med. Soc. Haun., vol. ii. (Malig. Scarl.), vol. iii., No. 8.—*J. Skeete*, Experiments and Observations on Bark, on Putrid Scarlet Fever, &c., 8vo. Lond., 1786.—*Rush*, Med. Inquiries and Observations, &c., Nos. 4, 5, p. 118, &c. (*The epidemic in Philadelphia of 1783 and 1784*).—*W. L. Perkins*, An Essay for a Nosological View of the Cynanche Maligna and the Scarlatina Anginosa, 8vo. Lond., 1787.—*Swediaur*, Nov. Nosolog. Method. Syst., vol. i., p. 164.—*J. G. Grundmann*, Abriss einer Scharlachfieber-epidemie, 8vo. Gera, 1788.—*W. Rowley*, An Essay on the Malignant Ulcerated Sore Throat, &c., 8vo. Lond., 1788.—*M. Stoll*, in Rat. Medendi, &c. Pars ii., p. 171, 361; P. iii., p. 5.—*T. Reece*, An Essay on the Erysipelatous Sore Throat, 8vo. Lond., 1789.—*J. Sims*, Of the Scarlatina Anginosa of London in 1786, in Mem. of Med. Soc. of Lond., vol. ii.; in 1798, ibid., vol. v.—*Lettsom*, in ibid., vol. vi., art. 22.—*G. Überlacher*, Abhandlung vom Scharlachfieber, 8vo. Wien, 1789.—*Johnston*, in Mem. of Med. Soc. of Lond., vol. iii., art. 17.—*F. J. De Wille*, De Febre Scarlatina (Coll. Diss. Lov., iv.), 8vo. Lovan., 1790.—*F. Saalmann*, Descriptio Febris Urthæte, Scarlatinae, et Purpuræ, 8vo. Monast., 1790.—*W. Rowley*, Observations on the Causes of the Great Number of Deaths in Scarlet Fever, &c., 8vo. Lond., 1793.—*W. Williamson*, Dissertation on Scarlet Fever attended with Ulcerated Sore Throat, 8vo. Philad., 1793.—*G. Mossman*, On Cold Water in Scarlatina Cynanchea (Ann. of Med., iv.), 8vo. Edin., 1799.—*J. Allen*, Treat on Scarlatina Anginosa and Dysentery, 8vo., 1799.—*T. Lauth*, Vom Witterungszustande, von dem Scharlachfieber und dem bösen Hals, 8vo. Strasb., 1800.—*Wells*, in Transac. of Soc. for Improvement of Med. and Chirurg. Knowledge, vol. ii., p. 225.—*C. G. Glaeser*, Ueber die Epidemische Krankheit, &c. (Scarlatina Maligna), 8vo. Wittenb., 1801.—*S. Hahnemann*, Hülfsung und Verhütung des Scharlachfiebers, 8vo. Gotha, 1801.—*J. F. Dubosq*, Recherches sur la Scarlatina Angineuse, 8vo. Vire, 1802.—*F. L. Kreysig*, Abhandlung ueber den Scharlachfieber, 8vo. Leipz., 1802.—*E. Parri*, Practial Information on the Malignant Scarlet Fever, 8vo. Lond., 1802.—*W. Blackburne*, Facts and Observations concerning the Prevention and Cure of Scarlet Fever, 8vo. Lond., 1803.—*T. C. W. Cappel*, Abhandlung vom Scharlachausschlage, 8vo. Goett., 1803.—*J. Currie*, Med. Reports on the Effects of Water as a Remedy in Fever, &c., 2 vols. 8vo. Lond., 1805, vol. i., *pluries*.—*C. A. Struce*, Untersuchungen über die Scharlachkrankheit, 8vo. Hannover, 1803.—*J. Braithwaite*, On the Use of Oxygenated Muriatic Acid in Scarlatina. In Annals of Medicine, vol. viii., p. 96. (*The first to employ chlorine for this disease*).—*G. W. Becker*, Das Scharlachfieber, 8vo. Leipz., 1804.—*J. Braithwaite*, in Lond. Med. and Phys. Journ., April, 1804.

\* [Blisters should never be employed in this disease under any circumstances.]



- R. Willan*, On Cutaneous Diseases (Ord. iii.), 4to. Lond., 1805-7.—*Etmüller*, in *Hufeland's Journ. du Practischen Heilkunde*, b. xx., st. 4, p. 97.—*Harles*, in *ibid.*, b. xii., p. 150.—*J. G. Bremser*, Ueber Scharlachkrankheit und Masern. 8vo. Weim., 1806.—*Fischer*, in *Hufeland's Journ. du Pract. Heilk.*, b. xiii., st. 4, p. 23.—*Filter*, in *ibid.*, b. xix.—*J. Steigitz*, Versuch der Behandlungsart des Scharlachfiebers. 8vo. Hann., 1806.—*Kilian*, Das Scharlachfieber, 8vo. Leipz., 1806.—*J. J. Friz*, Descriptio Morbi Epidemici Münchlingæ grassati, 4to. Tubing., 1837.—*W. Hamilton*, On the Use of Digitalis in Dropsy, Scarlet Fever, &c., 8vo. Lond., 1807.—*Malfatti*, in *Hufeland's Journ. du Pract. Heilk.*, b. xii., st. 3, p. 120. (*Account of Malignant Scarlatina in Lying-in Women in Vienna.*)—*Kolbany*, Fernere Nachrichten von der glücklichen Anwendung des Kalten und Warmen Wassers in Scharlachfieber, 8vo. Presb., 1808.—*Schnoeger*, in *Hufeland's Journ. du Practischen Heilk.*, b. xxii., st. 2, p. 122.—*Speun*, in *ibid.*, b. xix., st. 2, p. 132.—*Masius*, in *ibid.*, b. xviii., st. 4, p. 48.—*Harcke*, in *ibid.*, b. xiii., st. 1, p. 185.—*Kortum*, in *ibid.*, b. viii., st. 3, p. 29.—*Selig*, in *ibid.*, b. xvi., p. 19.—*A. T. Naumann*, De Febre Scarlatina, &c., 8vo. Erfurt, 1808.—*C. H. Tellegen*, Quædam Observationes in Scarlatina, 8vo. Groen., 1808.—*J. P. Frank*, De Curand. Hom. Morbis, l. iii., p. 69.—*P. A. Raggi*, De Purpure Scarlatinae Prophylaxi, 8vo. Vigevans, 1809.—*J. W. G. Benedikt*, Geschichte des Scharlachfiebers, einer Epidemie u. Heilmethode, &c., 8vo. Leipz., 1810.—*A. Daehn*, Beiträge zur Aetiologie und Cur des Scharlachfiebers, nebst Empfehlung der Einreibungen mit vit. 8vo. Leipz., 1810.—*A. F. Hecker*, Von der Krankheit vom Scharlachausschlag, 8vo. Erfurt, 1810.—*G. C. Reich*, Neue Aufschlüsse über die Natur und Heilung des Scharlachfiebers, 8vo. Hal., 1810.—*J. V. Rothe*, Belehrung zur Verhütung des Scharlachfiebers, Goslar, 1810.—*G. E. Kleven*, De Variâ Maliginitatâ Ratione in Febre Scarlatinosâ, 8vo. Leipz., 1811.—*T. Bateman*, A Practical Treatise on Cutaneous Disease, Edit. by *Thomson*, p. 127.—*C. G. Mentzmann*, Gibt es kein Schützmittel gegen das Scharlachfieber? 8vo. Leipz., 1814.—*Willan*, A Treatise on Scarlatina, 8vo. 1815.—*W. G. Matton*, On a Rash liable to be mistaken for Scarlatina, in *Med. Trans. of Royal College of Phys.*, vol. v., p. 149.—*Anon.*, Discorsi sulla Scarlatina, 4to. Palermo, 1816.—*Marcus*, Specielle Therapie, b. iii., p. 272.—*J. Armstrong*, Practical Illustrations of the Scarlet Fever, &c., 8vo. Lond., 1818.—*Reuss*, Wesen der Exantheme, 3d Th. Nuernb., 1818, § 451-555.—*J. A. Bonner*, A Statement of the Results of Practice in Fever, Scarlatina, &c., 8vo. Lond., 1818.—*D. A. G. Richter*, Die Specielle Therapie, b. i., p. 438.—*A. Trölich*, Abhandlung vom Nutzen des Wassers in dem Scharlach, &c., 8vo. Wien, 1818.—*J. Frank*, Præcox Medicæ, &c., vol. ii., pars. i., p. 206.—*C. Pfeuffer*, Der Scharlach, sein Wesen und seine Behandlung, 8vo. Bamh.—*G. Blane*, in *Trans. of Medico-Chirurg. Soc. of London*, vol. iii., p. 445.—*Olivier*, in *Nouv. Journ. de Médecine*, t. xv., p. 293.—*Gasté*, Journ. Univers. des Sciences Médicales, t. xxv., p. 129.—*Lemerclier*, Revue Médicale, t. ii., 1825, p. 454.—*Lobstein*, Repertoire Génér. d'Anat. et Physiol., &c., t. ii., p. 344.—*J. Wendt*, Das Wesen die Bedeutung u. Ärztliche Behandlung des Scharlachs, 8vo. Bresl., 1819.—*C. Duftschmid*, Tractatus de Scarlatina, 8vo. Linz., 1820.—*Junin de Saint-Just*, Dict. des Sc. Méd., t. i., p. 120.—*J. Zironi*, Beobachtungen . . . des Scharlachfiebers in Mannheim, 8vo. Mannh., 1820.—*W. Maemichael*, A New View of the Infection of Scarlet Fever, 8vo. Lond., 1823.—*G. Blane*, Select Dissertations, &c., 8vo. Lond., 1823, p. 213.—*H. van den Bosch*, Waarnemingen en Opmerkingen omtrent den Roodvonk, 8vo. Rotterdam, 1823.—*M. Good*, Study of Medicine, &c., 4th ed., vol. ii., p. 317.—*H. A. Goeden*, Vom dem wesen und der Heilmethode des Scharlachfiebers, 8vo. Berl., 1823.—*V. N. Hildenbrand*, Institut. Practico-Medicæ, vol. iv., p. 371.—*Guerseit*, Dict. de Méd. (art. Scarlatine), t. ix. Paris, 1827.—*J. Elliottson*, in *Lancet*, 1830, 1831, p. 392.—*Roche*, Dict. de Méd. et de Chir. Prat. (art. Angine Couenneuse), t. ii. Paris, 1829.—*Tweedie*, Cyc. of Pract. Med., vol. iii., p. 641.—*Braun*, Nouv. Biblioth. Médicale, t. vi., p. 231. (*Chlorine recommended, as first employed by BRAITHWAITE, and subsequently by the majority of modern physicians.*)—*Jahn*, in *Journ. Complement. des Scien. Méd.*, t. xxxvi., p. 387; t. xxxvii., p. 149.—*Martini*, in *Archiv. Génér. de Médecine*, t. v., p. 264.—*Dance*, in *ibid.*, t. xxiii., p. 321, 481.—*Wendt*, Lond. Med. and Phys. Journ., vol. xliii., p. 36, præmium.—*Barth*, Journ. des Progrès des Sciences Médicales, t. xi., p. 230.—*Bernd*, in *British and Foreign Medical Review*, vol. ii., p. 178.—*Williams*, in *ibid.*, vol. v., p. 363.—*Mackintosh*, in *ibid.*, vol. iii., p. 108.—*Newenhuys*, in *ibid.*, vol. iii., p. 161.—*Chapman*, in *ibid.*, vol. xxi., p. 364.—*A. W. Bodensius*, Untersuchungen u. Erfahrungen über das Kohlensäure Ammonium u. seine Heilkräfte gegen das Scharlachfieber, &c., 8vo. Heidelberg, 1842. (*Large doses of the carb. of ammonia from the commencement.*)—*Murray*, Edinburgh Medical and Surgical Journ., vol. xvii., p. 345.—*Willan*, in *ibid.*, vol. ii., p. 68.—*Binn*, in *ibid.*, vol. iii., p. 135.—*Craigie*, in *ibid.*, vol. xvi., p. 235.—*Stark*, in *ibid.*, vol. xvi., p. 366, and vol. xvii., p. 97.—*Reid*, in *ibid.*, vol. xviii., p. 89.—*Hamilton*, in *ibid.*, vol. xxxix., p. 144, and vol. xvii., p. 141.—*Wood*, in *ibid.*, vol. xliii., p. 34.—*Dezaur*, in *ibid.*, vol. xlv., p. 56.—*Williams*, in *Medico-Chirurg. Review*, July, 1837, p. 31.—*Burke*, Dublin Journ. of Med. Sciences, March, 1837, p. 30.—*R. Williams*, Elements of Medicine, vol. i.; On Morbid Poisons, 8vo. Lond., 1836, p. 115.—*Hamilton*, in *Medical Gazette*, &c., 1837, p. 119.—*Rumsey*, in *Transact. of Provinc. Med. and Surg. Association*, vol. iii., p. 194.—*R. J. Graves*, Med. Gazette, March, 1837, p. 841, and Clinical Lectures on the Practice of Medicine, vol. i., p. 304.—*Tait*, British and For. Med. Review, Jan., 1838, p. 281.—*G. Burrows*, in *Library of Medicine*, vol. i., p. 334.—*G. Gregory*, Lectures on Eruptive Fevers, 8vo. Lond., 1843, p. 137.—*H. Kennedy*, Some Account of the Epidemic Scarlatina which prevailed in Dublin from 1834 to 1842 inclusive, with Observations, 8vo. Dublin, 1843.—*E. Charlton*, An Account of the late Epidemic Scarlatina in Newcastle and its Neighbourhood, 8vo. 1847. (*An interesting report.*)—*T. Watson*, Lectures on the Principles and Practice of Physic, &c., 3d edit., vol. ii., p. 815.
- [AM. BIBLIOG. AND REFER.—*Felix Pascalis*, On Scarlatina Cynanchica, in *Med. Repository*, vol. vi., p. 163.—*N. Chapman*, Lectures on Scarlatina, in *Phil. Med. Examiner*, vol. i., p. 377, 393.—*Robley Dunglison*, Clinical Lecture on Scarlatina, *Med. Examiner*, vol. i., p. 290-301.—*E. C. Kecheley*, Treatment of Scarlet Fever, in *Southern Med. and Surg. Journal*, vol. iii., p. 593.—*William Baylis*, An Account of the Ulcerated Sore Throat as it appeared in the Town of Dighton, Mass., in 1783, 1786; Publications of Mass. Med. Soc., vol. i.—*G. Gilbert*, On Scarlatina, in *Bost. Med. and Surg. Journ.*, vol. xxiv.—*William Ingalls*, On Scarlatina, in *Bost. Med. and Surg. Journ.*—*George Logan*, in *Am. Journ. Med. Sciences*, vol. xxiv., p. 71; Account of Scarlatina in Charleston, S. C.—*H. D. Magill*, *ibid.*, vol. xxiv., p. 341.—*Samuel Webber*, in *Am. Journ. Med. Sciences*, vol. xxiii., p. 363; Account of Scarlatina as it prevailed in Charleston, S. C.—*F. M. Robertson*, *Am. Journ. Med. Sciences*, vol. xiii., p. 375; Observations on Scarlet Fever, &c.—*James Stewart*, On the Dropsical Affection following Scarlet Fever, *New York Journ. Med. and Surg.*, vol. iii., p. 35.—*J. A. Washington*, in *New York Journ. Med. and Surg.*, vol. iv., p. 216.—*T. F. Cornell*, An Essay on the Nature and Treatment of the Form of Scarlatina connected with Cerebral Symptoms, in *New York Journ. Med. and Surg.*, vol. iv., p. 45, 257.—*G. K. Pardee*, Cases of Scarlatina, *Am. Journ. Med. Sciences*, vol. xl., p. 127.—*Samuel Tyler*, Scarlatinal Fever, *Am. Journ. Med. Sciences*, vol. xxxvii., p. 539.—*George R. Pardee*, On Scarlatina resembling Poisoning, by *Salomon Dulcamara*, *New York Journ. Med. and Surg.*, vol. viii., p. 347.—*S. W. Williams*, Account of Scarlatina in Deerfield in 1830-31, *Am. Journ. Med. Sciences*, vol. ix., p. 293.—*D. Atkins*, Surgical Cases and Observations, 1832.—*S. W. Williams*, Edition of *Beddingfield's Practice*, 8vo.—*James Stewart*, Transl. of *Billard's Treatise on Diseases of Infants and Diseases of Children*, 8vo.—*D. F. Condie*, Practical Treatise on Diseases of Children, and ed. of *Watson's Practice*, 8vo.—*W. P. Dewees*, On Diseases of Children.—*S. H. Dickson*, Essays on Pathology and Therapeutics, 2 vols. 8vo.—*R. Dunglison*, The Practice of Medicine, a Treatise on Special Pathology and Therapeutics, 2 vols. 8vo.—*J. Eberle*, A Treatise on the Practice of Medicine, 2 vols. 8vo.; also, on Diseases of Children, 8vo.—*A. S. Doane*, edition of *Good's Practice of Medicine*, 2 vols. 8vo.—*N. Potter* and *S. Cathoun*, Am. ed. of *Gregory's Practice of Medicine*, 2 vols. 8vo.—*J. Bigelow* and *O. W. Holmes*, Am. ed. of *Marshall Hall's Principles of the Theory and Practice of Medicine*, 8vo.—*J. W. Heustis*, On Diseases of Louisiana, 8vo.—*O. W. Holmes*, Boylston Prize Dissertations for 1836 and 1837.—*D. Hosack*, Lectures on the Theory and Practice of Physic, edited by *H. W. Duclachet*, 8vo.—*J. A. Houston*, *New York Lancet*.—*C. Bruckhausen*, Transl. of *Hufeland's Enchiridion Medicum*, revised by *N. Nelson*.—*S. Jackson*, Principles of Medicine, 8vo.—*E. A. Atlee*, Transl. of *Lieutland's Practice of Medicine*, 8vo.—*S. G. Morton*, edition of *Mackintosh's Principles and Practice of Medicine*, 8vo.—*J. Mann*, Medical Sketches of the Campaigns of 1812, 1813, 1814, 8vo.—*Medical and Surgical Register*, by *J. Watts*, *W. Mott*, and *A. H. Stevens*, 2 vols. 8vo.—*T. Miner* and *W. Tully*, Essays on Fevers, &c., 8vo.—*M. Paine*, Med. and Phys. Commentaries, 3 vols. 8vo.—*B. Rush*, Med. Inquiries and Observations, and ed. of *Sydenham's Works*.—*J. Bell*, ed. of *Underwood's Treatise on Diseases of Children*, 8vo.—*B. Waterhouse*, Observations on Diseases of Children, 8vo.—*H. Sherrill*, An Essay on Epidemics, 1832.—*J. A. Gallup*, Sketches of Epidemic Diseases in the State of Vermont, 8vo.—*Trans. of Philad. College of Physicians*, 8vo.]

SCIRRHUS AND OTHER MORBID GROWTHS.—SYNON.—*Squirrhus* (σκιρρως,

hard), *Scirrhomia*, *Scirrhoris*, *Carcinos*, *Induratio maligna*; *Cancer scirrhus*, *C. fibrosus*; *Carcinoma*, *Celsus*. *Encephaloma*; *Scirrhomfungus*; *Scirrhomencephaloid*; *Scirrhomencephaloma*; *Scirrhomcancer*; *Scirrhomcolloid*; *Colloid*, *Colloid tissue*, of recent writers. *Kapke voc*, *Hippocrates*, *Galen*. *Scirrhus*, *Carkinoma*, *Swediaur*. *Carcinus*, *Good*. *Krebs*, *Krebschaden*, *Skirrus*, *Germ*. *Scirrhe*, *Carcinome*, *Fr*. *Scirrhom*, *Ital*.

SCIRRHOUS AND OTHER TUMOURS.—*Adventitious Growths*.—*Malignant and Non-malignant Tumours*.—*Cancerous and Non-cancerous Formations*.—*Cancer and Cancroid Growths*, *J. H. Bennett*.

CLASSIF.—See CANCER and FUNGOID DISEASE.

1. DEFIN.—SCIRRHO-CANCER.—*A morbid growth or structure possessed of the power of extending itself, or of redevelopment after removal, and arising from constitutional vice*.

2. NON-MALIGNANT GROWTHS.—*Structures which are adventitious, and possess the power of extending themselves locally, but which do not return after removal, nor contaminate the constitution*.

3. Professor BENNETT has defined true cancerous growths to consist of a structure which, "once existing, may spread to other tissues or organs, causing in them a disease or growth similar to itself, by a species of propagation similar to that possessed by animalcules or vegetable fungi." In the articles in this work devoted to the consideration of the chief forms of CANCER, *scirrhus* has been treated of in its principal pathological and therapeutical relations (see arts. CANCER, DISEASE, § 141, 142, and FUNGOID, or FUNGO-HÆMATOID DISEASE.) Since these were published, the researches of several eminent British and foreign physicians have appeared, and have added considerably to our knowledge of the intimate structure of cancerous growths, into which the scirrhus conformation enters more or less, and upon which the other forms of cancer often supervene or are ingrafted. Most of the recent writers on cancerous formations have described the microscopic appearances of these formations; but they rarely agree as to what really constitutes the cancerous elements of structure; and hence they contribute comparatively little to the diagnosis between truly cancerous and non-cancerous growths, and that little is neither generally nor readily applicable in practice; while it in other respects does not tend to the advancement of practical knowledge. The purely practical physician, however scientific and rational his acquirements, may, perhaps, value the researches of the "*Histologists*"—as the microscopic observers, conformably with Germanic custom, denominate themselves—at too low an estimate; but there is little risk of any of them falling into this error, however they may fail in adding to our knowledge of the causation, prevention, or removal of the diseases which they microscopically investigate. Nevertheless, the information which they furnish ought not to be neglected, but should stimulate others, by its very deficiencies—by showing how little is really obtained by carrying us a step or two forward in our analysis—by comparing numerous discrepancies, opposite views, apparent differen-

ces, contradictory assertions, &c.—to attain greater precision of observation and description, unbiased by hypothesis or hastily-formed opinion.

4. All the forms of cancer were, up to an early period of the present century, limited to, 1st. *Scirrhomcancer* and *Carcinoma*; and, 2d. *To Fungus Hæmatodes*, or *Hæmato-fungoid disease*. To these were successively added, 3d. *Encephaloma*; 4th. *Colloid disease*; and, 5th. *Melanosis*. *Encephaloma*, or *encephaloid tissue*, and *hæmato-fungoid disease*, are evidently identical, the former being a more remarkable development of the brain or milt-like production than the latter, which presents, with more or less of this production, a much more remarkable state of abnormal vascular development. *Colloid formation* has greater claims to the rank of a variety of scirrhomcancer, although it is often associated with, or approximates to, the scirrhus structure. *Melanosis* should be viewed as a distinct formation, and not more intimately connected with true cancer than are tubercles. Among the earliest investigators of the microscopic structure of scirrhomcancer, MÜLLER is most deserving of mention. In his work he divides scirrhomcancroid growths into the following varieties: 1st. *Carcinoma fibrosus seu simplex*; 2d. *Carcinoma reticulare*; 3d. *Carcinoma alveolare*; 4th. *Carcinoma melanodes*; 5th. *Carcinoma medullare*; 6th. *Carcinoma hyalinum seu fasciculatum*. VOGEL reduced the varieties to four: 1st. *Cellular cancer*; 2d. *Fibrous cancer*; 3d. *Melanotic cancer*; and, 4th. *Colloid cancer*. GLUGE distinguishes only three forms: 1st. *Fungus medullaris*; 2d. *Scirrhus*; and, 3d. *Cancerous ulcer*. Dr. WALSHE, and, more recently, Professor BENNETT, consider that there are only three forms of cancer, properly so called, viz.: (a) *Scirrhus*, or *hard*; (b) *Encephaloma*, or *soft*; and, (c) *Colloid* or *jelly-like cancer*. All the forms mentioned by morbid anatomists may, they think, be readily comprised under one or other of these heads.

5. Professor BENNETT remarks, that "when we endeavour to define what a cancerous growth really is, according to the description of morbid anatomists, or the symptoms of medical practitioners, we are at once thrown into a crowd of inconsistencies, from which the sooner we emancipate ourselves the better. This can be only done by attaching the term cancer to some characteristic structure. LEBERT has endeavoured to do this, and to establish that the existence of the cancer-cell is pathognomonic; that it may be distinguished from every other kind of cell formation, and at once indicates the nature of a cancerous growth." But Dr. BENNETT adds, that the numerous observations which he has made obliges him to differ from M. LEBERT, and rather to agree with MÜLLER in thinking that no single element is diagnostic of scirrhomcancer. The circumstance that no individual element is characteristic of cancer led MÜLLER to maintain that there is no histological difference between it and healthy textures. This also induced VIRCHOW to coincide with him in the opinion that "*carcinoma* is no heterologous tissue, and its finer parts are not essentially different from the tissues of benignant textures and the primitive tissues of the embryo." If this be true,



much indeed, nearly all that I have to add under this head to what I have already written on scirrho-cancer or malignant growths, may be spared; and I might join Dr. WATSON in remarking that "microscopic observers say that, in their minute and original structure, there is no perceptible distinction between the most innocent and the most malignant growths; nay, that both agree in their primary corpuscular elements with the healthy tissues of animals and even of plants. This very agreement, if it really be so complete, shows that in *classifying* morbid growths, we must reject the aid of the microscope, and attend to their proper and more palpable features."—(*Princip. and Pract. of Physic*, 3d edit., vol. i., p. 217.)

6. But the "Histologists" aver that the microscope alone can furnish the diagnosis and the basis of classification, and it alone; and as they include in their ranks illustrious names, notwithstanding equally illustrious dissentients, it is due to them to hear their statements and weigh their arguments. Professor BENNETT observes, that "this dispute as to whether a cancerous growth be heterologous or homologous (LÆNNEC), heteromorphous or homomorphous (LEBERT), arises from two modes of viewing the subject. If any one individual element be chosen as the test of comparison, then it does not essentially differ from others existing in healthy tissues, and the structure is *not* heterologous; but if several be chosen, and their relation to each other studied, then they differ from those in normal textures, and they *are* heterologous." (*Op. cit.*, p. 171.) VOGEL says, that "our diagnosis must be based not so much on the coarser physical characters, which in cancer are liable to extreme variations, as on the histological relations as viewed through the microscope." Before, however, the consideration of the distinctions which histologists believe may be drawn by means of the more powerful microscopes, it will be necessary, in the *first place*, to take a view of the *elements* assigned by them as entering into the structure of scirrho-cancer and morbid growths. According to Professor BENNETT, the latest writer on morbid structures of a scirrho-cancerous and canceroid nature, the following elementary forms enter into their composition: 1st. Molecules and granules; 2d. Naked nuclei; 3d. Cells of various kinds; 4th. Filaments or fibres; 5th. Blood-vessels; 6th. Crystals. These he considers as the elements of all morbid products. And agreeably with his own researches and with those of several other observers, he states that there is not any thing characteristic of cancer in either of these elements when viewed alone; and that it is only in relation to each other that they become important. In this article I shall consider the elementary structure of both SCIRRHUS-CANCEROUS and CANCEROID GROWTHS—of both MALIGNANT and NON-MALIGNANT TUMOURS; and shall follow the arrangement and researches of Professor BENNETT.

7. I. ELEMENTS OF MORBID GROWTHS.—i. MOLECULES AND GRANULES are described by Dr. BENNETT as varieties of the same form. A *molecule* he defines to be a minute body presenting no determinate edge or internal centre; a *granule*, a body which varies in size, and is distinguished by a distinct margin, the external edge of which is abrupt. When transparent,

granules refract light and present a bright or dark centre, according to the focal point in which they are viewed. A molecule may become a granule under a greater magnifying power, and the latter appears as the former under a less power; so that there is actually no real distinction between these two organic elements. These bodies seem to vary in composition. They may consist of various kinds of fat, and disappear on the addition of potash or ether; or they may be albuminous, and be partly dissolved by acetic acid; or partly fatty and partly albuminous; or they may consist of pigmentary or mineral matter. A granule may be so large as to be called a globule; such as the bodies found in milk. Molecules and granules differ in shape; in general they are spherical, but they are sometimes more or less angular; they may be isolated, or grouped, forming granular masses; they may exist alone, or be mixed with other elementary forms. Dr. BENNETT considers them the most universal element in tissues, and of the greatest importance in their indications of the nature of structure.

8. These bodies appear to be formed *primarily* by precipitation, and *secondarily* by disintegration. The *primary* change in the germinating seed or ovum is the gradual appearance, in a transparent fluid, of numerous molecules and granules, which, by coalescing or enlarging, are gradually changed into more compound structures. The *secondary* formation is when a structure decays, and gradually breaks down into an organic or animal debris; this is resolved into granules and molecules, which are ultimately reduced to a fluid state and are absorbed. Thus there may be granules of evolution and granules of disintegration.—(BENNETT.) Molecules and granules have distinct movements of their own; they turn round in a liquid with a tremulous movement. In the interior of cells these movements are often well marked, and very regular. "When we magnify a salivary globule 600 or 800 diameters linear, we can see minute granular contents in a state of continual vibration, or revolving in circles of extreme minuteness. In certain vegetable cells these circles are enlarged so as to constitute a visible circulation. We frequently find molecules and granules encrusting or attached to larger globules, and they, doubtless, occasionally serve to assist the progress of development. Sometimes they are attached together in masses, at others repelled and kept isolated. Similar facts may be observed wherever minute solid particles are seen floating in fluids, which prove that the movements of the minutest molecules are governed by laws as definite and fixed as those which rule the planets revolving in space."

9. "Molecules and granules may be produced mechanically, and are thus capable of being subjected to the same laws as those which are formed naturally. Thus, the pigmentary and mineral granules precipitated by the chemist are identical with those precipitated in living fluids. Again, when transparent oil and transparent albumen are brought into contact, a precipitation in a membranous form takes place at the point of union. Thus, a drop of oil cannot for a moment be surrounded by an albuminous fluid, without its being inclosed in a vesicular membrane or cell. Rubbing the two drops of

oil and albumen together resolves them into granules composed of a minute particle of the one surrounded by a thin film of the other, which granules are identical with those found in animal fluids. Now, when it is remembered that oil and albumen pervade all organized bodies, that they are continually coming in contact, and that membranes and cells must thereby be necessarily produced; moreover, as the other soluble elements which enter into organized structures must communicate to the fluids various kinds of densities, it will be clear that all the physical conditions necessary for endosmosis and exosmosis must be present. When, in addition, it is considered that modern anatomy and physiology have demonstrated that all organized structures consist of granules, nuclei, and cells, composed, in like manner, of a membranous envelope, and endowed more or less with the same physical properties, the importance of these facts must be recognised" (p. 140, 141).

10. Professor BENNETT considers it in the highest degree probable that all blastemata (*blastema* or *cytoblastema*, or the *amorphous plasma*, which gives origin to cells or organized formations; see *art. Pus*, § 2), containing the necessary nutritive principles in solution, precipitate minute oily particles, which are the elementary granules of histologists. These, either separately or united, constitute nuclei composed of oil, surrounded by an albuminous membrane. In this condition they become subject to the physical law of endosmosis and exosmosis, and absorb or exude materials, according to the circumstances in which they are placed, and the unknown vital power to which they are subjected. "It must always be remembered that the granules produced mechanically by the union of oil and albumen, are not vital structures; but when formed in the animal body, under certain conditions, they become so. The physical relations pointed out are only necessary preliminary steps for the addition of that unknown force we call vitality, which directs the ultimate form these structures assume. They are a *sine qua non*, without which vitality cannot be called into existence. The different cells entering into the composition of the tissues are not formed from them directly, as ASCHERSON supposed, but are the result of a series of physical and vital changes occurring in the elementary granules and nuclei, which, however, are themselves produced in the manner he pointed out" (p. 141, 142). Instead, however, of saying that the physical conditions or relations here adverted to "are a *sine qua non* without which vitality cannot be called into existence," it would be more correct to say, that they are the simplest and the earliest material or physical entities with which vitality is allied, and that, with the agency, or under the influence of this alliance, they are capable of passing through a series of changes of a more and more complex kind; that, although vitality could not be manifested without such material entities or alliances, in their earliest as well as in their progressively advanced states, the development and preservation of these states are entirely owing to the vitality with which such material entities are endowed from their earliest periods, and in their simplest forms, of existence. Dr. BENNETT concludes, that the

above considerations lead to a generalization that is of some importance, namely, that the molecular element is the real basis of all the tissues, and not the cell, as maintained by SCHWANN, or the nucleus, as is contended for by HENLE; for no cells are formed without nuclei, and no nuclei without granules; and it is a knowledge of the laws regulating the deposition of the latter in exudation, and within nuclei and cells, that must guide us to a rational therapeutics, so far as the diseases of nutrition are concerned.

11. ii. NAKED NUCLEI.—Nuclei may be formed, according to Professor BENNETT, *primarily* and *secondarily*. 1st. By the aggregation or confluence of molecules and granules, upon which a cell-wall is afterward formed, "during the transformations of which the nucleus may remain permanently, may undergo a species of development, or completely disappear." 2d. The original nucleus may expand and form the outer cell-wall, and another nucleus may be produced within it, also by the deposition and confluence of granules, which, by division, or the formation of other internal nucleoli, produce new nuclei and cells. "In either of these cases, occurring in healthy or morbid tissues, we may observe the nuclei of cells in all stages of their growth, and can have little doubt as to the progressive steps of their production." Dr. BENNETT considers that the nuclei formed in scirrho-cancerous and canceroid growths are produced in the same way as similar bodies in other textures; and that, when seen in well-formed cancer-cells, they are for the most part secondary; that is, formed subsequently to the cell-wall which incloses them. He has, however, often found numerous naked nuclei mingled with the fibrous stroma. In some of these, doubtless, their occurrence is explained by the breaking down and disappearance of the cell-walls, which at one time inclosed them. In this manner *free nuclei* occur secondarily, and are the result of disintegration; but at other times they are undoubtedly a primary formation, existing in an advancing, and not in a retrogressive growth, and are then often unconnected with cells. Whether free nuclei are ever capable of producing similar bodies, as BRUCH believes, without the agency of cells, is very doubtful. But Dr. BENNETT considers them in no way necessarily connected with cancerous growths. In some instances they are associated with fusiform corpuscles, and are observed either to be identical in form and appearance with their nuclei, or as elongating to constitute that corpuscle itself—a transformation rendered very probable by their appearances in several cases. "The true signification of these free nuclei is in some instances difficult to determine; for while we may occasionally, with M. LEBERT, consider them as fibroplastic, in progress of development into fibres, and at other times the remains of broken-down cells, the result of disintegration, there are other instances where the growth is advancing, and where there are no evidences to warrant either of these explanations." If they be connected with the fibrous element, it is easy to conceive that any of them remaining in a tissue may cause the return of a swelling in the cicatrix, or in the situation of a former tumour. But Dr. BENNETT is unacquainted with any fact



which proves that a growth consisting of great multitudes of free nuclei among the fibrous stroma ever possesses the power of spreading to other tissues, as is the case with cancer. "It is therefore probable, that as granules, which are in many respects identical, may be transformed into the nuclei of different textures; so nuclei which are alike may be connected with fibres, or with various kinds of cells. Of the laws regulating these transformations we are ignorant; but as there are no granules distinctive of cancer-nucleoli, so there are no nuclei distinctive of cancer-cells. Moreover, the observations alluded to show the necessity of considering nuclei as bodies distinct from cells. They may occur alone with fibres, producing a texture which may be called fibro-nucleated." KÖLLIKER and HENLE have described the occurrence of diaphanous bodies floating among various tissues. Dr. BENNETT has frequently seen these not only in cancerous and canceroid growths, but also in a variety of morbid products, and in the fluid squeezed from the lungs in catarrh and from other oedematous tissues. He thinks that they may present a certain stage in the development of the nucleus, but that they are more probably nuclei enlarged by the endosmosis of fluid, a view which is favoured by the fact of their frequency in textures which are softened or infiltrated with serum.

12. iii. CELLS.—Professor BENNETT states that there is no kind of cell-formation which, at all times and under all circumstances, is capable of being distinguished from every other form of cell-growth. Nevertheless, very characteristic differences may exist among cells, the study of which is of the greatest service in distinguishing one tissue from another. These differences principally depend upon the age or state of development, the situation in which the cells are formed, and a variety of concomitant circumstances, all of which should be taken into account before an accurate opinion as to their nature can be formed. The different kinds of cell which Dr. BENNETT has observed in scirrho-cancerous and canceroid growths are, 1st. The cancer-cell; 2d. Epithelial-cell; 3d. Cartilage-cell; 4th. Compound granular-cell; 5th. Fibro-plastic and fusiform-cell; 6th. Pus-cell. These names he admits to be open to objection, but he has none other to substitute for them. One viewed by itself is often not to be distinguished from another. It is only when occurring in groups, or examined in relation to surrounding textures, that these terms become significative. An exact appreciation of each is of the utmost importance in the microscopic study of morbid growths.

13. A. Cancer-cell.—Dr. BENNETT's description of this cell is the most elaborate. He states that it exists under numerous forms, presents very different appearances at different times, and is of variable size. In form it is either round, oval, candate, spindle-shaped, oblong, square, heart-shaped, or of various forms, from pressure on its sides. The external edge is generally sharp and well-defined on the field of the microscope. It varies in size from the 1-100th to the 1-10th of a millimetre in diameter; the former size occurring in a very early stage of its development, the latter when the cell is old, and contains other cells. It is most com-

monly 1-50th to 1-30th of a millimetre in diameter. The cell is destitute of colour, except in melanotic cancer, when the pigment-granules it contains tinge it of a light or dark bistre brown, passing into deep black. The cell-wall, when young, is smooth and distended; when old, it is more or less corrugated and flaccid. Its contents are various. There is always one nucleus, often two, and sometimes from three to nine. Most frequently there is only one, which is round or oval, generally the latter, and contains one or two granules or nucleoli. The nucleus, like the cell itself, varies in size, and may occupy from 1-6th to 4-5ths of its volume. Between the nucleus and cell-wall there is a colourless liquid, which, at first transparent, becomes afterward opalescent, from the presence of molecules and granules. On the addition of water, the cell-wall becomes distended by endosmosis, and is enlarged. Sirup and thick mucilage cause it to shrink and contract by exosmosis. The addition of acetic acid renders the cell-wall more transparent, and dissolves the young cells; while the nucleus either is unaffected, or its margin becomes thicker, and its substance more contracted. Liquor potassæ reduces the whole to an amorphous mass.

14. The mode in which the cancer-cell is developed offers, in the opinion of Dr. BENNETT, one of the best examples of the endogenous growth and multiplication of cell within cell. At first, numerous molecules and granules are formed in the semifluid or solid blastema, several of them coalescing to constitute a nucleus, which assumes an oval or round form. On this a cell-wall arises, and gradually enlarges, apparently formed either by the confluence of molecules attracted to the nucleus, or by the expansion of the nuclear wall. In either case, the cell-wall enlarges and separates itself from the nucleus by the endosmosis or assimilation of fluid from the surrounding blastema. Another nucleus may now often be observed arising within the cell-wall, first assuming the form of a granule, which gradually enlarges until it presents the same form and size as the former one. Double nucleated cells are very common. Within each nucleus may now also be seen one or two nucleoli, which sometimes form very early, and hold the same relation to the nucleus as the nucleus does to the cell. One or both nuclei now enlarge: the nucleoli also increase in size, and not infrequently within these latter other granules may be seen, forming and enlarging in their turn. "As the included nuclei grow and become transformed into cells, the original cell-wall becomes gradually atrophied, and dissolves or breaks down into granules of disintegration; but in cases where the growth is rapid it expands, and constitutes what has been called a mother-cell, within which several cells, nuclei and nucleoli, may be seen in various stages of development. More commonly they dissolve or break down before arriving at this, and their progress is often checked by the formation between the nucleus and cell-wall of numerous fatty molecules and granules, which at length fill up the cell, press upon the nucleus, and render it abortive." This constitutes one of the modes in which the so-called compound granular cell is produced.

15. As the cell-wall becomes older, it seems to thicken, and to be less readily affected by re-

agents. VOGEL says that the thick cell wall may assume a fibrous character. Dr. BENNETT has never seen this, nor any appearance of cancer-cells being developed into fibres. These cells may become caudate, elongated, and throw out pointed prolongations, but they do not split up into filaments. It is probable that fusiform or epithelial cells have been mistaken for them. Nor does Dr. BENNETT agree with KÜSS in supposing that the mother-cells may split into smaller segments, and so multiply by division. It is probable that cells impacted in masses of coagulated blastema have been mistaken for compound cells, owing to their close resemblance. BRUCH considers that secondary cells form within the parent one not only endogenously, but by the division of the nucleus; and supports this opinion by numerous known facts in the development of embryonal cells and of plants, in which the nucleus is seen dividing in various ways; but he denies that the cell-wall itself ever thus divides.

16. The *cause* of the cancer-cell varying in size, appearance, and structure, according to Dr. BENNETT, is the arrest of the process of development at different stages. It is, he supposes, with a simple cell as with the most highly organized plant or animal. It may perish at birth, infancy, youth, or maturity, while comparatively few arrive at old age. The situation and the amount of exudation or blastema thrown out also influence their number, form, and size; while the degree of pressure to which they are subjected produces a similar result.

17. Is the cancer-cell a *new substance*, or is it only a modification of cells pre-existing in the body? Dr. BENNETT states that, examined by itself, there is no possibility of distinguishing a cancer-cell from many epithelial, cartilage, or embryonal cells. "When, therefore, a cancerous growth involves a mucous membrane, the skin or bone, it may be maintained that the cells contained in it are only excessive multiplications of normal structures. When the universality of mucous membranes is considered, how they line all hollow viscera, and permeate the various glands in which cancer is common, the difficulty of disproving such a view becomes very great." In the liver, also, the hepatic cells may be confounded with those of cancer in certain stages of their development; and it may be asked whether, in this situation, the morbid cells are not altered normal ones. This question, then, can only be solved by paying attention to a series of observations; and Dr. BENNETT thinks that those which he has detailed are sufficiently numerous and varied to prove the following: 1st. That the cancerous originates in the same nervous and vascular disturbances as the other forms of exudation. 2d. That cancer-cells, in whatever tissue they may be found, whether glandular, areolar, osseous, &c., present the same characters; and, 3d. That cancer may be actually seen to arise in tissues altogether separate from epithelium or cartilage. "It may be doubted whether the true cancer-cell be ever formed by transformation of a previously existing one. On the other hand, the epithelial and cartilage cell may assume all the characters of that found in cancer, but a detection of their normal or abnormal origin constitutes one of the distinctions between cancerous and canceroid growths."—(Op.

cit., p. 149.) It is manifest from the foregoing that "Histology" throws but a faint light upon the diagnosis of the several forms of scirrhus-cancer. But it may be interesting to know what one of the ablest and most zealous histologists farther states respecting other cells found in morbid and healthy structures.

18. *B. Epithelial-cells.*—The different forms of epithelial or epidermic cells, and the mode of their formation, appear to be much the same in morbid as in healthy tissues. Dr. BENNETT states that young plastic epithelial-cells, when isolated and viewed by themselves, present all the physical characters of cancer-cells, especially when they have been lying for some time in a fluid, as often observed in the air vesicles of the lungs, in the ventricles of the brain, or in the mucous coat of the bladder. When studied, however, in mass, nothing can be more easy than to distinguish them. They have a disposition to run together in groups, and to adhere at their edges; they are of tolerably uniform size. Cancer-cells, on the other hand, never exhibit a tendency to coalesce, but are for the most part separated by a greater or less quantity of molecular and granular matter, either disintegrated, or aggregated together: they vary greatly in size. As epithelial-cells become older, their dissimilarity from cancer-cells becomes greater; they are then flatter, and resemble scales. They are also more opaque, and more resistant to the action of acetic acid. When epithelial-cells constitute the principal portion of a morbid growth, such as corns, warts, scaly eruptions, &c., they become greatly compressed together, those external presenting a series of superimposed laminae, while the deeper are round, oval, spindle-shaped, or more or less altered in form, or sometimes united into a firm growth, by pressure. "Occasionally such growths soften and ulcerate at their summit, especially on mucous membranes, when the superficial cells imbibe moisture, enlarge, and occasionally again present many of the characters of cancer-cells."

19. *C. Cartilage-cell.*—Dr. BENNETT states, that many young cartilage-cells present the physical characters of cancer-cells, and are similarly developed, so that at an advanced stage they resemble, with their included cells and nuclei, mother cancer-cells. They may, however, be distinguished in healthy articular cartilage, by the hyaline solid blastema in which they are imbedded, and by the great distinctness of their margins and the high refractive power of their nuclei. Even in diseased states of articular cartilages, the cells of this structure may be distinguished from cancer-cells, by the presence of some of the former in a healthy state, although the majority of them become more or less opaque, from the deposition of molecular matter, and from the cells becoming partly or wholly filled with fatty granules.

20. The cells in *morbid cartilaginous growths* are large, and, according to MÜLLER, more resemble those of the embryonal than of the adult tissues. These cells, when they become separated by disintegration of the hyaline substance, as observed in softened enchondromatous growth, pass more or less from the normal type, and resemble cancer-cells. In these cases the solid hyaline blastema breaks down



into a molecular fluid, the cells are liberated, become enlarged, and float in it, together with broken up fragments of the fibrous structure, should any have existed. Water and acetic acid produce different effects upon these from those occasioned on cancer-cells.

21. *D. Fibro-plastic and Fusiform Cell.*—M. LEBERT describes under this term a peculiar round or oval corpuscle, with a small nucleus, which has a tendency to elongate at both extremities, and to be transformed into fibres. Dr. BENNETT has met with these in all stages of their development, even in cancerous and canceroid growths; but very often also in tissues and under circumstances unconnected with cancer, as in gelatinous polypus, and in the coagulated exudation from inflamed serous surfaces. From this he concludes that fibro-plastic corpuscles are formed independently of all cancerous complication, and that cells so produced have the power, as stated by SCHWANN, of developing themselves into fibres. MÜLLER remarks, that "the caudate corpuscles are by no means peculiar to fungus medullaris: they may, indeed, often be observed in its substance, but they frequently do not exist in it, while they are as often met with in non-carcinomatous as in medullary growths." He adds, that they probably depend only on the transformation of cells into fibres, and are consequently merely fibres in an early stage of development. Both LEBERT and BENNETT conclude, that the round or oval fibro-plastic cell, by elongation on one or both sides, becomes caudate, spindle-shaped, and at length fusiform; and that "after a time, fusiform corpuscles, by being aggregated and compressed together, may produce a fibrous texture of considerable density, and, by subsequently splitting up into fibres, occasion a true filamentous or densely fibrous tissue." Dr. BENNETT adds, that the fibro-plastic cell may so resemble the young cancer and epithelial cell as not to be distinguished from either when viewed alone; but, by observing the form and character of the structures associated with it, and paying attention to the concomitant circumstances, it may in general be recognised.

22. *E. Compound Granular Cell.*—This cell is common in all morbid growths, and is frequently present in all the forms of cancer. It is round or oval, with a nucleus sometimes visible, at other times not. This cell varies from the 1-50th to the 1-35th of a millimetre in diameter, or even still more. It sometimes contains a few granules only, at others it is so completely filled with them as to assume a brownish or dark appearance. Water produces no change in this cell, but acetic acid sometimes renders the cell wall more transparent. Compound granular cells are soluble in ether, and break down into a molecular mass on the addition of potash and ammonia. On gradually pressing these cells by a compressor, large drops like those of oil, sometimes appear within the cell wall, or exude through it. The cell wall may be ruptured by friction, and its contents dispersed.

23. The development of these cells has been watched by Dr. BENNETT in all forms of morbid products, and especially in the softenings occurring in nervous centres. There it may be observed that the exudation first coagulates in minute molecules and granules, among which

larger, colourless, transparent bodies are soon perceived. These are nuclei, upon which a cell wall arises. Granules, nuclei, and cells may frequently be seen in all their stages of development, coating or incrusting the vessels externally. The granules are generally formed in the cell, between the nucleus and its wall. These become more and more numerous, until at length the nucleus is observed, and the whole cell appears full and distended with them. The cell wall is now dissolved, and its contents escape. Conjoined with this cell, masses of granules are often seen cohering together, of various shapes, and not surrounded by any membrane. These masses sometimes arise from the solution of the cell wall, or consist of portions of the coagulated exudation, frequently seen to break, and peel off from the vessels. The cells and masses now described are found in the exudative softening of parenchymatous organs, on the surface of granulations and pyogenic membranes, in the colostrum, accompanying pus corpuscles, and combined with cancerous, tubercular, encysted, and all other kinds of morbid growths. They were first described by GLUGE, who called them "inflammation globules." VOGEL termed them "granular cells;" and Dr. BENNETT first called them "exudation corpuscles;" but afterward "compound granular cells," as involving no theory.

24. The true nature of these cells has been variously viewed. They were long considered to indicate the existence of inflammation, and their presence in various kinds of exudation supported the opinion; but BENNETT states, that the recent researches of REINHARDT and VIRCHOW have shown that there is no form of cell growth which, under certain conditions, may not exhibit numerous fatty granules in its interior, and resemble the different stages of the compound granular cell. In this manner epithelial, cartilage, hepatic, pus, cancer, and indeed every other cell, may be transformed into the compound granular cell, by exactly the same series of changes as are above described. These observers consider that the frequency of this form of cell in so many kinds of morbid growth, and in such various textures and fluids, is not so much evidence of exudation as of the fatty degeneration of all cell formations; and they farther point out this fatty transformation as sometimes commencing in the nucleus, or even in the nucleolus when it is enlarged—a fact which explains many of the appearances observed in scirrho-cancerous and canceroid and other growths.

25. *F. Pus-cell.*—In the article Pus I have described the *Pus-cell*, according to VOGEL. Pus consists of numerous corpuscles floating in a clear fluid—*puris liquor*. These corpuscles are perfectly globular, and vary from 1-100th to 1-75th of a millimetre in diameter. Their surface is finely granular. They have a regular, defined edge, and roll freely in the liquor puris upon each other. The addition of water increases their size, their finely granulated surface disappears, and they become more transparent. Weak acetic acid partially, and the strong acetic acid completely dissolves the cell wall, and brings into view the nucleus, which assumes the appearance of two or three, or even four or five granules close together, each with a central shadowed spot, and generally

about 1-400th of a millimetre in diameter. Alkalies and ether completely dissolve the pus-corpuscle. Dr. BENNETT describes the production of the pus-cell as follows: The exudation first forms a molecular and granular blastema, the individual granules of which unite together in twos and threes, and constitute a nucleus, from which a cell wall arises. The early formation of pus may be observed in the matter squeezed out of unripe abscesses, and in the exudations from blisters and other inflamed surfaces. The cell wall thus formed is about 1-50th of a millimetre in diameter, is highly elastic, and assumes shapes according to the degree and direction of the pressure to which it is subjected. Water and acetic acid dissolve the cell wall, while the nucleus—which before the addition of these reagents resembled an ordinary pus-corpuscle—exhibits the usual two or three granules, which may be considered as nucleoli. Dr. BENNETT thinks that the bodies, which have hitherto been considered as pus-cells, are only the nuclei of corpuscles, the delicate walls of which are dissolved very rapidly and at an early period; but whether this is invariably the case requires to be confirmed.

26. *Pus* varies in its characters with the surface on which it is formed, and the stage and course of its formation—with its age and circumstances affecting it. When formed on a *mucous membrane*, it is often mingled with epithelial-cells in various stages of development. Some "*Histologists*" have talked of mucous corpuscles; but Dr. BENNETT very justly remarks, that there are no bodies peculiar to mucus, what have been described as mucous corpuscles being either epithelium or pus-cells. When formed on a *serous surface*, pus-cells are associated with filaments, and with corpuscles which differ from them in structure. These corpuscles, from the frequency of their occurrence in plastic lymph, Dr. BENNETT has called *plastic corpuscles*. VALENTIN and others have termed them *exudation corpuscles*; and M. LEBERT and Dr. WALSH *pyoid*, from their resemblance to those of pus. They are composed of a distinct cell wall, inclosing from three to eight granules. They vary in size from the 1-100th to the 1-75th of a millimetre in diameter. The addition of water and acetic acid causes no change in them, although the latter reagent sometimes contracts and thickens the cell wall, and at others renders it more transparent. On some occasions, when the exudation is so abundant on a serous membrane as not to coagulate, and when the fibrinous and serous portions are not fully separated, the corpuscles assume the characters of those of pus, although some of the fibrous element, with plastic corpuscles adhering to them, may still be observed. Dr. BENNETT states, that *pus-cells* are occasionally found in the fluid on the surface of cancerous ulcerations; but that he has never met with them in softened cancer of internal organs but in one case, when they were at once distinguished by the action of acetic acid. This reagent, by exhibiting the peculiar granular nucleus—or nucleoli—of the pus-cell, at once distinguishes this cell from young cancer-cells (§ 14), from young epithelial-cells (§ 18), and from fibro-plastic cells (§ 21).

27. iv. *FILAMENTS AND FIBRES*.—Scirrhus-cancer, canceroid, and various other morbid growths have generally for their basis a fibrous struc-

ture more or less firm, which presents all the characters as to early formation and development of fibrous tissues in healthy structures. Professor BENNETT\* states, that sometimes the fibrous tissue consists of delicate filaments of 1-600th of a millimetre in thickness; at other times of well-formed areolar tissue, the diameter of each filament varying from 1-500th to 1-400th of a millimetre in diameter. The addition of acetic acid often renders it more transparent, and presents visible permanent elongated nuclei. Such fibrous tissue is probably formed by the juxtaposition and ultimate development of the fusiform cells described above (§ 21). Occasionally the fibrous structure resembles elastic tissue, the filaments varying from 1-300th to 1-250th of a millimetre in diameter, and presents the characteristic curled appearance. These different kinds of filaments are sometimes so closely placed together as scarcely to be separated by the needle, at other times they are loose, widely separated, and easily torn. "They may run together, side by side, in wavy bands; be mingled together in an inextricable mesh-work; or arranged in the form of loops or circles, surrounding openings or loculi."

28. Fibrous tissue is said to be formed in three ways: 1st. By the precipitation in a fluid *hlastema* of fibrous molecules, in the form of rows, which afterward coalesce and become consolidated into filaments. This process has been shown in the buffy coat of the blood and in recent exudation from serous surfaces. 2d. By the accumulation of granules, so as to form a spindle-shaped nucleus, which by its elongation splits up the coagulated exudation into laminae and fibres, as is observed in many forms of fibrous tissue. 3d. By the development of cells which become elongated at both ends so as to form a fusiform corpuscle, which ultimately splits up into filaments, as seen in chronic exudation on serous surfaces. All these modes of formation are seen in canceroid and other morbid growths.

29. v. *CRYSTALS*.—These are sometimes found in cancerous and other growths, especially if these growths have been kept any time or are partly decomposed, or if they occur on mucous surfaces. "They then assume the prismatic and other shapes of the triple phosphate, and are the results of putrefaction. Irregularly formed crystalline masses are present in the structures, which undergo a cancerous degeneration. Crystals of cholesterine are occasionally found in the reticulum of cancer, and sometimes needle-shaped crystals of margarine."—(*Op. cit.*, p. 160, 161.)

30. vi. *BLOOD-VESSELS*.—Dr. BENNETT states that he has never observed any thing peculiar about the *blood-vessels* in cancerous or canceroid growths, and that he believes them to present the

\* The author has much pleasure in adopting the descriptions given by Dr. BENNETT of this and other tissues, because he has satisfied himself of their accuracy. Both in this country and in Germany, from 1816 until 1820, the author was much engaged in researches, chiefly anatomical, with the aid of the microscope then in use; but he found his eyes so seriously affected that he gave up the pursuit until recently, when the excellence of modern instruments induced him partially to resume it as occasions offered. He has it in his power to state that the observations he has made, which, however, have been comparatively few, have always proved the accuracy of British observers, more especially of BENNETT, WALSH, BOWMAN, DALRYMPLE, JOHNSON, &c.



same structure, and to be formed in the same manner, whatever that is, as in other tissues.

31. II. CHEMICAL COMPOSITION OF MORBID GROWTHS.—This subject has been considered by BENNETT and WALSHE, conformably with recent chemical doctrines; and for a full account of it the writings of these physicians, as well as those of LIEBIG, SIMON, DUMAS, DAY, and others, will be consulted with great advantage, although the chemical nature and relations of morbid growths are very imperfectly known. Dr. BENNETT, indeed, admits that the present imperfect state of organic chemistry renders any investigation into the composition of morbid structures most unsatisfactory. All that can be determined is that morbid growths partake of the same constituent elements as other forms of exudation from the blood; and "that not only are there no means of separating chemically the different forms of scirrhus-cancer and canceroid tumours from each other, but that it is also impossible to distinguish those from other morbid products, or even from healthy tissues. It is not by analyzing large masses of morbid structure, including, as they do, granules, cells, filaments, and salts, mingled together, that any light will be thrown upon the chemistry of tumours; but rather by first separating, with the aid of the microscope, the minute structural elements entering into the composition of the growth, and then by endeavouring, by chemical manipulations under the same instrument, to ascertain the exact nature of each. Chemists have not turned their attention in this direction to any great extent; but histologists are enabled, by the use of very simple reagents, to separate the chemical principles of cancerous and canceroid growths into four groups, viz.: 1st. Albuminous principles; 2d. Fatty principles; 3d. Mineral principles; and, 4th. Pigmentary principles. Farther than this they cannot go; but, fortunately, a knowledge of the relative amount of those is easily obtained, and yields very important information."—(*Op. cit.*, p. 162.)

32. I. ALBUMINOUS PRINCIPLES.—Under this head Dr. BENNETT classes *albumen*, *fibrin*, and *casein*, associating *gelatin* with these, although it materially differs from them. Albumen is the most abundant constituent of morbid structures. In this opinion—frequently stated in the course of this work—VOGEL, BRUCH, and BENNETT agree, while they also admit that the more solid parts are fibrin, and that the fluid in which the corpuscles swim is albuminous, the one being necessary to form the filaments, the other the cells. Fibrin may thus be considered as being formed from albumen; for ZIMMERMANN has shown that fibrin results from a change in albumen, and has referred to the experiments of TIEDEMANN and GRELIN on the chyme, chyle, and blood of herbivorous animals, compared with those of carnivorous animals, which show that, notwithstanding the nature of their food, the chyme of the latter contains no fibrin, and their blood less fibrin, than the blood of the former; the fibrinous principle of the food of the carnivora being reduced to albumen during the primary digestion. The experiments of MAGENDIE, NASSE, and others have shown that blood deprived of fibrin transfused into an animal, contained fibrin and became coagulable after having circulated for some

time. From these facts it is manifest that the fibrin of the blood is developed chiefly during circulation. On this subject Dr. BENNETT remarks, that "it seems extraordinary, if the muscular and fibrous tissues are formed from fibrin, that this principle should exist in normal blood only in the small proportion of from one to three parts in one thousand—a quantity wholly inadequate for the purpose."

33. But it should be recollected that the nutrition of muscular and fibrous tissues is not merely an attraction of fully developed fibrin, but of the constituents or elements of fibrin, which are changed into, or incorporated with, fibrous structures by the influence of vitality, the fibrin existing in healthy blood being merely the residuum of the conversion of these elements. This view of the subject is supported by what is actually observed in diseases which impede the nutrition of fibrous structures, as in acute rheumatism, pneumonia, consumption, inflammatory fevers, &c., in which the quantity of fibrin in the blood is excessive; for in these diseases the nutrition of these structures is either impeded or arrested, and hence the accumulation in the circulation of the elements forming them favours the development of fibrin in the blood, when vital power is not so far reduced as to prevent the attraction and cohesion of the constituents necessary to the production of fibrin. According to this view the increase of fibrin in the blood is a consequence of inflammatory diseases; the non-incorporation of the constituents of fibrin by fibrous tissues—or the interrupted nutrition of these tissues—causing an excess of these constituents, and the attraction and cohesion of a certain proportion of them, according to the state of organic nervous energy, in the form of fibrin, during the process of coagulation, when the blood is removed from the system.

34. The existence of *casein* in scirrhus-cancer and in other morbid growths is very doubtful, although its presence has been contended for by several chemical pathologists, in tuberculous and some other diseased structures. MÜLLER proved the presence of *gelatin* in enchondromatous and colloid formations. Dr. BENNETT states, some preparations of colloid in his possession are still perfectly transparent after long immersion in alcohol; while others have been transformed into a white opaque matter, resembling boiled white of egg. Hence the chemical composition of this viscid fluid in cancer may be inferred to differ in different cases; but in what this difference consists, unless it be owing to the quantity of albumen it contains, has not been determined. The able investigator just mentioned remarks that, in a fluid state, the albuminous principles are, with the exception of casein, not affected by the addition of acetic acid; but when once coagulated in the form of molecule, fibre, or membrane, they are again rendered more transparent by this agent. This property of acetic acid enables the histologist to render their sections and filaments of structure transparent, and to partly dissolve cell walls. The filaments and cell walls of scirrhus-cancerous and canceroid growths are composed of albuminous principles, and the more filamentous and dense the structure is, the more does it abound in this chemical constituent.

35. ii. FATTY PRINCIPLES.—The modes in which fatty matters may be produced in the system, in health and in disease, have been much and differently discussed among chemists and chemical pathologists—a class or sect of pathologists which have again risen to celebrity, with LIEBIG at their head. Fatty matter exists in scirrhus-cancer and other morbid growths in four states—as a nearly pure fat, in an almost saponified state, in a non-saponified state, and as a fatty acid. Dr. BENNETT states that it is never structurally free, for, being invariably associated with fluid albumen, no sooner is oil precipitated so as to assume form, than the minutest granule of it becomes inclosed in a thin coagulated film of albumen. Such granules may be recognised by the resistance they offer to the action of weak acetic acid, or by their disappearance on the addition of ether; and their number, in any given point of a structure, is a tolerable index of the amount of fatty matter present. Fat may also exist in the form of crystals of cholesterine, and of margaric acid. The French chemists insist that fat enters the body ready made in the food; while LIEBIG and his disciples maintain that it is formed in the system, 1st, by the *primary digestion*, and, 2d, by the decomposition of the tissues or by *secondary digestion*. It is probable that, in morbid structures, its presence may also be sometimes imputed to a transformation of the albuminous constituents, or of a portion of them.

36. The existence of fat in healthy and in morbid structures may therefore be more correctly referred to the following different sources: 1st. To the introduction of ready-formed fat in the food; 2d. To the early processes of digestion; 3d. To the decomposition and absorption of the tissues; and, 4th. To the transformation of the albuminous principles. The *first* of these sources requires no remark. As regards the *second*, it cannot be doubted that animals which become very fat by feeding on grain must have the power of converting the constituents of these into adipose tissue, as the very small proportion of oil which these contain could not be adequate to this result. The *third* source may be less readily admitted, although various considerations suggest its existence. As to the *fourth* source of fatty production, it certainly exists in morbid formations, and especially in albuminous exudations, more generally than is supposed. I have seen it repeatedly to a very great extent in the albuminous exudations formed between inflamed serous surfaces, more especially in the chronically inflamed cases; and when the albuminous exudations had passed to the state of organized, or partially organized, areolar tissue, this adventitious tissue appearing not only to contain oil-globules thickly disseminated throughout it, but, in some instances of long standing, gradually to pass into masses of fat, identical with other adipose parts. These changes in the adventitious membranes, adhesions, and parts connecting inflamed serous surfaces have been already noticed when treating of the alterations consequent upon inflammations of the *peritoneum* and *pleura*; but they have hitherto escaped the notice of pathologists. I have also observed this conversion of old exudations from, and adhesions between, serous surfaces into

fat within the vertebral theca, in cases of prolonged paraplegia; and very probably this conversion is one of the modes of reparation, or of removing these consequences of inflammatory action, the albuminous principles passing into the fatty to facilitate their absorption through fine vessels or canals.

37. Connected with this subject, Dr BENNETT remarks, that it is probable, under favourable circumstances, that the albuminous principles may be converted into fat; for pathologists are acquainted with numerous facts which prove that muscular, areolar, fibrous, and other albuminous tissues may be so converted. The universal occurrence of compound granular corpuscles in old exudations is evidence of this, although it may be erroneous to suppose that the original transformation is connected with any influence possessed by cells. DONNÉ, after carefully removing all the globules from milk, and leaving no visible evidence of fat under highly magnifying powers, still succeeded in extracting it by means of ether. "Fat, then, is probably held in solution, and enters the cell wall by endosmosis, where it is precipitated in the form of granules, which become enveloped with a layer of albumen, and are prevented from passing out. In this manner fat, resulting from the disintegration of exudations, becomes accumulated in previously existing cells. Hence various kinds of these bodies act as mere store-houses for excessive formations of fat in morbid growths, as the adipose cells proper perform the same function in healthy tissues. In one, fat exists in the form of granules, in the other as a fluid oil, because pre-existing cells generally have for their contents albuminous matter in a state of solution, which is not the case with the adipose cells."—(*Op. cit.*, p. 166.)

38. When the muscular system undergoes the fatty degeneration, it has been supposed that the deposition of fat by its excess causes atrophy, and subsequently destruction of the muscular fibres. But Dr. BENNETT states that, in watching carefully the progress of fatty transformation, he has convinced himself that it often commences in the very centre of the muscular fasciculus, apparently by the fibrillæ breaking up, losing their continuous and characteristic transverse markings, and assuming the form of minute fatty molecules, which afterward become larger and larger, so as to constitute granules of various sizes. The same change is observed in muscles in the vicinity of diseased parts which for a long time have not been called into action. This observer adds, that "the whole fasciculus becomes thus affected, and at length large drops of oil accumulate in the interstices of the fasciculi, which gradually assume all the appearances of adipose cells, and, by their increase at the expense of the muscular fibre, communicate to it the yellow colour and other physical characters of fat. This conversion of the albuminous principle into the fatty, is brought about independently of the agency of cells or nuclei, and shows that, in the retrograde as in the advancing process of nutrition, the molecular and granular element is the form of structure which is the basis of every other."

39. iii MINERAL PRINCIPLES.—In scirrhus, cancerous, and various other morbid growths,



as in every other exudation from the blood, more or less of mineral or saline matter is present, the amount, however, of which varies much in different cases. These form into crystals with the progress of decomposition, crystals of the ammoniaco-magnesian phosphate being not uncommon. More generally small collections of phosphate of lime are found either in granules or in masses, or in irregular fragments, which are soluble in the nitric and hydrochloric acids. Sometimes the mineral substance is so abundant as to impart to the dried growth an osseous appearance. This change may take place in cancerous as in tubercular formations, although not so frequently, converting portions of either into calcareous concretions. Dr. BENNETT states, that in some forms of canceroid growth, the mineral principle, like the fatty, seems to enter pre-existing cells in a state of solution, and to become afterward precipitated, so as to assume somewhat of an organized appearance.

40. iv. PIGMENTARY PRINCIPLES.—The exudation of blood into the substance of scirrhus, canceroid, and other morbid structures, and the change in the exuded blood, as well as the alteration thereby occasioned in the tissues in which the blood exudes, are manifestly the causes of the different tints of colour which these structures present. The deeper hues are probably owing to some chemical change in the exuded blood and other fluids, and probably the colouring matter of bile may sometimes aid in modifying or deepening the tint. Dr. WALSHE considers the bright yellow matter, associated with fatty matter, sometimes forming a reticulum, or collected together in masses, to be analogous to the kironosis of LOBSTEIN; but LEBERT views it as a peculiar kind of fat, which he calls xanthose. The black matter sometimes found in cancer, is owing either to the action of the morbid secretion of the diseased part upon the globules of the blood in the capillaries or exuded from them, or to the association of melanosis with cancer (*see art. MELANOSIS*, § 4, *et seq.*). That it originates in some change which the blood undergoes, is shown by the circumstance of this change having been traced in the same specimen through all the intermediate tints from blood-red and rusty brown to the deepest black. Dr. BENNETT has ascertained that the colour of the black matter occasionally found in cancerous growths is destroyed by nitric acid and chlorine—a change which distinguishes it from the black matter which commonly accumulates in the bronchial glands and lungs of old people, and in the black phthisis of colliers. In the latter instance the black matter is undoubtedly carbon, in the former its nature is unknown.\*—(*Sec arts. LUNGS*, § 185, and MELANOSIS.)

\* According to SIMON and DAY, the following *proximate analysis* of scirrhus have been made by M. L'HERETIER:

	Of Breast.	Of Uterus.	Of Dorsal Region.
Water .....	29.75	21.15	24.80
Albumen .....	28.10	29.85	21.70
Fibrin .....	18.80	15.20	27.15
Gelatin .....	7.60	.....	8.17
Fat .....	2.00	.....	8.05
Phosphorized fat .....	.....	6.00	.....
Proxide of iron .....	1.15	1.25	traces
Yellow pigment .....	.....	7.00	.....
Salts .....	12.60	9.55	10.13

A fatty growth analyzed by NEES VON ESENBECK con-

41. III. GENERAL ANATOMY OF SCIRRHO-CANCEROUS AND OTHER GROWTHS.—i. OF SCIRRHO-CANCEROUS GROWTHS.—Continuing to adopt the description of Professor BENNETT, these growths are constituted of nucleated cells, presenting the characters attributed above to cancer-cells (§ 13, *et seq.*), and infiltrated among the meshes of a fibrous stroma. Conjoined with the fibres and cells there is invariably present a viscous fluid, in which the cells swim, as seen under the microscope. The fibres, the cells, and the viscous fluid, are the three essential elements of these growths; and it is the relative amount of each which determines the species of cancer. "If the fibrous element be in excess, it constitutes *scirrhus*, or hard cancer; if the cells be numerous, *encephaloma*, or soft cancer; and if the fluid abound, or be collected into loculi or little cysts, it is *colloid cancer*. All these forms of cancer may frequently be observed in the same tumour—in one place hard or scirrhus; in another soft or encephaloid; and in a third jelly-like collections, or colloid. Yet, although they may pass into or succeed one another, they are not infrequently distinct from their origin to their termination."

42. A. *Scirrhus*.—Hard cancer has been fully described in the article CANCER; and I have therefore only to add at this place, that at all times a pulpy substance may be removed from a fresh-cut surface of it by scraping, which, on microscopic examination, is seen to contain numerous cancer-cells, mingled with molecules, granules, and fragments of fibrous tissue, an appearance which distinguishes scirrhus from certain forms of fibrous tumour, which to the naked eye exactly resemble it. A thin section of the scirrhus growth is seen to be principally composed of filaments, of various sizes, running in different directions, sometimes forming waved bands, at others an inextricable plexus, among which the cells may be seen infiltrated, or forming loculi or cysts inclosing masses of these cells.

43. B. *Encephaloma*.—Soft or brain-like cancer has been considered in the article FUNGUS DISEASE. It consists of a soft pulpy growth, of a whitish, yellowish, or bluish tint, breaks down on moderate pressure, and yields a copious milky or creamy juice. It presents different degrees of vascularity; reddish parts or spots appearing, owing to extravasations of blood, or to degrees of vascularity. On examining a fresh-cut section, it presents a very loose fibrous texture; but in the denser parts it approaches the character of the soft portions of scirrhus. In the pulpy parts no trace of fibres is visible, or merely fragments of them. Yellowish parts, either reticulated or collected into masses, generally consist of fatty degeneration of the cancerous tissue, and form the

tained 23.0 of solid fat; 12.0 of extract of flesh; 11.0 of gum-like animal matter; 23.0 of albumen; 19.0 of phosphate of lime; and 1.5 of carbonate of magnesia. It is not stated whether this solid fat contained cholesterine; in all probability it did, as this substance is often found in fatty tumours. In a fatty tumour examined by MÜLLER acicular crystals were found mixed with a gray substance which was deposited in vesicles and dissolved by boiling water, from which it was not precipitated by acids or the ordinary metallic salts. The crystals were insoluble in acids, water, or alcohol, but dissolved in ether; hence they probably consisted of cholesterine. Another fatty tumour contained some casein, precipitable from the aqueous solution by acetic acid.

cancer reticulare of MÜLLER. This yellow matter is often of cheese-like consistence, friable, and resembles tubercle, for which it has been mistaken. The blackish tinge is owing to black pigment (§ 40) infiltrated in the cancerous elements, or existing within the cells, constituting the malignant melanosis, or melanic cancer of some authors. The cream-like fluid presents, under the microscope, a number of the cancer-cells already described (§ 13, *et seq.*), sometimes mingled with a large number of molecules, granules, compound granular cells, blood-corpuscles, and more or less of the fibrous element. (*See art. FUNGOID DISEASE.*)

44. *C. Colloid or Gum Cancer.*—Glue cancer, or collections of gelatinous matter resembling glue, calves'-foot jelly, or semi-fluid gum, are found in masses varying from a minute point to the size of a large orange. In colour colloid is yellowish, grayish, brownish, or reddish; very rarely green or black. It may be transparent or amber-like, or semi-transparent or opaque, resembling honey. It may be disseminated in a fibrous texture, giving it a pearly aspect, or it may be collected in distinct cysts. "It is one of the most common constituents of compound encysted growths of the ovary, and it is not infrequently seen in cysts of the kidney, and follicular swellings of the skin."—(BENNETT.) On examination with the microscope, this substance is occasionally seen quite structureless, or exhibits only a fine molecular appearance, and it then has been called *colloid tissue*. At other times numerous nucleated cells, presenting all the characters of cancer-cells, in various stages of development, are found in it as a blastema; and it is then observed that the growth has a tendency to spread. This is *colloid cancer*.

45. "When colloid cancer is formed on a free surface, as on the peritoneum, it often presents small grains of a gray colour, resembling coagulated gum-arabic. When collected in masses, these have an irregular nodulated aspect. A fresh section presents a surface with numerous loculi or cysts, which vary from the size of a pin's head to that of a walnut, filled with a clear glistening gelatinous matter, surrounded by fibrous substances or mesh-work." Cancer-cells originate in colloid matter, as in other kinds of blastema, by the formation of granules, nuclei, and cells. The fibrous structure of colloid, according to Dr. BENNETT, never contains permanent nuclei, or affords any evidence of being developed from nuclei or cells; it seems rather to be formed by precipitation alone.

46. *D.* These three forms of true cancer are vascular, but in different degrees. Scirrhus is least so; colloid is more so than scirrhus; and encephaloma is most vascular—sometimes so much so as to bleed readily and profusely. These forms pass into each other, sometimes so imperceptibly as to render the arrangement of several specimens a difficult matter; more especially as respects scirrhus and encephaloma or fungoid cancer.

47. *ii. OTHER MORBID GROWTHS.*—Morbid structures, which, to the unaided sight, to the touch, and often in the progress of the case, so closely resemble cancer as to be frequently mistaken for it, and yet which present on microscopic examination differences of a very

marked character, have been termed *canceroid* by Dr. BENNETT. Hitherto, he remarks, this distinction has not been very accurately attended to; for, although practitioners have recognised the existence of fibrous, sarcomatous, warty, fatty, and other so-called non-malignant growths, experience every day proves that there are no symptoms which enable them to detect these with certainty.

48. *A. A fibro-nucleated canceroid growth* is described by this writer to consist of filaments infiltrated with oval nuclei. It can be distinguished from scirrhus and from encephaloma only by microscopic examination, as it sometimes closely resembles the one, and at other times the other. As to its minute structure, this growth ought to be separated from true cancer on the one hand, and from fibrous tumours on the other. It is deficient in cancer-cells, which are essential to the first; and it possesses numerous naked nuclei, in no way connected with cell-formation, which are not found in the second. This form of canceroid growth, however, evidently so closely resembles cancer, or possesses so much of what has been usually called the malignant character in other respects, that a diagnosis is difficult. The most important distinction between it and true cancer is that, although it may return in the place originally affected, after excision, it does not appear ever to occur secondarily in the glands or other organs.

49. *B. Epithelial Canceroid Growths.*—Dr. BENNETT considers that cancer of the lip, chimney-sweeper's cancer, *noli me tangere*, malignant ulcer of the face, cauliflower excrescence of the uterus, and other appellations are given to morbid growths, which have been considered cancerous or malignant, but which possess a very different structure, and are therefore only canceroid. Mr. PAGET pointed out the identity of several of these, considered them as warty in their nature, and ascribed them to hypertrophy of the papillæ of the skin. Dr. SIMPSON classed cauliflower excrescence of the cervix uteri with soft warts and condylomata, and stated that it had often been confounded with carcinoma or medullary fungus. Examined by REID and GOODE, it was shown to consist of groups of large nucleated cells. These and similar alterations of the epidermic and mucous surface Dr. BENNETT views as epithelial canceroid growths, and as essentially consisting of an hypertrophy of the mucous or epidermic layer, composed of numerous epithelial-cells more or less impacted together (§ 18). They may occur on large free surfaces, as the skin or digestive mucous membrane; or within mucous follicles, and the minute ramifications of secreting glands, as the mammaræ, kidney, &c. In the former case, corns, callosities, condylomata, warts, and scaly eruptions of the skin, or polypi and fungous excrescences of the mucous membrane are occasioned. In the latter case, various kinds of encysted swellings, hairy and horny productions, and dilatation of the minute ducts in secreting glands, by the desquamation and retention of their contained epithelial-cells, are produced. The forms of epithelial growth which more especially resemble cancer, and which are therefore canceroid, are, 1st. Certain warty and fungoid excrescences of the skin and mucous surfaces; 2d. Some



ulcerations of mucous membranes, especially those of the lip, tongue, and cervix uteri; and, 3d. The changes occurring in follicles and excretory ducts, the latter, when associated with hypertrophy of the surrounding fibrous tissue, constituting some forms of so-called sarcomatous tumours.

50. (a) *Warty and fungous excrescences* are very common. The former are often observed on the fingers of young persons, more especially of those addicted to the vice of self-pollution; and they sometimes also appear about the face and neck. They consist of a congeries of elongated papillæ, sometimes flattened at the top, at other times presenting fissures and sulci leading to a common root. These tumours may vary from the size of a millet seed to that of a child's head. Dr. BENNETT describes them as having their surface sometimes smooth, at other times lobulated, composed of rounded groups of papillæ resembling a cauliflower. When small, they are almost wholly composed of epithelial scales, which assume a square or elongated form, their nuclei being usually very distinct. The larger growths internally consist of a fibrous structure, into which loops of vessels from the capillary network of the dermis are prolonged. They are covered by compressed epithelial scales. They often soften and ulcerate on their surface or at their base, some of the epithelial-cells then enlarging from endosmoses and often resembling cancer-cells, while others are elongated and split into fibres. Mingled with the altered cells are numerous molecules and granules, and often pus-corpuscles, giving an ichorous character to the discharge from the sore or ulcerated surface. In this manner a cancrroid ulceration may be produced, and proceed to a greater or less extent, the base of the ulcers being generally covered by papillated fungoid projections, the edge being elevated, indurated, and rugged.

51. The *polypi* which grow from the surface of mucous membranes are covered externally by thickened epithelial-cells, are internally composed of fibrous tissue more or less dense, and are abundantly supplied with blood-vessels. They resemble in structure the excrescences just described, and like them may ulcerate, the ulceration, however, being much more frequently attended by hæmorrhage. These polypi are very common in the cervix and os uteri, and less so in other mucous surfaces.

52. (b) Another form of *epithelial cancrroid* is described microscopically by Dr. BENNETT as appearing first as an ulcer, sometimes as a slight induration of, or small wart on, the affected part. It is common on the under lip, on the tongue, and in the cervix uteri. In the lip, a furrow or groove is often observed early in the indurated spot. This slowly extends, in the form of ulceration, with indurated, thickened, and raised margins, is circular and cup-shaped, its surface being sometimes covered by white cheesy matter, at others by a thick crust; and proceeds until it involves a considerable portion of the structure, pouring out a foul ichorous discharge. In the tongue the base of the sore is fungoid and papillated, and dense, owing to the close impaction of laminae of epithelium. On the cervix uteri, these ulcers have hard, irregular edges, yield a copious ichorous discharge, and cause more or less

thickening of the adjoining textures. When examined microscopically, these cancrroid ulcers present on their surfaces masses of epithelial-cells in all their stages. Some of these cells are spherical, nucleated, about 1-50th of a millimetre in diameter; others much larger. They often resemble cancer-cells when viewed alone, but are associated with flattened scales, varying in size and shape, sometimes in groups adhering at their edges, at others forming confused masses. Many of the cells and scales often reach an enormous size, and as they become old split into fibres. These elements are commonly associated with numerous molecules and granules, naked nuclei, fibro-plastic, fusiform, and pus-cells. Immediately below the surface, the epithelial-cells are more or less compressed and condensed; and, when the disease is very old, they present concentric laminae, surrounding a hollow space.

53. (c) *Cystic growths*, consisting of epithelial cells and scales, often occur in minute follicles and crypts. They may also form within the excretory ducts of glands. They have been well described by M. LEBERT and by Dr. BENNETT. The contents of these cystic growths are not merely epithelium-cells in all stages of development, but also fatty cells, granules, and crystals of cholesterine. These obstruct the duct, and then enlargement or tumour of a cystic kind is formed. These cysts vary from the size of a pea to that of a large orange; their appearance varying with the proportion of epithelium, or of fat, or of cholesterine they may contain. Quantities of epithelium are also thrown off from the lining of the lateral ventricles in cases of cerebral meningitis, and in the ovary during ovarium dropsy.

54. "In many fibrous, or so-called sarcomatous growths in glands, we frequently find the hypertrophied filamentous tissue forming loculi which vary in shape with the amount of lateral pressure they receive. This may occur in cancerous and cancrroid growths, and the spaces so produced may be occupied by either cancer or epithelial cells. Hence, even on a microscopic examination, the latter may be readily mistaken by an experienced histologist for cancer. The fibrous tissue in both cases is the same, but the cells present the differences formerly pointed out between cancer and epithelial cells (§ 18), the latter being frequently about the same size, and exhibiting a great disposition to run together in groups." The cystic formations in sarcoma are caused by the same circumstances as produce simple cysts in the liver, kidney, and other granular organs: the minute excretory ducts are obstructed by granular exudations or exfoliations, and fluids accumulating behind them produce dilatations or cysts. Hence the frequency of encysted growths in structures furnished with follicles or ducts. Occasionally the epithelium is so closely impacted in the dilated ducts as to be turned out in the form of moulds of the tubes on making a section through them. "This form of epithelial accumulation in the ducts of glands, which are the seats of fibrous or sarcomatous growths, merits great attention, as to this circumstance must be attributed their great resemblance to cancer" (p. 183).

55. *C. Fibrous cancrroid growths* consist wholly of fibrous or filamentous tissue, and so close-

ly resemble scirrhus as to be continually mistaken for it. This fibrous tissue is formed as above described (§ 27, 23), and it may be thus produced in various tissues and organs. This tissue is the most universal both in healthy and diseased parts. It forms the stroma, or frame-work, of nearly all the tissues. "It exists in almost every kind of canceroid and cancerous growth: so that a fibrous tumour is one of these, minus the nuclei and cells, which give to each its peculiarities. Fibrous growths present themselves in numerous forms. One of the most common is that of *cicatrix*; another is that of a white glistening patch, so common on serous surfaces; a third is the chronic band or ligamentous tissue uniting serous membranes, the result of simple exudations of some standing; and a fourth is the peculiar induration of the skin, constituting sclerosis in children and elephantiasis in adults" (p. 184). Canceroid fibrous growths assume two principal forms: 1st. Thickening or hypertrophy of the sub-areolar tissue of mucous membranes; 2d. Tumours of different varieties.

56. *a. Thickening and indurations of the sub-mucous areolar tissue cause strictures of canals, as in the alimentary canal, urethra, &c.* They may follow any protracted irritation causing exudation. Chronic irritation of the stomach, or gastritis, may induce a similar lesion, with hypertrophy of the muscular coats, so as closely to resemble scirrhus; and many cases of stricture of the intestines have a similar resemblance; and yet upon a close examination they contain nothing but the elements of fibrous tissue—*are merely simply fibrous.* This form of morbid growth consists almost entirely of dense bands of filaments of a glistening or dull white colour. Here and there, naked nuclei varying in size, or fibro-plastic corpuscles, mingled with fusiform bodies, may often be detected between these fibres.

57. *β. Fibrous canceroid tumours* comprise, besides those which are strictly fibrous, those which have been usually called sarcomatous and neuromatous. Dr. BENNETT considers them all "to consist of a fibrous structure in different stages of development, the softer and more vascular forms being such, even when their elements have not yet completely passed into the perfect fibrous state. For this reason they have been made to constitute a distinct group by LEBERT, under the name of fibro-plastic tumours. Such growths may always be seen passing into true fibrous tissues. In some, while one part may be called sarcomatous or fleshy, another is truly fibrous. Other kinds of fibrous tumours resemble tough ligament and fibro-cartilage, presenting all kinds of intermediate degrees of conversion between the areolar and elastic tissues. Fibrous tumours may therefore be divided into, 1st. Sarcomatous; 2d. Desmoid; 3d. Chondroid; and, 4th. Neuromatous fibrous tumours" (p. 185).

58. 1st. *Sarcomatous tumours* are either spherical or more or less lobulated. The first are of the consistence of muscular tissue or soft cartilage. Their surfaces, when divided, are smooth or finely granular, and their colour varies from a whitish yellow to pink or deep red, with the amount of vascularity. Sometimes, on section, the surface is mottled from an intermixture of these tints, or ecchymosed. The vascularity of these tumours disposes them to ulceration

and to the breaking down of their substance with the formation of a purulent fluid. They are generally encysted, originate in cellular tissue, and are found in fibrous and osseous structures. In the last-named situation they have been called osteo-sarcoma, a name which has been sometimes given to cancerous disease in this situation. LEBERT considers fungus of the dura mater to be sarcomatous. These tumours increase in size slowly, causing injury by their pressure on adjoining parts, not only impairing function, but producing absorption and ulceration of the parts pressed upon. In a gentleman whom I attended for gradually increasing hemiplegia, passing slowly into general palsy and coma, one of these tumours existed in the upper jaw and another in the pericranium, and I stated that the palsy was most probably owing to a similar formation in the dura mater. On examination after death, this was found to be the case; a large tumour on one side having caused the hemiplegia, a small one being also present on the other side, and having produced the palsy of the other side also, shortly preceding dissolution. (*See art. BRAIN and MEMBRANES, § 8, 9.*)

59. Sometimes these tumours are more soft and lobulated, and are then readily mistaken for encephaloma. The lobules vary greatly in size, have externally a papillary or cauliflower appearance. They frequently resemble the pancreas, and were hence called pancreatic by ABERNETHY. The lobules are surrounded by a layer of more or less dense areolar tissue, and are of a grayish, yellowish, or rosy colour, according to their vascularity.

60. These tumours are found in many places below the skin copiously supplied with cellular and fibrous tissue. They are not infrequent in the mammæ, and in this situation they are distinguished from scirrhus with the greatest difficulty. M. LEBERT describes small mushroom-like growths on the conjunctiva which are sarcomatous, and which may destroy the eye by their size and pressure. Dr. BENNETT has found many granulations on the valves of the heart to consist of a sarcomatous and fibrous structure.

61. "The minute structure of these tumours is essentially fibrous, but many of the fibres are seen to be made up of congeries of fusiform cells closely applied together. These cells are of a spindle-shape, varying in length and breadth, and for the most part distinctly nucleated. Many of them may be seen branched at their extremities and passing into fibres, according to the mode of development of fibrous tissue described by SCHWANN. In some the nucleus will be found to have disappeared. Others of the cells will be found round or oval, or only slightly elongated; these are younger growths. In the same tumour all these different stages may be observed. In the softer parts, isolated cells and nuclei abound; whereas in the harder and denser parts the development into fibrous tissue will be found more perfect" (p. 187). Some of the softer forms of sarcomatous growths contain cysts, and in these groups of transparent cells are observed, which present on the addition of acetic acid distinct round nuclei, about one third the size of the cell. These cells closely resemble epithelial cells. The fibrous structure sometimes forms loculi, which



may be crowded with these cells, so that in these cases fibrous and epithelial growths are conjoined.

62. 2d. *Desmoid fibrous tumours* are generally of a white or whitish yellow colour, tough and elastic, resembling the structure of the dermis. They are of a rounded or oval form, often imbedded in a cyst, consisting of the structures in which they lie. They vary in density from that of tendon to that of fibro-cartilage. On section they present numerous white glistening fibres intimately interwoven, or arranged in bundles, forming circles or loops interlacing with each other. They sometimes have a bony centre or nucleus. They are not very vascular. They vary in size from that of a pin's head to several feet in circumference. Dr. BENNETT possesses one four feet in circumference, and he refers to one still larger. They may occur in various tissues and organs—in the sub-cutaneous cellular tissue, in the sub-mucous tissue, and in the mammae and uterus, where they are common. In the last situation, they often push the mucous membrane before them, and in this way grow outward, forming one of the so-called polypi uteri. In other cases, they grow towards the serous or peritoneal cavity, pushing the membrane before them, and thereby forming a neck by which they are attached to the uterus, as if growing from it. The pedicle thus formed may break off, and the tumour thus become free in the peritoneal cavity. In the same way these tumours may become detached in the joints, loose fibro-cartilages, and even in the veins, when they have been named *phlebolites*. The minute structure of these tumours is chiefly filamentous, the fibrils varying from the 1-700th to the 1-800th of a millimetre in diameter. Their softer portions may be separated by a fine needle, but this is impossible in the denser parts. Sometimes the filaments are more or less waved; at others, they are curled and brittle, as in elastic tissue. Occasionally fusiform nucleated cells are found, indicating that these fibres are probably formed from cells. Sometimes isolated nuclei and corpuscles are also found, as in sarcomatous tumours, but the proportion of them is very small. The bony centres of these tumours are sometimes cartilaginous, at others composed of amorphous mineral matter, more rarely of true bone, two instances of which latter were seen by M. LEBERT.

64. 3d. *Chondroid fibrous tissues* were first accurately described by MÜLLER, and shown by him not only to resemble cartilage, but also to possess much gelatin in their composition. They vary in shape. When divided they present a smooth, milk-white, glistening surface, like fibro-cartilage. Their thin substance is very dense, separated with great difficulty by needles, but easily cut into thin layers. It crunches under the knife, and is very little vascular. Its intimate structure consists of fibrous tissue, resembling the fibro-cartilage of the ear, or the intervertebral substance.

64. The preceding kinds of fibrous structure may be associated in one tumour. Some are composed of several rounded or oval masses, varying in size, and surrounded, and separated from each other by a cyst, or layer of areolar tissue. The external surface, under such circumstances, is more or less modulated. Some of these are occasionally soft and pulpy—semi-

gelatinous, with a very sparing layer of fibrous tissue, while others are more or less tough, gradually passing into a fibro-cartilaginous density, and grating under the knife. Dr. BENNETT has observed, even of one nodule, parts soft and others hard, the former being cellular, the latter fibrous, every degree of variation existing between them.

65. 4th. *Neuromatous fibrous tumours* are formed in the nerves, sometimes spontaneously, at others consecutively of injuries, especially of amputation. In the museum of the Richmond Hospital, Dublin, a series of these tumours is preserved, most of them taken from a person in whom almost every nerve presented knotty swellings, some of them varying from the size of a nut to that of a child's head. Dr. BENNETT examined them microscopically. Having been long kept in spirit, he could only determine the existence of fibrous bands running in various directions, mingled here and there with compound granular masses. In some fresh neuromatous tumours which he examined, it was demonstrated "that, in addition to bands of fibres running in waved lines, and sometimes forming loops, there were occasionally transparent cells, with a nucleus composed of two or more small granules, not affected by the addition of acetic acid" (p. 190).

66. *D. Cartilaginous canceroid growths* were first separated from cancerous and osteo-sarcomatous tumours by MÜLLER, who called them *enchondroma*. "When found in soft parts, or merely attached to bones, they are surrounded by an envelope of condensed areolar tissue, when in the bones, by a bony capsule. In the first case they occur, although very rarely, in the glands, as in the parotid or mamma. In the second case, they are most common in the bones of the extremities. When formed in the substance of long bones, they present rounded, smooth tumours; when in the periosteum or flat bones, their surface is rough and nodulated." The structure of enchondroma is the same as that of cartilage; it presents transparent nucleated cells, varying in size, isolated or in groups, situated in a hyaline substance. A network of filamentous tissue runs through the substance of the tumour, forming areolæ in which blood-vessels ramify. The cartilaginous and areolar tissues vary in amount in different tumours. Sometimes the cartilage is in excess; and it then resembles that of young animals, the cells being unusually large. When the fibrous element abounds, then the whole mass is identical with fibro-cartilage, as in sarcomatous tumours (§ 58-61). Between these extremes there are infinite varieties, many of which may often be seen in one tumour. Occasionally a bony nucleus is found in a nodule of enchondroma, and sometimes these nodules present all the stages of transformation into bone.

67. Notwithstanding these peculiarities of structure, these tumours are often mistaken for osteo-sarcomatous or cancerous growths, chiefly owing to their occasional softening, and to their presenting, in such circumstances, the external characters of encephaloma. The softened portion, even under the microscope, may, without great care, lead to error, as the cartilage-cells which float loose, mixed with granules and debris of the tumour, closely resemble those in cancerous growths.

68. *E. Fatty canceroid growths*, in the form of tumour, when mingled with fibres and other elements, may be mistaken at first sight for scirrhous. "Fatty tumours vary in size, but they may reach a growth weighing 30 lbs. Sometimes their surface is smooth, at others lobulated. They are of a yellow colour, resembling adipose tissue; sometimes divided into bands by white fibrous tissue. The relative amount of these two elements varies greatly in different specimens; some being soft, oily, containing few fibres; others being harder, dense, the areolar tissue preponderating. For the most part they are very sparingly supplied with blood-vessels, but these abound more in the fibrous varieties. In the latter case they are liable to ulcerate, and, under such circumstances, have frequently been mistaken for cancer. Some of these tumours, indeed, may be considered as fibrous or sarcomatous, combined with an unusual quantity of fat. Occasionally they are connected with the ordinary adipose tissue of the body. They are often surrounded by a delicate cyst or envelope; sometimes this is not perceptible. When the collection of fat resembles the ordinary adipose tissue, the tumour has received the name of *lipoma*. When it is more lardaceous, some have applied to it the term *steatoma*, in the same manner as when the substance is encysted."—(*Op. cit.*, p. 193.)

69. The minute structure of these tumours varies with the amount of adipose or of fibrous tissue. The former is composed of vesicles of a round or oval form, altered more or less in shape by pressure. The vesicles vary from the 1-20th to the 1-50th of a millimetre in diameter. They are composed of a diaphanous cell wall, frequently including a nucleus. The nucleus is round or oval, about the 1-100th or the 1-200th of a millimetre in diameter. Occasionally it appears stellate, of a crystalline aspect, from the formation of crystals of margaric or margaric acid around it. On rupture of the cell wall the oil may be made to flow out, and the cell wall shrinks up. Collapsed cells may often be seen among the more perfect vesicles, mixed with globules of oil and fat granules. The fibrous element consists of filamentous tissue running between groups of adipose cells, but is denser, and occupies more space, according to the proportion in which it enters into the tumour. Steatomatous and melicerous fatty matter may sometimes consist chiefly of the cells or vesicles just described; or these may be mingled in various proportions with granular matter. In some melicerous encysted growths Dr. BENNETT found the whole to be composed of granules, among which faint traces of delicate cell walls might be observed more or less compressed together. In all such productions the relative amount of the vesicular and granular element varies greatly.

70. Another form in which fat may occur is that of *atheroma*, consisting, for the most part, of numerous fatty granules, varying in size. Atheroma may constitute the contents of cysts, or the entire degeneration of certain glands, especially the mesenteric and lumbar. The fatty granules composing it vary from the 1-600th to the 1-400th of a millimetre in diameter. They almost entirely disappear in ether, leaving only a molecular albuminous matter. Similar fatty granules are also associated with most

morbid formations, sometimes free, at others existing within cells. "This kind of atheroma is identical in structure and chemical composition with certain forms of the reticulum in cancer. The granular fatty matter is often combined with crystals of cholesterine, more or less numerous." Sometimes they accompany various kinds of chronic exudation, and formations of epithelium, as above noticed (§ 53).

71. *F. Tubercular growths resembling cancer* are not uncommon. Dr. BENNETT remarks, that a mass of enlarged tubercular lumbar glands in his collection presents all the external characters of cancerous growths, and that he has no doubt that many cases of so-called cancer of the brain and other structures in youth are only tubercular; for, however easily the tubercular structure may be distinguished in its miliary or infiltrated forms, it may closely resemble cancer when it exists only in one or two large rounded masses in an organ, and is more or less softened. In such cases it can be distinguished only by a microscopic examination. The characters of tubercle which readily distinguish it from cancer, therefore, require to be pointed out. A tubercular mass presents a yellowish or dirty white colour, and varies in consistence from that of tough cheese to that of thick cream. Sometimes it is soft in one place and indurated in another. On dividing the harder parts, the surface is smooth or waxy; the softer parts present a slightly granular surface. On pressure they are friable, and break down into a pulpy matter, but never yield a milky juice. "A small portion squeezed between glasses, and examined under the microscope, presents a number of irregular shaped bodies approaching a round, oval, or triangular form, varying in their longest diameters from the 1-120th to the 1-75th of a millimetre. These bodies contain from one to seven granules, are unaffected by water, but rendered very transparent by acetic acid. They are what have been called tubercle corpuscles. They are always mingled with a multitude of molecules and granules, which are numerous as the tubercle is more soft. Occasionally, when softened tubercle resembles pus, constituting scrofulous purulent matter, we find the corpuscles more rounded, and approaching the character of pus-cells. They do not, however, on the addition of acetic acid, exhibit the peculiar granular nuclei of these bodies." Tubercle corpuscles are very readily distinguished under the microscope from cancer-cells. Compound granular masses and cells, mineral matters, crystals of cholesterine, and the debris of the texture in which the morbid product is found, are also often detected in tubercular masses of some standing. These masses may also be sometimes transformed more or less into cretaceous and calcareous substances, and either remain latent or be thrown off.

72. *G. A tumour*, which M. VELPEAU has called *fibrinous*, is occasionally met with. It may, under certain circumstances, be mistaken for cancer. It is caused by an extravasation of blood, which coagulates, becomes paler, and ultimately yellow, like a clot of blood in the sac of an aneurism. These tumours vary in size, may occur in various situations, especially in the female breast, when they may be mistaken for cancerous tumours. Dr. BENNETT has also seen these tumours in different textures, espe-



cially in the placenta and in the spleen. The structure of one found in the spleen consisted of numerous molecules and granules, fusiform corpuscles, compound granular masses, and irregularly formed bodies, probably altered blood corpuscles, such as are commonly found in old extravasations. Instances in which these tumours in the breast were mistaken for cancer have been recorded by MM. LEBERT and BERRARD.

73. *H. A peculiar form of tumour, which HENLE has called syphonoma, is described by him and Dr. BENNETT.* The specimen seen by the latter consisted of a large mass attached to the mesentery, that was in one place hard, fibrous, and nodulated, in another soft and cheesy, or even purulent, and in a third fibrous, but soft and of a dark red, resembling coagulated blood. Having been long steeped in spirits, its minute structure could not be exactly ascertained. The part examined resembled a vascular plexus, anastomoses here and there having been distinctly seen.

74. *I. The enlarged glands which accompany typhoid ulcerations in the intestines, and which are sometimes found, especially in the mesentery, will rarely be mistaken for cancer.* They vary in size from that of a hazel-nut to that of a hen's egg. They are vascular externally, of a bright red or purple colour, are soft and pulpy to the touch, and on section present a slightly granular surface, of grayish or fawn yellow colour, frequently exhibiting the commencement of softening. They are friable, and yield a grayish or dirty purulent-looking fluid on pressure. The matter infiltrated into the texture of the gland is the typhous deposit of ROKITANSKI, ENGEL, and other German pathologists. The fluid squeezed from these glands was found by Dr. BENNETT crowded with cells, naked nucleoli, blood corpuscles, granules, and molecules. The cells are generally spherical, varying in diameter from the 1-50th to the 1-35th of a millimetre. The nucleus occupies about three fourths of the cell, and is composed of an aggregation of numerous nucleoli, of about the 1-200th of a millimetre in diameter. "Sometimes from one to four of these nucleoli are seen scattered within the cell, either with or without a round or oval transparent nucleolated nucleus. On the addition of acetic acid the cell wall is rendered very transparent, while the nucleoli are unaffected. Many of them are free, and looked at first like altered blood globules, from which they are at once separated by the action of acetic acid. I have called these bodies nucleoli, from their holding that relation to the nucleus in well-developed cells, although at other times they may be considered as nuclei, no other bodies being present within the cells."—(BENNETT, *Op. cit.*, p. 200.)

75. *IV. PATHOLOGICAL RELATIONS OF SCIRRHOUS AND OTHER TUMOURS.—i. OF SCIRRHOUS GROWTHS.—A. The origin of these growths has been the subject of much discussion.* In the article CANCER certain views of this matter have been noticed, but others have been recently published. It was supposed by VELPEAU (*Revue Médicale*, t. i., 825, p. 357), from two cases in which encephaloid-looking matter was found in venous coagula, without disease of the veins, that cancer may form primarily in the blood; but there is no evidence that the matter was

really cancerous in these cases. VIRCHOW, however, states that he has seen cancer in the large venous trunks in six cases, and that he is convinced that they may thus arise locally in coagula of blood. GLUGE and NONAT discovered cancer-cells in a clot in the right iliac vein, the walls of the vein being smooth and not red; but in these, as in several others which have been recorded, cancerous disease existed in the viscera, and the cancerous matter in the blood may have arisen from venous imbibition. In the present state of our knowledge there is no proof that cancer may exist in the blood primarily, or independently of similar growths in other parts of the body. It is possible, however, that the liquor sanguinis may, in peculiar circumstances, act as the blastema of cancer within the vessels as well as when exuded; such an occurrence, however, must be rare. Dr. BENNETT, whose researches have been so able, infers that the filaments, cells, and fluid, which together compose scirrho-cancerous structures, originate in a coagulated exudation, which is poured out in the same manner as other forms of exudation—namely, by enlargement of the capillaries, their repletion with blood, and the transudation through their coats of the transparent liquor sanguinis, which, coagulating outside the vessel, forms an exudation more or less solid. The exudation, when first perceptible, consists of a finely molecular and granular matter, in which the cancer-cell arises as in a blastema, in the manner already described (§ 14). This view accords with that which I have stated in the article CANCER (§ 26), and shows that the change in the blastema, or exuded fluid, depends upon the state of constitutional and local vital endowment.

76. The exudation constituting the blastema of cancer is generally infiltrated between the filaments of areolar tissue. The nature of the tissue influences the formation of adventitious growths; and the areolar tissue, probably from its lower vital endowment, seems to favour the production of scirrho-cancer. While part of the exudation in this tissue passes into cells, another portion becomes fibrous, as observed to occur in a simple exudation during the healing of an ulcer or wound. All that is known of this stage of the production is, that filaments and fibres are formed, which are interlaced among the granules and cells of the blastema, to constitute the stroma of the growth, the form and density of which is dependent upon its arrangement and amount. "At first the cancerous exudation is fluid; and some of the albuminous principle held in solution, by coagulating, allows a certain quantity of serum to be set at liberty. In most instances this is in a great measure absorbed; but in a few, owing perhaps to some peculiarity in its formation or amount, it is retained in the meshes of either the pre-existing or new areolar tissue." Such Dr. BENNETT considers to be the origin of colloid cancer. The colloid matter so collected becomes in turn a blastema for the formation of cancer-cells, as above described (§ 14).

77. It is obvious that the exudation productive of scirrho-cancer must differ, either primarily or consecutively, or both, from the exudation of inflammation, or of scrofulous or tubercular cachexy. In what the difference consists we are ignorant. In this the histologists have

not enlightened us. Most probably the cancerous exudation is primarily different from these, owing to the state of vital endowment of the tissue affected, and that the difference increases with the retention of the exudation in the tissue which it infiltrates. The characters imputed to the blood by ROKITANSKI, ENGEL, HEILNER, and others, assigning a specific dyscrasia of the blood, or an excess of albumen or of fibrin in the blood, are vague, uncertain, and unsatisfactory. Dr. BENNETT believes that the cancerous peculiarity depends not upon the vascular system, which is the mere apparatus for the production of the exudation; not upon the nervous system; and not upon the texture, which is merely the seat of the exudation, as that varies; but in the inherent composition or constitution of the exudation itself. But in this belief this pathologist is not sufficiently precise; for if he means by the nervous system the spinal nerves, then it may be admitted that these can have little or no influence in determining the nature of the adventitious growth produced from a fluid blastema. It is, however, by no means so certain that the soft or ganglial nerves, which supply the vascular system, and which preside over nutrition and secretion, are so unconcerned in determining the nature and growth of the morbid formation as here stated. We know that all the forms of scirrho-cancer appear in circumstances and from causes which depress organic nervous energy, and impair the activity of the excreting or depurating functions; and which, moreover, diminish vital resistance, and favour the development of adventitious cell-formations and of parasitic productions. As these cell-formations become more perfect, and acquire the power of self-development, so as to spread and invade adjoining tissues, they soon burst forth, ulcerate, contaminate the circulation, and form exuberant fungoid excrescences, filling up or even extending beyond the textures which they destroy; and they thus impoverish and infect the fluids, and exhaust organic nervous or vital power. (*See arts. CANCER, § 11, et seq., and DISEASE, § 151, et seq.*)

78. B. The growth of scirrho-cancer is merely the extension of the fibrous tissue, cancer-cells, and nuclei above described (§ 41, *et seq.*). The old cell-walls dissolve or break down, and the included new cells and nuclei are liberated, and give rise to others in turn. For this purpose, however, a certain amount of blastema is requisite. "This is obtained at first from the original exudation poured out; but, after a time, as the fibrous tissue increases, new vessels are formed in it, which continue to furnish materials for the new growth, in the same manner as the old vessels furnish materials of growth to the old tissues." A pre-existing tissue exerts much power over new formations in its substance or immediate vicinity; and hence, when a bone is fractured, the matter exuded is transformed into bone; and other tissues are restored when divided by a texture analogous to the one injured. "Very compound tissues, as the skin, lungs, muscle, &c., are never completely restored, but a cicatrix is formed, composed of fibrous tissue. On the other hand, epithelial and epidermic structures are easily restored and reformed, and so are all textures which wholly consist of cells. Hence the more

a cancerous growth abounds in cells, the more rapidly it grows, and the greater is its power of re-development." Some pathologists suppose that this power depends upon pre-existing and permanent nuclei, or germinal centres. But as to the truth of this, Dr. BENNETT does not inquire, considering it sufficient to know—what, however, was sufficiently known before histology came into vogue—"that a tissue once formed and furnished with blood-vessels possesses the property of growth; that is, of exerting a species of selective vital attraction on the blood, whereby such matters are transuded through the capillaries as are readily transformed into a substance like itself." But this act of growth, which I believe to be correctly attributed to vitality, the sect of chemical pathologists would consider as altogether chemical; while another sect would consider it as simply one of endosmosis. Of the more prominent features of the growth of cancer, and of the extension of the malady and contamination of the circulation, I have nothing to add to what has already been stated in the articles CANCER and FUNGOID DISEASE.

79. C. *Is Cancer contagious?* This question has been answered in the negative by some, and in the affirmative by others. Inoculation has even been resorted to in order to test the fact.—(a) The negative evidence is chiefly the following. Dr. WALSHÉ says that he has known women afflicted with advanced cancer of the uterus take refuge in hospitals from the importunities of their husbands, and that these men were perfectly free, according to the assurance of their wives, from ulceration of any kind. Dr. BENNETT states that his hands, more than once, have been immersed in the creamy fluid of encephaloma, while recent scratches have been upon them, without the slightest irritation having resulted. VOGEL states that he injected fresh cancer-cells from a tumour into the blood-vessels of a dog, without any morbid change being manifest eight months afterward. GLÜCK has also been unsuccessful in his attempts to inoculate the disease.

80. (b) The affirmative evidence is chiefly the following: LANGENBECH injected the fluid from a cancerous tumour, while still warm, into the blood-vessels of a dog, with the effect of inducing secondary cancerous formations in the lungs of the animal. Dr. WATSON states that he has known two cases of cancer of the penis in men, whose wives were afflicted with cancer of the uterus. Some years ago, a patient was attended by Mr. MAYO and myself who was the subject of carcinoma of the penis and inguinal glands, and who soon afterward died of the disease. The malady had commenced in the glans penis, and he had infected his wife, who was found on examination with open cancer of the os uteri; and she died of the disease a considerable time after her husband. In this case there was no doubt of the husband having infected the wife, owing to the morbid matter from the ulcerated glans penis having been left in undisturbed contact with the os uteri. Mr. MAYO informed me that he had met with another case altogether similar to this. Dr. BENNETT asks if the cases to which Dr. WATSON has alluded were proved to have been cancer by a microscopic examination? But he has already shown that such examination adds but



little to the diagnosis of cancer; and it is well known that the majority of cases of open cancer, as these were, are so obvious as not to be mistaken even by the most inexperienced. Dr. BENNETT concludes that it is certainly opposed to experience that cancer can be communicated by contact or inoculation. I believe, however, that it can be so communicated, if circumstances favour the communication, more especially if the recent discharge from a cancerous ulcer is brought into, and remains for some time in undisturbed contact with a mucous surface, or part denuded of its cuticle.

81. *D. Degeneration of cancerous and canceroid growths.*—Dr. BENNETT remarks, that it is with the life of a cell as with that of the most highly organized individual: "It has its origin and birth, it gradually increases until it reaches maturity, then declines or degenerates until it has ceased to exist. The individual elements of a cancerous growth, like those of the healthy tissues of the body, are continually undergoing this process; like them, it leaves germs which continue to regulate its growth so long as they receive nourishment, and thus the structure, as a whole, is perpetuated. Sometimes this process receives a check from the cells, which are the entire agents of growth, being rendered abortive, and the result may be, 1st. A fibrous cicatrix; 2d. A fatty mass; or, 3d. A calcareous concretion."—(*Op. cit.*, p. 210.)

82. (a) It has been stated above (§ 78) that the cell-wall of the cancer-cell dissolves and breaks down, and thus liberates the young cells. This is the natural completion of individual cell-life. It has been shown that the increase of cells is dependent upon a due supply of blastema, in order to supply the materials of assimilation. Several cases are known, and one has come under my own especial and prolonged observation, when a cancerous ulcer has undergone the same changes as a simple ulcer; the cancer-cells in the one and the pus-cells in the other becoming gradually less in number, while the *fibrous element* has increased and terminated in the formation of a cicatrix. Dr. WALSHE has adduced several instances of this transformation; and Dr. BENNETT thinks that this is a more frequent occurrence than is generally supposed. The only question is whether the pre-existing morbid growth was actually cancerous or not; but the local appearances and sensations, and the constitutional symptoms, have certainly been such, in rare cases, as warranted the inference that the growth was actually malignant. This writer states that Dr. BOCHDALEK, of Prague, has met with instances of cancer of the liver, in which the diseased structure broke down into a cream-like matter, the fluid parts being absorbed, and the whole shrinking together, forming a puckering on the surface often corresponding to a fibrous mass, or a fatty material, in which collapsed cancer-cells may be detected.

83. (b) It has been stated above (§ 14) that the cancer-cell may be rendered abortive by the deposition of fat-granules between the nucleus and cell-wall, and by their pressure upon the former, and the ultimate disintegration of the whole body into numerous fatty molecules and granules. "This is a very common termination of the life of individual cancer-cells; and, when the process is carried on to any great ex-

tent, the fat granules often collect in masses, and mingle with old cells, which exhibit various stages of their retrograde progress, and old nuclei, which have more or less resisted disintegration, are at length observable to the naked eye. In this manner the yellow masses, and yellow reticulated appearance in certain cancerous growths of some standing are produced—an occurrence so common that MÜLLER described it as a particular form of the disease, under the name of *cancer reticulare*" (p. 212).

84. Professor BENNETT, H. MECKEL, and VIRCROW agree in describing the reticulum of MÜLLER as disintegrated cancer, or as composed of broken-down cancer-cells, the nuclei of which sometimes remain; at other times the whole has undergone the fatty transformation, and been converted into compound granular cells; and not infrequently, in the last stage of the process, nothing but molecules and granules can be discovered. Dr. BENNETT considers that this change is not a proof of so-called secondary inflammation of the growth, as is supposed by WALSHE, ROKITANSKI, and LEBERT; but that it is the same transformation that occurs in all old exudations, and in various organs where pre-existing cells undergo the fatty transformation, as in the liver, to constitute fatty liver, the kidney, to form BRIGHT'S disease, &c. The matter forming the reticulum occurs in *two forms*. In one it is seen in the fresh-cut surface, scattered throughout the growth, in the form of a net-work, more thick, however, and abundant in some places than in others. In the second form it forms masses of a bright yellow or orange colour, occasionally resembling tubercle, more or less friable, and of cheesy consistence. In the former compound granular corpuscles are most common; in the latter, irregular bodies, resembling tubercle-corpuscles, resulting from alteration in the form of the nucleus, after the cell wall has been broken down. These are called bodies of the reticulum by BRUCH. Compound granular cells are very common in cancer, and are to be considered as evidences of the cancer-cell. The greater their number and agglomeration, the greater the degeneration. The fatty degeneration is rarely uniform throughout a cancerous growth; commonly, while one part is converted into a fatty net-work, another is only partially so changed. This accounts for cancer having such a tendency to spread to other tissues, and for the destruction of one part being rarely attended by the reduction of the whole mass. Sometimes, however, the fatty degeneration is associated with the fibrous degeneration (§ 82), and extends to the whole morbid structure; and it may then be farther associated with an early stage of the calcareous transformation next to be mentioned.—(BENNETT.)

85. (c) A cancerous growth may degenerate into an accumulation of the *earthy matters* originally contained in the exuded matter. This form of cancerous degeneration is analogous to that sometimes observed in tuberculous formations. The cells break down, the more fluid and soft parts are absorbed, and the mineral parts are left concentered in the form of a calcareous mass or masses, of various sizes and shapes. This degeneration of cancer is very rare. Dr. WALSHE appears not to have met with it; although he mentions the bony lamel-

læ, which are continuous with part of the skeleton, and which characterize certain cancers connected with the osseous structure. Dr. BENNETT has, however, observed it in two instances. In one he observed mineral masses mingled with broken-down cancer-cells in the mesenteric and epigastric glands, "some of which felt hard from calcareous depositions; others were infiltrated with a putty-like substance; and a few were composed of an external shell of hard, calcareous matter; while their interior consisted of a semifluid, gritty, diffuent material, which flowed out on breaking them."

86. (d) The three kinds of degeneration of cancerous growths may be variously associated in retrograde cancer; these may be the fibro-fatty degeneration, with either element in excess, or one or both these conjoined, with the accumulation of mineral matters in smaller or greater masses. In these cases there is generally a loss of substance, occasioning a sinking inward, with puckerings of the adjoining surface. These changes occur only in cancerous growths of considerable duration, without ulceration or the formation of a cicatrix, as observed in the mamma when the nipple is retracted, and in the surface of some cancerous tumours. VIRCHOW ascribes the central depression in the white encephaloid masses of the liver to this cause. Dr. BENNETT views the stellate puckerings on the surface of cancerous growths as far from uncommon; and certainly, when this appearance exists, there must necessarily be loss of substance and contraction of surrounding tissues; and these changes can only result from a partial degeneration of the morbid structure, more especially of the older parts of it, although an extension of it to adjoining parts may actually be proceeding. I may, therefore, conclude, with the writer just mentioned, that cancer may undergo transformations, tending in very rare cases to a spontaneous cure; and that these transformations are into a fatty or a calcareous matter—that the morbid growth is checked, and that it consequently shrivels up, some of the softer parts being absorbed, the rest remaining inert. The contraction of the surrounding parts in these cases, and the fibrous stroma of the cancer, constitute the puckerings and cicatrices observed as evidences of a cure. Dr. BENNETT considers that the facts which he has adduced are unequivocal proofs that a cancerous growth may undergo spontaneous cure. In the case of a lady nearly related to, and almost constantly under the observation of the author, a cure certainly took place without any local treatment, the constitutional means about to be mentioned (§ 122, 123) having been assiduously employed.

87. ii. THE PATHOLOGICAL RELATIONS OF OTHER GROWTHS.—This subject has been noticed, as to most of what is known respecting it, when describing the anatomy of non-cancerous tumours, and in the article DISEASE (§ 110). Fibrous, epithelial, cartilaginous, and fatty growths, or those formations which are not adventitious as respects the economy (*see* DISEASE, § 111, *et seq.*), may be ascribed to an error in nutrition, or to a hypertrophy or excessive deposition or nutrition of these several structures in the parts in which they occur. The cause of their origin and development is not known, although certain circumstances connected with their formation have been noticed.

But why either of these formations should occur in preference to the others, we are ignorant. Certain of them may be caused by an injury of followed by increased exudation into a part, the exuded fluid undergoing changes favouring some form of nutrition in preference to others; but the same kind of tumour may occur without any such or any manifest cause. Tumours may form in the ovaria, or even in the substance of the uterus, or rather within the ducts and uterus, owing to an imperfectly developed or an unimpregnated ovum, detached partially or altogether, and arrested in either of these situations, sexual excitement having been imperfectly gratified or insufficiently developed. Other morbid growths are to be ascribed to an original constitutional vice, as the scrofulous and tubercular; and some are more or less dependent upon a constitutional predisposition acquired at an antecedent period, as the sarcomatous, fatty, and some others described above.

88. A. *May morbid growths, not originally scirrhus or cancerous, be transformed into either of the forms of cancer?* This question has been differently answered. As respects certain tumours or growths, as the tubercular and enchondromatous, no such transformations take place; but as regards some others, the change is possible, although not demonstrated. Dr. BENNETT remarks, that growths furnished with blood-vessels, such as the fibro-nuclear, epithelial, and fatty, may possibly be so changed, although it would be difficult to establish the change. But with respect to fibrous growths, the result of a simple exudation, or hypertrophy, at first of purely local origin, its occurrence seems to him to be absolutely proved. "According to LEBERT, inflammation (simple exudation), tubercle, and cancer are separated by distinct characters, originate from separate blastemata from the first, and never pass into each other. In this opinion, I think, he proceeds too far; for why may not a cancerous exudation be formed into the filaments of a vascular, fibrous, or fatty tumour, as well as among the filaments of the normal areolar tissue of the body? We are continually meeting with cases where a blow or injury on a part producing a swelling with the ordinary symptoms of inflammation is, after a time, followed by cancer. An indolent tumour may exist for years, and then suddenly assume the characters of cancer. Are we to suppose that such a tumour was composed of fibres and cancer-cells from the first, and that the growth of the latter had remained stationary all that time; or that nothing but a fibrous tumour existed at first, in which cancer-cells were afterwards formed? The latter appears the most reasonable proposition" (p. 217).

89. B. *The enlargement of growths* takes place from blood-vessels, which either permeate the mass or supply only portions of it, or reach to a greater or less extent of its surface. "In the first the growth is said to enlarge by intussus-

\* I have, in the foregoing pages, been much indebted to the work of Professor BENNETT on "*Cancerous and Canceroid Growths*"; but I have been unable to adduce more than a part only of his researches. His numerous and interesting cases, his careful microscopic examinations, and his graphic illustrations, should not merely be perused, but carefully studied, by every physician and surgeon, in connexion with his lucid descriptions of each kind of morbid growths, as exhibited in the pages of his very original and able work.



ception; in the third by pure imbibition; in the second by both means. These distinctions are less important than they on first view seem; the perfect nutrition of the extra-vascular natural tissues proves, as a general fact, the vigour and efficacy of the imbibition process; and, in truth, imbibition is at play in all nutritions; for the nutrient elements of vascular tissues must be imbibed through the coats of their vessels, and it may be in addition through a stratum of cells. Enlargement by intussusception differs, therefore, from that by imbibition, in degree rather than in kind. In whichever way conveyed to the seat of growth-formation, the nutrient material, at first fluid, is *evolved* and *appropriated* by continuous cell-generation. Now this cell-generation may be affected on an *endogenous* or an *exogenous* plan. When the plan is endogenous, the germs of young cells are evolved and contained within older ones; those secondary cells are endowed with a similar procreative faculty; the tertiary series are in like manner fecund, and so on. Here a single cell may be regarded as the *potential embryo of an entire growth*. When, on the other hand, the plan is exogenous, the germs of new cells are not found within, but lie and are evolved outside old ones."

90. "Where endogenous evolution prevails, and a cell is, potentially considered, a tumour in futuro, the perpetual production of similar cells is easily intelligible; the offspring that follows is as the parent that went before. But in exogenous growths the continuous germination of infinite series of like cells is not readily conceived. It may be surmised that, when a series of cells has sprung into being, this series acts on the evolution of succeeding ones, as a natural vascularized is known to do on the generation of epithelium-cells; the formed series so influences newly-exuded blastema (of which it constantly excites the accession), that this shall produce a new series of cells similar to itself. But, however the perpetuation of like cells be understood, be it remembered that the thing itself has its limits; for deposits may appear in growths, pseudo-tissues are among their frequent constituents, and a growth of one kind may establish itself a nidus within the area of another generically dissimilar. Elder cells thus seem (within certain limits) to cause the increase, and regulate the qualities of younger ones. Younger cells are, on the other hand, more or less active agents in effecting the destruction of the older ones; less so in endogenous growths, where the elder may increase materially in size (as their contained brood multiplies), and acquire thickened walls; more so in exogenous growths, where such enlargement of cells is not witnessed, and where the production of young is coeval with the disintegration of old ones."<sup>n</sup>—(Dr. WALSHE, *art. PRODUCTS, ADVENTITIOUS, in Cyclop. of Anat. and Physiol.*, vol. iv., p. 120.)

91. *C. The reproduction of growths or tumours* is of importance as regards the diagnosis as well as the treatment. Dr. WALSHE, in his very able article just quoted, observes, that "growths of all descriptions are liable, when removed spontaneously or by art, to be *reproduced* in the spot they previously occupied, if the removal have not been absolutely complete. The particles left behind act as attractive forces for new

blastema convertible into cells, similar to those of which themselves are composed. This mode of reproduction (as it is erroneously called, for it is nothing more than enlargement, facilitated by removal of pressure of pre-existing substance) occurs with growths of all kinds, cancerous, sarcomatous, fibrous, fatty, enchondromatous, erectile, &c. But it would appear that in some cases of surgical removal, when the whole mass has, as is presumed, been extirpated, a new growth vegetates in its place. The difference of the cases is often rather apparent than real; we have distinctly found the germina of cancer in tissue, reputed healthy, surrounding a cancerous mass; and it is manifest that such germina, though invisible to the naked eye, may, quite as readily as a fragment of diseased tissue of even considerable size, act as the efficient agents of new development. When, independently of this mode of generation, the disease returns in the seat of its former growth, the occurrence must depend upon the continuance of that depraved state of the blood which is fitted to supply the necessary blastema, and likewise, possibly, upon some peculiar state of vessels of the part favouring its exudation here rather than elsewhere" (p. 121). That the blood and blood-vessels are thus more or less concerned in the re-development of morbid growths may be admitted; but something, if not more, should be imputed to the depraved influence of the organic nerves supplying these vessels and the part affected. (*See art. CANCER*, § 26.)

92. In cases where the growth appears in one or more places remote from its primary seat, Dr. WALSHE remarks that the occurrence, which is termed the "distant reproduction" of the growth, is explicable in two ways. "The newly-discovered growth may have existed previously to the extirpation of the old one, and, having simply acquired additional activity, so become obvious, after that extirpation; or the new growth may have really first appeared subsequently to the removal of the older one." The latter alternative Dr. WALSHE believes to be rare. There is, however, reason to consider it to be more frequent than he admits, and to be produced not merely in the way which he states, although that way certainly exists to a certain extent. Of this consecutive production of the morbid structure in distant parts, he considers the simple explanation to be that the vitiated state of the blood, proper for the supply of the necessary blastema, continues; and that this blastema is poured out in some other part of the frame, the original tumour no longer existing to attract its deposition within or around itself. That this explanation may hold good, either altogether or in part, I shall not here dispute; but the organic nervous influence, controlling, as it does, the functions of assimilation, nutrition, depuration, and excretion, certainly has a primary, and by no means a small share throughout, in the distant reproduction and extension of cancerous and other tumours.

93. *D. The changes produced in tumours* during their evolution may be viewed as departures from the regular processes of their formation. The most important of these changes are their degeneration, which has been considered as regards cancer, and the removal or conversion of some of the non-canceroid, spontaneously, or by

the aid of internal means. These, however, are only rare occurrences. Much more frequently morbid growths experience the principal diseased actions to which the natural or healthy structures are liable, as congestion, infiltrations of serum or of blood, hæmorrhage, inflammation, gangrene, depositions of matters foreign to their nature; and, as consequences of these, various discolorations and changes in consistence.

94. *E. The effects produced by tumours and other morbid productions upon surrounding structures are most important, the injuries produced by them in many instances being chiefly of this kind. These effects are mechanical and vital.* (WALSHE).—(a) *The mechanical effects are principally pressure, displacements, detrusion or extrusion, condensation, discoloration, infiltrations, interrupted circulation, occlusion of natural cavities or canals.* When tumours form between muscular or movable parts and the membrane covering these parts, they generally are detruded from the original seats of formation, and, as they increase, they present stalks or peduncles by which they are attached to these seats, as most commonly shown by tumours in the uterus, which, assuming this shape from detrusion, and often subsequently from extrusion beyond the cavity of the organ, have been improperly called polypus.

95. (b) *The vital effects of tumours on the surrounding tissues are softening or rarefaction, atrophy, hypertrophy, inflammation and its usual results, as adhesion, induration, ulceration, mortification, perforation; changes in the blood-vessels; hæmorrhages; alterations of the sensibility, from numbness to the most intense pain; and infiltration of the surrounding textures with matter similar to that composing the morbid growth—an effect observed chiefly in respect of cancerous tumours.* Dr. WALSHE considers this last effect to occur in connexion with no other growth except cancer, and to constitute one of the most evident distinctions between cancerous and other allied formations.

96. iii. *THE SEATS OR LOCALIZATIONS OF TUMOURS AND MORBID FORMATIONS.*—A. Certain tissues and organs are much more liable to be the seats of growths than others, more especially the cellular tissue, and the female sexual organs. Dr. WALSHE observes that, while cellular tissue is the favourite site of growths, fibrous textures but rarely afford them a nidus. The mammæ, the ovaries, and the uterus are frequent sufferers; the lungs and brain are much more rarely affected. Certain parts of organs, also, are much more commonly attacked than other parts, as the pylorus and the epididymis, than the rest of the organs. Some organs, or parts of organs, are prone to be affected by certain growths in preference to others, as the mammæ, the stomach, the liver, &c., are most liable to be affected by cancerous productions; the bones to enchondroma; the neck of the uterus to cancer, in preference to the body of the organ, where fibrous tumours are chiefly developed; and the large intestines are very much more frequently the seat of cancer than the small.

97. *B. Sex influences the site of growths.* The female sexual organs are much more frequently their seats than the male organs; while the male urinary organs, especially the kidneys,

are more frequently thus affected than the urinary organs of the female. Age has also considerable influence, certain epochs of life favouring the development of certain growths in preference to others. Some tumours often appear to be compatible, and others incompatible, with the coexistence of others. Dr. WALSHE remarks, that some growths, as cystoma and carcinoma, are sufficiently prone to appear in the same person; others, as fibroma and carcinoma, are rare coexistences; none is actually incompatible, either as unconnected coexistences, or as developments in each other.

98. *C. The course of tumours, or other morbid growths, topographically, is either solitary, secondary, or multiplied.*—(a) A tumour may remain solitary until the death of the person in whom it exists, no other organ or tissue than that in which it commenced being involved by similar disease. This occurs chiefly in respect of enchondroma, of cystoid tumours, and occasionally of fibrous growths.

(b) *Secondary growths arise by the spreading of the morbid structure from its original site to parts either adjoining or at a distance.*—(1.) *Adjucent parts are secondarily affected by infiltration or imbibition of the morbid matter from the site of preceding disease, a morbid mass thus gradually extending from the primary seat to circumjacent tissues, and co-ordinately enlarging.*—(2.) *Secondary growths in distant parts are produced by the transmission of the morbid matter by either the lymphatic or vascular systems.* The matter, especially of cancerous and tuberculous growths, may sometimes be traced in the lymphatic vessels; and a lymphatic gland, in connexion with a cancerous mass, not infrequently becomes cancerous also; and, although the morbid matter cannot always be detected in the communicating vessels, there can be slight reason to doubt this mode of transmission. These glands may, however, be secondarily attacked, independently of this transmission of the cancerous matter; but this can rarely be the case where the vessels proceed from the primary site to the secondarily affected glands, and, as transmission is demonstrated in some cases, it may occur in all. When parts far distant are secondarily affected, these parts manifesting no lymphatic connexions, then it may be inferred that the secondary growth has either originated independently of the primary one, or been produced by the transmission of the morbid matter from it through the medium of the veins, in which cancerous as well as other morbid matters proceeding from the primary seats of disease have been detected. (*See arts. ABSORPTION AND ABSCESS, SECONDARY.*)

99. (c) *Multiplied growths may exist primarily and independently of the transmission by the lymphatics or veins of morbid matters from pre-existing growths.* The disease in distant and unconnected parts results from the constitutional morbid condition which thus manifests itself in sundry situations. This circumstance is often observed in cancerous and tuberculous maladies, and in cases of fibrous growths; and of cancerous diseases, the encephaloid or fungo-hæmatoid the most frequently manifests a multiplied origin.

100. *V. DIAGNOSIS OF SCIRRHOUS AND OTHER MORBID GROWTHS.*—The most important point of this part of the subject is the distinction be-



tween tumours or growths which are truly cancerous, and those which possess a different structure, although resembling the former. Histologists consider that "the local symptoms, and the general signs observed in individual cases, have been found insufficient; such as the lancinating pains, unequal surface, hardness, elastic feel, softening, ulceration, the surrounding tissue being affected, a general alteration of the constitution and return after excision," and have been, at various times, absent in cases undoubtedly cancerous, while they have existed in growths the nature of which is doubtful, and often been connected with epidermie, fibrous, fatty, or cystic tumours of the most innocent nature. That this difficulty exists in rare cases; that the symptoms and signs of cancer have been absent in truly cancerous diseases, and have existed in cases of an innocent nature, may be admitted to have occurred in rare instances; but these have not—at least rarely or never—furnished opportunities of examining the morbid growths microscopically until both diagnosis and treatment have been equally of no avail, or even until they have come under the knife of the anatomist. And even were opportunities of microscopic investigation afforded, it is manifest, from what is above stated (§ 5, 6), and from what has been advanced by the ablest histologists, that the diagnosis is by no means easy, even by the aid of the microscope. But I shall allow Dr. BENNETT to state the case in favour of this instrument.

101. "Symptoms alone, however, from their very nature, are apt to mislead, caused as they are by a variety of disorders which may affect an organ; while physical signs, once established and ascertained, are in conjunction with those of universal value. The only physical proof we can arrive at of the existence of cancer is by means of the microscope; not that this instrument is in itself capable, even in the most expert hands, of doing anything; but, conjoined with a knowledge of symptoms, progress of the case, form and appearance of the morbid growth, it offers us an additional and most valuable means of prosecuting our inquiries. It is from an union of these circumstances, combined with a minute examination of the growth, under such magnifying powers as will clearly display its cells and other primary elements, that we ought to found a diagnosis, and not from one or the other separately" (p. 222). It is evident, however, from the admissions of MÜLLER and others, and even from what has been stated by Professor BENNETT, that the microscopic history of morbid structures is only in its infancy; that there still remains much to be known respecting it; and that the connexions subsisting between vital power, vascular action, and morbid growths—connexions of the utmost importance to the physician, in a therapeutic point of view especially—have been generally overlooked; while there has been much difference in the information furnished by those who have professed themselves to be observers, gifted with the greatest powers of microscopic research.

102. *A. The diagnosis of cancer by means of the microscope*, as already stated (§ 100, 101), can seldom be determined until the disease has advanced so far as to become quite manifest without this aid. Dr. BENNETT remarks, that

wherever we see, in a morbid growth, cells including other cells, there can be no doubt of its cancerous nature; and that it is not by fixing attention on any one particular cell that we can discover a marked difference between it and a variety of others, but when grouped together we observe in different cells a variety in size and shape, some containing one nucleus, others two or three, and rarely more, and the nucleus containing one or two nucleoli. Such a group of cells is distinguished, 1st. From groups of epithelial-cells; 2d. From fibro-plastic cells; 3d. From pus and plastic cells; 4th. From compound granular cells; and, 5th. From fat-cells. The difference of the cancer-cells from cartilage-cells is also easily ascertained before softening, but after softening the diagnosis is more difficult; but even in this latter case, the action of water and acetic acid on the cells, and an examination of different sections of the growth, will assist the diagnosis. In all cases, the situation and characters of the tumours, and the concomitant circumstances and symptoms, should be taken into account. Open sores, the ulcers formed on the tongue, lips, or faces on the genitals and os uteri, furnish the best occasions for microscopic diagnosis during the life of the patient; and even in these situations many difficulties will often occur.\*

103. It is interesting to add what Professor WALSH has stated respecting this important matter. "A constant and unfailing microscopic characteristic of cancer has hitherto been vainly sought for; the following propositions will serve as a commentary on, and, in some sort, a justification of, the statement. (1.) Parent-cells, containing within them sub-cells having darker nuclei, and these, in turn, bright nucleoli, are strongly characteristic of cancer; but such cells are rare in, and may be altogether absent from, scirrhus; encephaloid, in some phases of its growth, may also be without them. (2.) The shapelessly caudate-cell seems significant of cancer; but it may be absent from encephaloid, and it is excessively rare in scirrhus and colloid. (3.) A tumour may present to the naked eye the characters of encephaloid, be the seat of interstitial hæmorrhage, affect the communicating lymphatic glands, run in all respects the course of cancer, and nevertheless contain no cells but such as are undistinguishable, in the present state of our knowledge, from common exudation-cells. (4.) Nay, more, while a primary "malignant" tumour alone contains these cells, the lymphatic glands secondarily affected may contain compound nucleated-cells, spherical and shapelessly caudate. (5.) The granular and imperfectly nucleated cell of scirrhus is valueless as an evidence of cancer. (6.) The true fusiform cell is an adventitious formation when it occurs in cancer, and has no diagnostic signification. (7.) The association of fibre and cell-structure, which will distinguish scirrhus from fibrous tumour, may be totally wanting in encephaloid, and it exists in sarcoma and enchondroma. (8.) If fat be associated

\* M. LEBERT states that the type of the cancer-cell is a small regular sphere with an elliptical nucleus, occupying about half of the interior of the cell, and containing one or more nucleoli, but that this type is not often pure; the cellular envelope takes the ovoid, triangular, heart, and caudate shape. In no other cell do we observe the uniformity of the cell-wall to the same degree. The nucleus is the constant element of the cancer-cell.]

in large quantity with fibre and cell-structure, the certainty that cancer is present becomes great, but not absolute.

104. "The property of infiltration, which serves well to distinguish cancer from other growths nosologically, fails practically in the distinction of tumours generally, because a true cancer is not necessarily infiltrated, and because tubercle and exudation-matter may be infiltrated. In ultimate analysis the single character least likely to deceive is this: if a tumour be cancerous, it will yield, on pressure, an opaque, whitish (milky or creamy-looking), albuminous fluid; if it be not cancerous, it will not yield a fluid of these qualities."—(*Cycl. of Anat. and Physiol.*, vol. iv., p. 137.)

105. *B. Fibro-nucleated tumours*, or growths, distinguished by the presence of fibres, among which are infiltrated naked nuclei, have hitherto been confounded with sarcomatous, encephalomatous, or osteo-medullary tumours. LEBERT considers this to be a peculiar form of fibro-plastic growth. Dr. BENNETT has observed but three or four instances of this tumour, and has viewed them as possessing marked peculiarities in structure, although presenting most of the appearances of those growths with which this has been confounded.

106. *C. Epithelial growths* generally commence in an induration or wart upon the skin or mucous surfaces, and are harder in the former than on the latter. Occasionally they appear as cauliform excrescences or condylomata, made up of elongated papillæ aggregated together, with their summits more or less flattened. In this condition their diagnosis is easy. Sometimes they soften externally sooner or later after their formation, and become covered with crusts of inspissated pus and epithelium. "This crust, on separation, leaves an ulcerated surface, presenting irregular clefts between the hypertrophied papillæ, the edge being everted, and the base and margin greatly indurated. The ulcer may slowly spread over a considerable portion of the surface, and cause great swelling of the lymphatic glands from the irritation produced. In this condition such ulcers are usually considered to be cancerous." But the progress of an ulcer commencing externally in warty excrescences, spreading laterally, slowly, and proceeding from without inward, is distinctly opposed to the progress of true cancer, which almost invariably is deep-seated at its commencement, produces ulceration consecutively by thinning of the integument, and throws out subsequently and rapidly fungoid masses. The progress of the case, the absence of cancer-cells, the microscopic appearance of the projecting papillæ, will establish the nature of the growth.

107. *D. Fibrous formations* cannot, at an early stage, be distinguished from scirrhus. Dr. BENNETT considers that at their commencement they are both identical, and remarks that experience is daily showing the truth of this statement; and that the distinctions between them insisted upon in surgical works are illusory. When a hard knot or induration follows a blow or injury, it may result from a simple exudation; but it may nevertheless become cancerous; although this conversion is much less likely to take place in a young than in a cachectic or aged person. When more ad-

vanced, fibrous tumours are distinguished by partial elasticity, smoothness, and regularity of surface, from the irregular nodosities and stony hardness of scirrhus, and the pulpy feel of encephaloma. But these symptoms are sometimes deceptive. So that at an advanced, as well as at an early stage, the diagnosis may be occasionally impossible. Dr. BENNETT advises a cautious use of the exploring needle and microscopic examination. When the latter can be obtained, the presence or absence of cancer-cells will decide the question. But the former, however cautiously employed, will often aggravate the local mischief, and prove of questionable utility as respects the results.

108. *E. Cartilaginous growths*, when occurring in the extremities connected with the bones, and surrounded by an osseous capsule, may readily be distinguished from cancer; but when they are deep-seated, covered by soft parts, and have no distinct bony capsule, their detection is very difficult. Enchondroma may thus be readily confounded with cancer of the bones, of which disease it presents all the general symptoms and signs; and, as already stated (§ 66, 67), if it be softened it is not easily separated from cancer by the aid of the microscope, even after excision. In doubtful cases, during life, a microscopic examination can be obtained only by means of the exploring needle, and even then it may be unsatisfactory. The progress of the growth is more distinctive, cancer of the bones being generally more rapid in its progress than enchondroma.

109. *F. Fatty Tumours*.—"Simple lipoma and most encysted fatty tumours are readily distinguished from cancer, the first by their lobulated, and the second by their rounded form, together with their doughy feeling and non-attachment to surrounding parts." A fatty growth may, however, assume all the symptoms and signs of encephaloma. SEDILLOR excised a fatty tumour from a man aged forty-seven. The growth returned twice after removal, and was excised the third time. It was considered to be encephaloid, from the local and constitutional symptoms and its return; and yet, on a microscopic examination, it was shown to consist only of adipose and filamentous tissue, and a chemical analysis proved it to be almost entirely composed of fat.

110. *G. Tubercular growths* can rarely be confounded with cancer. They simulate it only when the glands are enlarged in youth, and at an age when cancer scarcely ever attacks the frame, unless in the form of encephaloma or fungo-hæmatoid cancer. "Undoubtedly many of the so-called cases of cancer in the young are softened tubercle. The nature of the growth may be suspected from its cheesy consistence and absence of cancerous juice; while the differences between tubercle and cancer corpuscles under the microscope are so great as to be unmistakable. The only danger is confounding tubercle with the reticulum of cancer, which it closely resembles, and is a mistake that a critical examination of all the concomitant circumstances will alone enable us to avoid."—(BENNETT, *Op. cit.*, p. 229.)

111. VI. PROGNOSIS OF SCIRRHOUS AND OTHER GROWTHS.—i. *Of Scirrhus or Cancerous Formations*.—"Little may be added at this place to what I have stated when treating of CANCER



(§ 11, *et seq.*) and FUNGOID DISEASE (§ 17)—A. MÜLLER considers that *growths which are truly cancerous* when extirpated invariably return, and are inevitably fatal. Dr. WALSHE observes, that “cancer is not, as a matter of absolute necessity, a fatal disease; but the number of recoveries is relatively so small that, practically speaking, they are almost without numerical value, and may be excluded from considerations.” Professor BENNETT states, that he can no more agree with the modified statement of Dr. WALSHE than with the unqualified one of MÜLLER; and remarks, that the established recoveries may be small in number, but their numerical value is altogether unknown in the present state of science. He believes that a cancerous growth is for some time purely local; that indolent tumours exist in the female breast or elsewhere for years, without making progress, or causing much inconvenience, and after a certain time they often suddenly increase, and evince signs of malignancy; that a fibrous vascular tumour may exist, in the filamentous meshes of which a cancerous exudation may be afterward infiltrated, and that in this indolent state a tumour may often be discussed by suitable means, and, if excised, be permanently eradicated. These propositions may be conceded to Dr. BENNETT; they have been long received as practical doctrines, and long acted upon by both physicians and surgeons. Even when a growth has become undoubtedly cancerous, complete excision of it has been said to have been successful in a few instances; but still the actually cancerous nature of the tumour has not been satisfactorily established, for the histologists argue that it has not been determined by a sufficient microscopic examination. But even they admit, as stated above (§ 100, 101), that a microscopic investigation is not sufficient always to determine the fact; so that the imperfections which they impute to the infancy of the science may be admitted to belong to the nature of the subject—to the varying, ever-changing, and constitutional relations of these growths—to the alterations which take place in them under the influence of changes in the state of vital endowment and of vascular action, both of the growths themselves, and of the body in which they occur as parasitic or other productions. It is in vain to look for precise marks of demarkation, either in the diagnosis or in the prognosis, where none exists, and where every phase, grade, and form of morbid growth is observed, although in different cases; each of which phases and forms is continually undergoing farther changes, and assuming varying local and constitutional relations. The histologists, after all they have observed and written, leave the subject of prognosis, as well as that of diagnosis, pretty much in the state in which they found it; for one of the latest and best writers in this department has remarked, that “in the present state of our knowledge, there is no possibility of pronouncing accurately whether an operation will be successful or not”\* (p. 232).

\* [“Cancer,” says Dr. WARREN, “is not a specific disease. It has a variety of forms, of causes, and of habits of action. It is one thing in the tongue, another in the skin, another in the breast. There is nothing specific in it, unless we call its incurable disposition specific; but this it has in common with other disease. Besides, can-

112. ii. *The prognosis of morbid growths which are not cancerous* depends chiefly upon their situation and nature, and has reference to the probability of removing them by medical treatment, or by surgical means. The growth may appear in a situation which precludes an operation, or in which an operation or simpler mechanical means would be extremely dangerous, and where a recourse to medicine, in order to arrest its progress or to remove it altogether, should be tried or chiefly confided in, although the chances of success from it may appear small. Adipose or fatty tumours, tubercular growths, and glandular enlargements, admit of a more favourable prognosis than others, and furnish the greatest number of chances of their removal by medical treatment. Dr. BENNETT remarks, with reference to operations for the removal of tumours, that “it is now well understood that not only cancerous, but the most innocent growths may return after excision. It is generally supposed, however, that in all such cases the second growth originates in some germ which had been left in the part. Hence it is of great importance to separate a recurrence in the seat of the former tumour from that occurring in other places and textures. The former is not necessarily to be dreaded. Numerous instances are on record of fatty, fibrous, and encysted growths returning again and again, and finally extirpated with success.” Epithelial growths, also, occasionally return, but enchondroma, according to MÜLLER, does not. It should, however, be recollected that while truly cancerous growths generally return either in the same situation or elsewhere, non-cancerous tumours seldom return, even in the same situations, unless a portion be left behind, and when they return they appear not often in other parts. Warty and encysted growths may occur in several places; several fibrous tumours may exist in the body of the uterus; and neuroma may affect several nerves. Although cancer, after a time, extends itself to the lymphatic glands in the neighbourhood, the affection of these glands is not to be received as a proof either of the cancerous nature of the primary growth or of a fatal tendency of the malady; for a non-cancerous growth may cause, but much more rarely, enlargement of these glands, owing to the amount of local irritation produced by it. When, however, this affection of the glands occurs, it indicates, even in non-scirrhus tumours, a much more serious malady, than when no such glandular affection is observed.

113. VII. TREATMENT OF SCIRRHOUS AND OTHER TUMOURS.—i. *The treatment of scirrhus growths* I have considered fully in the article on CANCER (§ 27, *et seq.*); but there are a few topics which have been agitated since that was written, which require a brief notice at this place. The means which Dr. BENNETT advises for the “retardation and resolution” of cancer are *cold, dryness, pressure, and locality*; and these he views as the principal known measures by which we can hope to retard the pro-

ceed, though rarely cured, is not universally incurable. We see it disappear in various parts of the body without excision, though most rarely.”—*Surg. Observations on Tumours, &c.*, by JOHN C. WARREN, p. 351.]

duction and growth of cancer-cells. He remarks, that "a cancerous growth is a vascular structure, which consists of nucleated cells infiltrated among a fibrous stroma, and that its power of growth, extension, and redevelopment is dependent upon the amount of cells it contains. It follows, that to retard the growth of the cancer-cell when once formed, is to retard the advance of cancer itself, and that to render it unproductive is to arrest its progress." This view appears plausible at first sight, and the means proposed are to a certain extent appropriate to the pathological doctrine entertained; but it is questionable how far the doctrine is sound, and to what extent the means are beneficial. As to the former, if it be conceded that the formation of cancer-cells are the results of a low grade of vitality in the part—that cancer-cells, like hydatidic formations, are parasitic productions, proceeding from low grades of vital power and of vascular action, and, like all such productions, consequences of these states, the treatment here advised has reference merely to the morbid results, and has comparatively but little regard to the antecedent vital conditions, of which the cancer-cells can be viewed only as the products. In this instance, as in many others, the histologists would induce us to grapple with the morbid product, to the total disregard of the vital condition producing that product—to the entire neglect of those states of vital power and vascular action upon which all morbid growths depend, whether parasitic, hydatidic, cell-formations, or simple exudations.

114. Viewing, therefore, cancerous productions or growths as depending upon the causes, constitutional and local, which I have set forth in the article CANCER (§ 26)—entertaining the doctrine there stated, and knowing that it is supported by the ablest and most experienced writers and observers, as well as confirmed by my own experience, I firmly adhere to this doctrine, and to the *intentions of cure* set forth conformably with it in that article (§ 40, *et seq.*), believing that they are the best calculated to enable the constitution to resist the inroads of the malady, to prolong life, and to give the patient a chance of throwing off, or resolving the local evil. The measures which have more recently been advised should not, however, be passed over without notice, although but little evidence of benefit from them has hitherto been obtained. Dr. BENNETT observes, that "all eggs and young animals require warmth to favour their growth, and maturity is reached earlier in the tropics than in temperate regions. In the same manner, excessive cold, dryness, want of room, and unfavourable position are circumstances hostile to cell-development; but it requires no lengthy argument to prove the great influence of these agents on vital growth." Without disregarding this view of the subject, I would still insist upon the importance of the principle for which I have contended, both in the article CANCER (§ 26) and in that in HYDATIDS (§ 24), that these and all other parasitic formations increase and multiply in proportion as the parent animal becomes weakened, and as the secretions and excretions accumulate, and that those formations are most disposed to diminish and ultimately to disappear, with the full restoration of the vital power, and with the

healthy nutrition of the animal which produced them.

115. *A. Cold.*—Dr. BENNETT remarks respecting this agent, that "in a cancerous growth, the tendency of which is to excessive cell-formation, we evidently retard its advancement by the application of cold. Were it possible, indeed, to bring down the temperature of an entire growth below the vegetating point, we must inevitably kill it; but, supplied as it is with heat through the warm blood within, this is impracticable. Still, the external application of cold is one of the most powerful means we possess of retarding the progress of a cancerous or any other kind of growth." The beneficial agency of cold has, however, to be proved. If it be employed so as to promote and develop organic nervous energy and vital power, there can be no doubt of its proving more or less useful.

116. *B. Dryness.*—It has been supposed that, as the development of cell-formations depends upon a blastema or nourishing fluid, it follows that, if this were cut off, the growth would die. In order to accomplish this intention, it would be necessary to tie the principal vessels nourishing the growth. This has been done by MAGENDIE, JOBERT, and HOSACK, with partial success in some instances, and with complete success in others; but it is doubtful whether or no the disease was cancerous in all the cases. Dr. HOSACK applied a ligature on the carotid artery in two cases of scirrhus of the parotid gland. In one case the growth of the tumour was arrested, and the suffering of the patient relieved; in the other a complete cure was produced. Lotions and humid applications should be avoided, and those which produce a drying or absorbent, with an astringent, action ought to be preferred.

117. *C. Pressure* was first advised by YOUNG, and has since been adopted for the cure of CANCER (see § 37) by several writers. Pressure acts, 1st, by diminishing the supply of fluids to the morbid growths; 2d, by preventing the expansion and development of the cancer-cells; and, 3d, by promoting the disintegration and absorption of the morbid growth. Dr. BENNETT remarks, that "pressure applied externally to so-called cancerous tumours has been pretty extensively tried, and been found successful, sometimes in retarding, and at others in altogether removing them." TRAVERS has seen cases of this kind; and RECAMIER gives the following results of the practice tried in 100 cases. He says, of these, "sixteen appeared to be incurable, and underwent only a palliative treatment; thirty were completely cured by compression alone; and twenty-one derived considerable benefit from it; fifteen were radically cured by extirpation alone, or chiefly by extirpation and pressure combined; and six by compression and cauterization. In the thirteen remaining cases the disease resisted all the means employed." Dr. WALSH states, that Dr. A. R. J. BAYLE, out of 127 recorded cases, gives 71 cured, 26 improved, and 30 unaffected. These results are certainly much more favourable than could have been obtained from the treatment of the several kinds of scirrho-cancer; and I would therefore infer, either that the favourable results have been prematurely reported, or that cases actu-



ally not cancerous have been confounded with the cancerous.

118. Dr. NEIL ARNOTT has greatly facilitated the employment of pressure by the invention of an instrument for this purpose, and which has been described by Dr. WALSHE. It consists of a spring, an air-cushion, supported by a flat resisting frame or shield, a pad, and two belts. It does not interfere with the movements of the thorax, and the amount of pressure can be nicely regulated and equably applied; causing great relief from pain, and restraining hemorrhage in ulcerated cases. It has been proved useful in cases in which I have seen it resorted to. Dr. BENNETT remarks, that, if pressure alone be capable of producing such good results, its conjunction with one or more of the other means capable of retarding growth may be attended by even greater utility; and ~~thus~~ the apparatus invented by Dr. J. ARNOTT, by means of which pressure may be combined with external cold and dryness, is directly indicated, and deserves to be tried; or his apparatus, applied when the patient is at rest, may be alternated with that of Dr. NEIL ARNOTT, when exercise is desirable. I believe, however, that pressure will be found most efficacious when conjoined with those measures which are the best calculated to improve the general health, and to enable the vital power to throw off the parasitic formation. (*Sec art. CANCER*, § 40, *et seq.*)

119. *D. Locality* has been shown, in the article CANCER, to have considerable influence in favouring the development of this malady. Cold, humid, and malarious situations, unwholesome food, insufficient nourishment, and mental anxieties and depression, are among the most influential causes of scirrhus-cancer. Therefore a choice of locality, and, with reference to season, prevailing winds, and exposure, should be made with due care; a dry, moderately warm, and bracing situation and air, being selected. A clay soil, or a low alluvial, wet, and swampy soil should be avoided, even to a considerable distance; and food, exercise, and the regimen of both the body and mind, should be such as are most calculated to give due tone to the former, to refresh and agreeably engage the latter; interesting occupations being calculated to promote both intentions, while the want of occupation leaves the patient a prey to ennui and to his own depressing anticipations, or his still more lowering fears.

120. *E. Excision.*—The propriety of excising tumours, from a belief in their cancerous nature, or dread of their assuming this nature, or as the best mode of removing them, has been much discussed by both physicians and surgeons, especially in recent times. It may have been supposed that the discoveries of the histologists would have gone far to determine the question of excision, in as far as the nature of the growth may be concerned. But they have left the matter pretty much in the same state as that in which they found it. Professor BENNETT, after alluding to the discussion on this subject, and the differences of opinion expressed by the most eminent surgeons of Paris, remarks, that “a knowledge of the structure and natural progress of cancerous and canceroid growths must in future exempt sur-

geons from the doubt and difficulty they formerly experienced. At the same time, it cannot be denied that considerable obscurity still hangs over our knowledge of the pathology of cancer, and that there are no means of diagnosing a cancerous from fibrous and other forms of canceroid growth at their commencement. It seems to me certain that a cancerous may supervene upon a canceroid growth, and that both for a time may be local, so that, under all circumstances, where the nature of the tumour is doubtful, after means of retardation and resolution have had a fair trial, excision should be at once had recourse to. As there is no possibility at early period of knowing whether the growth may or may not ultimately become cancerous, prudence demands that *as soon as it becomes evident that these means have failed to arrest its progress*, an operation should be performed. If early excision were more practiced, many of the lamentable cases which occur would never appear.”—(*Op. cit.*, p. 242.) This is sound advice; and the same eminent physician farther remarks: “The practical rule, then, which pathology and experience unite in causing us to adopt, seems to be this, *that so long as cancer remains fixed in a part which is capable of being removed, and the strength of the patient is not too much reduced, so long is the surgeon warranted to interfere.* If this applies to cancerous, it does with ten-fold force to canceroid growths, which, everything that we know warrants us in asserting, are much less fatal and malignant.”—(*Op. cit.*, p. 245.)

121. *F. Chemical Applications, &c.*—The destruction of morbid growths by various cauterizing or dissolving applications can scarcely be accomplished, unless at very early periods of their production; and, as regards cancerous formations, these applications would increase rather than arrest the disease. Dr. BENNETT remarks, that “Acetic acid dissolves the cell-wall more or less, and strong potash reduces the whole to a granular mass. The continued application of these agents, therefore, would tend to dissolve if brought in direct contact with the cells, and need not necessarily excite such irritation as to cause fresh exudation. The only objection is, the utter impossibility of affecting the whole mass, even in cases of ulceration, and preventing the formation of deep-seated cells, while the superficial ones are destroyed. In certain canceroid growths, especially epithelial ones, the application of acetic acid is an established remedy, and should always be tried when it is thought possible to bring the fluid successively in contact with the entire mass of the disease” (p. 250). The external application of the chloride of zinc has been advised, and of iodine, and of several of its preparations. Probably the application of an iodide of zinc may deserve a trial.

122. *G. Internal Remedies.*—Before excision is attempted, and often contemporaneously with a judicious recourse to external means, several internal remedies, either singly or variously conjoined, may be tried, more especially those which tend to promote the digestive, assimilative, and depurative functions, and to develop the powers of life. As respects cancerous growths, this principle of treatment has been fully insisted on (*sec arts. CANCER*, § 40, and FUNGOID DISEASE, § 21); it therefore only

remains briefly to notice the importance of adopting it in our attempts to remove other morbid growths, especially before the constitution is subjected to the shock of an operation; and in cases where the situation of a tumour or other circumstances may render the success of an operation either extremely improbable or impossible. In three cases of large tumours—one seated superficially, evidently a fatty tumour, and about the size of a person's head, the others seated very deeply among the muscles of the upper half of the thigh—and in one case of tumour, apparently attached to the pericranium, a course of internal medicines entirely removed the disease. I had advised a recourse to surgical aid, but the patients having been desirous of trying medical treatment before any surgical means were adopted, a course of the medicines about to be mentioned was prescribed, very nearly the same substances having been employed for the four cases. Those cases occurred some years ago; but the persons who were the subjects of them had not, up to recent periods, experienced a return of these growths. The medicines which were prescribed consisted chiefly of the iodide of potassium, conjoined with solution of potash, the decoction or compound tincture of cinchona, the internal use of tar-water, and the fluid extract or other preparations of sarsaparilla, with due attention to diet and to exercise in the open air. When treating of CANCER (§ 34-41), the propriety of prescribing the preparations of iron was insisted upon, especially in such combinations as the peculiarities of the case would suggest; and the *iodide of iron* was then for the first time recommended in the treatment of cancerous diseases. This medicine has frequently been given by me in these maladies with sarsaparilla, or dissolved in the sirup of sarza, with more or less benefit; and the *nitro-hydrochloric acids* have been sometimes prescribed with vegetable tonics or bitter infusions. Considerable advantage has been derived, in several cases, from the use of inspissated *ox-gall*, as recommended in the first part of this work, and prescribed in numerous and varied formulæ in the APPENDIX which accompanied that part, more especially in correcting and promoting the functions of the digestive canal. *Conium*, and other narcotics formerly much praised for cancerous maladies, have rarely proved of advantage beyond the temporary relief to pain, or to other urgent symptoms they have sometimes afforded.

123. *H. Diet and Regimen.*—These require to be adapted to the temperament, diathesis, habit of body, and other circumstances of the patient, as well as to the presumed nature of the tumour. When treating of CANCER (§ 44), I mentioned the advantages generally derived from attention to the secretions and excretions, and from promotion of the primary and secondary assimilating processes. There can be no doubt of the good effects of moderate exercise in the open air, of a residence in a mild, dry atmosphere, and of pleasant occupations, with a cheerful state of mind. But the nature of the food admits of much more discussion. In the cancerous or scirrhus forms of morbid growth, the adoption of a farinaceous and vegetable diet has been advised by Dr. LAMBE and a few others. I have seen this diet most bene-

ficial in a case which was considered cancerous disease of the os and cervix uteri; but the patient enjoyed at the same time the advantages of removal to a good air, and her sanguine temperament and full habit of body favoured the change of diet. When, however, the patient is of the melancholic, lymphatic, or nervous temperature, or if anæmia or a cachectic habit of body be manifest, I believe that a judicious combination of animal with vegetable food, and the promotion of the assimilating and excreting functions, are most beneficial. In all cases of a malignant or contaminating nature, and in all cases which are likely to assume this nature, the chief indication of treatment is to enable the vital energy, by the aid of diet, air, and exercise, to resist the extension of the local evil, and to favour its transformation or resolution.

[According to WENDT, HELM, and others, the preparations of gold have been found very useful in scirrhus induration of the tongue. The usual form of administration is to rub them on the tongue. A case of scirrhus of the pylorus is related by H. HOFFMAN, in which the chloride of gold effected a perfect cure; and frictions of the chloride, as well as the oxide, on the labia pudendi, in cases of cancer of the uterus, have been recommended by HUFELAND, HERRMANN, MEISNER, GROTZNER, GOZZI, and others. KRIMER advises that they be applied to the os uteri. According to German writers, scirrhusities have frequently been dispersed through their agency, and even in open cancer marked improvement has been perceptible.

Dr. A. T. THOMSON has described a case of *scirrhus mamma*, which, after protracted and fruitless treatment by other agents, as other preparations of iron, with conium, ultimately was cured by a combination of *iodide of iron and conium*.

The *Calendula officinalis*, garden marigold, has considerable reputation in Germany for the cure of scirrhus and cancer. WESTRING, a Swedish physician, called attention to it in 1817, having found it very useful in cancer of the breast and uterus. He used a decoction of it internally, and also applied the fresh plant to the part affected, when practicable, and it was found to allay the burning pain. RUDOLPH afterward used it with much benefit, in a case of induration of the mamma, in a young female, applying the acetate of iron in solution, at the same time, externally. FEHR also found it useful both in incipient and advanced scirrhus. STEIN praises it highly in cancer of the integuments, using an ointment made of the expressed juice of the young plant and flowers, with fresh butter, giving at the same time a decoction of the plant internally. The salve causes considerable pain at first, but in a little time the ichorous discharge is improved, the offensive odour corrected, and in from fourteen to twenty-one days the ulcer is converted into one of a benign and readily cicatrizable character.

*Iodine* is highly recommended in scirrhus of the uterus, mammæ, &c., by HEIM, KLAPROTH, HENNEMANN, ULLMANN, HILL, MAGENDIE, WAGNER, ZIMMERMANN, and many other physicians, applying it in the form of the compound ointment to the part affected, and also giving it internally. MAGENDIE extols it in *cancer of the*



*tongue*, JAHN in incipient scirrhus of the stomach, while Dr. J. K. MITCHELL, of Philadelphia, has found the iodide of potassium afford very marked relief in a scirrhus tumour of the neck. — (*Medical Examiner*, 1846.) I have seen, also, decided benefit from the use of different preparations of iodine, particularly the *iodide of iron*, used both externally and internally, but I cannot say that I have witnessed any perfect cures from their employment.

The preparations of *platinum* have been recommended by DUTTENHOFER, PREVOST, and others, in different forms of cancer and scirrhus, but I have not seen them employed, nor is there sufficient evidence in their favour to recommend them to our notice. I have more confidence in attention to the loss of health, as connected with proper food, exercise, pure air, suitable clothing, freedom from anxiety, &c., than in all the drugs of the Pharmacopœia. The late Dr. TWITCHELL, of New Hampshire, was cured of a cancer of the face by an exclusive *bread and milk* diet; and since his case was published in the journals, I have known several others in which the disease was arrested by the same diet and regimen, without the use of any remedies whatever.

There can be no doubt that early excision is in all cases advisable, where practicable, great care being taken to remove every portion of the scirrhus part. If this be done, they are not likely to return unless there be a strong hereditary tendency to the disease; in this case, however, excision is advisable, inasmuch as it tends to protract life, if it does not save the patient. There is danger that too much reliance be placed on the means of retardation and resolution, mentioned by our author, to the neglect of the more important and radical treatment. But we are not to forget that cancer, like scrofula, is often a constitutional disease, and that if there be any remedy for it, it must be found in agents which influence the intimate structure of the body more generally and intimately than any medicinal substance can do, as proper diet, a healthy state of the excretory apparatus, a pure atmosphere, and exercise of the muscular system, suited to the constitution of the patient.]

BIBLIOG. AND REFER.—*Galenus*, De Tumoribus præter Naturam, Op. t. iii. — *Avicenna*, Canon, L. iv., Fen. iii., Tr. 2, c. iv. — *Ruffi*, De Tumoribus Phlegmaticis non Naturalibus, 4to. Tigur, 1556. — *J. P. Ingrassias*, De Tumoribus præter Naturam, Neap., 1553; in *Haller's Biblioth.* Med. Pract., vol. ii., p. 69. — *D. Leonus*, Methodus Medendi Tumores præter Naturam, 8vo. Bonon., 1562. — *Lami*, Ergo Molles Tumores boni. Paris, 1571. — *A. Read*, Chirurgical Lectures on Tumours and Ulcers, &c., 4to. Lond., 1635. — *F. Thevenin*, Œuvres contenant un Traité des Tumeurs, 4to. Paris, 1658. — *E. Rudius*, De Tumoribus præter Naturam, 4to. Venet., 1600. — *F. Blondel*, Epistola de Cura Carcinomatidis, absque Ferro vel Igne, 4to. Paris, 1666. — *Brown*, Of Preternatural Tumours, &c., 8vo. Lond., 1678. — *Wiseman*, Chirurgical Tracts, &c., fol. Lond., 1676. — *J. A. Helvétius*, Lettre sur la Nature et la Guérison du Cancer, 4to. Paris, 1691. — *Galloys*, In Mém. avant 1699. (*Common salt dissolved in urine and honey to tumours*). — *G. Deshayes*, Sur la Nature et la Guérison des Cancérs, 12mo. Paris, 1701. — *Mauvel*, Traité des Tumeurs et des Obstructions. Paris, 1702. — *W. Beckett*, New Discoveries relating to the Cure of Cancer, wherein a Method of Dissolving Cancerous Substance is recommended, 8vo. Lond., 1711. — *Deidier*, Traité de Tumeurs contre Nature, 12mo. Paris, 1738. — *A. Louis*, Observat. sur les Effets du Virus Cancéreux, &c., 12mo. Paris, 1747. — *Roy*, Traité des Tumeurs enkistées, 8vo. Brux., 1752. — *W. Norford*, Essay on the General Method of treating Cancerous Tumours, 12mo. Lond., 1753. — *W. Ogle*, Letter to Dr. Young concerning the Cure of encysted and other kinds of Tumours without the knife, 8vo. Lond., 1754. (*A secret applica-*

*tion*). — *C. Parry*, Mechanical Account of the Hysteric Passion, &c., with an Appendix on Cancer, 8vo. Lond., 1755. — *J. Astruc*, Traité des Tumeurs et des Ulcères, &c., 12mo. Paris, 1759. — *J. P. Berchermann*, Abhandlung vom Krebs, 8vo. Frank., 1756. — *R. Guy*, An Essay on Scirrhus Tumours, &c., 8vo. Lond., 1759. — *A. Sörck*, Libellus Primus, Secundus, et Supplementum de Cicuta, 8vo. Lond., 1760. — *J. Andree*, Observat. upon a Treatise on the Virtues of Hemlock in the Cure of Cancers, by Dr. Storck, 8vo. Lond., 1761. — *R. Guy*, Practical Observations on Cancers, &c., 8vo. Lond., 1762. — *A. Storck*, A Necessary Supplement to the former Essays on the Virtues of Hemlock, 8vo. Lond., 1762. — *A. Storck*, A Second Essay on the Medicinal Virtues of Hemlock, 8vo. Lond., 1762. — *L. Rouppé*, De Morbis Navigantium Liber, accedit Observatio de Effectu Extracti Cicutæ in Cancro, 8vo. Lugd. Bat., 1764. — *R. Guy*, Answer to Falsehoods respecting his Method of curing Cancers without Cutting, 8vo. Lond., 1765. — *H. Boerhaave*, Abhandlung vom Krebs und Krankheiten der Knochen, 8vo. Frankf., 1765. — *J. Burrows*, Practical Essay on Cancers, 8vo. Lond., 1767. — *J. M. Gamet*, Théorie Nouvelle sur les Maladies Cancéreuses, &c. (2 vols.), 8vo. Paris, 1772. — *J. J. Plenck*, Novum Systema Tumorum. Vien., 1767. — *J. Hill*, Plain and useful Directions for those who are affected with Cancers, 8vo. Lond., 1773. — *J. Le Petit*, Traité des Mal. Chirurg., &c., t. i.-iii., 8vo. Paris, 1774. — *P. Peyrilhe*, Dissertatio de Cancro, quam Duplice Præmio Donavit Academia Lugdunensis, 12mo. Paris, 1774. — *Bang*, In Act. Soc. Med. Havn., t. i., p. 88. — *G. Merula*, Riflessioni sulla Natura, Cagione, e Cura dei Cancro, 8vo. Firenze, 1775. — *Borie*, Ergo Tumores Ferro, potius quam Cauterio potentiali delendi. Paris, 1772. — *W. Rowley*, Select Cases in Scirrhus, Cancer, &c., 8vo. Lond., 1779. — *J. O. Justamond*, An Account of the Methods pursued in the Treatment of Cancerous and Scirrhus Disorders, 8vo. Lond., 1780. — *Lombard*, Dissert. sur l'Utilité des Evacuons dans le Cure des Tumeurs, 8vo. Strasb., 1783. — *G. Douman*, On the Nature, Causes, and Signs of a Scirrhus, &c., 8vo. Lond., 1784. — *H. B. Fearon*, A Treatise on Cancer, &c., 8vo. Lond., 1784. — *J. H. Jänisch*, Von Krebs und dessen Heilart, 8vo. Leipz., 1784. — *C. A. Nicolai*, Abhandlungen über Entzündung und Eiterung, Brand, Scirrhus und Krebs (2 vols.), 8vo. Jena, 1786. — *G. Bell*, Thoughts on the Cancer of the Breast, 8vo. Lond., 1788. — *A. Crawford*, Experiments and Observations on the Matter of Cancer, 8vo. Lond., 1790. — *R. Hamilton*, Observations on Scrofulous Affections, with Remarks on Scirrhus, &c., 8vo. Lond., 1791. — *J. Howard*, A Plan for the relief of Persons afflicted with Cancer, 8vo. Lond., 1792. — *J. Pearson*, Practical Observations on Cancerous Complaints, &c., 8vo. Lond., 1793. — *J. Adams*, Observations on Morbid Poisons, Phagedæna, and Cancer, &c., 8vo. Lond., 1795. — *Turnbull*, In Memoirs of Med. Soc. of Lond., vol. iii., art. 2. (*Recommends Electricity for*). — *J. Adams*, Observations on the Cancerous Breast, &c., 8vo. Lond., 1801. — *E. Kentish*, Cases of Cancer, with Observations on the Use of Carbonate of Lime, 8vo. Newcastle, 1802. — *W. C. Busk*, Observations on the Cause and Formation of Cancers, 8vo. Bath, 1804. — *J. North*, Observations on the Treatment of Scirrhus Tumours and Cancers of the Breast, 8vo. Lond., 1804. — *J. Abernethy*, Surgical Observations, containing a Classification of Tumours, 8vo. Lond., 1804; 4th edit., 1827. — *E. Home*, Observations on Cancer, with Histories of that Disease, 8vo. Lond., 1805. — *W. Thomas*, Commentaries on the Treatment of Scirrhi and Cancer, 8vo. Lond., 1805. — *Löffler*, In *Hufeland*, Journ. der Pract. Heilk., b. xvi., et. 4, p. 40. (*Issues and Setons for Tumours*). — *S. Young*, Inquiry into the Nature, &c., of Cancer, 8vo. Lond., 1805. — *R. Carmichael*, An Essay on the Effects of Carbonate of Iron upon Cancer, &c., 8vo. Lond., 1806. — *W. Lambe*, Reports of the Effects of a peculiar Regimen on Scirrhus Tumours and Cancerous Ulcers, 8vo. Lond., 1809. — *T. Denman*, Observations on the Cure of Cancer, 8vo. Lond., 1810. — *C. T. Johnson*, A Practical Essay on Cancer, 8vo. Lond., 1810. — *R. Stocker*, Observations on the Cure of Cancer, 8vo. Lond., 1810. — *J. Howard*, Practical Observations on Cancer, 8vo. Lond., 1811. — *Bayle and Cayol*, Dict. des Sc. Méd. (art. *Cancer*), t. iii. Paris, 1812. — *G. L. Bayle*, Vues Théoriques et Pratiques sur le Cancer, 8vo. Paris, 1812. — *J. L. M. Robert*, L'Art de Prévenir le Cancer au Sein chez les Femmes, &c., 8vo. Paris, 1812. — *W. Lambe*, Additional Reports on the Effects of a Peculiar Regimen in cases of Cancer, &c., 8vo. Lond., 1815. — *J. Rodman*, A Practical Explanation of Cancer in the Breast, &c., 8vo. Lond., 1815. — *C. Wenzel*, Ueber die Induration und das Geschwür in indurirten Theilen, 8vo. Mainz, 1815. — *C. Boyen*, Cancer considéré comme Maladie du système nerveux, 8vo. Paris, 1816. — *S. Young*, Minutes of Cases of Cancer, &c., 8vo. Lond., 1816. — *E. T. A. Baumann*, Ueber den Krebs, &c., 8vo. Leipz., 1817. — *F. J. L. Rouzel*, Recherches et Observations sur le Cancer, 8vo. Paris, 1818. — *S. Young*, Farther Reports of Cases of Cancer treated by the New Mode of Pressure, 8vo. Lond., 1818. — *F. J.*

*Beyenle*, Ueber den Krebs der Gebärmutter, 8vo. Maunk., 1819.—*Ferminelli*, *Giamballi*, Sulla Natura ed i Remedii de' Carcinomi, 8vo. Terni, 1820.—*E. G. Pariz*, Traité sur le Cancer de la Matrice, &c., 8vo. Paris, 1830.—*A. Scarpa*, Sullo Scirrho e sul Cancro, 8vo. Milan, 1821.—*C. Bell*, On the Varieties of the Diseases comprehended under the Name of Carcinoma (Med. Chir. Trans. xii.), 8vo. Lond., 1822.—*Breschel* and *Ferrus*, Dict. de Méd. (art. Cancer), t. iv.—Paris, 1832.—*Vorstmann*, Verhandeling over de Kanker, 8vo. Utrecht, 1824.—*W. Farr*, A Treatise explanatory of a Method whereby Occult Cancers may be cured, 8vo. Lond., 1825.—*R. Pruss*, Recherches Nouvelles sur la Nature et le Traitement du Cancer de l'Estomac, 8vo. Paris, 1828.—*Gouvert*, Archives Génér. de Méd., t. xvi., p. 282. (For Scirrhus Tumours, Pills of Ammoniacum, Conium, Aconitum, Pilula Rufi, et Supo Castil.)—*A. Cooper*, Illustrations of Diseases of the Breast, 4to. Lond., 1829.—*J. Cruveilhier*, Anatomie Pathologique du Corps Humain (liv. 4, 8), fol. Paris, 1829.—*J. A. Recamier*, Recherches sur le Traitement du Cancer par la Compression (2 vols.), 8vo. Paris, 1829.—*Begin*, Dict. de Méd. Prat. (art. Cancer), t. iv. Paris, 1830.—*E. Home*, A Short Tract on the Formation of Tumours and the Peculiarities of those become Cancerous, 8vo. Lond., 1830.—*Ullmann*, Encyc. Wörterb. (art. Cancer), b. vi. Berlin, 1831.—*Ure*, In Lancet, No. 663, p. 252. (Applicat. of Chloride of Zinc.)—Medical Gazette, No. 442, p. 287.—*Carusell*, Cyc. of Pract. Med. (art. Scirrhus), vol. iii. Lond., 1834.—And Illustration of the Elementary Forms of Disease. Lond., folio; t. xii., 1833-1837; t. iii., et pluries.—*T. Battaye*, Cancer extirpated without the Knife, 8vo. Lond., 1838.—*J. Warren*, Surgical Observations on Tumours, 8vo. 1838.—*J. Müller*, Ueber den feineren Bau der Geschwülste, &c. Berlin, 1838.—*Paget*, In Lond. Med. Gaz., vol. xxi., p. 287.—*J. Cruveilhier*, Anat. Path., &c. Livr. xxvi., pl. 3.—*Jobert*, Brit. and Foreign Med. Review, vol. ix., p. 260.—*Gluge*, Anatomisch-physiologische Untersuchungen zur Pathologie, b. i., 1838, p. 134; b. ii., 1841, p. 137, 190.—*Valentin*, Repertorium, &c., t. ii., p. 116, 275, et pluries.—*Goodsir*, Edin. Med. and Surg. Journ., vol. lv. 1841.—*A. Bérard*, Diagnostic Différentiel des Tumeurs du Sein, 8vo. Paris, 1842.—*L. Mandl*, Manuel d'Anatomie Générale appliquée à la Physiologie et à la Pathologie, &c. Paris, 1843, pluries.—*Andral*, Hématologie Pathologique, 8vo. Paris, 1843, p. 163.—*Vogel*, Icones Histologie Pathologicae. Lips., fol., 1843.—*Henlé*, Anatomie Générale, 8vo. Paris, 1843, t. i., p. 236.—*J. Müller*, Treatise on the Structure of Cancer and other Morbid Growths, translated by Dr. West, 8vo. Lond., 1840.—*Henlé*, Zeitschrift für rationelle Medicin., 1844, p. 190.—*Nasse*, Zur Analysis und Synthesis der Pseudo-plastischen Prozesse. 1844.—*H. Lebert*, Physiologie Pathologique ou Recherches Cliniques, Experimentales, et Microscopiques sur l'Inflammation, la Tuberculation, les Tumeurs, la Formation du Cal, &c. Accomp. d'un Atlas, &c. Deux Tomes, 8vo. Paris, 1845, vol. ii., Tumours, &c.—*Heller*, Archiv. für Physiolog. u. Pathol. Chemie u. Mikroskopie, b. i. 1846.—*G. Macilwain*, On Tumours, their General Nature and Treatment, 8vo. Lond., 1845.—*W. Walshe*, On the Nature and Treatment of Cancer, 8vo. Lond., 1846.—*Bruch*, Die Diagnose der Eosartigen Geschwülste, 1847, p. 287.—*Vogel*, Pathological Anatomy of the Human Body, transl. by Dr. Day, 8vo. Lond., 1847, pluries.—*C. Sedillot*, Recherches sur le Cancer, 8vo. Paris, 1846.—*Reinhardt*, In Archiv für Pathologische Anatomie und Physiologie, &c., b. i., p. 20.—*Virchow*, In ibid., b. i., p. 112-142.—*J. Hughes Bennett*, In Monthly Journ. of Med. Science. Sept., 1847.—On Cancerous and Canceroid Growths, &c., with numerous illustrations, 8vo. 1849. (An original and very able Work on the Microscopic Appearances of Morbid Growths.) (See also, BIBLIOG. AND REFER. to art. CANCER.)

[AM. BIBLIOG. AND REFER.—*Anson Smith*, in Medical Repository, vol. xiii., p. 246.—*W. Morrill*, Cancerous Ulceration of the Oesophagus, Am. Journ. Med. Sci., vol. xliii.—*Leonard Peirce*, Case of Cancer, Am. Journ. Med. Sci., vol. iv.—*M. Spalding*, Case of Scirrhus Testicle, Mass. Med. Transactions.—*Charles Knowlton*, Scirrhus of the Pancreas, Boston Med. and Surg. Journ., vol. xxix.—*M. Spalding*, Case of Scirrhus Testis cured by Electricity, Trans. Mass. Med. Soc., vol. ii. 1808.—*J. C. Warren*, Surgical Observations on Tumours, 16 plates, 8vo.

See AM. BIBL. to art. CANCER.]

## SCROFULA AND TUBERCLES.—SYNON.

—*Struma*, Celsus, Pliny, Linnæus, Good.  
*Scrophula* (from *Scropha* or *Serofa*, a pig or sow), Sauvages, Vogel, Sagar, Cullen, Macbride, Darwin, Young. *Xoupâs*, Hippocrates.  
*Scrophula*, Pinel. *Scrophulosis*, *Scrophulosus* Morbus, Vitium *Scrophulosum*, Dunglison. *Cachexia Scrophulosa*, *Adenosis Scrophulosa*; *Glandes*, *Strumæ*, *Ecrouelles* (Cruels, Scotticé),

Fr. Kropf, Skropheln, Skrofelkrankheit, Germ. *Serofula*, *Serofole*. Ital. *Scrofola*, the King's Evil, the Evil. External *Scrofola* or *Struma*.  
**TUBERCLES.**—*Tuberculum* (from tuber, a tumour); *Tuberculosis*, *Morbus tuberculosus*, *Strumosis*; *Cachexia tuberculosa*, *Dyscrasia tuberculosa*; *Diathesis seu Constitutio Strumosa*; *Tubercular* or *tuberculous Cachexy*, *Diathesis*, or *Vice*, &c.; *Internal Scrofola* or *Struma*.

CLASSIF.—3d Class, Cachectic Diseases. 3d Order, Impetiginous Affections (*Cullen*). 3d Class, Diseases of the Sanguineous Function. 4th Order, Cachexies (Good).—CLASS IV., ORDER I. (Author in Preface).

1. DEFINIT.—*Constitutional asthenia*; a weak or an atonic development of the frame, with a flabby state of the soft solids and predominance of cellular and lymphatic conformation; and a disposition to, or the presence of, swellings of the lymphatic glands, of disorder of the mucous surfaces, and of deposits, in various organs or parts, of small masses, varying in size, consisting of a firm, friable, inelastic substance resembling cheese, and denominated tubercles.

2. From the synonyms enumerated above, it may be inferred that the terms *Scrophulous diathesis*, or *cachexy*, or *vice*; *Strumous taint* or *constitution*; *Tuberculous cachexy* or *evil*, *Tuberculosis*, *Serofulosis*, may be considered as nearly synonymous, although the scrophulous taint or cachexy may be viewed as sometimes existing without the tubercular deposit being yet formed, this deposit, in some one or more of its numerous seats or manifestations, being the common structural change resulting from this taint—resulting so generally as to render it doubtful whether or not this taint ever exists without the tubercular formation being present in some situation or other, either in a developed or in a rudimental and latent form. *Scrophulosis* and *Tuberculosis* will, therefore, be considered by me as nearly synonymous—as very nearly allied, if not identical morbid conditions; the former, however, being more frequently applied to the external manifestations of the constitutional taint or diathesis, the latter more generally to the internal structural changes. I am aware that this opinion is different from that supported by SCHÖNLEIN, SCHARLAN, DR. EVANS, MR. PHILLIPS, and M. LEGRAND; but I believe that their doctrine will, in this respect, be considered incorrect, after the consideration which will be given to it in the sequel. In discussing the subject of *Scrofola* and *Tubercles*, I shall follow this arrangement:

3. i. Of the *Scrophulous diathesis* or *taint*—Latent or inactive *Scrofola*; ii. The Causes of *Scrofola* and *Tubercles*; iii. The Structure and Composition of *Tubercles*; iv. The Pathology of developed, open, or manifest *Scrofola* and *Tuberculosis*; v. The Pathogenesis of *Tubercles*; vi. The Comparative Pathology of *Tubercle*; vii. The *Scrophulous Taint* as predisposing to, and influencing the Symptoms, Course, and Terminations of various diseases; viii. Diseases attack the *Scrophulous* diathesis, without being essentially scrophulous or tubercular, although more or less nearly allied to *Scrofola*; ix. The associated alterations and complications of *Scrofola* and *Tuberculosis*; x. The prevention of *Scrofola* and *Tubercles*; xi. The Treatment of *Serofola* and *Tubercles*.



4. I. INDICATIONS OF THE SCROFULOUS DIATHESIS OR TAINT.—The *strumous* or *scrofulous taint* was no farther recognized by the ancients than in connexion with swollen external or lymphatic glands, the constitutional vice being overlooked until the writings of FERNEL, PLATER, BAILLOU, and others directed attention to a more correct pathology of the disease. More recently, numerous writers have furnished interesting information respecting strumous affections, especially HOFFMAN, HUBER, VAN SWIETEN, LALOUETTE, HUFELAND, and HECKER; and, in the present day, the writings of CARSWELL, GLOVER, PHILLIPS, BENNETT, WALSH, TYLER SMITH, and others, are especially deserving an attentive perusal. Dr. GLOVER very justly remarks, that “a careful distinction should be made between the scrofulous diathesis or predisposing constitution and the actual processes of the disease—between the *Ens in potentia* and the *Ens in actu*.” The scrofulous diathesis may, by the debility or the susceptibility accompanying it, predispose to other diseases besides those which are more strictly strumous or tuberculous; and a distinction should therefore be drawn between the latent or inactive scrofulous taint, the diseases which are not strictly attributable to this taint, and those maladies which are actually the structural manifestations of it. But is this distinction readily drawn? I believe not; and that the descriptions and distinctions adduced by HUFELAND, LLOYD, LUGOL, and many others, are so loose, and present so numerous exceptions, that they deserve, in many particulars, but little credence, and certainly some of them, at least, require a more particular investigation. Several of these have been subjected to a minute examination by Mr. PHILLIPS; but, as he considers tubercles to be distinct from scrofula, much of his reasoning on this subject fails in strictness of application to the subject in the wider signification which I have assigned to scrofula. M. LUGOL assigns so many indications of the scrofulous diathesis, and those with so little justice and precision, as to have it remarked that, of all his characters of this diathesis, there is not one which may not with equal value be replaced by a phenomenon diametrically opposed to it; yet this is one of the writers who is so much praised by the Gallic school in this country. Of the various indications of the scrofulous taint enumerated by this and other writers, many will appear to the experienced writer as possessed of little signification and dependence, and as deserving of very slight consideration.

5. The chief characters of the scrofulous taint enumerated by writers are the following: (a) A want of due bodily symmetry; small, weak, or crooked limbs; a gibbous or pigeon breast and flattened ribs; hare-lip (BREWSTER); hypertrophy of the pubis, the sacrum, and the ischia (LUGOL).—(b) A certain character of the head and face: the jaws are said to be broad, the forehead low and angular, and the neck long and rounded; a head larger than natural, especially posteriorly; a puffed-up rounded visage; great transparency or whiteness of the skin, often with a rosy tint of the cheeks; “a pale, inflated countenance; the chief colour of the dark complexion is dull or dirty, of the fair an unnatural whiteness, frequently with an agree-

able redness of the cheeks; in others a waxy yellowness, with a dirty pallor round the mouth.”—(BREWSTER). Bluish rings round the eyes; the eyes most frequently large, oftener blue than dark; the pupils are commonly large; the tunica albuginea of a pearly whiteness, traversed by injected blood-vessels, especially if the mesenteric glands are affected (HUFELAND), or of a bluish whiteness, and the pupils large when the lungs are diseased. The eyelids are often oedematous, the eyelashes are long, the Meibomian secretion is increased. The nose is wide or swollen, or red or shining; the upper lip is thick and projecting, and the furrow between it and the nose is deep. The general expression of the countenance indicates indolence and want of energy. The first teeth are small, and subject to caries. The second are broad, often covered by a glairy secretion, are very white, readily split, and often become carious.

6. (c) The appetite is irregular—sometimes impaired, at other times voracious; occasionally there is nausea; the tongue is often foul, the breath fetid or sour; the bowels are irregular; flatulent eructations are frequent and acid; and the excretions are also acid. The abdomen is large, tumid and flatulent on percussion. Discharges from the nose are common, and from the vagina not unfrequent. The soft solids are flabby; the adipose and cellular tissues abundant but soft, giving the surface of the body a full and rounded contour; the limbs are deficient in rigidity and firmness. The tendons are small and yielding; the capsules of the joints are weak; and the heads of the long bones are large. Hence a disposition to lateral curvatures of the spine, thick ankles and joints, large ill-formed hands and feet, and falling of the arches of the latter. The shoulders are high.

7. (d) According to HEUSINGER, one of the correctest writers on Pathology, the strumous taint consists of a torpid state of the nervous system. The blood, whose condition is yet but little known, appears to be from the commencement poor in globulin and hæmatin, rich in albumen, which, at a later period only, diminishes also. There are abundance of lymph, extension of the lymphatic vessels, marked development of the lymphatic glands, and predominance of the cellular system, not only under the skin, but in all the organs, where it commences to replace the specific tissues, which is especially apparent in the muscles, the bones, &c. All the mucoous secretions are augmented, and they often become albuminous.

8. (e) General lassitude, languor, and debility are commonly experienced, with an inability to sustain prolonged physical and intellectual exertion. The powers of the mind, although generally feeble, are often precocious. Dr. GLOVER remarks, that in very few of the subjects which he had examined has he found the bodily or intellectual powers fairly developed in a degree proportionate to the age and circumstances of the patient, and that a general retardation of development seems one of the most constant features of this peculiarity of constitution. According to HUFELAND and FISCHER, the generative functions are early and powerfully manifested. They may be early and frequently, but certainly not powerfully exerted. LUGOL maintains that these functions in scrofulous subjects are below the average.

9. (f) All that is known of the *blood* of scrofulous persons has already been stated (§ 7). The *urine* has been described by SIMON and others to be usually very pale, unless vascular excitement be present. Its specific gravity is low, and in children it is more acid than usual. There are differences of opinion as to the nature of the free acid; some consider it phosphoric acid; others hydrochloric acid; and others, again, lactic acid. The urea and uric acid are often diminished, while the salts, especially the phosphates, are increased; and even oxalic acid—an acid foreign to normal urine—has been found in the urine of strumous children. According to SCHÖNLEIN, the chief alterations observable in the urine of scrofulous persons consist in the diminution of nitrogenous constituents—the urea and uric acid; and in the appearance of the non-nitrogenous oxalic acid, and more rarely of benzoic acid. The acids are frequently so abundant, that the urine, upon cooling, deposits copious sediments of the oxalates, and these sediments sometimes form renal and vesical calculi. The frequent occurrence of oxalate of lime or mulberry calculus in children is well known.

10. (g) The observations of Mr. PHILLIPS on the characteristics usually assigned to the scrofulous taint are not devoid of interest, although open to the objection already noticed (§ 4). He states that, in many “instances, most of the alleged characteristics of the scrofulous constitution may distinctly exist, while no strumous deposit takes place, and in others, diseases ascribed to the strumous habit may take place in persons in whom the marks alluded to cannot be recognised.” In addition, however, to most of the indications which have been enumerated, Mr. PHILLIPS notices others which characterize also this diathesis, namely, a want of muscular development; an hypertrophied or infiltrated condition of the cellular tissue, which rapidly disappears under privation or disease; a pallor and coldness of the surface, owing to a feeble circulation; a marked disposition to disorders of the respiratory and digestive mucous surfaces; frequent soreness of, or discharges from, the nose, the eyes, and the ears; enlargement of the tonsils; the frequent dryness of the skin, or a greasy, sour, or fetid exhalation from the skin; and more or less disorder of nearly all the abdominal secretions and excretions.

11. (h) The colour of the hair is very variable; but for the most part it inclines, according to Mr. PHILLIPS, to a dark tint. Of nearly 9000 scrofulous children, he found a little over 32 per cent. had light hair and eyes. BARTHEZ and RILLIET state that, of 314 tuberculous children, the hair was fair in 150, red in 4, chestnut in 71, black or dark in 40, and not observed in 49. Dr. GLOVER remarked that, in 126 cases, 86 had fair hair and eyes, and 40 were of a dark complexion; and that in some work-houses, 97 cases had a light, and 47 a decidedly dark complexion. Mr. PHILLIPS remarks, that “the *alæ nasi* may be broad, but for the most part they are not so. The upper lip, or even both, may be tumid, but in the majority of cases they are not so. There is not, as some have supposed, any thing constant in the shape of the lower jaw, or in the appearance of the teeth.” He observes that the scalp and other parts of the integuments are often the seat of eruptive affections.

12. (i) It is obvious from the above that the strumous diathesis may be viewed as an original or an acquired deterioration of the constitution from the natural healthy pitch or condition; and that, before any actual manifestation of disease takes place, there may long exist such a state of organic nervous power, of circulation, of function, and of nutrition—of general asthenia, and of deficient structural development, as to constitute an obvious and wide divergence from health before the scrofulous formation or tuberculous deposit takes place; and, moreover, that the characters now described as constituting the scrofulous taint, cachexy, or divergency from the actual healthy condition, may exist for many years, or throughout a long life, without being followed by any of the marked structural manifestations of strumous disease or tuberculous deposit, although many determining or concurring causes very easily develop these diseases in very active and manifest forms.

13. II. OF THE CAUSES OF THE STRUMOUS TAIN, AND OF EXTERNAL AND INTERNAL TUBERCULOSIS.—The causes of scrofula have been investigated with much assiduity by Mr. PHILLIPS, but chiefly with reference to the external forms of scrofula, and as observed in young subjects. The limitation which he has assigned to the disease—the exclusion from his calculation of the tubercular or more internal states of struma—impairs or even altogether destroys the value that he has assigned to each of the causes he has investigated; and therefore they must be estimated either with reference to this limitation, or more loosely in the extended acceptance in which I have received the term. Mr. PHILLIPS remarks, that “hereditary influence, syphilis, bad air, bad food, and a cold and damp atmosphere, are the causes to which have been most frequently assigned the production of scrofula. The error of each theory is its exclusiveness; and when we reflect upon the difficulty of estimating the unmixed influence of any single cause, and when it is made probable that many causes are in action, we can scarcely comprehend how it happens that able inquirers should maintain with so much pertinacity not alone the efficiency, but also the universality of one.” When describing the *etiology* of DISEASE (sec § 7–62, of that art.), the combined, the concurrent, and the determining operations of several causes were insisted upon in the production of the morbid effect; and this associated action has been duly recognised in the causation of most diseases, the one now under consideration certainly being no exception. The difficulty of estimating the influence of any one of the several causes which usually co-operate in producing a disease is certainly great, and is owing to circumstances which are more or less obvious. It has been attempted by certain writers to confer an arithmetical value on each particular cause, and the attempt has been followed by some in this country. But the nature of the subject, the varying influences of seasons, weather, localities, social and moral conditions, and numerous concurring and intercurrent agencies, render such precision unattainable, even if the requisite data, at given periods, could be obtained with due certainty; the attempts which have hitherto been made being characterized by more manifest errors



than have distinguished even the loosest descriptions of much less ambitious writers.

14. The author now mentioned justly observes, that the difficulty of estimating "the force of any of the so-called causes of scrofula is owing to the fact that the opportunity of observing a single agent in action alone is very rarely afforded: where one cause exists, another is almost certainly intimately associated with it; and to assign to each its proper influence is rarely possible. This is particularly the case with bad food, bad air, and bad clothing; the existence of the one almost implies the presence of another." Nevertheless, the attempt to estimate aright the influence of individual causes should not be neglected, when it can be made with a reasonable hope of success. And that it may be made with success, the following instances will show: 1st. In a large charity school, of considerably above 100 girls, cases of scrofula became remarkably prevalent, notwithstanding a sufficient supply of wholesome food and clothing, and attention to ventilation, and treatment produced no benefit. During my duties as a visiting trustee, I ascertained that the wooden floors of the sleeping and other apartments of the institution were washed daily. I contended, in the committee managing the charity, that this was the cause of the disease, and advised dry-rubbing; and that washing the floors should be adopted only on requisite occasions. This advice was followed, and the cases under treatment soon recovered, and no new case occurred. 2d. In a large school of boys, scrofula, both external and internal (tubercular), was of frequent occurrence, several of the parents having removed their children, not unfrequently during advanced or incipient tubercular disease. Having been sent to one of the children, I could find no fault with the food and exercise of the pupils, nor with the beds and cleanness of the apartments; but the sleeping apartments were much too close, too crowded, and ill ventilated. Upon the removal of the cause, the school became remarkably healthy. Now, in these instances, the causes just named could not be disputed as having been the most active; most probably, however, various predisposing causes having existed, especially hereditary constitution, as respected the individuals affected.

[The frequency of scrofula among the inmates of our orphan asylums has frequently attracted our notice, and several years since we entered upon a careful investigation of the causes. In a large majority of instances, we distinctly traced it to errors in the dietetic management, the food not being sufficiently nutritious, and composed too largely of vegetable matters. Thin soups, with but little tender meat, light gruels, mush and molasses, and a poor quality of bread, with but rare and scanty allowance of milk, and that often diluted, made up the diet; while, at the same time, they slept in crowded, confined, and ill-ventilated apartments, and seldom enjoyed the luxury of a bath. They consequently had a sickly, blanched, leucophlegmatic appearance, with a miserable look of premature age, anxiety and distress, instead of the joyousness of youth, stamped upon the features. (See our article on "Dietaries of our public Institutions," in vol. ii. of the New York Journal of Medicine.)

On substituting a more liberal allowance of

animal food, such as good milk, butter, and tender meats, with rice, potatoes, and a better quality of bread, a marked change was immediately observed; the children became more florid, active, playful, and cheerful, and the scrofulous indications gradually disappeared. Facts, however, warrant the conclusion that scrofula may be developed from sleeping in ill-ventilated places, even when the food is of proper quantity and quality. We have seen this, in several instances, in large boarding-schools, and in children of both sexes, and we look upon the breathing of impure air at night as one of the most frequent and efficient of all the causes of this disease in our country.]

15. The causes of scrofula have been variously arranged by writers. Some have viewed them as *predisposing* and *exciting*, others as *hereditary* and *occasional*. I shall notice, 1st. *Those which depend upon one or both parents*; and, 2d. *Those which change the constitution of the individual, especially during childhood, and which are independent of the constitution of the parent*; both classes of causes often concurring to produce one or other of the morbid results usually termed scrofulous, strumous, or tubercular—or external or internal scrofula.

16. i. CAUSES APPERTAINING TO ONE OR BOTH PARENTS.—A. *Hereditary Constitution or Predisposition*. The operation of this cause has been much over-estimated by LUGOL, and many other writers, and as much underrated by LOUIS, HENNING, BAUDELOCQUE, PHILLIPS, and others. The circumstances which chiefly occasion this difference of opinion are the confounding of hereditary and congenital transmission of the disease with hereditary diathesis or constitution, and inattention to the fact that the parent or parents, who possess only the latent diathesis, may have children with the external signs of the disease in childhood, or with tubercular or internal scrofula at any future period of life, or with both manifestations of the disease; or that a parent affected with either the one or the other may have children presenting no indication of the malady beyond the latent diathesis, which, however, may be very obscure, or altogether absent, or may have an offspring affected by a different form of the disease from that of the parent. Let any observer of experience refer to what must be familiar to him, and he will find, what I have often remarked, that one parent possessed of the scrofulous diathesis has passed on to the age of sixty or upward, and has at last died of tubercular consumption, the other parent being of a sound and strong constitution, and either one or more of the offspring have had forms of external scrofula before puberty, or have grown up and been carried off by phthisis in after life; or have been affected both before and after puberty—some with external, some with internal scrofula. I have known many such occurrences, and even instances where the scrofulous diathesis, either latent or manifested by active disease, existed only in one parent, and yet, of numerous families, part died in early life, with external signs of scrofula as well as internal disease, and the rest, or the majority of the survivors, became consumptive at various ages, more or less advanced. Now, Mr. PHILLIPS and other writers, who consider tubercles a distinct lesion from scrofula, keep out of their calculations the former, and con-

sider the one to have no hereditary connexion with the other—a position which is altogether overturned by the numerous facts which are identical with the statement I have now made, the faithfulness of which is open to the investigation of every observer.

17. It is unnecessary for me to enumerate the authorities who have contended for the hereditary character of scrofula and tubercles; for the possession by the offspring of the diathesis or constitution of the parent or parents, more or less, or in one or more instances, and therewith the disposition to the same disease to which the latter was most liable. But, without regard to authority, let the matter be made one of observation, respecting which common sense is sufficient to judge. Mr. PHILLIPS remarks, that, after reading the essay of PORTAL on "Hereditary Diseases," he rose up in doubt, whether in the strict sense in which alone he thinks the question should be regarded, there be clear evidence that almost any disease is hereditary, though with respect to syphilis and small-pox the proof may be sufficient. Certainly much of the difference of opinion respecting the hereditary nature of the diseases depends upon the signification assigned to the term. No one at the present day considers that the offspring is born with the disease which afflicted the parent, although even this is the case in rare instances; but only that the constitution or diathesis is inherited, and with it the disposition to the same diseases which attended it in the parent or parents. This subject is, however, sufficiently discussed in the article DISEASE (see § 11, *et seq.*).

18. (a) *May the parent transmit scrofula or tubercles to the fœtus?* Scrofulous tumours and tubercles have been observed in the fœtus and in very young infants by DUPUY, ANDRAL, CHAUSSIER, BILLARD, and a few others. The instances in which they have been found are few, and the connexion of these cases with disease of the parents has not been shown in the majority of them. In three instances, in which the mothers died of consumption very soon after delivery, I found the lungs of the infants studded with tubercles in the first stage, a few having advanced to the second stage. The infants were remarkably emaciated, had cough very soon after they were born, and died in a few days. In these three instances, tubercles of the lungs of the fœtus were expected during the gestation of the parent by the practitioners in attendance (Mr. NICOLSON and Mr. WINSTONE), as well as by myself, and in each case the mother considered the child to have been born with the same disease as that with which she was afflicted.

19. (b) *To what extent may scrofula and tubercles be viewed as hereditary?* The statistical or numerical writers on this subject have mystified and misled many who pin their faith to authority and numbers, without inquiring into the data upon which their calculations are based, or into the meaning of the terms they employ. One of the most recent numerical pathologists, having defined and limited scrofula to be "enlarged cervical glands discovered by the touch or sight, sinuses or ulcers succeeding to such glands, scrofulous bones or joints, or the consequences of them;" and at another place having farther limited his definition to "disease of subcutaneous

lymphatic glands," gives the results of his examinations of 7587 children, and found nearly 23 per cent. of these bearing such marks of scrofula. He farther ascertained that, of 2021 children whose parents were both *untainted*, 21 per cent. presented marks of scrofula; that of 1092 children whose parents were both *tainted*, nearly 25 per cent. presented marks of scrofula; that of 2107 children whose father only was scrofulous, nearly 23 per cent. had marks of the disease; and that of 2367 children whose mother bore the marks of scrofula, while the father did not, nearly 24 per cent. presented signs of the distemper. Thus all that statistics here furnishes in favour of the hereditary influence of the scrofulous diathesis is not quite 4 per cent.; and many, believing in the precision and truth of numbers, would consider the evidence here adduced as most conclusive and incontrovertible. But of the children thus examined—their ages probably being from two to sixteen years—the lymphatic glands may have been enlarged, and returned to their healthy state before the examination was made, or either these glands or some other parts may have presented evidence of scrofulous change *after* the period of this examination; and, taking the more enlarged signification generally adopted, some internal organ may have become affected by the disease, either before or after puberty. It is not only external and palpable scrofula which is caused by the scrofulous taint, but also various internal maladies which are actually scrofulous or tuberculous in their nature, and which may be developed into an active state at any period either before or after puberty, an examination, on a single occasion, of numbers thus circumstanced, detecting a few merely from among them with the fully-developed or manifested malady.

20. But Mr. PHILLIPS does not stand alone in his skepticism of the generally received doctrine of the obvious hereditary nature of scrofula, and in his faith in statistics; for LOUIS, the apostle of the numerical method in medicine, states, with reference to phthisis, that in reality he had observed nothing decisive in favour of the hereditary character of that disease; and, in another place, that he had not collected any fact in favour of the hereditary nature of phthisis! But there is one circumstance connected with the hereditary nature of scrofula to which the numerical pathologists have paid little or no attention, namely, that the parent or parents may possess the scrofulous taint without any mark of the external or internal disease, and have one or more children which are either affected with open scrofula in childhood or attacked with phthisis in early life; and even that one or both parents of a scrofulous diathesis, without any developed disease, may have children, whose lymphatic glands or bones become tuberculous in early childhood, or whose lungs are thus diseased after puberty, and yet may not be the subjects of manifest strumous disease throughout life, or not until a far advanced period. In these circumstances the hereditary tendency would not be detected or reckoned by those who employ figures as their arguments, and thus their statistics would be vitiated, or rendered by this and other sources of error altogether worthless. That the hereditary character of scrofula and tubercles has been exag-



gerated by some writers may be admitted; but that it is so low in amount as some recent writers contend, or even nearly so low, will not be demonstrated by future observers who shall view all the circumstances and facts connected with the subject with due accuracy.

21. Of 80 cases observed by Dr. GLOVER, the predisposition to tuberculous affections—to scrofula in the sense in which I have viewed it—was hereditary in 42; very few of the remainder furnishing clear evidence of the transmission. There appears some reason, he adds (and I agree with him), to conclude “that the popular idea of evidence of the family taint often passing over one generation, or appearing in the uncles and aunts, while the parents are free from the disease under which their offspring labours, may not be incorrect.”

22. The hereditary predisposition is, according to my own observation and that of several others, more frequently derived from the mother than from the father, although the difference is not great, much depending upon the causes in operation in early life. The mother of nine children—six females, three males—had early signs of external scrofula; four of the female offspring died of phthisis between the ages of 20 and 30, and one of the males. All the children of the two remaining females are possessed of the scrofulous taint, and about one third of them have external scrofulous disease. Dr. PRITCHARD has justly remarked, that all original connate bodily peculiarities tend to become hereditary, while changes in the organic structure of the individual, from external causes during life, commonly end with him, and have no obvious influence on his progeny. There is no doubt of the strumous hereditary taint having disappeared from families, especially when it existed only on one side, more particularly when the mother was strong, healthy, and suckled her own children, and when the latter were placed in favourable circumstances in childhood and early life as respected air, locality, ventilation, exercise, and food.

23. *B. Diseases of the Parents.*—It has been justly remarked by Sir JAMES CLARK, “that a state of tuberculous cachexy is not the only morbid condition of the parent which entails the tuberculous predisposition on the children; there are several diseases which have this effect, the most important of which are a disordered state of the digestive organs, gout, cutaneous diseases, the injurious influence of mercury on the system, debility from disease, age, &c. In short, a deteriorated state of health in the parent from any cause, to a degree sufficient to produce a state of cachexy, may give rise to the scrofulous constitution in the offspring.” This opinion has been questioned by Mr. PHILLIPS, but I believe it to be in the main correct. Not, however, that parents thus circumstanced necessarily have children who become scrofulous in childhood, or tuberculous subsequently; but that the children of such parents are much more liable to be so diseased than the offspring of strong and healthy parents.

24. (a) *Of the influence of the syphilitic taint, and of the mercurial cachexy in the parent, in affecting the organization of the offspring so as to favour the development of external or internal scrofula, many writers are quite convinced.*

ALIBERT says, that “almost all the scrofulous cases at St. Louis are owing to a syphilitic infection transmitted hereditarily;” and CAMPER, STOLL, PORTAL, and HUFELAND entertain a similar opinion. Others are of a different opinion, especially KORTUM, CULLEN, BAUMES, BAUDELLOCQUE, and PHILLIPS. It is impossible to separate the influence of secondary and tertiary syphilis from that produced on the constitution by the excessive or prolonged courses of mercury, as, in former times especially, both were more or less injurious to the constitution of parents, and most frequently in connexion with each other. That parents thus circumstanced may have children free from any scrofulous taint may be conceded; but that their offspring are more frequently affected with either external or internal scrofula, at the respective ages of the occurrence of these, than the children of parents who have not been similarly circumstanced, I am convinced by the frequent occurrence of these states of scrofula in children born of a parent or parents whose constitutions, originally most sound, were deteriorated by one or both of these causes. I am aware that numerous instances will occur of the immunity of the children of parents thus circumstanced from scrofula; but many of these have not been observed or traced farther than childhood, or even than the earlier years of this epoch; and of those thus accounted exempt, or even robust or healthy at this period, many become tuberculous at more advanced ages.

25. (b) *That very aged, gouty, exhausted, or debilitated parents have children much more predisposed to external or internal scrofula than the offspring of healthy, mature, or young parents, has been asserted by many, and denied by some. It is more generally admitted that the children of such parents are delicate; but the opinions of many of the most observant writers of the seventeenth and eighteenth centuries confirm that of FERNELIUS, no mean observer, and justly possessed of the highest reputation in the sixteenth century, viz.: “Senes et valetudinarii imbecilles filios vitiosa constitutione gignunt;” and VAN SWIETEN has illustrated the opinion with his wonted ability. In the same category parents who have exhausted themselves by masturbation, or by premature or excessive venereal indulgences, may also be placed. On this subject Mr. PHILLIPS remarks: “I do not, however, deny that children born of parents advanced in life, as well as those born of youthful parents, may present less of vigour than the offspring of persons in the prime of health and strength, but it is not proved that they usually become scrofulous;” and he admits only that these children are often, though not always, weakly, and that a weakly child, placed under unfavourable circumstances, is more likely to suffer from scrofula than a strong one, but simply because he is weakly. It is difficult to prove the extent to which children born of parents of the description under consideration are liable to be scrofulous or tuberculous, or are more liable to become so than other weakly children; but that they are actually more or less liable to be thus affected, I believe.*

26. (c) *Does the milk of a scrofulous nurse occasion scrofula in the child?* Mr. PHILLIPS has ably discussed this topic, and has adduced opin-

ions in the affirmative as well as negative. BORDEU said that scrofulous nurses communicate the disease to the child. WHITE, FAURE, LAQUETTE, and PUJOL, on the contrary, denied that a nurse could transmit scrofula to her nursing. "But the impression that the disease may be thus communicated exists on the minds of many medical authorities in the present day." Yet, in support of this opinion, Mr. PHILLIPS states that he knows no single well-observed fact on record. I agree with him in concluding that, although there is no proof of the justness of the opinion "that the disease may be propagated in this way, neither is it easy to procure proof that it could not happen, since such proof could only be negative; meanwhile, as all our present evidence is negative, we are justified in saying that such communication is, in the present state of our knowledge, inadmissible."

27. (d) *Frequent Intermarriages, or Marrying in and in.*—It has been alleged by Mr. CAR-MICHAEL and others, that frequent and close intermarriages are generally followed by a puny race, and frequently by scrofula in one shape or another. On this topic Mr. PHILLIPS remarks, that there is no clear evidence of the bad consequences, either in the mind or body, of frequent intermarriages. As concerns the human race, the point is not easily elucidated, and the evidence is not conclusive that the practice is very injurious in the lower animals. Isolated classes, as Jews, Quakers, &c., furnish no evidence in support of the opinion; but the isolation of these or other classes is not so complete as to determine the question. The closest intermarriages or connexions between the sexes exist in several countries of Central Asia, as Thibet, &c.; but the inhabitants are said to be robust and healthy, the population being, however, kept down by one female in a family having several husbands, and those frequently her nearest male relations. Mr. PHILLIPS concludes that intermarriages among healthy persons tend to no such calamity as the production of scrofula, but that he must not be understood to assert that other physical or mental influences may not result from such unions. I believe, however, that a comprehensive consideration of the subject, and with reference to the lower animals as well as to man, will show that a close breeding in and in, when continued for more than three or four generations, will occasion a degeneration of the offspring; while crossing of races or breeds will give rise to increased development of constitution and power, especially in the weaker race. The Turks and Persians are manifestly indebted to the females of Georgia and Circassia for the best of their constitutional features; and few who have taken any interest in tracing the history of aristocratic families, even in this country, and are acquainted with the private histories, the intrigues, and intermarriages or crossings of many of them since the commencement of the seventeenth century, can fail of knowing how often family descent has thereby been preserved nominally, although not most legitimately.

28. (e) *Does the habitual use of certain articles of food predispose the offspring to scrofula or tubercles?* It has been supposed that pork, and the viscera and blood of animals, favour the occurrence of gout in those who frequently use them as food, and often give rise to scrofula in

their offspring. That these articles of diet are very often productive of diarrhoea, dysentery, and other disorders of the digestive organs, more especially in warm climates, cannot be disputed; and I believe that the offspring of those who live much on pork and bacon are more liable to scrofula, in some one or other of its forms, than persons who use a different or more wholesome diet.\* The food of the parents may reasonably be expected to influence the constitution of the offspring, and hence to predispose to certain diseases in preference to others. It is difficult to determine the influences, either of an excessive use of animal food by the parent or parents, or of the restriction to vegetable diet solely, in causing scrofula in the offspring; but that either extreme may have a predisposing effect, especially when aided by other causes, may be reasonably inferred. That the vegetable diet of the Hindoos does not exempt them from the presence, if not from the prevalence, of struma, appears to be established. It is not improbable, however, that a vegetable diet in a temperate and healthy climate, when it is wholesome in kind and quite sufficient in quantity, does not, *ceteris paribus*, predispose the offspring to this distemper; while the excessive use of animal food, and more especially of the articles of food just noticed as often injurious, is more likely to produce a noxious effect.

29. (f) *Insufficient, as well as unwholesome food*, certainly predisposes the offspring to scrofula, both external and internal; and when this is associated, as it too frequently is in the lower classes, with addiction to *spirituous liquors*, the injurious influence is the more marked, particularly when the mother is thus circumstanced and addicted during the periods of utero-gestation and of lactation. I have on numerous occasions remarked this to be among the most undoubted causes of strumous affections in the poor; but it is so generally associated with others about to be noticed, especially impure air and insufficient ventilation, that it is impossible to say truly what degree of influence may be assigned to it solely. The numerical pathologists may, however, assign it a number; I therefore leave its true value to be calculated by them.

30. ii. *CAUSES ACTING CHIEFLY DURING EARLY LIFE.*—The causes of struma occurring during early life act directly on the subjects of the distemper. These causes may be in operation during infancy solely, or during later childhood,

[\* There can be no doubt, we think, that the use of pork has a tendency to produce scrofula, and many cutaneous diseases. The Shakers, in some parts of our country, have wisely abandoned its use. It is somewhat remarkable that whatever was regarded as unclean in the Mosaic catalogue of edibles is still thought to be unfit for human food, with the exception of swine. If scrofulous affections are not actually generated, they are at least aggravated by its use. A friend went to the South, where he was so situated for a year that *fat bacon* constituted almost the only animal food he partook of during that time. His skin, which was before smooth and fair, became darker-coloured, rough and husky to the feel, to which succeeded sores and boils, which matured and discharged, leaving obstinate ulcers of an unhealthy character, and the general health much impaired. At the end of the year he returned North, where, upon a change of diet, he soon recovered, and has had no return of the cutaneous affection. We have observed other cases of a similar kind, and therefore would enjoin entire abstinence from this gross kind of food, at least to all who are predisposed to, or already labour under a scrofulous diathesis.]



or not until puberty, or even not until after this epoch. They are among the most influential causes of the distemper, especially when acting more or less in combination, as often observed respecting some of them. It is generally difficult to determine the influence of each, or even of several of them, when operating either co-etaneously or in succession, particularly when the constitution presents an hereditary taint, and in this case those causes are the most efficient in developing this taint into open or manifest disease. The *milk* of the nurse, especially if she be circumstanced or addicted as just mentioned (§ 29), or if her health be such, owing either to natural delicacy of constitution or to disease, as to render her milk insufficient, innutritious, or unhealthy, is a most influential cause of debility and disease of the infant, this disease assuming more frequently the form of internal or external scrofula, than any other. In connexion with suckling of the infant, there are several causes which often concur in the production of the morbid effect; the most influential of these are the articles of food given to the infant either supplemental of the milk of the nurse, or during and after weaning, and the state of the air which the child breathes by night as well as by day.

31. *A. The food and drink* which are best adapted to the infant, before it has got several teeth, is the milk of a healthy mother or nurse; and in as far as a departure from this food takes place, so far will the development of scrofula be risked. When the mother is incapable of suckling, or her milk is unhealthy or insufficient, a healthy nurse is required; and if she cannot be obtained, then the best means of feeding the infant should be adopted. In the various circumstances in which children are brought up, it is very difficult to determine the share of injury which may be imputed solely either to the nature and amount of their food, or to the state of the air which they breathe, or to the other influences which surround them. M. BENOISTON DE CHÂTANNEUF states, that of infants nursed by their mothers in Paris, 18 per cent. die in the first year, and that of those suckled by strangers, 29 per cent die in the same time. Doubtless much of this mortality is to be imputed to other causes, as to the close unhealthy air of a large city, as well as to those connected with the food of infancy. Both in towns and country districts, healthy wet-nurses cannot be obtained, owing to the circumstances of the majority of those requiring them; and artificial feeding becomes their only resource. This feeding, independently of the many unfavourable influences which concur with it, fails of furnishing an appropriate nourishment; and, consequently, a very large proportion of the infants who are subjected to this mode of rearing die in their first year; and of those who live, many become the subjects of internal or external scrofula. Mr. PHILLIPS has adduced a series of statistical details, illustrating the deaths during infancy of the inmates of several infant institutions, where the children are brought up by hand; and in these the deaths in the first year appear to vary from upward of 80 to 50 per cent. In *Lyons*, a crowded manufacturing town, where the infants are suckled, the mortality in the first year was 33 per cent., the ordinary mortality at Lyons during the first

year being about 20 per cent. In the London Foundling Hospital, where the children are provided with wet-nurses, the deaths are 22 per cent. during the first five years, and of these 10 per cent. only die during the first year; but it should be recollected that a child is rarely admitted before the third month, and that it is during the first three months of life that the mortality is greatest. In large manufacturing towns and cities the number of infants reared by hand is greatest, and the deaths are also much the greatest; and the proportions of the survivors that become scrofulous is also the greatest. In London, the number of infants thus reared who die during the first year is three or four times as many as those who die from among those similarly reared in the country.

32. While very much of the mortality, and of the disease of the survivors, of those reared by hand, is to be imputed to this cause, much also should be referred to the kind of food which is substituted for the milk of the mother, to the air which the infant breathes, and to the other circumstances by which it is surrounded. As respects the *kind of food* which is thus substituted, it may be stated that, in manufacturing towns, where the married women employed in the factories rear their infants by hand, little attention is paid to the nature of the food, and few of the children survive the first or second year, most of the survivors becoming scrofulous or tuberculous. Mr. PHILLIPS justly remarks, that there are two things to be noted in respect of children thus circumstanced, viz., the nature of the food and the manner of taking it. The food, even if it be milk, instead of being drawn directly from the mother, has probably been obtained some time before from a purely herbiferous animal—the cow, between the milk of which and that of human milk there is a very considerable difference, that of the former containing more than twice as much casein, and much less butter and sugar of milk. Moreover, in towns the milk of cows is often unwholesome, especially to infants, owing to the confinement of and modes of feeding these animals, and not unfrequently to tubercular disease developed in them by these causes. The same author justly adds, that the mode of taking the food exercises an important influence on the health of the infant. By the act of suckling, a certain quantity of saliva is pressed into the mouth, and is mixed with the milk, so as to render its digestion easier. Indeed, this is essential to good digestion in infants. Moreover, the act of sucking is an exertion which can be made only for a certain time, and hence over-distention of the stomach is prevented; while, when fed by hand, the risk of over-feeding is often run, by the anxiety of the nurse, and harm from this is not unfrequent.

[Much of the milk consumed in our large cities is formed from the slop of grain distilleries, the cows yielding it being confined in close, filthy, and ill-ventilated stables. Such milk is found to contain but a small quantity of butter, of a whiter colour than natural, and associated with more curd and whey than that obtained from other milk. The milk globules are less abundant than in good milk, and of smaller size. Such milk, also, contains a larger quantity of epithelial-cells, some distinctly granular, and

others higher-coloured, than pure and healthy milk. The sale of such milk should be prohibited by law. The nature of fermentation and distillation is to abstract from the grain all the fecula and sugar, the principles that are more particularly convertible into milk and butter, leaving the nitrogenized compounds, and also the casein and earthy matter, nearly untouched; hence the increased quantity of ashes, and also of casein, the nitrogenized compound in milk, while the sugar and butter are below the usual standard. Animals thus confined become diseased, tuberculous and scrofulous, and there can be little doubt that the use of such milk tends to develop these diseases in the human subject. It is a well-known fact, that a much larger proportion of the children of the poor in our large cities are affected with scrofula than of the same class in the country; and though breathing impure air may be one of the causes, we believe that the use of diseased milk is still more efficient in producing the disease. An extensive dispensary practice of several years furnished a multitude of facts in support of this belief.]

33. In the greatest number of instances, instead of milk, gruel with a little milk, sopped bread, or flour, or other farinaceous substances, are used. This food is assimilated with difficulty, and readily gives rise to acidity, flatulence, and irritation of the digestive mucous surface, with all the consequent evils of insufficient secretion and excretion, and impaired nutrition. Mr. PHILLIPS justly remarks, that these evils are made evident by the following facts: "In Lancashire and the West Riding of York, the deaths in the first year of life are to the total deaths as 1 to 3.9; while in Devon and Wilts they are one to 6.4! Now it is in the great factory towns, which are found in Lancashire, Cheshire, and Yorkshire, that the system of bringing up the child by hand is most commonly practiced, and where its evils are most apparent; first in the great destruction of infant life, and, failing that, in the development of scrofula. It is not that the mother has no milk, but that in such places she is enabled to make what she considers a more profitable use of her time than by staying at home and nursing her child. Her infant may be suckled at early morn, and again in the evening; possibly, too, at the middle of the day; but whatever food it may require at the intervening periods, if furnished at all, is afforded in the shape of the crudest and most inappropriate substances, and restlessness is known, in many places, to be habitually repressed by GODFREY'S Cordial." But the mothers are not solely the guilty parties in these circumstances. The fathers are often so drunken and dissolute as to provide little or no food for their families, and the mothers are therefore obliged to be employed in the factories to provide for the wants of their children, entertaining at the same time but little desire to add to their number, or to devote much care on those which require it the most.

34. The digestion of infants is rapid, and as the quantity of food taken at a time is small, it is necessary that, during the first month, the interval of feeding should not exceed from one and a half to three hours. If, in addition to inappropriate food, the intervals between the periods of administering it be much more pro-

longed, as it often is in manufacturing towns, the evils must be so much the greater. Mr. PHILLIPS states, that in the larger factory towns the deaths from tuberculous and scrofulous diseases are as 1 to 31 of the total deaths during the first year of life, while in the metropolis they are as 1 to 42. During the whole of life they are 1 to 5.6 in the factory districts, and 1 to 6.4 in the metropolis. According to the experience of Friendly Societies, he adds, the expectation of life in rural districts at 30 is 38.4 years, and in cities 32.8 years. Of the total population living at the age of ten, one half will have disappeared in cities before the age of 62, and in towns before 65; while in rural districts half the population will attain nearly 69 years. The greater longevity of the latter, or the less prevalence of scrofula, is not to be imputed to the food only, even granting this be more nutritious and more appropriate, for the former may possess the greater advantages in this respect; but to the air, ventilation, exercise, &c., enjoyed by those residing in country districts.

35. Dr. BARON HOWARD gives a just but melancholy description of the character of many of the operatives in large towns. "A large proportion of those who regularly receive high wages are constantly in a state of the greatest poverty, and often bordering on actual starvation; their houses are almost destitute of furniture, comfortless, and uncleanly; too often damp, cold, and ill ventilated. Their families are ill fed, scantily clothed, and badly lodged. They live much on innutritious and indigestible food, and often use articles of had quality, or such as are rendered unwholesome by adulteration, or by being kept too long. They are extremely intemperate in their habits, and, instead of purchasing wholesome food and proper clothing, the greater part of their wages is often expended by anticipation at the public house. The effect of the intoxicating liquids they consume is of course to produce a temporary excitement of the whole system, which is succeeded by a corresponding depression; they lose all relish for plain, nutritious food, and their appetites can be stimulated only by something savoury and piquant. This kind of diet does not afford sufficient nourishment to repair the losses the body is continually sustaining; great languor and debility are the consequences; for the removal of which stimulants are again had recourse to, and thus an alternately excited and depressed state of the system is kept up. By this mode of life, too, the digestive organs become impaired, and the function of digestion is so feebly and imperfectly performed, that even much less nutrition is extracted from the indigestible and impoverished diet they use than would be the case if the digestive organs were in a healthy condition." This writer adds, that "scrofula, in all its varied forms, may be mentioned as one of the commonest diseases prevalent among the destitute poor, and which frequently originate in deficiency of food." There can be no doubt of the justness of the conclusion at which Mr. PHILLIPS arrives from his researches, namely, "that in Great Britain scrofula is least prevalent where children and others are best fed; and although I by no means assume that the immensity is entirely owing to better feeding, because where much attention is bestowed on



the food it is hardly likely that other means of maintaining health will be neglected; yet I would submit, as a fair deduction from the foregoing evidence, that food exercises a more important influence than any other agent in the production of scrofula."—(*Op. cit.*, p. 175.)

36. (a) *What influence has particular kinds of food in causing scrofula and tubercles?* This question has been differently, but not satisfactorily answered. Several articles of diet have been accused of producing this effect, and to certain of these I have adverted above (§ 28). HALLER was among the first to mention the opinion of the prevalence of this distemper being caused by the use of potatoes. The use of these, as the staple article of food in Ireland, where scrofula is more prevalent, and the value of life is less than in England, tends to show that they may be concerned in producing these effects; but it ought not to be overlooked that they afford insufficient nourishment, and that there are other causes in operation. Mr. PHILLIPS believes that those who live almost exclusively on vegetable food in this country are less robust, and exhibit a greater tendency to scrofula, than those who subsist on an admixture of animal and vegetable food; and he considers that our own rural population, as well as that of Scotland and Ireland, bear out the assertion. "But, although it has been shown that insufficient and improper food, however associated, may lay a foundation for that disease, we have, in truth, no conclusive proof that any particular article of food directly tends to the production of scrofula."

37. (b) *The drink or beverage used by infants and children has no mean influence in favouring the development of scrofula, and of tubercles at a more advanced age.* Among the lower classes, especially in large and manufacturing towns, the frequent recourse to anodynes and carminatives, containing narcotics, sedatives, &c., in order to procure sleep or quiet for infants and young children, and to allay their wants, cravings of appetite, and irritations of temper, is of itself no mean cause of their weakness of constitution, of imperfect development of both mind and body, of scrofulous and tubercular formations, and of various other diseases, as they advance to puberty and manhood. The not infrequent practice, among the lowest and most abandoned classes, of giving spirituous and other intoxicating liquors to their children—of causing their infant offspring to partake of the noxious beverages in which they are themselves indulging—is productive of effects, in the innocent victims, of a similar kind to those just stated. The vices of the parent are, in the present state of society, not merely passively propagated in the offspring—to even the third and fourth generation—but are not infrequently most actively and feloniously extended, at the most tender and helpless periods of existence, to those for whom the ties of nature should be most intimate and indissoluble.

38. *B. Contaminated states of the atmosphere* are often not less influential than the nature and quantity of the food in causing scrofula and tubercles, and frequently they are the chief causes. The air may be contaminated by exhalations from drains, cess-pools, sewers, and water-closets; or by stagnation or insufficient renewal; or by being respired frequently or by

a number of persons or animals, without the requisite renewal; or by these several causes conjoined. In a very large proportion of the houses in manufacturing and other towns, as well as in many in country districts, the water-closets, drains, and sewers are so imperfectly constructed as to admit of the evolution of the foul air from the exuvia, &c., of the inhabitants, not only around, but even within their dwellings, so that they who reside in those houses are constantly breathing an air loaded with the vapours arising from the decomposition of their own excretions, which remain collected under, or close to, or even within, their apartments. These sources of contamination have been fully exposed in the article PESTILENCES—PROTECTION FROM (§ 9, *et seq.*)

39. *C. Next in importance to this source is the congregation of numbers in a close or insufficiently ventilated place, more especially in a close sleeping apartment.* Among the most prevalent causes of scrofula and tubercles, especially in the present state of society and manners, there are perhaps none more influential than congregating children and young persons in boarding and large schools, where they are often scantily fed, and through the greater part of the day restricted in air and exercise; confined in a school-room often insufficiently or improperly warmed, and improperly ventilated, in order to economize fuel; subjected to premature mental exertion, or to cramming modes of instruction; and packed into sleeping apartments insufficiently ventilated, and much too small for the number confined in them. It is a common practice in boarding-schools, in large towns, to put from six to twenty children or young persons in the same sleeping apartment; and the parents are, from ignorance, or the delusion of having a bed assigned to each, contented with the arrangement. Many such apartments even have not, during night, any ventilation, excepting what takes place by the fire-place, both the doors and windows being closed; and so foul does the air become by the morning, that it is sickening to a healthy person entering the chamber, so completely is it loaded with the emanations resulting from the insensible and sensible perspiration, and from having been repeatedly respired.

40. *This self-contamination of the air is often only supplemental of the contaminations derived from other sources, especially from such as have been just mentioned; and which, although injurious in many private seminaries, are even still more so in many large institutions and charities, owing to the congregation of greater numbers, particularly in sleeping apartments, to ill-regulated diet-tables, to insufficient exercise in the open air at a period of life which requires air and exercise for the healthy development of the frame, and to the over-exertion of the mind to the neglect of healthy pastimes and amusements.* This cause is especially productive of the more internal forms of scrofula, and particularly of tubercles of the lungs, and is the more influential as being in continued operation during the periods of the growth and development of the frame. These congregations of young persons, especially during the age of puberty—at the period of sexual evolution, when instinctive impulses are too strong for the control of the weakly-exerted dictates of reason,

often lead to practices which tend—and tend more than any other cause, especially at such early periods of life—to exhaust the powers of life, to impair and vitiate nutrition, and to favour the production of the several forms of the distemper now being considered. This mode of life, at this early age, as well as several others to which the lowest and even the highest, are often subjected—the one from misery and necessity, the other from ignorance, vanity, and excessive care—is not infrequently rendered still more injurious by the want of due exposure to the sun and air.

41. *Exhalations from privies, cess-pools, drains, and sewers*, especially in large institutions, manufactories, and towns, occasion this as well as other states of constitutional disease; and to these are often added the emanations from burying-places. Among the poor, the influence of cold, often conjoined with humidity, and with over-crowding and insufficient ventilation; the exhalations from the soil, and from the animal and vegetable matters which are undergoing decomposition in or upon the soil; living in damp, cold cellars and apartments on the ground floor, insufficiently drained and ventilated; and want of light and sunshine, are causes which aid the operation of hereditary predisposition, and of deficient or improper food.

42. Children and young persons subjected to the causes now mentioned become delicate or sickly. The vital endowment and the structural development of the several organs and textures are impaired or arrested in their progress. Like plants growing excluded from the sun and wind, their vessels often extend rapidly in the direction of their axis; but the parietes of the vessels and their lateral branches are thinly or weakly formed, are surrounded by a lax cellular tissue or parenchyma, and both the organic nerves and the animal fibres are imperfectly constituted. The formative processes seem arrested before they are completed. The circulating fluids present a superabundance of the serous and albuminous constituents, and a deficiency of fibrin and of red globules. While the blood is defective in its crisis, the blood-vessels are impaired in their tone, and the venous and lymphatic systems are more manifestly or more prominently developed. This condition of the frame often proceeds, as shown above, from the parent or parents. In many cases it is acquired in early life from various causes, especially from those now mentioned, as insufficient or improper food, breathing an impure or self-contaminated air, a cold and humid atmosphere, or dark, cold, and damp apartments, cellars, &c., the crowding of numbers in ill-ventilated places, and particularly in sleeping apartments, premature sexual indulgences, and solitary vices which waste or exhaust nervous and vital power, and consequently impair the digestive and nutritive processes, at the periods of life when due assimilation and nutrition are most required; and, while these causes often generate this state of frame, they produce, in various parts, textures, and organs, but particularly in the lungs, the deposit of tubercular matter.

43. There are other causes or circumstances influencing the constitution of young persons which have been viewed by some, and denied by others, to be concerned in the production of scrofula; but much of the difference of opinion

on these topics depends upon the limitation of the term scrofula, or the extension of it to the senses already stated (§ 4, *et seq.*). That confinement in prisons, in poor-houses, in asylums, in charitable institutions for education or reformation, in factories, &c., will occasion some form or other of scrofula, more especially tubercular deposits in internal organs, cannot be gainsaid with truth, although this morbid effect may be manifested in so few as to almost justify the denial of its existence, especially where a sufficiency of wholesome food, exercise in the open air, due light, ventilation, and sunshine are enjoyed. But where these are more or less wanting, and especially where there are over-crowding, particularly in sleeping chambers; low ranges of temperature, conjoined with dampness; contaminated states of the air; depression of spirits or anxiety of mind, &c., the morbid effects will soon become manifest, and frequently in the forms constituting those now under consideration. Most of the causes already considered have been numerically and statistically investigated by Mr. PHILLIPS, who has thrown much light upon several of them; but, in the extended sense in which I have viewed the subject—not solely with reference to external scrofula, nor to childhood, but with regard to both the external and internal distemper, as observed at all periods of life—I believe that several causes, which he views as possessed of little or no influence, are actually deserving of more consideration and elucidation than they have hitherto received. There can be no doubt that, in the several circumstances just enumerated, and in the different classes, positions, and employments of life, certain causes are more influential in some of these than in others—in one class or occupation than in the rest; and that, where several causes are in simultaneous action, it is difficult to estimate the relative value of each; but, nevertheless, whatever cause has the effect of lowering the powers of life, of impairing assimilation, nutrition, and strength, will, in a considerable proportion of those thus affected, give rise to tuberculous deposits, particularly if an hereditary predisposition or constitution already exists, and will reinforce or determine the action of other agents in developing this mischief.

44. *D. May scrofula and tubercles be communicated by contact or inoculation?* (a) ARETÆUS believed in the communicability of scrofula, and considered it dangerous to live in the same room with scrofulous persons. BAUMES, CHAUMETON, and others, have entertained the belief of the transmission of the disease to infants suckled by scrofulous nurses. BORDEU, no mean authority, states that young healthy women have married scrofulous men, and have become so themselves. BAUDELOQUE, however, remarks that in the “Hôpital des Enfants” there are 150 beds occupied by scrofulous patients, but that he has never observed any thing that occasioned a suspicion of contagion. Mr PHILLIPS says that he never heard of a single instance of the communication of the disease by contagion in the several institutions which he has visited. PINEL and RICHERAND have furnished a similar testimony.

45. (b) *Inoculation of scrofulous matter was practiced by HEBBEARD on dogs, but no sign of scrofulous infection was observed. LEPELLE-*



TIER tried similar experiments without effect; and Mr. PHILLIPS states that LEFELLETIER, GOODLAD, and KORTUM applied scrofulous pus to the wounds made for vaccination, and also to wounds made without reference to vaccination, but that scrofula was not produced, although the vaccination succeeded when the vaccine lymph was introduced with the scrofulous pus. Such experiments are most unwarrantable, and even criminal.

46. There may be but little risk of infection from cases of scrofula, when the disease is seated externally. But I believe that there is some reason for believing tubercular disease of the lungs, in the second and third stages, by no means devoid of risk to healthy persons, who may frequently inhale the breath of persons in either of these stages of the malady, or may sleep in the same bed, or even live in the same room, if small or ill ventilated, with persons thus diseased. It should not be permitted for a sickly or scrofulous child, or even for any one with pulmonary tubercles or with open scrofulous sores, to sleep in the same bed with a healthy child or person, however confidently several writers may assert the non-communicability of this distemper; for, although this may be true in ordinary circumstances, those which I have just mentioned may favour the occurrence of very different effects.

47. (c) *May pus from a scrofulous person, although not derived from a scrofulous ulcer, communicate the malady?* It has been supposed that leucorrhœa in scrofulous females, and that vaccination, or variolous inoculation, from a scrofulous child, will communicate scrofula to persons of a sound constitution. Several writers have favoured the affirmative of this question, but their facts are false, and their reasoning inconclusive. Mr. PHILLIPS remarks, that "an important question is raised by RILLIET and BARTHEZ with reference to the influence of small-pox and scrofula. We have seen that DE HAEN and ROWLEY were of opinion that the inoculation of small-pox had a tendency to excite in the system the development of scrofula; while RILLIET and BARTHEZ state that, in any of the variolous cases they have observed, the eruptive fever has not been terminated by tubercularization. They believe it to be proved that small-pox and tubercular disease are of different natures, and mutually repel each other; that since the use of vaccination tubercular diseases had become more frequent; that those children who die without having had small-pox are more frequently tubercular than otherwise; and that of those vaccinated a greater number are disposed to tubercles than of those who have not been vaccinated. They, however, guard themselves from assigning vaccination as a cause of tubercles; all they have been able to observe is, that a greater number of vaccinated children die with than without tubercles. The only precise evidence they furnish for the opinion is the following: Of 208 vaccinated children, 138 died tubercular, 70 non-tubercular. Of 95 children who died without having been vaccinated, 30 were tubercular, 65 not so" (p. 149).

48. These results certainly agree with my own observations, and confirm an opinion I have long entertained respecting the comparative effects of vaccination and small-pox upon the prevalence of scrofula. That scrofulous and

tubercular matter may become partially resolved and absorbed, the cretaceous or mineral parts of the deposit only remaining, has been proved to take place, but the exact circumstances in which it does take place have been very insufficiently ascertained. RILLIET and BARTHEZ believe that small-pox more especially, scarlatina, and typhoid fever, tend to favour this resolution. That scrofulous and tubercular affections have increased since the introduction of vaccination is undoubted; and that the dangers from the inoculation of small-pox, under due management and care in preventing the occurrence of the non-inoculated disease, were actually few, although remarkably exaggerated, are also certain; so that, balancing the results from the introduction of the one and from the suppression of the other, it is very difficult to say that humanity or society has gained any thing by these measures.

[This statement of our author, before it can be fully admitted, must be sustained by a more extensive collection and analysis of facts than has yet been presented. The observations of RILLIET and BARTHEZ have not, so far as we can learn, been confirmed by the experience of others whose attention has been turned to this subject. Our own belief is, that scrofula and tubercularis were far more common and fatal before the practice of inoculation or vaccination was introduced than they have been since. The thousands who were subjected annually to the royal touch for the cure of scrofula, shows very conclusively that the disease was by no means infrequent; while the ill-constructed habitations, the wretched diet, the neglect of personal and domestic cleanliness, and the total ignorance and disregard of sanitary observances and the laws of health, predisposed all classes of the community to this malady. We cannot, then, but regard vaccination as the greatest blessing ever conferred by science upon humanity, and JENNER as one of the greatest benefactors of the race.]

49. *E. May other diseases occasion scrofula and tubercles?* As already shown, it cannot be doubted that vaccination favours the prevalence of the several forms of scrofula; but it is not evident how this result is produced. Can it be occasioned by the inoculation of a virus, which, although productive of a local effect, causes a certain taint of the constitution which is not prevented or removed by its elimination in the form of pustules on the external surface? According to this view, vaccination may be, in many instances, the introduction of a poison or virus, which slowly and silently contaminates the frame, without being matured and thrown out on the surface, while small-pox has a very different effect, owing to the free suppuration of the pustules, and the elimination thereby of the morbid material or virus from the system. Besides vaccination, inflammations, measles, whooping-cough, &c., have been supposed to favour the production of scrofula; but there is not sufficient evidence to prove this occurrence, farther than that all diseases which lower vital power and resistance will more or less aid the operation of the more efficient causes of this distemper. Notwithstanding the laudation bestowed upon vaccination, I believe that, as the lapse of time allows the fact to be more fully demonstrated, it will be found to be a not unfruitful source of

scrofula and tubercles, and that its effects will be imputed to the circumstance just mentioned.

50. *P. Climate, residence in large towns, occupations in factories, confinement in union-houses, in pauper institutions, in prisons, &c., and other circumstances tending to prevent due exercise in the open air, or sufficient ventilation, or to deprive persons in early life of the requisites to healthy assimilation and nutrition, may be considered as concurring agencies in the production of either external or internal scrofula.* Mr. PHILLIPS has investigated these analytically, but with reference only to the production of external scrofula, and has come to the conclusion that "the development of scrofula is not shown to be so influenced by climate or temperature as to bear any definite relation to the warmth or coldness of the country in which the disease is found. Neither the general mortality nor the deaths from scrofulous diseases bear any definite relation to the closeness with which the population is crowded together, whether the comparison is made between one town or district and another, or between different portions of the same town or district. Particular occupations and social conditions exercise a greater influence on health and the duration of life than is produced by impure air or insufficient ventilation, but they do not operate in the production of scrofula in the sense of a specific agent or of a direct cause. The general mortality and the deaths from particular diseases bear a close relation to the poverty of the population, and to the vicissitudes, or alterations of prosperity or adversity, to which they may be exposed; while wealth and station, which insure to the more elevated classes of the community abundant food, ample clothing, convenient and well-ventilated dwellings, and pure air, are nevertheless unfavourable to longevity; and the industrious labourer, whose toil insures steady remuneration, and whose temperate habits and provident character insure him the necessities of life, good of their kind and ample in quantity, is in the condition the most favourable to long life and uninterrupted health. In the last result, then, it is to diseased nutrition, however brought about, that we refer the production of scrofula; an opinion in which there may be some novelty, inasmuch as many authors have assigned to perverted nutrition a powerful agency in developing the disease—especially CARMICHAEL in England, and LEPELLETIER and BAUDELLOCQUE in France; yet my controversy with BAUDELLOCQUE consists in a denial of the exclusive agency which he assigns to impure air in deranging nutrition" (p. 239).

51. While the disease is imputed chiefly by Mr. PHILLIPS to insufficient food, the other circumstances which I have viewed as concurring causes of no mean influence, especially a self-polluted or otherwise contaminated air (§38-42), are considered of little importance by him provided that the food is sufficient. It is manifest, however, that his investigation of external scrofula, chiefly with reference to an early age, has led him to overlook the more remote influences of certain causes, which he accounts of little importance. "But the cause of diseased nutrition," he remarks, "at that period of life when the seeds of scrofula are sown, is, in the vast majority of cases, insufficient food or improper feeding; and even if the less direct agencies,

which we have been considering, occasioned scrofula much more frequently than we believe they do, the distinction is of great practical importance, viz., that they do not act in virtue of a specific influence suited of itself to produce scrofula, but as general morbid agencies which impair digestion, and thus indirectly contribute to the production of the disease. That food, insufficient in quantity, or innutritious in quality, stands in the relation of cause to the development of scrofula, more directly than any other morbid agent, is shown by this circumstance, that whenever food is abundant in quantity, and of a sufficiently generous character, scrofula is kept under, that is to say, it is less frequently seen, although other noxious agents are perhaps rife, and the general mortality is great; and that in our rural districts, where the air is probably pure and the occupation healthy, and where the general mortality is small, scrofula is largely developed; because the food, even when abundant, does not contain sufficient stimulus to preserve the frame in healthy vigour. Yet, although we may have no satisfactory proof that a contaminated atmosphere, or any one of the other indirect agencies to which we have referred, will operate so injuriously on the digestive functions as of itself to induce scrofula, I do not the less deplore the influence of those debilitating agencies, which impair the healthy activity, and lessen the proper vigour of large numbers of our countrymen" (p. 241). But that the injurious or indirect agencies which Mr. PHILLIPS considers so little influential, are really of importance as respects the development of external and internal scrofula, both in early life and in more advanced age, I am convinced, although a sufficiency of wholesome food will counteract them to a considerable extent, and especially when an hereditary taint or predisposition is not present.

52. The injurious influence of insufficient feeding in poor-houses, union-houses, in other pauper institutions, and in prisons, has been sufficiently demonstrated by CARMICHAEL, BAILY, PHILLIPS, TYLER SMITH, and others. But it is not to the insufficiency of food alone that the production of scrofula should be imputed, although it may be admitted to be the chief agent. Crowding of the sleeping apartments, breathing an impure or contaminated atmosphere, insufficient ventilation, confinement or deprivation of exercise in the open air, and depression of spirits, co-operate more or less with this more efficient cause. But as in most of the union-houses the inmates have more food than the independent labourer can procure, even when fully employed, it cannot be a matter of surprise to find scrofula more prevalent in some country districts than it is even in some manufacturing towns. In connexion with this subject, Mr. PHILLIPS very justly remarks, that, believing the health of the child and the vigour of the man to depend upon the sufficiency and nutritious character of their food, a still more liberal diet for pauper children than is at present afforded would, at one and the same time, better the health of our population, and be consistent with a sound national economy. The reports of the Inspectors of Prisons furnish numerous instances where prisoners have manifested glandular tumours under the discipline to which they have been subjected, and have quickly rallied under



an improved diet. Dr. BALY states, that a "marked difference, in respect of their general health and the number affected with scrofulous disease, is presented by the convicts sent to the central prison at Millbank from different parts of Great Britain, preparatory to their transportation. By far the thinnest convicts, and the largest proportion of unhealthy and scrofulous individuals, come from the Scotch prisons, in which the diet consists of a sparing allowance of vegetable and farinaceous food."

53. iii. OTHER CAUSES CONCURRING IN THE PRODUCTION OF THE SCROFULOUS TAIN, AND AIDING OR DETERMINING THE DEVELOPMENT OF TUBERCULAR FORMATIONS.—The causes which have been here insisted upon are certainly the most influential in the production of latent and developed scrofula and tubercles; but there are others which concur with the foregoing either in producing a scrofulous taint or external scrofula merely, or in developing internal tubercles, especially in the lungs, in persons who are already imbued with this taint, and which, when acting energetically, may produce this effect even on those who are not thus manifestly imbued. In this latter case, the causes in question, acting either independently of the foregoing causes, or conjointly with them, or aiding and determining their effects, impair not only the vital energy and vital functions throughout the frame, but also the nutrition of the several tissues, and the intimate condition of vital cohesion and action. Many young persons possessed of a scrofulous diathesis, or who have been the subjects of external strumous disease in childhood, and even some who present no very marked sign of a scrofulous taint, become, as puberty, or early manhood, or more mature age, is arrived at, the victims of tubercular formations in some internal organ, especially in the lungs, owing to the operation of those causes which I am now about briefly to consider.

54. A. *Neglect of exercise in the open air*—of exposure to the light of day and to sunshine—is one of the causes which is most influential in superinducing tubercular formations in the scrofulous diathesis, and even in constitutions which evince no evidence of this taint. The general neglect of the indications suggested by the alternations of night and day; the neglect of repose during the hours of darkness, and of rising and of being employed during the hours of day; the common practice of pursuing our avocations and recreations during a large portion of the time intended by nature for our repose, and of devoting a large portion of the day to sleep, is not without influence in impairing the constitutional powers, in weakening the assimilating and excreting functions, and in relaxing the mental vigour. An early departure to nocturnal repose, and the limitation of this repose to the hours of darkness—the trite maxim of "early to bed and early to rise," &c., is of much greater importance than is indicated by the practice of modern times.

55. B. *Inattention to a due preservation of the cutaneous function* is not without its influence. The imperfect performance of this function, the sudden arrest of it, or the entire suppression of it, however well it may be vicariously discharged by the lungs, kidneys, or intestinal canal, endangers the healthy condition of the blood, and disorders the assimilating processes. It should

not be overlooked, in our pathological speculations, that the cutaneous function is supplemental of other important functions—of the respiratory, of the renal, of the hepatic, and of the intestinal; and that, even when no supplemental or vicarious office may be traced to this function or to either of these other functions, a very intimate relation subsists between them, the due discharge of the one influencing the others more or less. The importance, therefore, of duly regulating this function, guarding against its excess as well as its suppression, by proper clothing and exercise, will be admitted.

56. Among the *dark-skinned races*, a free and even an abundant cutaneous perspiration is most necessary to the continuance of health; and when it is habitually diminished, especially by migrating to a colder climate, tubercles, especially in the lungs, supervene in very numerous instances. A diminution of the accustomed perspiration may not, however, be the sole cause of this liability of the Negro and other dark races to tubercles after migrating to temperate or cold climates. The sedative influence of cold upon the constitution of these races may have a considerable or chief share in the production of this effect, especially in connexion with the obvious want of adaptation of the constitution of these races to temperate and cold climates. Of the *influence of climate* generally upon the prevalence of scrofulous and tubercular diseases no precise data exist. The subject, however, will be adverted to in the sequel, and in the article on TUBERCULAR CONSUMPTION.

57. C. *Intimately connected with the foregoing is the influence of dress and of various physical conditions depending on occupations and habits of life.* Exposure of parts of the frame requiring protection or uniformity of temperature, as the upper regions of the chest, and the hips and lower extremities, to vicissitudes of season and weather, and sleeping in too low a range of temperature, are injurious, the effects being more frequently manifested in the lungs than in any other organ. To restrain habitually the movements of the thoracic and abdominal parietes, by position, by occupation, or by dress, or to otherwise embarrass the function of respiration, is much more injurious than is generally considered. The stooping position, particularly when long continued or frequent; stooping at a low desk or table, especially if a part of the parietes of the chest is brought in contact with, or rests upon, the desk; and, above all, stiff and closely-laced stays or corsets, are among the most injurious agents to which youth or mature age can be subjected, and their effects are most frequently manifested by favouring the development of tubercles.

58. Stiff or unyielding stays prevent the due exercise of the muscles of the trunk, impair their development in early life, and weaken these muscles at later periods. If this article of dress be too closely applied or drawn around the waist, the movements of the ribs are restrained or even prevented; the liver is carried upward, and it invades the thoracic cavity, compressing the lungs and embarrassing the circulation through the heart and large vessels; and the colon is more or less displaced or pressed upon, with the rest of the abdominal viscera. The undoubted consequences of these conditions—consequences which vary in

amount and danger with the cause now assigned—are an imperfect performance of the respiratory, of the digestive, of the assimilating, and of the excreting functions; and ultimately a morbid state of the blood, tubercular depositions, especially in the lungs, hæmoptysis, anæmia, &c.

59. Not less injurious than tight lacing is the practice of wearing unyielding supports in the stays, especially steel supports, which, however well covered, tend to carry the electromotive influence from the frame, and to withdraw a salutary stimulus of nervous power from the system. The importance of attention to this matter is not hypothetical but real, as proved by long and frequent observation, and by the results following the removal of this evil. The more freely the movements of the trunk and spine are allowed to be performed, and the more efficiently the actions of the muscles concerned in these movements are accomplished, the more certainly and healthily will the functions of the several organs contained in the trunk be discharged. (*See art. DISEASE, § 23, et seq.*)

60. *D. Excessive secretion*, and more especially an excess of the recrementitious secretions, or an undue discharge of the latter contrary to the intentions and indications of nature, and particularly the unnatural and debasing vice of masturbation—a vice most generally practiced by prudes, the unmarried, and the sanctimonious—have no mean influence in the production of tuberculosis, especially of the lungs, even independently of the pre-existence of a scrofulous diathesis. The vice now adverted to, and a premature or excessive sexual intercourse, are injurious both by the discharge from the economy of a secretion intended to aid the healthy development of the frame, and afterward to support and to promote the nervous and other functions, and by the frequent and excessive excitement by which this discharge is preceded, a consequent state of languor, depression, and vital exhaustion always resulting.

61. *E. Prolonged mental application*, or exertion, is more or less exhausting to both mind and body, as respects not only its direct operation, but also its indirect influence, especially in preventing a salutary recourse to hygienic measures, and inducing a neglect of exercise in the open air, of change of air, and of the various recreations which tend no less to strengthen the body than to invigorate the mind.

62. *F. An inordinate indulgence of the passions and affections*; the various depressing moral emotions, anxiety of mind, hope deferred; frettings and disappointments, losses of fortune and friends, and all the sentiments which tend to weaken the organic nervous energy and lower the heart's action, more or less affect the digestive and assimilating as well as the excreting functions, lower the powers of life, vitiate the circulating fluids, impair or alter the nutrition of the structures, and thereby favour or develop tubercular formations. But it is unnecessary to pursue this topic any farther, as it is more fully considered in another part of this work (*see art. DISEASE, the Causation of, § 22, et seq.*)

63. III. OF THE PATHOLOGY OF SCROFULA AND TUBERCULOSIS.—Writers on scrofula and tubercular deposits have differed remarkably not

only in respect of the identity of these morbid states, but also as regards the origin, modifications, complications, and various other pathological relations of both. It will, therefore, be requisite to describe, 1st. *The Structure of Scrofulous and Tubercular Matter*—a. as anatomically displayed; b. as appearing under the microscope; and, c. as determined by chemical examination. 2d. To inquire into *The Identity and Dissimilarity of Scrofula and Tubercles*. 3d. To consider *The Pathological Relations, Origin, and Nature of these Maladies*. 4th. *Their Localization or Seats*. 5th. *Their Modifications and Complications*. 6th. *The Comparative Pathology of Scrofula and Tuberculosis*. The discussion of these topics will prove the best introduction and guide to the consideration of the very important subjects of the *prevention and cure* of these very prevailing diseases.

64. i. THE STRUCTURE OF SCROFULOUS AND TUBERCULAR MATTER.—Scrofulous and tubercular matters are peculiar morbid formations, the product of an altered secretion and nutrition of the parts containing them, arising independently of inflammation, although frequently associated with a modified state of inflammatory action, apparently induced by these morbid products. These morbid formations are different, 1st, from the products of ordinary inflammation, occurring in a previously healthy constitution; 2d, from other morbid growths, as shown in the article on Scirrhus and other Morbid Tumours. The scrofulous change, matter, or deposit present various appearances, superficially, according to its stage, its seat, and the alteration of the surrounding tissues; yet it is essentially the same at each of its stages, whether it is formed in a scrofulous external gland or in an internal organ. It varies chiefly in grade or stage, or in the successive changes which it undergoes, and in the form of its infiltration, especially at an early stage. Opinions, however, on these and other allied topics are extremely various, but I shall notice the chief of them.

65. A. *The Physical or Anatomical Structure of Scrofulous and Tubercular Matter*.—(a) As respects *scrofulous or enlarged superficial lymphatic glands*, the difficulty has been to demonstrate the changes which take place at the commencement, or at an early period of this disease. The question to be solved respecting them is whether the tubercular deposit, which is undoubtedly the chief change even in them, is the primary manifest lesion, or whether the increased vascularity often attending this deposit is the primary morbid alteration? This question will, however, be more fully considered in the sequel; but, before it can be entertained, the appearances presented by the scrofulous deposit, in various situations and seats, require to be noticed. The most obvious change in a scrofulous gland is its increased size. LLOYD and SOEMMERING ascribe this enlargement chiefly to thickening and increased vascularity; but it is more certainly owing to tubercular infiltration, in patches and rings, throughout the structure of the gland. The gland often remains in a stationary condition for a long time, presenting a granular yellow tuberculization, with little or no increase of vascularity, and with a permeable state of the vessels. But as the morbid deposits augment, the vascularity of the gland



itself diminishes, or is gradually obliterated, owing to the pressure of the infiltrated matter, although the vascularity of the cellular tissue surrounding the gland is increased. BREDDOW considers that the vessels found early in scrofulous glands belong to the tissue of the gland itself, and not to the scrofulous deposit in it.

66. Tuberculous matter, then, is infiltrated in the tissues of a gland, organ, or part. Sometimes traces of those tissues may still be recognised in the tubercular mass. It is only in such cases that any appearance of blood-vessels can be traced, the vessels being merely those belonging to the infiltrated tissues. In other cases, the tissues, being more and more compressed by the increase of the tubercular matter, almost or altogether cease to be distinguishable, and nothing is to be found but a homogeneous mass of this matter. In some instances, the mass is isolated by degrees from the surrounding living parts, and a cyst becomes formed around it, as is formed around pus or any foreign body. Here there is a close analogy between the formation of pus and tubercular matter, either of which being infiltrated into the tissues of the part in which they are found, and afterward becoming isolated by impacting the tissues around them into a cyst. According to MECKEL (*Pathol. Anatomie*, 2ter Bd., 2ter Th., s. 370) the encysted state of tubercles is more frequently met with in the lower animals than in man.

67. KINGSTON, THOMPSON, and LUGOL, however, maintain that they have recognised blood-vessels in tubercles; but CANSTATT remarks, that SEBASTIAN explains this rightly in viewing it as a mistake, arising from the circumstance of tubercular matter being sometimes deposited on a small blood-vessel without giving off a branch to this deposit. ANDRAL, ROCHOUX, CARSWELL, CANSTATT, and others agree in asserting that lymph-vessels do not communicate with the scrofulous deposit.

68. MM. BARTHEZ and RILLIET infer, 1st. That, when a lung contains gray granulations isolated from one another, an injection penetrates easily by the bronchi and by the pulmonary arteries and veins; 2d. That the vascular network which surrounds the granulations communicates very evidently with the pulmonary artery, and probably not with the vein; 3d. That the bronchial injection surrounds on all sides the gray granulation, and conceals it in part only: it is not disposed in very fine ramifications similar to a vascular lace-work, but in little grains united to one another; and, 4th. That perhaps the bronchial injection can penetrate the granulations. As respects the semi-transparent, gray infiltration, they state that there the veins and pulmonary arteries are very penetrable by injections, while the small bronchi are obliterated, which latter fact is similar to what is observed in pneumonia. These observations, however, do not prove the vascularity of tubercular deposits, but rather that this deposit, as respects the lungs, often takes place in the vesicular structure or air-cells of the organ, as supposed by MAGENDIE, CRUVEILHIER, CARSWELL, ANDRAL, and KINGSTON. That the vessels become obliterated with the progress of tubercular infiltration, is contended for by GUILLOT and CANSTATT, according to whom the tubercle itself is always non-vascular, but

around the mass, or around the cavity left by it, an infiltrated layer of gray matter exists, which obliterates the vessels in the space that it occupies.

69. Dr. GLOVER remarks on this topic, that these facts and observations, taken together, lead to the conclusion of the vascularity of tubercle being a non-essential phenomenon; and that the obliteration of the vessels of the tissue into which the scrofulous or tubercular matter is effused may be carried to a greater or less extent. And it farther agrees with my own observations, that the irritation produced by the infiltrated matter in the surrounding tissues may cause either increased vascularity, or in some instances obstruction of the vessels; and that the enveloping tissue of the tubercular mass may thus be either more or less vascular or devoid of vessels; but that tubercular matter is itself non-vascular.

70. The tubercular deposit, whatever may be its seat, may be viewed as a small tumour or tubercle, varying remarkably in size, from that of a small pin's head to that of an orange; and in colour from a grayish, semi-translucent hue to a yellowish white or grayish yellow, commonly of a round form, at first firm but friable, afterward being transformed into a heterogeneous matter consisting of whitish, curdy masses, and a sero-puriform fluid. When the tubercle is changed to this state, it generally gives rise to an ulcerous cavity, which extends more or less rapidly in every direction, sometimes remains stationary for an indefinite period, and, in much rarer cases, becomes cicatrized, or covered by a sero-fibrous lining.

71. (b) Much discussion has arisen as to the earliest recognised form and appearance of the tubercular formation. M. LAENNEC conceived that the white opaque corpuscle, constituting tubercle, is preceded by a grayish, semi-transparent granule, in whose centre is developed a whitish point, which by degrees extends to the surface and involves the whole substance of the granule, so that the granule is really the first stage of tubercle. Dr. BARON and M. DUPUY believed that tubercles originate in a transparent vesicle. M. ANDRAL has endeavoured to ascertain the accuracy of this opinion, and he states that it is quite certain that, in some few cases, small, round, transparent vesicles, filled with a serous fluid, are found along with undoubtedly genuine tubercles of various sizes in the lungs of the horse; but that he has never been able to find this appearance in the human subject, excepting in one solitary case. He has sometimes seen the fluid contained in these vesicles in the horse lose its transparency and become turbid, and the entire vesicle thus assume the aspect of the opaque, white tubercles around it. From this M. ANDRAL infers that the transparent vesicles found in rare cases among tubercles are only accidental productions, with which the latter are complicated; that they cannot be considered as the early stage of tubercles; and that, although they occasionally seem to secrete a matter similar to that observed in the early stages of tubercles, yet this does not prove identity.

72. M. ANDRAL farther contends that the original form of tubercle is not a serous vesicle, nor a grayish semi-transparent granule, as LAENNEC maintained. The opinion of this latter pa

thologist respecting the origin of tubercles in granulations has led to the notion that the small, grayish, irregularly-rounded bodies sometimes found studding the free surface of serous membranes are incipient tubercles. M. ANDRAL, however, more correctly views them as the mere rudiments of false membranes; and a similar mistake has been made in considering as incipient tubercles those grayish granules sometimes found in mucous surfaces, which seem to be merely mucous follicles in a state of enlargement. The identity, therefore, of the granulations found in different organs and surfaces with tubercles is not proved, although those granulations are frequently complicated with tubercles, and may secrete tuberculous matter as they may secrete pus.

73. M. CRUVEILHIER has advanced another opinion, namely, that before the occurrence of tubercle as a hard body, and at an earlier period, it may be detected in a fluid puriform state. MM. TROUSSEAU and LEBLANC have, as well as CRUVEILHIER, found among well-formed tubercles clusters of points, in some of which was a purulent infiltration, in others very small abscess. M. ANDRAL has seen, in a few cases, a similar appearance; but although those facts seem to offer some confirmation to M. CRUVEILHIER's opinion, yet the same objection applies to it as I have already adduced. It is probable that tubercles are secreted in a fluid state, but the fact is not demonstrated; and, however small tubercles may be, they are always found in the solid state. I have observed these bodies in the lungs of very young infants, and of the fetus at the full time—where they are extremely rare; but they have always presented the solid or consistent form.

74. It may be granted, as contended by M. ANDRAL, that tubercles are in their first stage when they appear as minute, opaque, friable, rounded bodies of a yellowish-white colour, and without any trace of organization or texture. But this is not the only form in which they may commence. Besides these *yellowish miliary tubercles*, there is another form, which, since the appearance of the writings of BAYLE, has been the subject of much discussion, namely, the *gray, semi-transparent granulations*, which, according to LAENNEC and LOUIS, are the first degree of development of tubercle, the miliary yellowish tubercle being only a transformation of the grayish granulation. This is, in fact, confirmed by microscopic observation by LEBERT (§ 85). The gray granulations, transparent towards their margins, and sometimes also at their centres, often show in this latter situation a point more opaque and yellower than the rest. They are not surrounded by any envelope. They do not constitute the necessary and constant origins of fully-developed tubercles, but are only one of two forms which these bodies assume at their commencement, the yellowish miliary tubercle often commencing as such, and sometimes being a transformation of the grayish granulations. Tubercle may, therefore, at its commencement, present either of these forms; or it may appear as a gray and yellow infiltration, as a gelatiniform infiltration, or as tuberculous dust, according to French pathologists. It was supposed that the gray granulations occurred only in the lungs; but it has been shown by MM. VALLEIX,

PAPAVOINE, NELATON, and others, that they are found also in other organs.

75. In scrofulous meningitis gray granulations and yellow particles are observed, as in the lungs. The former may also be detected in the glands, especially in the mesenteric glands, and between the coats of the intestinal canal. BARTHEZ and RILLIET, also, view the gray granulation as a form of incipient tubercle, not peculiar to the lungs, but existing occasionally in other organs, as under serous membranes, in the spleen, kidneys, liver, lymphatic glands, &c. It is chiefly developed in the cellular tissue, especially that connecting serous or other membranes to adjoining parts, and is often produced by congestion or by a mechanical hyperæmia. It is not improbable that the gray and gelatiniform infiltrations of LAENNEC are early stages of tubercular formations. The gelatiniform infiltration may pass into a gray infiltration, and this latter into a gray granulation, which may or may not go on to the state of yellow tubercle. The tubercle-grains, whether yellow, miliary, or semi-transparent granulations, are most separated and scattered when small, or at an early stage of development. As they increase in size they often become confluent. In the lungs more especially, they present every grade or stage both of change and development. There are often found, even in the same subject, the gray or semi-transparent granulation, rarely alone, but usually accompanied with yellowish granulations; the same miliary tubercle, quite yellow and caseous; tubercles much larger; masses more or less softened, or even cretaceous cavities, &c. In many cases death supervenes before a large proportion of the minute grayish tubercles, or granulations, has reached more advanced phases of their growth or progress. In many instances, grayish granulations are found as the commencement of tubercular disease in one organ, and the yellowish miliary tubercle in another organ or part. It is not rare to find in young children the latter in the sub-arachnoid cellular tissue, and the former under the pia mater. Gray granulations are often found in the sub-plural cellular tissue, and yellowish tubercles in the lungs.

76. (c) *Gray granulations* are found to possess the globules of tubercle from their earliest appearance (see the microscopic appearance of tubercles, § 81), and may exist in every part in which tubercle has been detected.—*b.* They are not a product of inflammation, although they may be found in inflamed structures.—*c.* They are most abundant and most frequent in the lungs and in the pia mater.—*d.* They are sometimes accompanied in the lungs with a dark or melanotic secretion.—*e.* When death does not take place early, they generally pass into the form of *yellowish tubercles*, by the destruction of the fibrils which separated their constituent elements and by the progressive deposit of the tubercular matter.—*f.* *Tubercles* do not necessarily commence in the grayish semi-transparent granulations, but also as frequently commence as yellow and opaque miliary tubercles.—*g.* In the same body both these forms of commencing tubercle are not unfrequently found, not only in different organs but even in the same organ.

77. (d) *Growth*.—Besides the transformation



already stated (§ 70), and previously to it, tubercles experience an *increase of bulk*. It seems important to ascertain how a body of the size of a small pin's head may acquire the bulk of a small orange. To account for this remarkable development, it has been supposed that this morbid production has the power of living like organized beings—of growing by intussusception. But if this were the case, it would show appearances of organization and vascularity: now, however large the tubercular mass may be, no trace of either the one or the other can be detected in it. We can, therefore, view this formation merely as a morbid secretion, which, having once commenced, continues, the deposition of the particles of tuberculous matter separated by the vessels from the blood increasing the mass.

78. (e) The *softening* of tubercles, or the puriform transformation of them, seems to arise from the circumstance of their acting as foreign substances on the surrounding tissues, the tubercular matter exciting a secretion of sero-puriform fluid from those tissues. This fluid divides mechanically the tubercle, and changes it into the state usually termed that of softening. The tubercular matter being once secreted in the tissue of an organ or part, thus becomes, after a time, a source of irritation to the vessels of the tissue in contact with it; and the consequence of this is the effusion of a fluid secretion which breaks down the tubercular matter. The semifluid matter thus formed tends to perpetuate and to increase the irritation of the surrounding tissue, and necessarily leads to a solution of continuity by which a way is opened for the escape of the tubercular matter, as in the case of a foreign body. But even after this has been accomplished, the morbid process excited in the surrounding texture generally continues. This theory of the softening of tubercles does not differ materially from that adopted by MM. LOMBARD and ANDRAL. After the expulsion of the tubercle has been accomplished, the process of supuration may continue, and, moreover, the same cause which had produced the tubercle before may produce it again; the same process which eliminated it may contribute to the renewal of its formation; so that, far different in this respect from a foreign body introduced from without, the tubercle may be indefinitely recreated simultaneously with the pus destined to produce its discharge. It has been asserted by ROKITSKY, Mr. RAINEY, and several pathologists, that the softening of tubercles always commences at their centres: this is certainly the case in many cases; but the process may also begin in other parts, and particularly towards their surface. When it commences in the centre, it may be imputed to a decomposition taking place in those molecules of the mass first deposited and farthest removed from the surrounding living tissues.

79. (f) In rarer instances tubercles, in place of being softened, acquire unusual hardness, and are *transformed* into a firm, gritty mass, in which a considerable quantity of the phosphate and carbonate of lime is found upon chemical analysis. These salts likewise exist in the softened, as well as in the early stage of tubercles, but in much smaller quantity. The transformation of the tubercles into a harder

substance seems to proceed from an absorption of a considerable portion of the animal matter of which they chiefly consist. M. THENARD found tubercles, in their primary or unsoftened state, to consist, in 100 parts, of 98.15 of animal matter, of 1.85 of the muriate of soda, phosphate of lime, and carbonate of lime, with a trace of oxide of iron; while those tubercles which had undergone the cretaceous transformation presented inverse proportions of those substances; that is, in 100 parts, of 3 of animal matter, and 96 of saline matter.

80. The *cretaceous transformation* occurs most commonly in those cases where the tubercles have long ceased to exert any hurtful influence on the constitution, this being the reverse of the purulent transformation. This change has been demonstrated to me in several cases, three of which occurred in medical men. I shall briefly allude to one case, as having lately come before me. A young man, about twenty, evinced symptoms of incipient phthisis, for which he was recommended to visit the Mediterranean. After being abroad for several years, he returned to London in a tolerably good state of health. I attended him some time afterward for an attack of partial bronchitis, during which he expectorated two or three cretaceous masses, evidently transformed tubercles. He recovered, travelled abroad, and returned again to this country, where he continued for a considerable time in apparent health. He was afterward attacked—about twenty years subsequently to the appearance of phthisical symptoms—by an acute disease, of which he died. Upon examination, a considerable number of cretaceous tubercles were found in the lungs, which were not otherwise much diseased. We may generally infer that, when symptoms have announced the presence of tubercles, and have subsequently disappeared, the patient continuing afterward to enjoy tolerable health, the cretaceous transformation of the tubercles has taken place. M. ANDRAL states, that he has occasionally found, surrounding the cretaceous tubercle, a tissue that appears shrunk, and occupies less space than in the healthy state; indicating that, in some cases at least, this tissue has actually been in part destroyed and absorbed, along with a tubercular mass whose remains appear as a calcareous concretion. This inference is farther confirmed by the fact of tubercles being sometimes found, even in the softened state, containing hard, gritty particles, formed of phosphate of lime, mixed with the curdy masses floating in the puriform fluid.

81. Tubercles being produced from a morbid state—whatever kind that may be—of the nutrition, and interstitial exhalation constantly going on in the different organs of the body, it follows that they may be developed in any one or more of them. As to the particular tissue in which this morbid exhalation or secretion takes place, some doubt may be entertained. The very general diffusion of tubercles and other considerations indicate the cellular tissue, either free or combined, as its seat; but although this tissue may be the most common, it is not the only seat of this secretion. It should, however, be stated that Dr. BARON refers it to the radicles of absorbent vessels, and some circumstances seem to support his opin-

ion. M. ANDRAL remarks on this topic, that "the submucous, subserous, and intermuscular tubercles are evidently developed in the cellular tissue. It would be difficult to prove that the same holds good of tubercles of the spleen; and we can admit it only by analogy in those of the brain, liver, kidneys, testicles, and lymphatic glands." As to the lungs, we may readily detect tubercles in the substance of the cellulo-vascular tissue which forms the parietes of the air-vesicles, and the extremely small bronchial tubes opening into them. An apparently tuberculous matter, he adds, has been found in the interior of cavities lined with mucous membranes, without the presence of ulceration. This rare occurrence leads to the inference that tubercles may be secreted in other tissues than the cellular; and proves that, as they arise from a morbid state of the interstitial exhalation constantly proceeding in the different organs and tissues of the body, they cannot be referred to a single tissue or system merely, however generally diffused through the body such tissue or system may be.

82. *B. THE STRUCTURE OF TUBERCLES AS DISPLAYED BY THE MICROSCOPE.*—The lower microscopic powers furnish but little information as to the intimate structure of tubercles, and those who have employed the highest powers differ as to the most important topics connected with this subject. Even the results published at different times by the same observers differ remarkably. Thus CANSTATT states, that "every trace of organized structure is wanting to tubercle-matter: vessels which have been observed in it either belonged to false membranes developed in its bounds, or were the remains of tissues accidentally destroyed." And he adds, that, "microscopically observed, the peculiar fine tissue of organized bodies, growing by intussusception and composed of cellular cyto-blasts, is wanting to tubercle-matter. A mass, composed, in great part, of imperfect cells easily broken down, is only distinguished. As the tubercular deposit increases from without, the tubercle grows by apposition, and in this way increases from tubercle-molecule to tubercle-mass, formed of layers placed concentrically. The outer layers more recently deposited consist of a more transparent matter. This mode of growth forms an essential distinction between tubercle and idioplastic parasitical formations, which increase, like organized beings, by intussusception, while tubercle grows more like inorganic bodies." But CONSTATT afterwards states that, contrary to his earlier view of cell-formation being wanting to tubercles, he has since convinced himself of the existence of cells, as VOGEL describes them; and he recalls what he had formerly said about the amorphous condition of tubercle. He adds, that "SCHARLAN describes the tubercle grains as an accumulation of minute corpuscles about the 1-2000th of a line in size, which in many situations form a dark, blackish-gray granulated mass; and that GLUGE and CERUTTI give a similar description. The observations of KUHN as to the papillary appearance of tubercle under the microscope rest on an illusion. The peculiar bodies, described by GRUBB in tubercular sputa, as consisting of whitish-yellow lenticular, round, or oval corpuscles, from one to ten times larger than pus-corpuscles, of a darker yellow, and of

concentric layers, are not confirmed according to others, and appear to have been a misconception. Tubercle consists, at its commencement, according to I. VOGEL, of an amorphous mass, which almost disappears in acetic acid, and even in ammonia, and in which the rudiments of cell-formations are already found; this mass gradually passes wholly into tubercle-cells, of very different sizes, from the 1-80th to the 1-400th of a line, and of different forms." VOGEL farther states, that these cells are either rounded, or oval, or long, or drawn out, tailed, or string-like, irregular, &c., with very pale walls, with nuclei which are larger in the small cells, smaller in the larger; and that they often contain fat granules, or granules of dark pigment. The walls of these cells become more transparent, or wholly disappear by means of acetic acid, while their nuclei remain unchanged. Both the cells and the nuclei are destroyed by ammonia. VOGEL, notwithstanding, agrees with VETTER in considering that, although the presence of cellular bodies is proved in tubercles, these bodies may be distinguished from the usual formative cyto-blasts; the organic elements found in tubercles being rather the rudimentary portions or altered remains of other tissues, than independent bodies.

83. The individual corpuscles of tubercle are, according to RUETTE, composed of an integument and a nucleus, and are rather larger than blood-globules. BREDOW says that he could find no integument to the corpuscles. SCHREER found the firmer or outer portion of tubercle to consist of a multitude of little granules and nuclei mixed with a few irregular larger cell granules, but no fibrous structure, nor free fat corpuscles. The softened inner portion contained nuclei of granular corpuscles, which were as large as the round nuclei of the more solid outer part. GERBER asserts that tubercles consist almost entirely of granules, from 1-2000th to 1-200th of a line in diameter; but that, with the granular matter, nucleoli, nuclei, or cells are mingled in a quantity in proportion to the amount of fibrin which the exuded fluid contains.

84. Mr. GULLIVER states, in his edition of GERBER, that tubercular matter consists "chiefly of irregular corpuscles and cells, with oblong and circular nuclei;" and that it is "void of regular structure, being composed of shapeless fragments, and a granular matter formed of minute spherules very variable in size." In Mr. PHILLIPS's work he is quoted as follows: "In the human subject, it appears to me that crude tubercular matter, from whatever organ obtained, differs as little in its microscopical as in its general and chemical characters. When examined by the aid of the microscope, crude tubercular matter can scarcely be said to present any regular structure, as it is merely made up of minutely granular matter, oily spherules, some shapeless albuminous flakes or shreds, and a few irregular corpuscles; the latter are probably nothing but effete, or shrunken primary cells" (p. 41).

85. M. LEBERT remarks, that tubercles present microscopical elements proper to themselves, and distinguishing them from all other morbid products. In this respect they obey the general law, that all existences which are really different pathologically differ also in respect



of molecular composition. Tubercles, according to M. LEBERT, contain a great quantity of molecular globules, varying in diameter from 1-1600th to 1-800th of a line, a hyaline substance which unites their elements, and a species of corpuscle which gives them a peculiar character. These corpuscles are of irregular angular form, vary in diameter from 1-200th to 1-300th of a line, and generally present a well-defined edge. Their interiors are yellowish, slightly opaline, and often contain molecular granules distributed through their substance: they never contain true nuclei, which are so common in cancerous globules, and so constant in those of pus. Acetic acid, which renders the latter transparent, and displays nuclei within them in a very distinct manner, renders the tuberculous corpuscles also more transparent, without disclosing true nuclei in them. If water be added to the tuberculous corpuscles to make them float, their form is seen to approach that of an irregularly polyhedral sphere, instead of being flattened like the globules of pus or cancer. They are numerous, and present so many superimposed layers in the best microscopical preparations, that it is necessary to have observed them repeatedly, and with a clearly defining magnifying power of from 400 to 500 diameters, in order to acquire an accurate notion of their characters.

86. The ordinary element of tubercle, according to Dr. GLOVER, in whatever situation this deposit may occur, is the granular corpuscle. "Many tubercular masses are composed almost wholly of this matter, which varies in size from about the bulk of a blood-globule to about, perhaps, 1-10000th of an inch in diameter. These corpuscles are generally of a somewhat yellowish colour; and when magnified by the highest power (610 diameter), show, occasionally, spots in their substance, which may possibly, in some cases, be nuclei." Mixed with these, which he believes to be in some instances altered cells, in other cases new formations, there are the following elements: 1st. Epithelial scales, variously altered, observed in lung-tubercle; 2d. Fat globules; 3d. Crystals of salts; 4th. Portions of the destroyed tissues, which sometimes assume singular shapes; 5th. Cells, which also appear to belong to the old tissues; 6th. Large granular and corpuscular masses of the most irregular forms. The description of tubercle by Dr. J. HUGHES BENNETT has been adduced at another place. (See SCIRRHUS and OTHER GROWTHS, § 71.)

87. Microscopical examinations of tubercle and scrofulous matter have also been made by Mr. DALRYMPLE, and published by Mr. PHILLIPS, as follows: "The whole material is composed of disintegrated tissue; granular molecules; irregular exudation corpuscles, in which the nucleus is seldom to be recognised; and a considerable quantity of oil globules, which may be abstracted by boiling in ether, and recovered by evaporation on a plate of glass.

88. The following remarks of Mr. DALRYMPLE are diagnostic of tubercular matter, inasmuch as they distinguish this matter from the *pus-globule*, and from the exudation corpuscle: "In acute or chronic inflammation of the glands, in otherwise healthy subjects, in whom no particular morbid disposition exists, the exudation corpuscle, by what appears a law of vitality, proceeds

to the development of a cyst around the nucleus or cytoblast; and this nucleus even splits into two or more, and hence a *pus-globule* is formed. At this point, however, the process stops, and the *pus-globule* subsequently disintegrates, and is resolved into granular and fluid matter. During the development of the cell and fissure of the nucleus, a *pus-globule* may be said to be an organic and vitalized body, deriving its means of increase from the blastema around.

89. "The exudation corpuscle, however, is capable of a much higher degree of organization; and, under favourable circumstances, the cell-germ produces its cell; the cell elongates, and either fibre or filament is produced, as in the healing of a wound.

90. "In scrofulous matter it appears that the exudation corpuscles do not possess even that feeble power which induces the farther change into pus, and therefore it passes from the nucleolated cytoblast into an irregular granular body (disintegrated), the elements of which, by some farther chemico-vital process, resolve partially into oil or fat globules" (p. 40).

91. C. THE CHEMICAL COMPOSITION OF SCROFULOUS AND TUBERCULAR MATTER.—M. SIMON remarks, that chemical analysis has hitherto thrown very little light on the nature of *tubercle*, or on the mode of its formation. A tubercular mass, analyzed by PREUSS, contained 19.5 of solid constituents, and 80.5 of water; the former were composed of a substance resembling casein in its relations towards acetic acid and heat, a fat containing cholesterin, and a very small quantity of salts. SCHERER, according to Dr. DAY, states that crude pulmonary tubercle yielded little fat or extractive matter, showing that the morbid process was not far advanced. An ultimate analysis, after the most careful removal of salts and foreign constituents, gave:

Carbon.....	53.888	} which corresponds with the formula C 43, H 35, N 6, O
Hydrogen....	7.112	
Nitrogen.....	17.237	
Oxygen.....	21.767	13.

Hence tubercle in a crude state may be regarded as *protein* (C 48, H 36, N 6, O 14), from which five atoms of carbon, one of hydrogen, and one of oxygen, have been removed. SCHERER has made several other analyses of tubercles from different parts of the body; but they differ as little as, and sometimes less than, the above from the composition of protein. (See Dr. DAY's Transl. of SIMON's *Animal Chemistry*, vol. ii., p. 480, &c.)

92. GUETEROCK has also analyzed tubercles from the neck, from the bronchi, and from the lungs; and he states that they contain, 1st. Albumen in small quantity; 2d. Pyine, differing from casein; 3d. Phymatine, a species of osmazome, which, according to him, is proper to tubercles, and which is soluble in water and in alcohol, is precipitated by the acetate of lead, but not by galls, nor by the solution of the sulphate of copper; 4th. Fatty matter, not only cholesterin, but also saponifiable fat. As to phymatine, a principle which GUETEROCK says is proper to tubercles, its existence requires to be proved by other analyses. Tubercular matter has been chemically examined by BOUDET, HECHT, and others, but the analyses of PREUSS and SCHERER appear to be most satisfactory,

and to them M. LEBERT has given the preference.

93. ii. THE BLOOD IN SCROFULA AND TUBERCLES has been long considered popularly, and with much truth, to be of a poorer quality than in healthy constitutions. SIMON states, that the blood is deficient in solid constituents, especially in fibrin and in corpuscles. The primary causes are probably due to a deficient formation of chyle, and to the influence of a most unhealthy atmosphere. According to DUBOIS, the blood of scrofulous subjects coagulates slowly, the clot is small, soft, and diffuent; the serum is thin, and often a reddish colour. Under the microscope, some of the corpuscles appear devoid of colour at the edges only, some entirely colourless. Their size is not materially changed, but they appear flattened, spherical, or cylindrical. Hence he infers that there is a deficiency of the salts in the blood of scrofulous persons. Mr. PHILLIPS remarks that, in every case in which he examined the blood of scrofulous subjects, the coagulum was relatively small, the serum large; the clot unusually soft, almost diffuent; in a few instances only it was tolerably firm. In most cases the proportion of globules was considerably under the healthy standard. The fibrin had not generally undergone much change. He states that there was in most instances a considerable increase in the proportion of albumen and of the salts, the latter being in some cases nearly double.

94. The state of the blood now mentioned certainly exists, as far as my own observation has extended, especially the deficiency of red globules and the increase of albumen. I have not found any diminution of the salts; but the fibrin has varied with the state of vascular action, an increase of this action and the association of inflammatory action with the scrofulous or tubercular lesion augmenting the quantity of this constituent. As external scrofula becomes more and more chronic, and as suppuration or ulceration continues, the blood becomes more watery and poor, the red globules diminish, and the clot is more soft. These results are also observed during the advanced stages of internal tubercles, as shown more fully when treating of *Tubercular Consumption*. The changes in the blood are well described in Dr. GLOVER's work on *Scrofula*, to which I refer the reader.

95. iii. THE STATES OF THE SECRETIONS AND EXCRETIONS in scrofulous and tuberculous persons have not been satisfactorily investigated; and unless in protracted and in the most severe cases, they probably do not present any very obvious changes from those usually observed even in healthy persons.—(a) The frequency of a fatty state of the liver in persons who have died of scrofulous disease or of tubercular consumption, has been imputed by some to a deficient secretion of bile, and to the circumstance of the bile containing a much less quantity of its fatty constituents, which are not separated from the liver by means of its secreting function. But the changes, whatever they may be, which exist either in the liver, or in the bile, or even in the chyle, are to be imputed chiefly to the previous alterations of organic nervous energy, to the state of the blood, especially in respect of the amount of red globules, and to the amount of function performed by the lungs.

96. FISCHER and DISSE contended that scrofulous persons suffer from disordered states of

the gastric secretions; and the existence of a specific scrofulous dyspepsia was not only asserted, but minutely described, by certain recent writers, who considered this supposition not merely a remarkable distinction, but as an important discovery. That the gastro-intestinal secretions should be changed more or less from the healthy condition throughout the course of scrofulous and tubercular affections, cannot be doubted. Organic nervous power, upon which secretion, assimilation, and nutrition are chiefly dependent, is more or less impaired in scrofulous constitutions; and hence the digestive and relative functions must necessarily be co-ordinately disordered, whenever the usual causes of disorder of these functions are in operation. As organic nervous energy is more and more weakened, and as the blood becomes thinner, or poorer, or more watery, owing to the consequent impaired digestion and assimilation, the usual phenomena attending these states of disorder may be expected to appear from even the slightest causes.

97. (b) The state of the urine in scrofula has been investigated by CANSTATT, DISSE, and GLOVER, but they have remarked no definite change in this excretion when the urinary organs are not especially implicated, and when the functions of the skin are not materially disturbed. When, however, these functions are either impaired, or arrested, or, on the other hand, much increased, the urine is generally vicariously changed accordingly, not merely in quantity, but also as respects its ingredients; much, in either respect, depending upon the nature and amount of the ingesta.

98. According to SIMON, the urine of children of the scrofulous diathesis differs in the majority of cases from the normal state. It is usually pale, but becomes deeper-coloured when there is vascular excitement. Its specific gravity is lower than in health, and it is often much more acid than the urine of children usually is. SCHÖNLEIN states that the principal changes in the urine of scrofulous persons consist in the diminution of the nitrogenous constituents—the urea and uric acid, and in the appearance of the non-nitrogenous oxalic acid, and occasionally, but more rarely, of benzoic acid. The acids are frequently so abundant, that the urine, upon cooling, deposits copious sediments of the oxalates, and these sediments sometimes form renal and vesical calculi. The frequent occurrence of oxalate of lime or mulberry calculus in children is well known. Dr. PROUT has remarked, that half the stone-cases occur before the age of full puberty.

99. iv. THE PATHOGENESIS OF SCROFULA AND TUBERCULOSIS.—A. The operation of the causes above described, either singly or in succession, or more or less in combination, is manifestly such as tend to weaken the organic nervous energy, and thereby to depress the digestive, the assimilating, the nutritive, and consecutively the depurating or excreting functions. The organic nervous system actuates these several functions, and is itself influenced by the physical agents which perpetuate animal existence—by external agents, and by the ingesta. The causes which have been now considered, whether those acting on the parents of the scrofulous subject, or upon the scrofulous individual himself at a



very early age, or even at later periods—whether external or internal—whether hereditary, congenital, or acquired—have all a similar tendency, namely, directly to depress, or to exhaust organic nervous or vital power; and thereby to impair vital resistance, to prevent the processes of repair consequent upon morbid vascular action, and to arrest the formative or organizing tendency of the exudations produced by this action. Not only is there a disposition to a dyscrasy—to a solution of vital cohesion, observable in parts the seat of scrofulosis, but there is also an absence of the formative effort in the fluids exuded by morbid actions in scrofulous constitutions. The state of vital power or endowment in the several tissues or organs of scrofulous persons, appears insufficient both for the healthy or sthenic actions or functions these parts should perform, and for the organization of the fluids or matters effused from their vessels. Hence the changes which the exuded matters undergo neither favour, nor are followed by, organization, even in its lower grades; and, most probably, the fluid itself is exuded from the capillaries of a kind and in a state which indisposes it to organization. It consequently undergoes changes independently of any formative tendency, these changes being chiefly those of increase by aggregation of the tubercular molecules, until the irritation produced by the morbid deposit affects the enclosing tissues, and thereby favours the progressive changes produced in this deposit, as mentioned above (§ 78).

100. It must be manifest that, admitting the more immediate and direct operation of the causes of scrofula on the organic nervous system, and through this system upon the functions which it actuates, the blood itself necessarily must be, sooner or later, or even from an early period of the action of these causes, most materially altered; and thereby become furnished with the elements of the morbid materials, or even with these materials themselves, which are deposited in certain parts in preference to others, owing to the states of organic nervous or vital power in these parts. That the blood is actually so changed is not very demonstrable in many instances, especially early in scrofulosis, or where the scrofulous taint only exists; but that it is more or less changed, in the majority of instances, even in these, is made evident by careful inspection and by chemical analysis, the secretions and excretions ultimately becoming more and more altered. It has been repeatedly shown, that not only is organic nervous power more or less weakened, but the blood, also, is manifestly thinner, or poorer as respects the amount of red globules, and even otherwise altered. Thus the organic nervous influence in the first place, and the circulating fluids in the second place, are the prime factors of both the scrofulous taint, and of the more diseased grades of this taint, as manifested by external or internal tuberculosis.

101. *B. The origin and source of scrofula and tuberculosis* may be readily inferred from what has been advanced above as to their causes, and as to the operation of these on the organic nervous power, on the digestive and assimilating functions, and upon the blood and vascular system generally. When it is considered that the

state of the circulation in the capillaries, the changes of the blood in them, and the exudations which take place from them, are controlled most remarkably by the organic nervous influence, it will be admitted that to this influence or power the primary morbid change should be imputed; and that, in whatever tissue or part this power is the most impaired, or most languidly exerted, or most depressed by external or physical causes, or by internal ingesta, or most affected by hurtful agents, in these tissues, parts, or organs will this primary change of nervous power affect the capillary circulation as respects not only the state of the capillaries themselves, but also as regards the conditions of the blood they contain, and of the exudations from them. While, therefore, the origin of the scrofulous taint may be ascribed to the organic nervous system, and to its influence upon the digestive and assimilating functions, the source of the morbid deposit may be traced to the state of the blood, and to the exudation which takes place from the capillaries in the seat of lesion.

102. *C. The nature of the changes constituting scrofula and tuberculosis*, must be manifest from the character of the causes which produce these changes primarily in the organic nervous system, and consequently in the assimilating functions and in the blood itself. These changes are, as respects this system, a state of depression, or of weakness, or asthenia; as regards the assimilating functions, a state of impairment or insufficient action; as respects the blood, a deficiency of red particles, and an increase of albumen; and as regards the capillary circulation, a languid condition, amounting to congestion in some organs or parts, and varying in grades of passiveness, and occasioning an exudation or deposit of the morbid matter of tubercle in the tissues, whose capillaries are thus more especially affected.

103. *V. AS TO THE STATE OF VASCULAR ACTION PRODUCING TUBERCLES*, much discrepancy of opinion exists. There are, however, three well-ascertained facts connected with the origin of these bodies, calculated to lead to an accurate opinion on the subject: 1st. Their frequently simultaneous formation in different organs; 2d. The very frequent absence of any appreciable symptoms of antecedent excitement, increased action, or congestion of the capillaries of the part in which they originate; and, 3d. Their very general origin in states of the frame remarkably characterized by deficient vital energy and by imperfect development; and consequently upon causes, as shown above (§ 99, *et seq.*), which, as respects both the parents and the offspring, depress or exhaust vital power and sthenic action, and impair the assimilating and nutritive functions.

104. *(a) The presence of tubercles in several organs at the same time* has been explained by supposing that the tubercular matter has been absorbed from the original seat of its formation, introduced into the circulation, and re-secreted or deposited in the parenchyma of other organs, the case being the same with tubercular matter as with pus. I will not deny the possibility of this occurring; but there is no decisive proof of it. Besides, this can hold good only with regard to the consecutive formation of tubercles, and not in respect of their simultaneous occurrence in distant organs. It would be more con-

sistent with the close observation of the phenomena of their origin to refer the latter, and even the former mode of their production to defective vitality of the capillaries, and to a modified state of the exhaling function these vessels are constantly performing in the different structures; this function being modified by the defective state of vital endowment of those vessels. The general diffusion of this primary morbid condition—this constitutional taint—will account for the simultaneous, as well as for the consecutive affection of several organs; the varied conditions of the textures and organs occasioning the diversities which are met with in respect of frequency of liability of each, the succession of attacks, and various other peculiarities occasionally met with.

105. (b) *The localization, or the origin of tubercles locally, has been ascribed to inflammatory action* by several pathologists. M. BROUSSAIS (*Exam. des Doct. Méd.*, t. i., prop. 168) said that he had never seen tubercles in the lungs without antecedent inflammation; and Dr. ALISON, in some very able papers published between 1820 and 1830, supported a nearly similar doctrine. This enlightened physician concludes “that scrofulous tubercles may be, and often are deposited in consequence of inflammatory action; and therefore, that as, on the one hand, scrofulous diseases may be, in many cases, prevented by applying the *tonic regimen* to persons of feeble constitution, but not yet affected with actual disease; so, on the other, they may also be frequently prevented by the early and prudent use of the *antiphlogistic remedies* in those in whom the slight inflammatory complaints so often preceding them have already appeared.”

106. *In opposition to the inflammatory doctrine of tubercles*, M. BAYLE, who has directed much attention to this formation in connexion with pulmonary consumption, has expressed himself very decidedly. He contends that tubercles are never an effect of inflammatory action, not even in its chronic form; and M. LAENNEC observes, that extensive observation proves that the development of tubercles results from a general disposition of the frame, that it takes place without previous inflammation, and that when inflammatory action coexists with tubercles, it is generally posterior to them in date. Moreover, the simultaneous occurrence of tubercles in nearly all the organs in the body is opposed to the doctrine of their origin in inflammation. According to M. LOUIS, inflammatory action, in some cases, influences the production of tubercles, and in other cases it seems to take no part in their formation. He farther remarks, that inflammation and tubercles occasionally coexist without being necessarily dependent on each other; and that tubercles may be developed in the lungs independently of inflammatory action of any grade, whether in the parenchyma of the organ or in the mucous membrane of the bronchi. A similar opinion has been published by MM. LEVEILLE and ROSTAN. In addition to the argument derived from the *post-mortem* appearances, I may state, that in no class of the human species are tubercles more frequently met with than in negroes and other dark varieties of the species, particularly when they are removed to a colder climate than that of which they are indigenous; and yet inflammatory diseases are seldom

observed among them. Whoever has had occasion to observe the character of morbid actions in these races, must have remarked their immunity from inflammation, and their general liability to diseases of a very opposite character, particularly to those attended with diminished vital energy, and to tubercular deposits.

107. MM. ANDRAL, LOMBARD, CRUVEILHIER, BECKER, and SCHROEDER VAN DER KOLK, entertain a doctrine intermediate between the foregoing—an opinion not far different from that espoused by Dr. ALISON, but leaning less to the inflammatory doctrine of the disease. They, however, admit the occasional origin of tubercles in a state of inflammatory congestion of the capillaries, preceded and accompanied by a constitutional disposition to tubercular productions. M. CRUVEILHIER, in his conclusions from the experiments, wherein he produced, artificially, miliary tubercles, by injecting fluid mercury into the veins of dogs, considers that these bodies are formed in consequence of a stasis of the fluid in the capillaries, followed by a morbid secretion.

108. The opinion offered by M. GENDRIN appears accordant with extensive observation of the causes, phenomena, and results of tubercular disease in man and the lower animals, and agrees with the experience I have had of this disease, particularly at the Infirmary for Children. This able pathologist states, that tubercles, during the whole of their early stage, are entirely independent of every form of inflammation; and that it is not until they begin to soften that the tissue surrounding them begins to be inflamed, this tissue then secreting a fluid which aids in dissolving the dense matter composing them.

109. It may be inferred, from an intimate view of the tubercular formation, that it consists of an exudation of a matter essentially different from that which is produced by inflammatory action; and that it proceeds from a modified state of the exhalent process constantly existing in living structures, owing to a weakened state of the vital endowment of the capillaries in the seat of the disease. The coagulating lymph produced by inflammation affecting the healthy constitution is susceptible of organization; the concrete matter forming the tubercular secretion is entirely insusceptible of this process, the changes which it undergoes being chiefly the result of decomposition, and of the admixture with it of the fluid exuded by the vessels of the tissue immediately surrounding it. Accompanying inflammation, of whatever grade, attacking the sound or untainted constitution, there is always a disposition to organization of its products; but in tubercular disease an opposite tendency obtains—the capillaries exude a fluid, undergoing changes in which this vital process has no share, and inducing irritation and disorganization in the parts in contact with it. In the former state of disease, the vital endowment of the capillaries is exalted, and an emanation of it serves to organize the inflammatory products; in the latter this endowment is diminished, and insufficient to prevent either decomposition of the matters secreted by it, or disorganization from the slightest causes of irritation.

110. As to the opinion which refers tubercles to irritation in the organ in which they are seat-



ed, little need be said, especially as the abettors of this doctrine have failed to define the meaning they attach to the word irritation, and even leave it uncertain whether they apply the term to the nerves, or the extreme vessels of the part, or to both. Even those who confine the term to the extreme vessels, leave us to doubt whether the terminations of the arteries, or the radicles of the veins or of the lymphatics, are its seat, and to puzzle ourselves with conjectures as to in what particulars irritation of a capillary vessel differs from inflammation, or whether it differs at all or not. Taking it, however, for granted that those who espouse the doctrine of irritation, mean by the term an excited state of the capillaries, giving rise to augmentation of the organic action, but falling short of acute inflammation, it may be remarked, that neither the symptoms by which this state is recognised during life, nor the effects it induces in the tissues, are altogether similar to those produced by tubercles. It is true that tubercles, when once they are formed, occasion irritation in the tissues surrounding them; but this is an effect, and certainly not a uniform cause, of their formation. It is possible, also, that irritation, in any of the acceptations of the word, may sometimes occasion the development of tubercles in an organ; but this result will never take place unless with the concurrence of other causes, many of them proper to the constitution of the individual, or at least pre-existent to irritation; for wherefore should tubercles result from this vaguely supposed state, rather than from any other of the numerous changes to which it is so generally supposed to give origin, if it were not because other pre-existent and concomitant influences caused tubercles to be formed in preference to any other morbid production or lesion.

111. The arguments which have been here stated in opposition to the opinion that tubercles proceed from irritation of the capillaries in the part in which they are formed, apply with still greater force to the idea of their origin in inflammation. After every consideration I can give the subject, I would infer that tubercles originate in a modification of the nutrient and exhalant functions constantly going forward in the organic structures, owing to defective vitality of the capillaries; and that when irritation, or inflammation, or congestion occur, they are either accidental and concurrent causes, or effects resulting from the accumulation or decomposition of the morbid exhalation in the particular form constituting tubercular productions. But this local morbid condition is only a part of a more general constitutional vice, manifested not only by the organic nervous energy, but also by the digestive, assimilative, and circulating functions, and even by the state of the blood.

112. vi. OF THE IDENTITY OF SCROFULA AND TUBERCLES.—This topic would not have required discussion, if several authors of repute had not disputed the identity of those morbid conditions, more especially SCHARLAN, SCHÖNLEIN, Dr. EVANS, Dr. CHAPMAN, and Mr. PHILLIPS. Dr. GLOVER has ably reviewed the arguments which these writers have urged in support of the differences between them. But the operation of similar causes, hereditary, parental, and exciting; the appearance of both forms in the

same family, and even in the same individual; the same diathesis, constitution, and states of the blood and secretions, and a similar grade of vital endowment, of vital cohesion, and of vital resistance, characterizing both diseased manifestations; the same tendency to dyscrasy, and the same indisposition to the healthy restoration of parts in both; and the same principles of treatment, and even the same agents and means, being the most successful for the cure of both forms of lesion, are circumstances which so manifestly show identity, that an opposite doctrine cannot with due reason be supported. The differences which have been urged, moreover, do not invalidate the doctrine of the identity of these states of disease; they have reference merely to difference of seat, and of epochs of life during which the one is more prevalent than the other.

113. But the great question, the solution of which ought to put an end to all discussion, is this: Is the morbid structure of external scrofula identical in its characters with that of internal scrofula, or tuberculosis? or, in other words, Is the external manifestation of scrofula by enlarged lymphatic glands the same in its minute structure as the internal manifestation of it by tubercular deposit? Preliminary to the answer which I shall give, I should state that scrofula is a term which may be, and has been, given to a diathesis—to a constitution—to a certain appearance, described above (§ 5, *et seq.*), and which may exist without any manifest external or internal lesion—without any special disorder, although often accompanied by some internal affection usually denominated scrofulous. Now this external affection, whatever it may be, most commonly, however, seated in the lymphatic glands, is, as respects the morbid change, the same as that found in other or in internal parts, no farther differences being observed than such as necessarily result from difference of seat. Dr. GLOVER remarks (and others have stated the same, both before and after he wrote), that the only difference which he has been able to detect between tubercular matter and the degenerated substance of scrofulous glands, is in the existence of a greater number of bodies presenting the appearance of thickened and translucent or opaque cells in the latter case; but the microscopic elements are in both instances the same. The results of chemical analysis, also, point out the identity of the two kinds of formation. M. LEBERT, whose researches into the intimate nature of scrofula and tuberculosis are most minute, patient, and trustworthy, states that the tubercular deposit in scrofulous lymphatic glands is the same as in other organs (vol. i., p. 534).

114. CANSTATT remarks, that the material and physiological causes of scrofula and tubercle, their progress, &c., scarcely leave a doubt of their identity; nevertheless, respect for those who entertain a different opinion suggests an inquiry into the force of their arguments.—a. They urge the difference of form between scrofulous formations and tubercle, the former being often indeterminate, the latter more rounded or provided with an envelope. But this is chiefly owing to the structure of the tissue in which the deposit occurs. In some cases, the lymphatic glands present in their interiors cysts filled with a tubercular matter, comparable with

isolated tubercles; and I may add, that the differences, as respects the great tumefaction of scrofulous glands and of their surrounding tissues, depend chiefly upon the nature and structure of these glands, and upon their connexions, not only with the vascular system, but also with the lymphatic vessels belonging to them, and with the adjoining cellular tissue.

115. *b.* It has been asserted that, while scrofulous glands may be injected, tubercles show no vessels in their structure. But the injection of these glands does not prove the injection of the tubercular deposit in them; this deposit, whether taking place in them, or occurring elsewhere, being without vessels, excepting such as belong to the tissue in which it is found.

116. *c.* The incurability of tubercular formations in the lungs has been adduced as a proof of difference between external scrofula and tuberculosis. But tubercles, in the lungs or elsewhere, may heal as well as the forms of external scrofula, and according to similar processes. Scrofulous formations, like tubercles, may pass into calcareous masses, or thus degenerate; or they may be thrown off by ulceration, or their supuration and the deposit of a reparative tissue may be followed by cicatrization. The chief circumstances which prevent internal tuberculosis from healing so frequently as the external malady, are the causes inducing the former, the frequently continued operation of these causes, the nature of the structures affected, the constant action of the atmosphere as respects tuberculosis of the lungs, as well as the other lesions which often precede, accompany, or follow this morbid formation.

117. *d.* It has been contended that, because persons below puberty are most frequently the subjects of external scrofula, and those more advanced in life are most subject to tubercular consumption, therefore there is a difference between them; but, as I have shown above, tubercles may occur at any age, however early, and are, in fact, very common in young children, while external scrofula may also be developed at any age; and it may be added, that open external scrofula before puberty does not prevent tubercular formations in internal parts subsequently. Tubercles may exist, in an early stage, both internally and externally in the scrofulous diathesis, and while concurring causes may develop the external malady, the internal may remain latent, or be but imperfectly manifested, or may appear long subsequently, or even not at all, if the causes usually determining the development of this lesion are avoided. Of 312 scrofulous children, only 47 were found without tubercles in the lungs. LUGOL remarks, that scrofulous children have always tubercles in the lungs. This inference is too general; but I have seldom inspected the body of a child who has died of a non-tubercular disease, and who manifested the external signs of scrofula, without finding internal tubercles in one or other stage of development.

118. *e.* It is almost unnecessary to pursue the subject farther; but one argument frequently urged is, that either form of the disease may run in families without the other form being met with. This statement is, however, pushed beyond the truth. Such an occurrence is not very frequent, nor are the exemptions contended for either complete or many. PORTAL con-

sidered both scrofula and phthisis identical, yet he admitted that either may be transmitted in families in preference to the other. Dr. HOLLAND remarks, that "in the scrofulous temperament, even more than that of gout, we have a remarkable diversity in the forms of the disease and the organs it attacks." I readily agree with Dr. GLOVER in remarking that, in respect of this topic, "on the one side all is clear, pathological and decided, founded on facts of essential relation; while on the other side we have doubtful assumptions, and at best non-essential relations."

119. *vii.* DISEASES ATTACK THE SCROFULOUS DIATHESIS WITHOUT BEING ESSENTIALLY SCROFULOUS OR TUBERCULAR, ALTHOUGH MORE OR LESS INTIMATELY ALLIED TO EITHER.—Not only may several diseases attack the scrofulous diathesis without being essentially tubercular, but this diathesis may predispose to them, and render them more chronic and difficult of cure. Thus, while I believe in the identity of scrofula and tubercles, I consider the latter as a development or manifestation of the former, arising out of one or more of the causes above described; and farther infer that various local affections, more or less resembling or allied to scrofula, may occur, either in delicate persons, especially in cachectic children, who are not of a scrofulous taint, or in those who are actually scrofulous, without being necessarily or actually scrofulous, or attended by external or internal tuberculosis.

120. *1st.* Various affections are occasionally met with in delicate or cachectic subjects, which are not truly scrofulous in their nature, but which, when occurring in this diathesis, are influenced by it, as stated hereafter (§ 125). It is not uncommon to observe in delicate or cachectic children, chronic inflammations, especially of the periotum or bones, to follow slight injuries, or other affections to follow slight causes, without any essential characteristic of being scrofulous. Various chronic affections of the skin, of the mucous membranes, or of the joints, or of the eyes, may also appear in these subjects, without presenting the scrofulous elements, although they most frequently do present them when occurring in the scrofulous diathesis.

121. *2d.* Other affections still more nearly allied to scrofula may take place in this diathesis, and yet be without any very manifest tubercular formation. Parts may become inflamed, go on to supuration or ulceration, and present no farther scrofulous characteristic than the long duration of the disease and indisposition to cicatrization. Caries of the bones, chronic ulceration of the skin, consequent upon eruptions, eczema, lupus, &c.; ozena, various states of gastro-enteric irritation or inflammation, diseased follicular glands, prolonged leucorrhœa, chronic bronchitis, affections of the eyes and eyelids, flexures and other diseases of the spine, enlargement of the joints, softening of the structures, &c., are very common in the scrofulous diathesis, without being attended by tubercles; and, although not strictly scrofulous, are more or less allied to it when occurring in this diathesis.

122. *3d.* These affections, however, are often attended or followed by tuberculosis either of adjoining glands or of internal viscera, especially in the scrofulous diathesis; the occurrence of



these appearing to complicate, or to develop the tubercular deposit. On the other hand, the tuberculosis may have existed previously, and been followed by either of those, which, in some instances, when allowed to proceed, or when accompanied by a discharge and by appropriate treatment, may supersede, or partially or altogether subdue, the tubercular malady.

123. The affections now mentioned, whether occurring in the scrofulous diathesis, without manifest external scrofula, or internal tuberculosis, or complicated with either external or internal scrofula, are most frequent and most obstinate in persons whose powers of life are constitutionally low or exhausted, and the vital cohesion or tone of the tissues are originally weak or otherwise impaired. They may occur, in this state of the frame, either independently of true scrofula or tuberculosis, or in an intimate association with tubercular deposits in some part or parts of the body; they may exist without tuberculosis, or they may be associated with it, although not necessarily depending upon it. They ought, therefore, not to be considered as varieties of scrofula, but should be separated from this affection; inasmuch as, although they are often met with in the scrofulous diathesis, they frequently also occur in weak constitutions or exhausted states of the frame, in which this taint, or any actual manifestation of tuberculosis does not exist.

124. viii. THE SCROFULOUS TAIN, OR TUBERCULAR CONSTITUTION, NECESSARILY PREDISPOSES TO, AND INFLUENCES THE COURSE AND TERMINATION OF, OTHER MALADIES.—However obvious and important this assertion may appear to many, and however frequent the observing and truly scientific physician may have had occasion to remark this influence, to regard its results, and to modify his practice accordingly, still the facts which this proposition comprises have too often been either altogether unrecognised or at least partly unheeded. The states of vital power and resistance throughout the frame, the conditions of the circulating and secreted fluids, and the vital cohesion of the tissues, of scrofulous and tubercular persons, are generally such as to predispose them to several maladies, and to modify the course and terminations of most of those which may afflict them.

125. A. *As respects the predisposition which this taint occasions*, it may be remarked that it is the most influential when no open or external manifestation of scrofulous disease has appeared; for when such disease is developed and is proceeding, internal and constitutional maladies are less apt to occur, or supervene only after the more energetic operation of the exciting causes. The external affection, especially when attended by a discharge, has often the effect of a derivant, and sometimes becomes a safety-valve to the economy in circumstances which might otherwise be attended by risk, as when exposed to the causes of endemic, epidemic, or constitutional disease. In other circumstances, especially when the morbid taint is present, without any active or developed external disease, the constitutional powers are too languid—too feeble, to resist the invasion of causes and the production of effects, which would have been successfully resisted by more powerful energies; and the causes of disease,

especially such as are depressing and contaminating, would make more rapid, more marked, and more dangerous impressions and changes in the scrofulous constitution than in any other. Experience furnishes many proofs of the truth of this position. Local injuries, such as bruises, contusions, concussions, the impression of cold, infectious and epidemic agents and influences, contagious and contaminating miasms and secretions, &c., are less successfully resisted by scrofulous persons than by others; and when the effect is produced by either of these, or by other causes, it is generally either more marked or more prolonged, and remedied with greater difficulty. The full development of the predisposing and exciting causes of diseases which I have attempted under a different head renders it unnecessary to remark farther on this topic, at this place, than to recall attention to its importance. (*See art. DISEASE, § 18, et seq.*)

126. B. *The Course and Termination of many Special States of Disease are very remarkably modified and aggravated by the scrofulous taint.*—(a) That this is more especially the case in respect of inflammations is generally admitted; but there is every reason to believe that the evil is not confined to this class of diseases. As regards inflammations, it may be remarked, that not only are they rendered more chronic in the scrofulous diathesis, although the acuteness, the severity, or the activity of these maladies is seldom so great as in the vigorous and healthy constitution, but their consequences are more dangerous, both as respects the changes produced in the structures affected, and as regards the state of the products of inflammation. In the strumous diathesis, softening, infiltration, tubercular deposition and disorganization of the inflamed structures readily take place; and restoration to the healthy condition is either very slowly or imperfectly accomplished. The fluids effused are much less prone to assume a state of partial or complete organization than in the healthy constitution, but they are more disposed to undergo changes of a more injurious nature—to assume a dirty curdy or cheese-like appearance, or a tubercular character, or to become the nidus of farther changes. It would appear as if the products of inflammation in the strumous diathesis proceed from a lower grade of vital action than in healthy constitutions; and that, while these products in the latter cases are more prone to organization, owing to a certain degree of derived vital endowment, those resulting from scrofulous inflammatory action are much less prone to this change, owing to this endowment being so much less as to be altogether insufficient for this end. The inflammatory products in scrofulous persons are thus not only different from those in healthy constitutions, even at the moment of their formation, but they become still more different after their exudation, owing to the partial absorption or exhalation of their more watery constituents, to the aggregation of their albuminous, mineral, and other elements, and to the consecutive irritation they produce in the surrounding or containing tissues.

127. (b) In all fevers also, especially such as are malignant or infectious, softening of mucous and cellular parts, ulceration of the intestinal mucous surface and follicular glands,

effusion from internal surface, and disorganization from loss of the vital cohesion of the structure, especially in parts which are pressed upon, or are irritated by external agents, more readily and more remarkably supervene in the scrofulous than in the healthy constitution. In all acute and chronic inflammations or congestions of the *brain, lungs, and their membranes*, repair is delayed, more difficult, or is imperfect; and either effusion or tubercular depositions, with their various unfavourable concomitants and consequences, are much more apt to supervene in the scrofulous than the healthy constitution.

128. (c) The influence of scrofula is less manifest in aggravating the course of other diseases than in originating many, both of a functional and of a structural kind. All those maladies which present a tubercular character, and several of those which consist of adventitious formations, or chiefly of alteration or vitiation of the nutrition of a part, may not only, in a great measure, proceed from this diathesis, as regards some cases, but also be aggravated or even altogether transformed as respects other instances. But it is unnecessary to pursue this topic farther at this place, as it, as well as several allied topics, are more fully discussed in the articles *DEBILITY, DISEASE* (§ 87, *et seq.*), *INFLAMMATION*, and in other parts of this work.

129. IX. THE ASSOCIATED ALTERATIONS AND COMPLICATIONS OF SCROFULA AND TUBERCLES.—From what has been stated above, almost every tissue or organ of the body may be the seat of tuberculosis; but there is a very wide difference in the frequency of the occurrence of this lesion in different organs or parts (§ 135). I have stated, with respect to the *pathogenesis* of scrofulosis or tuberculosis, that there are modifications of organic nervous power, of capillary vascular action, and even of the blood itself, which are necessary preludes to the alteration in the textures especially affected; the local change being chiefly characterized by congestion of the capillaries and the exudation or deposit from the blood, constituting the tubercular matter (§ 109). External scrofula most unequivocally presents itself in the form of enlarged or diseased lymphatic glands; and as respects them, it has been asked by an able writer, Mr. PHILLIPS, "Is this state of the gland determined by the circulation within it of blood which has undergone change, or is it independent of the blood? Does the blood fit the organ to receive the deposit, or does the organ fit itself? This is an important question, but of very difficult solution. Important, too, with reference to treatment; because, if the action set up were purely local, means might be taken to change it and render it unfit for the deposit. If the action depend only upon a general contamination of the blood, how comes it that all the lymphatic glands are not equally affected? It is notorious that they are not."

130. But the alteration of the blood here insisted on is only one part of the morbid condition, and, as respects the succession of changes producing this condition, a more or less advanced part. These changes have already been stated (§ 101, 109), and it has been shown that the constitutional changes—the changes in the organic nervous power, in the capillary circulation, and in the blood itself consecutively upon

the state of assimilative function, are such as tend to predispose the lymphatic glands, as well as various other textures, to experience these changes in a more manifest degree, especially upon the operation of various causes, whether constitutional or local, whether depressant or irritant, and to favour the supervention of farther changes in the capillary circulation of these parts, and ultimately to produce the exudation in them of the materials constituting the tubercular deposit.

131. The cause or source of the swelling and hardness presented at an early stage by external scrofulous glands has been a topic of discussion. This has been ascribed to increased vascularity in the first instance, and to the morbid exudation in the second. This is probably the case; but it is not so manifest that the vascularity is owing to increased action; it is more probably the result of interrupted circulation—of congestion, not merely of the blood in the capillaries of the gland, but also of lymph in the proper lymphatic vessels of the organ, aided more or less by an exudation of molecules or tubercular materials, or elements from the congested capillaries, which materials are incapable of organization, and which, by their aggregation, become more and more manifest, as shown above (§ 109). As these accumulate, they often change the capillary congestion, which partly occasions them, to inflammatory irritation, followed by the usual products of inflammatory action; and thus a state of simple congestion of the glands, induced in a constitution such as I have described, is converted, by the material exuded from the congested capillaries, and by the irritation this material occasions, into a state of inflammatory congestion, with all the consequences of this state in its more chronic forms. It should not, however, be admitted that the swelling existing in these cases is altogether owing to the changes within the gland itself; for much of it arises from congestion, increased vascularity, and serous effusion in the cellular tissue surrounding the affected gland. The greater tendency, also, of the external glands to become enlarged and ultimately even inflamed, in connexion with tubercular deposits in them, may be ascribed to the greater exposure of these glands to physical influences and agents, and to local or external irritants, affecting not merely their state of vital power and action, but modifying also the condition of the blood circulating through them.

132. A careful examination of a scrofulous cervical gland by Mr. DALRYMPLE is thus described in Mr. PHILLIPS'S work: "This enlarged gland appears to consist of a general parenchyma in a state of chronic inflammation, surrounding irregular masses of yellowish white matter, more immediately the subject of examination. In direct proximity to the edges of this white material, the blood-vessels are seen to be more enlarged and congested than elsewhere, and in some parts the capillaries are occluded with coagulated blood. The parenchyma, which at first sight appears healthy, is, on examination with high power, found to be infiltrated with exudation corpuscles, resembling lymph globules. The natural texture of the gland consists of its proper corpuscles, filamentous tissue, blood-vessels, lymphatics, and nerves. In this morbid specimen, every where is the filamentous tis-



sue infiltrated, and its fibres separated by innumerable exudation corpuscles, and the proper corpuscles of the gland are similarly surrounded and imbedded. As the parenchyma is nearer to the whitish matter, so proportionally do the proper corpuscles of the gland become more indistinct, the filamentous tissue more obscure, the blood-vessels irregularly dilated and filled with red globules, and they at last disappear insensibly. The exudation corpuscles are more numerous, but irregular in size and shape, and interspersed with minutely granular matter (p. 45).

133. A. The *modifications and associations of scrofula and tuberculosis* are to be ascribed chiefly to the pre-existence or association of various grades of capillary congestion, sometimes passing into chronic inflammatory irritation, in the seats of the tubercular exudation. But it may be asked whether or not this exudation ever occurs without these antecedent states of congestion or of inflammatory irritation. There is no sufficient reason to infer that this deposit may not take place without either of these alterations of local vascular action; for miliary tubercles and gray granulations are often found in tissues, the capillaries of which present no material alteration. It may, therefore, be inferred that tuberculosis may appear, 1st. Independently of locally increased vascular or capillary action; 2d. Consequently upon capillary congestion; 3d. In connexion with inflammatory irritation, or inflammatory congestion, of the part; and, 4th. Where the inflammatory diathesis is associated with the scrofulous, or where tuberculosis is associated with inflammation of a subacute or chronic kind. While, however, either of these states of local vascular action may precede or accompany the morbid deposit or exudation constituting tubercles, it is not improbable that this deposit as often becomes the cause, as shown above (§ 110, 111), of the vascular disorder, inducing such disorder where it has not previously existed, and increasing or developing it where it had already commenced.

134. B. The *complications of tuberculosis* are so diversified that a particular notice of them cannot be given at this place. It must be obvious that the state of constitution described above to constitute the scrofulous diathesis will favour the occurrence of various disorders, both without or independently of any tubercular deposit, and in more or less intimate association with it. It has been shown (§ 123, *et seq.*) that the scrofulous taint favours the occurrence of several diseases not actually scrofulous or tubercular, and that it modifies the course and termination of others; and various affections have been enumerated above (§ 119–121) as being met with in delicate constitutions, which are not scrofulous, in the scrofulous diathesis, without evidence of tubercular deposits, and in this diathesis complicated with these deposits in one or more organs. A knowledge of such occurrences, either as now stated, or as particularly noticed above, is sufficient to suggest the chief indications of treatment which these associations will require in respect of their individual forms.

125. X. THE COMPARATIVE MANIFESTATIONS OF TUBERCULOSIS—A. AS TO THE COMPARATIVE FREQUENCY OF TUBERCULAR FORMATIONS IN THE

DIFFERENT ORGANS OF THE ADULT BODY, much interesting information has been adduced by MM. LOUIS, LOMBARD, and ANDRAL.—(a) The lungs hold the first place, in respect of frequent liability to the disease; next, the small intestines. M. LOUIS found (leaving the lungs out of the calculation) in 353 adult subjects, tubercles in the small intestines in a *third* of them; in the great intestines, in a *ninth*; in the mesenteric glands, in a *fourth*; in the cervical glands, in a *tenth*; in the lumbar glands, in a *twelfth*; in the prostate, in a *thirteenth*; in the spleen, in a *fourteenth*; in the ovaries, in a *twentieth*; in the kidneys, in a *fortieth*; in the uterus, in *one case* of them only; in the cerebrum, in *one case*; in the cerebellum, in *one case*; and in the ureter, only in *one case*. There was no account taken, in those cases, of the occurrence of this production in the testicles or in the bones, which is not uncommon. Out of all of them, M. LOUIS found only one case in which tubercles were found in different other organs without existing in the lungs.

136. In one hundred *adult* subjects, Dr. LOMBARD found, not counting the lungs, tubercles in the intestines in 2 cases; in the mesenteric glands in 19; in the bronchial glands in 9; in the cervical glands in 7; in the spleen in 6; in the lumbar glands in 4; in the sub-peritoneal cellular tissue in 4; in the maxillary glands in 3; in the glands of the anterior mediastinum in 3; in the sub-arachnoid cellular tissue in 2; in the spinal chord in 2; in the false membranes of the pleura in 2; in those of the peritoneum in 2; in the intercostal muscles in 2; in the ovaries in two; and in the parietes of the gall-bladder, in the liver, cavity of the pleura, posterior mediastinum, vertebrae, ribs, omentum, uterus, prostate, sub-mucous tissue of the bladder, cerebrum and cerebellum, medulla oblongata, kidneys, and vesiculæ seminales, *one each*.

137. M. ANDRAL states, that his observations as to the relative frequency of tubercles in the different organs of the body observe nearly the same order as that indicated above, excepting that he has found in more cases than M. LOUIS, tubercles in other organs without detecting them in the lungs. He has also discovered them in the false membranes of the pleura and peritoneum in a greater proportion of cases than M. LOMBARD. M. ANDRAL has found them in the intervertebral cartilages in one case; and he adds very interesting information respecting the relative frequency of tubercles in the different organs of children.

138. (b) *Tubercles in children* more frequently affect a number of organs at the same time than in adults. They occur more commonly in this class of subjects, in other organs, without existing in the lungs. It will, moreover, be seen, from the following results furnished by M. LOMBARD, that the parts most commonly affected in adults are not altogether those which are so in children. In a hundred *young* subjects, he found tubercles in the bronchial glands in 87 cases; in the lungs in 73 cases (in 30 of which but one lung was affected, viz., the left in 13, and the right in 17 cases); in the mesenteric glands in 31 cases; in the spleen in 25; in the kidneys in 11; in the intestines in 9; in the nervous centres in 9; in the cervical glands in 7; in the membranes of the brain in 6; in the pancreas in 5; in the gastro-hepatic glands in

5; in the sub-peritoneal cellular tissue in 5; in the spleen in 4; in the inguinal glands in 3; in the cellular tissue under the pleura in 2; in the lumbar glands, in the sub-mucous tissue of the bladder, in the omentum, in the parietes of the gall-bladder, and in the false membranes of the pleura, *one case each*. It may be remarked that, in these hundred cases, tubercles were not found in the liver in a single case; and in all the cases of adults the liver contained tubercles in one case only.

139. M. PAPAVOINE found, in 50 children in which the seat of tubercles was ascertained, 49 in which they existed in the bronchial glands; 38 in the lungs; 26 in the cervical glands; 25 in the mesenteric glands; 20 in the spleen; 17 in the pleura; 14 in the liver; 12 in the small intestines; 9 in the large bowels; 9 in the peritoneum; 5 in the brain; 3 in the cerebellum; 3 in the cerebral membranes; 3 in the pericardium; 2 in the kidneys; 1 in the pancreas; 1 in the vertebræ; 1 in the stomach. In 10 instances tubercles were present in the bronchial glands without having been found in the lungs. The relative frequency of tubercles in the abdominal organs is very different in M. PAPAVOINE's table from that furnished by M. LOMBARD. The above show that they are more frequent in the bronchial glands of children than in the lungs; while in adults the proportion is much greater in the latter than in the former. Besides, in this class of subjects, they are seldom met with in these glands without being observed in the lungs; but they are often found in adults, in the lungs, without there being any in the glands.

140. B. AS TO THE RELATIVE FREQUENCY OF TUBERCLES AT THE DIFFERENT PERIODS OF LIFE, without reference to the organs in which they are seated, the following inferences may be adduced: 1st. Tubercles are very rarely developed in the fœtus; but several instances have occurred to me, particularly in the lungs of those whose mothers were suffering from phthisis during gestation.

141. 2d. During the first months after birth, tubercles are likewise rare. In the lungs of an infant (attended by Mr. NICHOLSON of Davies's Street and myself) born of a mother far advanced in consumption, affected with cough from the moment of birth, and that died instantly from profuse hæmorrhage from the lungs under three months, the lungs were so studded with tubercles, many of them large and softened, as not to collapse upon opening the thorax. Tubercles existed nowhere else. This state of disease in so young a subject was rare, and the nature of the result still rarer.

142. 3d. From nine months to five or six years, tubercles are very frequent. According to M. LOMBARD, tubercles are found in only one eighth of the children who die between the ages of one and two; in two sevenths of those between two and three; in four sevenths of those who die between three and four years of age; and in three fourths of those who die between the ages of four and five years. From my experience at the Infirmary for Children, I am of opinion that M. LOMBARD calculates the proportions as too high in respect of children between the ages of three and five, and too low in respect of those below two years. However, the results may vary somewhat between Lon-

don and Paris. There can be no doubt of the fact mentioned by this writer, that at the age of four or five years a greater number of organs are simultaneously affected with tubercles than at either an earlier or later period of life. I believe that these tubercles begin to form about the period of dentition and weaning, the change which is then made in the diet of infants being the chief cause of their formation; and that the fatal effect most commonly does not occur until about the fourth or fifth year.

143. 4th. From the sixth to the sixteenth year tubercles are much less frequently met with than from the third to the sixth, but they occur more frequently than under the age of two years. The results which I have stated in the preceding paragraphs differ much from those furnished by M. LOMBARD; but they are in many respects confirmed by the researches of M. PAPAVOINE made at the Hospital for sick Children at Paris. This physician found, in 408 children under fourteen years of age affected with tubercles, 73, or 1-5-1-2, under two years; 64, or 1-6, from two to three years of age; 46, or 1-9, from three to four; 35, or 1-12, from four to five; 32, or 1-13, from five to six; 29, or 1-14, from six to seven; 24, or 1-16, from seven to eight; 16, or 1-25, from eight to nine; 18, or 1-23, from nine to ten; 12, or 1-31, from ten to eleven; 24, or 1-16, from eleven to twelve; 10, or 1-41, from twelve to thirteen; 11, or 1-40, from thirteen to fourteen; and 14 whose ages were not ascertained.

144. 5th. After puberty tubercles again become more frequent, but only as regards the lungs, the intestines, and some parts of the lymphatic system, especially the lungs. Does this increased frequency arise from the new source of exhaustion which comes into action in the development of the genital organs? I think that it does. According to M. ANDRAL, males are particularly subject to tubercles between the ages of twenty-one and twenty-eight; while females are more subject to them before the age of twenty. After these periods, tubercles are much less frequently met with until from about the 38th to the 45th year in females, and from about the 40th to the 55th year in males, when a slight increase is again remarked, particularly in females.

145. C. AS TO THE COMPARATIVE LIABILITY OF THE SEXES, it has been generally admitted that the female is more frequently the subject of tubercles than the male sex, and this certainly holds in respect of children. But according to the data furnished by M. LOMBARD, the difference of liability of adults is extremely small. He states, that in 52,857 persons who died of tubercles in the lungs, 26,124 were males, and 26,733 females. M. LOUIS, however, found the proportion of adult males to females affected to be 70 to 92. M. PAPAVOINE considers the difference to be still greater between the two sexes in children. According to the returns of the Registrar General, the proportion of deaths by tubercular consumption is about 24 males to 28 females.

146. D. WITH REFERENCE TO THE OCCURRENCE OF TUBERCLES IN THE LOWER ANIMALS, M. ANDRAL observes, that "several animals have, in common with man, the tendency to tuberculous affections. Among the mammalia, animals using the most different kinds of food are equally sub-



ject to these affections—the carnivorous as well as the herbivorous. Among the carnivorous, however, there is one species in which, though we frequently examine their bodies, genuine tubercles have never been discovered: I mean the canine species. Is this because the dog lives in freedom in a climate that agrees with him, and where he can enjoy exercise in proportion to his strength? And is it because the lion happens to be in opposite circumstances, that he dies in this climate affected with tubercles? Most of the animals in which we have proved the existence of this affection are either transported from a hot to a cold climate, where they are deprived of liberty and exercise (as is the case with monkeys and parrots), or confined in damp places, without sun, and almost without air (cows, pigs, house-rabbits), or exposed either to continual alternations of heat and cold, or to constrained and violent exercise, as the horse." The want of due ventilation, or a too frequently respired air, a too hot or else, or a too cold and humid atmosphere, and the close confinement so opposite to the habits of these animals, are not without their influences.

147. XI. ARE SCROFULA AND TUBERCULOSIS MORE PREVALENT NOW THAN FORMERLY? This question hardly can be answered in the present state of knowledge, as the data on which rational speculation respecting it either are altogether wanting, or are of so loose a kind as to prevent the possibility of arriving at a sound conclusion on the subject. Mr. PHILLIPS has, indeed, entertained the topic, but with reference chiefly to external scrofula, or the "King's evil," as so denominated in former times. The principal data he has adduced are the loose reports of the bills of mortality of former years, and the numbers said to have received the royal touch during the reign of the second Charles. It is obvious that no conclusion can be drawn from these respecting the comparative prevalence of the several forms of tuberculosis in former and recent times. A careful consideration of the relative influence of the principal causes of scrofula in past ages and at the present day, may suggest vague ideas on the subject; but as certain of these causes were, perhaps, more influential formerly than now, while others were less so, and while some have even recently come into operation, others have nearly or altogether disappeared, the question must be viewed as not admitting of solution, however important the considerations which it involves.\*

[\* It is well known that the active causes of disease and death are increasing in this country, and that the average duration of life is not as great now as it was 40 or 50 years ago. It will be found, on examining bills of mortality, that deaths by scrofula and tuberculosis have equally increased. For example, the deaths in Boston, in 1830, were 1 in 48; in 1845, 1 in 39. The deaths under 5 years of age, in Boston, in 1830, were 5.96 per cent.; in 1840, 7.32 per cent.; and in 1845, 9 per cent.—nearly doubling in less than 20 years; and in all the years under 40, there also appears an increased mortality. The same holds true, so far as we have data, throughout New England and New York. Thus the average age of all that died in Boston, in 1810 to 1820, was 27.85 years; while in 1840 to 1845 it was 21.43 years only, showing a difference of 6.42 years. In New York, in 1810 to 1820, it was 26.15 years; and in 1840 to 1845, it was 19.69, a difference of 6.46 years. In Philadelphia, in 1810 to 1820, it was 26.25; and in 1840 to 1845, it was 22.01, a difference of 4.24 years. Since then the duration of life has declined in each of these cities. It is found that the average age of our clergymen is seven years less than it was 30 years ago, and that of physicians is 9 years less; and the same decline has occurred among all ranks and professions. So that, although medical skill has in-

148. IV. THE PREVENTION OF SCROFULA AND TUBERCULOSIS.—It is obvious that the *prevention of a constitutional taint*, which is not limited to the individual thus tainted, but which is very commonly propagated to his offspring, in some one or other of its forms or contingent effects, is much more important than even the cure of these effects, when they come under the eye of the physician; and it is equally obvious that the prevention consists in the avoidance of the causes producing this taint—these causes being fully exposed above (§ 13, *et seq.*), with the implied object of enabling the medical adviser, or whoever is concerned in the matter, carefully to avoid them—this avoidance having reference to the parent or parents, and to the offspring for successive generations. By no class of diseases are the misconduct, the imprudence, and the want of judgment of the parents more severely punished than by this—by none so distressingly, hopelessly, extensively, and successively, until the tainted race is almost or altogether extinguished. Instances illustrative of the misery—of the numerous miseries—resulting from the thoughtless, the ignorant, the worse than culpable intermarriages of scrofulous persons, or even by the marriage of a healthy person with one who is thus tainted, crowd upon my recollection, and are too common—too well known to every one who may read this—to require enumeration. The subject is sufficiently illustrated by the calm consideration of every thinking mind.

149. Several of the causes which I have discussed above require only to be known to be guarded against, and certain of them may readily be avoided by careful persons. Others cannot be avoided by those most concerned, or who are about to become their victims; but they may be altogether removed by those who have the power of inflicting them. Richly-endowed public institutions or schools may be so managed, and have been so managed, as to become hot-beds for the generation of scrofulous or tuberculous diseases. The same remark often applies to private as well as public schools, and not merely as respects food and clothing, but also as regards ventilation, exercise, light, sunshine, and purity of air. The constitutions of the industrious poor are sacrificed on the altar of gain, and governments lend their aid to the immolation, that they may receive the unrighteous support of the priests of mammon in perpetuating their power, their patronage, and the aggrandizement of their satellites. The physical and moral ameliorations, which salutary measures would impart to those most in want of them, cannot be afforded out of the luxuries and patronage which aristocratic governments bestow on their supporters and themselves. The inevitable tendencies of extreme taxation and of an immense national debt are to reduce the middle classes to the lowest, to render the poor still poorer, more wretched and more debased, to augment the wealth and the influence of capitalists and contractors, to render these last more dishonest and over-reaching; and, as the general result, to multiply beyond calculation the chief sources from which scrofulous and tuber-

creased, and science advanced, yet the active causes of disease have increased faster than the appliances for their prevention and cure, as shown by Mr. SHATTUCK, in his "Sanitary Report," p. 104, 105.]

cular maladies, the physical curses of society, derive their origins. Dishonesty, moreover, in professions, trades, and the several relations of life—the necessary consequence of the foregoing—is daily increasing, and leaving its victims physically and mentally reduced, thereby favouring still more the invasion of the most hopeless forms of the maladies under consideration. These are results which are manifest to the common-sense thinker, however they may be controverted by political economists, and by political and statistical haranguers, who will prove or disprove whatever may suit their arguments, their purposes, or their motives, and even bring an array of figures and numbers to their support, without caring for the accuracy of the amounts which they thus imposingly marshal \*

150. *The hygienic treatment of scrofula* should, however, not be limited to the careful avoidance of the causes above described, whenever this object can be attained; but be extended to the use of such rational means as may prevent the full development of the scrofulous taint, and of its consequences, in those who may evince it in any grade, in childhood or infancy, and more particularly in the children of scrofulous parents. If this latter indication be carefully pursued, and if judicious means be employed, much may be accomplished, especially if the tainted subject be early submitted to these measures. As respects the *infants* of scrofulous parents, hygie-

[\* It is abundantly evident that the great objects of investigation connected with scrofula and tuberculosis are the *causes* and *means of prevention*. These can only be ascertained by an extensive series of systematic, uniform, and exact observations of the external circumstances, atmospheric, local, and personal, occurring in each case. The *American Medical Association* could not engage in a more useful labor—one promising more beneficial results to humanity—than in an energetic and united effort to obtain such observations in regard to as many cases of these affections as possible. These, tabulated in due form, would lead, by an easy induction, to general facts and principles, which could be readily applied to the prevention of these wide-spread and fatal maladies. To show the influence of the seasons upon tuberculosis we quote the following table from Mr. SHATTUCK's "*Report of the Sanitary Commission of Massachusetts*."

Months.	Massachusetts, except Boston.				Boston. 1 Year. 1849.	N. York. 4 Yrs. 1838-43.	B'hamen. 1848-49.
	7 Years. 1842-1848. Both sexes.	4 Years. 1845-48.	Male.	Female.			
January.....	1,113	273	446	68	888		
February.....	1,134	296	439	43	855		
March.....	1,248	317	484	59	923		
April.....	1,242	306	484	75	917		
May.....	1,195	273	463	50	799		
June.....	1,084	270	410	49	711		
July.....	1,159	302	434	62	698		
August.....	1,197	315	474	56	718		
September.....	1,270	315	498	45	745		
October.....	1,198	286	470	34	766		
November.....	1,060	277	417	50	690		
December.....	1,127	272	439	65	751		
Total.....	14,027	3,502	5,458	654	9,471		
Winter.....	3,495	886	1,369	168	2,676		
Spring.....	3,521	849	1,357	174	2,427		
Summer.....	3,626	932	1,406	163	2,161		
Autumn.....	3,385	835	1,326	149	2,207		

Thus it appears that the largest number of deaths occur in September, though they are nearly the same in March and April; while the smallest number occur in November and the autumn quarter, a law which seems to prevail in Great Britain as well as this country. Such tables, however, throw no light upon the causes of the disease; nor, as the disease is indefinite in its duration, do they indicate the seasons when the seeds of the malady are most extensively planted in the constitution, which are doubtless the autumn and winter. That *age* and *sex* have a greater influence in modifying the operation of its causes, is demonstrated by the following table, for which we are also indebted to Mr. SHATTUCK.

enic treatment should be adopted as early as possible. If the taint exist on the mother's side,

Ages.	Massachusetts.		New York City.		New York State.		Philadelphia.		London.	
	4 Years. 1845-1848.	Both Sexes. 1842-1848.	6 Years. 1839-1843.	2 Years. 1847-1848.	2 Years. 1847-1848.	2 Years. 1847-1848.	10 Yrs. 1836-1845.	Both Sexes. 1836-1845.	4 Years. 1840-1846.	Both Sexes. 1836-1845.
Under 1.....	172	151	110	93	116	144	240	593	563	
1 to 2.....	235	179	123	119	87	82	194	491	525	
2 to 3.....	208	65	79	136	84	70	247	344	378	
3 to 4.....	859	334	309	336	287	296	681	1,428	1,486	
4 to 5.....	192	68	102	101	56	74	102	350	439	
5 to 10.....	304	68	142	52	82	48	114	263	389	
10 to 15.....	1,065	189	518	245	146	167	405	757	895	
15 to 20.....	3,368	708	1,409	959	617	1,010	1,224	3,199	3,167	
20 to 30.....	2,412	567	945	1,063	439	372	1,180	3,478	2,999	
30 to 40.....	1,641	431	610	812	496	339	372	2,819	2,004	
40 to 50.....	1,249	338	453	443	254	289	302	1,644	1,027	
50 to 60.....	1,239	364	423	260	163	257	286	723	471	
60 to 70.....	1,062	310	365	67	79	220	183	145	86	
70 to 80.....	330	79	128	37	86	71	37	18	11	
Over 80.....	13,711	3,443	5,384	4,350	3,911	2,776	7,666	14,824	12,964	
Total.....	1,355	404	533	549	531	480	925	2,041	2,314	
Under 15.....	9,735	2,296	3,835	3,437	3,111	1,832	6,116	11,897	10,092	
15 to 60.....	2,621	753	916	364	269	593	617	886	568	
Over 60.....										

From this table we learn that tuberculosis is most frequent from 20 to 30, and next, from 30 to 40, that, at the ages of 30 to 30, the number of females who die of consumption is nearly double that of males, being 1,409 of the former to 708 of the latter, while from 30 to 40 the number of each sex is nearly similar.

The following table of Mr. SHATTUCK shows the relative population of the sexes, victims of tuberculosis, in different places and countries.

Places.	Time.	Both Sexes.	Males.	Fem.	Proportion of each.
Massachusetts.....	4 yrs.	8,837	3,443	5,384	as 39-01 to 60-99
N. Y. City.....	7 "	9,616	4,938	4,668	" 51-41 " 48-59
N. Y. State.....	2 "	6,715	2,827	3,888	" 42-08 " 57-92
Philadelphia.....	10 "	7,666	3,851	3,818	" 50-23 " 49-77
London.....	4 "	27,788	14,824	12,964	" 53-35 " 46-65
England.....	1 "	52,176	24,048	18,088	" 46-13 " 53-87

It thus appears that, while the disease destroys more males than females in New York and London, it destroys nearly the same of both sexes in Philadelphia, and in the country towns of Massachusetts, the proportion of the sexes is as 39-01 males to 60-96 females; in New York, as 42-08 to 57-92; and in England, except London, as 46-13 to 53-87, a striking difference appearing in all ages over 20. What are the particular causes which render the disease so much more rife relatively among females in the country than in the city, remains to be shown, as well as the different causes existing in cities to aggravate the disease in the other sex. If we turn our attention to *locality* as influencing this disease, we find, for example, that the proportion of deaths in the four western counties of Massachusetts from it does not vary much from that on the sea-coast, being from 18-29, to 31-67 per cent., or as 1 in 5-43 to 1 in 4-61 of all the deaths; the lowest number in the state having occurred in Boston, from 1830 to 1840, 14-04 per cent., or 1 in 7-11. In New York city, from 1811 to 1830, the mortality from tuberculosis was 23-40 per cent., or 1 in 4-27; while throughout the state, in 1847 and '48, the mortality was 25 per cent., or 1 in 4. A superficial survey of this subject would seem to show that the prevalence of tuberculosis is, to a considerable extent, independent of those causes above mentioned, for we have seen that it sweeps off nearly as many among the scattered country population of New England as among the crowded denizens of our large cities. There would, indeed, appear to be some constitutional taint, predisposing about one fourth of our population to this fatal malady; and this, too, when surrounded by circumstances apparently the most favourable to health and longevity. Our manufactures are not so managed, as in England, as to develop scrofula or tuberculosis to any great extent; while labour is so well rewarded, that the poorest can obtain an abundance of wholesome food. What, then, are the specific causes which predispose so many of the female sex to these mal-



a wet-nurse of healthy constitution, and suitable as to the state of her milk, should be procured; and if this be impossible, ass-milk, immediately upon being drawn from the animal, or goat's milk, may be given. Recourse may otherwise be had to milk expressed through a bag containing suet, as advised by Dr. PARIS. Great care, especially as respects food and clothing, should be taken of the child at the periods of dentition and weaning. At these epochs, especially the latter, ass-milk, milk boiled with suet—cod-liver oil, or sweet oil, on the surface of the milk—small doses of liquor potassæ, or of BRANDISH's alkaline solution, or of the iodide of iron, in the sirup of sarza, especially in older infants or children—salt-water bathing, the temperature being adapted to the strength of the child—and warm flannel clothing over the whole body, are the most beneficial hygienic means.

151. The support of animal warmth, and the animal heat derived from a young healthy nurse, are most beneficial to delicate, and more especially to scrofulous infants, and the more so the younger the child. An emanation of organic nervous power, as well as of warmth, may be furnished from this source to the delicate infant. The lower animals afford this protection to their young until growth is considerably advanced; and yet the young animal which is most helpless in infancy, and requires this the most, is the oftenest deprived of it, or is allowed to remain no longer in the bosom of its nurse than when it is suckled. During the coldness or coolness of night, and often in a chamber much below the usual temperature of the sitting apartment, the infant is often allowed to sleep in a cot altogether apart from the curtained and warmer bed of the nurse.

152. Change of air, or the migration from one locality to another, according to the circumstances of the case, the age of the patient, and the season of the year; removal from crowded towns or situations; residence near the sea-coast, in a temperate and dry air, and on a gravely or sandy soil; sea-voyaging in some cases; sleeping in large airy chambers; exercise in the open air, the enjoyment of light and sunshine during the waking hours, and limiting sleep to the hours of darkness, are generally of great service, especially in advanced childhood, and during the progress to puberty. Cold-bathing, particularly sea-bathing, frictions of the surface, a generous diet, with a due proportion of animal food, and regular meals, are also most beneficial in the early periods of life. While these means are pursued, the digestive and assimilative functions should be promoted, whenever they are insufficiently performed, by stomachic and tonic aperients, as the compound decoction of aloes with the compound steel mixture, or the compound infusions of gentian and senna; and the use of unnecessary stimuli or stimulating bev-

erages? We suppose it will not be disputed that they are often, at least, to be traced to a violation of some of the laws of health; as sleeping in close, ill-ventilated apartments; neglect of out-door exercise; tight lacing, and the present monstrous and absurd modes of dress; inattention to the functions of the skin and bowels; sitting in rooms heated by air-tight stoves; sleeping in feather beds, beneath thick cotton quilts; reading works of fiction, &c., &c. In short, all causes which lower the vital forces, and tend to the deterioration of the general health, must predispose, to a greater or less extent, to the development of these diseases.]

erages, of pork and indigestible meats, of sugar and saccharine substance, should be avoided.\*

153. As puberty advances, the utmost care should be exercised in all matters which may affect the sexual feelings or desires. A proper superintendence of both sexes ought to be instituted, in order to prevent the tendency to masturbation, which is greater among scrofulous constitutions, at this epoch of life, than in others; and which, if practiced at all, will certainly develop this diathesis into actual tubercular disease, especially tubercular consumption. A careful supervision should also be exercised, after puberty, in order to prevent attachments being formed between scrofulous persons, or between an individual of this diathesis and one who possesses a healthy constitution. This intention, however, will frequently fail; but where it is attempted among the well-informed classes, and the evils consequent upon the neglect of it are duly explained by members of the profession, it will receive attention, and the good results will ultimately become apparent.

154. V. THE MEDICINAL TREATMENT OF SCROFULA AND TUBERCULOSIS.—The medicinal treatment of scrofula consists, 1st. In aiding the hygienic or regimenal treatment above discussed, when the scrofulous taint is suspected or apparent, especially in early life; and, 2d. In employing such medicinal agents as are most likely to arrest the progress of the mischief when scrofula or tuberculosis is more or less manifest. In the first case, medicines are chiefly brought in aid to hygienic means; in the second, they are the principal agents, regimenal means being aids to their operation.

155. i. *In scrofulous cases devoid of any very manifest local lesion*, in connexion with the hygienic means now mentioned, various medicines possessing an alterative and tonic influence may be used. One of the earliest indications of scrofulous taint is furnished by the weak state of the digestive functions—a state evidently caused by the low condition of organic nervous power; and hence occur indigestion, flatulency, acidity of the prima via, irregular state of the bowels, torpid function of the liver, and consecutively a poor or thin state of the blood. Formerly small doses of blue pill, or of gray powder, with soda or other antacids, were given for

[\* We have seen great benefit result from the use of the compound decoction of *aloes* in scrofulous and anæmic subjects, but we should hardly be willing to recommend any of the preparations of *senna* as a stomachic, or to aid the function of assimilation. With regard to *sugar*, we agree with Dr. DUNGLISON, who states that it is one of the most important agents for modifying the functions of nutrition that we possess. Under the use of three or four ounces daily of sugar, in the form of sirup, this writer remarks that "the patient has rapidly gained weight, and the action of the system of nutrition were so much changed that the *cachexy* induced by poor living, and a residence in confined, unhealthy situations, as well as that which characterizes atrophy without any manifest cause, has been removed; a complete renovation has taken place; inveterate cutaneous diseases have disappeared, and old ulcers have filled up and cicatrized. The sugar in these cases appears to act as a *substantive* and *adjective* aliment; that is, it furnishes a richer and more abundant chyle; and, moreover, puts the digestive organs in a condition to derive a larger quantity of nutriment from the food than they would otherwise do, or it acts as a condiment." We have not observed the injurious effects of saccharine substances in these cases, as pointed out by Dr. COPLAND, although, from our limited experience of its use, we are not prepared to endorse freely the statements of Professor DUNGLISON.]

these, conjoined with stomachic aperients and tonics; and very frequently with marked benefit, which, however, was very often counteracted by the excessive use of sugar and saccharine substances, the injurious influence of these either being not known in these cases or overlooked. This treatment, first advocated by the truly greatest name in medicine of his day—Mr. ABERNETHY—was afterward advocated by his pupil, Mr. LLOYD, and is still one of the best that can be adopted; and has been employed by myself in numerous cases with marked advantage and variously modified. Two grains of gray powder, with one or two of dry carbonate of soda, or four or five of magnesia, with rhubarb and powdered cascarilla or cinnamon, taken once or twice daily, according to the features of the case, were generally most beneficial.

156. In cases which present increased frequency of pulse, with or without the disorder of the digestive functions, the use of the above means, modified to meet the circumstances of the case, will be advantageously assisted by small doses of either the infusion or the decoction of cinchona, with the solution of the acetate of ammonia, sometimes with the ammonia in excess, and the sweet spirits of nitre; or the infusion of cinchona may be given with moderate doses of the hydrochloric acid and hydrochloric ether. In cases where aperients are required, and when a pill may be taken, PLUMMER'S pill may be given at night with soap; and the citrate of magnesia, or the phosphate of soda, in some pleasant vehicle in the morning.

157. On the other hand, when, with disorder of the digestive organs in scrofulous subjects, there is more or less languor of the circulation and of the frame generally, Dr. GRIFFITH'S myrrh mixture—(one of the most valuable medicines in existence)—with the compound decoction of aloes, when the bowels require aid, sometimes with the addition of the solution, or of the carbonate of potash and extract of conium, &c., will then be found most serviceable.

158. Since the introduction of *iodine* into practice, there has been no other substance so generally employed as it has been, in some one or other of its preparations, and especially in the form of iodide of potassium. It has superseded the use of mercury even in the combinations mentioned above; and certainly, when prescribed in small doses, as I have usually done since 1821, and in conjunction with the solution, or the carbonate of potash, with the mixture just mentioned, or with a tonic infusion, or with some preparation of sarza, it is a valuable remedy; but it is one that may prove injurious if it be given in too large or frequent doses, or insufficiently diluted, or if its effects are not carefully watched in all cases.

159. Where scrofula is suspected or manifest by its taint, rather than by developed disease, other means may be employed, either alone or in aid of those already noticed; and one of the best, both as a nutrient and as an alterative, is the *cod-liver oil*. When it is prescribed in full doses for the age of the patient, an alterative mercurial pill or powder may be taken occasionally at night (§ 155), and an aperient in the morning, in order to promote the functions of the liver and to prevent biliary accumulations; and in cases where the debility is marked, and the surface is pallid and the structures flabby,

the use of this oil should be aided by the preparations of iron, or it may be taken on the surface of water containing a few drops of the hydrochloric tincture of iron.

160. In cases of scrofulous taint conjoined with much debility, as well as in those presenting manifest external or internal tuberculosis, various modifications and combinations of the above means may be brought in aid of hygienic measures. The alteratives may consist of a combination of mercury and of iodine, or of iodine and iron, with preparations of sarza, or with tonic infusions, according to the features of the case; and while these are being employed at suitable periods of the day, the cod-liver oil, or vegetable tonics, or bitters may also be taken. But in these the several means already advised, both for the prevention of the farther development of the malady and as regimenal treatment, should not be neglected, according as the peculiarities of the case may suggest.

161. In some cases of external scrofula, when there was a languid circulation, more benefit has appeared to accrue from the internal use of the muriatic or nitric acid, or the nitro-muriatic acids, prescribed in an infusion of cinchona, than from any of the preparations of iodine; while in others a course of two or three weeks of the former has been alternated with a similar course of the latter with obvious benefit. In some instances, also, the muriated tincture of iron, conjoined with an increased proportion of the acid, or with the hydrochloric ether, has been prescribed with the infusion or tincture of calumba or quassia, with even greater advantage than either of the preceding.

162. A combination of small doses of the bichloride of mercury, with the compound or simple tincture, or the decoction of cinchona, or with the preparations of sarsaparilla, has been long recommended both for the scrofulous taint and the more declared forms of tuberculosis; and I have frequently had recourse to it in one or other of these forms. In non-febrile cases, or where a tonic is required, this combination is often eminently beneficial; and a course of it is generally very advantageously followed, or alternated, by one of either of the preparations of iodine, as already advised (§ 158, 160, 161).

163. ii. The *medicinal treatment of the more developed states of tuberculosis* is not materially different from that already recommended; but there is generally required a more appropriate application of the means already mentioned, as well as of others about to be noticed, to these states—to the particular forms and seats of tuberculosis. When the malady affects external parts, as the lymphatic glands, the joints, the bones, &c., then the medicines above advised, more especially those last mentioned, will be found in general most serviceable; and in these the cod-liver oil may also be taken. When the mesenteric glands seem to be chiefly diseased, the preparations of iodine should be given in very small and much diluted doses; and this oil may also be brought to their aid; frictions over the abdomen, with oleaginous and stimulating liniments (*Form.* 306, 311), being additionally resorted to.

164. When the glands go on to suppuration, or when a discharge is furnished by them, or when external sores, fistulæ, &c., appear, then strict attention should be paid to the digestive



and assimilative functions, and more especially to the states of the circulation and of the blood. Not only should the former functions be aided or corrected as advised above (§ 155, 156), but the blood should be improved whenever it appears to be thin or poor in red globules, by means of the preparations of iron; and of these, the judicious use of the compound steel mixture, or of the iodide of iron in the sirup of sarza, has proved most beneficial in my practice. In all scrofulous cases attended by suppuration or discharge, there is a marked tendency to alteration of the blood—to a state of anæmia, particularly as respects the coloured globules; and hence these medicines are the more required. In all cases, also, of open scrofulous sores, care should be taken to prevent, as much as possible, the access of the air to them; as the air not only injuriously affects the diseased surface, but it also alters the discharge from this surface, and renders it more irritating. Local applications, therefore, in these cases, should be employed with the view not merely of removing the morbid action of the part, but also of completely excluding the air, and of correcting the acrimony of the discharge.

165. When scrofula, in any of its open forms, attacks *females*, it is often complicated with either a delay of the catamenia, especially about or soon after the period of puberty, or with irregularity of some kind, or an entire suppression of this evacuation. In many instances an obstinate form of leucorrhœa accompanies the catamenial disorder, and not infrequently the scrofulous as well as the sexual disease has been induced or aggravated by the baneful vice of masturbation. Due attention should be paid to this causation and to this morbid association, as due inquiries on the part of the physician, and a careful supervision by the friends of the patient, may be productive of ultimate success in the treatment, which in general should be chiefly constitutional.

166. In some cases, it will be found advantageous to commence the treatment of scrofula, especially when it is internal, or the glands are chiefly implicated, and the tongue is loaded, with a smart emetic of sulphate of zinc, and to promote the emetic operation by means of the tepid infusion of chamomile flowers; and, having subsequently improved and promoted the secretions and excretions by the alteratives and stomatic aperients already mentioned (§ 155–157), to enter upon a course of either of the more energetic medicines as advised above (§ 160–162). When the scrofulous affection is seated in a gland, and has gone on to suppuration and fluctuation, the integuments being thinned and purplish, there can be no doubt as to the propriety of procuring the discharge of the matter by a small incision of the integuments, and of afterward protecting the orifice from the air. In cases of this kind, as well as in those attended by open sores, the state of the constitution, particularly as respects the blood, should receive attention; and the treatment ought to be especially directed to the improvement of the assimilative powers and of the blood, whenever they are in fault, either by the means already noticed, or by the other vegetable or mineral tonics generally in use.

167. Whenever any sexual disorder complicates the scrofulous taint, or any form of tuberculosis (§ 165), as will be frequently observed

in practice, meddling examinations, *per vaginam*, should not be instituted without sufficient reason. Most of these disorders will yield to the treatment advised for them severally, under their respective heads in this work, especially when conjoined with the medicines found most serviceable in scrofulous and tubercular affections. Indeed, the general indications and means of cure most appropriate to the one class are very frequently suitable to the other; and this remark need not be limited to the constitutional treatment, but be extended to the local also.

168. After the operation of an *emetic*, when it is required, the alvine secretions and excretions ought to be duly promoted by a combination of *stomachics* or *tonics* with *aperients* and *alteratives*, due regard being also had to the diet and regimen recommended above (§ 150, *et seq.*). As occasion may offer, the *mineral springs* and *baths* about to be noticed (§ 193, *et seq.*) may either be brought in aid of other internal or constitutional remedies, or may follow the use of these latter, or even be alternated with them.

169. iii. OF THE SEVERAL MEANS RECOMMENDED FOR THE CURE OF SCROFULA AND TUBERCLES.—When a person possessed of common sense hears of the numerous spells, charms, incantations, superstitious rites, &c., so frequently had recourse to in former days for the cure of scrofula, he considers them humiliating proofs of the credulity of the human mind, during ages commonly called dark, or only partially enlightened; and he is induced to form a comparison between those ages and present times, and to draw inferences which will probably be by no means in favour of the former. Superstitious and absurd notions and practices were no more then than they are now, confined to the lower classes of society, or to the uninstructed mind; and however lowering they may appear to the dignity of human nature, however irrational and impossible the results imputed to them may seem to the thinking, however devoid of those connexions which entitle the imputed causes to the credit of the reported effects, when any effect was even loosely observed, still greater absurdities, still more wonderful charms, more entrancing spells, more blind superstitions, and more gross impositions are credited, in this age of boasted civilization, of scientific advancement, and of mechanical contrivance and invention, and more numerous instances of blind credulity are daily manifested, than in ages of the darkest and lowest mental abasement.

170. Every where—in all ranks and classes, in all professions, and even among those reputed to be instructed, or learned, or even imbued with science—most absurd doctrines connected with the healing art, human impossibilities, the most ridiculous notions, the most extravagant assertions, are promulgated by knavish impostors, and believed in by credulous multitudes; the impudence of the former and the faith of the latter being the greater, the more devoid of truth these doctrines are, and the more they are opposed to good sense, to true science, and to honest dealing. When we find, as may be found at the present day, in the senate, in the hierarchy, in the judicial bench—among those who govern the country, who interpret and administer the laws, who profess to direct the religious belief of the community, not merely believers in, but also propagators of, the most absurd med-

ical doctrines and medical means—officious meddlers in what they are incapable of understanding—abettors of the knavery of mischievous quacks—can the decadence of true medical science be far off? What is neither honoured nor rewarded must necessarily cease to be sufficiently, ardently, and patiently cultivated. If the impertinence of the ignorant, the impudence of the vulgar, the professions of the uneducated, are to be esteemed above the acquirements of the scientific and philosophic investigator, there must, at no remote period, be an end of the learning and science of those who shall hereafter assume the office and rank of physician.\*

171. *A. Superstitious practices* have been adopted for the cure of external scrofula since the earliest ages, and have been of various kinds, the oldest being more or less connected with pagan or religious rites, and the most recent with certain medical doctrines and quackeries which influence more or less the faith or confidence of the patient. It is not unlikely that scrofulous sores formed no small part of the external maladies respecting which so ample a provision was made in the 13th, 14th, and 15th chapters of Leviticus, and for which the means were calculated no less to excite the faith and hopes of the patient, than to benefit the priests, who, in those ages and places of imperfect civilization, conjoined the healing art with the priestly office. During the earlier

\* It is very generally believed that the patronage of quacks and quackeries—of impostors and of impositions—is to be imputed chiefly to ignorance; but this is only one of several sources to which it should be referred. Credulity, a tendency, even in the incredulous, to believe in whatever is confidently asserted, a disposition to admire whatever is unknown or unexplainable, the faith which many place in the impossible—the Catholic dogma—“*Credo quia impossibile est*”—have collectively and severally an influence on the minds of the majority—on those who will not take the trouble of looking closely into matters, or of thinking sufficiently for themselves, especially when they are either imperfectly or not at all acquainted with the natures and relations of such matters. It is not a little remarkable that, since the founding of the College of Physicians at the commencement of the 16th century, expressly with the view of preventing the injurious and irregular medical practices of the day, down to recent times, most of the quacks and quackeries, against which the college had to contend, were patronized by bishops and dignitaries of the Church, and by persons of high rank, as sufficiently set forth in GOODALL'S History of the College.

It would appear, at the present day, as if the aberrations of the human mind apparent in all classes and places, in matters connected with the disorders of the body, were the humiliating inflictions of Providence on those to whom the professions are as a worldly craft, science as a matter of traffic, and learning as an occupation of the memory involving none of the higher manifestations of the mind. The history of human delusion as to matters medical, and of the fashions which have successively engaged the weak and selfish respecting the ailments of their debilitated frames, shows that, in an era of luxurious indulgence, of exhausting vices, and of enervating enjoyments, the impudent assertions of impostors have a more powerful influence on the minds and bodies thus emasculated than the upright and rational advice of scientific and learned physicians. The victims of the former are either incapable of reasoning upon, or are too indolent to examine, the opinions and assertions which they practically adopt; and hence, of the several medical impostures of the present day, the most popular is that one which is the most extravagant in its pretensions, the most abounding in absurdity, the most deficient in the least approach to truth. “*Probitas laudatur, et alget*”—honesty, however, is hardly praised; but dishonesty and assurance are more than praised—they are worshipped with a fervency equal to the extent of delusion they achieve—to the amount of their success—a success acquired only at the expense of human suffering, and by the sacrifice of human life, but worshipped nevertheless.

epochs of Jewish history, both prophets and priests had recourse to sprinkling with oil and touching the diseased parts for the cure of external sores; and, before the introduction of Christianity into northern countries, the Druids or priests, while they undertook the treatment of these affections, most probably adopted the same or analogous means. PLINY, TACITUS, and SUETONIUS furnish some doubtful evidence of touching the sick having been resorted to as one of the means of healing; and it would appear, from the Scandinavian Eddas and Sagas, and from some German and French writers in the seventeenth century, that the practice of healing external sores by the royal touch existed in the northern countries of Europe as early as the eleventh and twelfth centuries, and was very commonly adopted from those times until the middle of the eighteenth century.\* When the age and other circumstances in which external scrofula presents itself are considered, it may be safely inferred that a very large proportion of those who were thus touched recovered at indefinite periods after it was resorted to. The accession of puberty, the influence of the mind on the body, the change of living, of season, of air and scene, and the journey, when this mode of healing was confided in, and various related circumstances, combined to produce no mean constitutional effects, and thereby to remove the local manifestation of the constitutional evil. The transfer of nervine influence from the healthy to the sick, or any other mode of explanation which the modern mesmerist adopts to account for the effect, when effect was observed, could have but a small share, if any, in producing it; but at the present day mesmerism usurps the place of the royal touch, although with doubtful efficacy, unless it brings to its aid all the accessories which I have now mentioned, as well as many others aiding more or less in producing a constitutional as well as a local change.

172. *B. The preparations of iodine* are among the most efficacious remedies which can be prescribed for scrofula, when judiciously administered and combined; but, when improperly employed, they may be most injurious. I have employed them extensively both in public and private practice, from 1820 until the present time; and have generally commenced their ex-

\* During the seventeenth and eighteenth centuries, the seventh son of a seventh son, and, still more, the ninth son of a ninth son, divided the laurels with royalty for their success in curing scrofula by the touch; the old numbers, as well as the rare occurrence of so prolific offsprings in succession, producing the cures as effectually as the high rank of the royal competitors. At the present day, the passes of the mesmerist profess to effect more than either the royal touch or the humbler ministrations of even the ninth son of a ninth son, wherever he may be found.

[With regard to the influence of the royal touch, it is well to recollect what is stated by WISEMAN, who wrote at the period it was practiced, viz., that part of the duty of the royal physicians and sergeant surgeons was to select such patients afflicted with scrofula as evinced a tendency towards recovery, and that they took especial care to select those who approached the age of puberty; in short, those only whom nature had shown a disposition to cure. The patient was thus secured from the importunities of art, and the efforts of nature left free and uncontrolled, and the cure not retarded or opposed by the administration of adverse remedies. We have no comments to make upon the spirit-rapping and clairvoyant systems of practice; the knaves who practice them, we trust, may yet be so situated as to do the state some service, if they cannot wholly compensate for the enormous evils they have inflicted upon communities.]



hibition in small doses, and often much diluted, always preferring to give them very soon after a meal. The preparations of iodine I have preferred are the iodide of potassium, the ioduretted solution of the iodide of potassium or the compound tincture of iodine, and the iodide of iron. The iodides of mercury are much more rarely indicated, and the iodide of sulphur is too irritating. The iodide of potassium I have often combined with the carbonate of potash, or with liquor potassæ, or with BRANDISH's alkaline solution, and sometimes also with preparations of cinchona, or of sarsaparilla, or with one or other of both. The iodide of iron should be given in sirup, especially the sirup of sarza. When scrofula is associated with syphilis, then the iodides of mercury may be given, or mercury may be prescribed night and morning, or otherwise employed, while the preparations of iodine are taken as just recommended.

173. During the exhibition of iodine in any form, especially if continued above a few days, the state and functions of the liver should be carefully watched; for iodine may, by passing directly into the portal circulation, excite, or even irritate, the liver to a very injurious extent. The preparations of iodine may be employed externally in various ways, either to the part affected, or by means of local or general baths. When applied to the diseased gland or part, care should be taken that they do not, by too great concentration, convert congestion into inflammatory action, or otherwise injuriously irritate the part. Baths containing the iodide of potassium, with or without the addition of sub-carbonate of potash, I have often found of much service, especially when brought in aid of internal means. Iodine, even when cautiously prescribed, may disagree with some constitutions. Its operation should, therefore, be carefully observed. It ought not to be too long employed without intermitting its use; and, during its exhibition, the urine should be examined and tested, not merely with respect to its acidity or alkalinity, but also as to the presence of albumen; and if the latter appear, the use of the iodides should be relinquished.

174. *C. Mercurials.*—Mercury, in the form of calomel, corrosive sublimate, and black sulphuret (Ethiop's mineral), was generally employed for scrofula during the seventeenth and eighteenth centuries. MAYERNE, BORDEU, MARX, and others prescribed it not only internally, but also to the scrofulous sores. HUFELAND resorted to mercurials with the belief that they removed the scrofulous irritation by virtue of a law of the animal economy, that different kinds of irritation destroy each other, or, in other words, that one kind of irritation removes, by superseding, the antecedent irritation. But in this he assumes two things, namely, 1st, that the morbid action consists of irritation; and, 2d, that it or any irritation may be removed by an irritant, neither of which he nor any other one has proved. But, while HUFELAND and others recommended mercurials, even until they produced salivation in the more obstinate cases, others, with equal justice, contended, with MORSON and GIRTANNER, that they were injurious when carried so far as to occasion salivation; and they were fortified in this by the obvious impropriety of prescribing a debilitating medicine for a disease essentially of debility.

175. At the present day, several other preparations of mercury have been resorted to, especially mercury with chalk, the iodide and sub-iodide, the bromide and sub-bromide, and the nitrate, externally. I have employed several of these, especially the iodides, with results similar to those already mentioned in respect of iodine; but the mercurial iodides require a careful observation of their effects. Mercury with chalk is an excellent alternative, and is often required to correct or to increase the biliary functions. Of all the preparations of mercury, the *corrosive sublimate* is certainly the most beneficial; but it should be prescribed in very small doses, and generally in conjunction with some preparation of sarza or of cinchona; and, when thus exhibited, I have found it almost equally efficacious with the preparations of iodine. It was much used by VAN SWIETEN, AKENSIDE, and their contemporaries. I have usually given it with the fluid compound extract, or sirup of sarsaparilla, or in the compound tincture or decoction of cinchona. In the more obstinate cases, a course of the sublimate may be alternated with a course of one of the iodides; and when the bones are at all implicated, this plan will generally prove efficacious, especially when aided by an appropriate diet and regimen.

176. *D. Preparations of Iron.*—Most of the preparations of iron may be given advantageously in scrofula, especially after morbid secretions and fecal accumulations have been evacuated. The preparations which I have preferred are, the *ammonio-tartrate*, the *potassio-tartrate*, the *ammonio-chloride*, the *saccharine carbonate*, the *iodide*, and the *compound mixture of iron*. Mention has already been made of the iodide (§ 172). The compound mixture of iron is one of the most efficacious, and I have usually prescribed it with an additional quantity of the carbonate of potash, or with solution of potash, with extract of conium and liquorice. The *sulphate* and *muriate of iron* were generally preferred by THILENIUS, THOMANN, and HUFELAND; and when the former can be taken in a pill, and when the latter is given in the form of the tincture of the sesquichloride, either of these is very beneficial. These preparations are most serviceable where there is any tendency to anæmia or chlorosis, and not less so when scrofula is associated with hysteria or disorder of the catamenia in any form.

177. *E. Chlorides.*—(a) *Chloride of Barium.*—Dr. ADAIR CRAWFORD first contended for the anti-scrofulous operation of the muriate of baryta, and in this he was supported by FERRIAR, THOMANN, PEARSON, BUCHOLTZ, WESTRUMB, HUFELAND, PINEL, ARMSTRONG, WENDELSTADT, VERDIER, &c. But CHAPMAN, PORTAL, JADELOT, and others have not fully confirmed the opinions which were formerly entertained respecting it. The muriate of baryta had fallen into neglect for some time, its use having been superseded by medicines which were found more efficacious and less irritating to the stomach, when Dr. PIRONDI advised a more active employment of it. He prescribed six grains of the medicine in four ounces of water, and directed a tablespoonful to be taken every hour, excepting the hours before and after a meal. He increased the dose by six grains every day, until a drachm was given; and the patient was restricted to a vegetable diet and water. Having had some

acquaintance with Dr. PIRONI, I was induced to make a partial trial of this plan in a few cases, but I could not succeed in giving more than ten or twelve grains in the twenty-four hours, and then it was given more diluted than he advises. Its irritating effects on the stomach frequently prevented me from prescribing more than six or seven grains in the twenty-four hours. It appeared to be more efficacious when given in moderate doses, either soon after or with the meals, than when taken in larger doses in the intervals. According to Dr. GLOVER, who makes a very favourable mention of the chloride of barium in scrofula, the *bromide* and *iodide* of barium has the same physiological action with the chloride, the iodide, moreover, acting energetically on the uterine system.

178. (b) *Chloride of calcium* was formerly much employed against scrofulous swellings and sores, and in similar states of solution to those in which the chloride of barium was prescribed. BEDDOES, ODIER, FRANK, and HUFELAND have made favourable mention of this substance. The last-named of these writers, however, considered it more irritating than the chloride of barium, and that it, therefore, should be used more cautiously. Dr. SIMMONS stated it to be inefficacious, and Mr. PHILLIPS seems to be of a nearly similar opinion. "FOURCROY and the Dutch physicians had much confidence in its power over scrofula. BIETT for many years made much use of this medicine in the treatment of the scrofulous patients of St. Louis, without observing those inconveniences which are frequently attendant upon the use of baryta in full doses. It is the base of the anti-scrofulous nostrum of NIEMANN. I have frequently used it in the following form: a drachm of this chloride to twenty drachms of distilled water, of which a tea-spoonful was taken in milk two or three times a day. I have carried the dose up to two tea-spoonfuls, but not exceeded that dose. I am not satisfied that it has any evident action upon scrofulous glands, but it is more generally tolerated than the chloride of barium."—(PHILLIPS, *Op. cit.*, p. 282.)

[BENEKE has shown that the *phosphate of lime* in man, as well as vegetables and the inferior animals, is absolutely essential for the formation of cells, and he considers that many pathological states of the system may depend on a deficiency of this salt, such as ulcerations depending on a general dyscrasia, infantile atrophy, scrofula, and tuberculous diseases. Dr. STONE, of New Orleans, has, in consequence of these views, employed the *phosphate of lime*, in conjunction with *cod-liver oil*, in such cases, with very beneficial results, and we have no doubt it will prove one of our most valuable remedies in such cases. It is used in doses of from six to eight grains, three times a day.]

179. (c) There are other *chlorides*, as the *chloride of potassium*, the *chloride of zinc*, &c., which, if judiciously employed, may act beneficially in scrofulous swellings and sores. The *chlorate of potass* has been very frequently prescribed by me in this and in other cachectic diseases since 1819, and I can recommend it as one of the substances most deserving adoption in scrofulous affections. Dr. GLOVER remarks that his experiments prove the *chloride of potassium* to be much more energetic than the corresponding compound of sodium, although not so powerful

as the iodide of potassium. "There is scarcely a doubt but that the chlorides, bromides, and iodides of the same bases produce effects identically similar in kind, differing only in degree. The bromide of potassium is more powerful than the chloride, less active than the iodide. Not being so apt to occasion nausea as the latter substance, it may be used in cases where this might disagree."

180. *F. Solutions of chlorine—aqua chlorinei*—and chlorinated solutions of the alkalis have considerable influence in the more cachectic states of scrofula. Dr. GLOVER observes that the strongest analogy, in physiological and medicinal properties, exists between chlorine, bromine, and iodine; and that any one of these bodies is capable of producing the effects which can be obtained from another; but that the different forms in which we must use them give rise to differences in action. "Thus the very slight solubility of iodine almost precludes its use in watery solution, and the convenience with which solutions of *bromine* can be prepared renders this body peculiarly adapted to form lotions for external application." Mr. POTTER and Dr. GLOVER have proved the utility of bromine used externally, eight or twelve minims of bromine being added to a pint or half a pint of water. I have directed one drachm of bromine to eight ounces of distilled water; and from five to twelve drops of this solution to be taken in any suitable vehicle internally; and from one to two drachms of the solution to eight ounces of water for external use.

181. *G. Alkalies* have long had a great reputation for the cure of tuberculosis and scrofula. They are much praised by HAMILTON, BLANKARD, KIRKLAND and FODÉRE, especially the carbonates and the solution of potass. These are, however, much less efficacious than BRANDISH's alkaline solution, which owes much of its efficacy to the lime which it contains. The alkalies should generally be conjoined with tonic or bitter infusions or decoctions, with chalybeates, as in the *mistura ferri composita*, or with deobstruent extracts, as taraxacum, guaiacum, sassa, &c.; or they may be given in the form of common or medicated soap, in conjunction with these extracts, or with ammoniacum, myrrh, &c. I have frequently combined either of the carbonates, or the solution of potash, with the iodide of potassium, with marked advantage. The aerated alkaline waters may be made the vehicle for several other medicines in the form of tincture; and, when the bowels are lax or irritable, or discharges from any of the mucous canals are troublesome, then lime-water, or the aerated lime-water taken either alone, or with milk, or with other medicines, which the circumstances of the case will indicate, will be of great service.

182. *H. Acids* have rarely been found of service in scrofulous swellings, although they have often been given in certain states of tuberculosis, especially when affecting the lungs, and sometimes with benefit. I have found, however, the *nitro-hydrochloric acids* used internally or externally, or in both ways, of great service; and they may be employed either as the chief means, or in aid of other remedies. They are most beneficial when the functions of the liver are imperfectly performed, when the circulation is languid and weak, especially in the extremi-



ties, and when the hands or feet are cold. The *hydrochloric acid* was recommended by FERRIAR and JOERDENS, and I have prescribed it in scrofulous affections in the decoction or infusion of cinchona with much advantage. The nitro-hydrochloric acids may be taken either alone, or in bitter or tonic infusions.

183. *I. Tonics* of various kinds have been very generally recommended for external scrofulous affections, but not so frequently for internal tuberculosis as rational views of the nature of this malady might have suggested. The preparations of *cinchona* were much employed by WHYTT, FOTHERGILL, NORTHCOTE, and FORDYCE; and various bitter extracts and vegetable tonics by GROSSMANN, HUFELAND, and others. The connexion of scrofulous affections with debility, and with imperfect digestion and assimilation, indicates the necessity of having recourse to this class of medicines either as the principal means of cure, or as adjuvants, or as the vehicles of other more specific remedies. A solution of *pepsin* has been recommended as a tonic and promoter of digestion by Dr. TYLER SMITH. He gives it a quarter of an hour after every solid meal, and in larger quantity after dinner than at any other time.

184. *K. Cod-liver oil* and the *oil* from the livers of other species of the same genus have been recently much employed in the treatment of all forms of scrofula and tuberculosis. I have prescribed it since its use was revived; and I have had numerous occasions of observing its beneficial effects, especially when aided by such means as the peculiarities of the case should suggest. Its operation is not merely that of a nutrient, but it is also alterative, and it certainly produces more or less of a healing influence on ulcerated cavities or surfaces; these effects being the more manifest, the more recent the oil, and the less it is subjected to clarification and other chemical manipulations. I have usually found it most beneficial when taken on the surface of diluted lemon-juice, or on lemonade, or on the surface of the infusion of orange-peel, with or without a few drops of the solution of potash, or of BRANDISH's solution; or on water containing a few drops of the nitro-hydrochloric acids, or of the muriated tincture of iron. When there is much cachexy, or inaction of the liver, or more or less anæmia, these modes of exhibition should be preferred.

185. *L. Burned sponge* had once considerable reputation for the cure of scrofula, and to this it was chiefly indebted to ARNAULT DE VILLENEUVE, ASTRUC, LANE, RING, FODÉRE, and HUFELAND. I have had no experience of its effects; but that it was entirely without effect I cannot believe, although the quantity of iodine it contains is very minute. The animal charcoal which was thus formed might not have been entirely inefficacious, especially in correcting the contents of the alimentary canal; for which, indeed, powdered charcoal is extremely efficacious. LETTSON, a sagacious practitioner, often had recourse to burned sponge, and sometimes gave it with calomel.

186. *M. Various substances* have been employed more or less empirically, or without any clear ideas as to their operation, or as to the amount of effect which may be ascribed to them.—(a) Of the benefit which may be derived from

*emetics* and *stomachic aperients*, as advised by SCHMIDT, WEIKARD, and others, there can be no doubt, when prescribed at the commencement of the treatment, and when circumstances indicating their use are present. Several other substances were also much employed at different periods, and were probably not altogether without benefit, particularly as alteratives and restoratives, thereby improving the constitutional powers. Among these *guaiacum*, *sassafras*, the decoction of *walnut-leaves*, *willow-bark*, *hops*, *taraxacum*, *tussilago*, *cantharides*, *asafetida*, &c., held the most conspicuous places. RIVERIUS prescribed *gum ammoniacum*, both internally and externally; and I have seen much benefit derived from the *balsam of Peru*; and, in other instances, from *capsicum* taken internally, and from the external application of a weak infusion of it to scrofulous sores. Dr. TYLER SMITH has recently recommended the exhibition of *pepsin* in order to promote the functions of the stomach.

187. (b) *Digitalis* was formerly much employed internally against scrofulous and tubercular diseases. M. BAYLE (*Biblioth. Thérapeutique*, t. iii.) states that it was first prescribed by VAN HELMONT; and subsequently by HALLER and DARWIN, the latter of whom gave the powder in as large doses as five or six grains thrice daily. This substance was used also externally, either in the form of the infusion, or powder of the leaves, and the internal and external uses were conjoined. I have no experience of the remedy in scrofula, and I believe that it is more likely to prove injurious than beneficial. The *walnut-leaves* have lately been much recommended by M. NEGRIER; but I agree with Dr. GLOVER in considering them as only slightly beneficial as a tonic, when the preparations of these leaves are used internally, and as an astringent when applied externally, and as inferior to several other tonics and alteratives usually adopted.

188. (c) At the commencement of the last century *tar-water* was very much vaunted for the cure of every form of scrofula and tuberculosis, and some years ago I prescribed it largely, both internally and externally, in a stronger form, as a wash to scrofulous sores; and, from my experience of its effects, I consider it one of the most efficacious means which we possess, when aided by a suitable diet and regimen. I also gave the pure Norwegian *tar* in the form of pill by means of liquorice powder. Tar may be given more largely when made into pills with magnesia, but in this combination the pills often pass through the bowels without being dissolved. In the more indolent states of scrofulous sores, *creasote* may be substituted for tar-water, but my experience leads me to prefer the latter. The tar may likewise be made into pills with powdered charcoal or other substances, or be taken in gelatine capsules. This medicine is often very efficacious in the chronic cutaneous eruptions which occur in the scrofulous taint, or associated with any of the forms of scrofula or tuberculosis.

189. (d) During the 16th and 17th centuries, and more recently, a medicine was much in vogue as an alterative and restorative, not only in scrofula, but also in many other maladies, under the appellation of the *infusion of a thousand flowers*. This consisted of an infusion, either warm or cold, of the recent dung of cows

and bullocks feeding in open pastures. The only effect which this medicine could produce must be referred to the proportion of bile which it contained. That *ox-gall* is possessed of much efficacy, either alone or properly combined, I have shown in various parts of this work, especially in promoting the digestive and assimilating processes. It is readily procured in the states of inspissation and extract. I have prescribed it in the form of pill since 1820, and it is now kept by most of the chemists in this city. It is most beneficially used as an adjunct to other appropriate means, especially in the states of inaction of the liver, and when the bowels are weak and irritable.

190. (c) Since the work of STÖRCK on *conium* appeared, this substance has had great reputation for the cure of scrofula; and, although it has received the commendations of QUARIN, RUTTY, and many others, I am at a loss to recognise its virtues. The same remark applies to *digitalis*, which has been prescribed by MENZ, DARWIN, and HUFELAND. *Sulphur* in various states of combination is more deserving attention. I have often prescribed it in scrofulous affections, in conjunction with magnesia, powdered cascarrilla, or aromatics and warm carminatives, with the view of promoting the cutaneous functions, which are often imperfectly performed (and this object it attains more permanently than most other means), and in order to promote the intestinal evacuations. *Camphor* was recommended internally by COPLAND, LETTSON, and FODÉRÉ, and externally dissolved in olive oil; and in this form it may be applied with gentle friction or more permanently. *Sulphate of zinc* was praised by WHITE, but it is much inferior to the sulphate, or other preparations of iron.

191. (f) *Electricity* was long since recommended by SIGAUD LA FOND for scrofulous swellings, and its use has been recently revived; but in whatever manner this agent may be employed, either as electro-galvanism, or as electro-magnetism, or as shocks from the Leyden jar, or as sparks from the parts affected, it is appropriate only to the more indolent and atonic states, and when the parts furnish no signs of acute inflammatory action.

192. *N. Change of air* to the sea-side, in connexion with sea-bathing, &c., has frequently a beneficial influence, and a considerable share of the benefit has been imputed to the sea-air. The amount of benefit has most probably been exaggerated, but I cannot think that it is without influence, especially when the body is duly protected from cold. Mr. PHILLIPS thinks that change to the sea-coast exercises no greater influence on scrofula than change to any inland situation where the air is pure and dry. For young persons and scrofulous children change of air is always beneficial, and when this can be conjoined with the use of sea-water and sea-bathing, I believe the benefit to be augmented; and, for this purpose, especially to residents in the metropolis or other large towns, there are no places more salubrious, during the months of June, July, August, and September, than Lowestoft and its vicinity, and the Isle of Thanet.

193. (a) *Sea and mineral waters* have always had a great reputation in the treatment of scrofulous and tubercular affections. Sea-water has been strongly recommended by RUSSELL, KIRK-

LAND, TOLBERG, and many others, both internally and externally; and of all waters it is certainly most generally appropriate and efficacious, if its use be judiciously directed. When it can be retained on the stomach, even in small quantity, it will generally be taken internally with benefit; and when the bowels are sluggish it is one of the best aperients that can be given. As a warm, tepid, shower, or cold bath, or used in washing or sponging the surface, it is also an excellent remedy. But when sea-bathing is adopted, especially for children, the period of immersion should be brief—short in proportion to their youth and the amount of debility; and, if alarm be caused by it, the shock should be avoided by substituting effusion on the surface by a sponge, or even by less alarming modes of employing salt-water. In some cases artificial sea-water may be used, or a solution of bay-salt, or this salt may be added to sea-water. Reaction should follow cold bathing; and when this is not manifested, either the period of immersion has been too protracted, or the means is too severe for the constitutional powers of the patient, and should not be persisted in.

194. (b) *Several mineral waters* are used with great benefit, both internally and externally, for scrofulous affections; but they should be prescribed with strict reference to the states of nutrition, circulation, and assimilation, otherwise but little advantage will be derived from them. Where the assimilative functions are much impaired, and more or less of anæmia exists, the chalybeate mineral waters of this country should be preferred; and these may not only be taken internally, but also used externally as baths, as advised by LENTIN and others. The several alkaline and sulphureous waters, as those of Bath, Harrogate, Leamington, &c., are generally of service, especially when a deobstruent and alterative effect is required. Dr. GLOVER remarks that the mineral waters of Shap and Shotley, in the north of England, appear to be the best suited for scrofula, on account of the large quantity of alkaline and earthy muriates which they contain. Besides these, the mineral springs and the factitious waters of Carlsbad, Ems, Fachingen, Homberg, Kissingen, Seltzer, and of Bâges, Bonnes, Cauterets, Enghein, &c., have severally been recommended in scrofulous affections, and are more or less beneficial when judiciously employed, and aided by suitable medicines, diet, and regimen.\*

195. *O. Medicated baths* of various kinds have been recommended for external scrofula. Those containing the iodide of iron, or iodide of potassium with the sub-carbonate of potash, or small quantities of the sulphuret of potash, are the most beneficial. I have prescribed baths with the sub-carbonate of potash alone, and believed them to have been of service. It is manifest that these can be viewed merely as aids of internal remedies.

196. *P. The local treatment of scrofula* requires

\* [Our country furnishes a vast variety of mineral waters, of which the carbonated saline and ferruginous springs of *Saratoga*, the sulphur waters of *Avon*, *Richfield*, and *Sharon*, New York, and the White, Red, and Salt Sulphur Springs of *Virginia*, are the most celebrated. These are all well adapted to different forms of scrofula, in some of its stages, but the advice of a physician will be needed to indicate their respective adaptations to particular cases. Much of the benefit, however, is to be attributed to change of air and habits.]



merely a few remarks; for, if scrofulous glandular swellings receive an early attention, the internal or constitutional means described above, more especially the administration of the preparations and combinations of iodine, appropriately to the circumstances of the case, should be chiefly confided in. The treatment of scrofulous swellings should depend chiefly on the absence or presence of increased heat and redness. If either or both be present, very different means from those which are indicated when they are absent are required. As long as the tumour continues devoid of redness, of increased heat, or much tenderness, gentle frictions, with fresh olive oil, to which small proportions of spirits of turpentine and camphor are added, with or without a little soap, will generally be of service. The preparations of iodine, especially ointments, lotions, and tinctures of iodine, have been much employed to the affected parts. But these should be sufficiently mild not to irritate the skin; for when they are too strong, the irritation of the surface caused by them will extend to the parts underneath, and superinduce an inflammation which might not otherwise have occurred. The iodine ointment of the *Pharmacopœia* is much too strong, and contains too large a proportion of iodine as respects that of the iodide of potassium and that of lard. I have much preferred the ointments prescribed in the *APPENDIX* (see *Form.* 766–770); and even they should be cautiously applied, so as to avoid irritation and pain. If the swelling be painful, or if it be irritated by the friction, the compound tincture of iodine may be applied, more or less diluted, to the surface, or the lotions prescribed in the *APPENDIX* may be employed (see *Form.* 671–673); but the stronger of these should be very much diluted.

197. When inflammatory action appears, either in the surface of the swelling or in the subjacent parts, the more common applications for sthenic inflammation are seldom of service, but, on the contrary, are often prejudicial. The existence of pain in the swollen part should not be viewed as always indicative of inflammation, for where the former is most severe the latter may not be present. In these cases, the *unguentum iodinii plumbi* and the *unguentum iodinii opiatum*, in the *APPENDIX* (*Form.* 768, 770), are the most serviceable. I have also found the *unguentum calomelanos cum camphorâ* (*Form.* 757) of use. These ointments should be rubbed gently over the surface, without exciting irritation. If increased heat and redness continue nevertheless, warm and anodyne applications are frequently more beneficial. In these cases, either of the deobstruent ointments in the *APPENDIX* (*Form.* 761, 762) may be tried, as there prescribed or more or less diluted.

198. If the inflamed part goes on to *suppuration*, an early outlet should be given to the matter, as its retention contaminates the tissues which surround it, and, extending in more than one direction, often gives rise to sinuses. The *ulceration* consequent on scrofulous suppuration generally requires not only much attention to the general health, by the means above described, but also a pure air, and suitable diet and regimen. In addition to these, gently stimulating applications, consisting either of very weak ioduretted ointments or lotions—of ointments containing either the balsam of Peru or

a small proportion of the iodide of zinc—of lotions containing a few drops of the tincture of capsicum, or of one of the chlorides—will be used with benefit. The solutions of iodine recommended by LUGOL to scrofulous ulcers are the following:

	No. 1.	No. 2.	No. 3.
Iodine .....	2 grs.	3 grs.	4 grs.
Iodide of Potass.	4 grs.	6 grs.	8 grs.
Distilled water..	1 pound.	1 pound.	1 pound.

These, commencing with the weakest, may be used frequently, either as washes or lotions, or be injected into scrofulous sinuses.

199. *Q. The diet and regimen of scrofulous and tubercular subjects, whether infants, children, or adults, are in every respect the same as above recommended (§ 148–153) for the prevention and the hygienic treatment of scrofula and tuberculosis.* The chief of these means are animal warmth and suitable food during infancy; a pure, dry, moderately warm and uncontaminated atmosphere; due ventilation of the apartments, especially of bed-rooms; change of air, sea-air, and voyaging; a due regulation and subjugation of the passions, desires, and imagination; a light, digestible, and nutritious diet, avoiding stimulants or heating beverages; and regular exercise in the open air; due exposure to light and sunshine; early and regular hours for sleeping and waking, and for meals; and attention to the states of all the secretions and excretions—the cutaneous, intestinal, and urinary—are the most conducive, not merely to the prevention of scrofula and tuberculosis, but also to the recovery of health in all the forms in which these states of disease manifest themselves.

[With Drs. STOKES, WARREN, and others, we hold that there is nothing *specific* in the character of scrofula, or reducible to the supposition of a *virus* existing in the system; but that its essence consists essentially in a slow irritation of the lymphatic system, occurring in persons who have a preponderance of white fluids and white tissues. This may be hereditary (congenital) or acquired, and when acquired, it is superinduced by the causes pointed out so fully by our author; all of which tend to diminish the proportion of the red tissue, to give a preponderance to the lymphatic system, and lower the vitality of the system. The scrofulous diathesis implies an *arrest of development*, an excess of the white, and diminution of the red tissues, and not in any specific virus, as many suppose, which is to be eradicated also by specifics. The blood is albuminous, the proportion of fibrin and red globules small, the muscles, consequently, weak and flabby, and all the symptoms indicate a weakened state of the vital forces. The indications then point to such enervative means as tend to invigorate the system and add to the existing sum of vitality.]

The *extractum carnis*, as recommended by LIEBIG, will be found, as it has hitherto proved, well adapted to the treatment of scrofula and tuberculosis. The manner of preparing it is to take *one pound* of lean beef, free from fat, chop it fine, as for mince-meat; mix uniformly with it its own weight of cold water; heat slowly to boiling; after boiling about two minutes, strain through linen. Salt may be added, or other condiments, to suit the taste. Prepared thus, it is

admirably adapted to cases of scrofula, phthisis, &c., especially where there are derangements of the digestive organs, such as ulcerations, dyspepsia, tubercular deposits in the intestinal glands, &c., as well as to the early and later periods of typhus, sloughing of the cellular tissue, and copious suppuration. One ounce of the "*extractum carnis*," thus prepared, is equal to 32 ounces of meat, and, being in a state of fine solution, may be readily assimilated, without much exertion of the digestive organs. The remedial properties of alimentary substances deserve more attention from the profession, as they are often far more efficient agents in combating disease than strictly pharmaceutical agents, which may stimulate languid organs, but do not renovate, by supplying new material. We would not advocate the doctrine that no substances should be used as remedies, in this or other diseases, except such as help to constitute in health the solids and fluids of the body; but we do hold that in such diseases as scrofula, tuberculosis, general cachexy, &c., where there is a vitiated and impoverished state of the blood, and corresponding affection of the solid tissues, the true indication is to supply a more nutritive material by way of aliment, and in such form as will be most easily assimilated. Quinine, iron, iodine, and other agents, which act dynamically or chemically, are to be used only as adjuncts, and with due regard to the state of vital force and organic nervous power.

M. NEGRIER, of Angers, found a strong infusion of *walnut-leaves*, taken internally and applied as a wash to scrofulous sores, very efficacious in the treatment of the disease. Twelve out of seventeen scrofulous children, nine of whom had osseous enlargement with caries, seven ulcerated glands, and one several swollen cervical glands, with scrofulous ophthalmia of both eyes, were cured by the above remedy after a course of six months' treatment, so that M. NEGRIER considers that the *walnut-leaves* are superior to all other anti-scrofulous remedies. —*Brit. and For. Rev.*, Oct., 1841.

A new remedy has lately been introduced into some of the French hospitals, called *extract of blood*, which promises to be of service in scrofulous and endemic subjects. It is prepared from fresh beef's blood, allowing it to coagulate, depurating the serum through a filter, and drying the clot by evaporation until it can be readily reduced to a powder; of which from 10 to 20 grains are given three or four times a day. This, as will be perceived, is only another form of the "*extractum carnis*" of LEBIG; whether it will prove a perfect substitute remains to be proved.

With regard to *iodine* in scrofulous affections, we have used it very extensively in dispensary and private practice for many years, and think we have seen the most marked and unequivocal benefits from its employment. We have generally employed the *sirup of iodide of iron*, which will be found to suit a majority of cases better than any other preparation. It must be continued, however, for a considerable period, in conjunction with cutaneous friction and cold sponging, and a nutritive diet of animal food; these, with abundance of active exercise in the open air, will usually produce decided amendment. Some of our ablest physicians, however, are somewhat skeptical with

regard to *iodine* in this affection. Dr. J. C. WARREN remarks, for example, that "after many years' trial of the preparations of *iodine* in various forms of scrofulous affection, I have rarely seen any very distinct advantages from it. I have employed it in large and small doses, in hospital practice and private, externally and internally; nor, in truth, ought we to allow ourselves to expect the results which have been promised. Scrofula is a constitutional disease. If there be any remedy for such a disease, it must be found in agents which influence the intimate structure of the body more generally and intimately than iodine, or any medicinal substance can do. Such agents are food; a healthy state of the excretory apparatus; a pure atmosphere; and an exercise of the muscular system, suited to the constitution of the patient. I do not wish to dissuade from the use of so convenient a medicine as iodine; but would advise it to be employed in such a way as not to disturb the functions which remain healthy; and that it never should be used to the exclusion of those restorative means to which reason and experience have given their sanction."—*Surg. Observations on Tumours*, p. 164.

*Cod-liver oil* has now been sufficiently tried in diseases of a cachectic character to have its value properly determined. Our experience with the article more than 20 years ago in dispensary practice, fully satisfied us of its important remedial influence in scrofula, &c., although, from carelessness in its preparation, it was too nauseous to be borne well in a very large proportion of cases. But where it was retained, and did not derange the appetite, it produced the most marked benefit. Such is the experience of a large majority of those who have employed it. Dr. GERHARD states that it has proved of great service in the Pennsylvania Hospital, that the tuberculous patients to whom it was administered increased in flesh, weight, and strength under its use; that the cough and expectoration diminished, and in some cases the hectic and rigours wholly disappeared, and the patients resumed their usual occupations. The improvement of the physical signs was not coincident with that of the general symptoms; and, where the disease terminated fatally, the appetite, nutrition, and strength appeared for a time to be decidedly increased—life appeared for a time to be temporarily protracted; but for a few weeks preceding dissolution the remedy seemed to have lost its value. It was also found necessary to continue its use for some time after the most striking symptoms of the disease had disappeared. It was generally taken before meals, in milk or porter, sometimes clear, and where it produced nausea, the pale oil was substituted for the brown, and it was given after eating. For a large array of testimony in favour of cod-liver oil in scrofula, rickets, tuberculous cachexy, see "*New Remedies*," by Prof. DUNGLISON, ed. 1851, p. 552-4.]

BIBLIOG. AND REFER.—Hippocrates, Περὶ Ἀσθεν. Opera, p. 270.—*Celsus*, l. v., ch. 28.—*Galen*, De Tumoribus, c. 10, 15. Methodus Medendi, l. xiv., c. 11.—*Oribasius*, Synopsi, l. vii., ch. 29.—*Avicenna*, Canon, l. iv., fen. iii., tr. 2, c. 9.—*W. Tooker*, Explicatio totius Questionis, de Mirabili Sanitatum gratia, in qua præcipue agitur de solenni et sacra Curatione Strumæ, cui Reges Angliæ Divinitus Medici sunt, 4to. Lond., 1597.—*W. Cloves*, A Right fruitful and approved Treatise for the Cure of Struma or Evil cured by Kings and Queens of England, 4to. Lond., 1602.—*A. Laurentius*, De Mirabili Strumæ



- sanandi vi solis Gallie Regibus concessa, 8vo. Paris, 1609. — *J. Barbier*, Les Miraculeux Effets de la Main des Rois de France, 12mo. Lion, 1618. — *Rivierus*, Cant. i, obs. 76; ii, 54; iv, 18. — *Anon.*, Traité de la Guérison des Ecrouelles par l'Attouchement des Septentrionaux. Aix, 1643. — *F. Tomlinson*, Of Scrofula, &c., in *Chirurgical Treatises*, fol. Lond., 1676. — *Wiseman*, Several Chirurgical Treatises, l. iv. — *J. Brown*, Adenochirodologia; or, a Treatise of Glandules and Strumals, or King's Evil Swellings, 8vo. Lond., 1684. — *T. Mayerne*, Praxis, p. 162. — *T. Fern.*, A perfect Cure for the King's Evil, 8vo. Lond., 1709. — *W. Vickers*, A brief Account of a specific Remedy for curing the King's Evil, 3d ed., 8vo. Lond., 1710. — *J. Gibbs*, Observations of various eminent Cures of Scrofulous Disorders, 8vo. Lond., 1712. — *Morton*, Phthisiologia, l. i, c. 9. — *R. Boulton*, Account of the Gout, King's Evil, &c., 8vo. Lond., 1715. — *F. Gherli*, Centuria de rare Osservazioni, &c., 8vo. Venezia, 1719. (*Recommends a Liniment consisting of Osgall, Oil, and Salt.*) — *W. Beckett*, Two Letters as a free Inquiry into the Antiquity and Efficacy of touching for the King's Evil, 8vo. Lond., 1722. — *Petit*, Traité des Mal. Chirurgical, t. i, p. 209. (*Salt applied in Bags locally.*) — *R. Blackmore*, Discourses on the Gout, Rheumatism, and King's Evil, 8vo. Lond., 1726. — *P. V. Dubois*, Traité Nouveau des Scrofulues, 12mo. Paris, 1736. — *R. Willan*, Essay on the King's Evil, 8vo. Lond., 1746. — *J. Badger*, Cases of Cures of the King's Evil perfected by the Royal Touch, 8vo. Lond., 1748. — *R. Russell*, De Fabe Glandulari, 8vo. Oxon., 1750. — *J. B. Charmetton*, Essai théorique et pratique sur les Ecrouelles, 12mo. Avign., 1752. — *W. Scott*, Dissertation on the Scrofula or King's Evil, 8vo. Lond., 1759. — *Anon.*, Essay on the Nature and Cure of the King's Evil, by a Gentleman of Ilsted, in Essex, 8vo. Lond., 1760. — *Durant*, A Treatise on the King's Evil, 8vo. Lond., 1762. — *Murel*, Essay on the Nature and Cure of the King's Evil, 8vo. Lond., 1760. — *J. Morley*, Essay on the Nature and Cure of Scrofulous Disorders, 8vo. Lond., 1767. — *M. Renard*, Essai sur les Ecrouelles, 8vo. Paris, 1769. — *Blankard*, Collect. Med. Physica, Cent. i, n. 41, 42. — *Kirkland*, On the present State of Surgery, vol. ii. — *Anon.*, Observations on the Effects of Sea-water on the Scurvy and Scrofula, 8vo. Lond., 1770. — *M. Chappot*, Système de la Nature sur le Virus Ecrouelleux, 8vo. Toul., 1779. — *P. de Lalonde*, Traité des Scrofulues vulgairement appellés Ecrouelles, 12mo. Paris, 1780. — *Rutty*, In Med. Observat. and Inquiries, vol. iii., art. 23. — *Astruc*, Traité des Tumeurs, t. ii. — *J. Swainson*, Hints to Families on the increasing Prevalence of Scrofula, 8vo. Lond., 1787. — *Lettson*, In Memoirs of the Med. Society of London, vol. iii., n. 29. — *Lanc.* In *Ibid.*, vol. i, art. 14. — *Anon.*, The Ceremonies for the Healing of them that be Diseased with the King's Evil, used in the time of King Henry the VII., 8vo. Lond., 1789. — *J. Rymer*, A short Account of the Method of treating Scrofula, &c., 8vo. Lond., 1790. — *R. Hamilton*, Observations on Scrofulous Affections, 8vo. Lond., 1791. — *Thomann*, Annales Wurceb., t. ii, p. 163. — *D. Roberts*, Remarks on the King's Evil, with an Account of a Specific, &c., 8vo. Lond., 1792. — *G. Mosseman*, An Essay to elucidate the Nature, Origin, &c., of Scrofula and Glandular Consumption, 8vo. Bradford, 1792. — *Assalini*, Ueber die Krankheiten des Lymphatischen Systems, 8vo. Dresden, p. 56. — *F. A. Weber*, Von der Skropheln, eine Epidemische Krankheit vieler Provinzen Europäischen, 8vo. Salz., 1793. — *W. Nisbett*, An Inquiry into the History, &c., of Scrofula, &c., 8vo. Lond., 1795. — *Ferriar*, Medical Histories, vol. iii., ch. 3. — *White*, A Treatise on the Struma, or Scrofula, commonly called the King's Evil, 2d edit., 8vo. Lond., 1794. — *S. T. Soemmering*, De Morbis Vasorum absorbentium, 8vo. Traj., 1795. — *Crawford*, In Medical Communications, &c., vol. ii, n. 25. — *C. Brown*, A Treatise on Scrofulous Diseases, showing the good Effects of Factitious Airs, 8vo. 1798. — *White*, Observations on the Willow-Bark, 8vo. Lond., 1798. — *J. Burns*, Dissert. on Inflammations, 8vo. Glasg., 1800, ch. vi. — *Beddoes*, On Consumption, Digitalis, and Scrofula, 8vo. Lond., 1801. — *A. Pujol*, Œuvres, t. — *Copland*, In Edin. Med. Comment., vol. xv., p. 92. — *J. A. Capelle*, Essai sur la Nature, &c., des Affections Scrofulueuses, 8vo. Paris, 1802. — *J. Herdman*, Dissertation on White Swellings, &c., 8vo. Edin., 1802. — *F. Hebreard*, Essai sur les Tumeurs Scrofulueuses, 8vo. Paris, 1802. — *Salmade*, Précis d'Observat. sur les Affect. Scrofulueuses, 8vo. Paris, 1803. — *Joerden*, In *Hufeland*, Journ. der Pract. Heilk., b. xiv., st. 4, p. 122. — *W. Lambe*, Inquiry into the Origin of Constitutional Diseases, 8vo. Lond., 1805. — *J. B. T. Baumes*, Traité sur le Vice Scrofuloux, 2d ed., 8vo. Paris, 1805. — *Mazeyrie*, Observat. sur l'Emploi de la Douce Amere dans le Traitement des Mal. Scrofulueuses, 8vo. Paris, 1805. — *Badard*, Des Ecrouelles et des Tumeurs froides, 8vo. Paris, 1807. — *J. Russell*, A Treatise on Scrofula, 8vo. Edin., 1808. — *R. Carmichael*, An Essay on the Nature of Scrofula, 8vo. Lond., 1810. — *J. Brandish*, Observations on the Use of the Caustic Alkali in Scrofula, &c., 8vo. Lond., 1811. — *C. Armstrong*, Essay on Scrofula, 8vo. Lond., 1812. — *W. Turton*, Observat. on Consumption, Scrofula, &c., 8vo. Lond., 1812. — *W. Goodlad*, Practical Essay on the Diseases of the Absorbent System, 8vo. Lond., 1814. — *G. Hemming*, A Critical Inquiry into the Pathology of Scrofula, 8vo. London, 1815. — *J. C. Demurat*, Essai sur les Causes de la Maladie Scrofulueuse dans le Département du Cantal, 4to. Paris, 1815. — *J. Rabben*, Commentarius de Præcipuis Causis Mali Scrofulosi, 8vo. Lond., 1817. — *C. W. Hufeland*, Ueber die Natur, Erkenntnis-mittel und Heilart der Skrofelkrankheiten, 3d ed., 8vo. Berlin, 1819. — *Begün*, Dict. des Sciences Médicales, t. i, p. 273. — *E. Lloyd*, A Treatise on the Nature and Treatment of Scrofula, 8vo. Lond., 1821. — *M. Macher*, Ueber die Ursachen, &c., der Skrofelkrankheit, 8vo. Wien, 1821. — *W. Favé*, Treatise on the Nature of Scrofula, 8vo. Lond., 1822. — *J. Baron*, An Inquiry into the Nature of Tuberculated Accretions of Serous Membranes, and the Origin of Tubercles and Tumours, &c., 8vo. Lond., 1819; and Illustrations of the Inquiry respecting Tuberculous Diseases, &c., 8vo. Lond., 1822. — *J. F. Coindet*, Observations of the Remarkable Effects of Iodine in Bronchocle and Scrofula, 2d edit., 8vo. Lond., 1824. — *Andral*, In *Revue Médicale*, art. 1825, p. 405. — *Guerstein*, In *Dict. de Médecine*, art. *Scrofula*, t. xix., 8vo. Paris, 1827. — *F. M. J. Siebold*, Die Englische Krankheit, 4to. Wurzb., 1827. — *C. Van Mons*, Considér. sur les Scrofules et le Rachitisme, 8vo. Brux., 1829. — *J. G. A. Lugol*, Mémoire sur l'Emploi de l'Iode dans les Maladies Scrofulueuses, 8vo. Paris, 1829. — Mémoire sur l'Emploi des Bains iodurés dans les Mal. Scrofulueuses, 8vo. Paris, 1830. — Troisième Mémoire sur l'Emploi de l'Iode, 8vo. Paris, 1831. — Recherches et Observations sur les Causes des Mal. Scrofulueuses, 8vo. Paris, 1844. — *Jahn*, In *Journ. Complément du Dict. des Sc. Méd.*, t. xxxv., p. 18. — *S. Deguillères*, Théorie nouvelle de la Maladie Scrofulueuse, 8vo. Paris, 1829, p. 73, &c. — *Tonnellé*, *Journ. Hebdomad. de Med.*, t. iv., p. 567; t. v., p. 187. — *Le Pelletier*, Traité complet de la Mal. Scrofulueuse, p. 22. — *J. R. Von Vering*, Heilart der Skrofelkrankheiten, 8vo. Wien, 1829. — *Papavoine*, *Journ. des Progrès des Sc. Méd.*, 2d ser., t. ii, p. 84. — *W. B. O'Shaughnessy*, Essay on the Effects of Iodine in Scrofulous Diseases. Translated from *Lugol*, with an Appendix, 8vo. Lond., 1831. — *C. Cramin*, art. *Scrofula*, in *Cyclop. of Pract. Med.*, vol. iv., p. 701. — *Fischer*, Ueber Ursache, Wesen u. Heilart der Scropheln, &c. Leipzig, 1832, t. 33. — *J. A. W. Biedmuss*, Die Heilung der Scrofulen durch Königshand, 8vo. Dresden, 1833. — *J. Clark*, A Treatise on Pulmonary Consumption, comprehending an Inquiry into the Causes, Nature, Prevention, and Treatment of Tuberculous and Scrofulous Diseases in general, 8vo. Lond., 1835. — *J. Furniell*, On Consumption and Scrofulous Diseases, 8vo. Lond., 1838. — *Harrel*, In *Archives Génér. de Médecine*, t. xxi., p. 444. — *Godier*, In *Ibid.*, t. xxi., p. 596. (*Chlorinated Soda*). — *Lo-grand*, In *Ibid.*, t. xxi., p. 622. (*Preparations of Gold for Scrofula*). — *W. Alison*, In *Transactions of Med. and Chirurgical Society of Edinburgh*, vol. i, p. 365; vol. iii, p. 273. — *J. Abercrombie*, In *Ibid.*, vol. i, p. 682. — *Lombard*, In *Edinburgh Medical and Surgical Journal*, vol. xxix., p. 210. — *J. A. Disse*, Die Skrofelkrankheit nach ihrem Wesen. Berlin, 1840, s. 19. — *Henle*, Pathologische Untersuchungen, 8vo. Berlin, 1840, p. 153. — *Gruby*, Observat. Microscop. ad Morpholog. Pathol. Vindob., 1840, p. 27. — *J. Vogel*, Anleitung z. Gebrauche des Mikrosk., 8vo. Leipzig, 1841, s. 457. — *Vetter*, In *Schmidt's Encyclop.*, b. vi., s. 248. — *Mandl*, In *Archives Génér. de Méd.*, Oct. and March, 1840; Febr., 1841. — *Schönlein*, Allgemeine und Spec. Pathologie und Therapie. St. Gallen, 1841; t. iii., s. 71. — *L'Héritier*, Chimie Pathologique. Paris, 1842, p. 23. — *W. Alison*, Outlines of Pathology and Practice of Medicine, 8vo. Edin., 1844; vol. i, p. 187. — *C. F. Heusinger*, Recherches de Pathologie Comparée. Cassel, 1844, p. 131. — *W. Holland*, Medical Notes and Reflections, &c., 8vo. Lond., p. 32. — *Canstatt*, Specielle Pathologie u. Therapie. Erlang., 1843; b. i., s. 222. — *Bredow*, Ueber die Scrofulsucht. Berlin, 1843. — *J. J. Scherer*, Chemische u. Mikroskopische Untersuchungen zur Pathologie, 8vo. Heidelberg, 1843, s. 199. — *W. Tyler Smith*, Scrofula: its Nature, Causes, and Treatment; and on the Prevention and Eradication of the Strumous Diathesis, &c., 8vo. Lond., 1844. — *N. Lebert*, Physiologie Pathologique, ou Recherches Cliniques, Expérimentales et Microscopiques, sur l'Inflammation, la Tuberculisation, &c., 2 tomes, 8vo. Paris, 1845; t. i, p. 351, et seq. — *Barthes et Rilliet*, Des Mal. des Enfants, t. iii., p. 3, et *plurives*. — *J. H. Bennett*, In *Edin. Med. and Surg. Journal*, April, 1845. — *T. Addison*, In *Guy's Hospital Reports*, April, 1845. — *B. Phillips*, Scrofula: its Nature, its Causes, its Prevalence, and the Principles of Treatment, 8vo. Lond., 1846. — *R. M. Glover*, On the Pathology and Treatment of Scrofula; being the Fothergillian Prize Essay for 1846, 8vo. Lond., 1846. — *T. Hughes Bennett*, Treatise on the Oicum Jecoris Acelli, as a therapeutic agent in certain forms of Gout, Rheumatism, and Scrofula, 8vo. Edin., 1848. — *W. Addison*, On Healthy and Diseased Structure; and the true Principles of Treatment for the Cure

of Disease, especially Consumption and Scrofula, &c., 8vo. Lond., 1849, p. 47.—*G. C. Holland*, Nature and Cure of Consumption, Indigestion, Scrofula, and Nervous Affections, 8vo. Lond., 1850.

[AM. BIBLIOG. AND REFER.—Few if any Monographs have been written on Scrofula in this country.—See *John C. Warren*, Surg. Observ. on Tumours, with Cases and Observations, 8vo. Boston, 1837.—*L. Shattuck*, Report of the Sanitary Commission of Massachusetts, 8vo. Bost., 1850.—*Levick*, on Cod-liver Oil, and its uses in Tubercular Disease, Am. Journ. Med. Sci., Jan., 1851, p. 21.—*T. M. Markoe*, In New York Med. Gazette, Feb. 9, 1842.—*C. L. Payne*, Case of Scrofula, successfully treated by Iodine, in vol. vi., Am. Journ. Med. Sci.—*Shattuck*, In Am. Journ. Med. Sci., vol., xlv., p. 80, 85.—*C. A. Lee*, Review of Lugol, in New York Med. and Phys. Journ., 1829.]

SCURVY.—SYNON.—*Scorbutus*, Sauvages, Vogel, Cullen, &c.—*Scorbutus Nauticus*, Young. *Porphyræ Nautica*, Good. *Scharbock*, *Skorbut*, Germ. *Skiorbug*, Dan. *Scorbut*, Fr. *Scorbuto*, Ital. *Scorb*, *Scarbock*, *Skörbut*, *Scorbie*, &c., Saxon; hence *Scorbutus*, *Scurvy*.

CLASSIF.—4th Class, Cachectic Diseases.

3d Order, Impetiginous Affections (Cullen). 3d Class, Sanguineous Diseases.

4th Order, Cachexies (Good).—CLASS IV.,

ORDER IV. (Author in Preface).

1. DEFIN.—*Lassitude, debility, lowness of spirits, fætor of the breath and sponginess of the gums, followed by livid sub-cutaneous patches and spots, especially on the lower extremities and roots of the hair; and, lastly, by spontaneous hemorrhages from mucous canals, by contractions and pains of the limbs, and superficial ulcers, &c., the disease proceeding from an alteration of the blood, caused by the nature of the food, and chiefly by the privation of fresh vegetables and fruit.*

2. I. HISTORICAL SKETCH.—Some writers have supposed, with SENNERTUS, MEAD, and MILMAN, that scurvy was known to the ancients, while others have believed, with FRIEND, that there is nothing to be found in their writings to warrant this supposition. HIPPOCRATES, in mentioning enlargement of the spleen—*σπλὴν μέγας*—notices but one symptom which is applicable to scurvy, and that is ulceration of the legs; and, in describing *Convolvulus Sanguineus*—*Εἰλεδὸς αἱματίνης*—he adduces the dark discoloration of the skin, the eruption of ulcers on the legs, and the difficulty of walking, as more particularly distinguishing it; but these remarks are insufficient to show that he was actually acquainted with true scurvy. It has been supposed that the disease, with which PLINY states the army of CÆSAR GERMANICUS to have been afflicted after a long encampment in Germany beyond the Rhine, near the sea-coast, and which was ascribed to the water which was drank, was that now under consideration. He states that “the teeth dropped out, and the knees became paralytic. The physicians called the malady *Stomacace* and *Scletyrbe*. They discovered a remedy against it, viz., *Herba Britannica*.” What this plant, of which PLINY adds a very short and imperfect description, actually was has not been shown by his commentators. Subsequent ancient writers, not even the Arabians, have furnished any thing in addition to what I have now adduced.

3. The earliest account of scurvy is that given by the Sieur JOINVILLE, as it appeared in 1260, in the army of Louis IX. in Egypt, owing to the nature and scarcity of the food, and the scarcity of water. The next notice taken of it is by FABRICIUS, who states that it was very prevalent and fatal in Misnia during 1846. As soon as

long voyages were undertaken, scurvy appeared in an unmistakable form. During the voyage of VASCO DE GAMA, who first made the passage to the East Indies by the Cape of Good Hope, more than 100 of his men out of 160 died of this malady. The History of Portuguese discoveries, by W. LOPES DE CASTENNADA, contains the relation of this voyage which furnished the first account of this disease as it occurred at sea.

4. That scurvy was not then, nor for some time afterward, known, is evident from the account given by CARTIER of his second voyage to Newfoundland in 1535. After mentioning the characteristic symptoms, he adds that, “about the middle of February, of a hundred and ten people there were not ten whole.” “Eight were already dead, and more than fifty sick, seemingly past all hopes of recovery. This malady being unknown to us, the body of one of our men was opened, to see if by any means possible the occasion of it might be discovered, and the rest of us preserved. But in such sort did the calamity increase, that there were not now above three sound men left. Twenty-five of our best men died, and all the rest were so ill that we thought they would never recover again, when it pleased God to send us the knowledge of a remedy for our health and recovery.” The remedy was a decoction of the leaves and bark of a tree, which was called by the natives *amedra* or *hamuda*, and which has been considered to have been a species of spruce-fir.

5. DR. LAND states that the name of this disease is said to be mentioned in the history of Saxony, by ALBERT KRUNTZ; and if so, he will be found the first author now extant who calls it the scurvy. It is next taken notice of by EURITIUS CORDUS in his *Botanologicon*, published in 1534, where it is observed that the herb *Chelidonium minus* is called by the Saxons *Schorbock rout*, being an excellent remedy for that disease. In the year 1539, it is mentioned by J. AGRICOLA in his *Medicina Herbaria*. OLAUS MAGNUS, in his history of the northern nations, published in 1555, observing what diseases are peculiar to them, gives a long description of scurvy, mentioning that it is vulgarly called *Schoerbuck*, which is synonymous with the cachexy of the Greeks. He refers it chiefly to the nature of the food, and mentions that the habitual use of absinthiated beverages is had recourse to in order to prevent and to cure it. About this period, four treatises on the disease were published by RONSSEUS, ECTHIUS, WIERUS, and LANGIUS. FORESTUS states that the description by ECTHIUS was contained in an epistle sent in 1541 to BLENBURCHUS, a physician in Utrecht. The first book published expressly on scurvy was by RONSSEUS, who remarks, in a reprint, that if he had first seen the accurate description by WIERUS, his own should not have been published.

6. WIERUS states that scurvy had been long peculiar to the inhabitants of the countries near the North Seas, and that he had never met with it in Spain, France, or Italy, nor in Asia or Africa. There can be no doubt of the existence of scurvy in the northern countries of Europe from the earliest ages, although no account of it had appeared previously to the appearance of the works now mentioned; and it is equally manifest that years of scarcity, wars, sieges, &c., must have rendered it more or less endemic, or even epidemic, in various places and localities. During



severe winters and early spring, the food of the inhabitants of these countries, the dried and imperfectly-cured meats and fish, and the want of succulent and other vegetables, particularly in the countries adjoining the Baltic, and the Northern and German Oceans, must have occasioned a remarkable prevalence of this malady, even although nature had provided them with the best preventives and means of cure in the spruce-fir, and numerous other antiscorbutic plants and herbs with which they abound. The comparatively recent culture of succulent vegetables, and more especially of the potato, in these countries, accounts not only for the rarer appearance of this malady in these parts in recent times, but also for the prevalence of it during earlier ages.

7. Of the four ships which sailed from England the beginning of April, 1609, for the establishment of the East India Company, three were so severely visited by scurvy as to have lost nearly one fourth of their crews when they arrived at the Cape of Good Hope. The commodore's ship was not attacked. This immunity arose from three table-spoonfuls of lemon-juice having been served daily to each of his men. Notwithstanding this evidence of the success of lemon-juice in preventing scurvy—evidence the most conclusive—this valuable remedy and preventive was altogether slighted for 150 years afterward, although scurvy destroyed often one half or three fourths of the crews of our fleets, and was even more destructive to our armies than either battles or sieges, independently of the deaths it occasioned, both on land and at sea, in trading vessels. Sir R. HAWKINS states, in his observations on his voyage to the South Sea in 1593, that upward of ten thousand mariners had died of scurvy under his own observation alone, during the twenty years that he had been at sea.—(PURCHAS'S *Collect. of Voyages*, vol. i. and iv.) Admiral HOSIER, who sailed in April, 1728, with seven ships of the line to the West Indies, buried his crews twice, and died broken-hearted in consequence. Lord ANSON'S expedition, at the end of two years from its leaving England in 1740, had lost from this disease more than four fifths of the number that sailed in it. The voyages of DRAKE, CAVENDISH, DAMPIER, BYRON, and of numerous other navigators, furnish similar details, and show how recklessly the lives of sailors were sacrificed.

8. But it was not only in fleets and single ships that scurvy was so destructive, but also in towns, fortifications, camps, and armies, and wherever the population was subjected to the causes which occasioned it in fleets. That scurvy was endemic, and also epidemic, in northern European countries, has been stated to be manifest from the early works on the disease, and from the nature of the food upon which their inhabitants subsisted. Owing to the difficulty of procuring fresh, succulent vegetables, and from their ignorance of the disease and of its several preventives and cures, the early frequenters of Hudson's Bay, of Newfoundland, and the coast of Labrador, were frequently almost altogether destroyed; and the early French settlers in Canada experienced so severe losses in winter and early spring from this disease, as almost to induce them to abandon the settlement.

9. While sporadic cases of scurvy were of

frequent occurrence, the ravages of the disease were often great in winter and spring, especially in years of scarcity, and in besieged towns or fortifications, and in armies. VANDER MYE states that, during the siege of Breda by the Spaniards in 1625, the garrison and inhabitants were grievously affected by this disease, 1608 soldiers having been attacked up to the fourth month of the siege, the numbers having increased daily until the place surrendered in June, after a siege of eight months. BACKSTROM has recorded that, in 1703, when Thorn, in Prussia, was besieged by the Swedes, 5000 of the garrison, besides many of the inhabitants, were carried off by scurvy during the five month's siege; the besiegers being altogether exempt from it. During the war between the Austrians and Turks in 1720, "when the imperial army wintered in Hungary, many thousands of the common soldiers, but not one officer, were cut off by scurvy. Dr. KRAMER, physician to the army, being unacquainted with a remedy for it, requested a consultation of the College of Physicians at Vienna. Their advice was, however, of no avail; the disease, which broke out at the end of winter, continued until, at the approach of summer, the earth became covered with greens and vegetables." BACKSTROM (*Ob servat. circa Scorbutum, &c.*, 1734) states, that both in the siege of Thorn and in the imperial army, as soon as the former was raised, and vegetables and greens from the country were admitted into the town, and when the latter procured the same articles of food, the disease entirely disappeared. From these and other facts, he concludes that an abstinence from recent vegetables is altogether and solely the cause of the distemper, and so these alone are its effectual remedies.

10. Dr. NITZSCH, in 1747, gave a detailed account of the prevalence of scurvy in the Russian armies, especially at Wihurgh, and during the siege of Asoph, in 1736. At these and other places, the mortality was great during winter and spring, and was, as on most other occasions, ascribed to the unwholesome nature of the food, and the want of fresh succulent vegetables. In the spring of 1760, the British troops, forming the garrison of Quebec after its capture from the French, suffered so severely from cold, and the want of vegetables, that, before the end of April, 1000 of them were dead of scurvy, and more than twice that number unfit for service. M. FODÉRE states that scurvy was remarkably prevalent in the French army of the Alps in 1795; and LARREY says that, in 1801, during the siege of Alexandria, which was commenced in May, and ended with August, 3500 scorbutic patients were received into the military hospitals of the city. During the war in Siam and Ava, the native and British troops suffered most severely from scurvy and scorbutic dysentery,\* owing to causes which will be referred to in the sequel. In 1836, the troops in the province of Adelaide, near the Cape of Good Hope, also suffered severely from scurvy, although abundantly supplied with good fresh meat; but they had been long without fresh vegetables and fruit. Scur-

\* During 1827, the directors of the East India Company allowed me to inspect the regimental and other returns preserved in the India House, respecting the Causes, Nature, and Treatment of this disease as it occurred in the expedition to Ava, and of the cholera then prevalent in India.

vy was seldom or never seen in Great Britain since the end of the last century, up to 1847, excepting in jails and penitentiaries. In 1823 it appeared in the form of scorbutic dysentery in the Millbank penitentiary, owing to a poor and watery diet, without fresh or succulent vegetables; and, in 1836, 1837, and 1838, it occurred in several jails, owing to the same causes, more especially to the privation of fresh succulent vegetables. During the early months of 1847, 1848, and 1849, scurvy has appeared in various parts of England, Scotland, and Ireland, owing chiefly to the potato-blight. The *Literary History* of this disease will more fully appear from the BIBLIOGRAPHY AND REFERENCES appended to this article.

[It would seem that scurvy has almost invariably attacked the early colonists of northern latitudes, while those within or near the tropics have, from the abundance of fruits and vegetables, escaped. The early Massachusetts colonists, especially those who came in the Mayflower, and landed at Plymouth, Massachusetts, were dreadfully afflicted, more than half having died the first season. This disease has occasionally appeared in the United States army and navy; but more frequently among our merchant whaling vessels, which continue for many months at sea—in which there is little regard paid to personal cleanliness, and which are often excessively filthy and offensive. Notwithstanding, there is no instance on record, so far as we know, where the disease has prevailed on board of any vessel which had a good supply of fresh potatoes. In 1809, the scurvy proved very fatal among the United States troops on the lower Mississippi, 600 men having fallen victims to it. From 1819 to 1839, it prevailed occasionally in the United States army, sometimes proving quite fatal, as at Council Bluffs and St. Peter's, in 1820, when there were 503 cases and 168 deaths. It also was observed to some extent during the Florida war, in 1837 and 1838 (FOVRY), and also among the American troops during the late Mexican war. Dr. FALTZ, surgeon, has described the disease as it existed on board the United States squadron in the Gulf of Mexico, in the summer of 1846 (*Am. Jour. Med. Sci.*, vol. xv., N. S.); and within the last two years it has committed extensive ravages among the early colonists, especially the miners, in California.]

11. II. DESCRIPTION.—i. Of the *symptoms of scurvy*, the earliest are observed in the countenance. The face, as well as the rest of the surface, is pale and bloated. The caruncule of the eyes and lips have a dirty or greenish hue. The expression of the features is depressed. The gums are swollen, spongy, soft, livid, and bleed on the slightest friction. The odour of the breath is offensive. The patient complains of lassitude and debility, frequently of pains in the lower extremities, resembling rheumatism. He is averse from any kind of exertion; and when he attempts to exert himself he complains of stiffness of the joints, feebleness of the limbs, of panting or breathlessness, and of extreme fatigue. The skin is dry and harsh, and it generally continues dry throughout the course of the malady. Sometimes it is rough, resembling the goose-skin appearance; but it is more frequently shining, with patches, streaks, or spots of a reddish-

brown, bluish, greenish, black, or livid hue, resembling those following a severe bruise. The size of these patches varies from a small point to that of a handbreadth, and it generally increases with the progress of the malady. The patches are first observed, and are most numerous on the legs and thighs; but they soon appear on the arms and trunk, and on the scalp; very rarely on the face, which, however, assumes a more dingy and bloated hue. The ankles swell, and the legs and feet become œdematous. In addition to these, the patient often complains of shifting pains; and, if the disease have supervened upon rheumatism or ague, these pains are more or less severe, and are referred to the bones, to the back, thorax, or joints. When the disease follows ague, obscure or irregular remissions or intermissions of febrile symptoms are observable, and more or less enlargement, with pain in the region of the spleen, is often detected. The above may be considered as the *first or early stage* of the distemper.

[As described by our naval surgeons, "lassitude and debility" are not usually among the symptoms which usher in this disease; on the contrary, there is generally great activity, and not unfrequently cheerfulness, good appetite, and sound sleep at night, for weeks after the teeth were loosened, the gums ulcerated, the limbs œdematous and discoloured. The nervous symptom was commonly the last to be invaded, and then it was not an indisposition to corporeal exertion, but an actual disability. The countenance became pale, languid, cadaverous, the respiration oppressed and irregular, and the pulse feeble, fluttering, intermittent, simultaneous with this muscular prostration. Slight efforts to turn, sit up, or move about, were followed by tremours and syncope; and these symptoms usually indicated an early fatal result.]

12. These symptoms may continue a longer or a shorter time, or may be removed quickly by an appropriate treatment; but otherwise they may remain stationary; or, if the cause continues, they increase in severity. The gums become more tumid, more livid, and bleed from the slightest touch, and the breath remarkably offensive; the patches on the surface of the body enlarge, increase in number, and present a deeper and darker ecchymosed appearance. The pains are more severe, and are accompanied with swellings of the hams, stiffness and contractions of the knee-joints and ankles, and often with a brawny feel of the parts, owing to effusion of lymph between the integuments and aponeuroses, preventing the motion of the skin over the swollen parts. With the exudation of lymph, red globules, &c., into the tissues, chiefly into the connecting cellular tissue and periosteum, exudations of blood take place, giving rise to more or less marked hæmorrhage from mucous canals, especially from the nostrils, mouth, and bowels, and from the vagina; much more rarely from the bronchi, urinary organs, and stomach. The tendency to hæmorrhage increases with the progress of the malady, and the loss of blood is often so great as to rapidly sink the vital powers of the patient. In this *advanced stage*, the livid patches are generally associated with hard and painful swellings in various parts, particularly in the lower extremi-



ties, and in the calves of the legs; and these often pass into superficial fungous ulcers. Old cicatrices frequently open afresh, and become the seats of foul scorbutic sores. The teeth fall out; the gums present foul, livid, spongy ulcers. The respiration becomes remarkably short and hurried on the least exertion, and delirium or faintness is apt to supervene. The contractions of the joints, the œdema, induration, and pain of swollen parts, the discoloration of the patches, and the number of the ulcers, are all more and more developed, and the debility and vital depression greater.

13. From the commencement of the disease the *alvine evacuations* are more or less disordered. The stools are morbid; but at first they are not so remarkably so as to attract attention, and costiveness is then often experienced; but, as the disease advances, they are not only much disordered, but are much more frequent, and very offensive. Diarrhœa and colicky pains often supervene, and, with more or less attendant hæmorrhage, rapidly sink the patient at this stage. Under certain circumstances, the disease passes into a state of scorbutic dysentery, or dysentery and scorbutus supervene upon each other, and thus become associated, as shown when treating of DYSENTERY (see that art., § 39, et seq.). The *urine* is scanty and high-coloured (see § 20).

14. The *pulse* is often little affected at an early stage, but is more generally slower and feebler than in health; but in more advanced cases, or when the malady is associated with some degree of asthenic or sub-inflammation in the seats of effusion, the pulse is often remarkably frequent, as well as small or weak. When the pulse is slow and feeble, the patient is often chilly, the surface cool, and the temperature of the body lower than natural. This state of the disease was called the *cold scurvy* by the earlier writers. When much swelling and hardness, with pain, is occasioned by effusion in the connecting cellular tissue, or even below the peritoneum, the pulse is generally frequent, varying from 100 to 120 in a minute, probably owing to some degree of inflammatory irritation produced by the effused matters in these situations, as indicated by the great tenderness which always is present. This state of febrile action gave rise to the distinction of *hot scurvy*, according to various authors.

15. The *tongue* is generally clean and pale, but commonly broad, flabby, and indented at its edges by the teeth. The insides of the cheeks and lips are pallid, and contrast remarkably with the appearance of the gums. *Thirst* is not much complained of, unless in the more febrile state of the disease, or when the supply of fluids is scanty. The *appetite* is not impaired. It may be even greater than in health; and digestion is not very manifestly impaired. *Sleep* is not deficient, unless at a far advanced stage, when wakefulness or disturbed sleep is experienced. The *mental faculties* are not impaired, although the spirits are generally more or less dejected and anxious; but towards a fatal issue the patient becomes indifferent and torpid. The memory is generally unimpaired, but the eyesight is occasionally weakened.\*

16. As the disease approaches an unfavourable issue the *breathing* becomes remarkably frequent, and the *dyspnœa* extreme. The patient coughs, and expectorates a frothy mucus, sometimes tinged with dark blood. The chest was generally every where resonant on percussion; the respiratory murmur was loud and distinct; and the sounds of the heart were loud and extensive, but unaccompanied by any morbid bruit in six cases examined by Dr. BURN. In the most advanced states of scurvy, not only may ulcers, and injuries or wounds which have healed up for many years, break out afresh, but old and well-united fractures may become disunited. The tendency to *swoon* in the most severe cases is sometimes so great that the slightest motion, or the erect posture, or even any trifling exertion, may be followed by fatal syncope. It is stated in the account of Lord Anson's voyage, that many of the men, although confined to their hammocks, eat and drank heartily, were cheerful, and talked with much seeming vigour, and in a strong tone of voice; and yet, on their being the least moved, although it was only from one part of the ship to another, and that in their hammocks, they have immediately expired; and others, who have confided in their seeming strength, and have resolved to get out of their hammocks, have died before they could reach the deck. And it was no uncommon thing for those who could do some kind of duty, and walk the deck, to drop down dead in an instant, on any endeavour to act with their utmost vigour.

17. Emaciation is not necessarily a phenomenon of the disease, unless there has actually been considerable privation of food; but it is occasionally observed, and anæmia is not infrequent. Dr. BURN observes that, although there is a remarkable tendency to the breaking out of old ulcers or wounds long previously healed, yet there is very little disposition to the occurrence of bed-sores from pressure. The separation of the epiphyses from bones has been mentioned by some writers as having occurred in children attacked by this malady, but it has not been often observed in adults, or, if observed, not mentioned by many writers.

18. *Scorbutic ulcers* exude a thin, fetid, sanious fluid, instead of pus. Their edges are of a livid colour, and, as if puffed up, a coagulum soon forms on their surfaces, which is separated or wiped away with difficulty. The parts underneath it are soft, spongy, or putrid. When this coagulum is removed, the same change again occurs after a few hours, forming a soft, bloody fungus, resembling boiled bullock's liver.

of the disease as it existed on board the United States frigate Columbia in 1843, and also by Dr. FOLTZ, U. S. N. The blindness is represented as coming on soon after sundown, the conjunctiva becoming injected, when the blindness was so perfect as to prevent vision, even at a few inches distance. Dr. FOLTZ, in his history of the disease, as it appeared on board the United States frigate Raritan, remarks as follows: "Nyctalopia occurred in five, and hemeralopia in two cases. One case of the latter was so bad that the patient could not move about the even decks, with which he was perfectly familiar, without the greatest difficulty. There were other affections of the eyes, owing obviously to this scorbutic diathesis, such as inflammation of the conjunctiva, induration, and irritation of the ciliary, accompanied with a copious acrimonious discharge. The usual collyria were used without any benefit, and the eyes improved or became worse in proportion to the arrest or progress of the scurvy; and ultimately, as the disease was eradicated, the ophthalmic affections permanently disappeared."—*Loc. cit.*

\* [Nyctalopia, or moon-blindness, is a symptom which is not uncommon as a precursor or attendant on scurvy, and has been particularly noticed by Dr. COALE in his account

This fungus exudation, Dr. LIND states, sometimes rises in a night's time to a great size, and, although cut off, in which case a plentiful hæmorrhage generally ensues, at the next dressing is as large as ever.\*

19. ii. THE CHEMICAL ANALYSES OF THE BLOOD AND URINE in scurvy have been few, and even these unsatisfactory. It is manifest that the states of the blood and of the excretions in this disease will depend much upon the treatment adopted, and upon the time during which the treatment has preceded the analysis.—A. SIMON'S "Animal Chemistry" furnishes no information as to the blood in scurvy; but Dr. DAY, in his additions to the work, states that Mr. BUSK, in three well-marked cases of scurvy, found the composition of the blood as follows, comparing the scorbutic blood with the healthy, according to his analysis of the latter :

	1st Case.	2d Case.	3d Case.	4th. Healthy Blood. (Busk.)
Water .....	849.9	835.9	846.2	788.8
Solid constituents.	150.1	164.1	153.8	211.2
Fibrin .....	6.5	4.5	5.9	3.3
Albumen .....	84.0	76.6	74.2	67.2
Blood-corpuscles ..	47.8	72.3	60.7	133.7
Salts .....	9.5	11.5	10.9	6.8

Although the fibrin appears to be increased, its vital cohesion is evidently impaired; and the albumen is certainly altered in quality, although the alteration is not shown by chemical analysis.

\* [Dr. FOLTZ, United States navy, maintains that the *Land Scurvy* (*Morbus maculosus, Werlhofii*) is a "totally different" disease from *Sea Scurvy*. "In their symptoms there is, in the early stages, a slight assimilation; but, as they progress, in their pathological character they are perfectly dissimilar. Among the troops employed in Florida during the Seminole war, the morbus maculosus committed extensive ravages. Nyctalopia was a common symptom; some thirty cases of the disease occurring among the marine corps, co-operating with the army, were transferred from the field to the Marine Hospital at Washington, then under our charge. These cases, as well as a number we witnessed at Point Isabel, in May, in the forces engaged under General TAYLOR, were totally distinct from the scurvy as it occurs on board ships at sea. Purpura cedema, the cadaverous and fetid effluvia which follows the extreme emaciation, the fainting upon the slightest exertion, and the extent of disease in the respiratory and circulatory systems, which always occur in the scurvy on board ships, are never met with in the land scurvy. In the latter we have sponginess of the gums, ulceration, which terminates in dysenteries and fevers, the first induced by a cachectic diathesis, but never involving that complete anæmia of the blood, which amounts to a universal septic tendency." Is not this difference in the phenomena of the disease owing solely to the fact that on board of vessels at sea men are compelled to breathe a confined, vitiated, and impure air, while upon land this cause of deterioration of the blood is removed? It is much to be regretted that the internal arrangements, with the accommodations for officers and crew, on board many of even our large public vessels are so defective—the hold being small, badly arranged, and imperfectly ventilated, while the berth-deck is low, with very small air-ports, which are only opened in port, or at anchor, and in the best weather; while the apartments for the officers are small, dark, and contracted. The ventilation is imperfect below, because the hatches leading to the berth-deck are so arranged that wind-sails cannot pass in a perpendicular line from the spar-deck to the berth-deck or hold; while the sick-bay in the bows of the ship, on the berth-deck, and the cockpit, are without light and air, with a temperature sometimes of between 80 and 90° for weeks together, and no hatch for the admission of a wind-sail. When to these we add the low dismal ward-room, poorly lighted and ventilated; and the coldness, and dampness in winter, incident to daily washing and wetting, the daily use of salt beef and pork, long preserved, and consequently innutritious; the daily *spirit-ration*, and personal uncleanliness, we need not be surprised at the occasional appearance of scrofula, in its most malignant form, in the United States navy.]

20. B. The urine in scurvy is commonly of a dark reddish brown, and sometimes of an almost black colour. Although it is slightly acid as it is evacuated, it very soon becomes alkaline, and emits a strong and disagreeable ammoniacal odour. Blood is often discharged with the urine, and the urine then assumes a dark reddish-brown colour, in consequence of the presence of hæmatoglobulin; in this case it develops hydrosulphate of ammonia, and soon becomes putrid. Dr. SIMON examined the urine in three cases of scurvy in SCHÖNLEIN'S clinical wards—two men and one woman. The urine was very similar in these three cases in its physical characters. It was scanty, and of a deep dark-brown colour; after standing a few hours, it emitted a disagreeable ammoniacal odour. The three specimens resembled each other, and were found to approximate the chemical characters of the urine in typhus. The urea was less than in healthy urine, not exceeding 25-30ths of the solid residue. The fixed salts were diminished in the two male cases, being 14-18ths of the solid residue; but in the female they were 27, or a little above the normal average (25). The uric acid was slightly above the healthy standard in all, being from 1 to 3 of the solid residue.

21. iii. APPEARANCES ON DISSECTION.—Scurvy at the present day seldom proves fatal, unless in ships or in besieged towns, where opportunities of minutely examining the bodies after death are rarely enjoyed; and the observations of early writers on this subject are generally devoid of precision, and the necessary details. The best account of the appearances after death has been furnished by Dr. BUNN, from the cases which were brought to the *Dreadnought* Hospital Ship. He states, "The general inferences to be drawn from preceding facts are, that, in the inspection of the bodies of persons who die of scurvy, the chief indications of that disease are met with in the colour of the skin, in the state of the gums, and in the presence of fibrinous effusions, and of ecchymoses, or effusions of blood. These effusions occur most frequently in the skin, in the subcutaneous cellular tissue, and between the muscles of the lower extremities, between the periosteum and bones of the lower extremities and of the jaws; and in the peritoneal coat, and in the muscular and mucous coats of the intestinal canal. The numerous traces of hæmorrhage observed in the coats of the intestines are in accordance with the frequency with which scorbutic persons pass blood by stool."

22. The slight effusions of blood between the periosteum and bone do not destroy the muscular connexions between these parts, so that the latter does not generally present farther alteration. Beyond a paleness of tissue, there is no change characteristic of scurvy observable in the brain. The organs of respiration, the heart and large blood-vessels, the glandular system and the bones, presented no remarkable changes in the cases inspected by Dr. BUNN. His observations furnished him with no direct information respecting the blood, except that it is deficient in red particles; that it does not impart a stain to the lining membrane of the heart or vessels; and that it has not lost the property of coagulating. The change observed in the skin and in the complexion is to be ascribed to



the alteration of the blood, and the hæmorrhages doubtless proceed, at least in part, also from this alteration. Former writers have noticed more or less of a fluid or dissolved condition of the blood, and a soft, flabby state of the heart; this latter change accounting for the swooning and fatal deliquium sometimes occurring in the more extreme cases. The *liver* has been found pale, or of a pale buff colour, or of a nutmeg appearance; and the *bile* in the gall-bladder of a pale or yellowish colour. The *spleen* is generally soft, of a plum colour, and often more or less enlarged. The *lungs* are sometimes œdematous, especially in their more depending parts. The *kidneys* and urinary passages seldom present any change in the uncomplicated states of the disease.

23. According to the descriptions of *POUPART*, *LIND*, and others, the blood discharged from the mucous canals during life, as well as that found in the cavities of the heart and vessels after death, was remarkably altered, fluid, broken down, and presented more or less of a greenish-black hue. The spleen was generally much enlarged, and so soft as to break down on being handled. Adhesions often existed between the costal and pulmonic pleura, and sometimes dirty serous effusions were found in the pleural cavities. Black, corrupted blood was generally effused between the muscles, or infiltrated between their fasciculi, and under the skin and periosteum; and the auricles were remarkably distended by coagulated blood, in those who died suddenly. In young subjects the epiphyses were loosened from the shafts of the long bones, and the ribs had separated from their cartilages. In some the glands of the mesentery were more or less enlarged. The kidneys were occasionally altered. The alterations found in the bones, especially those now mentioned, most probably arose from the effusion of blood between the periosteum and osseous structure, and from the consequent destruction of the vessels of the former, which nourish the latter.

24. IV. COMPLICATIONS, &c.—Much of the diversity observed in the symptoms and progress of scurvy, as well as in the appearances after death, depends upon the nature of the food, or of the privations causing the malady, and upon antecedent, concurrent, or intercurrent disease; for, as will be shown in the sequel, although the privation of fresh vegetables and fruit is mainly productive of it, still much is owing to the food upon which the patient has been living up to the time of his attack and during its progress. The diseases which commonly precede and favour the appearance of scurvy are agues and remittent fevers, enlargement of the spleen or liver, rheumatism, dysentery, or chronic diarrhœa; and either of these may complicate, in a more or less evident manner, the scorbutic state, especially in its more chronic form, or may appear as an intercurrent malady. These complications are most apt to occur in warm or temperate climates, and wherever malaria is present; and probably the association with rheumatism is most common in colder regions and seasons. When they do appear, they are readily recognised when the physician is alive to the probability of their association, and when the causes on which they chiefly depend are observed to be in operation. The supervention

of scurvy upon ague, or upon enlargements of the spleen, or upon affections of the bowels, is not infrequent, especially in the winter and spring months, when fresh vegetables and fruits have become scarce, and when cold, humidity, and these diseases have predisposed the frame to this malady; and it was certainly much more common in former ages, before potatoes came into general use.

25. The complication of scurvy with dysentery was the most prevalent and fatal disease during the Burness war, and was entirely owing to the nature of the food in connexion with malaria and bad water. But it is unnecessary to add, at this place, to what I have stated when treating of the forms and complications of DYSENTERY (see § 39, *et seq.*). Although rheumatism is undoubtedly in some cases, and at certain seasons, occasionally associated with scurvy, still the pains, which are most commonly attendant upon the latter, are rather to be imputed to the infiltrations of blood which take place between the muscular fasciculi and under the periosteum, than to any rheumatic complication. A moderate attention to the matter will be sufficient to distinguish the nature of the case, as well as the existence of enlargement of the spleen, and the connexion of the disease with ague.

26. Persons labouring under scurvy are very liable, when exposed to cold and humidity, to experience severe attacks of pleurisy, or of pericarditis, or of peripneumonia, or of bronchitis, which may carry off the patient in a short time, without materially influencing the symptoms of scurvy. In these cases, the dyspnoea, cough, and difficulty of expectorating become urgent; the expectoration, varying with the state of pectoral disease, from a slight mucous, frothy matter, to a dirty brown, or dark red, or sanious substance. Effusion into the pleural cavities, or effusion into the air-cells and small bronchi, and splenification of the substance of the lung, ultimately hasten or occasion a fatal issue. In rarer instances changes in the kidneys, which I have ascribed to cachectic inflammation of the secreting structure of these organs (*see art. KIDNEYS*, § 80, *et seq.*), supervene, and, by embarrassing the functions of these organs, superinduce dropsy upon the scorbutic disease, and thereby occasion or accelerate an unfavourable termination.

27. III. DIAGNOSIS.—Of the numerous writers who preceded *LIND*, very few pointed out with due accuracy the diagnostic characters of scurvy, or distinguished sufficiently between this disease and malignant or putrid fevers. In many circumstances, and on many occasions, some of which I have myself witnessed, it is difficult to determine as to the presence of scurvy or of putrid fever, at first sight, or until a more patient and close observation has shown the difference, so insensibly or gradually, in such circumstances, some of which I observed in Germany and France after the last war, does the one malady approach the characters of the other. In Ireland, in 1847, owing to the failure of the potato-crop, and general misery, scurvy was intimately associated with putro-adynamic fever, and it was most difficult to distinguish between them, or to say which was the primary malady. The same observations equally apply to purpura, which often arises from similar causes to those producing scurvy, and is more

or less closely allied to, although generally distinguished from, scurvy, the more extreme points of difference between the two having been laid hold of as diagnostic characters, while the closest resemblances have been kept out of view. It will be more just, more conducive, moreover, to accurate pathological views, and certainly tend more to the adoption of sound indications and means of cure, to look closely at diseases as they occur in practice, to consider both alliances and differences, and to proceed in our treatment on the comprehensive basis thereby furnished us.

28. Circumstances have occurred, and may occur again, in which certain of the causes of malignant fever, as a confined impure air, crowding of numbers into a small and ill-ventilated space, &c., have come into operation, in connexion with the causes of scurvy, especially a deficiency or want of fresh vegetables and fruit, and have given rise either to the petechial or putro-adyamic form of fever, or to a state of febrile scurvy, or to a disease in which the symptoms of either the one or the other predominated, according as the causes of either prevailed. In attempting to distinguish between these diseases, or to determine the existence of either, the discriminating physician will be guided by the slow and gradual, or the rapid accession of the symptoms; by the states of the skin, of the gums, and of the teeth; of the general surface, and particularly of the lower extremities; by the discoloration and other changes there observed; by the presence or absence of complete prostration and of other febrile phenomena; by the acuteness or intensity and duration of the malady; by the appetite and function of digestion; by the inability or capability of leaving the bed; and by the presence or absence of contractions of the lower extremities, or of hardness, swelling, and livid patches or ulcers in these situations.

29. In distinguishing, also, between scurvy and *purpura*, the presence or absence of the majority of the above symptoms, and more especially the states of the gums and teeth, the swellings, indurations, livid blotches, œdema of, or the fungous ulcers on, the extremities; the contractions of the joints; and various associated phenomena, will guide the physician to a correct diagnosis, and while they indicate with due precision the existence of either the one or the other, will at the same time point out the close alliance between both as to their causes and their natures. (*See PURPURA*, § 23.)

30. IV. THE PROGNOSIS OF SCURVY.—Before the disease is advanced so far as to present contractions, indurated swellings, or fungous ulcers on the extremities; or hæmorrhages from mucous canals; or swoonings upon assuming the erect posture, or on slight exertion, a speedy recovery will generally follow the use of the means about to be recommended; but when the malady is thus far advanced, although the same means will often save the patient, they may also fail; and this unfavourable result is the more likely to ensue if, with these symptoms, the patient complains of dyspnoea, and oppression at the chest; if his respiration and pulse be very frequent; if there be any pulmonary, pleuritic, or dysenteric complication; if dropsical effusions or albuminous urine supervene; if the spleen be much enlarged; and if

hæmorrhages from the bowels be copious, then great danger may be apprehended, and with still greater reason, if the adoption of a suitable diet and remedies is not soon followed by any amendment.

31. In cases which present not the extreme symptoms characteristic of scurvy, and are nevertheless unamenable to the usual scorbutic remedies, some complication should be looked for and ascertained, as this most probably either retards or prevents the efficacy of such means, or the disease partakes, owing to the causes above noticed (§ 28), more or less of the characters of putro-adyamic or petechial fever—possesses the intermediate form already mentioned (§ 27), and requires an appropriate method of treatment. I am persuaded that the instances of scurvy which have been adduced of the failure of these remedies have either been the severer, or pulmonic, pleuritic, pericardiac, dysenteric, or dropsical complications of the distemper, or those intermediate states of disease now alluded to.

32. V. CAUSES OF SCURVY.—The causes of scurvy were only partially known until a comparatively recent period; for the disease was often ascribed to one only of the causes, and that a predisposing cause; and even now, when the chief causes have been duly recognised, others which either predispose the frame to their operation, or concur with them, and aid or determine their effects, are too generally overlooked, and their influence in modifying the malady, or in delaying or preventing the beneficial operation of the means employed, is altogether neglected, or even unknown. It has been fully ascertained that several of the causes to which scurvy was formerly imputed are not really the exciting or efficient causes of this malady; but their influence as predisposing, concurring, or determining causes should not be denied, although they cannot take the highest rank in causation, or because they have been pushed from the position formerly assigned them, by others of much greater influence.

33. i. PREDISPOSING CAUSES.—Several of these causes were formerly believed to have had the chief share in the production of scurvy; but they are now more clearly proved to perform a less important part; but this part they fill in the causation not only of this malady, but also of dysentery, putro-dynamic fever, *purpura*, and probably of other diseases.—A. Much importance was attached formerly to living on *salt provisions*; and as this disease most frequently and certainly appeared in ships provisioned with salt meats chiefly, so it was inferred that these were the causes of its occurrence. That salted meats are not more productive of scurvy than fresh meats, or at least not much more so, is shown by the prevalence of the malady, in the spring of 1720, in an army which KRAMER stated to have enjoyed an abundance of fresh meat at a low price; in the Russian armies, in 1736, which were similarly circumstanced; in the French prisoners, at the middle of last century, who had no salt provisions; and in the regiments at the Cape, in 1836, that enjoyed an abundance of fresh meat.

34. From these and other facts, it may be inferred that scurvy may appear even among those who have a sufficient supply of fresh meats, if there be a prolonged deficiency at the



same time of succulent vegetables and fruits. Nevertheless, the question remains, Are salted meats more favourable to the supervention of scurvy than fresh meats? I believe, after having paid some attention to the matter, that recently-salted or uninjured salt meats, if they have been of a good and healthy description, and quite fresh when salted, are not materially more productive of scurvy than fresh meats; but while the quality of the latter is generally manifest, that of the former is not always so evident. The salted provisions supplied to ships have frequently been long cured, even before they are received on board, and are so often of the most inferior and unwholesome character, as to account in great measure for the appearance of cachectic maladies in those who live upon them. It was notorious, during Queen Anne's wars, that, owing chiefly to collusion between the heads of the commissariat or others in power and the contractors, and even in more recent times, that the salted provisions supplied to the navy and army often consisted not only of long or imperfectly cured meats, but also of the flesh of animals which had died of disease; that horse-flesh was often placed in casks of beef; and that similar villainous acts were not confined to salted provisions, but extended also to the flour and biscuits supplied to these services, both of these having been adulterated, and the latter mouldy, and swarming in maggots and weevils. Owing to this cause, as shown by some medical writers of the day, a much greater number of human lives were lost from scurvy, scorbutic dysentery, and putro-adyynamic fever—by diseases caused by the unwholesomeness of the provisions—than from all other diseases, and from naval and military actions, sieges, and other causes combined.\*

35. Not only were both salted and farinaceous provisions frequently deleterious, but the supply also was insufficient to both army and navy, up to the mutiny at the Nore, the causes of which were generally misrepresented by those in power, and misunderstood or glazed over by historians. In times more recent, acts similar to the above have been perpetrated in more places than one. The returns made to the Medical Boards in India by the medical officers, and which are preserved at the India House, are full of complaints as to the unwholesome nature of the provisions supplied to the army in the Burmese war; even the rice having been either unripe or damaged. The remarkable prevalence of scorbutic dysentery, and low fever among the troops in that war, was ascribed chiefly to this cause; the mortality continuing great until more wholesome provisions were procured. But it was not only in the public services—in fleets, armies, and transport vessels—that these enormities were practiced; trading-vessels, emigrant ships; &c., were sometimes, and are occasionally up to the present day, supplied with the cheaper kinds of Irish provisions, which are frequently of a similar kind to that

above described; and to this circumstance in part, and to others about to be noticed, should be ascribed the scurvy and fever so frequently breaking out in ships after their provisions have been used sufficiently long to produce their effects. To the unwholesomeness and nature of the food, and to the state of the water, even independently of the want of fresh vegetables and fruit, the diversity of characters presented by scurvy and fever in ships, armies, prisons, &c., is in great measure to be imputed, as well as the want of success in treating these diseases by the more usual remedies, or by those more generally found efficacious under other circumstances—the same causes not merely predisposing to these forms of disease, but actually producing them, and giving them their distinctive features.\*

36. Much of the mischief observed in those who had lived long on salt provisions was formerly, and still is by many imputed to the salt by which these are cured, or at least to the state of the provisions; and by others to the supposition that salted meats are not so nutritious as fresh. But when these provisions have been from the first wholesome and good, have been salted while quite fresh, and have not been afterward kept so long as to produce any sensible or unpleasant change, they may then be considered as having had no farther share in the production of scurvy, even although it should have appeared during the use of such provisions, than that they have constituted the chief or only food, to the neglect of other articles requisite to correct the effects of so exclusive a diet, such as fresh vegetables and fruits. On this subject Dr Bupp justly remarks, that "the circumstances showing that scurvy may prevail to a frightful extent among persons living solely on fresh meat; that persons who, from the nature of their occupations, are continually absorbing saline particles, are exempt from scurvy; that scurvy is not brought on by the use of sea-wa-

\* [In the United States navy, the salt beef and pork, which constitute a great portion of the daily ration of the seamen, are very generally deteriorated by age, and often unwholesome and innutritious; and, as the navy is supplied with these articles by contract, they are generally long kept, and nearly spoiled before they are served out. The salt, moreover, which is used in curing them is frequently of an inferior quality. As Dr. FOLTZ has stated, when new beef and pork are delivered to the government in a sound and wholesome state, they are carefully stowed away until the old stock on hand is consumed, by which time the new has reached the same condition as that which was nearly in a state to be condemned, if surveyed.]

Dr. COALE (United States navy) states that "the best beef that could be procured" (on board the United States frigate Columbia, previous to the appearance of the scurvy), "had been salted so long that all characteristics as an article of food seemed to be lost, and its odour, when boiled, was scarce supportable. The biscuit was very dark, required generally a hammer to break it, and the fracture mostly resembled a vitreous lustre."—(*Am. Journ. Med. Sci.*, Jan., 1842.) The daily rations supplied to the United States seamen are as follows:

Bread, fourteen ounces; whiskey (*at option*), half a pint daily; and in addition, on *Sunday*, suet, quarter of a pound; beef, quarter of a pound; flour, half a pound. *Monday*, pork, one pound; beans, half a pint. *Tuesday*, cheese, two ounces; beef, one pound. *Wednesday*, pork, one pound; rice, half a pint. *Thursday*, suet, quarter of a pound; beef, one pound and a quarter; flour, half a pound. *Friday*, cheese, four ounces; butter, two ounces; rice, half a pint; molasses, half a pint. *Saturday*, pork, one pound; beans, half a pint; vinegar, half a pint. It would doubtless conduce very much to the health of our sailors if potatoes could enter somewhat largely into the dietaries of our vessels, and form part of the daily rations.]

\* From a tolerably extensive field of observation in various parts of Europe and within the tropics, between the years 1815 and 1819 inclusive, I can state, that, of the various kinds of unwholesome cured meats, pork is perhaps the most injurious, especially when it has been imperfectly salted or too long kept; and, more particularly, if it have been coarsely fed, or diseased, or not cured immediately upon being killed; scorbutic and other forms of dysentery generally resulting.

ter, which may be drunk with impunity, even by scorbutic people; and that the disease may be prevented for any length of time in persons who subsist on salt provisions, and can be readily cured, even in those who continue the use of them, are sufficient to justify the conclusion that salt has no share whatever in producing it" (p. 65). To this statement I would merely add, that the salt conceals, and partly corrects, the sensibly noxious properties of previously tainted, diseased, or otherwise unwholesome meats; and hence meats of this description, when salted, are more readily, and perhaps less injuriously, partaken of, and, moreover, have not their injurious nature made so manifest, or even suspected, as if an attempt to use them in their fresh state were made.

37. *B.* Next to the state of *meat provisions*, that of *farinaceous food* supplied to ships, armies, &c., as predisposing to, or even as producing scurvy, may be noticed. In various countries in the East, where little or no animal provision is used, scurvy has nevertheless appeared, and has been ascribed, with sufficient reason, not so much to deficiency of the amount as to the unwholesome nature of the food, whether rice, Indian corn, &c., which often have been damaged, unripe, mouldy, or too long kept. The flour, biscuits, and other farinaceous articles, supplied by contract or otherwise to the public services, and to trading vessels, were formerly, on many occasions, similarly damaged and unwholesome, or became so after having been kept for some time, and contributed their share towards the production of scurvy, fevers, and even to visceral disease. That these articles of food have actually been productive of these maladies, was demonstrated by the occurrences in the Burmese war; native Indian regiments subsisting entirely on rice and other farinaceous articles, which in that war was more or less damaged and unwholesome, having been universally attacked with scurvy and scorbutic dysentery.

38. *C.* The *water*, also, with which ships of war and trading vessels were supplied for long voyages, having been kept in wooden casks, the use of iron tanks for this purpose being of recent date, the water became offensive and unwholesome, on many occasions so much so as to be nauseous, and to require the addition of spirits to prevent its more immediate ill effects. The effects of marsh water in causing bowel complaints and enlargements of the spleen and liver, are well known to many who have possessed powers of observation in connexion with the requisite opportunities. But I can say from personal observation, that water, long kept in wooden casks, however well these casks may have been charred, as they sometimes are on their insides, becomes even more deleterious to health, and much more offensive to the senses, than any water taken from marsh-grounds or land-tanks, much, however, depending upon the state of the water when filled into the casks. The greater attention now paid to the supply, state, and preservation of water in the public services, and in trading vessels, is one of the chief causes of the less frequent appearance of disease in them, and more especially of scurvy and allied maladies.

39. *D.* *Cold and humidity* have long been considered as very influential in favouring the occurrence of scurvy. That these causes are of

some importance, I can assert, although Dr. Bunn strongly doubts their influence. But he has not viewed them in a proper light. He remarks, that "the merchant seamen who enter the port of London, affected with scurvy, come almost exclusively from Mauritius, India, Ceylon, or China; and have consequently been in no higher latitude than that of the Cape." But he overlooks the circumstance that those voyages are long, and that the men have been living long upon cured meats, without a due supply of fresh fruits and vegetables; while most other vessels arriving at the port of London have had short voyages, they coming from much nearer countries, and consequently a sufficient period for the development of scurvy in them has not elapsed. It is not, however, the cold and moisture depending upon climate, or even upon weather, that are so influential in favouring the development of scurvy, as the cold and humidity arising from daily, and even twice daily, washing and scrubbing the decks, formerly and even still so much in use, to the neglect of dry-scrubbing and cleansing. The evaporation from the wet decks during day and night, consequent upon frequent washings during fine and dry weather, and the wet and humidity of body-clothes, bed-clothes, and hammocks, produced by these washings, and during foul or stormy weather, are the forms of cold and humidity which, on ship-board, predispose to scurvy, and more directly produce the several forms of rheumatism, chiefly by suppressing the cutaneous functions, by reducing nervous power, and thereby causing the accumulation of those excrementitious matters, the retention of which occasions these maladies. All the most experienced writers on scurvy have remarked the suppression of the cutaneous functions previously to the appearance of, and during the progress of scurvy, and I have no doubt of the fact from my more limited observation.

40. *E.* *Impure air* has been considered by some writers as predisposing, more or less, to the appearance of scurvy. The testimony of LIND, TROTTER, and BLANE, most experienced physicians, is opposed to the opinion that it has any influence either in the production or on the course of this malady. That the influence is not very remarkable, may be admitted: but that this cause is not altogether without effect cannot be denied, especially in modifying or altogether changing the characters of the disease, when conjoined with those causes which more directly and commonly produce scurvy. It was observed in the American squadron, in 1846, that scurvy was most severe in vessels which were the worst ventilated.\*

41. *F.* *Several other diseases* predispose the frame to the appearance of scurvy; and although the predisposing influence has been attributed to the debility produced by those diseases, yet I believe that it is not the debility

\* [In every instance where scurvy has broken out on board any of our United States public vessels, as the *Raritan*, the *Potomac*, the *Falmouth*, &c., it could be traced directly to the unwholesome and indigestible character of the meats, beef and pork, owing to long keeping, and the inferior quality of the salt used in curing them. In connexion with this was long absence from land, the total want of fresh provisions, breathing a vitiated atmosphere from imperfect ventilation, bad water, or a diminished supply; and, in some cases, despondency and disappointment from being kept on board after the expiration of the period for which the crew had shipped.]



alone which predisposes, but more especially the nature of the malady. Agues, remittent fevers, enlargement of the spleen, and rheumatism, and previous disorder of the digestive organs, especially the former, have been generally considered by medical writers as more or less influential in the production of scurvy. The previously impaired assimilation and nutrition, and the consequent state of the blood, in connexion with exhausted organic nervous energy, readily account for the readiness with which scurvy supervenes upon those maladies when its causes are in operation.

42. *G. The state of the mind* is influential both in predisposing to and warding off scurvy; the depressing passions favouring the appearance, and the exciting emotions preventing or delaying the occurrence of the malady. Disappointed expectations; anxiety; hope deferred; longings to return to more desired scenes; prolonged confinement; a want of exciting, amusing, and exhilarating occupations; breathing the same kind of air in the same locality; a monotonous and unexciting course of existence; losses of relations and friends, and extinction of those hopes or expectations which render privations endurable—all have their influence in predisposing the body to scurvy or its allied states of cachexy.

43. *H. The seasons* have no small influence on the appearance of scurvy, but mainly in consequence of the privation of fresh vegetables and fruits, which is experienced chiefly during winter and spring; so that in armies, as well as in fleets in, or departing from, cold or temperate countries, a deficient supply of those dietetic means of prevention is more likely to be experienced at those seasons than at any other. Suppressed perspiration, produced by the cold and humidity of these seasons, may also not be altogether unimportant, as shown above (§ 39), in favouring the evolution of this malady. In northern countries, where the inhabitants, the seamen, and the soldiers, live chiefly upon cured meat provisions, as salted and smoked meats, and dried fish, during winter and spring, and until the commencement of summer, when vegetables and fruits begin to appear, their constitutions have made considerable progress to the scorbutic diathesis; so that, when these preventive articles of diet cannot be obtained at this latter season, owing either to states of siege, and to the provisioning and other circumstances of armies or fleets, scurvy is then much more apt to break out in spring, and even in summer, than at other seasons.

44. *I. The early writers* on scurvy were inclined to ascribe a *contagious influence* to this disease, chiefly from the number attacked with it in the same place and circumstances; but it was clearly shown that contagion had no share in producing it, by LIND and others, who wrote about the middle and end of the last century, the causes inducing the malady being common to all affected by it in the same locality. But, although the disease is actually uncontagious, it is by no means unreasonable to infer that the putrid emanations from a number of persons in an advanced stage of the disease, confined often in very limited spaces, either on board of ships, in the crowded hospitals of a besieged town, or in crowded prisons, are not altogether innocuous, or are not without some influence

in predisposing the body to this or some allied malady, arising from the contamination of the circulating fluids, and from the depression of vital or organic nervous power, by the accumulation of these emanations in the air which is respired for a longer or shorter time. Nor would it be improbable that the emanations arising from a number of scorbutic patients, in places insufficiently ventilated, may convert the scorbutic malady into putrid, maculated, or putro-dynamic fever, or into scorbutic dysentery, or even may more directly develop these diseases.

45. *K. Age and Sex* have probably but little influence on the production of scurvy, for it is observed at all ages, and in both sexes; but there is no doubt that it occurs much more frequently in adults, or from early puberty until far advanced age, than in children, and in males than in females, chiefly in consequence of the greater exposure of adult males to the causes, owing to the circumstances in which they are liable to be placed.

46. *ii. THE EXCITING CAUSES OF SCURVY* may be briefly stated to be the use, for a longer or shorter period, of all kinds of animal meats, too long or imperfectly cured or preserved; of dried, or smoked, or tainted meats or fish; or mouldy, old, damaged, diseased, or unripe farinaceous articles of food, to the exclusion of, or without possessing the advantages of, fresh or succulent vegetables and fruits, or of other preventive articles of diet, or of medicine; more especially when the use of the former kinds of food, and the want of the latter, are aided by one or more of the predisposing or concurring causes already considered. That the want or neglect of those vegetable productions which have been found so beneficial, both in preventing and in curing scurvy, has a greater influence in the production of the malady, than even the prolonged use of the several kinds of animal food, however cured or preserved, has been proved on various occasions. But it cannot be denied that damaged, tainted, or too-long-cured substances—pork, the viscera and blood of the animals generally used for food—the flesh of animals which have died of disease, &c., are much more likely to occasion scurvy, and its various complications, than fresh and wholesome meats; although even these last may be followed by the disease, when too long or exclusively used, and when fresh vegetables and fruits cannot be obtained.

47. Although I cannot admit that scurvy is to be ascribed entirely and always to the absence or want of fresh succulent vegetables and fruits, as articles of diet, as contended for by Dr. BURN, yet I will not deny that such a privation is the most common and exciting cause of the malady, especially when no suitable means are employed—none of the numerous preventives about to be noticed (§ 54, *et seq.*) is had recourse to, in order to supply the deficiency, or to counteract the effects resulting from the nature or state of the aliments. In this, as well as in other diseases, we cannot with propriety ascribe the sole agency to one cause; generally more than one, frequently several, although of diversified amount of power, are concerned in developing the result, whether that result be simple, definite, or specific, or whether it be complicated more or less, or contingently associated.

48. *iii. The chief causes insisted on by writers*

on this disease were often approaches only to the truth, but these approaches were sometimes so near as to lead to judicious means of prevention and cure, although certain subordinate agencies were often overlooked. ECHTUS, one of the earliest writers on scurvy, assigns as causes, "gross, unwholesome food of salt, dried, or semi-putrid flesh and fish, pork, spoiled bread, stinking water," &c. RONSSEUS ascribed the frequency of scurvy in Holland to the diet and air, to eating quantities of water-fowl, but chiefly to living on flesh first salted, then smoked and dried, and to the season and weather. WIERUS, who probably viewed cases of psoriasis as modifications of scurvy, and in this agreed with many who both preceded and followed him, more justly remarked the not infrequent connexion of scurvy with ague and malignant forms of fever; and, with sufficient reason, ascribes this distemper "to unwholesome air, and chiefly to such bad or corrupt food as was used in northern countries, and by their shipping, viz., stinking pork, smoked rancid bacon, mouldy bread, thick, feculent ale, bad water, melancholy and grief of mind, preceding fevers, the stoppage of usual evacuations," &c. DODONÆUS imputed the scurvy in Brabant, in 1556, to the use of corrupted rye during a season of scarcity. ROSOCK, in a treatise published in 1589, remarks, that impure water and bad air aid unwholesome food in producing scurvy, and states that the disease is endemic in several northern countries, and that scorbutic mothers often there bear scorbutic children, and often miscarry, or bring forth dead fœtuses. BRUNNER insists upon the influence of damp, marshy localities, and other sources of malaria, in producing scurvy, and ascribes more to the nature of the bread used by the inhabitants of those localities than previous writers. HORSTIUS likewise insists upon the influence of malaria, and the use of new ale, without hops or any other bitter, in causing scurvy in various places in the north of Germany. VANDER MYE notices, more particularly than any previous writer, the influence of the emotions and passions of the mind in causing and in preventing scurvy, and adduces the effects of occurrences which took place during the siege of Breda in support of his views. In this siege he attributed the disease chiefly to the general use of old, spoiled, or musty rye, and to humidity; but other causes, both physical and moral, were also in operation. He adds, that "the distemper proved most fatal to the English soldiers, as they very early began to feed on dog's flesh, were in want of their beloved tobacco, and lay in the most wet or damp barracks. It was much less frequent among the Walloons and Flemings, they being more careful and delicate in their diet, and having much wholesomer quarters. Among the French it was more rarely met with, owing to their being stationed in the driest part of the town, and to their more sprightly dispositions."

49. J. HARTMANN takes notice of the influence of mercury, and of mercurial courses, in predisposing to scurvy. In 1645, the medical faculty of Copenhagen published a consultation on the causes, prevention, and cure of the distemper, for the benefit of the poor of the country; and in this meritorious production, the influence of cold, humidity, malaria, and of unwholesome water and beverages, is insisted upon, as aid-

ing the effects produced by food such as that already mentioned. MARTIN LISTER, and many of preceding and contemporary writers, and subsequently COCKBURN, PITCAIRN, BOERHAAVE, and others down to the appearance of BACHSTROM'S work, in 1734, agree in ascribing scurvy to the use of unwholesome food and water, or to those causes chiefly which had been mentioned by their predecessors. But the last-named author was the first to demonstrate that, however much the food and water used were concerned in occasioning scurvy, *abstinence from recent vegetables was the chief cause of the malady, and the use of these the chief prevention and cure.* Notwithstanding this very decided opinion, and the very conclusive evidence BACHSTROM furnished of its truth, the disease has been imputed by writers, down almost to the present day, rather to the prolonged use of cured provisions, than to the want of fresh vegetables and fruit. But it is unnecessary to pursue this part of the subject any farther.

50. Dr. LIND states that scurvy most commonly occurred on land in persons who subsisted chiefly on dried, or smoked, or salted flesh or fish, and the unfermented farines; or upon bread made of peas, or a composition of peas and oatmeal. KRAMER states that, in his time, this distemper appeared most frequently among those who lived altogether on boiled pulses, without any green vegetables or summer fruits. The occurrence of the disease among the Russian troops, whose chief food was rye bread and meal, has been already noticed. Scurvy appeared among the inmates of a lunatic asylum in India, whose food consisted chiefly of rice and split peas; and Mr. MACOLMSON mentions the occurrence of the distemper in the same country among prisoners kept on bread and water. That various kinds of bread, especially when long kept, will occasion scurvy, or at least not prevent it, I believe, when they are not accompanied with succulent vegetables or fruits. But something is also owing to insufficiency, as well as sameness of diet, to living in a state of confinement, to breathing the air of the same place or habitation, and to the duration of this state of confinement; for it has always been remarked that, when this latter cause has been concerned in producing the disease, the first cases have been those longest confined. It may also be noticed that the influence of farinaceous food in occasioning scurvy is great in proportion to the length of time the articles have been kept previously, or subsequent to their usual modes of preparation, and to their healthy, or ripe, or untainted condition when prepared. And it should be recollected that flour, if sound and fresh, is more likely to prove beneficial when baked or otherwise prepared, shortly before it is used, than when it has been made into bread or biscuits a long time previously.

51. The prevalence of scurvy during 1847 and 1848, in Ireland, Scotland, and some parts of England, was very generally ascribed to the failure of the potato crop. But in some places in Scotland, Dr. CHRISTISON imputed the disease to the privation of milk—an opinion which has been negatived by numerous observations of the prevalence of scurvy where the supply of milk was abundant.\*

\* [In the Perth general prison where scurvy was very



52. VI. THE NATURE OF SCURVY may be inferred with tolerable accuracy, especially as respects every practical purpose, from what has been adduced. But it is obvious that the numerous occurrences of the distemper, both on land and at sea, as described at least by the majority of the writers referred to in the *Bibliography*, were associated with the appearance of one or more of those maladies, of which I have pointed out the relations with scurvy (§ 27, *et seq.*); and that, with many cases of scurvy, both simple and complicated, others of a different nature, as psoriasis, and various chronic eruptions, also appeared. To these circumstances—to the extended signification thus imparted to the name, as well as to the complications it actually manifested—are to be ascribed the diversity of description, and the numerous and complicated subdivisions of the malady, contained in works upon it during the 17th and 18th centuries. Opinions as to the nature or proximate cause of scurvy were no less diversified, and even numerous. Without attempting to adduce these opinions in full, or to connect them with their authors, it may be briefly remarked, that they generally agreed with the pathological doctrines of the day in which they respectively appeared, and were assigned by their authors, without any satisfactory proofs—were mere suppositions, or, at best, inferences from loosely-observed phenomena. While some writers imputed scurvy to an acid state of the blood, others ascribed it to an alkaline condition of this fluid, and some even, to make more sure of the fact, considered that acidity in certain cases, and alkalinity in others, were its actual causes, the predominance of either condition giving rise to the different forms of the malady. These views not proving satisfactory, especially to those who had opinions of their own to propose, the existence of a predominant saline condition of the blood was supposed and accredited by many. But the particular salt was never shown, some considering it to be an acid salt, others a rancid salt, and so on. Then came a viscid state of the blood to be asserted, then a vitiated as well as a viscid condi-

tion, and even the existence of a putrid ferment in the blood to be inferred. More recent writers considered that a simple dyscrasis of the blood only existed; others, not content with the simplicity of this view, thought it necessary to impart to it some special property or chemical quality, and contended that the dyscrasy was acid; and some were positive as to the dyscrasy being alkaline. Lastly, we find the distemper referred to the existence of a dyscrasis produced by the evolution of an acid ferment in the blood; the chief reason for the existence of this ferment being that an alkaline ferment could not exist; but the particular acid was not shown.

53. The chemical pathologists of the present day have not thrown much more light upon this part of the subject than their predecessors, each of whom considered his opinion as good as the former believed their own to have been. Dr. CHRISTISON supposes that scurvy arises from the want of vegetable albumen or animal casein in the food; and Dr. GARROD believes that the malady is caused by the absence of potash, and that potatoes and other antiscorbutics owe their virtues to the potash they contain. Dr. ALDRIDGE contends for the influence which should be ascribed to a deficiency of phosphorus, sulphur, lime, and the alkalies, in occasioning scurvy. That something may be owing—a part merely—to the causes contended for by Dr. ALDRIDGE, is not improbable. But it is unnecessary to pursue this subject any farther than very briefly to state that one of the most evident changes from the healthy condition is seated in the blood; but that this change is probably not the earliest in the procession of morbid phenomena, as it most certainly is not the only or the most advanced. That the change of the blood is manifested by the sensible or physical properties, as well as by the chemical constitution of this fluid, will readily be admitted; and that, in consequence of this change, the several solids of the body are more or less affected, will also be conceded; but I contend that these are not the only alterations; for the vital qualities of the blood itself are more or less altered, or rather impaired—those vital qualities which the blood derives from the organic nervous system, through the medium chiefly of the vessels in which it circulates. That the organic nervous system is early affected, either primarily, or through the medium of the blood, or in both modes, is shown, not merely by the functions, but also by the vital cohesion and organization, of the viscera and tissues which this system supplies and vitally actuates. But it is immaterial whether this system or the blood be the part primarily affected; for there can be no doubt that morbid states of the chyle, occasioned either by the nature and quality of the aliments, or by the defect of certain elements consequent upon the want of the requisite vegetable productions, or by both causes conjoined, will affect the assimilating functions, both by impairing organic nervous power and by altering the constitution of the blood, the slow and gradual progress of these changes giving rise to all the structural as well as functional alterations characterizing the advanced stages of the malady.

prevalent, Dr. CHRISTISON states that the prisoners were constantly employed; that they were not exposed to damp; that the ventilation of the cells was tolerably good; that the victuals of all kinds were excellent in quality; that there were *no salt provisions*; that fresh succulent vegetables, though not abundant, were not wanting; that milk has recently been withdrawn, and *treacle* substituted in its place. Hence he concludes that the sole cause of the disease was the absence of milk; for he states that the restoration of the milk arrested the spread of the disease. But *meat* was also given three times a week, which no doubt contributed to check the disease. That the absence of milk alone will not cause scurvy, is demonstrated in all our penitentiaries, alms-houses, jails, &c., in which milk is rarely, if ever, used, and yet the disease is almost unknown. The want of potatoes, meat, and milk in the Perth prison, with imperfect ventilation, was amply sufficient to produce the disease. So we have observed the disease, in former years, to prevail pretty generally among the New York pauper children, confined in crowded apartments at the Long Island Farms, and kept on too unnutritious food, scanty in quantity, and miserable in quality, which disappeared on supplying them with meat, and a more generous diet. *Any diet whatever*, which will deteriorate the blood, lessening the globuline and its plastic qualities, will produce scurvy; and where persons subjected to such diet breathe an atmosphere deficient in oxygen, the blood becomes still more rapidly vitiated, and the disease assumes a more severe and malignant form. The Indians of our western prairies live for weeks on the flesh of the buffalo, without fresh vegetables, and yet we never hear of their being attacked with scurvy.]

54. VII. THE PREVENTION OF SCURVY.—A. The efficacy of *limes, lemons, shadlocks, oranges,*

and *pomegranates*, in preventing scurvy, was known to several of the earlier writers on the disease, one of whom is quoted by LIND, in proof of the use thus made of these fruits by the Dutch seamen. ROUSSEUS, ALBERTUS, and other writers in the 16th century, make particular mention of lemons and oranges for the prevention and cure of scurvy. Although particular and convincing proofs of the efficacy of these were thus early furnished, not only by the Dutch, but also by some of our own early navigators, and subsequently by Admiral WAGER, and others, insufficient attention was paid to the use of these fruits until the appearance of Dr. LIND's celebrated work on scurvy, at the middle of the last century. Notwithstanding the evidence so conclusively adduced by this able writer, these means of preventing scurvy were nevertheless more or less neglected, or were left to the caprice or choice of commanders and others, until the efforts of BLANE, BLAIR, and TROTTER, towards the end of that century, succeeded in procuring the adoption of lime-juice for the naval service. The lemon and lime juice now supplied to the navy is preserved by the addition of one part of strong brandy to ten of the juice. But when the fruit can be procured, it is generally preferred, and is used, especially when it is actually required, with much pleasure and relish.

55. B. Other fruits, particularly those of an acid nature, and even the *sweet fruits* before they are ripe, are more or less efficacious in the prevention and cure of scurvy. Dr. TROTTER states that, having remarked that scorbutic slaves threw away ripe *guavas*, while they used the green fruit, he resolved to try the effects of such. He selected nine negroes, equally affected with scurvy. To three of those he gave limes, to three green *guavas*, and to three ripe *guavas*. They were served by himself; and, at the end of a week, those who were restricted to the ripe fruit were nearly as before the experiment, while the others were almost well. M. FODÉRÉ states that the good effects of *unripe grapes* were very apparent in the scorbutic cases of the French army of the Alps, in 1795. Sir J. PRINGLE recommended *apples* as a preventive in 1776; and Dr. TROTTER remarks that, "when Lord BRIDPORT's fleet arrived at Spithead, in September, 1795, almost every man in the fleet was more or less affected with scurvy. Large supplies of vegetables were provided; and lemon-juice being scarce, in consequence of the previous great consumption, fifty baskets of unripe apples were procured for the use of the fleet. The *Royal Sovereign*, in particular, derived great benefit from them;" and the cure of the disease was every where most speedy. *Tamarinds*, and most of the acidulous fruits of warm and hot climates, are more or less antiscorbutic. When scurvy was prevalent among the troops at Rangoon, during the Burmese war of 1824, the *Phyllanthus emblica*, or *anola*, which has a rich, acid taste, was employed as an antiscorbutic with much benefit.

56. When BACHSTROM asserted, in 1734, that scurvy was the result of a more or less protracted privation of fresh vegetables and fruits, he stated at the same time both its prevention and its cure; and, although certain vegetables and fruits accomplished these purposes more quickly and fully than others, all those which

are edible possess more or less of these beneficial properties. The writers of the 16th century have generally noticed the popular use of *scurvy-grass*, *brook-lime*, *water-cresses*, &c., for the prevention and cure of this distemper. All succulent vegetables and plants comprised in the order *Cruciferae* are more or less efficacious, especially the *radish*, *horseradish*, *turnip*, *carrot*, *cabbage*, &c.; and even such of these as are commonly only used when boiled are most efficacious when taken raw and fresh from the ground. Dr. LIND very justly insists upon this circumstance, and remarks that herbs in form of salads are more efficacious than when boiled; and that their antiscorbutic properties are destroyed by drying, as shown by KRAMER, and by the results observed from the antiscorbutic herbs sent from Vienna to the army in Hungary. *Onions*, *garlic*, *leeks*, and *potatoes* are all very decidedly antiscorbutic, and as these may be preserved for some time, they are most beneficial for the provisioning of ships or armies. The very general use of potatoes in modern times partly accounts for the remarkably less prevalence of scurvy at the present day than formerly.

57. Most of the articles which are antiscorbutic may be preserved by *pickling*, especially by the pyroligneous acid or vinegar, and retain in a great degree their virtues. The immunity of Dutch vessels from scurvy has been ascribed by Dr. KERR and others to the use of *sour krout*; and the health of the crew of the *Centurion*, during Captain Cook's voyage, was considered to have been owing to a liberal supply of this antiscorbutic.\* The quantity usually allowed of this substance was two pounds' weight to each man per week, besides a pound and a half, or two pounds, with every gallon of peas, for making soup.

58. There is no northern country where scurvy is generally endemic during winter, spring, and the early part of summer, that does not furnish a supply of antiscorbutics, if duly recognized and preserved for these seasons. In Norway, Greenland, Iceland, and Lapland, they employ *scurvy-grass*, *sorrel*, and various other warm and acid herbs. Sir E. PARRY, in his first polar expedition, experienced the advantage of sorrel in the cases which occurred among his crews. He states that sorrel was preferred by the Esquimaux to *scurvy-grass*. He adopted, also, the advice of BACHSTROM and LIND, and raised small quantities of *mustard* and *cress* in his cabin, in small, shallow boxes, filled with mould, and placed along the stove-pipe; and as much of these were thus produced, although etiolated from want of light, as to prove beneficial to the scorbutic cases.

59. C. There is, perhaps, not any vegetable production more remarkably antiscorbutic than the tribe of *firs*, especially the *spruce-fir* and

\* Dr. KERR, in his able treatise on scurvy, remarks, that "Sour krout or croute (*sauer-kraut*, Germ.) is prepared by slicing the soundest and most solid cabbages in the way cucumbers are used in this country. In this state they are put into a barrel in layers, hand high, and over each is strowed a handful of salt and caraway seeds: in this manner it is rammed down, stratum supra stratum, till the barrel is full, when a cover is put over it, and it is pressed down with a heavy weight. After standing for some time in this state, it begins to ferment; and it is not until the fermentation has entirely subsided that the head is fitted to it, and the barrel is finally shut up and prepared for use."—*Cyclop. of Pract. Med.*, vol. iii, p. 691.



common fir, and mountain pine. MOELLENBROEK states, that when the Swedish army, at war with the Muscovites, were attacked with scurvy, Dr. ERBENIUS prescribed a *decoction of fir-tops*, by which the most deplorable cases were cured, and the rest of the troops protected from the distemper. Two squadrons of ships fitted out by Russia in 1736, were obliged to winter in Siberia, and their crews became affected with scurvy. After attempts to discover a remedy, the pines which grew plentifully on the adjoining mountains were hit upon; and by these all the men recovered in a few days.—(GMELIN, *Flor. Siber.*, p. 181.) Dr. LIND remarks, that pines and firs, as well as the shrub called the black spruce, have all analogous medicinal virtues, and great efficacy in the prevention and cure of this disease. "A simple decoction of the tops, cones, leaves, or even green bark and wood of these trees, is an excellent antiscorbutic; but it becomes much more so when fermented, as in making spruce-beer, where the *molasses* contributes, by its diaphoretic quality, to make it a more suitable medicine. By carrying a few bags of spruce to sea, this wholesome drink may be prepared at any time. But when it cannot be had, the common fir-tops should be first boiled in water, and the decoction afterward fermented with molasses, in the common method of making spruce-beer, to which a small quantity of wormwood and horseradish root (which it is easy to preserve fresh at sea) may be added."

60. *Tar-water* was formerly strongly recommended as an antiscorbutic; but the extravagant praises bestowed upon it at the commencement of the last century greatly injured its just reputation. Dr. LIND still continued to uphold it; and many years ago, I had occasion to have recourse to it as a preventive, when placed in circumstances most likely to occasion this distemper, and when no other means could be obtained.\* There are many reasons to believe that all the *terebinthinates* are antiscorbutic; and that, when the disease is attended by hæmorrhage, there is no substance so efficacious as the spirit of turpentine, when taken in small and repeated doses, in arresting the hæmorrhage, in restoring the tone of the extreme vessels, and removing the contractions of the joints. With this impression, I recommended Sir E. PARRY to have a supply of this medicine in his last polar expedition; and he adopted the recommendation. The *anuda-tree*, to which CAR-

TIER attributed the remarkably quick recovery of his crew, is considered by LIND to have been the leaves and tops of the American spruce; and it, as well as the other pines and firs, evidently owed much of its virtues to the terebinthinate principles it contained.

61. *D. Molasses* has been considered by LIND and others as antiscorbutic; and Sir G. BLANE states, that the ship in which it was first tried was the only one in the squadron that was free from scurvy, which prevailed so much in the other ships, that, on their return to Portsmouth in August, 1780, 2400 men were sent to the hospital with this disease. Subsequently, molasses was served with rice to the men who were scorbutic, or threatened with scurvy, in Lord Howe's fleet; and the benefit derived from it was so great that it was made for some time a regular article in the victualling of ships. Nevertheless, the malady was not entirely prevented; and in some vessels well supplied with it, scurvy prevailed to a great extent. Dr. BUDD believes that the antiscorbutic properties of sugar-cane are greater than those of molasses, and that they are much impaired by the process employed in the manufacture of sugar. I consider this opinion to be correct, from what I have observed in warm climates.

62. An anonymous work on scurvy, published in 1767, recommended the use of *wort*, or an infusion of malt, as an antiscorbutic; and this substance was afterward favourably noticed by Dr. BADENOCH. Captain Cook employed it in the *Centurion*, and spoke highly of its efficacy. He took with him a large supply of malt, with which to make wort; of this from one to three pints were given daily to each man. Sir G. BLANE states that the fleet in the West Indies was supplied with the *essence of malt*; that it proved of service, but that its antiscorbutic properties were inconsiderable. The process of extracting the essence very probably impaired the properties possessed by the infusion.

63. *E. Various fermented liquors* have been used as antiscorbutics, some of them from times immemorial, in northern countries. In Norway, in the Feröe and Shetland Isles, the inhabitants have, from the earliest ages, used, as their common beverages or drink, two kinds of fermented liquors; the one consisting of the fermented serum of butter-milk, or of fermented butter-milk, the caseous matter being removed as the fermentation proceeds; the other being an infusion of the bran or husks of oats and barley, that is fermented after the chief part of the farinaceous deposit from the infusion is removed. This deposit takes place from the infusion after this latter is poured off, or otherwise separated from the bran or husks. The infusion is then allowed to ferment, and the farinaceous deposit is removed, and used as an article of diet. These are very agreeable beverages, especially during the advanced stages of their fermentation, and constitute the common drink of the inhabitants. They are the chief means of averting scurvy in these parts, where fresh vegetables are either scarce, or not to be obtained, during a great part of the year, and where fruits are almost altogether wanting.

64. In all the continental countries bordering on the Baltic, and Northern and German Oceans, *spruce-beer* is the most generally and most efficaciously used as a preventive of scur-

\* The author of this work, in the winter of 1817, and 1818, was a passenger to England in a vessel which was detained by bad weather at sea during thirteen weeks and four days, and which was provisioned and watered for seven or eight weeks only. He fortunately had laid in a small stock of articles for his own use; but, nevertheless, it was found necessary, after some time, to place every one on an abridged allowance of food and water. The meat provisions were altogether long salted, and were chiefly pork; the biscuit was coarse and mouldy. The water ultimately, also, was short in quantity, turbid, bluish, and most offensive. There fortunately was a very moderate supply of potatoes. During thirteen weeks no land had been seen, nor any other vessel communicated with. In this predicament—which, however, was not the only or the most dangerous one—the author caused a small quantity of *tar* to be put into the water before it was used for drinking, and a little spirit was added. To these means, aided by a very moderate supply of potatoes, he attributed the preservation of the crew from scurvy and scorbutic dysentery, every person arriving in the Downs in good health, notwithstanding the unwholesome supply of food and water, and the unfavourable season.

vy; vessels from Denmark, Sweden, Holland, Riga, Dantzic, &c., being generally provided either with it or with the essence of spruce, for their antiscorbutic properties. Spruce-beer is beneficial, not only for the prevention and cure of scurvy, but also in the treatment of most fevers of a low type, and of several cachectic diseases; in all of which I have, since the commencement of my practice, frequently prescribed it. As shown above (§ 59), it may be readily prepared from the materials which are easily procured, and as easily carried about. *Cider* and *perry* are among the most decided antiscorbutic beverages in use in this country, and were long ago shown to be very serviceable by Sir J. PRINGLE and Dr. LIND. *Small-beer*, in a state of brisk fermentation, is also antiscorbutic, especially when a sufficient quantity of hops, or of a vegetable bitter, has been added. Sir G. BLANE and others have made a favourable mention of *malt liquors*, and I have seen them used with advantage, especially *porter*, when bottled and well preserved.

65. The several kinds of *wine* are more or less antiscorbutic; and they are rendered still more so by the addition of vegetable bitters and aromatics, more particularly absinthium, calumba, cascarilla, ginger, orange and lemon peel, &c. It has been observed that scurvy was rare in French ships of war in which the wines of their country were served out to the crews. Sir G. BLANE, Dr. LIND, and Dr. BRYSON, agree in reproaching the use of spirituous liquors. There can be no doubt of the injurious tendency of these when taken in excess, or habitually, or undiluted; but used in small quantity, largely diluted, and added to the more common antiscorbutic beverages, or to bitter vegetable infusions, they are decidedly beneficial, both in the prevention and cure of the distemper. There are various contingencies which occur to voyagers, requiring a cautious and moderate recourse to one or other of these liquors; and, in circumstances threatening the outbreak of scurvy, the addition of a small quantity of either of them to the means of prevention in common use has a very beneficial influence upon the spirits and constitution of those who thus abstemiously use them, and promotes the good effects of the more efficacious antiscorbutics, especially during exposures to cold and humidity.

66. *Vinegar* was early employed as an antiscorbutic, and our fleets were generally supplied with it during the last century. Dr. LIND, Sir G. BLANE, Dr. TROTTER, and others, have shown that the distemper prevailed in ships which were well supplied with this article. Much, however, depends upon the kind of vinegar employed. The pyroligneous acetic acid certainly possesses considerable antiscorbutic properties, much apparently depending upon the source and the preparation of this article. Dr. BUNN remarks, that he has observed scurvy in ships well supplied with vinegar; but the disease, in its most aggravated form, has appeared among those crews which had no regular allowance of this article.

[The expressed juice of the *Agave Americana* (American aloe, or *maguey*, as it is termed in Mexico) has lately been used with great success in the American army in Texas for scorbutus. Dr. PERIN, U. S. A., reports several cases cured very promptly by the *maguey*, which go

to show it to be greatly superior to most other remedies in this disease. The leaves are cut off close to the root, placed in hot ashes until thoroughly cooked, when they are removed, and the juice expressed from them. The expressed juice is then strained, and given in doses of from ʒij. to ʒiij., three times a day. It is not disagreeable to take, and sits well on the stomach. After the leaves have been cooked, the cortical portion near the root may be removed, and the white internal portion may be eaten. It appears to be a wholesome and nutritious food.—(*New York Jour. Med.*, Sept., 1851.)

The *wild pepper-grass* (*Lepidium Virginicum*) was found very useful in the treatment of scurvy in Florida during the Seminole war. The *wild onion* (*Allium angulosum*), a small bulbous plant growing on the Upper Missouri and the Western prairies, has also proved very beneficial in arresting the disease.]

67. *F.* The *mineral acids* have been found but little influential in the prevention and cure of scurvy. Dr. LIND took twelve patients on board of the *Salisbury* at sea; their cases were quite similar. They lay in one place, and the diet was the same for all of them. Two of them were ordered a quart of *cider* daily; two others took twenty-five drops of *elixir of vibriol* three times a day; two had two spoonfuls of *vinegar* thrice a day, and their food well acidulated with it; two were put on a course of *sea-water*, about half a pint having been given every day; two had each two *oranges* and one *lemon* daily; and two had the size of a nutmeg, three times a day, of an *electuary* made of *garlic*, *mustard-seed*, *rad. raphan.*, *balsam of Peru*, and *myrrh*; using barley-water, acidulated with *tamarinds*, for drink. The oranges and lemons were the most speedily beneficial; next to those the *cider*: those who took the other medicines were, at the end of a fortnight, much in the same state as those who had taken only lenitive electuary and cream of tartar as an aperient.

68. *G.* There are numerous medicines besides those already mentioned which are more or less useful in preventing as well as in curing scurvy. Most of the more *succulent* and *acidulous* vegetables, plants, and fruits, especially when fresh, or preserved by pyroligneous vinegar, are beneficial; but many of them lose their antiscorbutic virtues when dried, and others when boiled. Of the medicines which may be used, and which are certainly occasionally serviceable, even when other means have failed, I may mention the *chlorate of potash*, *nitrate of potash*, *camphor*, the *chlorides*, *lime-water* and the *chloride of lime*, *chlorine*, *chlorinated water* and *chlorinated soda*, *sarsaparilla*, *serpentaria*, *sassafras*, *capsicum*, *turaxacum*, *guaiacon*, *mezerion*, *sene-ga*, *elm-bark*, *dulseamara*, the several *balsams*, &c.; but these are severally only of use for certain modifications and complications of the malady.

69. It has been frequently supposed, and the supposition too often acted upon, that *fresh meat* is of itself sufficient to prevent or to cure scurvy when it breaks out in ships, and this opinion may supersede the opportunity of procuring fresh vegetables and fruits. Dr. BUNN states, that, during the year in which he wrote on this disease, "the captain of a vessel trading to the Mauritius furnished his men, while they stayed



at the island, with a plentiful supply of fresh beef, procured at considerable expense, but neglected to provide them with vegetables and limes, which abound in the island. The consequence was, that scurvy broke out soon after they set sail, and before the ship arrived in this country one half the men before the mast had died of it, and the rest were disabled" (p. 77).

70. *H.* It is not alone requisite to use the above means of prevention, as they may severally be possessed by individuals or communities, under circumstances which render the appearance of scurvy either probable or certain; but all the *predisposing and exciting causes* (§ 33, *et seq.*) ought to be carefully avoided, as far as this can be effected. I believe that no mean cause of the prevalence of scurvy in the navy, as well as in trading ships, was the habit, morning and evening, of washing the decks, thereby keeping in a constant state of humidity and evaporation, and the air either cold and humid, or close and humid, according to concomitant circumstances. This evil is partly abated by adopting dry scrubbing and similar means; but it still should be kept in recollection, as the adoption of it depends upon the knowledge or caprice of the captain, who in this, as well as in other matters connected with naval service, may thus occasion an unhealthy state of air, an artificial malaria, the humidity favouring the concentration of emanation from the hold and other parts of the ship, and from the individuals confined during the night in a limited space and in a close air. Harassing duties, fatigue, and whatever lowers the general standard of health, or depresses the vital powers, ought also to be avoided.

71. *I.* Much, as will be seen from the above, depends upon the victualling of ships, especially those which proceed upon long voyages. The sailors should have a sufficient supply of cocoa, tea, coffee, fresh lemon-juice, sugar, or molasses; and while spirituous liquors are allowed in very moderate quantity, and only when wet or fatigued, they should either be withheld, or allowed in very small quantity only, when these exigencies do not exist. In circumstances tending to depress the mind, endeavours should be used to amuse and to excite it, in such ways as may the least tend to be followed by depression. In these respects, as well as in others, the means adopted by Sir E. PARRY deserves both praise and adoption, as far as the latter is possible.\*

\* [Potato or corn starch, which is now extensively manufactured, ought to enter largely into the dietaries of seamen, especially since it is so prepared and put up that there is no danger of deterioration by age or climate. An abundant supply of potatoes, sliced and dried, was taken out in the late United States Exploring Expedition in search of Sir John Franklin, and answered an admirable purpose in preventing scurvy. Dried apples and peaches should also be supplied in liberal quantities to the navy, and more frequent supplies of fresh meat and vegetables should be furnished, by a more frequent resort to ports where they can be procured. More attention is also needed, in our mercantile and public vessels, to ventilation, the quality of stores, personal cleanliness, and to the abolition of the spirit-rational, which is a constant source of both moral and physical evil. The forecabin on board our merchantmen is either cold, wet, and uncomfortable, or hot, suffocating, and filthy, with all manner of offensive smells, and no ventilation whatever. Since the recent enactments by Congress in regard to the regulation of emigrant vessels and packet ships, many of the abuses which formerly existed have been done away with; still there is great neglect in enforcing the law; and the consequence is, that typhus fever, dysentery, &c., often prove very fatal

72. VIII. TREATMENT OF SCURVY.—What has already been stated with reference to the *prevention* of scurvy applies equally to the *treatment* of it, especially in its early stages, and less complicated or less severe states. But it is occasionally observed that, owing either to the continued influence of certain causes which are overlooked, or cannot be removed, or to the presence of some complication, the disease resists the usual means of cure, and even those remedies which have generally been efficacious in the most severe cases. *Lime-juice*, and especially fresh lemons and limes, have been found the most efficacious means of cure in pure scurvy; but instances have been recorded very recently in which lime-juice has failed. These instances of failure have, however, been adduced in too general terms, and without a sufficient and precise record of the several circumstances in which the failure occurred, or of the particulars in which the disease varied in its character from that usually observed. The distemper has commonly been stated to have been scurvy arising out of the usual causes; and lime-juice has been said to have been given without benefit; but no particulars are adduced as to the existence or non-existence of one or more of those predisposing and concurring causes described above (§ 33, *et seq.*), as not merely contributing to the production of the malady, but also actually perpetuating, modifying, or aggravating it, if they are allowed to continue in operation during the treatment. When lemons, limes, shaddocks, and oranges can be procured, they are preferable to other means; but otherwise the preserved lime-juice or crystallized citric acid should be substituted. In respect of the preserved juice, we have no adequate information as to the time it will retain its antiscorbutic properties; for it is not unreasonable to infer—indeed it has been proved—that, when this juice has been kept two or three years, as is not infrequently the case, it may have lost much of its virtues, the failure of it under such circumstances being sufficiently evident, without looking for the cause of failure in the nature of the disease itself, or in the inefficacy of the remedy.

73. One of our oldest English writers on scurvy, JOHN WOODALL, in his meritorious work, entitled the "Surgeon's Mate"—a name too vulgar to be noticed by doctors of modern manufacture—observes that "we have many good things that heale the scurvy well on land, but the sea chirurgeon shall do little good at sea with them, neither will they endure. The use of the juyce of lemmons is a precious medicine, and well tried; being *sound and good*, let it have the chiefe place, for it well deserves it; the use whereof is: it is to be taken each morning, two or three spoonfuls, and fast after it two hours; and if you add one spoonful of *aqua rila* thereto, to a cold stomach, it is the better. Also, if you take a little thereof at night, it is good to mixe therewith sugar, or to take of the syrup thereof is not amisse." This good advice was given in 1636, and farther insisted upon subsequently by MARTIN LISTER, DELLON, and many

on board these vessels. Were the regulations, however, fully carried out with regard to the number of passengers, the quality and quantity of food, ventilation, and cleanliness, these diseases would rarely be observed on board, if, indeed, they ever appeared, except sporadically.]

others; and yet, when Lord Anson proceeded on his circumnavigation, no provision of the kind was made against scurvy; the prevention and cure of disease, and rewards for those who devote themselves to those laudable undertakings, never having been considered of any importance by British governments, or, at least, of very minor importance only; the aggrandizement of party and family connexions always absorbing and utterly annihilating considerations of public justice and patriotism.

74. Since the works of LIND, TROTTER, and BLANE established the reputation of lemon-juice and acidulous fruits for the cure of scurvy, these, with the use of fresh succulent vegetables, have been generally adopted. Nevertheless, other means have been resorted to, owing either to the failure of the lemon-juice, or to the form of, and circumstances attending, the malady. The other vegetable acids, and the mineral acids, have been found very remarkably inferior to the citric in the treatment of scurvy; but the amount of benefit which various kinds of salts, and the alkaline carbonates, are capable of affording, has not been ascertained, excepting in the single instance of nitre. Mr. PATTERSON, a naval surgeon, writing in 1794, showed the good effects of a solution of *nitrate of potash* in vinegar. He advised four ounces of nitre to be dissolved in a quart of vinegar, and gave half an ounce of this solution twice or thrice daily, and bathed the local sores with it as often. He states, that "some patients cannot bear the solution without the addition of water, while others, without the least inconvenience, bear it undiluted. The discharges by stool, or the presence of gripes or nausea, guide me with respect to increasing or diminishing the dose; but, at the same time, it is not a slight degree of nausea, colic, or diarrhoea that renders an alteration in the quantity of the medicine necessary. To a great number of scorbutic patients, eight ounces of this strong solution, containing one ounce of nitre, have, in the course of the day, as long as such a quantity was necessary, been administered to each with the greatest success. Also, large and frequently-repeated doses of this medicine have been given in cases of scorbutic dysentery, and, instead of increasing, I have always found it remove the disease."

75. Mr. CAMERON, another experienced naval surgeon, states, that having on several occasions observed the excellent effects of a solution of nitre, as recommended by Mr. PATTERSON, in scurvy, he was induced to employ it when the disease broke out among the prisoners on board of a convict-ship proceeding to Sydney in December, 1829, under his care. As soon as he commenced the use of this solution, many almost hopeless cases began to improve rapidly, and, before one third of the voyage was accomplished, the health of the sick improved so fast under the new treatment, that he did not think it necessary to go into any port; and the general health of the prisoners (216), when they arrived at Sydney, was much better than when they embarked in Ireland. Some of the cases manifested a severe pulmonary complication, but these also recovered. Mr. CAMERON's preparation consisted of eight ounces of nitre, dissolved in sixty ounces of vinegar. Sometimes equal parts of vinegar and lime-juice were used: a little sugar was generally added, to ren-

der it more palatable, and a few drops of oil of peppermint, and a little alcohol. An ounce of this solution was a dose; and from three to eight doses, according to the stage and severity of the disease, were given at equal intervals, from six in the morning until eight at night.

76. It has been contended by Dr. STEPHENS that the state of the blood in scurvy indicates the exhibition of the non-purgative salts, and not of acids. His own experience appears not to have furnished him with sufficient evidence in this matter. But I may mention that, in states of disease closely allied to scurvy, I have given, from an early period of my practice, the *chlorate of potash*, as well as the *carbonates of soda and potash*, with very marked benefit. In obstinate or complicated cases, or when the above means fail, a combination of these salts—of the nitrate and chlorate of potash, and the carbonate of soda or potash—may be tried; or the *chlorinated solutions of lime or of soda*. When diarrhoea is present, *lime-water* with milk, or small and frequent doses of the *chloride of lime*, or of *creasote*, in any demulcent vehicle, may be of use; and when hæmorrhages are present, small or moderate doses of the *terebinthines*, or of the *spirits of turpentine*\* (§ 68, 69), should be exhibited in any suitable form, or on the surface of spruce-beer, when that beverage can be procured.

77. When the disease is complicated with *pleurisy* or with *congestive pneumonia*, the nitre, with lime-juice and camphor, will be found beneficial; and epithems or embrocations applied to the chest or over the seat of pain, consisting of the compound camphor and turpentine liniments, will prove of essential service. When the disease is associated with disease of the *spleen*, as often occurs when it follows *intermittent or remittent fevers*, the preparations of cinchona or quinine, of *serpentaria*, *gualiacum*, &c., have frequently been found of service. In these, as well as in complications with *ague*, the remedies just mentioned should be exhibited in decided or sufficient doses; or various chalybeate preparations may be substituted, or given as circumstances may suggest. If the functions of the *liver* be torpid, or if congestions of this organ or of the *spleen* be indicated, the *nitro-hydrochloric acids* may be taken in weak solution, as the common drink, and the surface of the trunk, or the lower extremities, sponged or bathed with the tepid or warm solution of these acids. In many circumstances of the disease, the compound decoction of *sarsaparilla*, or other preparations of this medicine, will be taken with advantage; and several of the substances mentioned above (§ 68, *et seq.*) will be beneficially conjoined with others, according as circumstances arise.

78. During the course of scurvy, whether simple or complicated, the *bowels* are often more or less disordered. When *costiveness* occurs, it should be removed by the least irritating but efficient means. The most appropriate and the

\* Very recently the spirits of turpentine has been recommended for hæmorrhages, as a new medicine for this class of diseases. I may mention that, in a memoir, with experiments on the use of this remedy in disease, published by me in 1821, in the *London Medical and Physical Journal*, it was strongly advised to be prescribed for all hæmorrhagic affections; and the same advice has been given for these affections, as well as for numerous others, in this work.



most successful is a solution either of the *citrate of magnesia* or of the *phosphate of soda*; or a sufficient quantity of *magnesia*, taken shortly before exhibiting the lemon-juice or the solution of citric acid. In order to keep the bowels sufficiently open, and to procure a return of the functions of the skin, *magnesia* may be taken conjoined with the precipitated *sulphur* and a little powdered ginger, in repeated doses. If *diarrhoea* or *dysentery* supervene, the means already mentioned, or those advised in another place (*see* DYSENTERY, SCORBUTIC), should be employed. If the evacuations be very offensive as well as frequent, lime-water with milk, or the chloride of lime, or powdered charcoal, or tar-water, or creasote, will be found very beneficial; and to either of these the *calamus aromaticus*, or other similar substances, may be added. M. BRACHET states that he has cured several cases of scurvy with powdered carbon alone.

79. As the disease approaches to, or assumes the characters of *putro-adyamic* or *maculated fever*, as observed sometimes under circumstances favouring this occurrence, the remedies advised above (§ 68) for the complication of the distemper with ague; and various antiseptics, especially those recommended for the treatment of putro-adyamic or typhoid fevers (*see* FEVERS, § 585, *et seq.*), should be prescribed with due decision, and appropriately to the features of individual cases. In all the states or complications of scurvy, as in low states of fever, approaching in character to those of scurvy, an *expectant practice* is not only a most dangerous, but a fatal one. The medical journals of the day—the middle of the 19th century—teem with the histories of cases of low fever, in which the practice was either expectant or inappropriate, as far as the treatment is recorded; the *post-mortem* changes revealing the results, which, by the experienced and observing physician, may have generally been anticipated.

80. The *diet* and *regimen* during the course of the malady constitute the chief part of the treatment, and, as such, have been sufficiently noticed, in respect both of the prevention and cure of the malady. A warm, dry, and pure air (avoiding exposure to cold and wet), and moderate mental excitement, amusement, &c., will contribute very remarkably to the removal, as well as to prevention of scurvy.

[The facts stated by our author with regard to the causes and successful treatment of scurvy may perhaps be so generalized, by careful induction, as to lead to a knowledge of the principles involved. It is very evident that the elements of healthy secretion and excretion must be found in sufficient quantity in the food, or that the fluids will deteriorate, and the health suffer. Every part of the body, the bones, the nervous matter, the muscles, the cellular tissue, &c., each must have those elements supplied in the food, which belong to its normal constitution, as lime, phosphorus, sulphur, potash, &c., or disease will be the consequence. In all cases where scurvy has existed, some of these elements have probably been wanting. There must be sufficient protein, oxygen, nitrogen, hydrogen, and carbon for the soft tissues, as well as phosphate of lime for the bones, phosphorus for the brain and nerves, sodium and sulphur for the bile, and iron for the blood, in

order for the due performance of the animal functions. By a process of oxygenation, the various solids and fluids are being constantly thrown off in various forms, as urea, lithic acid, lactic acid, bile, sweat, &c., and they must as constantly be supplied, though the relative quantity may vary with the age and the circumstances in which an individual is placed; more lime and iron, for example, being required in the early periods of life. But the food must supply elements equal to the waste. Now animal food, as well as vegetable seeds, furnish nitrogen in that form which is most easily assimilated; while succulent roots supply the inorganic elements, the alkalis, lime, sulphur, and phosphorus; while the carbonaceous element of the farinaceous substances serves for combustion, and the production of animal heat. Now, under favourable circumstances, it is possible that some of these elements may be wanting in the food, and still the health not appear to suffer; but where other causes co-operate with this, scurvy or some analogous affection is very sure to occur. The constituent wanting may be organic or inorganic. Dr. GARROD has attempted to show that in all scorbutic diets *potash* exists in much smaller quantities than in those which are capable of maintaining health; that all antiscorbutics contain a large amount of potash; that in scurvy the blood as well as urine is deficient in potash; and, lastly, that the disease is effectually cured by the same agent, without making any change in the diet. It is certain that in salt beef and pork, owing to the action of the soda, there is a gradual exosmosis of the potash, and loss of this element; while in milk, fish, potatoes, and in most vegetable juices and fruits, it is very abundant. It also abounds in wine, cider, spruce-beer, wort, the pine, juniper, and spruce, the vegetable acids, and, in fact, in all antiscorbutic articles of food. The *nitrate of potash*, as well as the *bitartrate* and the *oxalate*, have also proved valuable remedies in the disease. The rapidity of the cure will generally be proportioned to the nutritious quality of the food, together with the variety; but in all cases, fresh vegetables, which abound with the salts of potash, are the most beneficial.]

BIBLIOG. AND REFER.—*Hippocrates*, De intern. Affectionibus, edit. Foesii, p. 557.—*Celsus*, lib. ii., cap. 7.—*Pliny*, Hist. Natural., lib. xxv., cap. 3.—*Olaus Magnus*, Hist. Sept. Nat., lib. ix., cap. 38.—*J. Cartier's* Second Voyage, &c., in *Hakluid's* Collection of Voyages, vol. iii., p. 225.—Collection of Voyages and Travels, compiled from the Library of Lord Oxford, vol. iii., p. 808.—*J. Echlinus*, De Scorbuto vel Scorbutica Passione Epitome. 1541.—*B. Roussius*, De magnis Hippocraticis Lienibus, Plin. ut Stomacae ac Sceleribz, seu vulgo dicto Scorbuto Commentarius, &c., 12mo. Antw., 1564.—*J. Wirus*, Medicarum Observationum lib. ii., De Scorbuto, &c., 4to. Basil, 1567.—*A. H.*, On the Scorbic and Cancer: that on the Scorbic, translated out of *Wyer's* Observations, 12mo. (no date).—*J. Echlinus*, De Scorbuto, &c., 8vo. Witteb., 1585. (*Vide Sennertus*.)—*J. Guillemeau*, A worthy Treatise of the Eyes, &c.; together with a profitable Treatise of the Scorbic, 24mo. Lond., 1586.—*E. Heutenbach*, De Scorbuto, 12mo. Viteb., 1591.—*M. Martinus*, De Scorbuto, 8vo. Jenæ, 1622.—*J. Langius*, De Scorbuto Epistola duæ, 8vo. Franc., 1624.—*C. Horn*, Kurzer Bericht von dem fremden, jetzt aber eingreifenden Krankheit dem Scharbock, 8vo. Nürnberg, 1633.—*J. Roeterbeck*, Speculum Scorbuticum, oder Beschreibung des Scharbocks, 8vo. Nürnberg, 1633.—*J. Hartmann*, Præcox Chymiatricæ, &c., De Scorbuto, p. 355, 8vo. Geneva, 1633.—*A. Falconet*, De Scorbuto, 8vo. Lion., 1642.—*L. Riverius*, Præcox Medicæ, lib. xii., cap. 6, de Scorb. Affect. 1640.—*F. S. Feyo*, Trattado de Scorbuto a que o volgo Chama mal de Soneda, 4to. Lisbon, 1649.—Consilium Med. Facult. Hafniensis de Scorbuto, 8vo. Hafn., 1645.—*S. Albertus*, Scorbuti Historia, 4to. Fr., 1654.—*J. Echlinus*, De Scorbuto vel Scorbutico Pas-

sione Epitome, 4to. Franc., 1654.—*J. Langius*, De Scorbuto, 4to. Franc., 1654.—*Sennertus* (et alii), Tractatus de Scorbuto, 4to. Franc., 1654.—*H. Brucaus*, De Scorbuto Propositiones, 8vo. Hag., 1658.—*B. Brunnerus*, De Scorbuto Tractatus, ii, 12mo. Hagae, 1658.—*S. Engulenus*, De Morbo Scorbuto Liber, 12mo. Hagae, 1658.—*J. A. Graba*, Kurzer Unterricht vom Scharbock, 8vo. Erf., 1661.—*E. Maynwaringe*, Morbus Polyrrhizos, or Polymorphus; a Treatise on the Scurvy, 12mo. Lond., 1666.—The Cure of the Scurvy, 12mo. Lond., 1667.—*Uiles*, Observations factæ in quibusdam Scorbuticorum Curationibus, 12mo. Lond., 1668.—*Guyot*, Ergo Scorbutus ab Aquarum Vitio. Paris, 1667.—*J. Schmidt*, Bericht von drey abschœulichen Krankheiten, der Pest, Franzosen und Scharbock, 12mo. Augs., 1667.—*N. Venette*, Traité du Scorbut ou du Mal de Terre, 12mo. Rochelle, 1671.—*G. Charleton*, De Scorbuto Liber Singularis, 8vo. Lond., 1672.—*W. Sermon*, The Englishman's Preservation of the Dropsy, Scurvy, &c., 12mo. Lond., 1673.—*H. Cellarius*, Bericht vom Scharbock, 12mo. Halberst., 1675.—*Debbs*, History of the Ferde Isles, p. 98.—*G. Harcey*, The Disease of London, or a new Discovery of the Scurvy, 8vo. Lond., 1675.—On the Small-pox, with a Discourse of the Scurvy, 8vo. Lond., 1683.—*C. Patin*, Oratio de Scorbuto, 8vo. Pat., 1679.—*T. Willis*, His Works translated by R. L'Estrange, Appendix of Scurvy, fol. Lond., 1679.—*H. Reussner*, Exercitationes de Scorbuto, 8vo. Fr., 1680.—*M. Mackaille*, The Diversity of Salts, &c.; the Scurvie Alchemie discovered, &c., 8vo. Aberd., 1683.—*L. Chameau*, Traité du Scorbut, 8vo. 1683.—*M. Lister*, Sex Exercitationes de Morbis Chronicis (v. de Scorbuto), 8vo. Lond., 1694.—*W. Cockburne*, Sea Diseases, 8vo. Lond., 1695.—*J. Baggart*, Over de Scheurbuyk, 8vo. Middelb., 1696.—*Colbatch*, Essays Medico-Physical, &c., 8vo. Lond., 1696.—*J. Vestling*, Tractat vom Scheurbock, 8vo. Doventer, 1702.—*S. de K. Koester*, De Scorbuto Mediteraneo, 4to. Libini, 1707.—*Baglini*, Opera, p. 17. (*Advised Spruce-beer and decoction of Fir-tops*).—*F. Poupart*, Account of strange Effects of the Scurvy. In Phil. Trans. for 1708.—*A. Fucaini*, The Poor Man's Physician: of Scurvy, &c., 12mo. Edin., 1716.—*S. E. Duccumano*, De Morbo Scorbuto Liber, 12mo. Amst., 1720.—*J. F. Bachstroem*, Observaciones circa Scorbutum, &c. In *Halleri*, Dissert. ad Med. Prac., t. v., 4to. 1734.—*J. G. H. Kramer*, Disputatio Epistolica de Scorbuto. In *Halleri*, Dissert. ad Med. Prac., t. vi., 4to. 1737.—*G. Berkeley*, Siris: A Chain of Philosoph. Reflect. and Inquiries, concerning the Virtues of Tar-water. 1744.—*P. Shaw*, On the Scurvy; Miss Stephen's Remedies, &c., 8vo. Lond., 1738.—*S. Sutton*, Historical Account of a New Method of extracting the Foul Air out of ships, &c., with a Discourse on the Scurvy, by *Dr. Mead*, 8vo. London, 1745.—*C. Alston*, A Dissertation on Quick-lime and Lime-water, 8vo. 1750.—*A. Nitsche*, Beschreibung des Scharbocks in den Russischen Armeen, 8vo. Petersb., 1750.—*A. Addington*, Essay on the Sea Scurvy, 8vo. Reading, 1753.—*J. Huxham*, Essay on Fevers, with an Appendix on Preserving the Health of Seamen, &c., 8vo. Lond., 1750. (*Recommends Cider*).—*F. Hoffmann*, A Treatise on the extraordinary Virtues of Ass's Milk in the Cure of various Disorders, particularly Gout and Scurvy, 8vo. Lond., 1753.—*L. W. de Knoer*, Die über den Mercurium triumphirende Venus, und vom Faul-artigen Scharbock, 8vo. Leipz., 1753.—*J. Lind*, A Treatise on the Scurvy, in three parts, 8vo. Edin., 1753.—*C. Bisset*, A Treatise on the Scurvy, designed chiefly for the British Navy, 8vo. Lond., 1755.—*E. B. J. Rosen*, De Purpura Chronica Scorbutica, 4to. Lond., 1756.—*J. Bona*, Tractatus de Scorbuto, 4to. Verona, 1761.—*J. Travis*, The Use of Copper Vessels in the Navy, a Cause of Scurvy. In Med. Obs. and Inq., vol. ii., 8vo. Lond., 1762.—*C. E. Eadler*, Die längst gewünschte Cur des Scharbocks, 8vo. Hamb., 1764.—*Clergyman*, A Remarkable Cure of an inveterate Scurvy, 8vo. Lond., 1766.—*J. Hill*, On the Power of Waterdock against the Scurvy, 8vo. Lond., 1765.—*Anon.*, Method of Treating the Scurvy at Sea, and use of Wort in it, 8vo. Lond., 1767.—*J. Pringle*, Address to the Royal Society. 1776.—*D. Macbride*, An Historical Account of a new Method of treating the Scurvy, 8vo. Lond., 1767.—*N. Hulme*, Libellus de Natura, Causa Curatioque Scorbuti, 8vo., Lond., 1768. A Proposal for preventing the Scurvy in the Navy, 8vo.; Lond., 1768.—*W. Jercey*, Practical thoughts on the Prevention and Cure of the Scurvy, 8vo. Lond., 1769.—*W. Logan*, Observations on the Effects of Sea Water in Scurvy and Scrofula, 8vo. Lond., 1770.—*J. Morley*, An Essay on the Nature and Cure of Scorbutic Disorders, 8vo. Lond., 1770.—*G. V. Zeciani*, Sopra lo Scorbuto, 8vo. Verona, 1770.—*Dinkgreve*, De Similitudine Indolis Scorbuti et Febris Putridæ. Leyd. Bat., 1772.—*L. Rouppe*, Abhandlung vom Scorbut, 8vo. Götta, 1775.—*E. Salmon*, Scorbutus, in *Linnæi*, Amœn. Acad. t. ix., 4to. Ups., 1775.—*J. Badenoch*, On the Use of Wort in the Cure of Scurvy. In Med. Obs. and Inq., vol. v., 8vo. Lond., 1776.—*J. le Meilleur*, Traité sur le Scorbut, 12mo. Par., 1777.—*C. de Mertens*, Observations on

the Scurvy. In Phil. Trans. for 1778.—*Hell*, Der Zucker, ein neues Preservativ wider den Scharbock, 8vo. Wien., 1779.—*J. Pringle*, In Edin. Med. Comment., vol. iv., p. 313.—*Anon.*, Cursory Remarks on the Nature and Cure of the Marine Scurvy, 8vo. Lond., 1782.—*C. L. Hoffman*, Vom Scharbock, &c., 8vo. Munster, 1782.—*J. Rymer*, Letter to the Commissioners for Sick Seamen on the Means of preventing and curing the Scurvy, 8vo. Lond., 1782.—*J. Sherwen*, Cursory Remarks on the Marine Scurvy, 4to. Lond., 1782.—*F. Milman*, Inquiry into the Source from whence Scurvy and Putrid Fevers arise, &c., 8vo. Lond., 1782.—*J. Edwards*, A short Treatise on Goosegrass, with its Efficacy in the Scurvy, 8vo. Lond., 1784.—*G. Blane*, Observations on the Diseases of Seamen, 8vo. Lond., 1785.—*Murray*, Apparatus Medicam., vol. i., p. 3. (*Recommends Juniper*).—*T. Trotter*, Observations on the Scurvy, with a Review of Opinions, &c., 8vo. Edin., 1785; 2d edit., 8vo. Lond., 1792.—*H. A. Bacharach*, Abhandlung ueber den Scharbock, 8vo. Petersb., 1786.—*W. Brown*, On the Scurvy in Russia in 1785, in Edin. Med. Comm., vol. xii., 8vo. 1786.—*W. Guthrie*, On the Effects of a Cold Climate on Land Scurvy, in *Ibid.*, vol. xii.—*H. A. Bacharach*, Dissertation Pratique sur le Scorbut, trad. de l'Allemand par *Desbouts*, 8vo. Reval., 1787.—*D. Spediciati*, Theoretische und Praktische Beschreibung des Scharbocks, 8vo. Petersb., 1787.—*Brockslesby*, Econom. and Med. Observat., p. 306. (*Cinchona*, &c.).—*J. Dupuy*, Lettre, Quel est le véritable Caractère du Scorbut? 8vo. Aix, 1789.—*F. Thomson*, An Essay on the Scurvy, 8vo. Lond., 1790.—*Dumouret*, Traité le Scorbut, 8vo. Par., 1793.—*Schindler*, De usu Conii maculati et mali Citrei in Scorbuto. Ulm, 1791.—*D. Paterson*, A Treatise on the Scurvy, 8vo. Edin., 1793.—*F. Salea*, De Analogia inter Scorbutum et quendam Febres, 4to. Barcelona, 1794.—*T. Trotter*, Medical and Chemical Essays, containing additional Observations on Scurvy, &c., 8vo. Lond., 1795.—*R. J. Crossfield*, Remarks on the Scurvy among the English Prisoners in France, 8vo. Lond., 1797.—*Cisson*, In Mém. de la Soc. Méd. d'Emulation. An. v., p. 91.—*A. Nitsch*, Abhandlung vom Scharbock, 8vo. Leipz., 1797.—*J. G. Hempel*, Eigene Erfahrungen, &c., vom Scharbocke, 8vo. Kopenh., 1798.—*Colnatz*, Voyage to the South Atlantic, &c., 8vo. Lond., 1798.—*A. Corbelli*, De las Enfermedades internas y externas del Escorbuto, 8vo. Madrid, 1800.—*P. V. Pallois*, Essai sur l'Hygiène Navale: ex l'Hygiène appl. à préserver du Scorbut les Equipages des Vaisseaux, 8vo. Paris, 1801.—*J. C. Jacobs*, Traité du Scorbut en général, 8vo. Bruxelles, 1802.—*C. Balme*, Observations et Réflexions sur le Scorbut, 8vo. Lyon, 1803.—*Jourdanet*, Sur l'Analogie du Scorbut avec le Fièvre Adynamique, 8vo. Paris, 1802.—*B. D. J. Larrey*, Relation de l'Expédition en Egypte, 8vo. Par., 1803.—*H. Millio*, Essai sur le Scorbut qui a régné à Alexandrie en Egypte, 8vo. Par., 1803.—*J. G. Coguelin*, Mémoires sur le Scorbut, 8vo. Par., 1804.—*P. M. Keravrand*, Réflexions sommaires sur le Scorbut, 4to. Par., 1804.—*F. von Schraud*, Nachrichten vom Scharbock in Ungarn im Jahre 1803, 8vo. Wien., 1805.—*Lanaothe*, Dissertationes in Scorbutum, &c., 8vo. Mantue, 1807.—*J. Anderson*, Journal of the Establishment of Nopal and Tuna, for the Prevention and Cure of Scurvy, 8vo. Madras, 1808.—*W. Heberden*, Some Observations on the Scurvy. In Med. Trans. of College of Phys., vol. iv., 8vo., Lond., 1813.—*C. Balme*, Traité Historique et Pratique du Scorbut chez l'Homme et les Animaux, 8vo. Lyon, 1819.—*R. W. Bampfield*, A Practical Treatise on Tropical and Scorbutic Dysentery, with Observations on Scurvy, 8vo. Lond., 1819.—*J. Cloquet*, In Archives Génér. de Médecine, t. i., p. 470.—*Fodéré*, Dict. des Sc. Méd., art. *Scorbut*, t. i. Par., 1820.—*Fersari*, in Journal des Progrès des Sciences Médicales, t. iii., p. 146.—*P. M. Latham*, Account of the Disease at the General Penitentiary, 8vo. Lond., 1825.—*Rochoux*, Dict. de Méd., t. xix., 8vo. Par., 1827.—*Da Olmi*, Précis d'Hygiène Navale, suivi d'un Recueil des Ferits sur le Scorbut, &c., 8vo. Par., 1828.—*W. Kerr*, Cyc. of Pract. Med., vol. iv., p. 678. Lond., 1834.—*D. Macnab*, In Transactions of the Medical and Physical Society of Calcutta, vol. viii., p. 101.—*J. M. Gregor*, In Medical Gazette, May, 1837, p. 234.—*B. Durt*, In Med. and Phys. Trans. of Calcutta, vol. iv., p. 16; also various Communications in *Ibid.* vols. iii., vii., and viii., and Quarterly Journal of Med. and Phys. Soc. of Calcutta, vol. i.—*Murray*, In Med. Gazette, vol. xx.—*G. Budd*, In Library of Medicine, vol. v., p. 58.—*R. Christison*, On Scurvy, In Edin. Monthly Journal of Medical Science, June and July, 1847.—*C. Ritchie*, In *Ibid.* July and August, 1847.—*H. Lonsdale*, On Scurvy in Cumberland, in *Ibid.*, for August, 1847.—*A. B. Garrod*, On the Nature, Cause, and Prevention of Scurvy, in *Ibid.*, January, 1848, p. 457.—*T. Shapter*, On the recent Occurrence of Scurvy in Exeter, in Medical Gazette, vol. xxxix., 1847, p. 945.—*A. Fawcett*, Sur le Scorbut observé à la Salpêtrière en 1847, &c. In Archives Génér. de Médecine, t. xiv., p. 261.—*O. Curran*, On Scurvy, in Dublin Quarterly Journal of Medical Science, N. S., vol. iv., p. 83. 1847.—*J. M. Foltz*, Report of Scorbutus as it



appeared in the United States Squadron in the Gulf of Mexico in the Summer of 1846. *American Journal of the Medical Sciences*, January, 1848, p. 38; also, *British and Foreign Medico-Chirurgical Review*, vol. ii., p. 439.

[AM. BIBLIOG. AND REFER.—O. B. Bellingham, On Scurvy, as it prevailed in Ireland in 1847. *Am. Jour. Med. Sci.*, N. S., vol. xiv., p. 455. From *Dubl. Med. Press.*—Ed. Coale, Notes on the Scurvy, as it appeared on board the United States frigate Columbia, 1838, '39, '40. *Am. Jour. Med. Sci.*, N. S., vol. liii., p. 68. —S. Fovry, On Scorbutus, which prevailed in the United States Army at Council Bluffs and St. Peter's, *Ibid.*, N. S., vol. iii., p. 77, and vol. ii., p. 330. Also, in "The Climate of the United States."—Wood, *Practice of Medicine*. Phil., 1849.

See *Braithwaite and Ranking's Abstract* for 1848, '49, '50, for several valuable articles on Scurvy.]

## SEROUS AND SYNOVIAL MEMBRANES.—

SYN.—*Membranes séreuses*, Fr. *Seröse Häute*, S. *Ueberzüge*, Wasser-häute, Ger. *Membranes synoviales*, Fr. *Synovial-kapseln*, *Synovial-häute*, Ger.

CLASSIF.—See art. PERITONEUM, PLEURA, &c.

1. The pathology and diseases of serous and synovial membranes have been so fully considered in the articles PERITONEUM, PLEURA, BRAIN, MEMBRANES OF, that a description of the organic changes presented by these membranes would be only a repetition of what has been already stated under these heads. As respects these changes, whether those consequent upon the several states of inflammation, or those arising from constitutional causes or vice, and altogether independent of inflammation, I believe that they will be found to be more fully described at the places now referred to than any where else. Since these articles were written, the very excellent works of ROKITSANSKY, and the able treatise of Dr. BRINTON on the pathology of serous and synovial membranes have appeared; but, after attentively perusing these, I find nothing that requires to be added, at this place, by way of appendix to the articles just enumerated. Indeed, there is one lesion, or rather ultimate change, consequent, in rare instances, upon chronic peritonitis and chronic pleuritis, lately seen by me in these maladies, which is not noticed by either of these writers, viz., the complete degeneration of the greater part of the organized exudation, false membranes, or adhesions produced by these diseases, as well as by chronic inflammation of the serous membrane of the spinal marrow, into fat. This ultimate change, observed by me in these three situations, in old or very chronic cases of these maladies, appeared to be not merely a far-advanced change, but also a reparative one, admitting of a partial return of the functions of the parts adjoining. (See art. PLEURA, § 100.)

2. The contractions, also, produced in cases of chronic inflammation of the peritoneum, described by Dr. HODGKIN and myself, have also not been mentioned by these writers. (See art. PERITONEUM, § 116.)

3. It is almost unnecessary to state that the organic changes met with in the membranes usually denominated serous occur also in those commonly termed synovial, their intimate structures being alike, although their connexions are different.

BIBLIOG. AND REFER.—See the *Bibliography and References* to the articles PERITONEUM, PLEURA, and BRAIN, MEMBRANES OF, &c.; also, C. Rokitsansky, *Anatomic Pathologie* (see: transl. by C. H. Moore, vol. iii., p. 17, at seq.—W. Brinton, *Cycloped. of Anatomy and Physiology*, vol. iv., p. 538.—G. Williamson, *Catalogue of Preparations*, &c., in *Morbid Anatomy*, &c., in the Museum of the Army Medical Department, Fort Pitt, Chatham, 8vo. Lond., 1845,

p. 92, 105, et pluries.—E. Stanley and J. Paget, *A Descriptive Catalogue of the Anatomical Museum of St. Bartholomew's Hospital*, vol. i. Descriptions of Specimens illustr. of *Pathological Anatomy*, 8vo. Lond., 1846, p. 88, 193, et pluries, &c.—W. Coulson, *On Diseases of the Hip-joint*, 2d edit., 8vo. Lond., 1841.—B. C. Brodie, *Pathological and Surgical Observations on Diseases of the Joints*, 5th edit. Lond., 1850.—J. Copland, *Of the Causes, Nature, and Treatment of Palsy and Apoplexy; of the Foris, Seats, Complications, and Morbid Relations of Paralytic and Apoplectic Diseases*, 8vo. Lond., 1850, p. 62.

## SHOCK, VITAL OR NERVOUS.—SYNON.—

*Sudden sinking of Vitality; Vital Depression; Nervous Shock, Nervous Depression, Fatal Sinking, &c.*

CLASSIF.—I. CLASS, I. ORDER (Author).

DEFINIT.—*Sudden or instantaneous depression of organic nervous or vital power, often with more or less perturbation of body and mind, passing either into reaction or into fatal sinking, occasioned by the nature, severity, or extent of injury, or by an overwhelming moral calamity.*

1. A shock, whether physical or moral, may present any grade of severity, from merely a slight but sudden depression of the vital functions to the rapid extinction of these functions. From its slighter forms, the powers of life react sooner or later, especially when judiciously aided; but its more intense states are either removed with great difficulty, or they proceed, with various rates of celerity, to a fatal issue; the vital sinking increasing more or less rapidly, and extending from the organs more strictly vital to all other parts—from the seat of injury to the solar ganglion, and thence to the heart, respiratory apparatus, brain, spinal chord, muscles, and senses—until the functions of all are extinguished. *Vital shock* varies, not only in severity and fatal tendency, but also somewhat in its phenomena, according to the constitution and vital energies of the sufferer, and the nature of the cause.

2. Although the effects of shock have been recognised by most observing persons, even by the uneducated, yet they have received extremely little attention from medical men; they have not been noticed, either in medical or in surgical writings, excepting very casually in some surgical works; and I believe that they are now treated of for the first time in a systematic medical work.\* It is necessary to distinguish shock from concussion; for, although concussion, whether of the head or of the spine, is generally attended with more or less of vital shock, still concussion concerns chiefly the functions of either the brain, or spinal chord, or of both, according as the injury is directed to either or both of these quarters. The severity and danger of shock depends not upon the amount of pain produced, but rather upon the suddenness and violence of the injury, relatively to the amount of vital resistance; for when a cannon-

\* The diseases of the CÆCUM and its Appendix were fully described, and their treatment pointed out in this work, long before they received any adequate attention elsewhere. Some years afterward, papers were published on that subject in the Transactions of the Medical and Chirurgical Society; and the learned author of these papers commenced with the veracious statement that the subject had never engaged the attention of any previous writer, although the comprehensive article on the subject in this work is sufficiently extensive to make a small volume. It was then in the hands of many thousand readers. It is to be hoped that the present article may receive attention, but not quite similar attention, especially from surgical readers, whom it more especially interests. "*Si eos non vobis*," &c.

ball, or any other ball, carries off a limb, or does other fatal injury, pain is not produced, but the vital shock is extreme, the general depression, or vital sinking, often passing rapidly to dissolution.

3. Pain of itself rarely occasions, although it may accompany shock, and, when it does, it generally tends to diminish shock, and to develop reaction. Pain and shock are often associated in injuries and surgical operations; but the former is an endowment tending to the protection of life, to the counteraction of the effects of shock, and to the development of a salutary vital reaction. The severest or most prolonged pain does not occasion vital shock, but it causes vital exhaustion, sometimes even sleep. This was proved by the tortures of the rack in former times, and by the history of the most painful affections. When pain attends severe injuries and operations, the patient sinking more or less speedily, the result should be imputed to the influence of the shock on the constitution, and not to the pain, which is merely unavailing in counteracting the fatal result. This view of the subject, I am aware, is very different from what is generally taken; but a more intimate consideration of the phenomena than has hitherto been entertained will show its truth. The importance of this topic is remarkably heightened, at the present day, by the circumstance of anæsthetics being so generally employed during operations, and even during parturition; for, if the view I now take be just, the shock to the constitution, or vital influence, by severe operations, or by a severe labour, will be increased by annihilating the preservative influence of pain; and the immediate as well as the more remote effects of shock will be thereby more or less increased.

4. In the article Poisons, I have shown the effects produced by the *inhalation of chloroform and ether* (§ 615, 616). It may be useful to view these effects in connexion with those produced by dangerous or fatal injuries, and to contrast them as far as they admit of contrast. It will be seen, by observing the progressive effects of chloroform, that it paralyzes sensibility, and subsequently, as its influence extends to the medulla oblongata, it more or less paralyzes the respiratory functions, and ultimately the heart itself, if its inhalation be continued sufficiently long to produce this effect; the functions of the brain, of the medulla oblongata, and of the ganglial system, being successively extinguished. The effects of fatal shock are similar as respects the sinking and extinction of the functions of these several organs, but they present a different order of procession, as will be more fully shown hereafter, the ganglial and cerebro-spinal functions being successively affected. Now, as the effects produced by the inhalation of chloroform are depressing as well as anæsthetic, and as shock is also depressing, although in a somewhat different manner, must it not be reasonable to infer that the shock will be more severe and dangerous, *cæteris paribus*, during the influence or effects of chloroform, than when the frame is unaffected by this agent, and when pain exerts its influence, and develops a salutary vital resistance? In this matter the ascertainment of truth is my object. I reason from my own observation, as far as it has extended, and I leave this part of my subject to

those who have had, or may have, a more extensive experience of the phenomena to which these remarks apply.\*

5. Shock produces effects of various grades of severity, according to the health, or the states of depression or of excitement the individual may be in at the time of sustaining it. Thus a person of a powerful constitution is much less affected by it than a delicate, nervous, or melancholic individual. A state of excitement, anger, passion, &c., to a certain extent, counteracts its effects, while fear, grief, or any of the depressing passions, increase its effects. Even pre-existing disorder, or structural change, renders these effects more dangerous or severe, especially organic change of the structure, or of the cavities or valves of the heart. These are important circumstances as respects persons for whom severe operations may be required, and should be kept in recollection when such operations are about to be determined on. While the *severity* of shock is thus influenced by constitution, temperament, states of mind, and existing disorder or actual organic disease, the *phenomena* constituting shock are also modified, by these circumstances, in a more or less remarkable manner. The intensity, as well as the modifications of the phenomena of shock, is very remarkably influenced, or even in great measure occasioned, by the state or amount of alarm produced in the mind of the sufferer by the injury causing the shock; this is the more remarkable in severe wounds and other injuries.

6. From these considerations, it will be readily inferred that the *symptoms* or *phenomena* of shock will vary more or less in different cases, according as one or several of these modifying causes are in operation; and that, while certain of them may be wanting in some instances, the whole may be differently grouped, or may appear in varied succession, in most cases.

7. I. PHENOMENA OF SHOCK.—The *symptoms* of shock vary with the severity or intensity, and nature of the *cause*, and the state or constitution of the recipient. The *causes* of shock are chiefly, 1st. Contusions, bruises, blows, and concussions; and these vary in their effects, according to their situation upon or near vital or

\* [We believe that *anæsthetics* not only annul *pain*, but also *prevent the shock* which the system would otherwise sustain during a severe surgical operation. They produce such an impression on the nervous centres, or so modify their functions, that causes which in a normal condition excite pain, or rapidly exhaust nervous energy, produce comparatively no effect. This may partly be owing to their influence on the mind, removing all fear and mental alarm; but it is not wholly due to this cause. In order that shock should be felt, the functions of the nervous system must be in a normal state, or the seminal powers active. If a limb, for example, be amputated, or an extensive burn be inflicted during deep intoxication, *from any cause*, no shock will be experienced, any more than pain. We lately had an opportunity of observing this in a man who had both feet burned off during a state of intoxication. There were no apparent symptoms of shock whatever. So, also, the statistics of capital operations, both in European and American hospitals, show that the average mortality from shock, occasioned by such operations, has been greatly diminished since the introduction of anæsthetics into surgical practice. Their pre-eminent value consists, indeed, in their preventing shock. If they have this effect, and that they do is sufficiently proved by facts of daily occurrence, even granting that the effects of chloroform are temporarily depressing, the danger of a fatal result is not enhanced, but greatly diminished by its use. Pain, within certain limits, may be conservative; beyond these it rapidly exhausts nervous energy and the vital force, and co-operates with shock in inducing a fatal result.]



important organs, as when they are seated over or near the epigastrium, the cranium or neck, the joints, the spine, &c. 2d. Gun-shot wounds, by which large nerves, blood-vessels, or important viscera, or joints, or large bones, are more or less injured. 3d. Penetrating or incised wounds, or surgical operations, implicating these or other parts. 4th. Simple or compound fractures, dislocations, lacerations, or lacerated injuries of all kinds; and, 5th. Mental alarm or terror, or shocks from the sudden or unexpected intelligence of losses of near relations, of friends, of wealth, of honour, or of worldly consideration, or intense fear or dread of some calamity. In many of the preceding classes of causes of shock, mental alarm or dread—the mental shock—greatly increases the effects of the physical shock upon the vitality of the frame, and especially on the manifestations of life in the nervous system; so that, in estimating the amount of the latter, care should be taken not to overlook the existence and intensity of the former—of the mental alarm or shock.

8. Now, although these several classes of injury, with their frequent attendant, mental alarm or shock, may be supposed to produce varied effects, yet such is not always the case; for so much may be owing to the severity, as well as the nature of the cause, relatively to the state and constitution of the sufferer, that the phenomena consequent upon the one class may hardly vary from those following the others. So much, however, is often observed to depend upon the viscera and parts injured, and upon the loss of blood, and the amount of that loss, as well as upon the intensity of mental alarm, as to render it necessary to connect the shock and its intensity with the nature and severity of the cause or causes which produced it. For, according to the cause, (1st) the shock may be altogether and simply a vital one, as when it is produced by a violent blow on the epigastrium, occasioning concussion of the solar ganglion; (2d) or it may be associated with various nervous phenomena, as when a large nerve, or joint, or limb, is lacerated or severely injured, and the patient thereby greatly alarmed; (3d) or it may be complicated with, or rather characterized by, comatose sinking, as when the contusion, concussion, or blow effects the intimate organization and circulation of the brain; (4th) or it may be so associated with the sinking, consequent upon losses of blood, as not to be distinguished from this cause, especially when the injury is such as occasions both shock and hæmorrhage; or (5th) the alarm or shock may be entirely a mental one, or that consisting entirely of the sudden effects of extremely depressing emotions on the action of the heart, or of the sudden and unexpected intelligence of distressing losses or events, whereby the nervous system is more or less shocked, the mental manifestations disturbed, and the functions of the heart and vital organs depressed and otherwise disordered.

9. It will thus be perceived that the injuries or causes occasioning shock may be divided into *five classes*, and that the effects they produce may present *five modified forms*; but, although either of these may result from either class of causes, and although it is necessary to connect our observation of the phenomena, and our

treatment of shock, with the particular cause of it, it is still more important, especially as regards the treatment, to mark the particular form and modification requiring our aid.

10. (a) The *simple* or more *vital states* of shock may be so slight as to pass off in a few hours, or so severe as to terminate fatally in a few minutes, according to the intensity of the cause. This effect may be altogether independent of any hæmorrhage, and may result from a variety of causes. A violent blow or contusion over or near the epigastric centre may so paralyze the heart as to produce more or less sinking, not only of the action of this organ, but of all the vital functions; the *symptoms* being chiefly feebleness, slowness, or irregularity of the pulse; coldness and pallor of the face, general surface, and extremities; a distressing feeling of sinking and anxiety; slow or irregular respiration; sometimes cold perspiration, with general tremour; and a sunken or collapsed state of the countenance, terminating, more or less rapidly, in loss of pulse at the extremities and in the carotids, and in extinction of sensation, of the heart's action, and of respiration. In some cases, especially when the injury is less intense, or when a large joint is very severely injured or crushed, these symptoms may not be so intense, may be of longer duration, and be attended by others, as vomiting, singultus, or by restlessness, by feelings of alarm and anxiety at the epigastrium; and, according to the nature and severity of the cause, relatively to the state of the sufferer, these symptoms may lapse into fatal sinking, or be followed by imperfect efforts at reaction, or by delirium, or by reaction, terminating ultimately either in coma and death, or in recovery, according to the constitution of the patient and the treatment adopted.

11. (b) With more or less of the above symptoms, others may supervene, or may be present from the first, more especially when a limb is carried away by a cannon-ball, or when it is lacerated extensively, or near to the trunk of the body, or when large blood-vessels or nerves are lacerated, or large joints are crushed. In these circumstances, as well as in others, especially in nervous and irritable temperaments, various *nervous symptoms*, especially mental alarm and restlessness; irregularity of the heart's action and of respiration; a terrified, as well as a sunk state of the countenance; delirium, terror, and incoherence; a general tremour and coldness; a remarkable and peculiar tremour or quivering of the injured limb, with a cold, wet, pallid, or leaden state of the surface of the limb, or parts adjoining, are more or less remarkable, and seldom terminate in a salutary reaction, unless in a few cases which admit of surgical interference by amputation, &c. When severe injuries are inflicted upon any part of the abdominal cavity, a state of stupor or apathy, yellowness of the surface of the body, collapsed features, and fatal sinking, as already described (§ 10), either appear from the first, or supervene upon the symptoms just enumerated. In most of these severe injuries, and especially those produced by fire-arms, the amount of pain is very small compared with the intensity of the shock; and even where the shock is the greatest, the pain may be the least, or may even be entirely absent. Indeed, in many cases, the pain precedes the occurrence

of reaction, and even favours the development of this salutary effort of nature.

12. Although surgeons have neglected to treat specifically of *shock*—a state which particularly concerns them, as respects both the period and the prudence of operating, and the effects of operations—the subject has been briefly adverted to by many, and especially by LARREY, GUTHRIE, COPLAND HUTCHISON, DUPUYTREN, and HENNEK. It falls not within the scope of this work to notice the remarks they have offered respecting it; but what they have advanced, which is extremely little, will be readily found in the works of these celebrated surgeons.

13. (c) Injuries may be received directly or indirectly by the brain or spinal marrow, so as to produce a form of shock, which has been generally termed *concussion of the brain*, or of the *spinal chord*, as either may be affected. In such cases, with more or less shock to vitality or to the frame, there is a special shock sustained by these nervous centres, the minute or ultimate organization and circulation of these parts being so changed or affected as to instantly arrest all the functions they perform. With the phenomena of shock, as manifested in its more simple form (§ 10), unconscious fecal and urinary evacuations, sometimes with vomitings, are also present. When the injury thus implicates the brain, or upper portion of the spinal chord, the annihilation of the functions of those parts especially distinguishes the case, although the marked and often rapid sinking of the heart's action, or the paralysis of the respiratory muscles, farther characterizes it, either of these being the more immediate cause of dissolution.

14. (d) Cases often occur in which the shock is heightened by, or complicated with, either *internal*, or *concealed*, or *open hæmorrhage*. In these the symptoms of simple shock (§ 10) are more or less manifest, with great pallor of the surface, often with coldness and tremour, sometimes with succussions, or shudderings, or vomitings, passing into deliquium, or fatal sinking, especially when attempting to sit up. The action of the heart then ceases, and with it respiration; the cerebral functions either being but slightly disturbed, unless shortly before death, or ceasing in a way not to be distinguished from the accession of sleep, excepting in the rapid failure of the pulse and respiration. In the less severe cases of this kind, reaction may supervene, and recovery take place, when the nature of the injury causing the shock and hæmorrhage, and the consequences of both, admit of this issue.

15. (e) The *fifth form* of shock depends more or less on mental causes of an intensely depressing nature. The physical effect may be entirely owing to the mental cause, or partly owing to this cause, or to alarm or dread of dissolution in connexion with a physical cause, as in cases of gun-shot or other wounds, severe injuries, operations, &c. In these latter cases, the causes are both physical and mental; and the phenomena present a mixed character, more or less of mental alarm or of nervous phenomena, such as are above noticed (§ 11), being associated with physical depression—the symptoms of either the *first* or the *second* of these forms predominating with fright, anxiety, or most manifest alarm and distress, or of absolute ter-

ror, or even delirium, sometimes, in females, with hysterical convulsions, prolonged faintness or catalepsy. In this form of shock, the strength of mind, the nervous energy, or force of character of the sufferer, modifies remarkably the amount or intensity, as well as the particular form or state, of the physical effect; for the same intensity of cause, which might make but slight impression on a person thus mentally constituted, or on one physically robust, might produce a very dangerous effect on a delicate, nervous, and susceptible individual; this effect being, moreover, often attended by faintness, convulsions, incoherence, &c. Mental shock is more especially depressing and dangerous to persons who are the subject of organic diseases of the heart or brain—of the former particularly—death often immediately following it.

16. II. The DIAGNOSIS and PROGNOSIS of SHOCK require but little remark.—A. Of the *former* it may be observed, that it is often difficult to determine whether or no a fatal result be owing to the immediate physical shock and mental alarm which an injury or operation produces, or to the consecutive effects on the frame, either by interrupting some important or vital function, or by contaminating the blood. True or simple shock is always instantly manifested on the cause producing it; it is generally attended by nearly all the symptoms already enumerated, by more or less mental alarm, and by a sensation of sinking and anxiety referred to the epigastrium and præcordia, sometimes with vomitings, characterized by slight or even no effort, or with unconscious or involuntary evacuations, and a universal failure of all the vital functions. In some of the most severe cases of physical shock, instead of mental alarm, there is either delirium, or stupor, or apathy.

17. B. The *Prognosis* depends entirely upon the nature of the cause or injury, and the intensity of the effect indicated by the symptoms. Great slowness or weakness of the pulse; or great frequency, with feebleness or irregularity; marked coldness, pallor or leaden hue of the surface; tremour, cold perspirations, vomitings, singultus; irregularity of the respiration; continual restlessness; a sensation of sinking or of impending dissolution; delirium, apathy, or stupor; involuntary evacuations; a jaundiced appearance of the surface; rapid failure of the pulse, &c., are all very dangerous, and often fatal symptoms. When the phenomena are less severe, and when the means employed are successful in bringing about a salutary reaction, or even in diminishing the severity of those now mentioned, then hopes of a recovery may be entertained. But so much depends upon the nature and peculiarities of the case, upon the patient's feelings and opinions as to the issue, which should always be duly considered, and upon the progress and contingencies of the after-treatment, especially for complicated injuries, as hardly to admit of definite laws of prognosis being assigned.

18. Many of the injuries which occasion severe shock involve the questions, 1st, as to the propriety of amputating a limb, or shattered or torn stump; and, 2d, as to the period at which this operation should be performed. The first of these questions has been satisfactorily considered by surgical writers; but the second has been long a subject of discussion, many writers



of experience taking different views of the matter. The differences of opinion, as well as of success, as regards the period, after these injuries, at which the operation should be performed, have arisen from the want of due attention to the existence or non-existence of the more marked phenomena of shock at the time of performing the operation, and from recourse having been too frequently had to it before these phenomena had subsided, or before the frame had recovered itself, either partially or more fully, from the shock it had experienced—before vital reaction had commenced; for, if a few hours be not allowed for this purpose before the operation be attempted, the performance of it so rapidly upon the receipt of the injury may convert a state of shock, admitting of vital reaction, into a state of fatal sinking; or, if the vital energies continue to sink more and more, during the few hours thus allowed for them to rally, notwithstanding a recourse to rational means to this end, an operation will only add to the patient's suffering, and accelerate the fatal issue.

19. III. TREATMENT OF SHOCK. — *The treatment of the more simple states* of physical shock (§ 10) should be appropriate to the intensity or apparent danger of the symptoms. In the *slighter forms*, warm diluents, the application of external warmth, the allaying of mental alarm, a cheerful confidence evinced by the attendants, and a moderate recourse to gentle stimuli or restoratives, such as camphor, ammonia, ether, &c., in small doses, are generally all that may be required. But, in *severer or dangerous cases*, a more assiduous and a more liberal recourse to these means is absolutely necessary, and should be continued until indications of commencing reaction appear. In these, as well as in others of more imminent danger, even an assiduous and a decided use of these means may be insufficient to bring about the desired effect; and others must be brought to their aid. In these cases, more especially, the existence of mental alarm should be taken into account, and where it is inferred—for it may exist without being made apparent—the patient should be assured and encouraged. In all cases of a severe and dangerous nature, and where the occasion admits of having recourse to the means, the patient should be placed in a bed previously well warmed, and two young persons, according to the sex which may be proper, ought to be placed close to him, one on each side, without any intervening covering; and warmth should be promoted by sufficient bed-clothes. In some countries, it has been customary to apply animal heat in a different way, namely, by the skins of animals, torn from their bodies instantly on their being killed, and the internal surfaces applied directly to the patient's body, or even the opened bodies of the animals themselves, while still warm. I have seen these means employed, and certainly with greater success than I expected. In cases of shock from blows or contusions on the abdomen, or near the epigastrium, these means are appropriate, and their success admits of rational explanation.

20. In some cases, a stimulating or medicated warm bath may be tried, salt, mustard, &c., having been added to the water. I do not, however, consider these as efficacious as animal warmth applied in either of the ways just men-

tioned; and I have generally preferred to warm baths, as being more efficacious, more immediate, and attended with less trouble and fatigue, or exertion, on the part of the patient, the application of flannels, wrung as dry as possible out of very warm water, then freely sprinkled with spirits of turpentine, and instantly applied over the epigastrium and whole abdomen, evaporation from them being prevented by dry cloths or oil-skin placed over them. These hot epithems should be continued or renewed until reaction commences, when they, as well as the internal means had recourse to, ought to be discontinued, and the case subsequently treated according to its peculiar requirements.

21. In those cases which present, from the nature of the injury, more or less of the nervous symptoms above noticed (§ 11), various nervine remedies, in addition to those already mentioned, may be employed. In these more especially, and sometimes in others, opium, in certain states of combination particularly, is often of service. In conjunction with camphor, or with ether, or with ammonia and aromatics, it is a most valuable remedy. When delirium is present, camphor is required in full doses; while the addition of opium, or of morphia, soothes the irritability, and allays the restlessness sometimes present, and diminishes the mental alarm. But when delirium occurs, its passage into coma should be dreaded, and opium and other narcotics should be used with caution, and only in combination with camphor and other restoratives and antispasmodics.

22. When the hæmorrhage caused by injuries is so great as to increase the vital sinking attendant on shock, and especially when it increases the alarm of the patient, means appropriate to the circumstances of the case should be taken to arrest it. Prolonged faintness, coldness of the surface, and slowness or irregularity of the pulse, require a decided use of the means already mentioned (§ 19, *et seq.*), aided by the exhibition of ammonia, wine, warm, strong coffee, the horizontal position, and the external application of warmth, as already advised (§ 20). If vomitings accompany this or other states of shock, the hot epithems prescribed above should be assiduously employed, and especially if convulsions or spasms of any part be complained of. Effervescing draughts, with the ammonia in excess, with opium, camphor, ether, &c., may also be given, or pills containing creasote, opium, and aromatics.

23. The terror and mental alarm, often increasing the physical shock in most cases of severe injury, should be combated by the confidence and encouragement of the medical attendants, by a recourse to opium, ammonia, ether, mulled wine, &c. The states of mental shock, produced by sudden and alarming moral causes, may occasion so severe physical effects as to require similar means to those already advised. Faintness, more or less prolonged or repeated, or hysterical convulsions, or spasms, or delirium, may complicate the physical depression, and require the exhibition of diffusive stimulants, conjoined with antispasmodics and anodynes. In cases of general shock, from concussion of the brain or spine, the internal use of stimuli may not be required, and it should at all times be administered with caution. The turpentine epithem (§ 20) may, however, be applied

along the spine, when it is the special seat of shock, or even around the cranium, when the concussion implicates the brain, and an enema may be administered containing asafœtida, with a moderate quantity of camphor. But a recourse to these or other means should depend much upon the states of the pulse, and of the sensorium, at the time.

24. The external or local means must be left to the judgment of the medical attendant. Cold applications ought not to be made to the seat of injury, as long as coldness of the surface, collapse of the features, and failure of the pulse exist. They will not only aggravate these symptoms, but also increase the anxiety, sinking, and pain at the epigastrium, and the general restlessness and distress. Warm fomentations, with a decoction of poppy-heads, especially if much pain be experienced, or warm embrocations containing some preparation of opium, will generally afford some relief.

25. The injury, especially those produced by gun-shots, severe compound fractures, lacerations, &c., may require the removal of the limb. In this case, if the phenomena of shock produced by the injury be severe, this operation should not be performed until the constitution shows indications of rallying, either by the efforts of nature—owing to the vital resistance in less severe cases—or by the means above recommended. A few hours should be allowed for this purpose—often not more than two or three—seldom more than eight or ten hours; for if, at the termination of this longer time, reaction has not commenced, and more especially if the vital depression has increased, the additional shock produced by the operation may rapidly terminate life. It will be better, therefore, to persevere somewhat longer in the use of the means advised for rallying the powers of life, and to increase the doses of these means, always with due reference to the previous habits of the patient, than to attempt an operation which will be of no avail.

26. As soon as indications of *vital restoration* or of *vascular reaction* appear, the means resorted to for attaining this end should be relinquished; and gentle diaphoretics be given with the view of equalizing the circulation and removing internal congestions, which are apt to occur during the vital depression caused by the shock. If the reaction be such as is attended by heat and dryness of skin, full or strong pulse, thirst, &c., cooling diaphoretics, purgatives, and even blood-letting, especially if the previous loss of blood has been inconsiderable, should be prescribed; and these should be aided by such local means, in cases of severe injury, as their nature may require.

27. The reaction following mental shocks, especially in nervous, susceptible, and delicate persons and females, is apt to be followed by *delirium* or *fever*, sometimes by *phrenitis* and inflammation of the brain or its membranes, on either of which *coma* is liable to supervene, and similar consequences may follow concussions of the brain or spinal marrow; in such circumstances, the treatment recommended for these diseases, under their respective heads, should be adopted. (*See articles* BRAIN and its MEMBRANES, INFLAMMATIONS of; also DELIRIUM, COMA, &c.)

28. In some instances, instead of either a

salutary reaction, or increased or inflammatory action of the nervous centres, or their membranes, the shock, whether mental or physical, degenerates into a low, incoherent, or muttering *delirium*, passing more or less rapidly into *coma* (§ 27). In these circumstances recovery rarely takes place; but, nevertheless, a strenuous recourse to the restorative means already mentioned, such as frequent doses of camphor or ammonia, terebinthinate epithems on the scalp and epigastrium, stimulating enemata, &c., should not be neglected. (*See arts.* DELIRIUM and COMA.)

BIBLIOG. AND REFER.—I am not acquainted with any work or treatise on vital or nervous Shock, and but few writers notice it incidentally, far less describe it, or advise a treatment suitable to its several states. I have treated of Shock in this work, because I consider it a most important and dangerous affection, implicating more or less the whole vital and animal functions, and hence coming strictly within the province of the physician, as well as within that of the surgeon. When we consider that, of the numerous accidents and wounds which cause death, the greater proportion produce this effect by the severity and suddenness of the shock to the vitality of the frame, rather than by any interruption to the functions of the injured part, the interest of this subject will appear in its true light. The principal works in which it is incidentally mentioned are the following: *Larrey*, Mém. de Chirurg. Militaire, 4 tomes, 8vo. Paris, 1812–1817.—*G. Guthrie*, On Gun-shot Wounds of the Extremities, 3d ed., 8vo. London, 1827; and on Wounds and Injuries of the Abdomen and Pelvis, 8vo. London, 1847.—*J. Hennen*, Principles of Military Surgery, 2d ed., 8vo. Edin., 1820.—*A. Copland Hutchison*, Practical Observations in Surgery, 2d ed., 8vo, 1836; and Observations on the Period for Amputating in Gun-shot Wounds, 8vo. London, 1817.—*Dupuytren*, Leçons Orales de Chirurg. Clin., t. ii., art. 7; t. iv., art. 7, et 14.—*S. Cooper*, Surgical Dictionary, 7th ed., 8vo. Lond., 1838, p. 650.

SKIN.—SYNON.—*Integuments*; *Integumental Sac*, or *envelope of the frame*; *Cutis*, *Corium*, *Derma*; *die Haut*, *das Fell*, Germ. *Peau*, Fr.

CLASSIF.—GENERAL AND SPECIAL PATHOLOGY—SYMPTOMATOLOGY.

1. I. FUNCTIONAL ALTERATIONS.—The *skin*, or integumental sack or covering of the body, discharges more important functions than have commonly been imputed to it. I long ago, and more recently in various parts of this work, endeavoured to prove that the skin performs offices of a very high order in the economy; that through it effete and excrementitious matters are carried out of the blood, and that in this respect, as a depurating organ, it aids the functions of the kidneys, of the large bowels, and of the lungs; an impairment of the functions of either of these being often attended by a vicarious increase of its actions. It is thus an eliminating organ, contributing to the depuration of the blood, generally to an extent more or less intimately related to the amount of function performed by the other emunctories. That the skin performs a vital action, consisting of an insensible and a sensible exhalation, the amount of either depending much upon the state of the atmosphere, is generally admitted. Increased transpiration may proceed from a variety of causes, and so may diminished transpiration; and either, in its more manifest states, is an important indication of disorder. The insensible perspiration may become sensible, owing only to a mild, warm, or humid state of the air; while the perspiration may not only be insensible, but this state of it may be much increased, by more or less evaporation of the fluid in the skin by great dryness of the air.

2. A. When the halitus, or transpiration of



the skin, exceeds the evaporation of it in the atmosphere, sweat is formed; but, in addition to the substances contained in the perspiration, carbonic acid is also given out by it. In healthy persons, the skin exhales carbonic acid, nitrogen, and a watery fluid containing small quantities of the following substances: 1st. Matters soluble in ether: traces of fat, sometimes including butyric acid. 2d. Substances soluble in alcohol: alcoholic extract, free lactic and acetic acids, chloride of sodium, lactates and acetates of potash and soda, lactate or hydrochlorate of ammonia. 3d. Substances soluble in water: watery extract, phosphate of lime, and an alkaline sulphate. 4th. Substances insoluble in water: desquamated epithelium, and phosphate of lime with a little peroxyde of iron.

3. Carbonic acid and nitrogen gases are exhaled in constant but in varying proportions. COLLARD DE MARTIGNY states, that they are exhaled in the greatest quantities after meals and violent exertion; and that vegetable food causes an excess of carbonic acid, and an animal diet an excess of nitrogen. It may be regarded, with EDWARDS, that the physical exhalation of the skin is pure water and these gases; and that the organic function of the skin is the elimination of the above substances (§ 2). The proportion and amount of these matters vary much in different races of men. From several experiments, made many years ago on the negro, I found that the gaseous exhalation from the skin, as well as the solid matters contained in the perspiration, especially the former, was much greater in this than in the white race; and that the function of the skin in the former was more decidedly supplementary of that of respiration than in the latter. Indeed, the cutaneous function of the negro race is of a much more decidedly eliminating nature than that of the white race.

4. Besides the perspiration, the skin furnishes, by means of its sebaceous glands or follicles, a substance consisting of stearin, albumen, extractive matter with olein, phosphate of lime, &c.

5. The eliminating function of the skin is suppressed or interrupted in many diseases, especially in inflammations, until suppuration commences, in the early stage of fevers, in scurvy, in diabetes, &c.; while it is more or less augmented in the sweating stage of agues, in some adynamic forms of fever, in pestilential cholera, in acute rheumatism, in the advanced stages of tubercular consumption, in internal abscesses, and in other colligative maladies.

6. *B.* The perspiration may be variously changed in *quality* in several diseases, owing to the contamination of the blood by some specific animal poison, or by the combinations of elements or materials which are usually, in health, eliminated from the blood by the several emunctories, and which, when either of these emunctories become impaired in function, accumulate in the blood, and are evacuated, in different combinations or states, in the cutaneous exhalations. Thus the sweat of rheumatic and gouty persons is generally acid, while in putrid adynamic fever, and in scurvy, it has a putrid odour. The perspiration of persons affected with itch is said to emit a mouldy odour, and that of syphilitic patients has a sweet smell. STARK states, that the sweat of scrofulous per-

sons resembles the odour of sour beer. The perspiration of persons labouring under small-pox or measles, or pestilential cholera, or scarlet fever, is often so peculiar in each of these maladies as to lead to the recognition of the disease by its scent alone. On entering a house in which cholera was present, I have recognised the malady by the odour of the effluvium from the patient before I have seen him. The sweat is not only abundant, but often presents a urinous odour, in suppressions of urine, or other obstructions of the urinary organs.

7. The *lactic acid*, which is the usual free acid of the perspiration, is generally much increased in acute rheumatism and gout, especially the former. DR. PROUT found free *acetic acid* in the sweat of a person in hectic fever. STARK says, that the lactic acid is increased in the perspiration during scrofula, rickets, and various cutaneous eruptions; and both it and acetic acid exist in the sweat of females during their confinements, and even during suckling. The putrid sweat in adynamic fevers probably contains *ammonia*. The *saline ingredients* of the perspiration may be much increased. DR. PROUT observed the skin of a man in dropsy covered with a white crust of chloride of sodium after an abundant sweat. In cases of gout, of urinary concretions and urinary obstructions, the quantity of phosphate of lime, and of other salts, is more or less augmented.

8. *C.* The foregoing consists only of an increase of the *normal constituents* of the perspiration; but *abnormal constituents* may be present. ANSELMINO and STARK assert, that *albumen* may exist in the sweat in rheumatic fever, in putrid, gastric, and hectic diseases. *Blood* has been seen in the perspiration in scurvy, and in putrid and yellow fevers. *Uric acid* and *urate of soda* have been found in the sweat of persons suffering from gout and urinary calculi. *Bilin* and *biliphaein* have been found in the perspiration of jaundiced persons, and sometimes in those labouring under low, bilious, remittent fevers. This secretion has, in rare instances, been seen variously coloured, owing to the existence of certain colouring matters, as cyanurin, &c. *Fat* has been found in the sweat in some colligative maladies.

9. Various *substances, foreign to the economy*, may have been taken into the body and appear in the perspiration, especially sulphur, mercury, iodine and its combinations, indigo, saffron, asafoetida, camphor, &c. But as regards these and various other substances which are carried into the circulation, and eliminated from it by the emunctories, it is difficult to determine, unless by well-planned experiments, how much of this elimination is performed by the skin, or by the pulmonary exhalation, or by the kidneys.

10. II. ALTERATIONS OF APPEARANCE AND STRUCTURE.—i. The *temperature* of the skin varies much in disease, and somewhat in different constitutions and temperaments. It is generally *below* the healthy standard in scurvy, in some states of chronic rheumatism, in paralysis, especially in anæsthetic paralysis, and in pestilential cholera most remarkably. The temperature is very much *increased* in the early stages of most fevers, especially in those characterized by augmented vascular action, and when transpiration from the skin is much diminished or altogether suppressed. In these

cases, more especially in ardent fever and inflammations, and in some states of malignant fever, the skin is not only hot, but it also conveys the sensation of an acrid or burning heat, even above that which the actual rise of temperature should impart. In all inflammations and acute diseases, the heat of skin is increased, especially when the perspiratory functions are interrupted. The temperature of the skin is also greater than natural, when the blood is loaded with excrementitious elements, owing to diminished elimination by the kidneys, bowels, and skin, and more especially when the accumulation of these elements in the blood is attended by febrile or increased vascular action. It is also sometimes increased shortly before dissolution, probably owing to this state of the blood.

11. ii. *The colour of the skin* is variously changed in disease, and this change may be general, or in large patches, streaks, or in small spots or points. The change may consist either in absence of colour, or uncommon pallor, or in a deepening of the tint. All changes of colour arise from the quantity and quality of the blood circulating in the vessels of the cutis vera; or, in the opinion of ROKITANSKY, from the state of the epidermis, especially its inner, or Malpighian layer, from some change in its cells, or from some unusual pigment in them.

12. A. *Pallor* of the skin is owing either to excessive loss of blood, to exhausting maladies, or to the chronic deficiency of red globules observed in spontaneous anæmia, and some states of dropsy. The pallor may be associated with a slightly greenish or etiolated hue, as in chlorosis. It arises, in rare instances, from a congenital deficiency of pigment in the dark races, as observed in Albinos, or from an acquired defect of this kind. This latter change—achroma—may occur in all races, is generally limited in extent, or consists of a number of spots, of various sizes, that gradually spread.

13. B. *Yellowishness* of the skin is one of the most common alterations of colour. The shade may be very pale or very deep, or the yellow may be mixed with green, and even a dark greenish hue may predominate. These shades of colour occur in the different states of jaundice, and are most frequently owing to biliary obstructions occasioned by disease of the liver, or gall-bladder, or of the gall-ducts. Various tints, varying from yellow to yellowish green, to a yellowish blue, seldom uniform in all places, or continuing of the same depth or shade, are observed in the courses of pestilential yellow fever, or hæmagastic fever, when the blood becomes much altered, and resemble the discolorations caused by contusions. This change occurs in large blotches, patches, streaks, &c., and is not limited to any one part of the body.

14. C. A *dark, sallow, or muddied aspect* of the skin is observed at an early stage of typhoid or adynamic fevers, and this appearance often increases as the disease advances. It is owing chiefly to the state of the blood produced by defective organization, or by imperfect depuration by the emunctories. A hue resembling this, but deeper, or inclining to brown, or to brownish yellow, seems to be owing to the deposit in the epidermis of a pigment. It occurs most frequently in spots, or in patches or streaks, very rarely over the whole surface. I have observed it in spots and patches in a lady, who many years previous-

ly was the subject of jaundice. The uniform em-browning of the skin, by exposure to the sun, the spotted stains or freckles—ephelis, and the liver-spots, connected with disorders of the biliary apparatus, or of the uterine functions, are modifications in the colouring matters retained by the epidermis. ROKITANSKY remarks, that the skin sometimes becomes dark, when, with neglect of it and indulgence in alcohol are combined infiltration of the liver with fat, and a tallowy state of the sub-cutaneous layer of fat. The skin in this case feels fatty, soft, and velvety, like that of a negro; its colour proceeds from the deposition of a pigment, containing fat, in the deepest layer of the epidermis—a fact of much interest, owing to the association it evinces.

15. D. *Redness* of the skin occurs in so diversified forms, and with so numerous shades of yellow, blue, brown, livid, copper, or bronze colour, &c., as to elude precise description, unless in affections and alterations of which these colours are pathognomonic. Of the several congestions, inflammations, impetiginous, exanthematous, chronic, and specific eruptions, these colours are severally characteristic. The redness passes into blue, or bluish yellow, even to black, after exudations of blood into the cutaneous tissue; as in the sugillations, ecchymosis, vibices, petechiæ, &c., of scurvy, purpura, maculated and malignant fevers.

16. E. *Blueness* of the skin is the characteristic of cyanosis, which is more or less general, although somewhat deeper in parts which are delicate and vascular, and in the extremities. When it is limited to particular parts, it is usually the result of congestion or of cold. A transient blueness of various parts of the surface has been remarked in rare instances by OTTO; but in small patches or spots this discoloration is not infrequent. A *deep leaden* or bluish tint attends the collapse of pestilential cholera, but it is deeper on some parts than in others, especially shortly before dissolution. It also appears, in a slighter degree, in the face and extremities, in threatened asphyxia from congestive pneumonia, general bronchitis, hydrothorax, and from congestion of the lungs. A blue tint, approaching to bronze, is sometimes produced in the skin by the protracted use of nitrate of silver, and remains permanent, or nearly so, during life.

17. F. A *blackish tint* is sometimes observed in aged cachectic persons, especially in the lower limbs, and extends over large portions of the skin. It has been called melasma, and is different from melanosis. Lighter shades of black, passing into a tawny, dirty gray, leaden hue, &c., are sometimes observed in connexion with various acute and chronic diseases, characterized by extreme cachexia and dyscrasis of the blood and soft solids, especially pestilential and malignant maladies, scurvy, cancer, &c.

18. iii. *The texture of the skin* is often remarkably affected, and changes of texture are also attended and followed by alteration of colour.—A. *Anæmia* of the integuments is observed chiefly in universal anæmia, but it may affect the integuments of the extremities only. The skin is always pallid when anæmic; and the pallor presents a waxen hue when the skin is delicate, and the parts beneath are fat or oedematous.

19. B. *Congestion* of the skin is observed after death in the most depending parts. It is seen in some adynamic or malignant diseases, occasion-



ing lividity, dark-redness, or a bluish or blackish tint, and is most manifest in parts most remote from the heart, and when mechanical obstructions of the circulation exist.

20. *C. The exudations of blood*, or small, circumscribed hæmorrhages, into the tissues of the skin, forming small spots or larger patches, or sometimes streaks, observed in purpura, in scurvy, and in petechial fevers, have been ascribed by ROKITANSKY to a higher degree of congestion of the skin; but however greatly these changes may be owing to the cause to which he imputes it solely, they depend more on impaired irritability of the extremc capillaries, on diminished vital cohesion of the tissues composing the skin, and on dyscrasia and other changes in the blood itself. (*See art. HÆMORRHAGE, § 14-19.*)

21. *D. Inflammations* very frequently attack one or more of the tissues composing the skin. They are sometimes idiopathic and substantive diseases, especially when produced by external or physical causes; but they are more frequently symptomatic, or caused by morbid conditions of the circulating fluids, arising from a superabundance of excrementitious elements and materials in the blood, or from a specific animal miasm or poison. Most of the chronic eruptions or inflammations depend upon morbid states of the blood, caused by impaired depuration by the kidneys, liver, large bowels, or by the skin itself. Some of these inflammations may also appear as a morbid reflection on the skin of disordered actions of important internal viscera. Inflammations of the skin are either limited to spots or to patches, more or less numerous, or diffused over large tracts. They sometimes are seated only, or chiefly, in the external layer and papillæ, as in *erythema*; and at others, the deeper layer, and the whole thickness of the corium, are affected, as in *phlegmonous* inflammation. From these forms there are numerous transitions and associated changes, according as one or more of the layers or tissues composing the integuments, or as the subjacent cellular tissues, are implicated, and as the disease may extend in spots or patches, or become more or less diffused. Inflammations of the skin, whether erythematous, exanthematous, impetiginous, phlegmonous, furuncular, gangrenous or ulcerative, or acute, chronic or specific, have been so fully described in the numerous articles or heads to which they severally belong, that I cannot devote farther space to their special consideration, more particularly as there is nothing of importance which I can add to what has already been advanced respecting them individually.

22. *E. Adventitious growths* in the skin have been described chiefly in respect of their internal characters, and often commence in the subjacent cellular tissue. — *a. Molluscum simplex*, or soft, wart-like growths, attached by a pedicle, consists of saccular dilatations of the corium, and contains cellular tissue, and sometimes also fat. — *b. Fleishy excrescences*, which often form on the nose, are composed of a luxuriant growth, or hypertrophy, of the corium, and of cellular tissue.

23. *c. Condylomata* commonly form about the organs of generation and the arms, especially in the mucous membrane of the former. They are either soft, or more or less firm; and in their form they are either broad, or rounded, or pointed. They are often attached by a pedicle, their extremities resembling a mulberry, a cauliflower, or a cock's comb. They are composed of an invest-

ing layer of epithelium, and of newly-formed cellular tissue. They originate in the corium, where they take deep root. With these, ROKITANSKY believes that certain tumours regarded as syphilitoid, the Radesyge, &c., may be connected.

24. *d. Fatty tumours* are most frequently congenital, but they are sometimes developed at later periods of life. One only may exist, or there may be several on different parts of the body. They are rounded, often truncated, and attached by a pedicle, and they sometimes reach a very considerable size. They consist of a prolongation of skin, as if protruded by an inclosed lobule of fat, which is continuous, by a sort of pedicle, with the sub-cutaneous, adipose stratum. The epidermis covering them is sometimes dark-coloured, owing to the pigment it contains, and hair occasionally grows upon them. When congenital, it is often associated with nævus in other parts of the skin.

25. *e. Fibrous tissue* occurs in the skin after repeated or chronic attacks of inflammation, and in the cicatrices after burns and other injuries. The alteration termed *cheloïd* by ALIBERT is connected with the fibrous; for it appears to consist of a fibrous callus, and with that appearance its external cicatrix-like aspect corresponds. ROKITANSKY describes this latter alteration—the *cheloïd*—as consisting of several varieties—of a simple hardness or callosity of the skin; or of a flat, somewhat raised, or a depressed hardness; or of a cord-like hardness, and of a white, or pale, or rose colour. In either form, it may terminate in white or red elevated lines or processes. It is of inconsiderable extent, and occurs, for the most part singly, at the upper part of the trunk, on the extremities, or on the face. It rarely exists in large numbers, and it seldom ulcerates; when it does so, it becomes indolent and difficult to heal. It is generally connected with constitutional disorder, but it is not truly cancerous.

26. *f. Bony deposits* are extremely rare in the skin. ROKITANSKY once found a bony plate, which was oval, yellowish, hard, and rugged, of the size of a half crown, in the substance of a scar on the trunk. It corresponded precisely with the osseous deposits occurring in fibrous exudations on scrous membranes.

27. *g. Vascular nævi*—*teleangiectasis*—are generally congenital. They sometimes form deep or bluish red stains, of various sizes and shapes; occasionally red tumours, resembling cherries, strawberries, or mulberries, and often present a transient swelling—*erectile* or *splenoid tumours* of some authors. They also commence, in rare instances, after birth, or at later periods, and are at first, or even subsequently, not malignant; but they may, in the cancerous diathesis, be converted into malignant growths—into a fungus hæmatodes cutis.

28. *h. Melasma*, or the blackish discolorations observed chiefly in aged, decrepit, and cachectic persons, occurs either diffused in parts of the surface of the body, especially the lower extremities, rarely over the whole surface, or concentrated in small raised spots, or berry-like tumours, on the trunk or face. In the former, the colouring matter is diffused on the surface of the cutis; in the latter, in the substance of the cutis also. Melasma should not be confounded with melanosis, the cancer melanodes.

29. *i. Tubercle*.—It is doubtful whether or no true tuberculosis affects the skin in a way corre-

sponding to that observed in mucous, serous, and parenchymatous structures. Tubercles, however, appear in ulcers affecting the cutaneous expansions of scrofulous persons, but most frequently in a softened form, or in that of puriform tubercular matter. An ulcerative softening of the skin, in connexion with tubercular deposits in the sub-cutaneous cellular tissue or in lymphatic glands, is a common occurrence.

30. *k.* *Cysts* do not occur in the cutis vera; but the sebaceous glands often degenerate into cysts of considerable size. Cysts also form in the subjacent cellular tissue, and become closely connected with the skin. These, as well as morbidly-enlarged sebaceous follicles, commonly contain cholesterine. This substance has also been met with as a stratum on the surface of open ulcers of the skin.

31. *l.* *Cancer* and cancerous ulceration are often met with on the skin. When cancer commences in the sub-cutaneous or glandular tissues, particularly the mammae and lymphatic glands, it generally soon implicates the skin, and becomes, from an early period, very closely connected with the cutis. But cancer often also originates in the skin, in the form either of fibrous or scirrhus cancer, or of medullary cancer.

32. (*a*) *Fibrous cancer* of the skin generally assumes the form of a tuberculated or rounded nodule, sometimes flattened, or even depressed, below the surface of the skin, and forming an umbilicated fossa. It is generally single, about the size of a hempseed, pea, or small nut, firmly fixed, and as hard as cartilage. Sometimes it is smooth and shining externally, occasionally covered by a hard, laminated crust of cuticle, and often darker than the surface around. It occurs chiefly on the face, lips, and nose, but occasionally on other parts of the body. It is commonly the primary cancerous growth, and often the first of a series of cancerous formations in different organs. In some instances it reaches a considerable size, growing into a tuberos mass, projecting beyond the skin. (ROKITANSKY.)

[This form of cancer is called "superficial epithelial" by PAGET. The condylomatous appearance which it assumes is owing to enlargement of the papillæ of the skin or mucous membrane. It is this character which often leads to mistaking them for common warty growths. For a very lucid account of the different forms of epithelial cancer, see American edition of "*Lectures on Surgical Pathology*," by JAMES PAGET, Philadelphia, 1854.]

33. (*b*) The *medullary kind* is usually a secondary formation, and consequent upon large cancerous growths, which first appear just beneath the skin, or which involve the sub-cutaneous structure first, and then the skin itself. In either case it grows in the skin in isolated or confluent nodules, near the primary mass. It sometimes also appears in the skin after it has been localized in one or more organs. The nodules which it forms in the cutis are mostly numerous, and about the size of peas or hazel-nuts; they are scattered over the body, especially over the trunk, and generally near similar growths in the sub-cutaneous cellular tissue. In the case of a boy, about 14 years of age, for whom I was consulted, I counted upward of twenty thus disseminated. It is characterized as a whitish or whitish red growth, which is sometimes tolerably firm and lardaceous, or medullary, and occasionally

looser, softer, and resembling cerebral substance, or even much softer and diffuent, and it often grows to a considerable size. It may also contain black pigment, and thus constitute *cancer melanodes* of the skin. The layer of skin above the nodule becomes stretched, and shining or transparent, or rough from the loss of its epidermis. Sometimes the elementary particles of the disease are deposited in vascular *nævi*, or, as the deposition takes place, the vessels of the part are excessively developed, and a cancerous structure, of uncommon vascularity, is the result, or *fungus hæmatodes* of the skin. ROKITANSKY considers *chimney-sweepers' cancer* and ALBERT'S *eburnated cancer of the skin* as special varieties of this disease.

34. *a.* *Chimney-sweepers' cancer* appears to be medullary. It begins in the scrotum as a tolerably firm, small nodule, or warty excrescence, which after some time becomes red, excoriated, moist, and covered by a cortex of thickened cuticle. The papillæ beneath enlarge, and the whole becomes an ulcer, with irregular, hard, and raised edges. Fresh nodules form around the original one, undergo the same changes, and enlarge the disease superficially. The nodules are developed into fungous cauliflower excrescences, and the disease extends deeply, until the dartos, the tunica vaginalis, and testicle are successively implicated, and the gland itself ulcerates, while the adjoining lymphatic glands and vas deferens degenerate up to the abdominal cavity.\*

35. *β.* *Eburnated cutaneous cancer* is a secondary degeneration of the cutis over a sub-cutaneous scirrhus mass. The skin is white, glistening, indurated, partially transparent, and immovable, over the firm or hard mass. This change of the skin evidently belongs to the fibrous form of cancer, as it is always connected with the subjacent scirrhus. *Cancerous ulceration* supervenes, at a sooner or later period, upon all the forms of cutaneous cancer, and generally proceeds as I have described when treating of CANCER. (See that art., § 11, et seq.)

36. *m.* *Parasites*.—Several kinds of *pediculi* are found on the skin, especially on parts covered by hair; and the *acarus scabiei*, and probably other species of the genus *acarus*, occur on, and in eruptions of, the skin. Various fungi also exist in certain chronic eruptions on the cutis, as in cases of *tinca favosa* and *sycosis*. The sub-cutaneous cellular tissue not infrequently lodges the *filaria medinensis*, especially in certain climates, as the western coast of Africa, &c.

37. III. THE SEBACEOUS GLANDS or follicles and their ducts are often the seats of various disorders; and in many of the affections of the skin, and in some of the exanthemata, especially small-pox and measles, they are especially implicated. But they are more manifestly the seat of disorder when an accumulation of thin secretion takes place in them, owing to an impaired power of discharging it, or of throwing it off, or to obstruction of their ducts. In the former state, or impaired power of excretion, the duct is enlarged, and fill-

\* [Small, scaly, or incrustated warts are very common in chimney-sweepers, and the whole skin is apt to be dry, harsh, and dusky. They are not confined to the scrotum, but may exist on every part of the trunk and limbs. Why soot should produce such a condition of skin as to lead to epithelial cancer in persons of a cancerous diathesis (for it is inoperative in others), it were in vain to seek. Charcoal dust and other powdery substances produce no such effect, so far as we have observed.]



ed with the accumulated secretion, forming what has been termed *maggots*. In the latter state, the secretion accumulates in the follicular sac itself, and produces a rounded tumour, from the size of a millet seed to that of a hazel-nut, or even larger. The matter thus accumulated consists of a whitish substance, of a pulpy consistence, viscid like fat, and resembling adipocire. In many cases it is very offensive in its odour, and irritating to the containing tissues, thereby producing inflammation, as in acne, sycosis, &c. Calcareous deposits, and even horny excrecences, may even originate in those glands in very rare instances. The secretions of the sebaceous follicles may be either deficient in quantity, altered in quality, or excessive in amount, and in either case occasion a more or less manifest disorder of the functions of the skin. In the *first* of these conditions, the skin will be dry and harsh; in the *second*, the exhalation from it will be more or less offensive; and in the *third*, it will be unctuous, humid, and often also offensive to the smell.

38. IV. THE CUTICLE AND NAILS partake in several of the diseases of the skin.—(a) The *cuticle* is sometimes very thin and delicate throughout, owing to original formation, but more frequently only in parts, especially in those where it has been recently thrown off. It is much more frequently formed in excess; and then either its outer layers are separated in the form of bran, scales, scurf, or laminae, or it accumulates and adheres, producing callosities, corns, or crusts, of various forms and sizes, occasioning more or less uneasiness, or pains of the subjacent parts.

39. a. The *colour* of the skin partly resides in the deeper layers of the cuticle, which may contain a yellowish, brownish, or a black pigment, distinguishing, when congenital and general, particular races or individuals. But the colouring may be acquired, and limited to particular spots or parts, or be more or less diffused, and indicate disorders of important internal organs, or a cachectic condition of the whole economy. It is always in excess, in a remarkable degree, in congenital naevi. A complete absence of the colouring matter is congenital in albinismus, and is acquired in achroma or vitiligo. The former may be general or partial; the latter is always partial at first, but it may become more general.

40. β. The epidermis is often drier and harsher than natural; it is rarely more moist. It presents the former states in various cutaneous diseases, in which it is either thrown off in the form of scales, or it accumulates, and occasions cracks or fissures, extending through it into the cutis. Accumulation of the epidermis, or of the cells composing this structure, is often simultaneous with, if not the consequence of, excessive development of the papillæ of the cutis. The morbid results of these conditions are one or other of the following: 1st. *Callosity*, tyloma, or simple accumulation of epidermoid cells, in the form of strata, successively formed underneath, the more recently produced extruding the older; 2d. *Corn*, or clavus, a circumscribed callus, projecting into the corium, and occasioning more or less pain; 3d. *Crusts*, scutes, or seutiform accumulations of laminae of diseased epidermis, presented by the scaly eruptions; 4th. *Horny growths* proceed either from a diseased portion of skin, or from a sebaceous follicle, and are met with generally on the scalp, and are usually single; much more rarely two or more are observed. They are of

various dimensions, from half an inch to several inches in length, and as thick as, or thicker than a finger; straight, or curved, or crooked; attached by a broad base, and of a dark colour. They have been observed in some cases to be regularly shed at intervals; and when removed, they are reproduced, if the portion of skin producing them be not destroyed.

41. (b) The *nails* often present the peculiarities possessed by the parents, or evince hereditary characters. Their growth may be excessive or deficient, or they may be misshapen or thick, twisted, or curved; they may be everted or inverted; or become excessive in length, or much shortened. Eversion is often observed in psoriasis, when shortening, thickening, and induration are often coexistent with it. The nails are then discoloured, and are also drier and more brittle than natural. Incurvation of the nails, sometimes with elongation, is common in tubercular consumption. The most deformed states of the nails are observed in connexion with the scaly eruptions. (See the articles on these eruptions and that on the HAIR.)

42. V. CLASSIFICATION OF THE DISEASES OF, OR AFFECTING THE SKIN.—The arrangement of diseases of the skin must necessarily be conventional. All disorders of the animal economy—whether functional or structural, whether local or constitutional, whether internal or external—glide insensibly into those more intimately allied to them in situation, in the nature of the tissues affected, in constitutional disturbance, and in the local and general characters of the affection, and present no constant lines of demarcation by which they can be accurately separated from those which they most resemble. Morbid actions, even in their most visible and palpable forms, evince none of the unalterable features characterizing the products of the vegetable and animal kingdoms. These products belong to distinct genera and species, and each consists of a specific being; but morbid actions are incalculably diversified and ever varying, passing insensibly, and more or less rapidly, into as varying states of visible disease, and ultimately into not merely manifest but also palpable organic changes, when the earlier phases or grades of morbid action are not arrested by vital resistance, or by the aid of medicine.

43. Of the more or less *artificial classifications* of diseases of the skin, furnished by PLENCK, WILLAN, BATEMAN, PLUMBE, RAYER, WILSON, and others; or of the *natural arrangements* attempted by ALBERT and PAGET, most of the former being modifications of the classification of PLENCK or WILLAN, it is unnecessary to take particular notice. An artificial arrangement involves frequent repetition when treating of this class of diseases—presents as unvarying distinctions what are continually undergoing changes, and are neither peculiar nor constant—and insufficiently recognises constitutional disturbances, specific taints, and contaminating causes. Natural classifications, while they are based on natural alliances arising out of constitutional conditions, and specific causes or contaminating influences, retain those visible or palpable distinctions which actually exist, and present them for the purposes of diagnosis and of rational treatment. The artificial plan comprises, under the same order, eruptions which require the most opposite indications and means of cure; while the natural arrangement associates those maladies in one

family or order, for which the same indications and remedies are found most beneficial. Without entirely neglecting the classifications of ALIBERT and PAGER, the following has been devised with a much stricter adhesion to constitutional and natural alliances than these writers have shown, and with a due recognition of the causes, contaminating characters, and ultimate changes which distinguish these diseases individually, and which connect each group and family with those preceding or following it. The reader will perceive, by comparing the following arrangement with those of the authors above mentioned, in what it differs, as well as in what it agrees with them.

44. ORDER, FAMILY, OR NATURAL GROUP I. DYSCHROMATA.—*Maculæ*.—Changes of colour, or excess or deficiency of the colouring matter of the skin, occurring congenitally, or at any period of life, generally in spots or large patches, and frequently connected with slight disorder of the digestive organs or of the general health.

45. GENUS i.—PANNUS—EPHELIS—*Chloasma*.—Consisting of spots, patches, &c., of various forms, of a darker or deeper hue of the skin, owing to increase of its colouring matter, occurring at any period of life.—*Spec.*: 1st. *P. lenticularis*; 2d. *P. hepaticus*; 3d. *P. melaneus*; 4th. *P. carateus*. (See art. EPHELIS.)

46. GENUS ii.—ACHROMA.—White spots or patches scattered over the skin, or limited to a part, the discoloration being remarkable, and often attended by temporarily impaired sensibility, owing to deficient or interrupted arterial circulation, when the extremities are its seat.—*Spec.*: 1st. *A. Vitiligo*; 2d. *A. Congeniale*.

47. ORDER II. DERMATITES—D. SIMPLICES—ECZEMATA.—*Eczematosa*.—Inflammations of the skin, attended by redness, itching, stinging, slight swelling, or an eruption of papulæ, vesicles, bullæ, pustules, or tubercles; often being of local origin, but much more frequently depending upon disorder of the digestive and eliminating organs, and consecutively of the circulating fluids, and observing either an acute, or sub-acute, or chronic course. They are not limited to any part of the cutaneous expansions; they may affect one or more of the cutaneous tissues, or even extend, more or less, to the subjacent cellular substance; and they are not contagious.

48. GENUS i.—ERYTHEMA.—Superficial redness, varying in extent, with slight elevation, terminating in furfuration and desquamation, or, in cachectic habits, from neglect of cleanliness, or improper treatment, in excoriation or ulceration.—*Spec.*: 1st. *E. spontaneum*; 2d. *E. endemicum*; 3d. *E. epidemicum*; 4th. *E. Intertrigo*; 5th. *E. Paratrimma*; 6th. *E. Pernio*; 7th. *E. per Adulescentem*. (See art. ERYTHEMA.)

49. GENUS ii.—ROSEOLA—*Rosc-rash*.—Rose-coloured, irregular, and slightly-elevated patches of the skin, transient and not papular; passing into deeper roseate hues as they disappear, generally preceded or attended by slight fever, or gastro-intestinal disorder.—*Spec.*: 1st. *R. æstiva*; 2d. *R. autumnalis*; 3d. *R. annulata*; 4th. *R. infantilis*; 5th. *R. symptomatice vel associata*—of small-pox, of cow-pox, of fever; of gout, of the consecutive fever of pestilential cholera. (See art. ROSE-RASH.)

50. GENUS iii.—URTICARIA.—An eruption of regular, prominent patches or wheals, of various sizes, generally transient, and attended by burn-

ing, tingling, and itching, and by slight fever and disorder of the digestive functions.—*Spec.*: 1st. *U. febrilis*; 2d. *U. evanida*; 3d. *U. tuberosa*.

51. GENUS iv.—LICHEN—*Licheniasis*.—An eruption of clustered or irregularly disseminated papulæ, attended by itching, stinging, &c., and slight febrile disturbance, or gastro-intestinal disorder, terminating in desquamation, and liable to recur.—*Spec.*: 1st. *L. simplex*; 2d. *L. Strophulus*; 3d. *L. agrius, vel L. tropicus*. (See art. LICHEN.)

52. GENUS v.—PRURIGO.—A papular eruption, the papulæ being larger than those of lichen, of nearly the colour of the skin, generally appearing on the outer surface of the limb, attended by burning and intolerable itching, &c.—*Spec.*: 1st. *P. mitis*; 2d. *P. formicans*; 3d. *P. scnilis*. (See art. PRURIGO.)

53. GENUS vi.—ECZEMA.—An eruption of minute vesicles, crowded together, non-contagious, and terminating by the absorption or evaporation of a thin fluid, or by excoriations, with serous exudations, concreting into crusts.—*Spec.*: 1st. *E. simplex*; 2d. *E. rubrum*; 3d. *E. impetiginodes*; 4th. *E. mercuriale*. (See ECZEMA.)

54. GENUS vii.—HERPES.—An eruption of vesicles, distinctly but irregularly clustered, upon inflamed bases, extending beyond the margins of the clusters, attended by tingling, concreting into lamellar scabs.—*Spec.*: 1st. *H. phlyctenodes*; 2d. *H. circinnatus*; 3d. *H. Zoster*; 4th. *H. præputialis*; 5th. *H. Iris*. (See art. HERPETIC ERUPTIONS.)

55. GENUS viii.—BULLÆ.—An elevation of the epidermis by an effusion of serum, often passing into a sero-puriform fluid, into large vesicles or blebs, which are generally round or oval, have a broad base, and vary in size from that of a pea to that of an egg.—*Spec.*: 1st. *Pemphigus*; 2d. *Rupia*. (See arts. BULLÆ, PEMPHIGUS, and RUPIA.)

56. GENUS ix.—ECTHYMA.—An eruption of phlyzaceous pustules, always distinct, seated on a hard, inflamed base, and followed by dark scabs, leaving slight cicatrices or red stains, which disappear after some time.—*Spec.*: 1st. *E. acutum, vel E. vulgare*; 2d. *E. chronicum, vel E. cachecticum*. (See art. ECTHYMA.)

57. GENUS x.—IMPETIGO—*Mellitagra*.—The eruption of psudaceous pustules, commonly grouped in clusters, sometimes distinct, and forming yellowish, rough incrustations; attended by itching, but by little or no fever.—*Spec.*: 1st. *I. simplex*; 2d. *I. favosa, vel Porrigio favosa*; 3d. *I. eczematosa*; 4th. *I. rodens*. (See art. IMPETIGINOUS AFFECTIONS.)

58. GENUS xi.—ACNE—*Varus*—*Adenodermatitis*.—A pustular affection, appearing chiefly about the period of puberty in both sexes, occurring as small, isolated pustules, with hard, deep bases, leaving circumscribed, indolent, and hard tumours, and seated chiefly in the sebaceous follicles, most frequently of the face, neck, shoulders, and breast.—*Spec.*: 1st. *A. simplex*; 2d. *A. indurata*; 3d. *A. rosacea*. (See art. ACNE.)

59. GENUS xii.—FURUNCULUS.—Inflammation limited superficially, but extending to all the cutaneous tissues and subjacent cellular substance, forming a hard, conical tumour of a dull red colour, varying from the size of a pea to that of a pigeon's egg, terminating in suppuration, with the evacuation of a membranous slough, or of the membrane that enclosed the matter.—*Spec.*: 1st.



*F. vulgaris*; 2d. *F. asthenicus*; 3d. *Hordeolum*, or *Stye*.

60. GENUS xiii. — *CARBUNCULUS*. — Circumscribed, hard, round, and painful swelling, seated in the cellular tissue of the skin and the sub-cutaneous tissue; at first of a livid red colour, afterward black, or of a deep livid hue in the centre or throughout, and covered by lenticular vesicles; terminating in gangrene or sloughing.—*Spec.*: 1st. *C. sporadicus*; 2d. *C. endemicus*; 3d. *C. symptomaticus*. (See art. *FURUNCULAR ERUPTIONS*.)

61. ORDER III. — *SQUAMOSÆ*. — *Dermatitis squamosa* — *D. serpigmosa* — *D. chronica* — *Serpiginos*. — Chronic affections characterized by the production, on the surface of the skin, of inorganic, laminated scales, of a whitish gray colour, dry, friable, and slightly elevated above the skin, which remains red and dry when the scales fall off. They are generally slowly developed, spread, and continue for months, or even for many years. They are not contagious.

62. GENUS i. — *PITYRIASIS*. — A superficial affection, implicating chiefly the cuticle, characterized by a copious desquamation and renewal of this tissue, and, although it may appear on any part, affecting chiefly parts covered by hair.—*Spec.*: 1st. *P. Capitis*; 2d. *P. Palpebrarum*; 3d. *P. Labiorum*; 4th. *P. palmaris et plantaris*; 5th. *P. præputialis et pudentalis*; 6th. *P. versicolor*; 7th. *P. nigra*. (See art. *PITYRIASIS*.)

63. GENUS ii. — *PSORIASIS*. — *Lepriasis*. — Patches of chronic inflammation of the skin, with slight elevations changing into scales—those of *psoriasis* being of different sizes, with irregular margins, and the centres not depressed; those of *Lepriasis* being more or less rounded, slightly depressed in their centres, and their margins raised and reddish.—*Spec.*: 1st. *Psoriasis guttata*; 2d. *P. diffusa*; 3d. *P. inveterata*; 4th. *P. lepraformis* — *Lepriasis*. (See arts. *PSORIASIS* and *LEPRIASIS*.)

64. ORDER IV — *HÆMATODES* — *Sanguineous Eruptions*. — Infiltrations of blood in the cutaneous and sub-cutaneous tissues, generally without manifest elevation of the surface, owing to impaired vital cohesion of these tissues and of their capillaries, and to alteration of the blood.

65. GENUS i. — *PURPURA*. — Small, distinct, purple specks or patches in the skin, attended by languor and debility, generally without fever.—*Spec.*: 1st. *P. simplex*; 2d. *P. hæmorrhagica*; 3d. *P. urticæ*; 4th. *P. symptomatica vel associata*—of exanthematous and continued fevers. (See art. *PURPURA*.)

66. GENUS ii. — *SCORBUS*. — The appearance of patches or blotches of a livid, reddish, or purplish hue, chiefly on the lower limbs, with swelling and bleeding of the gums, great debility and pains, and contractions of the lower extremities, &c.—*Spec.*: 1st. *S. sine Febre*; 2d. *S. febrilis*. (See art. *SCURVY*.)

67. GENUS iii. — *PETECIÆ*. — *Ecchymoses*. — Small spots, generally of a reddish colour, but often livid, violet, or blackish, scattered over the surface of the skin, sometimes resembling fleabites or small freckles, remaining a longer or shorter time, varying from an imperceptible point to the size of a hempseed, occurring with or without fever, but most frequently in the advanced stages of adynamic fever.—*Spec.*: 1st. *P. primaria*, vel *P. sine Febre*; 2d. *P. secundaria*.

68. ORDER V. — *EXANTHEMATA* — *FEBRES EX-*

*ANTHEMATICÆ* — *DERMATITES EXANTHEMATICÆ*.

—Eruptions of various kinds, preceded by fevers of specific natures and fixed durations, the eruptions being generally also of determinate durations, spreading by infection and contagion, or by both—by specific contaminating miasms or animal poisons, and generally affecting the economy only once. (See arts. *EXANTHEMATOUS DISEASES* and *INFECTION*.)

69. GENUS i. — *RUBEOLA* — *MORBILLI* — *Measles*. — Fever, with frequent sneezing, coryza, redness of the eyes, lachrymation, followed generally on the fourth day by a crimson rash, consisting of stigmatized dots, slightly elevated, on the face, neck, breast, and trunk, usually desquamating on the seventh, occurring frequently epidemically, spreading by infection, and affecting the system only once.—*Spec.*: 1st. *R. vulgaris*; 2d. *R. complicata*; 3d. *R. maligna*; 4th. *R. sine Catarrho*; 5th. *R. sine Exanthemate*. (See art. *MEASLES*.)

70. GENUS ii. — *SCARLATINA* — *Febris Scarlatinosa*. — A continued fever, on the second or third day of which a scarlet efflorescence generally appears on the fauces, face, and neck, spreading over the body, terminating in desquamations from the fifth to the seventh day, frequently attended by affection of the kidneys, and followed by dropsy; often occurring epidemically, propagated by infection, and attacking the system only once.—*Spec.*: 1st. *Scarlatina Hominum*.—*Var.*: a. *S. simplex*; b. *S. anginosa*; c. *S. maligna*; d. *S. sine Exanthemate*; e. *S. latens*. (See art. *SCARLET FEVER*.) *Spec.*: 2d. *Scarlatina rheumatica*, vel *S. r. epidemica* (see art. *SCARLATINA RHEUMATICA*); 3d. *Scarlatina Equi*,\* vel *S. Equi epidemica*; 4th. *Scarlatina Canis*.

71. GENUS iii. — *FEBRIS EXANTHEMATICA* — *Typhus* — *Typhus exanthematicus*. — Typhoid, low, or adynamic fever, attended by stupor, vertigo, confusion of ideas, delirium, or typhomania; by a reddish, papillar eruption on the trunk of the body and limbs; propagated by infection, appearing epidemically, and seldom affecting the system a second time.—*Spec.*: 1st. *F. Typhoides*; 2d. *Typhus contagiosus*. (See art. *FEVER*, *TYPHOID* and *TYPHUS*, § 485, et seq.)

72. GENUS iv. — *VARIOLA* — *SMALL-POX*. — Fever, commencing with shivering, and after forty-eight hours, or three days, attended by an eruption of red points, passing successively into pimples, acuminated vesicles, flattened and umbilicated vesicles, pustules, and hard brown scabs; ceasing on the development of the eruption, and returning when the eruption has reached its acme, or from the eighth to the eleventh day; the falling off of the scabs, from the twelfth to the twenty-fourth day, leaving behind them dark pits or

\* I have lately had reasons, indeed evidence, for the following inferences: 1st. That scarlatina was originally a disease of the horse, and that it formerly occurred, and has even recently occurred, epidemically, or as an epizooty among horses; 2d. That it was communicated in comparatively modern times from horses to man; 3d. That it may be, and has been communicated also to the dog.

While this article was passing through the press, and after the preceding part of this note was printed, Mr. PERCIVAL, veterinary surgeon to the 1st regiment of Life Guards, and author of the very able and well-known work on the Diseases of the Horse, kindly furnished me with additional evidence in support of the opinion I have stated at this place, and when treating of SCARLET FEVER. (See that article, § 90, &c.) Mr. PERCIVAL also referred me to the second volume of his work, where scarlatina in the horse is mentioned.

marks; highly contagious, and affecting the system only once.—*Spec.* 1st. *Variola Hominum*.—*Var.*: a. *V. discreta*; b. *V. confluens*; c. *V. sine Variolis*.—*Spec.* 2d. *Variola Animalium*.—*Var.*: a. *V. vaccina*; b. *V. ovilis*, vel *Clavus*.—*Spec.* 3d. *V. varioloidea*, vel *Variola Hominis anomala*. (See *arts.* SMALL-POX and VACCINATION.)

73. GENUS V.—VARICELLA—*Chicken-pox*.—An eruption of semi-transparent, glabrous vesicles, with red margins, following and attended by a slight attack of fever; the vesicles seldom passing into suppuration, but breaking on the third or fourth day, concreting into small puckered scabs, and leaving no cicatrices; affecting a person only once.—*Spec.*: 1st. *V. lentiformis*; 2d. *V. conformis*; 3d. *V. globularis*. (See *art.* CHICKEN-POX.)

74. GENUS VI.—MILIARIA—*Sudamina*.—An eruption of whitish or pale reddish vesicles, the size of a millet-seed, in the course of severe infectious fever; the vesicles being distinct, containing a serous fluid, of a whitish, or reddish, or purplish hue, bursting in two or three days, and terminating in a scurfy desquamation.—*Spec.*: 1st. *M. simplex*; 2d. *M. abnormis*. (See *art.* MILIARY ERUPTIONS.)

75. GENUS VII.—ERYSIPELAS.—Asthenic inflammation of the integuments, consequent upon febrile disorder and a morbid state of the blood, affecting the skin or scalp more or less extensively, with a diffused swelling disposed to spread, propagated by infection when circumstances favour the operation of the poisonous miasm.—*Spec.*: 1st. *E. simplex*; 2d. *E. complicatum*. (See *art.* ERYSIPELAS.)\*

76. ORDER VII.—DERMATITES CONTAGIOSÆ — D. SPECIFICÆ CONTAGIOSÆ — AISCHRODES — *Eruptiones contagiosæ* — *Contaminating Eruptions*. — Eruptions propagated by direct or mediate contact, or indeterminate, but generally prolonged duration, often contaminating the whole frame; and certain of them tending to fatal terminations.

77. GENUS I.—SCABIES—*Itch*.—An eruption of distinct, slightly acuminated vesicles, attended by constant itching; the eruptions varying in character, but often concealing a parasite or *acarus*, either causing or produced by it, unattended by constitutional disturbance.—*Spec.* 1st. *S. Hominis*.—*Var.*: a. *S. H. vesicularis*; b. *S. papuliformis*; c. *S. lymphatica*; d. *S. purulenta*; e. *S. cachectica*.—*Spec.* 2d. *Scabies Canis*. (See *art.* ITCH.)

78. GENUS II.—SYCOSIS—*Montagra*.—A pustular eruption of a pale yellow colour, seated chiefly in the hairy parts of the face, as the chin, upper lip, cheeks, &c., affecting the hair follicles and connected tissues, bursting in the course of some days, and producing brownish crusts, which after one or two weeks leave indolent purplish tubercles; the pustules being renewed in different parts, thus continuing for an indeterminate period, and apparently propagated by a parasitic plant or cryptogamic formations.—*Var.*: 1st. *S. simplex*; 2d. *S. contagiosum*. (See *art.* SYCOSIS.)

79. GENUS III.—FAVUS—TINEA—*T. maligna* — *Porrigo* — *Ring-worm*.—A specific chronic inflammation, seated chiefly in the hair follicles,

exuding a peculiar yellowish substance, which accumulates and forms a cup around the base of each hair, the aggregation of a number of these resembling the cells of a honey-comb. The hair of the diseased follicles is altered, imperfectly nourished, and falls out; and if the disease be not arrested, the subjacent tissues become affected. This contaminating eruption is usually seated in the scalp, sometimes extending to the face, neck, and other parts of the body, and is communicable to any part of the skin.—*Var.*: 1st. *F. dispersus*; 2d. *F. confertus*. (See *art.* TINEA.)

80. GENUS IV.—PUSTULA MALIGNA—*Contagious Anthrax*.—A large vesicle filled with a sanious fluid, seated over a lenticular induration, which is speedily surrounded by an erysipelatous areolar swelling, which soon becomes gangrenous, and contaminates the circulating fluids; caused by the contact of a septic animal poison, and communicable from person to person, and from the lower animals to man.—*Spec.*: 1st. *P. M. Hominis*; 2d. *P. M. Animalium*. (See *art.* PUSTULE, MALIGNANT.)

81. GENUS V.—GLANDERS\*—FARCY—*Farcy Glanders*.—Fever of a low and malignant character, attended by chancrey sores of the membrane of the nose, and a profuse, offensive discharge, and by pustular eruptions, or tubercular, gangrenous ulcers in various parts of the cutaneous surface, produced by the contact of the poisonous matter.—*Spec.*: 1st. *Simple Acute Glanders*; 2d. *Acute Farcy Glanders*; 3d. *Simple Chronic Glanders*; 4th. *Chronic Farcy Glanders*. (See *art.* GLANDERS.)

82. GENUS VI.—SYPHILIS—*Syphilitic Eruptions*—*Veneral Eruptions*.—A distemper contracted generally by impure contact, and characterized, externally, by copper-coloured spots, or by pustules, vegetations, excrescences, ulcerations, swellings, tumours, or imposthumes; internally, by pains in the bones or periosteum, or by caries.—*Spec.* 1st. *S. eczematosa*.—*Var.*: a. *lenticularis*; b. *papularis*; c. *vesicularis*; d. *pustularis*; e. *tubercularis*.—*Spec.* 2d. *S. squamosa*.—*Var.*: a. *Leprosa*; *Psoriasis*.—*Spec.* 3d. *S. vegetans*.—*Var.*: a. *verrucosa*; b. *Condyloma*; c. *Cauliflora*; d. *Frambæsia*; e. *Crista-Galli*.—*Spec.* 4th. *S. exulcerans*.—*Var.*: a. *serpiginosa*; b. *fissata*; c. *excavata*. (See *art.* SYPHILITIC AFFECTIONS.)

83. GENUS VII.—MYCOSIS.—A contagious disease, consisting of fungous excrescences, occurring chiefly on the face, hairy scalp, or about the organs of generation, resembling a mulberry or strawberry, exuding a yellowish, fetid, and viscous humour, sometimes forming tumours of considerable size, and often attended by pains in the bones, by hoarseness, coryza or ozæna, ulceration of the tonsils, &c.—*Spec.*: 1st. *M. Frambesioides*, *Frambæsia*; 2d. *M. Molluscum*, *Amboyna-pox*; 3d. *M. syphiloides*, *Sibbens*, &c.

84. ORDER VIII.—LEPRODES—*Leprous Eruptions*.—Morbid degenerations of the skin, depending upon constitutional vice, attended by diminution of the sensibility of the diseased sur-

\* The several forms and states of complication manifested by *Erysipelas* are fully described in the article referred to, as they have been observed in many countries and climates by the author, and during different epidemic constitutions.

\* This malignant and contaminating distemper is generated in horses from crowding, and from breathing a contaminated or foul air, and is communicated from them to man. There is great reason to believe that most, if not all the maladies comprised under this order, have originated in some of the lower animals, and have extended, with various modifications, to man; and not improbably small-pox has had a similar origin, as well as scarlet fever, as already mentioned.



face, by general hypertrophy of the cutaneous tissues, by originating in endemic influences and bad food, insensibly and slowly, and by their very prolonged duration and hopeless curc.

85. GENUS i. — *LEPRA TUBERCULOSA* — *LEPROSY* — *Leprosy of the Middle Ages* — *Lepra Hebraeorum*. — Dusky-red or livid tubercles, of various sizes, on the face, ears, and extremities; a rugous and thickened state of the skin, impaired sensibility and falling out of the hair, excepting on the scalp; hoarse or altered voice, and oæna; terminating in ulcerations of the affected surface, and extreme fetor; the distemper being often hereditary, and even contagious by means of the matter discharged from the sores. — *Spec.*: 1st. *Lepra Taurica* — the Leprosy of the Crimea; 2d. *L. anasthesiaca*; 3d. *L. Hebraeorum* — Jewish or Egyptian Leprosy. (*See art. LEPROSY.*)

86. GENUS ii. — *RADESYGGE*. — Lassitude, torpor, and heaviness of the limbs, stiffness and pains of the joints; a pale, bloated, leaden, or reddish appearance of the face, hoarseness of the voice, oæna; a rugous, scaly, and callous state of the skin, especially in parts, followed by cracks, furrows, tuberculous callosities, and ulcers. — *Spec.*: 1st. *R. vulgaris*; 2d. *R. scorbutica*.

87. GENUS iii. — *ELEPHANTIA* — *Elephantiasis of the Arabians*. — Hardness, lividity, and great tumefaction of one or both limbs, or of the scrotum, owing to great thickening of the cutaneous and sub-cutaneous tissues, with an irregular, glabrous, or scaly state of the surface; endemic chiefly in warm countries. — *Spec.*: 1st. *E. vulgaris*; 2d. *E. tuberosa*; 3d. *E. Scrotatis*. (*See art. ELEPHANTIASIS.*)

88. GENUS iv. — *PELLAGRA*. — An endemic and hereditary malady, characterized by thickening, scaly excoriation, cracks, and deep fissures of those parts of the skin exposed to the sun or air; attended by general cachexia, by burning pains in the trunk and limbs, by disorder of the digestive organs and nervous system; at first appearing after prolonged intervals, afterward being more continued, and often fatal. — *Spec.*: 1st. *P. Milanensis*; 2d. *P. Asturiensis*. (*See art. PELLAGRA.*)

89. GENUS v. — *ICHTHYOSIS*. — Morbid enlargement of the papillæ of the skin, and thickening of lamellæ of the epidermis, either in parts, or more or less generally, presenting irregular compartments often resembling the scales of fish. — *Spec.*: 1st. *I. hereditaria*; 2d. *I. papillaris*; 3d. *I. localis*. (*See art. ICHTHYOSIS.*)

90. ORDER IX. — *CANCRODES* — *Cancerous Distempers*. — Cancerous diseases of the skin are characterized by their slow and insidious attack, by their prolonged duration, by their foul ulceration and lancing pains, by their resistance to treatment, and by their general return to adjoining or remote parts after removal by excision: they depend on a peculiar diathesis, which is often hereditary.

91. GENUS i. — *LUPUS* — *Cancer Lupus*, Sauvages. — A disease of all the tissues of a portion of the skin, chiefly of the face, implicating also the subjacent cellular substance; of remarkably slow progress and long duration; always extending either superficially or in depth, with a stinging sensation of heat; passing into ichorous and slow phagedenic ulceration, and destroying the textures to which it extends. — *Spec.*: 1st. *L. superficialis*; 2d. *L. phagedenicus*; 3d. *L. non-exedens serpiginosus*. (The different species of *Lupus* form the connecting links between the

leprous and the cancerous diseases of the skin. *See art. LUPUS.*)

92. GENUS ii. — *CARCINUS*. — An alteration of all the tissues of the skin and subjacent cellular tissue, generally commencing as a small, hard, indolent tumour, with itching or stinging; passing into pungent or lancinating pains, and often attended or followed by ichorous and slow ulceration, and by general contamination of the frame. — *Spec.*: 1st. *C. scirrhus* — *Carcinoma*; 2d. *C. verrucosus* (Chimney-sweeps' Cancer); 3d. *C. medullaris*; 4th. *C. melanæus*; 5th. *C. eburnæus*. (*See arts. CANCER and SCIRRHUS and OTHER TUMOURS.*)

93. GENUS iii. — *KELIS*. — A prominent, hard excrescence, sometimes cylindrical, sometimes round or square, flattened in the centre and elevated at the margin, projecting roots into the skin. — *Spec.*: 1st. *K. genuina*; 2d. *K. spuria*.

94. ORDER X. — *HETEROMORPHIÆA*. — Alterations of the skin, cuticle, or nails, not comprised under the foregoing, nor referable to changes or morbid actions similar to, or allied with, those which characterize the preceding groups.

95. GENUS i. — *NÆVUS* — *Vascular Nævi* — *Moles*. — A congenital alteration of a portion of the skin, consisting either of a convoluted congeries of capillary vessels, more or less elevated, in the form of a small vascular tumour, above the surface, or of a more diffused and dark or livid-coloured patch, or of a warty, hairy, or discolored elevation or excrescence. — *Spec.*: 1st. *N. vascularis circumscriptus*; 2d. *N. vascularis diffusus*; 3d. *N. non-vascularis*; 4th. *N. pilosus*.

96. GENUS ii. — *VERRUCA* — *Warts*. — A very circumscribed, hard excrescence, sessile or pedunculated, sometimes movable, sometimes more fixed, of nearly the same colour as the skin, its surface being rugged, horny, or hard, and not susceptible of inflammation, although the cutaneous papillæ to which it is attached are more than usually vascular. — *Spec.*: 1st. *V. vulgaris*; 2d. *V. Acrochordon*.

97. GENUS iii. — *TYLOSIS* — *Corns*. — Circumscribed, dry, hard, lamellated callosities, owing to hypertrophy of the cuticle from pressure, which drives the altered structure inward upon the subjacent tissues, developed chiefly on the toes. — *Spec.*: 1st. *T. indurata*; 2d. *T. gomphosa*; 3d. *T. bulbosa*.

98. GENUS iv. — *ONYGOSIS*. — Inflammation with swelling, redness, and pain of the matrix of the nail, causing malformation, induration, eversion, or inversion of the nail. — *Spec.*: 1st. *O. acuta*; 2d. *O. chronica*; 3d. *O. cum Inversione*; 4th. *O. cum Eversione*; 5th. *O. complicata vel associata*. (Often associated with *Psoriasis* and *Lcpriasis*, which see, § 23.)\*

\* [The above arrangement appears, in many respects, preferable to that of WILAN. The latter classes cutaneous affections under eight orders. I. EXANTHEMATÆ; II. BULLÆ; III. VESICULÆ; IV. PUSTULÆ; V. PAPULÆ; VI. SQUMÆ; VII. TUBERCULA; VIII. MACULÆ. — The syphilitic virus may produce on the integuments each of the leading forms which characterize the above orders. The great objection to such a classification is, that the papular, vesicular, and pustular forms are not constant, but are sometimes transformed into each other, as a vesicle into a bulla, and a mere redness into a papule or pustule, so that the distinctions founded on them are often arbitrary and illusory. We see this change of character well illustrated in the varioloid or modified forms of small-pox, which may assume almost every variety of cutaneous disease. So nothing is more common than to see papular forms of lichen pass into a squamous state, or erythema to present papular or tubercular elevations, or the vesicles of scabies may assume a pustular form, as

99. Having exhibited what may be considered a strictly *natural grouping* or *classification* of the changes, appearing either primarily in the tissues of the skin, or contemporaneously with, or consecutively upon, febrile and constitutional diseases, it will be seen that the local connexions, the symptomatic relations, and the more prominent features and alliances of these changes, are brought more completely and more accurately under view. And it will be more clearly perceived that these affections of the skin, so difficult to arrange, and so generally considered and treated as local alterations merely, are more or less important manifestations, in the cutaneous tissues, of disordered or diseased conditions of one or more of the vital functions—of the organic nervous influence or energy, of the digestive and assimilating functions, of the depurating or eliminating functions,

and, consequently, of the circulating fluids, and of the constitution or frame in general. Thus, a natural arrangement of cutaneous affections directs the attention more entirely to the relations, and constitutional and visceral dependencies, of these affections, and leads to rational and successful methods of cure, most of the affections grouped under the same order manifesting such morbid relations and connexions as require similar indications and means for each.

100. As *artificial arrangements* of *cutaneous diseases* have been so commonly received, and as they tend to facilitate diagnosis, I shall conclude this subject by giving the improved modification of the classification of WILLAN, by M. RAYER, the arrangement of WILLAN being itself only a modification of that originally published by PLENCK.

TABLE.

DIVISION I. Diseases of the Skin.	CHAPTER I. Inflammatory Affections, distributed according to the Number and Form of their elementary Lesions.	SECTION I. Having a single elementary Form.	1. EXANTHEMATA.—Erythema, Erysipelas, Rub- eola, Roseola, Scarlatina, Urticaria; Arti- ficial Exanthemata.		
			2. BULLÆ.—Pemphigus, Rupia; Artificial Bul- læ—Blisters, Ampullæ.		
	CHAPTER II. Peculiar States of the Skin not refer- able to Inflamma- tion.	SECTION II. Having several ele- mentary Forms.	3. VESICULÆ.—Herpes, Eczema, Hydrargyria, Scabies, Miliaris sudatoria ( <i>suetta miliaris</i> ), Sudamina; Artificial Vesicles.		
			4. PUSTULÆ.—Variola, Varicella, Vaccinia, Vac- cinella, Acne, Rosacea, Sycosis, Impetigo, Fa- vus, Ecthyma; Artificial Pustules.		
			5. FURUNCULI.—Hordeolum, Furunculus, An- thrax.		
CHAPTER III. Morbid States of the secreting Func- tions of the Skin.	CHAPTER IV. Neuroses of the Skin.	CHAPTER V. Faulty Structure, or unusual States of one or other of the Elements of the Skin.	PIGMENTI (Achromata; Dyschromata).	6. GANGRÆNÆ.—Anthracion vel Pustula malig- na, Anthrax Pestis.	
				7. PAPULÆ.—Strophulus, Lichen, Prurigo; Arti- ficial Papulæ.	
				8. SQUAMÆ.—Pityriasis, Psoriasis, Lepra, Pel- lagra; Artificial Squamæ.	
				9. TUBERCULA.—Lupus, Scrofula, Cancer; Ele- phantiasis Græcorum; Artificial Tubercles.	
				1. SYPHILIS.	{ Exanthematica, Bullosa, Vesiculosa, Pustulosa, Squamosa, Papulosa, Tuberculosa, Vegetati- va.
				2. AMBUSTIO.	{ Exanthematica, Bullosa, Gangrenosa.
				3. PERNIO.	{ Exanthematica, Bullosa, Gangrenosa.
				{ ANEMIÆ. CONGESTUS SANGUINEI. HÆMORRHAGIÆ.	
				{ Purpura (Petechiæ, Vibi- ces, Eechymoses, Der- matorrhagia).	
				{ PERSPIRATIONIS Ephidrosis. EPIDERMIDIS Exfoliatio.	
				{ Anæsthesia, Hyperæsthesia.	
				{ Albinismus seu Leucopa- thia, Nigrities, Ephel- is, Lentigo, Chloasma, Melasma, Nævus pig- mentarius, Color cæru- leus, Color subflavus; Artificial Discolora- tions.	
				Papillarum et Epi- dermidis.	{ Ichthyosis, Verruca, Pro- ducta cornea, Tylosis.
				Vasorum Cutis.	{ Phlebotasia, Angiectasia capillaris, Nævus aru- neus flammeus, &c. Tumor vasculares.
				Coril, Membranæ cellularis subcuta- næ, et Telæ adi- posæ.	{ Cheloidæ, Tumores var- ii, Elephantiasis Ara- bica, Andrum, et Pe- darthoræ, Barbadoes Leg. &c.

well as the papules of prurigo, &c. These and other cases of a similar kind only go to prove that there are no constant characters, nothing absolute in nature, especially in morbid nature. Moreover, these instances of trans-

formation of one genus or species of cutaneous disease into another are only exceptions to a general rule, or accidental complications, which do not materially interfere with an accurate diagnosis.]



DIVISION I. Diseases of the Skin.	CHAPTER VI. Degenerations.	{ DEGENERATIONES FIBROSÆ. MELANOSIS. DEGENERATIONES TUBERCULOSÆ.
	CHAPTER I. Special Diseases of the Sebaceous Follicles.	{ Secretio aucta, Vermes sebacei, Levatio follicularis, Tumor follicularis, Calculi Folliculorum.
DIVISION II. Alterations of the Dependencies of the Skin.	CHAPTER II. Special Diseases of the Piliferous Follicles.	{ Atrophia, Defectus congenitus Pilorum, Pili supernumerarii; Incrementum insolitum Pilorum, Coactio Pilorum, Alopecia, Canities, Plica.
	CHAPTER III. Special Diseases of the Ungual Matrices and Alterations of the Nails.	{ Onychia, Vita Conformationis et Structuræ Unguium; Eechymosis subungualis; Incrementum insolitum Unguium; Situs insolitus; Ficus; Defectio, Degeneratio; Productio et Reproductio, &c.
DIVISION III. Foreign Bodies on the Surface, under, or in the Substance of the Skin.	Parasitic Insects infecting the Skin of Man.	{ Pediculi; Pulices; Acarus Scabiei; Filaria medinensis; Cestrus.

101. I may farther add the arrangement proposed by Professor J. H. BENNETT, of Edinburgh. He excludes from the orders *Exanthemata* and *Pustulæ* the diseases characterized by excessive fever, as being essentially febrile. From the order *Vesiculæ* he also removes miliaria and varicella, for a similar reason; and he expunges the order *Bullæ* altogether. With some other alterations, consisting chiefly of reductions of genera to the rank of species, he assigns the following as his classification of skin-affections. It will be seen that it is a modification, with several omissions, of the arrangement generally adopted of diseases of the skin; while in that which I have given above, I have comprised also the principal of those maladies which generally also affect or implicate the skin in a more or less obvious manner:

ORDER I. <i>Exanthemata</i> .	ORD. vi. <i>Tuberculæ</i> .
Erythema.	Lepra tuberculosa.
Roseola.	Lupus.
Urticaria.	Molluscum.
ORD. ii. <i>Vesiculæ</i> .	ORD. vii. <i>Maculæ</i> .
Eczema.	Lentigo.
Herpes.	Ephelides.
Seabies.	Nevi.
Pemphigus.	Purpura.
ORD. iii. <i>Pustulæ</i> .	ORD. viii. <i>Dermatozoa</i> .
Impetigo.	Entozoon folliculorum.
Ecthyma.	Acarus.
Acne.	Pediculus.
Rupia.	ORD. ix. <i>Dermatophytæ</i> .
Lichen.	Porrigophyte
Prurigo.	(Favus).
ORD. v. <i>Squamæ</i> .	Mentagraphyte
Psoriasis.	(Mentagra).
Pityriasis.	
Icthyosis.	

BIBLIOG. AND REFER. — *Hippocrates*, Opera Omnia, edit. Vander Linden, 8vo. Lugd. Bat., 1665, *pluries*. — *Celsus*, De Re Medica, 8vo, *pluries*. — *Galenus*, Opera, fol. Basil, 1562. — *Plinius Secundus*, Historia Mundi, 8vo, edit. Valpy. Lond., 1826, lib. xxxvii. — *Cælius Aurelianus*, De Morbis Acutis et Chronicis, 4to. Amstel., 1755. — *Arctæus*, De Causis et Signis Acut. et Diuturn. Morb. Boerhaavi edit., fol. Lugd. Bat., 1735. — *Ætius*, Tetrabiblos, &c., fol. Basil., 1542. — *Paulus Ægineta*, Opus de Re Medica, lib. i. Paris, 1532. (Distinguished *Lepra* from *Psoriasis*.) — *Rhazes*, in Medicinali Disciplina, ch. xxvi., fol. Venet., 1542. (Accurately described *Small-pox*, *Measles*, &c.) — *Avicenna*, In Res Medicas omnes, &c., fol. Venet., 1564. Lib. iv., fen. i., tr. vi. (Gives this, the earliest, diagnosis between *Small-pox* and *Measles*: “*Variola*, at an early period, presents an eminence or elevation above the surface: *Morbillus* is less elevated than *variola*, and approaches the eye less; it is attended by more lachrymation and less pain of the back.” He distinguishes also between *Seabies* and *Prurigo*.) — *Avenzoar*, De Rectificatione et Facilitatione Medicationis et Regiminis, fol. Venet., 1549. (The first to mention the *Acarus Scabiei*.) — *Theodorici Chirurgia*, fol. 1519. — *Gilber-*

*tus Anglicanus*, Laurea Anglicana seu Compend. totius Medicinæ, 4to. Lugd. Bat., 1510. (Described the *Leprosy* of the Middle Ages.) — *Torella*, De Pudendagra Tract., &c. In Aphrodisiacus Luisini, fol. Lugd. Bat., 1728. — *Fracastorius*, Syphilis, sive de Morbo Gallico, libri tres, 4to. Veronæ, 1535, et De Morbis Contagiosis, lib. ii., cap. 15. (He endeavours to show what diseases of the skin are contagious, and what non-contagious.) — *Guy de Chauliac*, Chirurgiæ Tractatus, fol. 1570. (He pointed out the several eruptions of the scalp, and was the first to show the contagion of Itch.) — *Vidius Vidius*, Ars Univers. Medicinæ, t. ii., cap. vi.; De Variolis et Morbillis. (Was the first to notice *Varicella*.) — *Fernelius*, Universa Medicina, fol. Colon., 1579. (Described Syphilitic eruptions, *Purpura*, &c.) — *Schenkius*, Observat. Med. Rarior., lib. vii., fol. Lugduni, 1644. (Alterations of the hair, cuticle, &c.) — *Sennertus*, Opera, t. iii., lib. v., pars 3tia; De Cutis, Capill. et Ung. Vitiis, fol. Parisiis, 1631. — *L. Joubertus*, De Affect. Pilorum et Cutis, 12mo. Genev., 1572. — *E. Compelongo*, De Morbis Cutaneis, l. iv., tr. iii. Paris, 1634. — *P. Accardius*, Tract. de Morb. Cutaneis, et omnibus Humani Corporis Excrementis, ex Ore H. Mercuriali, &c., 4to. Venet., 1572. — *J. Riolan*, Opera Omnia, fol. 1610, p. 547, De Morbis Cutaneis. (Divides skin diseases into *Pustulæ*, *Deformities*, and *Tubercles*.) — *Willis*, De Affectibus Cutaneis, eorumque Morbis, Opera Omnia, 4to. Amstel., 1682, p. 279. (Distinguishes two classes, with swelling and without swelling.) — *J. J. Mangeti*, Bibliotheca Medico-practica, fol. Genevæ, 1745. Cutis Morbi, t. i., p. 603, et seq. — *D. Turner*, A Treatise of Diseases incident to the Skin, 8vo. Lond., 1714. — *Anon.*, A Compendious Treatise of the Diseases of the Skin, by T. S., 8vo. Lond., 1724. — *T. Fuller*, Exanthematologia, or an Account of Eruptive Fevers, 4to. Lond., 1730. — *J. T. Klein*, Tentamen Herpetologica, 4to. Leid., 1755. — *J. C. Nyander*, Exanthemata viva (Linn. Amn. Acad., v.). Upsal, 1757. — *H. Haquenot*, Tractatus de Morbis externis Capitis, 8vo. Genev., 1759. — *S. Morand*, Réflexions sur la Gale dans l'Hôtel Dieu, 8vo. La Haye, 1767. — *D. Lysons*, Practical Essays (on Elm-bark in Cutaneous Diseases), 8vo. Bath, 1772. — *T. Aery*, Essay on the Nature and Cure of the Essera or Nettle-rash, 8vo. Whitehaven, 1774. — *A. C. Lorry*, Tractatus de Morbis Cutaneis, 4to. Par., 1777. — *D. Lysons*, Farther Observations on Calomel, &c., and on Elm-bark, 8vo. Bath, 1777. — *F. Spilsbury*, A Treatise on Gout, Scurvy, Leprosy, and other Cutaneous Eruptions, 8vo. Lond., 1777. — *H. F. A. de Roussel*, De variis Herpetum Speciebus, &c., 8vo. Cadorni, 1779. — *C. Strack*, De Crusta Lactea Infantum, 8vo. Franc., 1779. — *M. Poupert*, Traité des Dartres, 12mo. Par., 1784. — *J. J. Plenck*, Doctrina de Morbis Cutaneis, 8vo. Vien., 1776, 2d edit., 1783. — *C. Bertrand-Lagrezie*, Essai sur le Traitement des Dartres, 8vo. Par., 1784. — *E. Rigby*, An Essay on Animal Itch, and on Cutaneous Eruptions, 8vo. Lond., 1785. — *J. F. Carrère*, Traité de la Douce Amère dans les Dartres, 8vo. Par., 1789. — *B. de Sauvages*, Nosologia Methodica, 2 vols. 4to. Amstel., 1768, vol. i., p. 32. — *Retz*, Des Maladies de la Peau, &c., qui précèdent des Affections du Foie, 12mo. Par., 1790. — *S. H. Jackson*, Dermato-Pathologia; or, Practical Observations on the Pathology and Cause of Diseases of the Skin, 8vo. Lond., 1792. — *A. C. E. Mangor*, Underretning von Radesygens, &c., 8vo. Kopenh., 1792. — *M. Bem*, Mémoire sur la Décoction du Tabac employé au Traitement de la Gale, 8vo. Par., 1794. — *W. G. Pfifferkorn*, Ueber die Norwegische Radesyge und Spedalskhed, 8vo. Altona, 1797. — *A. Dufresnoy*, Des Caractères, du Traitement, &c., des Dartres, 8vo. Par., 1798. — *Vincenzo Chiarugi*, Delle Malattie Cutanee sordide in Genere

ed in Especie, 2 vols. 8vo. Firenze, 1790.—*J. Ruette*, Essai sur l'Elephantiasis et sur les Maladies Lepréuses, 8vo. Par., 1802.—*G. Alley*, Essay on an Eruptive Disease arising from the Exhibition of Mercury, 8vo. Dub., 1804.—*N. C. D'Audebert*, Des Exanthèmes épidémiques, &c., 8vo. Par., 1804.—*J. Derien*, Essai d'une Table Synoptique des Mal. de la Peau, 4to. Paris, 1806.—*A. Moriarty*, Description of the Mercurial Lepra, 12mo. Dub., 1804.—*F. Dobscha*, De Cute et de Morbis Cutaneis, 8vo. Jena, 1815.—*J. Klapp*, Chémico-physiological Essays on the Functions of the Skin, 8vo. Phil., 1805.—*R. Willan*, Description and Treatment of Cutaneous Diseases, 2 vols. 4to. Lond., 1805–7.—*J. L. Alibert*, Précis Théorique et Pratique sur les Maladies de la Peau, 8vo. Lond., 1810.—*W. Cooke*, A Practical Treatise on Tinea Capitis, 8vo. Lond., 1810.—*D. L. Suasso*, Specimen Variellæ atque Scarlatinæ, 4to. Amst., 1810.—*D. L. Suasso*, Specimen Rubæolarum et Morbillorum, 4to. Amst., 1810.—*A. Mathias*, The Mercurial Disease; an Inquiry into the Nature of the Disease produced by Mercury, 8vo. Lond., 1811.—*J. C. Gales*, Essai sur le Diagnostic de la Gale, &c., 4to. Par., 1812.—*T. Luzmore*, Observations on the Nature and Treatment of Tinea Capitis, 12mo. Lond., 1812.—*T. Bateman*, A Practical Synopsis of Cutaneous Diseases, 8vo. Lond., 1813.—*J. F. N. Jadelot*, Notice sur le Traitement de la Gale au moyen des Bains, &c., 8vo. Par., 1813.—*P. F. Percy*, Rapport sur une Nouvelle Mode de Traitement de la Gale, 8vo. Orleans, 1813.—*J. Wilson*, A Familiar Treatise on Cutaneous Diseases, 8vo. Lond., 1813.—*J. L. Alibert*, Descriptions des Maladies de la Peau, fol. Par., 1814.—*R. Willan*, A Practical Treatise on Porrigo and Impetigo, 4to. Lond., 1814.—*T. Bateman*, Delineations of Cutaneous Diseases, 4to. Lond., 1815.—*Chaussier and Adelon*, Dict. des Sc. Méd. (art. Peau), t. xxxix. Par., 1819.—*W. A. Haase*, De Exanthematibus Chronicis in universum, 4to. Lips., 1820.—*T. M. Kelson*, A few Hints relative to Cutaneous Complaints, 8vo. Lond., 1820.—*S. Plumbe*, A Practical Essay on Ringworm of the Scalp, &c., 8vo. Lond., 1821.—*C. H. Wilkinson*, Remarks on Cutaneous Diseases, 8vo. Lond., 1822.—*Lud. Ritter von Braun*, Ueber die Erkenntniss und Behandlung des Pemphigus, 12mo. Frankf., 1823.—*J. Frank*, Præxose Medicæ Universæ Præcepta, 8vo. Lips., 1815–25, Pars ii., vol. i., Doctrina de Morbis Cutis.—*T. Chevalier*, Lectures on the Anatomy and Functions of the Skin, 8vo. Lond., 1823.—*A. Clarke*, An Essay on Diseases of the Skin, 8vo. Lond., 1823.—*C. A. Bergmann*, Die Krankheiten der Haut, &c., 8vo. Lips., 1821.—*M. Kichhorn*, in Journ. des Progrès des Sciences Méd., t. iii., p. 88 (*Physiologia Cutis*); *ibid.*, t. vii., p. 79; *ibid.*, t. viii., p. 61; *ibid.*, t. ix., p. 55.—*Westrumb*, in *ibid.*, t. xi., p. 13, et Archives Génér. de Médecine, t. xxi., p. 113.—*Bostock*, Transact. de Med. Chirurg. Soc. Lond., vol. xiv., p. 424.—*P. J. Martin*, in *ibid.*, vol. ix., p. 52.—*H. Earle*, in *ibid.*, vol. v., p. 96, and vol. vii., p. 406.—*S. Plumbe*, A Practical Treatise on Diseases of the Skin, 8vo. Lond., 1824.—*P. Rayer*, Traité Théorique et Pratique des Maladies de la Peau, 2 vols. 8vo. Par., 1826–7. Translated by *R. Willis*, 8vo. Lond., 1835.—*Alibert et Biett*, in Journ. Hebdom. de Méd., t. liii., p. 289, &c.; t. iv., p. 43, &c.—*W. C. Dendy*, A Treatise on the Cutaneous Diseases incident to Children, 8vo. Lond., 1827.—*Lond. Med. Gazette*, vol. vi., p. 464.—*A. Cazenave*, *H. E. Schedel*, Abrégé Pratique des Maladies de la Peau, 8vo. Par., 1828. Translated by *T. H. Burgess*, 8vo. Lond., 1842.—*L. Hunefeld*, Die Radesyge, oder das Scandinavische Syphiloid, 8vo. Lips., 1828.—*L. A. Struve*, Synopsis Morborum Cutaneorum. Uebersicht der Hautkrankheiten (Lat. et Germ.), fol. Berl., 1829.—*A. T. Thomson*, Atlas of Delineations of Cutaneous Eruptions, 8vo. Lond., 1829.—*T. Bateman*, Synopsis, &c., with Notes by *A. T. Thomson*, 8vo. Lond., 1831.—*Paget*, On a Natural Classification of Diseases of the Skin, in Edin. Med. and Surg. Journ., vol. xxxix., p. 255.—*J. Green*, A Practical Compendium of the Diseases of the Skin, 8vo. Lond., 1835.—*L. A. Struve*, Synopsis Morborum Cutaneorum, fol., c. fig. Berlin, 1829.—*G. B. Fantonetti*, Trattato Teorico e Pratico dei Mali della Pelle. Milano, 1830.—*R. Hunt*, Synopsis of Diseases of the Skin, 12mo. Lond., 1838.—*R. Willis*, Illustrations of Cutaneous Diseases, with a Summary of their Symptoms, Diagnosis, and Treatment, folio, coloured plates. Lond., 1839.—*J. Eriksen*, On Diseases of the Scalp, plates, 8vo. Lond., 1842.—*T. Hunt*, Practical Observations on Diseases of the Skin pronounced intractable, 8vo. Lond., 1847.—*E. Wilson*, On Diseases of the Skin, 2d ed., 8vo, with plates. Lond., 1847.—Also on the Management of the Skin as a means of Promoting and Preserving Health, 2d ed., 8vo. Lond., 1847.—Portraits of Diseases of the Skin, fol., fascic., x. 1850.—*A. T. Thomson*, A Practical Treatise on Diseases affecting the Skin. Completed and edited by *E. Parkes*, 8vo. Lond., 1850.—*J. H. Bennett*, The Classification and Diagnosis of Cutaneous Diseases, in Edin. Month. Journ. of Med. Science. April, 1850, p. 340. See also the *BIB. and REF.* to the individual diseases of, or affecting, the skin.

[AM. BIBLIOG. AND REFER.—*Cazenave and Schedel*, Manual of Diseases of the Skin, with Notes and Additions, by *T. H. Burgess*. Revised and Corrected, with additional Notes, by *H. D. Bulkley*, M.D., 12mo. S. S. and W. Wood, New York.—*E. Wilson*, Am. ed. of Treatise on Diseases of the Skin. 1850.—*N. Worcester*, Synopsis of the Symptoms, Diagnosis, and Treatment of the more Common and Important Diseases of the Skin, 60 coloured figures, 8vo.—*S. Plumbe*, Am. ed. Practical Treatise on Diseases of the Skin, their Constitutional Causes and Local Character, &c., coloured plates, 8vo.—*P. Rayer*, Am. ed., Diseases of Skin. Phil., 4to.]

## SLEEP AND SLEEPLESSNESS.—CLASSIF.: GENERAL PATHOLOGY—SYMPTOMATOLOGY— THERAPEUTICS.

1. DEFINIT.—i. SLEEP.—*The suspension of sensation and voluntary motion, occurring at periodic intervals, continuing for some hours, then terminating spontaneously, or by some irritation or excitement, being indispensable to the due discharge of all the sensory, intellectual, and voluntary functions.*

ii. SLEEPLESSNESS.—*The non-recurrence of this periodic suspension of sensation and voluntary motion, or the imperfect or interrupted recurrence of it, as a symptom of disease, or as the chief manifestation of disease.*

2. I. SLEEP is necessary to the due discharge of the sensory, intellectual, and voluntary functions for any considerable period; and if wakefulness be much prolonged beyond eighteen or twenty hours, even during states of excitement or anxiety, an overpowering disposition to sleep is experienced; although powerful constitutions, on trying occasions, may continue awake for much longer periods. The organic functions, or those functions which are actuated by the organic, nervous, or ganglial system, and which consist chiefly of digestion, assimilation, circulation, nutrition, and secretion—all these functions commonly termed involuntary—require not the suspension or repose constituting sleep, which, if extended to them, would soon terminate life. But these functions are performed—at least some of them—with less activity during this period. Sleep is not only indispensably requisite to the adequate discharge of the functions performed by the cerebro-spinal nervous system, but is also necessary to the due nutrition of this system—to the due supply of the waste of nervous power, and even of intimate nervous organization, required for the healthy performance of the functions of this system. While the ganglial nervous system, on the one hand, discharges its functions through the media of the several organs actuated by it almost continuously, and without marked repose or waste of substance or structure, the cerebro-spinal nervous system, on the other hand, demands periodic or alternate repose and action, in order to insure its healthy function and organization, and to prevent excessive exhaustion and waste.

3. The restoration of cerebro-spinal nervous power consequent upon sleep has been, by some physiologists, attributed to the due nutrition of the cerebro-spinal organs during this period, as much as to the suspension of exhaustion and waste, this restoration and nutrition being requisite in proportion to the antecedent waste, which, if not duly restored, successively increases until the intimate organization of these nervous centres ultimately undergoes irreparable and tangible change. In early age and during manhood, the voluntary actions and mental exertion may be continued during comparatively long periods



without exhaustion, for nutrition, or the restoration of the nervous expenditure, is then more rapid and complete than in advanced or old age; whereas, at this age, these efforts, especially such as are of a very exhausting nature, are followed by a more prolonged and a more urgent want of repose; and if repose be not obtained, disease, or even disorganization, more especially inflammation, in the earlier epochs of life, and apoplexy and paralysis in advanced age, may speedily supervene. Thus we observe that when, in advanced life, mental exertion, bodily fatigue, or venereal indulgences are carried too far, the disposition to sleep is most urgent, and, if the required repose be not obtained, the risk from the supervention of these maladies becomes great.

4. The seat of consciousness, or of active sensation, has been long since supposed by some writers to be different from that of the mental faculties; and it has been believed that, while the former is in the central and basilar parts of the brain, the latter are to be referred to the convolutions of the hemispheres. During sleep, therefore, the more central parts, the seats of sensation, are altogether inactive, or incapable of feeling or perceiving impressions made upon the senses, and thence conveyed to those parts, unless the impressions be so strong as to rouse them to a state of activity; but while sleep consists of the inaction or repose of these parts, and of the hemispheric convolutions as well, when sleep is complete or profound, a less profound form of sleep consists of a less complete state of inaction of both the hemispheric convolutions and the central cerebral structures. This latter, or imperfect state of sleep, comprises numerous phases or grades from that attended by indistinct *dreams*, through the various states of *dreaming*, until the half-waking and half-sleeping state is reached.

5. During *dreaming*, the structures of the brain more especially concerned in the mental manifestations are not completely or entirely in a state of repose, nor can it be admitted that the seats of conscious sensation are also completely or profoundly inactive, otherwise the former manifestations could not be perceived or remembered by the latter. It will be, therefore, more correct to view the several portions of the brain concerned in sensation, mental manifestation, and volition, as not completely, although more or less, inactive during sleep, unless the sleep be very deep, and altogether without dreams; for more frequently, especially when the dreams are distinct, and are recollected upon awakening from sleep, certain parts of the brain continue more or less active, repose not being universal and complete. Dreaming during sleep in health may be rendered more vivid and remarkable by the excitement of the brain during the various mental or physical exertions of the day, or by the nature of the food or drink, or by disorders of the digestive functions, the imagination and reasoning powers being either partially or actively exercised, and the results of these being remembered when waking. This partial or irregular activity of the hemispheric portions of the brain during sleep is often still more strongly manifested during the imperfect sleep of fever, and is even expressed more or less audibly and actively; those suggestions, conceptions, and unconnected ideas, constituting dreams in health, passing into more or less manifest delirium in states of disease. Thus

various grades of sleep and of dreaming may exist either occasionally or habitually during the ordinary health of the individual; and thus, during disease, various grades or phases of delirium, passing into sopor, lethargy, and coma, may occur, as the states of nervous power and of the circulation may favour their appearance.

6. During sleep, especially when it is not profound, the sensorium may be influenced in various ways, so as to give rise to changes of position, to various conceptions, and even to acts, without a conscious perception of them. An uneasy position, or the muscular sense, may occasion during sleep a complete change of position—a person may turn from one side to the other, without being conscious of either the cause or the act of turning. In this case, the uneasiness influences the sensorium, or induces an unconscious sensation sufficient to give rise to a similarly unconscious volition productive of the act, but there is no perception of it. During dreaming, the conception of numerous occurrences, circumstances, and acts passes through the mind with greater or less rapidity, and generally in a very incongruous and unconnected manner. The various processes of thought which had engaged the waking brain are often partially renewed or suggested during sleep, or while the mind is unconscious of impressions on the senses, frequently in singular forms, or with inconceivable rapidity, or in disjointed or impossible states; these suggestions or conceptions being, however, sufficiently strong, in many cases, to excite conscious sensation, so far, at least, as to be partially remembered on waking.

7. These suggestions seldom amount to perfect conceptions, but are loose and unconnected, generally faintly entertained, and soon extinguished. They are the results of imperfect or disordered states of repose of the parts of the brain more especially concerned in the mental processes. They may occur without any excitement or stimulus of the senses, or of parts distant from the brain, as apparitions merely of anterior processes of thought or of acts, in partial or newly-combined and bizarre forms, without any circumstance which can account for their appearance; and they may assume the most lively characters, and be attended by more or less correct reasoning, and by the highest flights of imagination. But in some instances they may be referred, with great accuracy, to antecedent occurrences, occupations, or mental processes, of which they are the imperfect or distorted remains or apparitions, although sometimes the most lively or intense, but also the most incongruous conceptions. In other cases they are excited by local impressions, or irritants, or changes which sympathetically affect the brain, so as to give rise to those conceptions which constitute dreams, or even to acts which those conceptions occasion. Thus the irritation of the bladder may give rise, during sleep, to conceptions connected with micturition, and this act may even follow without waking, although it generally immediately terminates the sleep. Thus, also, irritation of the vesiculæ seminales produces lascivious dreams, and not infrequently is followed by seminal emission. Various internal excitants, moreover, or external agents, acting during sleep, may be followed by dreams having a more or less obvious connexion with the causes which produced them; the impressions made by such agents calling up

certain related, although incongruous or disjointed conceptions in the sensorium.

8. The conceptions arising in the manner now explained—either with or without any obvious excitant or physical cause—may be so slight and evanescent as hardly to be remembered upon awaking, and as not to occasion any change of position, or any act implying volition, of either a conscious or unconscious kind. But not infrequently the conceptions formed during sleep, when lively or active, give rise to volition, and are followed by acts. The individual aets the dream, or performs the conception passing through his mind, without being so conscious of his act as to remember it when he awakes, or when the functions of sense and perception are fully restored. This constitutes *somnambulism*, or sleep-walking, a state of partial or imperfect sleep, which has been sufficiently noticed, in respect of its nature and relations, when treating of the *pathology of PARALYSIS* (see § 193, *et seq.*)\*

9. *Sleep*, that it may be refreshing and restorative to both body and mind, should, 1st, take place at a stated and proper hour, and after stated intervals; 2d, continue for a certain period of time, without being prolonged much beyond that time; 3d, be aided by the necessary preparations to secure ease of position, and to prevent disturbance of the vital and animal functions. When sleep is obtained without these precautions—when it occurs at unseasonable hours—when it is broken or unusually shortened—when it is taken on a loaded stomach, or after the ingurgitation of heating or stimulating beverages—when the position of the body is unusual, cramped, or uneasy—when the stomach or bowels are distended by flatulence, or irritated by acidity, then it is either disturbed or unsound, unrefreshing; the body and mind are left, on waking, either languid or torpid, and the requisite exertions or engagements of the following day are entered upon with disrelish, and are soon productive of fatigue.

10. To secure refreshing sleep, a sufficiently early and a punctual period of retiring to repose

should be adopted, after having spent a reasonable period in the open air, chiefly in exercise suited to the state and constitution of the individual. The diet should be digestible and moderate in quantity, and such as will not favour flatulency or acidity. Repose ought not to be taken for some hours after a full meal, and the place in which it should be sought ought to be airy and dry, the temperature being not above 70° of Fahr. or below 55°. The bed should be firm and moderately elastic, slightly elevated towards the head, and the clothes, both above and under the person, sufficiently warm and light. All the day-clothes should be taken off. The chamber ought to be large and airy, and light and noise excluded. If air be not sufficiently renewed in the sleeping apartment, sleep becomes feverish or restless, and the individual awakes unrefreshed and uncomfortable.

11. The *amount* of sleep should vary with the age, the occupation, the constitution, and the habits of the individual. During infancy and childhood, prolonged periods of sleep are required for the nutrition of the nervous masses and the growth of the body. Infants sleep the greater part of the twenty-four hours. Children require twelve or fourteen hours; older children, or those from eight years until fourteen or fifteen, about ten hours. From commencing puberty until full growth, or from twenty-five to thirty, eight hours are sufficient. After this age, the duration of sleep should range from six to eight hours, according to the occupations or exertions, mental or physical, of the individual.

12. The *causes of sleep* are not only the fatigue, the exhaustion, and the periodicity characterizing all our sensorial actions and manifestations already insisted upon as requiring restoration and reinforcement of nervous power during the periods of repose, but also various states and phenomena which act more or less on the sensorium of those who are either incapable or not in a situation of having recourse to those mental or physical operations which more certainly conduce to repose. The entire *absence* of sensorial impressions, or the *monotonous repetition* of such impressions, will frequently occasion sleep, as occurs when listening to a drawling, monotonous reader or preacher, or to distant sounds of unvarying loudness. Persons who have become accustomed to sleep, notwithstanding the continuance of sounds which would keep the unaccustomed awake, frequently cannot sleep when deprived of these sounds, or when removed to perfect stillness, or when they are within the reach of sounds of a different intensity or key. Friction of various parts, especially in nervous or susceptible persons, prolonged combing of the hair, monotonous sounds of any kind, continued and gentle motions of the body in the same directions, rapid transport of the body backward, or with the back placed towards the place where the body is carried, as when thus seated in a carriage, or on a railway, and directing the mind to uninteresting objects or matters, severally induce sleep, especially when other circumstances concur in causing this effect. There are, moreover, other causes which produce sleep, and which may be viewed as pathological, inasmuch as they are more or less morbid in their consequences or nature: they require merely enumeration. Venereal excesses may occasion sleep, lethargy, or sopor, especially in the aged; extreme exhaustion of the organic

\* [Under this head it may not be irrelevant to allude to a class of phenomena, now generally recognized by physiologists, and which have been sometimes erroneously called mesmeric. They are, 1st. A state of complete *coma* or perfect insensibility, analogous to hysteric coma, and usually distinguished from the coma of cerebral oppression by a constant twinkling movement of the eyelids. In this condition some surgical operations may be performed without any consciousness on the part of the patient. 2d. A state of *somnambulism* or sleep-walking, which may present all the varieties of the natural *somnambulism* from a very limited awakening of the mental powers to the state of complete double consciousness, in which the individual manifests all the ordinary powers of his mind, but remembers nothing of what has passed when restored to his natural waking state. This state of *somnambulism*, in the form which it generally takes, is characterized by the facility with which the thoughts are directed into any channel which the observer may desire by the principle of "suggestion," and by the want of power on the part of the *somnambulist* to apply the teachings of ordinary experience to the correction of the erroneous ideas which are thus made to occupy the mind. 3d. A frequent phenomenon of this condition, and one which has its parallel in natural *somnambulism*, is a remarkable *exaltation of one or more of the senses*, so that the individual becomes susceptible of influences which, in his natural condition, would not be in the least perceived. 4th. In this condition, also, the *muscular system* may be excited to action in unusual modes, and with unusual energy. And, lastly, it is maintained by some physiologists, as Dr. ELLIOTSON, that various effects may be produced upon the *organic functions* by what is called mesmeric influence, and thus that it may exert an important curative effect. More extended observations, however, are required before any such curative influence can be admitted as established.—(*Carpenter's Principles of Human Physiology*, Am. ed.)]



nervous and cerebro-spinal energies; a plethoric state of the brain, or of the vascular system generally; the superabundance of excrementitious materials in the blood, or an imperfect oxydation of this fluid; the administration of narcotizing substances; and various related morbid affections, induce sleep, either excessive as respects its continuance, or of a disordered or unrefreshing kind (see *art.* COMA and LETHARGY).

13. *The accession of sleep* is very different in different persons, or when sleep supervenes naturally and healthily, and when it is induced artificially, or assumes more or less of a disordered character. Healthy sleep may occur either suddenly or gradually. Disordered sleep is generally slow and partial in its accession. The sensorium gradually loses its control over the current of the ideas, which becomes unconnected and incongruous; and in this state of transition—of half sleeping and half waking—a dreamy, or even a delirious existence is passed for a longer or shorter period, until an entire loss of sensibility of external objects—a more complete torpor of the sensorial parts of the brain—supervenes, and sounder sleep is induced. The disposition to and indisposition from sleep are very much in the power of the individual, for, by abstracting the mind from all objects of sense, and from the suggestions or ideas they excite, by ceasing every phase or mode of volition, and by ceasing to think upon or respecting any topic requiring mental exertion, or calculated to occasion mental excitement, or by directing the attention to, and fixing it on, a single, uninteresting, unexciting, or simple object, and engaging the thoughts with no other, the sensorium will soon lapse into that state of torpor productive of sleep.

14. The accession of sleep is often attended by various morbid phenomena, especially in persons predisposed or subject to any nervous, or spasmodic, or paralytic affection. These consist chiefly of startings, twitches, contractions, or cramps of one or more limbs or muscles; of convulsions and spasmodic laryngeal disorders, or croup, in children; of epileptic fits, more or less complete, or merely slight or partial, and even of various mental and spectral illusions. Any of the foregoing may occur upon the accession of sleep, and before sleep has become complete, or immediately upon falling asleep; or during the commencement of sleep, when sensation is partially or suddenly excited by any excitant or disturbing cause.

15. *Awakening from sleep* may be either sudden or gradual. The healthy and sufficiently sound and prolonged sleep terminates spontaneously and immediately, leaving the person who has enjoyed it refreshed and active; or if it be terminated by impressions made upon the senses, these impressions produce this effect readily and completely—an effect not observed from them when the sleep is of that morbid kind which constitutes lethargy, stupor, sopor, or coma, in its several morbid grades. Disordered, unsound, or insufficient sleep generally passes into that state of half sleeping and waking noticed above (§ 4), and, according to the circumstances causing the disorder or unsoundness, is attended by the dreamy, or even by the delirious states of temporary existence just mentioned, until stronger impressions on the organs of sense, or diminished torpor of the sensorium—the increased activity of the sensorial or conscious portions of the brain

—are followed by the restoration of the several manifestations or functions of this organ.

16. *Sleep may be excessive:* 1st. As respects its duration; 2d. As regards its profound character, and the difficulty of arousing the person from it; and, 3d. In the frequency of its recurrence. These are diseased states, and either amount to one or other of those described under the heads COMA and LETHARGY, or generally pass into one or other of them, if not soon arrested by a treatment appropriate to the exciting and pathological causes which occasion them. Too profound or prolonged sleep should always excite suspicions of a disposition to, or the actual presence of, cerebral congestion, owing either to nervous exhaustion, or to a morbid state of the cerebral circulation, or to an interrupted return of blood from the brain, occasioned by pulmonary or cardiac engorgements, or to a morbid state of the blood itself. To one or other of these morbid conditions, excessive or deep sleep, especially when amounting to lethargy or sopor, may be imputed, the existence of either condition, or of more than one, generally becoming manifest upon a careful examination of the case.\*

## 17. II. SLEEPLESSNESS — Wakefulness —

[\* A very remarkable case (*Cataportha of Good*) was exhibited in the city of New York, in the summer of 1853, in the person of a man named *Cornelius Vroman*, who was said to have slept five years, with intervals of wakefulness amounting to not more than three days in that time; the longest period being sixteen hours. He lay like a person in ordinary sleep, the eyes nearly closed, but rolled upward, with a quivering of the eyelids, and resistance to opening them, with rigidity and fixedness of the muscles of the limbs, as in catalepsy, or artificial somnambulism; respiration rather slower than natural, breathing slightly stertorous, pulse some seventy-five strokes in the minute, soft and weak; mouth slightly opened, with spasmodic contraction of the muscles on attempting to open it by force. The body was very much emaciated; the arms folded upon the breast, and any attempt to remove them strongly resisted. The muscles generally were rigid and tense when the effort was made, and it was impossible, without violence, to change the position of the limbs. When placed erect on his feet, it required some moments to balance him exactly, but afterward he retained the same position, as in catalepsy, and once for three days at a time. He was a farmer, from the town of Clarkson, New York. In June, 1848, he employed a physician for pain in the stomach and head, which gradually resulted in a disposition to sleep, until it was impossible to wake him. Wakeful intervals of short duration would occasionally occur, but of late once only in about six weeks; and when awake, he seemed totally unconscious of his peculiarity. He then straightens himself up, and walks as limberly as others. His diet has consisted chiefly of milk, which has to be administered by prying open his jaws as in *trismus*. Once he went without food for five days, during which there was no change in his symptoms. When the seizure commenced, his weight was 100 pounds; in October, 1853, it was but 90. Height 6 feet 2 inches. Urinary secretion high coloured, of about the normal quantity, and discharged once or twice a day, and not involuntarily. Alvine evacuations very scanty, occurring only at intervals of from six to twenty days. He had been subjected to various treatment, as bleeding, setons, issues, blisters, tonics, stimulants, &c., but without any effect.

We have called this a case of Lethargy, or *Cataportha* of Dr. Good, of which he has given an example that continued five years, in the person of a young lady eighteen years of age, whose mind had been previously in a state of great anxiety; the remissions recurred irregularly twice or three times a week, and rarely exceeded an hour or two; during these periods she sighed, ate reluctantly what was offered to her, had occasional gesticulations, and instantly relapsed into sleep. In the case, however, that we have related, were combined the symptoms of *ecstasy* ("total suspension of sensibility and voluntary motion; mostly of mental power; pulsation and breathing continuing; muscles rigid; body erect and inflexible."—*Good*), with the most prominent ones of *cataplepsy* ("the limbs and body yielding to and retaining any given position"). The disease resulted fatally in November, 1853, having continued from the 19th of June, 1848.]

*Ἀγρυπνία*—*Insomnia*—*Pervigilium*—is a symptom of disease, but it sometimes is also a forerunner of the worst forms of disease, or occurs before any very obvious disorder can be recognized. An interrupted sleep, or a more or less incomplete form of wakefulness—states of partial sleeplessness—may occur in consequence of too varied or too anxious states of mental occupation, or of the use of various beverages, or indigestible articles of food, near the period of repose, which prevent the accession of sleep, as green tea, coffee, &c. But when it is not induced by any of these causes, and even when the wakefulness occasioned by them is complete, it should be considered as a most important symptom, and its pathological cause ought to be carefully investigated. *Wakefulness* may be either *partial* or *complete*: the former may be so frequent as to be habitual, or merely occasional; the latter cannot be of long continuance without being followed by dangerous disease.

18. *i. Partial or incomplete sleeplessness* is of frequent occurrence, especially in persons whose minds are much and anxiously engaged, or whose occupations subject them to great mental exertion, or to the vicissitudes of fortune. It may likewise follow the unreasonable indulgence of grief, severe losses of any kind, and the numerous vexations and disappointments of life. When it is continued nightly for a long period, it may superinduce serious disease of the brain, or of the heart, or some other organ, as the cause of the wakefulness may operate upon the frame; the nature of the cause having a more or less special influence upon either the brain, heart, lungs, liver, &c., according to the susceptibility or predisposition of these organs. Partial insomnia is often occasioned by sleeping with too many clothes on the bed, or by the use of curtains to the bed, and to the closeness with which they are drawn, or by an insufficient renewal of the air in the sleeping-chamber. These causes, especially the breathing of an impure or self-contaminated air, induces a febrile state, attended by headache, restlessness, and more or less complete pervigilium, the tongue and mouth being foul and clammy in the morning, and the person unrefreshed, or even much more fatigued and disordered than when repose was sought.

19. Partial sleeplessness has always a most intimate relation to the states of morbid action, and, according to these states, is attended by peculiar features. The sleeplessness may be occasioned, or the sleep may be broken, interrupted, or unsound, by indigestion, flatulence, or acidity of the stomach or bowels, or it may be disturbed by cramps or spasms of various muscles. This association is often observed in gouty and dyspeptic persons: the irritation of the *prima via* by flatus, acidity, or undigested articles disorders the ganglionic nerves, and, through the medium of them, disturbs the sleep, excites the brain and spinal chord, the irritation thus extended to these centres being, in some cases, reflected from them to one or more of the muscles of voluntary motion, occasioning spasm or cramp. When wakefulness proceeds from the disordered digestion consequent upon indigestible articles of food, or upon an overloaded stomach, there is not merely more or less restlessness, but also often a feeling of oppression, a disposition to sleep, which, when it takes place, is generally attended by disturbing or fearful dreams, or by the nightmare, the indi-

vidual waking up in fright, with a dry mouth and excited pulse.

20. When this state of sleeplessness is occasioned by mental exertion, or by continued mental rumination, when retiring to rest, on the subjects which have just before engaged the mind, whether these subjects be abstract or emotional—whether they be intricate or difficult in their nature, or calculated to perpetuate anxiety or distress—then feverishness, headache, restlessness, thirst, &c., are apt to occur, and to render sleep, when it at last takes place, unquiet, disturbed by dreams, and unrefreshing. In some cases of this kind, more especially, the person often dreams aloud, and, in rare instances, particularly when there is much nervous susceptibility and mental activity, he *acts his dream*, and evinces a more or less complete state of *somnambulism*, or *sleep-walking*. A youth, whom I knew, was much engaged in becoming an accomplished player on the flute; his dreams had frequent reference to this study, and he often disturbed the family by his performances on this instrument during his sleep. I was called one night to a young lady, who had disturbed and alarmed her relations by walking through more than one of her apartments in her night-dress, singing some songs she had been recently practising. And another young lady, whom I saw on this account, sometimes left her chamber in her sleeping-dress, and sat down to the piano in another room and performed some pieces of music which she had been learning. Females, who are somnambulists, generally first evince this disorder either at the period of puberty, previously to, or about, the accession of the catamenia, or where this discharge is interrupted or otherwise deranged.

21. Persons labouring under disease of the substance or valves of the heart are subject not only to imperfect and disturbed sleep, but also to fearful dreams; and if they fall asleep in an uneasy position, or on the left side, in some cases, they generally waken up soon after from a fearful dream, as falling from a precipice, drowning, &c.; their dreams being more pleasant when the position is more comfortable. The same phenomena are often observed in dyspeptic subjects, when the stomach or colon is distended by flatus; for, when the individual lies on the left side, the weight of the body presses on it, while the liver presses on the stomach and colon, and the flatulent distension of these pushes the diaphragm upon the heart, and embarrasses the circulation through this organ.

22. There are very few chronic diseases of which partial wakefulness is not a symptom; but it is more especially distressing in atonic gout, rheumatism, affections of the skin, and disorders of the urinary organs. Anomalous states of hysteria, the several forms of dyspepsia, and derangements of the functions of digestion, are, as well as the foregoing, attended by partial wakefulness, or by a disturbed, insufficient, and unrefreshing sleep. Certain beverages and articles of diet may be the chief cause; and when these are relinquished, the sleep becomes more sound. Tea, especially green tea, coffee, and spirituous liquors, often occasion wakefulness; and a full meal of animal food, especially of pork, late in the day, often causes either restlessness, loss of sleep, or disturbing dreams. It would be unprofitable, as it is unnecessary, farther to notice the contin-



gent occurrence of want of sleep in chronic diseases, as it is very generally observed and readily accounted for.

23. ii. *Complete sleeplessness* is often a most important symptom of disease, and when it occurs without any manifest physical disorder to account for its existence, it should be viewed as the forerunner of dangerous disease, particularly of the brain. Complete wakefulness, even for many nights, is generally attendant upon nervous and other fevers of a continued type, upon inflammations of the brain, and upon inflammatory affections of an acute character. It also attends the eruptive fevers, rheumatic fevers, delirium tremens, the gouty paroxysm, painful and spasmodic maladies, and pestilential distempers. When it is continued for many nights and days, vital power and resistance become exhausted, and delirium, followed by coma, is very apt to supervene. All acute diseases attended by febrile excitement or increased vascular action, especially towards or during the night, are characterized by a more or less complete insomnia; and when the febrile action subsides, then sleep returns, the occurrence of sleep often proving critical of these diseases (see *art. CRISIS*).

24. When insomnia is not followed by sound repose after a long continuance, it often passes into a state of half sleeping and half waking, in which the ideas of the patient are rapid, unconnected, and otherwise disordered, and generally expressed aloud, or in a low key. He dreams aloud in this half-conscious condition; or becomes more obviously delirious. The slighter forms of this delirium have usually been called wanderings of the mind, and at first they appear only occasionally, or during the night merely; but, when they are not soon followed by composed sleep, are apt to be more continued, more fully developed, and to pass ultimately into sopor or coma.

25. If wakefulness is unattended by any very manifest disorder, or even by slight disorder, or such as appears insufficient to account for it, some serious disease of the brain should be viewed as impending, although a considerable time may elapse before the advent of it. In these cases, the symptoms more especially connected with the nervous systems should be carefully investigated, in connexion with the occupation, habits, modes of living, arrangements for sleeping, ventilation, &c. The temperature of the head, action of the carotid arteries, the functions of sense, and those of digestion, assimilation, and excretion, ought to be carefully examined, and a treatment based on the report thereby obtained should be adopted. A dignitary of the Church consulted me for prolonged insomnia. He evinced no other disorder. Palsy, or apoplexy, or coma was dreaded, and the treatment was directed accordingly. He was soon very much better, and continued so for two or three years, during which time I did not see him; but at the termination of it he was seized with apoplexy, at a great distance from London, and died in a few hours. An eminent physician and author was afflicted with insomnia, he afterward became insane. A patient to whom I was called had long been subject to wakefulness, and was afterward attacked with phrenitis.

[There is a form of sleeplessness which is often the precursor of insanity. Sometimes, perhaps generally, it is accompanied by the well-known symptoms of incipient mental derangement, and, unless it is relieved, confirmed insanity is very

sure to follow. Diligent inquiry should in all cases be made as to its causes, and the most effectual and prompt measures resorted to for their removal. An aperient, followed by a full dose of a suitable narcotic, repeated according to circumstances, will often succeed in overcoming the watchfulness.]

26. *Pervigilium* is not infrequent in nervous females, after their confinements, especially when they breathe a close or impure air, or when they have experienced hemorrhagic or exhausting discharges. It may pass gradually, or even suddenly, into delirium or mania, if not arrested by an appropriate method of cure. I have been called to several cases of this kind, where the disorder was aggravated by a treatment diametrically opposite to what ought to have been adopted, and which, when adopted, speedily cured the patient. This is a most important affection in the puerperal state, and should, even when attended by no other manifest disorder, receive constant attention, and suggest the most decided and appropriate means of cure—appropriate, however, to the various circumstances which occasion it, to the several associations in which it is presented to us, and to the maladies of which it is either the precursor or the attendant.

27. *Insomnia* is sometimes met with in young and even in older children: in them it should be viewed either as the precursor of serious disease, or as caused by some latent or undeveloped morbid condition. It not infrequently precedes or attends disease of the membranes or substance of the brain, especially tubercular deposits in the former, or softening of the latter, before serous effusions take place to any considerable amount; or it accompanies the earlier and more latent stages of these lesions.

28. iii. *The treatment of insomnia* should be altogether based upon those indications of cure which the disease of which insomnia is symptomatic, or of which it is the precursor, should rationally suggest. It is owing chiefly to a neglect of this principle that means, directed more particularly to this symptom, either fail of producing their intended effects, or even often greatly aggravate this particular disorder. In all cases of insomnia, attention should be directed to the age, temperament, habit of body, modes of life, and diathesis or morbid tendencies of the patient, before measures should be prescribed for the disorder, and these measures ought to be especially devised against the disease on which the wakefulness depends. A principal indication is to remove the several causes, remote, external, physical, and pathological, which occasion it, more particularly to correct a close or contaminated air; to reduce the temperature of the apartment when it is high, and the quantity or warmth of the bed-clothes; to remove all the excitants of the senses; to abstract the mind from all exciting, harassing, or engaging thoughts, and to direct it to such as are uninteresting or unexciting—to one simple, unimportant topic; and to remove or counteract the morbid conditions, of which this is a symptom or prominent consequence. In both young and aged subjects, but especially in the dyspeptic and gouty, the accumulations of disordered secretions and excretions—of fecal or contaminating matters—of flatus, of acid or saburral materials—or a loaded state of the stomach or bowels, are apt to take place, and require free evacuation and correction

by laxatives, conjoined with antacids and absorbents. The existence of a plethoric state of the vascular system, or of engorgement of the liver and portal system, should suggest a repeated recourse to purgatives, deobstruents, and alkaline preparations.

29. When there is actual fulness of the cerebral vessels, or cerebral congestion, then local vascular depletions, purgatives, derivatives, the shower-bath, warm stimulating pediluvia, &c., should be prescribed; and, if the insomnia appears to be caused by increased vascular action, or by febrile disturbance towards night, or by augmented determination of blood to the brain, antimonial preparations, or other diaphoretics, conjoined with alkalies, &c., will generally procure sleep, while narcotics, exhibited in such cases, would only aggravate the disorder, induce headache, and increase disorder of the digestive functions.

30. Anodynes and narcotics should not be exhibited in cases of either incomplete or prolonged wakefulness, until general plethora or local congestions be removed by the means now suggested—until morbid secretions, excretions, and faecal accumulations have been completely evacuated. But they are important means after these ends have been attained, and when this disorder occurs in nervous, hysterical, or irritable temperaments; when it follows copious losses of blood, or exhausting discharges, and when it is thus met with in the puerperal state. In these circumstances, the choice of the agent should depend upon the peculiarities of the case, upon the existence or non-existence of anæmia, and upon the evidence as to the purity or richness of the blood, and as to the actions of the several emunctories. When there is anæmia, or great debility or nervous susceptibility, the preparations of opium, or of hop, or of henbane, or of poppy, with those of iron, or the vegetable bitters and the alkaline sub-carbonates, will generally be of service; but all narcotics in such cases should be given two or three hours before the desired period of their operation, more particularly opiates; and, in order to secure their effects, and to prevent headache, sickness, or other disorder in the morning, they should be combined with aromatics and alkalies. In some cases, it may be preferable to administer the narcotic in a suitable enema or suppository; or the odour of it may be inhaled during respiration, by lying with the head on a pillow containing a narcotic substance, as hops, &c.

31. When sleep is disturbed by cramps, nightmare, frightful dreams, &c., the bed should be elevated towards the head, and acidity of the prima via and costiveness ought to be prevented by magnesia, either alone or with sulphur, or with an antimonial preparation; and food should not be taken for several hours before retiring to rest. Persons who are subject to partial wakefulness, or to troublesome dreams, or to sleep-walking, should be submitted to the curative means now advised, adapting these, however, to the peculiarities of each case. Due exercise in the open air, attention to the digestive functions, and a common-sense regulation of the moral manifestations and physical powers, will generally aid the effects of appropriate medical treatment. In all cases, the use of substances or beverages which are liable to disturb the digestive functions, to occasion heartburn or flatulence, or to excite the nervous system, more especially during the ad-

vanced hours of the afternoon or evening, the reading of exciting writings late in the evening, and reading in bed, more particularly, should be avoided; and, if wakefulness or disturbed sleep occur in persons who are addicted to these practices, it should, in great measure at least, be attributed to them, and the relinquishment of them ought to be insisted on.

[*Incubus*, or *Nightmare*, deserves mention in connexion with sleep. It is an affection so distressing, and yet so obscure in its nature, its pathology so little understood, that, though passed over in silence by most writers on practical medicine, it is worthy of special consideration.

*History*.—By some writers *incubus* has been confounded with other nervous diseases, and regarded, as by GALEN, as a form of *epilepsy*. By many of the ancients, however, it was attributed to the visitation of an *evil spirit*, or to satyrs and fairies: hence its name, *Incubus*. The idea that it was owing to demons, witches, and evil influences, prevailed down to a late period; and in our own country, especially in its early history, the victims of nightmare were supposed to be possessed or bewitched, and hence relief was only sought through the mystic rites of witchcraft.

*Symptoms*.—*Incubus* is characterized by an oppressive sense of suffocation in the præcordia and chest, coming on during sleep, continuing only for a short time, and which is completely overcome by a few deep inspirations. If the disease attacks during profound sleep, the powers of articulation and voluntary motion are often completely annihilated, and the individual is impressed with the image or idea of some object compressing his chest. There are, however, many variations in the mode of attack, according to its violence and the condition of the individual at the time, although, in every form, it is attended with the most horrible or painful sensations. A person may retire to bed apparently in perfect health; after a while, perhaps, he dreams, and experiences variable sensations, which, however, are all dispelled by the consciousness that he is in bed. All of a sudden he experiences a heavy weight on his breast, creating an urgent sense of suffocation, and, vainly endeavouring to remove it, he attempts to cry out, but his voice fails; he makes an effort to move, but not a fibre of his muscles yields obedience to the calls of volition. The feeling of suffocation increases every minute, and the condition of the individual is rendered more distressing by the delusion that takes possession of his dream—that a giant, an old hag, a dog, a bear, &c., is mounted upon his breast, and is the cause of his distress. The difficulty of respiration constantly increases, and, after repeated efforts to speak, he finally succeeds in giving utterance to slight, deep groans, which call the attention of other individuals, or he is awakened by the sound of his own voice, together with his feelings of extreme suffering. With the first deep and free inspiration every sense of suffocation and uneasiness is removed, the patient falls into tranquil slumbers, and awakes in the morning refreshed and invigorated, and without any unpleasant sensation remaining. The only reminiscence he retains of the events of the night is the image of the illusory object which pressed him in his sleep, and this, with the very credulous, is often magnified into the importance of a real phantom. Such are the usual phenomena



of a mild attack. In severe cases the sufferings of the individual are much more distressing. The attack may come on soon after closing his eyes in sleep, with slight spasms in the upper or lower extremities, a more or less intense constriction about the neck, and shocks, like those of electricity, through the body; the epigastrium is tender and sensitive to the touch, the pulse small, irritated, and jerking, the respiration impeded by the apparent existence of some obstacle to the ready descent of the diaphragm during the act of inspiration. The lungs, consequently, are not fully distended with air, and the patient makes repeated efforts to inspire more freely, which only tend to increase the præcordial distension. At length the patient starts suddenly with a loud cry, feeling that the sense of suffocation can only be overcome by a full and deep inspiration. Often there is a sensation of wind ascending from the stomach, and diffusing itself through the chest, a cold sweat breaks out upon the head and chest, and the sufferings of the patient are very great. In some individuals there may be several attacks during the same night, alternating with violent cramps and spasms. Tranquil and refreshing sleep only occurs after the development of a gurgling noise about the pylorus, which is followed by a subsidence of the feeling of distension and suffocation. The sleep is not often disturbed after the occurrence of these changes, and, if nothing should happen to awaken the individual, his subsequent sleep is rarely broken by a renewal of the distressing symptoms which had harassed him in the first part of the night. In this more aggravated form of incubus the unfortunate sufferer is seldom allowed respite for a single night, and even during the day, and when fully awake, he frequently experiences attacks of spasm, embarrassed breathing, and oppression about the præcordia, which are of short duration. There are other symptoms, which occasionally occur, as a kind of *aura*, diffusing itself from the chest to the brain, giving rise to an impairment of the sensory function, and threatening even an attack of apoplexy. Free eructations of air from the stomach, with full inspirations, generally afford instantaneous relief.

Those who are affected with incubus in a severe form suffer during the day, and while they are awake at night, with the spasmodic and other unpleasant sensations which forebode an attack of the disease. The individual sometimes experiences the feeling of a current of cold air ascending from the stomach to the head; he is unable to cry out, and, in order to prevent himself from falling prostrate, he seizes upon the nearest object at hand. A deep inspiration is generally sufficient to dispel the unpleasant sensation, but very often the accessions are repeated from four to six times in the course of an hour, and with each renewal of the attack the symptoms of apoplexy and sudden death become more urgent. In some cases patients complain of great palpitation of the heart, mental confusion immediately after waking, tremors of the limbs, roaring in the ears, oppression about the chest, &c.; and it is worthy of particular remark, that constriction of the bowels, an abnormal state of the alvine evacuations, disturbance of the digestive function, flatulence, &c., are almost constant attendants on the disease, and constitute leading conditions in its pathology. The most characteristic symp-

toms of the disease are the existence of peculiar phantasms or hallucinations, annihilation of voice and voluntary motion, and disturbance of respiration. It is an affection which it is generally believed can only occur during sleep, but yet there is every reason to believe that slighter forms of the same disease, attended with a sense of oppression and suffocation about the chest and præcordia, with confusion of intellect, may occur during the day, and which require for their relief deep and forcible inspirations, the upright posture, and exercise, such as walking, &c. Such cases are mentioned by GOOD, JOHNSON, SCHMIDT, DALLAS, RHODIUS, LOSS, SCHENCK, and others. Of course the phantasms and false perceptions can only occur during sleep, and they are not always present during attacks in that condition, and therefore not pathognomonic of the disease; nor are abolition of speech and voluntary motion constant symptoms, though generally present. Painful and *oppressed respiration* is, however, strictly pathognomonic, and has this peculiarity, that it seems to proceed from the præcordial region, and disappears almost instantly on waking, after free inspiration.

*Causes.*—These are such as impede respiration, as a constrained posture, a distended stomach, diseases of the heart, an attack of asthma—in short, anything which may prevent due arterialization of the blood. During our waking hours such slight impediments to the respiratory process are easily obviated by our voluntary efforts, as change of posture, full inspirations, eructations of gas, &c.; but during sleep these efforts are suspended, respiration is more limited, and, if impeded by any cause, as an accumulation of gas in the stomach or bowels, venous blood accumulates in the lungs and right side of the heart, with a feeling of oppression and suffocation, which increases to that degree as to become almost insupportable, and, by breaking the spell of sleep, the individual is enabled to make those voluntary efforts which will result in due oxygenation of the blood and relief of the bodily functions. Dr. STRAIL thinks that the alimentary canal, before the attack, becomes spasmodically closed at some point, so as to intercept the passage of the flatus downward, while the stomach is preternaturally distended, thus preventing the free motion of the diaphragm in inspiration, and the inflation of the lungs. He also supposes that the gaseous accumulation in the stomach rises upward into the œsophagus, forcibly distending it, and compressing the trachea. It is this that causes the individual to cry out, to seek the erect posture, and make an effort of deglutition to force the air downward into the stomach, or throw it off by free eructations, by which the symptoms are instantaneously removed: thus showing that there is a strong analogy between *globus hystericus* and *incubus*—the choking sensation in both cases being owing to the same cause, and relieved in the same manner.

Other pathologists, however, regard the accumulation of air in the stomach and bowels as an accidental concomitant rather than an essential element in the disease itself, and that the disease, in a majority of cases, occurs independent of such gaseous accumulation. By these writers it is attributed to irritation, or some perverted action of the pneumogastric nerve, which extends its influence to the organs of respiration and cir-

CLASSIF.—1st CLASS, Febrile Diseases. 3d  
Order, Eruptive Fevers (*Cullen*). 3d

4. That small-pox was not known to either Greek or Arabian writers early in the 6th century, is manifest from the circumstance of no mention having been made of it in the work of ALEXANDER TRALLIANUS, in which all the diseases then known are briefly described. Dr. GREGORY, in his very excellent work on "Eruptive Fevers," remarks, that "the first notice of a disease which looks like small-pox is to be found in a chapter of PROCOPIUS, 'De Bello Persico' (lib. ii., c. 22), where he describes a dreadful pestilence which began at Pelusium, in Egypt, about the year 544." But I cannot agree with this view; for PROCOPIUS states that malady to have been attended by buboes and carbuncles, which, with the other particulars mentioned by him, point rather to the plague than to small-pox. Dr. GREGORY, however, adds, that whether this "disease was small-pox or not, may be doubted; but certainly within a short time afterward very unequivocal traces of small-pox are to be met with in the countries bordering on the Red Sea, for we read of caliphs and caliph's daughters being pitted."—(*Op. cit.*, p. 35.)



5. It cannot be doubted that small-pox had prevailed and been well known in Arabian and adjoining countries, and even in the western parts of Europe, some centuries before RHAZES described it at the commencement of the 10th century; and probably it was even much earlier known in China, or in some eastern countries, than in these. Mr. BRUCE, the celebrated traveller, believed that the first epidemic of small-pox of which any notice can be found occurred in 522. MEAD says that, according to an Arabian manuscript, in the library of Leyden, this malady appeared for the first time in 572, the year of the birth of MOHAMMED, in Arabia, where it was introduced by an Abyssinian army. MARIUS, bishop of Avenches, remarks, in the second volume of his "*Historia Francorum Scriptorum*," &c., that it existed in Europe two years before this date, and that it ravaged France and Italy. MARIUS, who sat in the second council of Maçon, held in 585, states positively, in his chronicle, that in 570, "*morbus validus cum profluvio ventris et variolis, Italiam Galliamque valde afflixit*;" that it ceased for some years, and reappeared in 580 in the same form as in 570. He adds, that DAGOBERT and CLODOBERT, sons of King CHILPERIC and FREDEGONDA, died of this malady; that the wife of GONTRAN, king of Burgundy, was also attacked in 580, and that, feeling her dissolution near, she accused her two physicians, NICOLAS and DONAT, of having poisoned her, and requested their execution, which was carried into effect over her tomb.

6. M. MONFALCON states that AHRON, a physician of Alexandria, at the commencement of the 7th century, first mentioned the symptoms, the different varieties, and the treatment of small-pox; and that in 640, during the reign of the caliph OMAR, when the irruption of the Arabs or Saracens into Egypt took place, the disease appeared in so destructive a manner as to lead many contemporary writers to suppose that it was a new pestilence. It appears to have extended during the 7th century to all the countries whither the Saracenic conquerors carried their arms.

7. Although RHAZES was the first to write expressly and fully on small-pox, he does not pretend to have been the first who had noticed it, for he gives extracts from the works of AHRON, the elder MESUE, and the elder SERAPION, in which mention is made of it. This malady was afterward noticed by AVICENNA, HALI-ABBAS, and other Arabian authors. It appears to have reached England towards the close of the 9th century, or even earlier. After or during the Crusades, the spread of the malady appeared more extended. It then prevailed in most of the temperate countries of Europe. BERNARD GORDON, professor of medicine at MONTPELLIER, in 1285, notices the frequency and fatality of the disease in France at that time; but it does not appear to have been so early known in NORWAY, LAPLAND, and other very northern countries; the coldness and dryness of the air probably retarding its progress to them. Dr. GREGORY states that the word Variola is to be found in several Latin manuscripts in the British Museum of dates decidedly prior to 900. It should not be overlooked that the contagious nature of small-pox was admitted by all the Arabian and other early writers.

8. From Europe, small-pox was carried across the Atlantic to Mexico, which it devastated in

1527, and spread from thence, with fearful virulence, throughout the American continent. The ravages of small-pox were especially great within the tropics, and still are most remarkably so in the dark-skinned races, as sufficiently demonstrated to my own observation. From the earliest notices of the malady, until the appearance of the writings of SYDENHAM, there is little to mention in the history of its progress, prevalences, or treatment, farther than that it was the most generally diffused, the most frequently epidemic, the most fatal, and the worst treated of all known pestilences. The heating or sweating regimen had gradually reached its acme when SYDENHAM appeared. He not only accurately described this disease, but distinguished it from measles, and reformed the treatment of it. BOERHAAVE and VAN SWIETEN adopted and carried out the views of SYDENHAM, and demonstrated the extension of the malady by means of a specific miasm or virus alone.

9. The inoculation, or artificial production, of the disease was then only brought into notice in Europe, although it had been practised in various countries for ages previously. We have no information as to the period when this resource was first adopted, or as to the circumstances which suggested it. It is by no means improbable that the well-known contagious nature of small-pox, the greater severity of the disease in childhood and infancy than in adult age, the admitted liability of all to be infected, the immunity from a second attack, and the desire generally felt of having what was inevitable undergone as early in life as possible, may have suggested to those exercising the healing art the experiment of artificially communicating the disease, when prevailing in a mild form, to children and those exposed to its infection, in order to secure an immunity from it in after life; and it is equally probable that those considerations influenced many in more countries than one, and at different eras. The obvious advantages which resulted must have led to the diffusion and the continuance of the practice. VOLTAIRE, writing as early as 1727 in favour of inoculation, remarks, that the females of Circassia and Georgia were, from times immemorial, in the habit of communicating the small-pox to their children at as early an age as six months, by making an incision in the arm, and by inserting in this incision the contents of a pustule taken from another child. M. MONFALCON states, that inoculation was practised from remote antiquity in Africa, especially on the coasts of Barbary, in China, Hindostan, Egypt, Armenia, Tartary, in Greece, and even in Wales and some parts of the west of England, and in Auvergne and Perigord in France. He does not, however, give the authorities for this statement. BARTHOLIN, who wrote about the middle of the 17th century, states that inoculation had been long used in some parts of Denmark. MONFALCON remarks, that it was employed for the first time in Constantinople in 1673, and BRUCE, the celebrated traveller, says that it had been practised for ages in Nubia. Dr. E. TIMONI, Mr. KENNEDY, and Dr. PYLAMNI, in 1714 and 1715, made the profession in England acquainted with it, but no attention was paid to it until Lady MARY WORTLEY MONTAGUE had her son inoculated at Constantinople in 1717, and her daughter in 1721 in England. After successful trials upon six condemned criminals in Newgate, the Princess of Wales submitted successfully her

own daughters to the new process in 1722. VOLTAIRE, in 1727, was the first writer in France to direct popular opinion in favour of inoculation. His observations on the subject may even now be read with interest. He remarks, that most of the 20,000 who died of small-pox in Paris in 1720 would have been saved if inoculation had been then introduced.

[The practice of inoculation was introduced into the United States as early as the year 1721. Dr. WILLIAM DOUGLASS, of Boston, in his "*Practical Essay concerning the Small-pox*" (1730, p. 38), remarks, that "The Circassian method of procuring the small-pox by *variolous pus*, applied externally to fresh cutaneous incisions, lately introduced in Great Britain and New England, seems to bid fair to alleviate the crisis as to the quantity and deleterious nature of the inflammations and suppurations; but it is not an absolute certain remedy against a bad sort. Much of the same nature is what Dr. WILLIAMS says has been an immemorial custom in some parts of Wales, called *buying of the small-pox*: the person procures a few fresh pocky scabs, and holds them in the hollow of the hand a considerable time; about ten or twelve days thereafter the person sickens, &c." In another tract, by Dr. NATHANIEL WILLIAMS, of Boston (Boston, 1752), are contained particular directions for the practice of inoculation, and he states that fifty out of sixty-five whom he inoculated were sitting up and walking about soon after the eruption appeared; and that but a single patient, a child of eight weeks, died, of all whom he inoculated.]

10. The first ten years of the career of inoculation in this country, Dr. GREGORY observes, were singularly unfortunate. It fell into bad hands; it was tried on the worst possible subjects, and practised in the most injudicious manner. The consequence was that it soon fell into disrepute. The pulpit, too, sounded the alarm; and, conducted as inoculation then was, it was a questionable improvement. A new era in this practice arose in 1746. The Small-pox Hospital was founded for the extension of inoculation among the poor. In 1754, the College of Physicians put forth a strong recommendation of the practice, and MEAD and DE LA CONDOMINE wrote treatises in favour of it. In 1763, the practice was especially adopted by Mr. R. SUTTON and his two sons, who inoculated with great skill and success. "In 1775, a dispensary was opened in London for the gratuitous inoculation of the poor at their own houses; but the institution failed, chiefly through the opposition of Mr. DIMSDALE, who had succeeded the SUTTONS, and fully equalled them in popularity and success. The Small-pox Hospital then took up the plan of promiscuous inoculation, which was carried on to an immense extent between the years 1790 and 1800. In 1793, Dr. JENNER announced the discovery of vaccination. In May, 1808, the inoculation of out-patients was discontinued at the Small-pox Hospital. In June, 1822, inoculation was discontinued to in-patients. On the 23d July, 1840, the practice of inoculation, the introduction of which has conferred immortality on the name of Lady MARY W. MONTAGUE, which had been sanctioned by the College of Physicians, which had saved the lives of many thousands during the greater part of the preceding century, was declared illegal by the English Parliament. All offenders were to be sent to prison; and it was even

provided that any attempt to produce small-pox by inoculation, even though unsuccessful, including, of course, the testing of vaccinated subjects, was an offence at law.—(*Op. cit.*, p. 39.)

11. II. DESCRIPTION OF NATURAL SMALL-POX.—This malady presents several forms, depending chiefly on its grades of severity, these grades arising from the intensity or concentration of the infecting miasm; from the susceptibility, constitution, or habit of body, of the person infected; and from the extent to which vital organs or surfaces are affected by the morbid actions developed by the morbid leaven. The state of the eruption more especially fixes our attention, inasmuch as it disorders the functions of an important organ, as it is a suppurative inflammation of a surface which induces serious sympathies in the economy, as it is an indication of the state and character of the vital powers, of the vascular action, and even of the blood itself, and as it most visibly and tangibly manifests the form or variety of the disease, suggesting not merely the diagnosis and prognosis, but also the indications of cure. As respects the eruption, therefore, it may be *distinct*, *corymbose*, *semi-confluent*, or *confluent*, according to the number, grouping, or distribution of the pustules; it may also be superficial, cellular, limited to the cutaneous surface, or extended more or less to the mucous membranes, especially at the outlets of canals; it may, moreover, be papular, vesicular, pustular, ichorous, scorbutic, or sanious, or purplish, or even blackish, according to the changes taking place in it. As regards the type or character of the attendant fever, small-pox may be *benignant*, *synchoid*, *petechial*, *malignant*, or *puero-adyynamic*. It may also be *simple* throughout its course, and it may be more or less *complicated*, or associated with a prominent affection of one or more important internal parts or vital organs, developed during the progress of the malady. As will be rendered more apparent in the sequel, there is in general an intimate dependence of the state and appearance of the eruption upon the type and character of the fever, and of this latter upon the organic functions and the conditions of the blood. Whatever may be the form which the disease may assume, or however varied the associations of the states now enumerated may appear, small-pox presents certain stages which more particularly mark its course. These stages have been divided into, 1st, that of incubation; 2d, that of invasion; 3d, that of eruption; 4th, that of suppuration; and 5th, that of exsiccation. But some authors have distinguished only three, namely, 1st, incubation; 2d, maturation; and 3d, decline. The stages may be divided into, 1st, the *latent*, *precursory*, or *incubative*; 2d, the *febrile*, or the *primary fever*; 3d, the *period of eruption and development*; 4th, the *maturative* or *suppurative stage*, or the *period of secondary fever, desiccation, and decline*.

12. I. DISTINCT, BENIGN, OR SIMPLE SMALL-POX.—This form of the disease is very frequently met with in healthy constitutions, favoured by a pure air. It was that most frequently produced by inoculation, when this mode of communicating the disease was permitted. Between it, however, and the confluent no very precise demarcation can be assigned, as the corymbose and the semi-confluent are mere approaches to this more severe form. In the distinct or benign states of small-pox there is no serious depression of the vital power, or contamination of the fluids or sol-



ids, or dangerous affection of internal or vital organs, which more or less prominently mark the confluent and typhoid forms of the malady. The distinct small-pox presents in general the regular procession of the stages just distinguished.

13. *A. The period of latency or incubation—the precursory stage*—in small-pox, or the time which elapses from the inhalation of the infecting miasm, or the morbid leaven, until the appearance of the primary fever, has been ascertained with considerable precision on numerous occasions. In cases of inoculation the duration of the stage is rendered apparent; but in natural small-pox it is very commonly a matter of doubt. Dr. GREGORY, who has directed his attention to this topic, states that a large accumulation of facts enables him to fix this period at about twelve days, and that the extremes may be stated at ten and sixteen days. It has been, however, contended by several writers that circumstances may occasion much longer or much shorter periods of incubation than are here assigned, and my own observation tends to confirm this opinion. A concentrated effluvium or miasm from the infected; a severe and prevalent epidemic; a very susceptible, weak, or cachectic habit of body; great fear of the disease, or dread of infection; a warm, humid, and close atmosphere; and the respiration of air loaded with emanations from a number of small-pox cases, may somewhat shorten this period, and hasten the next or eruptive. On the other hand, various circumstances may prolong this stage, and retard the appearance of the next, especially a weak dose of the poison; strong health and insusceptibility of the patient; a dry, cold, and pure state of the air, or residence in a dry and bracing locality. In the former circumstances, the period of incubation may possibly be shortened to seven or eight days, and in the latter it may be prolonged even to twenty or twenty-one days; but of these extreme ranges Dr. GREGORY very strongly doubts, ten and sixteen days being the extremes, according to his observation. The inoculated disease furnishes a more determinate duration, which is generally from seven to nine days.

14. The first days of this period are often passed without much or obvious disorder; but in other cases some symptoms are experienced indicating a state of impaired health, especially languor, lassitude, or malaise. When the disease is infected by a miasm floating in the air, or emanating from the sick, the patient sometimes experiences, at the time, an unpleasant and peculiar odour, generally attended by a feeling of sickness, giddiness, and of impending disease. When this feeling is strong, it is often accompanied by a state of alarm or dread, which seems to shorten this stage and to hasten on the next, and even to render the malady more severe.

15. *B. The febrile stage, or that of invasion—the primary fever*—supervenes upon the preceding period; or from the ninth to the thirteenth day from the time of infection, or from the seventh or eighth day from inoculation, the patient experiences rigors, followed or attended by febrile symptoms, especially acceleration of pulse, heat of skin, pains in the loins and limbs, restlessness, scanty and high-coloured urine, nausea, vomiting, &c., &c. In some cases, the *rigors* and *heats* alternate for some time, or during the first day; but the latter generally soon follow on the former. On the second day the fever is at-

tended by *nausea* and *vomiting*, and great depression, with tenderness at the epigastrium on pressure, and anxiety at the *præcordia*. The lassitude and torpor are often accompanied, in adults, with somnolency, headache, and sweats; and in children, with faintness, sinking, or even with convulsions, or eclampsia. *Pain* throughout the body, more especially in the head, back, loins, and limbs, is always experienced, and the pain at the epigastrium is often so severe as not to admit of the least pressure, or even the weight of the bed-clothes. In some cases the headache is attended by stupor or delirium, especially in adults; and in children by sopor, or epileptic convulsions; in these, the face is hot and flushed, and the carotid and temporal arteries beat strongly, the *tout-ensemble* of the symptoms indicating great vascular reaction. SYDENHAM remarks, that when children, especially after dentition, are seized with convulsions during the primary fever it is a sign of the speedy appearance of the eruption; so that, supposing the convulsions to take place over night, a kindly small-pox may be expected to appear in the morning.

16. In other cases, excessive prostration, with faintness or syncope, extreme anxiety at the *præcordia*, oppression at the chest, frequent sighing, and even dyspnoea, pallid countenance, coldness of the extremities, and feeble pulse, usher in the febrile stage, and take the place of rigors or chills, or follow immediately upon them. These symptoms are indications of the depressing influence of the poisonous miasm on the organic functions, and of the inability of the vital energies to react sufficiently, or to develop a state of healthy action. In these cases, a confluent state of the disease, or marked adynamia may be expected, with pulmonary congestion, &c. One or other of the foregoing groups of symptoms generally usher in the eruptive fever, and although neither of them can be considered as evidence of the nature of the incipient malady, still, the previous good health of the patient, the suddenness or severity of the seizure, the prevalence of variola in the vicinity, or prior exposure to infection, even although vaccination or previous small-pox should have been undergone, ought to be viewed as very strong indications of the disease. Dr. GREGORY justly remarks, that the fact of prior vaccination should not throw the physician off his guard, for the initiatory fever is just as severe after vaccination as it is in the unvaccinated.

17. *C. The Period of Eruption and Development.*—Forty-eight hours elapse from the rigors to the first appearance of eruption. The period is never less, but it may be protracted by weakness of constitution to seventy-two hours, and the full development of the eruption over the whole surface may even occupy three days. Generally, however, the eruption appears on the third or fourth day of the fever. During this fever, besides the more prominent symptoms above mentioned, stridor of the teeth in children, with sopor, is very common; and in adults, a peculiar and fetid odour, with sleeplessness, dryness of the fauces, and turbid state of the urine. The pulse is much increased in frequency, and is either soft, or broad and compressible. The febrile symptoms more or less abate in the morning, and increase towards evening.

18. Minute papulae, sensibly elevated above the general surface or plane of the skin, show themselves, at first on the face, forehead, and

wrists, especially on the sides of the nose, upper lip, and chin; then on the neck and breast, and afterward, on the limbs and trunk. When the papulæ are numerous, their first appearance is attended by tension and slight pruritus; and, upon moving the fingers over the skin with some firmness, the papulæ are felt to be not merely superficial, but based in the cutis vera. The eruption rarely commences in the lower extremities. Sometimes two or three large papulæ precede the general eruption, and advance to the state of vesicle before the surface is extensively occupied. The papulæ are "generally not thrown together confusedly and without order, but are arranged in groups of three or five. Crescents and circles may be traced very distinctly, when the eruption is not too copious. This constitutes an important diagnostic between variola and varicella." In most cases, the eruption affords great relief to the general constitutional disturbance. The fever abates, the sickness subsides, and the pains of the head, loins, and limbs moderate, or altogether cease.

19. *The development of the papulæ commences with the evolution of the eruption and the subsidence of the fever, which precedes and evolves the eruption.* But during this period, although the fever abates more or less remarkably, especially in the benign or distinct form of the distemper, yet it rarely ceases altogether, or disappears without returning more or less slightly in the evening. When the eruption is abundant, or the temperament of the patient is irritable or sanguineous, the mitigation of the fever is less remarkable; and, if the eruption has been delayed, or is confluent, or if the disease be complicated by some internal congestion or prominent affection, the febrile action may be continued during the development and maturation of the eruption with but little abatement, and generally in a typhoid, adynamic, or even putro-adynamic form or type.

20. *The number of the pustules vary according to the severity of the case—from three or four to some thousands, appearing first on the face, neck, and upper extremities, then on the trunk, and lastly on the lower extremities, and changing from the state of papulæ, or vari, to that of vesicle and of pustule in succession.* When the eruption is fully out over the body, and the pustules on the face begin to mature, or about the eighth day from the commencement of the eruptive fever, the whole face, head, and neck become somewhat swollen, particularly the eyelids, which are often so distended as to close the eyes; and the swollen parts are painful when touched, and even throb. This intumescence lasts about three days, the spaces between the pustules appearing inflamed, or of a deep red, or damask rose colour: the closer this resemblance, the milder, generally, is the subsequent disease. Nearly one fifth of the number of pustules appear on the face; and according to SYDENHAM, the danger is in proportion to the number of pustules on the face, those on the other parts of the body hardly influencing the event. This, however, is not altogether the case, for the danger chiefly arises from the *tertiary* effects of the poison, or those produced upon vital or internal parts; the *secondary* effects being the cutaneous eruption.

21. *D. The suppurative or maturative Stage—the Period of secondary Fever and Desiccation.*—With the intumescence of the face, the fever,

which had remitted, returns, and the secondary fever commences. In cases of ordinary severity, the return of the fever is marked by a considerable increase of heat of surface, by a frequent pulse, and by slight delirium, from which the patient is easily roused. In favourable cases, the swelling of the face, the redness of the intervening spaces, and the secondary fever, having continued from the eighth to the eleventh day, subside, and the pustules, now fully ripe, burst and discharge a thin yellow matter, which concretes into crusts that fall off on the fourteenth or fifteenth day from the commencement of rigors, and the disease terminates, leaving the surface underneath the crusts depressed and of a pale lake colour. If the disease be of greater severity, hæmaturia, hæmoptysis, oppression in the chest, or a hard dry cough, may be complained of, with severe headache or pains in the loins or limbs, and more marked delirium, or even sopor; these more severe symptoms, however, generally subsiding on the eleventh or twelfth day.

22. *When the symptoms assume an unfavourable aspect or threaten a fatal issue, then the face, which ought to have been intumescent on the eighth day, remains without any fulness or swelling; and the spaces between the pustules, instead of being red or inflamed, as seen in the favourable cases, are pale and white.* SYDENHAM says that the pustules look red, and continue elevated even after death; and the sweat, which was free up to this day, suddenly ceases. At this critical period, the secondary fever, instead of presenting more or less of asthenic character, may assume either a typhoid or an asthenic or a sinking form. When the secondary fever presents a typhoid type, the tongue becomes brown and dry, the pulse very frequent, and delirium soon appears, and often quickly passes into sopor or coma. In the rapidly sinking form, the patient may appear as suddenly overwhelmed by the depressing influence of the morbid poison, the pulse being hardly increased in frequency, the heat of the body natural, and the intellect unimpaired. Dr. R. WILLIAMS remarks, that the first case he saw of this kind, he could not help assuring the patient "that his symptoms were favourable; but he shook his head, and, perhaps from an inward feeling that his fate was sealed, affirmed that to survive were impossible, and he died a few hours afterward."—(*On Morbid Poisons*, p. 228.) Such cases are, however, rare in the discrete small-pox, but they are much more frequent in the confluent (see § 33, *et seq.*), and result from the influence of the poisoned and contaminated blood on the organic nervous system and heart. These cases very closely resemble, in all respects excepting the eruption, the character and termination of the putro-adynamic form of fever (which see, § 472, *et seq.*).

23. *In the more severe cases of the discrete or distinct small-pox, the morbid poison acts not only on the skin, but also on the mucous membrane of the eyes, throat, and mouth, occasioning an eruption, often somewhat pustular, in these parts.* This additional affection does not appear to aggravate the fever, at least not materially, but it occasions more or less inconvenience. The eruption in the mouth and throat causes hoarseness, soreness of throat, and difficulty of swallowing. When the eruption extends to the conjunctiva or cornea, it is often not attended by much pain; but when the swelling of the eye-



lids has subsided, the extent of mischief which sometimes takes place, especially when the cornea is implicated, is then discovered. The mucous surfaces are, however, not so much or so generally affected in the discrete as in the confluent form of the distemper (§ 39, *et seq.*)

24. At this period a peculiar faint and sickly odour, particularly when the eruption is copious, emanates from the patient. Sometimes, especially in females and persons of a delicate and scrofulous habit of body, the secondary fever is accompanied with a very tender state of the general surface; but it is a very favourable sign. Recovery may be retarded by weakness of habit, by cold, and by the presence or development of the scrofulous taint. An ethymatous eruption may also occupy the surface, or the skin may be left dry and scaly, or the scabs may be adherent. These phenomena are chiefly owing to the form of secondary fever, in connexion with the habit of body, &c.

25. *E. Of the Progress and Appearance of the discrete Eruption.*—The affection of the skin being generally present, while that of the mucous membranes is often wanting, especially in milder cases, the cutaneous eruption requires especial attention. The eruption runs a course of eleven or twelve days, in discrete small-pox, from the very first appearance of it until its termination; and, in its progress, is at first tubercular or papular, then vesicular, afterward pustular, and, lastly, it scabs and falls off. The first, or papular, lasts about two days; the second, or vesicular, occupies four days; the third, or pustular, or suppurative, lasts three days; and the desiccative lasts three days more. The form and progress of the eruption is different in the confluent, in the verrucose small-pox, and in variola after vaccination. The eruption at first consists of a number of minute pimples or papulæ, which feel like minute tubercles in the true skin, when the fingers glide firmly over the surface, and are about the size of a pin's head. They are more or less numerous, but distinct from one another, and hardly salient. On the third, or close of the second day, a minute vesicle forms on the apex of each pimple or papula, which, as it fills, is bound down or depressed in its centre, or umbilicated, and contains a clear whey-coloured fluid. On the approach of suppuration or maturation, the cuticle covering the vesicle loses its transparency, and becomes white and opaque. About the fourth or fifth day of the eruption, a red areola appears around the base of each vesicle, and, shortly afterward, the central *bride*, causing the umbilication of the vesicle, ruptures, and the vesicle becomes pustular, enlarges, and fills, and assumes a somewhat conical or acuminate form. From the fifth to the eighth day of the eruption, the pustule matures, when the surface becomes rough and yellow, and the cuticle breaking, allows a portion of the contents to ooze out. In the interval from the eighth till the eleventh day, the pustule secretes the peculiar viscid matter which concretes and forms the scab. This scab desiccates, and is detached between the eleventh and fourteenth days, leaving the cutis, which it covered, of a reddish brown, which lasts many weeks; but if the pustule has so penetrated as to cause ulceration of the rete mucosum, it leaves a permanent depression or pit. The cicatrix which is formed after these burrowing pustules is usually white.

26. *F. The internal structure of the variolous pimple and pustule* has attracted the attention, first, of COTUGNO in Italy, and afterward of JOHN HUNTER, ADAMS, BOUSQUET, GENDRIN, JUDD, PETZOLDT, and others. Dr. GREGORY has given the following account of the organization of the variolous pustule: "Inflammation begins at the spot called the phlyctidium. Its seat is in the cutis vera. From the central point, or stigma, the inflammatory action proceeds by radiation to the surface, penetrating to a greater or less depth in different cases. Beneath the epidermis, and constituting the greater part of the phlyctidium, is formed a substance or disc, of the consistence of pulp or thick mucus. This is not considered as any part of the skin altered by disease, but as a product of a specific action of the vessels. JOHN HUNTER and ADAMS called it the variolous slough. At the height of suppuration this substance is swollen, and moist like a sponge. The floor of each phlyctidium presents the papillated structure of the skin, elevated and marked with fissures. The vesicle is divided, like the substance of an orange or poppy-head, into numerous cells—twelve or more. It is multilocular. A filament of cellular tissue binds down the central portion of cuticle to the lower surface of the phlyctidium, and gives to the vesicle, in its early stages, that umbilicated form—that depression of its centre which, though not peculiar to the variolous eruption, is so striking a diagnostic mark between it and genuine variella. The fluids, lymph and pus, which at different periods distend its cells, destroy at length the filamentous attachment of the stigma to the cuticle, and that which was at first a depressed or umbilicated vesicle becomes at last an acuminate pustule. It bursts, discharging a well-formed purulent matter, of a yellowish colour and creamy consistence."\*

\* The following descriptions farther illustrate this topic: BOUSQUET says that the pustule has its seat in the true skin, and that the epidermis is not thickened. On removing, however, the epidermis, which is easily detached, we discover a white, opaque, smooth surface, which is a layer of lymph deposited from its adherent surface, and, on removing this "disc," the interior of the pustule is seen divided by many concentric radii into a number of divisions or cells, each filled with fluid, but not communicating. This interior arrangement BOUSQUET compares to a cut orange or pomegranate, while GENDRIN says it resembles that of a spice box. The depression at the centre on the umbilication is occasioned by a portion of cellular tissue which binds down the cuticle, and is slow to undergo the process of ramolissement by which it ultimately ruptures. The description of the pustule by Mr. JUDD, who appears to have examined the formation of the small-pox pustule with great care, is, in some respects, different. For he states, "that in the small-pox pustule circles of vessels enlarge and project from the cutis vera, and they secrete a thin serum, which gradually raises a ring of the cuticula externa from the rete mucosum, and, distending it, forms a vesicle, without, except in some violent confluent cases, breaking up the attachment in the centre between the cutis rete and the cuticle. Hence the vesicle is bound down at that spot, and hence it has a depressed summit. The degree of inflammation suddenly increases, and a thick coagulable lymph is then thrown out that at once consolidates, and forms a thin flat plate like a cymbal, but with a small hole left through its centre, from the coagulation taking place around the before-mentioned thread-like attachment of the cuticle. Now, about the time when the fever and inflammation are again increased, called the secondary fever, and pus being secreted, it elevates the lately described cymbal or plate, and causes it to divide the pustule horizontally, into an upper and lower cell, and the progressive distension at times breaks up the remaining attachment between the cuticle and cutis. The pustules become opaque; for the pus passes through the hole in the plate, or septum, and blends with the lymph or serum above. The lower part of the pustule is completed by an extremely thickened state of the rete

27. The inflammation of the phlyctidium is attended by a specific or erythematous inflammation, called the areola, extending to some distance beyond the margin of the vesicle. The exact tint of this areola should always be carefully noted as indicative of important local and constitutional states. On the subsidence of this inflammatory areola, the ripened pustules, having burst and discharged their contents, are succeeded by scabs, which dry up and fall off, in a healthy constitution, in four or five days. In very mild cases, when the process of pustulation is not fully gone through, many of the vesicles shrivel, and form only imperfect, scaly crusts. On the lower extremities this premature desiccation of the vesicles is often very general.

23. In severe cases, the inflammation of the corion does not cease with the completion of the pustulating process. Portions of the cutis vera are then actually destroyed and slough away, the skin presenting the appearance of pits or fossæ, with a clarety hue, when cicatrization is at length completed. The dark tint wears off in the course of three or four months, but the depressions are permanent. From the great vascularity of the face, and from the exposure of it to light and air during the progress of the eruption, there is always a more severe effect and disfigurement produced by the disease in this situation than in any other part of the surface of the body.

29. ii. MODIFICATIONS OF DISCRETE OR BENIGN SMALL-POX.—A. *Verrucose Small-pox*—*Variola verrucosa*.—*V. cornea*—*Horn-pock*, &c. This mild, mitigated, or modified form was well described by VAN SWIETEN. Its symptoms are similar to those of the preceding form, but are much milder. The primary fever is often little more than a febricula, and the pustules seldom exceed one or two hundred. These, indeed, seldom reach a pustular state, but, having passed through that of tubercle or papula into that of vesicle, on the sixth day, or even sooner, desiccate, shrivel up, and crust. This form is so mild, that the secondary fever is not manifested and consequently is wanting, convalescence commencing on the eighth day of the eruption.

30. B. *Variola discreta siliquosa*.—When there are empty vesicles between the pustular pimples, or when the pus of the pustular pimples has been absorbed, so that they are left empty, the disease has been named *discrete siliquose small-pox*. When the eruption continues *vesicular*, instead of being *pustular*, the disease has been called *discrete crystalline small-pox*. When vesicular pimples appear in the interstices between the pustules, this modification has been named *discrete vesicular small-pox*. In these varieties the symptoms are generally mild, the eruptive fever generally slight or moderate, and the sec-

ondary fever is either wanting or mild; the duration of the disease being rarely prolonged, but often somewhat shortened.\*

31. C. *Small-pox without the Eruption*.—*Variola sine Eruptione*.—Variola presents, in the more severe cases, the fever, the cutaneous eruption, the affection of the mucous membranes, and the internal complications, hereafter to be described. In the more mild or benign cases, it consists only of the fever and the eruption; but in both classes of cases there is a *primary* and *secondary* fever. In small-pox the fever is remarkable, and distinguished from all other fevers by its remission at the end of four days, or when the eruption has come out, and by its return after a remission of four days, or about the end of the eighth day in the discrete, and about the eleventh day in the confluent small-pox. But cases sometimes occur, especially where the pustules are few, or their maturation is rapid or abridged, in which the secondary fever is either very slight or altogether wanting; and other cases are met with, much more rarely, where neither the eruption nor the secondary fever is detected; and yet there can be no doubt of infection having taken place, and of the system being protected from another attack. In those, however, the primary fever has taken place, but without inducing the usual eruption. SYDENHAM, LENTIN, PELARGUS, DUBOIS, DU BOURG, FRANK, and others have observed, during the epidemic prevalence of small-pox, that some few persons who have not previously had the disease, nor been vaccinated, have been seized with all the symptoms of the primary variolous fever, and which having subsided without any eruption having appeared, they have afterward been found unsusceptible of the disease.

32. SYDENHAM, DE VIOLANTE, CROSSE, and some other writers above referred to, have remarked that cases have occurred, during the periods when small-pox was raging, which have been attended by petechiæ, bloody urine, or by purple spots and low fever, and have terminated fatally. These cases were viewed by them as small-pox without the eruption, the severity of the internal complication, or the state of the habit of body and of constitutional powers, preventing the due and regular evolution of the disease on the surface. It is by no means unreasonable to suppose that analogous phenomena to those which I have described in respect of *scarlet fever* (see that disease, § 26, *et seq.*) may also occur during the prevalence of epidemic small-pox, and that, owing to a predominant affection of the kidneys, or to depressed vital power, the eruption is either not developed on the surface, or very imperfectly, or in such manner as remarked by these and other writers. In cases where the kidneys are thus severely and early implicated, especially so as to arrest their excreting functions, not only are the usual phenomena and progress of the distemper interrupted, but a fatal issue soon takes place.

33. iii. SYMPTOMS OF CONFLUENT SMALL-POX.—This state of the distemper commences generally with symptoms similar to those of the dis-

mucous, which forms a raised lip or cup around; and, in most instances, the pustule may be stripped off with the cuticle and rete, still leaving the cutis entire. But the cutis vera has frequently a slight depression left from ulceration at the base of the cup, and occasionally a papule of the cutis projects into its centre, to which the band of attachment from the cuticle still adheres.

"After the incrustation has separated, and the eruption is gone, a stain, with a depression, is commonly left in the centre of the rete mucosum, occasioned by a zone of red vessels remaining long distended, both in the Ethiopian and in the European. In the former it is black and permanent, except when the cutis vera has been penetrated; while in the latter the marks are red and transitory, unless, indeed, when ulceration has penetrated the cutis, in which case, in them, also, the pits are white and permanent in the European."

\* [This form of small-pox occasionally occurs in an epidemic form, mixed with the ordinary form of the disease, and even confluent cases, and is not unfrequently mistaken for chicken-pox. The character of the eruption, however, is very various, assuming in different cases almost every form of cutaneous disease. As they may be all traced to variolous infection, there can be no doubt of their being cases of modified small-pox.]



tinct variola, but more severe. The primary fever is usually attended by more sickness and vomiting; by severe pain in the loins, head, and limbs; by greater heat of surface; by more considerable and continued delirium; and in children, especially in the evening, or just before the eruption, by eclampsia or convulsions. The fever is not only more intense than in the discrete variola, but it is also of shorter duration, the eruption appearing somewhat earlier, or generally on the third day, sometimes at the end of forty-eight hours from the rigors, but rarely later than the third day. The sooner the eruption appears, the more confluent, generally, does it become. Sometimes it is preceded by extensive erythematous inflammation, and the papulæ come out irregularly, or in small clusters, or resemble the measles, and are more prominent than in the distinct variola.

34. The eruption is followed by a less complete remission of the primary fever than in the discrete small-pox, the pulse continuing frequent and soft, the tongue white, and the skin more or less hot, especially in the evening or night, when also delirium often occurs. Salivation, which seldom is seen in the distinct, excepting in the more severe cases of that form, very generally occurs in the third stage of the confluent distemper—during the period of development, beginning either with the eruption or a day or two afterward. The salivary discharge is at first thin and abundant, resembling that produced by mercury; but it becomes thick and viscid about the eighth day of the eruption, and, in very severe cases, it either ceases for a day or two and then returns, or it disappears altogether. Adults are more liable to salivation than children; but diarrhæa more frequently occurs in the latter, and often becomes profuse, or continues during the disease. The eruption is more or less modified in the confluent distemper; for the pustules, especially those on the face, do not rise, and are more irregular and flatter in their forms than in the discrete form. Owing to their greater number and contiguity, they run into each other and become confluent; sometimes forming irregular blisters or bullæ, varying from the diameter of a fourpence or sixpence to that of a half crown.

35. These symptoms may not vary materially until the eighth day of the eruption, or eleventh of the fever, when the stage of secondary fever commences, and greatly increases the severity of symptoms and danger of the malady. Previous to this period, the confluent malady seldom endangers life, unless hæmaturia, or suppression of urine, or hæmoptœ, or congestive pneumonia, or general bronchitis, &c., supervene, or the character of the pustules, or other signs, indicates a very contaminated state of the circulation. On and after the eleventh day, especially on that day, and on the fourteenth, the seventeenth, or the twenty-first day, according to SYDENHAM and R. WILLIAMS, the patient is often brought to such an extremity, that it is equally uncertain whether he may live or die. He is first endangered on the eleventh day by a high fever, attended by great restlessness or delirium, or by other symptoms, which usually prove fatal, unless controlled or prevented by treatment. If he outlive this day, the fourteenth and seventeenth are to be dreaded, for distressing restlessness, with more or less of the unfavourable symptoms about to be noticed, are liable to come on, or to become ag-

gravated, between the eleventh and fourteenth days, and to place him in the most imminent jeopardy.

36. The most dangerous symptoms in the advanced stage of the distemper, or appearing with or during the secondary fever, are, the absence of the usual redness in the intermediate spaces; the non-intumescence of the face; the distribution of petechiæ in the interstices, or a black spot, hardly so large as a pin's head, in the centre of each pustule, or the partial filling of the pustules with a dark ichorous matter, or a disposition to gangrene in the larger vesicles; suppression of the salivation; cough, with hæmoptœ; suppression of urine, or hæmaturia; the signs of congestive pneumonia or bronchitis on percussion and auscultation, more especially if attended by lividity of the lips, face, or extremities, indicating the affection of both lungs, which is generally the case; a brown or dry tongue; great restlessness, or a continued delirium, coma, or sopor; unconscious evacuations; exudations of a dark or ichorous blood from the mucous canals, &c. From certain of these, particularly those first mentioned, recovery may take place when the treatment is judicious and energetic, but the convalescence is long, and its progress is often delayed by ulcerations of the cornea, or general asthenic ophthalmia, causing blindness; by purulent depositions in the joints, or ulcerations or erosions of the cartilages, producing lameness; by otitis, terminating in deafness; by abscesses in various quarters; and by suppuration of the sub-cutaneous cellular tissue, causing cicatrices and alterations of the features. (*See the Complications, &c.*, § 42.)

37. The disease may assume a *semi-confluent form*, or one intermediate between the discrete and the confluent. This form is generally *superficial*, although not always or necessarily so, and much less frequently implicates the sub-cutaneous cellular tissue than the confluent. When thus superficial, whether semi-confluent or confluent, the eruption passes through its regular stages, but the inflammation does not extend deeper than the cutis vera. This superficial confluent form appears in the unvaccinated, and sometimes in the vaccinated; and the pustules over the whole body mature equally and regularly, pursuing their usual course, and occupying the full time to their termination or desiccation. "This form of the disease was well known before the days of JENNER, and is not to be confounded with the confluent small-pox, as modified by vaccination."—(GREGORY.) It takes either the same time to mature as the distinct, namely, seven days, or an intermediate period between the discrete and the confluent, videlicet, about eight days, the confluent generally requiring nine or even ten.

38. iv. *VARIOLA AFTER VACCINATION.*—The symptoms of this form of the disease may vary with the time which has elapsed from vaccination, but in the majority of cases they are the same as those characterizing the variola verrucosa, or the horn-pock (§ 29), or that very mild or mitigated form which matures in five or six days, or in a shorter period. I have seen, on several occasions, and even described, as early as 1823 (*see Lond. Med. Repos.*, vol. xxi.), small-pox as it affected the members of the same family at different periods after vaccination; and in the younger persons, or those who had been vaccinated only ten or eleven years, the primary

fever produced an eruption which was merely papular, or hardly vesicular, while in the older, or in those who had been vaccinated a longer period, the primary fever was more severe, and the eruption either vesicular and verrucose, or pustular in a distinct or even confluent form; the severity and fully developed state of the disease being generally in proportion to the length of time which had elapsed from vaccination. In the former class of cases, the disease is thus more or less modified, and the secondary fever either slight or absent; but in the latter, or pustular, the modification is either slight or hardly apparent, the secondary fever being more or less severe. I have, moreover, seen cases, after undoubted vaccination, having been effected from thirty to forty years previously, that presented the most malignant states of the confluent disease, the pustules maturing imperfectly or slowly, or being filled with a black ichorous matter, the distemper presenting the characters described when treating of *putro-adyamic fever*. (See art. FEVER, § 472, *et seq.*)

### 39. III. THE COMPLICATIONS OF SMALL-POX.—

A. In a large proportion of confluent, and in some semi-confluent cases, the *mucous surfaces* are more or less implicated in the progress of the malady. The parts to which the air has ready access are most frequently affected, as the nose, mouth, trachea, &c.; but other parts covered by mucous membranes are also attacked, as the œsophagus, stomach, intestines, &c.: this *mucous complication* has been well described by Dr. GREGORY. The eruption appearing on these surfaces is sometimes distinct, but more frequently confluent. Numerous white points appear on the tongue, palate, velum pendulum, and pharynx. Hoarseness or alteration of voice indicates that the same or similar changes extend to the mucous surface of the larynx and trachea; and the pain in swallowing shows that the pharynx and œsophagus are also affected, especially in severe cases. In these especially, a cough, which is at first dry, tearing, or clangous, is present, with more or less dyspnoea and oppression in the chest. As the malady progresses, the cough becomes more loose, but sometimes also more suffocative, and about the seventh or eighth day expectoration is more or less abundant, frothy, and viscid, containing some whitish specks. This affection of the respiratory surfaces often evidently increases, and extends over a larger surface, and constitutes a peculiar or specific form of acute *laryngo-tracheal bronchitis*, which may exist either singly or separately, or be associated with a *congestive pneumonia*, or superinduce this latter. When once this complication is present, and more especially when it is thus severely extended, most dangerous results are then generally observed. It is apt to occur in the most severe cases, or where the constitutional powers are weak, and the febrile symptoms present more or less adynamia. In these circumstances, this complication is the more liable to extend downward; and, from the trachea, it is prone to advance to the bronchi of both lungs; the *bronchitis*, or the *pneumonia*, or the *broncho-pneumonia*, thus superinduced, being not only asthenic or congestive, but generally double, or implicating both sides; hence the severity, the rapidity, and the fatality of the results.

40. Even when the complication is limited to the mouth, throat, and larynx, or proceeds no

farther than the trachea, the œdema or swelling of the sub-mucous tissues may be so great, particularly about the seventh or eighth day, as to impede the free access of air to the lungs, and the same consequences ensue, especially in respect of the blood, as follow the extension of the complication to the bronchi and lungs. In either case, the blood does not undergo the requisite changes in the lungs; it is no longer, or only imperfectly, oxydized or arterialized, and the following phenomena supervene: The vesicles are flat, or, at least, do not acuminate; their contents are dark or ichorous, and the areolæ which surround them on the trunk and face are dark, or claret-coloured. Sometimes the surface presents a dark, erysipelatous appearance, attended by large watery blebs, or bullæ, from which an ichorous fluid escapes. On the succeeding day the tongue swells, and, with the lips and gums, exhibits a purplish hue; the extremities and nails become livid; low, muttering delirium is present; and either restlessness, anxiety, and dyspnoea succeed, or coma, distended bladder, or relaxation of the sphincters takes place, and death soon afterward supervenes.

41. The *digestive mucous surface* has presented changes more or less nearly approaching the pustular character, according to the accounts furnished by RIVERIUS, BRENDÉL, WRISEBERG, BLANE, and many others, and these have been met with on the œsophagus, stomach, and small and large intestines. But the changes there observed, whether eruptive or pustular, have not been described with sufficient precision. Granting it to have presented somewhat of an eruptive appearance, it could not, however, have been pustular; for the nature of the tissues—the structure of the parts—admits not of a pustular formation. It is much more probable that, in the course of this as well as of other eruptive fevers, the glandular structures of the digestive canal become more particularly implicated, the morbid state of the blood exciting a special affection of these structures in the course of their functions, which have a very strict reference to the conditions of this fluid. In the most malignant or putro-adyamic state of this distemper, I have observed, especially in the dark races, the exudation of a dark, dissolved, or sanguineo-ichorous matter from one or several of the mucous canals, at an advanced stage of the distemper; an occurrence also observed in, and described when treating of, *putro-adyamic fever* and *hemogastric pestilence*, and resulting from changes of a similar nature. In these, the alteration of the blood, and the loss of tone in the capillary circulation, admit of the exudation of blood from those parts or tissues especially, which, owing either to previous affection, or to loss of vital cohesion, are most prone to experience this change. (See art. HÆMORRHAGE, § 13, *et seq.*)

42. B. The *sub-cutaneous cellular tissue* is often implicated differently from, and even more seriously than, that which has been already cursorily noticed (§ 36). In the discrete form, this tissue is rarely affected, but in the confluent or semi-confluent, and in the variety which Dr. GREGORY calls irregular or corymbose, the morbid action often extends deeper than the skin, and invades the cellular substance either partially or to a very considerable extent. According to this limitation or extension, the integuments are swollen and tense. When the scalp is affected, it becomes



remarkably swollen, and resembles erysipelas of this part, excepting that it is attended or followed by a diffuse or confluent pustulation, or a succession of small abscesses. The salivation already described (§ 34) is often accompanied with great swelling, more or less diffused, in the throat and neck. In some instances the tongue is involved; and when a diffused inflammation of the neck and throat thus extends to the tongue, an unfavourable issue then soon follows.

43. The cellular tissue in various other parts, especially where pressure is experienced, or where the vital cohesion of the tissue is the weakest, often becomes the seat of an asthenic inflammation, particularly in the more severe or malignant confluent cases. The sacrum, back, hips, elbows, scrotum, legs, and various other parts, may be the seats of boils or carbuncles, or of sphacelation. This change is most apt to appear during the secondary fever. Dr. GREGORY remarks, that he saw, at the Small-pox Hospital, an exact counterpart of the pestilential bubo and carbuncle in the groin of a small-pox patient. The face always suffers in these cases very severely; and if recovery takes place, it is not only pitted, but also seamed and scored by the cicatrizations consequent on the inflammation of the subjacent cellular tissue. Dr. GREGORY states, what I have also often noticed, that the disposition to suppuration of parts affected during the secondary fever of small-pox appears to be universal and almost uncontrollable. In some few cases the larger joints fill with purulent matter. Of the gangrene which so often occurs in the severe cases of variola, it may be remarked, that attempts should be made to prevent it, by attention and proper nursing and regimen, for in such cases it is often induced or aggravated by the absence of these, especially when the patient breathes an air rendered impure by putrid animal emanations, or contaminated by being too frequently respired, or breathed by too many persons.

44. *C. Ophthalmia* is a frequent and most important complication of small-pox. It has been unjustly stated that the inflammation of the tissues of the eye is attended by the formation of pustules on the cornea and conjunctiva; but, although these tissues are very susceptible of the inflammatory states complicating this malady, they cannot admit of pustular formations. When inflammation implicates the eye, it may either be limited to the conjunctiva, or extended deeper, and even affect the whole organ. It is most disposed to take place when the changes in the skin arrest the natural functions of this surface, and when, with the secondary fever, there is a manifest contamination of the circulation, or some internal complication. The ophthalmia of variola may be the only prominent local affection, or it may be associated with others of an important or more dangerous nature. Dr. GREGORY remarks, that ophthalmia commencing on the tenth day of the disease sometimes advances so rapidly, that in forty-eight hours the whole eye-ball is irrecoverably injured. The whole eye may even be converted into one large abscess. "More usually the inflammation runs into some one of its less violent and more familiar consequences. An ulcer forms at the outer edge of the cornea, by which the aqueous humour escapes, or at which a staphylomatous protrusion of the iris takes place; or the aqueous humour becomes eluded, or specks form on the cornea, from which blind-

ness, more or less complete or permanent, results. Many things concur to render it almost certain that the affection of the eye in small-pox is connected with some altered condition of the blood, and the retention of the vitiated matters which ought to have been eliminated." Of this there can be no doubt; for, as I have shown in various parts of this work, the depression of organic nervous power, and the contamination of the blood, superinduce all the complications observed in the advanced course of both continued and eruptive fever, and of other maladies impairing the functions of excreting and depurating organs.

45. *D.* It must be manifest that the *circulating fluids are more or less contaminated* by the poison of small-pox, whether that poison be communicated by the mucous or by the cutaneous surface. This contamination must necessarily exist in all cases of the malady, but in a very inappreciable amount in slight and benign cases, the eruption on the skin being its more prominent effect. Where, however, the vitiation is greater, and especially where the eliminating or excreting organs imperfectly discharge their functions, or where vital power is much depressed by either the primary or secondary operation of the poison, the circulating fluids, and particularly the blood, become very remarkably and even sensibly altered. This alteration is manifested in various ways, but more especially in the advanced course of the malady; although it may be perceptible from the commencement of the primary fever. It is, however, more frequently noticed when the eruption appears, or at a later period, or when the eruption is proceeding to maturation. It is this contamination of the blood which, when more fully consummated, imparts the character of malignancy or of putro-adyndamia to the distemper. This vitiation of the circulating fluids is rendered apparent, 1st, by the state of the blood when drawn from a vein; 2d, by the change in the appearance of the eruption; 3d, by the hue of the surface in the spaces between the pustules, and by the lividity of the lips, tongue, and extremities; 4th, by the petechiæ, vibices, or ecchymoses, intermixed with the variolous papulæ or vesicles; 5th, by the filling of the vesicles with a bloody matter, or with a dark ichor, or even with dark, dissolved blood; 6th, by the passive hæmorrhages which occur from the mouth, or nose, bowels, or urinary organs, or from the vagina, or from two or more of these outlets.

46. *a.* The more visible changes in the blood drawn from a vein are similar to those which I have described when treating of the *pathology of the Blood* (see § 125, *et seq.*), and consist chiefly of impaired crisis of the crassamentum, or a loose, gelatinous portion covering the black and hardly coherent portion of the coagulum. The alteration is often still more manifest in the blood poured out from one or more of the mucous canals, this fluid appearing as partially dissolved, dark, or ichorous, and being incapable of coagulating.—*b.* The eruption has at first a dingy or livid aspect; and as it proceeds to imperfect maturation, the vesicles fill only partially with a dissolved bloody serum, or with a matter containing the blood-globules changed to a blackish or brownish hue; and the vesicles are intermingled with petechiæ, &c., already mentioned.—*c.* The *general appearance* of these cases is often peculiar, and they are the most distressing and frightful manifestations of disease which can present

themselves to our observation. The expression of the countenance is most anxious. The tumefaction of, and eruption on, the face; the exudations of blood from the mouth and nostrils; the closed, livid, and tumid eyelids; the discharges from under them, or from the eruption; the swollen, softened, livid, or blackened hue of the general surface; the ichorous or bloody exudations from the urinary and genital organs and bowels—all combine to impress the mind with an idea of a pestilence, exceeding in severity and frightfulness of its aspect both the plague and yellow fever; and to suggest the idea of a general dissolution or putrefaction of the structures, even before life has taken its departure—a dissolution which has already partially taken place, in so far as that the tissues have actually lost a very large share of their usual vital cohesion, and have entered upon changes identical with those which appear soon after death.

47. The appearances now described are but rarely observed in the variola of the *white races*; yet I have met with them in a few cases, and in two or three instances the patients had been vaccinated many years previously. This malignant form of the malady was of more frequent occurrence formerly—before the introduction of inoculation and vaccination—than now, and was more common in some epidemic visitations of the distemper than in others. It was called by older writers the *variola nigra*, or black small-pox; and is even now the not uncommon form of the disease among the *dark races*, especially the *Negro*, and particularly when the distemper spreads by the respiration of miasms from the infected. When the adult female is the subject of this state of the malady, a most depressing or exhausting menorrhagia is apt to take place. I attended, some years ago, with Dr. GREGORY, a lady who was carried off by this form of small-pox. She had been vaccinated about thirty years previously, but she nevertheless presented the appearances just described. In this case, as in the following, mentioned by this physician in his work, the functions of the brain were not disturbed. "In February, 1842," Dr. G. remarks, "I saw, in consultation with Dr. L. STEWART, a lady in small-pox, whose whole body was the colour of indigo, and whom I at first believed was a native of Africa. She conversed with me in the most tranquil manner, and died a few hours afterward, proving that the nervous system is not necessarily, nor is it even usually, implicated in the petechial form of small-pox" (*Op. cit.*, p. 52). This exemption of the brain from disturbance is very often met with in other malignant fevers, more especially in putro-dynamic fever, in malignant puerperal fever, in the hæmagastic pestilence, in plague and pestilential cholera—maladies in which the circulating fluids are most signally vitiated. Dr. GREGORY has remarked, what I have reason to believe to be correct, namely, that death may take place, in consequence of this remarkable condition of the blood, before any unequivocal signs of small-pox are developed, and has adduced two instances in which this appears to have occurred. Under common circumstances, the malignant or petechial form of variola exhibits an abundant confluent eruption, but this never makes much progress towards maturation. "Nature apparently gives up the struggle as hopeless. The patient is carried off very unexpectedly, perhaps on the fourth

day, or from that to the sixth." But I have seen such cases sometimes protracted to the seventh or eighth day.

48. *E.* The brain and nervous system are often prominently affected in small-pox. This may occur at any age. Children are seized with convulsions on the accession either of the primary fever, or of the secondary fever; or they grind their teeth, roll their heads, scream, and squint. On these, inflammatory action, effusion, &c., supervene; or these changes have already taken place, to some extent, and occasioned these symptoms. In such cases, death very generally follows, either during an attack of eclampsia or convulsions, or with the usual signs of cerebral congestion and effusion. In older children and adults, the accession of the cerebral complication is attended by delirium of a violent or maniacal form—the *delirium ferox*. In some cases, the delirium is owing more to irritability of temperament, or peculiarity of constitution, than to inflammatory action; and in others, the nervous symptoms are attended by great depression of spirits, and by an inclination to commit suicide.

49. Dr. GREGORY remarks, that "a peculiar nervous affection often supervenes on the tenth day, when the skin is extensively occupied by the confluent eruption, without nervous complication. It is identical with that which is familiar to surgeons as the consequence of extensive burns and scalds. General tremours, low delirium, a quick and tremulous pulse, a dry tongue, collapse of the features, cold extremities, and subsultus tendinum, are the symptoms of this nervous complication, and the precursors of a fatal event."—(*Op. cit.*, p. 51.) This is an accurate description of the unfavourable termination of a large proportion of confluent cases, as observed in weak constitutions, when the vital resistance is insufficient to oppose the depressing tendency of the distemper, or when the powers of life have not been sufficiently supported, or when support has failed to be efficacious. It is of great importance to recognise the accession of this state of sinking of vital power, in order to have a chance of opposing it with success.

50. *F.* Certain of the bronchial and pulmonary complications have been already noticed (§ 36, 40), especially such as arise from, or depend upon the contamination of the blood. But it is not unusual to observe a state of bronchial irritation, or inflammatory action, from the commencement of the febrile state, especially during the winter season. It may accompany the progress of the malady, without being materially increased, or without inducing a more violent form of the distemper. Frequently, however, and more especially in warm climates, or in the *dark races*, who have migrated to cold or temperate regions, the bronchitis extends generally to both lungs, and often to the substance of the lungs also, thus developing a form of congestive broncho-pneumonia (§ 39). Sometimes associated with bronchitis, or with pneumonia, or occurring independently of either of these, pleurisy supervenes, and constitutes a most dangerous complication of variola. It has been noticed as follows by the able author just mentioned: "Variolous pleurisy occurs between the twelfth and twentieth day. It is a peracute form of inflammation, remarkable for its sudden invasion, rapid progress, and invariable termination by empyema. The symptoms are very unequivocal: intense pain of



the side, a hard or wiry pulse, shortness of breathing, great anxiety of countenance, a peculiarly pungent heat, and dry state of the surface, betoken but too forcibly the state of the pleura, even without stethoscopic aid. Blood-letting is almost powerless in this state of the disease. Death usually happens on the third, or, at farthest, fourth day from the invasion of thoracic symptoms.”—(*Op. cit.*, p. 54.)

51. *Variolous pleurisy*, whether occurring as a complication or as a sequela, is not confined to the confluent or any other form of small-pox. It may appear in the distinct or mild variety, or in the varioloid or modified disease, and in these forms it may be traced to exposure to a current of air, or to some other cause; and it may take place, especially when thus produced, at any stage of the malady. When it supervenes during the confluent distemper, and at the far-advanced stage, as just now described, it may justly be ascribed, as Dr. GREGORY has inferred, to the morbid condition of the blood at this stage—a cause which sufficiently accounts for the rapid progress and fatal issue of the complication. The variolous pleurisy, however, may not only be acute, or attended by very sensible indications of its existence, but also *latent*, until the consequent empyema or effusion has produced very manifest effects upon the respiration and blood.

52. *G. The heart, pericardium, and blood-vessels* are more frequently affected in a very prominent manner than has been generally supposed.—(a) The *endocardium* and *pericardium*, either or both, may be implicated in the progress of the more severe forms of variola, owing to the alteration of the blood, produced either primarily by the variolous poison, or, secondarily, by the absorption of a portion of the matter formed in the pustules, and by interrupted excretion; but, however induced, this complication is rapidly fatal, often without any other symptom than sudden sinking, and rarely with either pain or palpitation; more frequently with sudden anxiety and sense of dissolution.

53. (b) That the internal surface of the *blood-vessels* become *asthenically inflamed*, as an advanced complication or sequela of small-pox, has been on several occasions witnessed by me at the infirmary for children since 1820; but I believe not so frequently as the endocardium and pericardium. The veins are certainly oftener implicated than the arteries, or, at least, more sensibly so, especially when the affection of the former gives rise to obstruction of the circulation through them. But, as I attempted to show many years ago, *asthenic phlebitis* may supervene in the progress of malignant distempers, and fail of producing lymph from their internal membrane capable of coagulating; the product of the morbid action being a fluid exudation, which passes into and mingles with the blood circulating through the inflamed vessels, thus contaminating, or poisoning more fatally, the blood, heart, and blood-vessels.

54. *G. The purulent collections*, also formed within the capsules of joints, are rare complications or sequelæ of small-pox, yet they are not so rarely met with as to permit being overlooked. These deposits may be referred to the same series of changes, especially as regards the circulation, as have been noticed, and even fully discussed, with reference even to small-pox, when

treating of purulent formations. (See art. Abscess, § 27, *et seq.*)

55. *H. Abdominal complications* are less frequent than the thoracic affections now passed under review. They are nevertheless sometimes met with, especially during the epidemic prevalence of the distemper, and oftener in some epidemics than in others. This circumstance is not always readily explained; although in some cases it may be referred to modes of living previously to, or at the period of infection, or to the water, or other peculiarities of the locality, or to the place of residence.—(a) The most common of this class of complications are *diarrhæa* and *dysenteric affections*, sometimes leaving behind them, when convalescence has so far proceeded, diseased mesenteric glands, with emaciation and atrophy, as a sequela of the malady. Children in unhealthy localities are not infrequently affected by a mucous diarrhæa, or even with tenesmus and other symptoms of dysentery, in both the discrete and confluent forms of small-pox; the risk from this association being increased according to its severity. In a few instances, blood is passed with, or intermingled with the stools to an amount which tends rapidly to sink the patient. If the stools be merely streaked with blood, the risk is less; but even these may indicate great danger.

56. (b) Pain in the region of the *kidneys*, symptoms of congestion of these organs, and *hæmaturia*, are not uncommon in the severe states of the distemper, and are always to be viewed as most unfavourable occurrences, especially if the urine be scanty or suppressed. In cases of hæmaturia, the source of the sanguineous exudation has not been accurately determined, but there is reason to infer that it is the secreting structure of the kidneys, and that these organs are more frequently and seriously implicated in severe cases of this distemper than is commonly supposed. I do not say that they are so generally or so dangerously involved as in scarlatina, but this symptom, in connexion with remarkable scantiness of the excretion, and an almost complete suppression of urine, have been remarked by myself and others sufficiently often to attract a more particular attention to the function of the kidneys during the course of the malady, and to the appearances they exhibit in fatal cases, than has hitherto been directed to them. It must be manifest that even a partial impairment of the excreting offices of these organs, at any period of small-pox, must necessarily render the blood more and more vitiated, and superinduce various other dangerous or fatal results in vital organs, as I have fully shown when treating of *scarlet fever*. (See that art., § 49, *et seq.*)

57. *I. Other complications* may occur, on rare occasions, in the course of variola, but they are very seldom detected during life, and more rarely looked for or disclosed on dissection. I shall only mention a few of those which have been noticed, and which should be kept in recollection during our dealings with this distemper: the presence of *intestinal worms*, which often aggravate the character of the disease, and which are often discharged at an advanced stage of the most severe and fatal cases; signs of inflammation, or congestion, or of functional disorder of the *liver* or of its appendages, various changes in these parts being detected after death; intumescence of the *spleen*, and softening of this organ in fatal

eases; one or other of the several forms of *erysipelas*, or diffusive or asthenic inflammation of the cellular tissue; inflammation of the *urinary bladder*, and exudations of blood from the inner surface of this viscus; and a similar affection, with an imperfect development of pustules, vesicles, or papule, on the *labia vulvæ* and *vagina*; this last being very frequent, and very troublesome in some cases.

53. ii. SMALL-POX MAY COEXIST WITH OTHER SPECIFIC OR EXANTHEMATOUS MALADIES.—This is a rare occurrence, but one which should not be overlooked.—(a) *Measles* coexist with *variola* more frequently, perhaps, than with any of the exanthemata. This combination has been observed, both distempers running their normal course, and uninfluencing each other, by DIEMERBROECK, DE HAEN, WEBER, TRACEY, KING, DELAGARDE, JONES, and others. MANCET says that measles delays the supuration of small-pox, when both coexist; and ERTMÜLLER states, what is very surprising if it be true, namely, that he saw a case in which the eruption of small-pox broke out on one side, and that of measles on the other side.—(b) *Scarlet fever* has also been seen coexisting with *variola*, both distempers pursuing their regular courses, by JENSENIUS, MAFATTI, KRÜGELSTEIN, MARSON, BARNES, and DESSESSARZ. Dr. GREGORY informs me that he has seen, at the Small-pox Hospital, many unequivocal cases of the concurrence of small-pox and scarlatina anginosa; and that *variola* and cow-pox may coexist, as HOLM and others have contended. DESSESSARZ, who has paid much attention to the coexistence of *variola* with other specific diseases, mentions this concurrence of *variola* with *sypilis* and with *hooping-cough*, this latter delaying the eruption of *variola*, according to his observation. When *vaccina* and *variola* coexist, they may both run their usual course, or the one or other be more or less modified in aspect and progress.

59. iii. VARIOLA IN THE PREGNANT AND PUERPERAL STATES AND IN THE FŒTUS.—When a pregnant woman is seized with small-pox, abortion or premature labour may or may not take place, and the disease may or may not be communicated by the mother to the fœtus. Much depends upon the mild or the severe character of the distemper. If the disease be not very severe, the mother may not abort, and the fœtus may not be infected; but if the distemper be severe, confluent, or malignant, abortion takes place, as in nearly all instances of other malignant or pestilential maladies, the fœtus being dead, and furnishing proofs of its having contracted the malady. The communication of *variola* to the fœtus has been observed by H. AUGENIUS, FERNELIUS, DERHAM, FORESTUS, MEAD, MAURICEAU, KITE, MORTIMER, WRIGHT, FLINDERS, WATSON, DIMSDALE, HUNTER, LYNN, TURNBULL, PEARSON, and HAYGARTH. Dr. GREGORY remarks, that it does not necessarily happen that a pregnant woman taking small-pox conveys the disease to the child; several instances to the contrary have occurred at the Small-pox Hospital. An opinion was entertained by Dr. MEAD (but erroneously), that where a woman undergoes small-pox without aborting, the infant would remain through life unsusceptible, having, in fact, passed through the disease in utero. Dr. JENNER has detailed two cases, which prove very satisfactorily that a fœtus in utero may contract small-pox, provided the mother be ex-

posed to the contagion, although she herself does not take it. "An infant, born under these circumstances, sickened for the small-pox five days after birth, and twelve from exposure to contagion."—(*Op. cit.*, p. 751.) In several collections fœtuses are preserved whose skins are covered with variolous eruptions. The earliest period of fœtal life at which Dr. GREGORY ever saw traces of variolous eruption is four months.\*

\* The following abstract is taken chiefly from the American edition of Dr. GREGORY's work on "*Eruptive Fevers*." Dr. MITCHELL (*Amer. Journ. of Med. Science*, vol. vii., p. 555) adduces the case of a mother who bore the marks of small-pox, with which she was affected in childhood, and whose infant was born in an apparently healthy state, but exhibited symptoms of *variola* three days after birth, and nine days after birth the pustules were in a state of complete maturity. M. DENEUX (*Ibid.*, vol. xi., p. 499) instances the case of a woman who had been vaccinated and never had small-pox, but who bore an infant covered at birth with confluent small-pox in the eleventh or twelfth day of the eruption. Dr. C. GUOLI (*Ibid.*, vol. iv., new series, p. 485) states that a child was born in June, 1841, covered with pustules of *variola*. The pustules were at their height on the second day after birth, and matured on the fifth; but the child died on the ninth day after birth. The mother had been vaccinated when an infant, and had escaped small-pox. M. GERARDIN (*Ibid.*, vol. vi., N. S., p. 210) reported to the French Academy of Medicine, in 1842, an instance of a child born with the eruption in a state of suppuration; but no mention is made of the mother in this case. Dr. JOSLIN (*Ibid.*, vol. v., N. S., p. 249) met with a case of small-pox in the fœtus, in New York, in 1842. The fœtus had on its body about 170 regularly-formed pustules, apparently such as they are from eight to ten days after the attack. The child lived only a quarter of an hour. The infection had been received by the mother just thirty days previous to the birth of the child. She was exposed but once to a single case, at the very commencement of the eruption, and for a single day. She had been vaccinated in early childhood, and the operation had been repeated on the day of exposure by Dr. JOSLIN himself, but without effect. M. DAPPAUL (*Bullet. de Thérap.*, 30th April, 1849) saw a case of transmission of *variola* from a mother to her child, which had numerous pustules at birth. The mother had visited a person with the disease a short time before, without taking it. A case occurred in the Maternity Hospital, in Paris, in which the face, scalp, and different parts were covered with the pustules of small-pox at birth, though the mother retained the marks of vaccination, and had never had the small-pox. About ten days before, she had seen a patient at La Pitié, near another with small-pox (*Lancet*, 18th February, 1843, p. 741). Dr. MEAD (*Works*, ch. iv., p. 253) has recorded an instance in which a woman was delivered of a dead child at the full time, covered with variolous pustules. She formerly had the disease, and was attending her husband when it when delivery took place. Dr. LEBERT (*Bullet. de Thérap.*, 30th April, 1849) exhibited to the Biological Society of Paris a fœtus about four months old, whose body was covered with pustules of *variola*. The mother had the disease slightly, and aborted during her convalescence. Dr. KING (*New York Med. and Surg. Journ.*, April, 1840, p. 292) mentions the birth of a living child at seven months, covered with umbilicated pustules, the mother having entirely recovered, and presenting at the time of its birth no evidences of the eruption, excepting the red spots succeeding the scabs; the child having been born twenty-one days after she was first attacked, or seventeen days after the appearance of the eruption. Dr. L. V. BELL (*Amer. Journ. of Med. Science*, May, 1836) adduces an instance of a lady who had confluent *variola* at the seventh month of pregnancy, and escaped without abortion—a rare circumstance in confluent small-pox. At the expiration of her full term she was delivered of a healthy child, whose abdomen and thighs were marked with decided small-pox pittings, and who was unsusceptible of the vaccine disease. VAN SWIETEN (*Commentaria*, vol. v., p. 8) records, among several others, a similar case to the last; the child was born at the full time, with pits of small-pox, the disease having been transmitted to the fœtus through its mother, who had herself undergone the disease. Dr. HOSACK (*Med. Essays*, vol. ii., p. 111, and vol. iii., p. 473) refers to numerous other instances, recorded by authors, of the communication of *variola* to the fœtus in utero.

"It will be found, on examination of the preceding and of other cases, that the communication of *variola* to the fœtus in utero has occurred after vaccination of the mother in infancy, and after her revaccination on the day of her exposure, and also after *variola*, both naturally and by in-



60. When a pregnant woman is seized with small-pox so severely as to place her life in jeopardy, she aborts, the fœtus being generally dead; and the mother very rarely recovers. The abortion probably favours this event, especially if it be attended by much sanguineous discharge; but this event has taken place with equal rapidity where this discharge has been most remarkably small, or altogether wanting, as in a case which I lately attended with Mr. BARNWELL. The same issue is observed in respect of other dangerous maladies, especially low fevers, scarlatina, measles, and the several malignant and pestilential distempers. When small-pox is caught shortly before delivery, so that the fœtus is born before the disease has proceeded its full course, the fœtus is generally infected, and the distemper assumes in the mother a most severe and complicated or confluent form, recovery seldom taking place. I have seen several cases of variola in the puerperal state, infection having taken place before confinement, but I have met with only one in which the disease presented a mild form.

61. iv. OF THE CHARACTERS OF THE LOCAL AFFECTION AND OF THE FEVER.—A. The *local changes*, whether external, as evinced by the varying condition of the eruption, or internal, and constituting the contingent complications of the malady, present every phase or gradation of inflammatory action, from the most slight to the most disorganizing, from the sthenic to the most asthenic, or that most rapidly passing into the dissolution of structure.

62. B. The *type of fever*, whether of that ushering in the disease, or of that developing the suppuration or maturation, also varies in respect of power and vital resistance—as respects the organic nervous energy and the states of the circulation and circulating fluids—from that which may be viewed as inflammatory, until it sinks into the most malignant and pestilential, passing, in different cases, through every intermediate type, form, or phase; the local changes always presenting a more or less intimate relation to the state or character of the febrile commotion. Nevertheless, however numerous the forms or states, either of the local changes or of the constitutional disturbance, this distemper, more remarkably even than any other specific disease, preserves all its special properties unaltered and unalterable, elaborates the same poisonous miasm and virus, and propagates its kind through innumerable gen-

eration. It has also taken place when the mother is yet suffering from the disease, and after she has passed through its phases previously, and when she herself escapes entirely.

“The fœtus may be infected by absorption of the virus through the mother, without her experiencing any effect from it; or the disease may be transmitted directly by inoculation of the mother, and may be communicated any time from the fourth month (and perhaps earlier) to the full time. The fœtus may be thrown off in three or four days after cessation of motion, or may be retained for three or four weeks.

“The child may be covered with eruption at birth, and this eruption may present itself in different stages of its progress in different cases, even up to the eleventh or twelfth day of the eruption, or may not appear until three or four, or even seven days after birth. It may also be born at full time, with pits left by the disease some weeks previously.”

The child either falls a victim to the disease at once, or lingers for only a few days; but it has been born healthy at the full time, with marks of previous disease; and it has survived when the disease, in a mild form, has appeared after birth. On this, and all other topics connected with variola, the admirable *Commentaries* of VAN SWIETEN on the *Aphorisms* of BOERHAAVE will be studied with advantage.

erations, without changing or even modifying any of its features. The same now as it was twelve centuries ago, it has lost none of its qualities or attributes, and gained no new property. We observe it now as it was observed from the earliest periods of its history; with the same remarkable modifications in both the local changes and the constitutional disturbance, the slightest and most benign form of morbid action, and the most pestilential; each form, and each intermediate phase appearing in the same epidemic, in the same locality, and in the same family, the distemper, nevertheless, preserving its special nature and identity.

63. The very remarkable modifications of variola now described are to be imputed, 1st, to vaccination; 2d, to inoculation; 3d, to infection by the mucous surfaces, and especially by the respiratory passages; 3d, to the dose or the quantity of the poison which has infected the frame, particularly by these passages, relatively to the vital power and resistance of the patient; 4th, to the constitutional power, habit of body, diathesis, temperament, and health of the patient; 5th, to his race, or to the variety of his species; 6th, to his modes of living, mental power, and moral courage; 7th, to the physical agents which surround and influence him, especially the conditions of the atmosphere in respect of temperature and humidity, of purity and requisite renewal; in short, to the various circumstances which I have pointed out, in full detail, when treating of the several causes and sources of pestilences, with reference to their removal and avoidance (*see art. PESTILENCES, PROTECTION FROM*); and, 8th, to the character or nature of the prevailing epidemic constitution.

64. According to the influence of these, either singly or in various combinations, the disease assumes a mild, or a distinct, or a severe, or a semi-confluent, or a confluent, or a complicated, or a malignant form, the primary and consecutive fever developing these several states, or at least presenting, conformably with them, and with strict reference to them individually, either a slight, or mild, or an inflammatory, or an adynamic, or asthenic, or a putro-adynamic, or a malignant character, the appearance of the eruption being one of the chief indications of the type or character of the fever. Certain of the modifying influences now enumerated may require a brief remark. The first four mentioned manifestly need no comment.

65. The *race*, or the *variety of the species*, to which the patient belongs, is of the greatest importance in modifying the distemper. The white race, especially that inhabiting northern and temperate climates, experiences a much milder, and more frequently a discrete form, than the dark races, particularly the Negro. Among the latter races the disease more commonly assumes a confluent or malignant form, and is the most dangerous pestilence which can overtake them. It is to them what the hæmogastric pestilence is to the Europeans when they migrate to the hot countries where and when that pestilence is epidemic. Among the dark races this pestilence is comparatively mild, but most fatal among the white race; while the very opposite obtains in respect of small-pox. As to this, I speak from personal observation. There is nothing which can be conceived more pestilential than I have seen small-pox when it has seized upon a Negro town or

community: the general malignancy of the distemper, the desertion of the afflicted by the healthy who have not passed through the disease, and the semi-putrid or decomposed and lideous appearances of those who are yet alive, but nevertheless exhibit much of the characters of structural dissolution, cannot fail of making a never-to-be-forgotten impression on the observer.

66. The state of the atmosphere is also very influential in forming the general character of small-pox. In dry, pure, and moderately cold or cool states of the air, this distemper is much milder and less prevalent than in hot seasons, and in humid and still states of the atmosphere. In countries enjoying the former atmospheric conditions, the malady is less generally and severely epidemic than in warm countries, where the latter conditions obtain; there are, however, frequent exceptions to this law that probably are dependent upon the unknown nature of epidemic constitutions; but this topic, and others connected with it, will be considered more fully in the sequel (§ 93, *et seq.*).

67. The form or character of the malady thus depending upon the circumstances now mentioned, and modified as above described, must, in the present state of our knowledge, be viewed as the result of agencies which tend either to resist or to limit the susceptibility and the poisonous properties of the miasm or virus which produces it on the one hand, or to increase that susceptibility, or to develop the injurious operation of these poisonous properties on the other. We observe, 1st, that a previous attack, with very rare exceptions, destroys the susceptibility of a second infection; 2d, that vaccination produces a similar effect, but for a certain time only, at least in many instances; 3d, that the mode of communicating the malady, which is the best calculated to secure the introduction of the smallest possible quantity of the poison into the system capable of infecting it, is the safest and best, namely, inoculation; 4th, that whatever tends to promote the excreting functions, to depurate the blood, to resist the contamination of the fluids, and to support the vital powers, also favours the production of a mild or discrete form of the malady; 5th, whatever has a contrary tendency—whatever occasions contamination of the blood, as a foul, close, or frequently-respired air, and interruption of one or more of those functions, by means of which effete or injurious elements are eliminated from the blood—develops a severe, a complicated, or a confluent and malignant form of small-pox; and, 6th, whatever reduces vital power and resistance at the period of infection, and favours the reception of a large dose of the poisonous miasm into the lungs, as in cases of infection by respiring the morbid emanation directly or closely from the sick, relatively to the susceptibility of the individual, generally gives rise to the dangerous varieties of the distemper just mentioned.

68. V. APPEARANCES ON DISSECTION. — The changes which more especially belong to small-pox are those observed in the skin and mucous surfaces. Those of the skin require no remark. The rare exception, however, of death occurring either before the eruption has appeared, or at a later period, when the amount of internal disease, or the poisoned state of the blood, has prevented the evolution of the eruption, should be kept in recollection. The pharynx, larynx, and trachea generally display more or less disease, especially

in cases which have proved fatal from the seventh to the tenth day. The mucous membrane of these parts appears covered with viscid, puriform matter, more or less copious, and of a brownish or grayish colour. Underneath this, the membrane is generally found congested, softened, thickened, and pulpy; and in the more malignant cases it is black and sloughy, and exhales an offensive odour. Congestion, softening, discoloration, &c., with a muco-puriform or sanguineo-puriform exudation, may often be traced down the trachea, and thence to the bronchial ramifications to a greater or less extent. The lungs frequently evince congestive or inflammatory appearances, or rather such changes as may be referred to a congestive pneumonia, or this associated with bronchitis, or an alteration approaching in appearance to that of splenization, with or without a puriform infiltration. The pleura is often inflamed, but it presents no changes different from those which are often seen in asthenic inflammations of serous membranes, occurring in the course of other exanthematous and adynamic fevers. As in these, so in this, the inflammatory affection is attended by injection, softening and thickening of the membrane, with an exudation of lymph forming a layer varying very much in thickness and density. These changes extend more or less to one, or even to both sides; the cavity of the pleura also containing much sero-puriform fluid resembling a dirty whey, or a mixture of milk or cream and water.

69. It was believed by many that, in the dangerous states of small-pox, a pustular eruption took place in various portions of the digestive canal; and there can be no doubt of considerable alteration being observed in this quarter. These alterations may have assumed a papular or vesicular form, or one approaching the appearance of pustules, when the follicular glands of the digestive surface were chiefly inflamed. These changes have been remarked in the œsophagus, in the stomach, and in the small and large intestines. Dr. GREGORY remarks, that "much discussion has taken place regarding the occurrence of variolous pustules on the gastro-enteric mucous membrane. COTUGNO, WRISBERG, REIL, and others, who have paid great attention to the subject, concur in opinion that this structure is not capable of developing them. Sir G. BLANE, again, reports a case where this membrane presented the appearance of ulcerated spots, which he compared to variolous pustules. The experience furnished by the Small-pox Hospital is in favour of the old doctrine. Inflamed, enlarged, and ulcerated follicles, with petechial patches, may indeed be noticed in a few cases; but such changes are in all respects the same with those observable in typhoid fevers." I have seen ecchymoses, with or without those alterations, in the digestive mucous surface, and in the internal surface of the urinary bladder, but much more rarely in this latter situation. The kidneys are often congested, and the internal surface of the pelvis of the kidneys is also congested, softened, and discoloured. But these appearances, as well as those observed in the brain and its membranes, in the spleen, liver, and biliary organs, are very much the same as those seen in fatal cases of the other exanthemata, and of low or malignant fevers.

70. IV. DIAGNOSIS OF SMALL-POX.—It is not easy, and, indeed, seldom even possible, to distinguish the primary fever of variola from that



of the other exanthemata, or even from the commencement of continued fever. In children, however, there is a more frequent occurrence of convulsions, more sudden and severe vomiting, and pain at the epigastrium, than in these; and in adults the muscular and other pains are more severe.—(a) The fever of *measles* is more generally attended by cough and watering of the eyes than that of *variola*; and the eruption is about twenty-four hours later in the former than in the latter. The papulæ of small-pox are firmer and deeper seated than those of measles, which are superficial, and do not give so knobby or so granular a sensation to the touch as those of the former, which implicate the *cutis vera*.

71. (b) *Febrile lichen* may be confounded with small-pox; but the interval between the occurrence of rigour and the appearance of eruption is much shorter in the former, generally only twenty-fours, or half the time of that of the latter. The eruption of *variola* generally appears first on the face, while that of *lichen* takes place uniformly over the head and trunk, is superficial, and devoid of the granular feel to the touch which belongs to *variola*. (See art. *LICHEN*.)

72. (c) A form of *secondary syphilis* sometimes occurs, in which the eruption over the face and trunk is very similar to distinct small-pox, and passes through the grades of papulæ, vesicles, and pustules. It is, however, generally preceded by little, or by a slighter fever, and the eruption is much more tedious in its development than that of *variola*; the pustules do not mature, or proceed simultaneously, but irregularly, or in successive crops. The general aspect of the patient, and the history of the case, will farther assist the diagnosis.

73. (d) The diagnosis between *variola* and *varicella* has been fully discussed, and the distinct natures of these have been shown at another place; but independently of various other points of difference, the impossibility of inoculating the latter, the occurrence of it after cow-pox, and even after small-pox, and the absence from *varicella* of the deep-seated granular sensation to the touch, and of the umbilicated vesicle, characteristic of the variolous eruption, sufficiently distinguish the one from the other.\* (See art. *CHICKEN-POX*, § 2, 3, 10, 11.)

\* The following remarks respecting the distinct nature of *Chicken-pox* and *Small-pox*, contained in Dr. GREGORY's excellent work, already referred to, deserve perusal, and quite agree with my own observation. "The first thing I observe in *varicella* is the eruption of vesicles of the size of a split pea, being simple elevations of the cuticle, or minute blisters. The parts chiefly occupied by the eruption are the back and scalp. The face is not so universally the seat of eruption as in *variola*; nevertheless, at times the face is extensively occupied. The vesicles vary in shape. Dr. WILLAN, who loved minuteness, wishes to distinguish three kinds—the lenticular, the conoidal, and globose. I cannot see these distinctions myself. The vesicles are surrounded by a superficial and narrow areola. They appear in successive crops for two or three days. While the new vesicles are forming, the old ones shrivel and dry up. On penetrating the vesicles, a clear lymph, scarcely at all mucilaginous, escapes, and the cuticle falls to the level of the surrounding skin. There is no tumour, no varus. If the vesicles remain unbroken for twenty-four hours, the contained fluid becomes slightly opaque. They are very itchy, and, when rubbed, a degree of superficial inflammation may succeed, sufficient to convert the lymph into an imperfect pus. The scabs of *varicella* are very small, and, as the lymph is wanting in mucilaginous quality, they are granular. The desiccation is very rapid, and in six days the complaint completes the whole cycle of its phases. No constitutional symptoms of much importance are present. The complaint often shows itself in schools, and runs through all

[No single fact in pathology is better established than that the eruptions of small-pox are extremely various. I have described an epidemic varioloid disease which prevailed in the town of Gorham, Ontario county, New York, in the summer of 1853,\* and from the appearances presented have drawn the following conclusions:

1. That the small-pox virus will give rise to eruptions of a very diversified character; the modifications being produced by previous vaccination, the period which has elapsed since vacci-

the young members of a family. It is manifestly infectious and epidemic."

*Varicella* almost exclusively attacks children; it is very rarely seen in adults. "It is taken indiscriminately by those who have and those who have not been vaccinated. It is now nearly always taken *after* vaccination. Whether it was taken equally after inoculation of small-pox I cannot tell from my own experience, but I have the authority of the late Sir HENRY HALFORD for saying that it was. These general considerations are of themselves sufficient to decide the question of non-identity. But if we examine the subject still more closely, we find that the organization of the varioloid vesicle differs from that of the variolous; there is no umbilication, no central depression, no slough. There is simply elevation of the cuticle, of irregular and undetermined arrangement. Here we see no groupings into threes or fives—no crescentic or circular figures formed. Every thing in *varicella* is hurried forward—the incubation, the eruption, the desiccation."

There is a form of small-pox which, in some of its features, and from its mildness, may be mistaken for *varicella*; "and physicians in former times, looking only to the general, and neglecting the minute anatomical characters of the eruption, have thought proper to confound the two diseases. By way of distinction, we will call the one *varicella vera*; the other, *variola varicelloides*. In the true *varicella* there is little or no premonitory fever. In the *variola varicelloides* there are at least forty-eight hours of preceding febrile disturbance. In the *varicella vera* there are no hard vari or tubercles. In the varioloid form of *variola*, tuberculous elevations of the skin are distinctly perceptible. In the vesicles of the one there are no central depressions, in the other central depressions exist." In true *varicella* the crusts quickly fall off, and rarely leave any pits. Can *varicella* be communicated by inoculation? "Dr. WILLAN entertained the belief that it can; but his experiments are few (two or three only), and these few, to my mind, very unsatisfactory. Since his time, Mr. BRYCE, by more extended and more careful investigation, has set the question at rest. He states that he has inoculated with the fluid of *varicella vera* at all periods of the disease, and at all seasons of the year, children who had never undergone either small-pox or cow-pox, and yet that he had never been successful in producing from it either *variola* or *varicella*. Since the date of BRYCE's experiments (1816), I know of none on the inoculation of *varicella*."

What, then, are the arguments which can be brought forward in support of the doctrine of the identity of small-pox and chicken-pox? I have adduced the arguments which have been urged by Dr. THOMSON and others in favour of this doctrine, and I have answered them seriatim in another place (see art. *CHICKEN-POX*, § 2, 3, 10, 11); but, nevertheless, it is interesting to know what farther Dr. GREGORY has stated as to this topic. Dr. THOMSON's great argument is, "that *varicella* presents itself when *variola* prevails, and never without. Hence," says he, "we may deduce the probability that one contagion is operating, not two." The answer to this, is, that the facts are incorrectly stated. *Varicella* frequently prevails without *variola*. Dr. MOHL has shown this most satisfactorily from the experience of the Copenhagen epidemics. From 1809 to 1823, chicken-pox was annually observed at Copenhagen without accompanying *variola*; since 1823 both diseases have prevailed epidemically, but the physicians could always trace their sources, and this convinced them that the generating miasms were distinct. Besides, the doctrine goes for nothing if it can be shown, as has been shown over and over again, that some children take *varicella* after cow-pox, and others cow-pox after *varicella*, while sometimes both diseases may be seen going through their phases at the same time. "It cannot be doubted for one moment, after reading the details of this controversy in the works of Dr. THOMSON and elsewhere, that a very large proportion of the cases of alleged secondary or recurrent small-pox are really cases of genuine lymphatic *varicella* mistaken for small-pox;" or, I may add, that the supposed first attack of *variola* was merely that of *varicella*.

\* [American Journ. Med. Sciences, vol. li., p. 120.]

nation was performed, age, general health, habits, idiosyncracies of the patient, and unknown causes.

2. The eruption may have all the specific characters of *variola verrucosa* (horn-pock), water-pock, swine-pock, varicella, varioloid, pemphigus, purpura, and probably other forms of cutaneous disease.

3. In general, those persons who have been vaccinated will have the lighter forms, as *varioides* of GREGORY, and *varicella*, though in some cases it may be severe and even confluent.

4. As a general rule, the disease will assume a milder form in proportion to the recency of the vaccination.

5. The eruption produced by small-pox virus may recur in a vesicular form, or in a papular, speedily becoming vesicular, or it may be pustular, the pustules sometimes with and sometimes without a central depression, or it may assume the form of purpura, &c.

6. The eruption may be irregular in size and form, as well as in the place of its first appearance, and may occupy merely the surface of the skin, or may occupy the true skin, leaving pits. It may come out in successive crops on the body, after it has reached its height on the face, as in true varicella.

7. The fluid thrown out by the eruption may be water or lymph, sero-purulent or purulent, sanguinolent or sanguineous (*purpura*); and the pock may dry into horny scabs covering tubercular elevations of the skin, or scale off and leave the skin perfectly smooth, though of a claret, dusky, or livid hue, or scarred and pitted.

8. At the decline of the eruption, vesications on an inflamed basis, to a greater or less extent, may appear, filled with air or lymph, and small abscesses may form in the sub-cutaneous cellular texture.

9. The eruption has generally none of the smell peculiar to small-pox, this being confined, for the most part, to the confluent cases.

10. The disease may be so severe as to prove fatal, or so slight as not to be attended with eruptions, and but slight if any constitutional disturbance, and this both in the vaccinated and unvaccinated, though rarely in the latter.

11. The varioloid form often cannot be distinguished from pure varicella by the character of the eruption; frequently crops of vesicles may appear in succession for several days, the first beginning to shrivel while new ones are forming; the vesicles that remain after the third day becoming slightly opaque, and like pearls; taking on inflammation by the irritation of friction or scratching, so as to be collected into pustules; the scabs small and gummy, drying quickly and falling off, leaving small cicatrices or marks, and attended with little if any constitutional disturbance.

12. These conclusions do not militate against the doctrine that there is a separate disease, *chicken-pox* (*varicella lymphatica*), which springs from a specific contagion, producing a vesicular eruption, running a definite course; having no tendency, when undisturbed, to supuration, occurring ordinarily but once, affording no protection against small-pox, as small-pox affords no protection against it.

13. Chicken-pox often occurs epidemically in various parts of our country, unmixed with varioloid cases, and not traceable to variolous infection, showing it to be a distinct disease.

14. Lastly, when practitioners meet with any

eruption which is at all equivocal, they should use the same precautionary measures for preventing the extension of the disease as if they were certain it was modified small-pox.

There are, then, cases of small-pox in which the eruption cannot be distinguished from that of genuine *varicella*, and it may assume the form of *purpura*, *pemphigus*, and other well-known cutaneous diseases. The attempt to draw the line in all cases from physical characters, between small-pox and varicella, must necessarily fail, as such do not always exist (*see the New York Journ. of Med.* for September, 1853). I have seen, *e. g.*, in a family of seven children, all vaccinated when young with what I believe to have been genuine kine-pock matter, every form of the disease (taken from the same variolous infection), from confluent small-pox down to a mild vesicular eruption, with all the characteristic marks of true *varicella*. The pathognomonic characters, therefore, if such exist, must be found in other marks or phenomena than the eruption.]

74. V. THE PROGNOSIS OF SMALL-POX is tolerably manifest from what has been already stated. The circumstances enumerated above as modifying and aggravating the fever of small-pox (§ 63, *et seq.*), increase also the *danger* of the distemper; but the following more especially tend to this: 1st. The quantity and confluence of the eruption. 2d. The state of the circulating fluids. 3d. The presence and nature of the complications, especially those of the respiratory organs and nervous centres. 4th. The age, habit of body, and temperament of the patient. 5th. The circumstances and influences under which the patient is placed; and, 6th. The season, temperature, and epidemic constitution in which the disease occurs.

75. *a. A confluent form* of the malady should, even when proceeding favourably, be viewed with distrust; for, in children, a fit of convulsion may occur, and carry off the patient; and in adults the blood may become contaminated to an extent incompatible with the continuance of life; or the secondary fever may farther implicate vital parts. If the vesicles on the trunk and extremities be flat, with a claret-coloured or livid areola, "while the eruption on the face is white and pasty, no reasonable hope of recovery can be entertained." An excessive quantity of eruption always tends to depress vitality, to vitiate the blood, and to favour the occurrence of internal complications, which concur with these to destroy life. On the other hand, if the pustules on the extremities acuminate, and exhibit a crimson areola, a good ground of hope is furnished.

76. *b. The contamination of the fluids*, as shown by the hue of the surface, the colour of the lips, tongue, and gums, so far as they can show it; by the appearance of the vesicles; by the state of the evacuations; and by whatever indicates a tendency to putrescency, or a partially dissolved state of the blood and depressed organic nervous influence, is extremely dangerous. Petechiæ, ecchymosis, gangrenous, or sloughing sores; hæmorrhages from mucous canals, the blood being dark, dissolved, or ichorous; menorrhagia or hæmaturia; the vesicles being filled with a dark, bloody, or ichorous matter; purulent depositions in the joints, &c., are generally fatal indications.

77. *c. The occurrence of any of the pulmonary complications* mentioned above; cough or hoarseness at an early period of the disease; hæmoptysis at a more advanced stage; bronchitis, or con-



gestive pneumonia, or asthenic pleuritis, especially when either extends to both sides, are extremely unfavourable. The appearance, also, of an abundant or confluent eruption in the puerperal state, and particularly soon after parturition, is always attended by the utmost danger.

78. *d.* The state of the *nervous system* is most important in the diagnosis. Continued delirium, or prolonged want of sleep, restlessness, moaning, despondency, or an inward persuasion of death, or an apathetic condition, or unconcern as to the result, so frequently observed in pestilential maladies, suppression of urine, sopor, lethargy or coma, leipothymia, or a tendency to faint upon raising the head from the pillow, or attempting to sit up, are severally dangerous or fatal symptoms.

79. *e.* The *age* of the patient is of much importance in the diagnosis, especially in confluent and semi-confluent cases. Dr. GREGORY remarks, that the "extremes of life are those on which small-pox always falls the heaviest. Persons above 40 years of age seldom recover even from the semi-confluent small-pox. Children are in danger from an amount of eruption that can scarcely be called semi-confluent. In both, the processes of maturation and cicatrization are attended by great exhaustion of nervous power, the result of which is often the setting up of acute inflammation in an internal organ essential to life—either the brain, the larynx, or the lungs. The most favourable age for taking small-pox is from the seventh to the fourteenth year, when the powers of life and reproduction are in their fullest vigour."

80. *f.* The *habit of body* and *diathesis* have considerable influence on the result. A plethoric habit of body, a sanguine, a melancholic, a leucoplegmatic, or a bilious temperament, constitutional asthenia or debility, and a serofulous diathesis, are more or less aggravating circumstances as respects either the severity of the disease, and abundance or confluence of the eruption, or the complication and sequelæ of the malady.

81. *g.* The circumstances which indicate a *favourable issue* are, a discrete form of the disease; the absence of any symptom of complication; a natural tone of the voice, and freedom from cough and hoarseness; an age between 6 and 26; the occurrence of the malady at a cool, dry season, and under other favourable influences, as respects air, ventilation, and healthiness of position.

82. *h.* Much, however, depends upon the state of the patient before the accession of the malady, upon the influences in operation during the treatment, upon the measures which have been employed at the commencement of the distemper, or during its earlier stages; upon the purity of the air, and the ventilation of the patient's apartment; upon his nursing, and the non-interference of friends; upon the character of the prevailing epidemic, or of the reigning epidemic constitution; and upon various subordinate circumstances and unexpected contingencies.

83. VI. THE CAUSES OF DEATH FROM small-pox are, 1st. During the first week, or prior to the maturation of the eruption, the poisonous influence of the variolous miasm or virus on the blood, and the consecutive effects of the poison on the organic nerves and nervous centres; 2d. During the second week the greater number of deaths occur, and the most common cause is asphyxia, or consecutive vitiation, and interrupted oxydation of the blood, owing to the prominent affection of the respiratory passages, or of the lungs, or to suppression or interruption of the urinary excretion; 3d. During the third week, or when secondary fever has advanced, death may be produced by effusion on the brain, or by effusion in the pleura, or in the pericardium, or by the complications which occasion it in the second week; or by gangrenous destruction of some portion of the integuments; 4th. During the fourth or following week, death may result from erysipelas, or from some other complication or sequelæ of the distemper. The following table, furnished by Dr. GREGORY, exhibits the days on which 168 cases of small-pox were fatal at the Small-pox Hospital in 1828-29, and proves that no importance can be attached to critical days in this distemper:

Days.	Fatal Cases.	Days.	Fatal Cases.	Days.	Fatal Cases.
3d.	1	13th.	11	24th.	3
4th.	5	14th.	5	25th.	1
5th.	10	15th.	7	27th.	1
6th.	5	16th.	5	28th.	1
7th.	11	17th.	3	29th.	1
8th.	27	18th.	3	31st.	1
9th.	15	19th.	1	32d.	1
10th.	14	20th.	2	35th.	1
11th.	16	21st.	3	38th.	1
12th.	11	23d.	1	39th.	1

TABLE exhibiting the total Number of Persons having Small-pox, admitted into the Small-pox Hospital of London, in the Years from 1841 to 1850, inclusive, with the Proportion of Cases admitted *after Vaccination*, and the Mortality in each Class respectively.

Years.	Total Admissions of Persons having Small-pox.	Deaths.	Per Centage of Deaths.	Total of Persons Vaccinated with Cicatrices.	Deaths.	Per Centage of Deaths.	Total of Persons unprotected, including the Vaccinated without Scars.	Deaths.	Per Centage of Deaths.	Per Centage of Admissions after Vaccination with Scars.	Persons professing to have had Small-pox previously.	Deaths among Persons professing to have had Small-pox previously.
1841	342	74		151	10		191	64		44	2	1
1842	141	34		62	4		79	30		44	1	0
1843	149	27		69	0		80	27		46	2	0
1844	643	151		312	24		331	127		50	3	2
1845	367	79		217	13		150	66		60	3	0
1846	147	29		77	5		70	24		52	2	0
1847	450	81		230	17		220	64		51	8	3
1848	686	168		365	38		321	130		53	4	2
1849	190	33		115	11		75	22		60	4	0
1850	307	58		155	8		152	50		50	1	0
Total in 10 Years.	3422	734	22	1753*	130	7	1669†	604	36	51	30‡	8

84. VII. CAUSES OF SMALL-POX.—i. From the earliest accounts of small-pox to the days of BOERHAAVE, variola was considered to owe its origin to the same causes, with certain unknown modifications, which give rise to other epidemic maladies, aided by infection and contagion. It was thus believed that small-pox might be generated *de novo*, from some defect or vice in one or more of the six non-naturals—air, aliment, the secretions, exercise, sleep, and mental emotions, but that when thus produced it would spread by infection. BOERHAAVE was the first to contend that this doctrine was incorrect, and that small-pox was in all cases the product of a specific miasm or poison derived from the same malady. "He acknowledged that the miasm must originally have sprung from some fortuitous combination of common causes, and that what had happened once might happen again, but he held that this contingency was improbable, and might safely be excluded from our reasonings."

85. It is impossible to say, with any degree of confidence, in what source, or in what combination of causes, or under what influences, the poisonous miasm first constituting and afterward perpetuating the disease was produced. There is some reason, however, to infer from what we know of the origin of certain distempers, and of the communicability of them from the lower animals to man, and from the proofs of the causes, and of this communication of these distempers, furnished by the old historians, as shown in the articles EPIDEMIC INFLUENCE (§ 12, *et seq.*) and INFECTION (§ 4, *et seq.*), and by modern pathological and other writers, that this malady, as well as they, originated in the lower animals, and extended from them to the human species by infection or contagion. However this may be, there

is no proof that the disease appears or becomes epidemic, after longer or shorter intervals, owing to certain combinations of causes or influences, producing it *de novo*. On the contrary, there is every reason to infer that it is perpetuated by its miasms, or effluvium, or virus, which spreads it by infecting the healthy, either directly or indirectly, by the media of substances—of *fomites*—which preserve, for longer or shorter periods, and thus propagate the poisonous agent (*see art. INFECTION*, § 16, *et seq.*); and that this distemper has been thus perpetuated since its first appearance in the sixth century. Instances are constantly occurring of either single cases, or of the outbreak of several or of many cases, without proofs of antecedent infection or contagion having been obtained, especially as respects the earliest cases. But as regards these, all the preceding circumstances or occurrences may not be known, or even may not admit of recognition; and as respects many of these, the same or similar circumstances may have taken place to those which occurred in the following case adduced by Dr. GREGORY: A child took the small-pox, in the country, under circumstances which seemed to exclude all suspicion of infection. She had never left the house for several weeks; the few neighbours who had called were free from sickness, and no small-pox existed in the neighbourhood. During her convalescence, a looking-glass being put into her hands, she immediately said, "My face is exactly like that of the child at the door, from whom I bought the beads." On inquiry, it was found that some pedlars had passed through the village, and that the child had been to the door, although she had never left the house. Had this child died, or been an inattentive observer, the origin of this attack of variola must have remained forever mysterious.

86. When we consider the facts connected with *infection*, as I have shown in that article, and the long periods during which the infectious miasm may be retained by fomites without losing its specific character and operation, and connect this with the numerous substances which may thus become the media of infection, and with the many occasions on which one or other of these media may have come within the sphere of our senses without our recollection or knowledge—

\* Nearly the whole of these 1753 cases were above the age of fifteen years.

† Many of the persons alleging to have been vaccinated, but not showing cicatrices, were doubtless duly vaccinated; but to distinguish such cases from the others was impossible.

‡ N.B.—The persons professing to have had small-pox at some former period sometimes announced themselves to have been inoculated, sometimes to have had the casual small-pox, but in no one instance was there any corroborating evidence of the truth of the statement. These cases, therefore, are included in the third column of "*persons unprotected*."



and, moreover, when the long period which elapses from the moment of exposure to infection to the manifestation of the distemper is taken into account, the frequent difficulty or impossibility of accounting for the infection cannot be a matter of wonder. The poisonous miasm of small-pox is given out from all the mucous, cutaneous, and excreting surfaces—especially the lungs and skin—the exhalations, the secretions, the excretions, the matters in the vesicles and pustules, and the scabs, all contain this poisonous material, with all its specific characters; and this material attaches itself to many dissimilar substances, especially to the bed-clothes, body-clothes, woollen and cotton articles, &c. These, when wrapped up or in any way excluded from the free action of the air, retain the specific miasm for a very long but indeterminate time, and give out this miasm when opened up and exposed to the air.

87. The length of time during which fomites will retain the infectious miasm, with all its properties unimpaired, has not been ascertained; but there is reason to believe that, when they are excluded from the air, this miasm may be preserved for many months, or even for some years. The stages of the distemper during which the infectious emanation is most abundant and noxious have been variously estimated, but without any accurate data. There is every reason to infer that the disease may be communicated by respiring the air containing the morbid effluvium from the commencement of the eruptive fever; and it may be admitted that the infectious miasm is most powerful or concentrated when it is most manifest to the sense of smell. The dried crusts of the pustules, or scabs, not only also possess a contagious quality, but also retain this quality for a very long time, especially when shut up from the atmosphere, or undecomposed; and the dead body possesses also the power of infection, both by the effluvium which it exhales and by the matter in the pustules. How long this power continues after death has not been determined with precision, but it may last from a week to a fortnight, according to the exposure of the body to the air, and to the temperature and humidity of the atmosphere.

88. The distance at which the infectious property may be exerted has been variously estimated by Dr. HAYGARTH and others. Some suppose that the sphere of infection does not extend farther than a few feet, while others contend that it may extend to many hundred feet. An American physician informed Dr. HAYGARTH that the infectious effluvium crossed a river 1500 feet wide, and affected ten out of twelve carpenters at work on the other side. The sphere of infection mainly depends upon the state of the atmosphere and the existing epidemic constitution; a still, warm, humid, and impure air extending the sphere of infection; and a cool, dry, and pure air, and free ventilation, circumscribing this sphere, by diluting and dissipating the poisonous miasm.

89. It is obviously of importance to ascertain what degree of cold and heat, or what proportion or amount of chlorine gas, or of the chlorides in solution, is capable of destroying the poisonous miasm or virus contained in fomites, in order that these agents may be employed in disinfecting bed and body-clothes; but our knowledge of the disinfecting powers of these agents, although

considerable, requires much greater precision than it at present possesses. There is, however, sufficient reason to believe that a temperature of about 200°, or somewhat above this range, is sufficient to destroy the infectious property, and that these chemical agents produce a similar result in moderately-concentrated solutions.

90. During the last century, and even at the commencement of the present, a singular notion as to the origin of small-pox, and as to the possibility of the entire extirpation of the distemper, was promulgated, and even entertained by some respectable writers, namely, that small-pox was generated *de novo* in infants by the blood of the mother left in the portion of the umbilical cord attached to the fœtus on tying the cord—that the fluids remaining in this portion of the cord being absorbed by the fœtal vessels, thereby contaminated the blood and frame of the infant, and thus developed anew the distemper under consideration, independently of infection or contagion received from any other source. It was therefore recommended by these writers, in order to prevent the generation of the distemper, and ultimately to procure its entire extirpation, that the portion of the cord attached to the fœtus should be thoroughly emulged, and the fluids pressed out of it, upon securing it at delivery. That small-pox neither originated in this source, nor can be extirpated or prevented by any method of managing this operation, will not be disputed at the present day, however great importance may be attached to it in other respects.

91. ii. *The causes predisposing to or increasing the susceptibility of the infection of small-pox are not wanting in importance.*—A. A very early age has much influence in predisposing to this distemper. It has been admitted by Dr. HAYGARTH and other writers that the greatest mortality by small-pox takes place in the early periods of life. In 1795 (before the introduction of vaccination), it was computed that in Chester nearly half the deaths among children below ten years of age was due to small-pox. From the data furnished by Mr. FARR's first and second reports, it appears that out of every hundred who died of small-pox in England, seventy-five were below the age of five years. Of 9762 persons who died of this disease in England in 1837 and 1838, there were 7340 under the age of five years, 1668 between the ages of five and fifteen years, 528 between fifteen and thirty, 210 between thirty and seventy, and 16 upward of seventy years of age. Of 2285 persons who died of small-pox in London in 1840 and 1841, 2060 were under fifteen years of age. During the last quarter of the last century (from 1775 to 1800), that is, prior to the discovery of vaccination, the proportion of the mortality by small-pox to the total mortality was as 8 to 100 in London, and it was probably the same throughout the country. From the commencement of the present century the proportion has varied much, rising in years when small-pox was prevalent, as in 1838, as high as this, and in other years falling far below it.\*

\* [Ninety-one deaths from small-pox were reported in New York in 1838, of whom sixty-nine were children under 10 years; in 1839, sixty-eight deaths were reported, of whom forty-five were under the same age; and of two hundred and thirty-one deaths from the same cause in 1840, one hundred and thirty-one were under 10. Compare this with the results of vaccination in public institutions, which we give in another place, and the benefits of vaccine will be demonstrated. So, also, the registers of

[It appears from the British army statistics that in eight years, from 1844 to 1851, out of a total number of 1,125,854 soldiers, only 745 cases of small-pox occurred, or 66 to every 100,000 men; while among 363,370 sailors there were 417 cases of small-pox, or 115 in every 100,000 men. The deaths from small-pox were only 130 in nearly 1,500,000 men. Among the boys in the military asylum, who are all vaccinated, or have had small-pox, there were only 39 cases and 4 deaths among 31,705; and it appears also that almost as many of these cases occurred in boys who had had small-pox as among those who had been simply vaccinated. All the four deaths were in boys who had had small-pox. — J. G. BALFOUR, surgeon to the Royal Military Asylum, Chelsea.]

Of 266 cases of admission for small-pox into the Philadelphia Small-pox Hospital, in 1840–1–2, there were, according to Dr. STEWARDSON, 161 of small-pox, of which 41 died; 73 of varioloid, of which none died; and 32 doubtful, of which 3 died. Of these, 79 were whites, of whom 22 died; and 82 blacks, of whom 19 died—the proportionate mortality being very similar. Of the whole number, 113 were unprotected, of whom 30 died; 99 had been vaccinated, of whom 4 died; 51 doubtful, of whom 10 died. The variolous disease was mild, and the pocks few in number. — *Am. Journ. of Med. Sci.*, vol. v., N. S., p. 80.]

92. The susceptibility of infection exists in all persons who have not had the disease, and who have not been vaccinated, but in various degrees: it is greatest in infancy and childhood, and least in advanced age. Dr. GREGORY, however, thinks that this greater mortality from small-pox does not depend upon a greater susceptibility of infection, but because the disease is usually contracted on the first exposure to the infectious miasm. There can be no doubt of this being the case, but it is chiefly owing to the susceptibility being so remarkable at this age. Numerous exceptions have, however, been remarked to this general susceptibility. Both before and after the introduction of inoculation, many persons were frequently exposed to infection without experiencing the disease; and this circumstance, which is common to all infectious and pestilential maladies, was most ignorantly urged by non-contagionists as an argument against the existence of an infectious property; they either not adverting to, or concealing the fact, that many of those who thus appeared quite unsusceptible of infection had the disease communicated to them by inoculation. "A lady, in 1804, was successfully inoculated for small-pox at the age of 83, and lived several years afterward. She had brought up a large family, most of whom she had attended in attacks of small-pox, but had never taken it herself." I shall have to show in another place

that the susceptibility which, in vaccinated persons, is destroyed for some years, returns with advancing age, and becomes greater as life advances.

93. B. The several causes which predispose the system to the infection of other pestilential maladies have a similar effect in spreading small-pox. Of these the most manifest are diathesis, or peculiarity of constitution; humid and warm seasons and states of the air; a close and stagnant, or impure atmosphere; fear of infection; an endemic or epidemic constitution, favourable to the diffusion or operation of the poison: arrival from a pure and healthy air into a locality in which the malady is prevalent; and the constitution of the Negro and dark races. — *a.* A delicate conformation and susceptibility of the nervous system, a scrofulous or other diathesis existing in families, and exhaustion or depression by previous disease or other causes, either predispose the frame to infection or render the malady more severe. — *b.* A high range of temperature,\* especially when conjoined with humidity, stillness, and impurities, arising from animal or vegetable decomposition, both predispose the frames of those who are subjected to these causes, and concentrate the poisonous miasm emanating from the sick, and spread this miasm in a wider sphere. — *c.* Fear of being attacked, by depressing vital power, lays the body more open to the invasion, as in all other pestilential maladies. — *d.* There is something in the state of the stationary epidemic constitution which certainly influences variola and other epidemic distempers, and which we are unable to demonstrate otherwise than in the characters of its results; but although the epidemic prevalence of small-pox may be limited to a particular place, or extended over a whole country, either in cold seasons or weather, or in warm seasons and countries, yet it is most severely and generally prevalent in these latter circumstances. — *e.* The constitution of the dark races evinces a remarkable susceptibility of

\* BOERHAAVE, one of the ablest illustrators of the pathology of small-pox, states, "Est ut plurimum epidemice, verno tempore primo incipiens, estate crescens, languens autumnio, hyeme sequente fere cedens, vere iterum eodem ordine rediturus." The truth of this was shown in the course of the Norwich epidemic of 1819, when a few cases only were observed in the preceding winter, and the greatest prevalence and mortality were in June and July. Small-pox was introduced, also, into the town of Lynn at the commencement of this year, but did not spread with rapidity until summer. A knowledge of this circumstance induces the native inoculators in the East to inoculate the small-pox in the cool season.

[There is no good reason for believing that the weather or seasons have such influence on this disease, as stated by Dr. C. Taking the mortality from small-pox in New York, from 1816 to 1853 inclusive, the result shows for January, 661 deaths; February, 531; March, 559; April, 309; June, 350; July, 288; August, 243; September, 194; October, 269; November, 370; December, 521. Spring, 1217; Summer, 911; Autumn, 633; Winter, 1713. Showing that the greatest mortality is in the winter, and successively less in the remaining seasons; the deaths during the autumnal months not being half as great as during the winter. Though we have had occasional mild epidemics of small-pox in the summer, those attended with much fatality have uniformly commenced in the fall, or at the beginning of winter. The same is observed by SYDENHAM as occurring in his time. The contrary, however, has been observed in some instances. At present, there is every reason to believe that small-pox is quite independent of cognizable climatic conditions, such as the temperature, density, and humidity of the atmosphere. There doubtless are unknown atmospheric conditions, especially as connected with its electrical state, &c., which influence the susceptibility to variolous contagion, but what they are must be determined by future observations.]

the Northern and Northwestern Dispensaries of New York show that of five hundred and forty-nine variolous cases (variola and varioloid) treated in those institutions, ninety-three, or 17 per cent., were one year old or under; one hundred and sixty-three, or 30 per cent., from one year to five; one hundred and twenty-six, or 23 per cent., from five to ten years; one hundred and four, or 19 per cent., from ten to twenty; fifty-four, or 10 per cent., from twenty to forty; seven, or 1.3 per cent., from forty to sixty; and two, or 0.6 per cent., over sixty; showing that 47 per cent. were five years old or under. Taking the whole city of New York, sixty-four per cent. of small-pox deaths, during the past five years, have been under the age of five.]



variolous infection. The destructive epidemics which have occurred in warm climates and in the Western World illustrate this fact. Although in many of these much may be attributed to the high range of temperature, humidity, and other concurring causes, nevertheless much more should be assigned to peculiarity of constitution, as evinced by the remarkable prevalence and fatality of the distemper when introduced into America among the natives of all climates and localities in that quarter of the globe.

[The Annual Reports of the City Inspector of the city of New York, for 1824, 1830, 1834, 1839, 1841, 1842, and 1844, show that 19.6 per cent. of all who died of small-pox were coloured, while only 7.8 per cent. of the total mortality was in this class.]

94. C. There are certain circumstances, *apart from vaccination*, which influence not merely the susceptibility, but also the character of the malady. Those just mentioned (§ 91, *et seq.*), while they increase the former, have generally a very remarkable influence in augmenting the quantity of the eruption and the severity and malignancy of the distemper.—*a.* The character of the case generating the infection has no influence upon that produced by it, whether the infection has taken place through the medium of the lungs or by inoculation; a discrete case may occasion a confluent or malignant one, or this latter the former. This may arise from the susceptibility, or constitution, or diathesis of the infected, or from the quantity or concentration of the poison inhaled in a tainted atmosphere. The general mildness of the distemper, when inoculated, may be the result of the small quantity of the poison which may be administered in this way.—*b.* The best state of health, or vigour of constitution, may favour the occurrence of infection, but it will also favour the appearance of a mild form of the disease; while unhealthy or cachectic states of the frame, or some pre-existing disorder, may diminish the disposition to be attacked, and yet may render the distemper more severe or malignant when the infection is once produced.—*c.* Certain physical and other influences or circumstances may concur with the first manifestation of disorder to render variola mild, or discrete, or confluent, or malignant. Some of these, especially high temperature and impurity of the air, have been already noticed (§ 93), as tending to aggravate the malady. Whatever determines the circulation to the surface, as warm baths, cordials, a heating regimen, too many bed-clothes, stimulating diaphoretics, a plethoric habit of body, and external irritants, increase the quantity, or favour the confluence of the eruption; while a cool, dry air, large and well-ventilated apartments, a cooling regimen, and active purgatives, taken during the latent period, or at the commencement of the primary fever, diminish the quantity of eruption, determine the circulation from the external surface and lower febrile action. Vascular plethora, especially if accompanied with more or less excrementitious accumulations, favour not merely a confluent or malignant form of the distemper, but many of the complications described above (§ 44, *et seq.*). Extreme debility, weakness of constitution, and anemia, delay the eruption, and impress the malady with a nervous or asthenic character.

95. F. *Epidemic visitations* of small-pox observe several of the same laws as govern the recurrence of other epidemic pestilences: 1st. They

return to a locality after a varying number of years, the intervening years presenting merely a few cases. This may, in some measure, be owing to the numbers of susceptible or unprotected cases having become, after many years, so numerous as to furnish a sufficient supply to an epidemic outbreak; the straggling or few cases usually met with readily extending the infection to the accumulated mass of susceptible persons, as soon as states of air and other influences concur to predispose their constitutions to this result.

96. 2d. These visitations are characterized by greater severity, and are attended by a greater mortality, than when the disease occurs in solitary instances, or when it does not assume an epidemic prevalence: this may be owing to aerial or other causes having predisposed the constitution of susceptible or unprotected persons to severer attacks, and partly also to more concentrated states of the poisonous miasm conveyed by the air from the sick to the healthy. It is thus not uncommon to find persons who have been exposed to the infection of small-pox on ordinary occasions without being attacked, who nevertheless are seized by the disease in the severest form when it is epidemic.

97. 3d. Small-pox epidemics, like others, have a more or less gradual increase, and, when they reach their height, a gradual decrease. The rapidity of progress towards their height and their disappearance necessarily depend upon the population of districts where they break out, upon the numbers of susceptible persons, upon the communications, direct or indirect, between the sick and healthy, upon the observance of segregation, upon the rapidity with which the susceptible are infected, and upon the prevalence of the atmospheric and other concurring influences to the formation of an epidemic constitution, either in a limited locality, or in a more extended sphere.

98. 4th. Small-pox differs from other pestilences, inasmuch as that it may be propagated at all seasons of the year, and in very different atmospheric conditions, although with varying grades of rapidity and prevalence; whereas other infectious pestilences, as I have shown when treating of these, require certain ranges of temperature for their epidemic prevalence, or even for their contingent or possible communication. But small-pox, like scarlet fever and measles, although favoured more or less by temperature and season as these are, may prevail at any season in temperate countries, and more especially in the British Isles, yet the more general and most severe epidemics appear during warm seasons, or when a high temperature and much moisture in the air favour predisposition of constitution and the concentration of the poison. This compatibility of infection with any season and range of temperature incidental to temperate countries, accounts for the circumstance of small-pox, as well as scarlet fever and measles, being a domiciliated malady in these countries, although occurring after longer or shorter intervals in epidemic forms of prevalence and severity, as the numbers of unprotected persons become increased, or as the protection of vaccination wears out.

99. 5th. Epidemic small-pox may be local, owing to local circumstances and influences, as occurred in Norwich in 1819, when, between the months of May and October, about 530 persons died of the distemper within the limits of the bills of mortality, which do not include several parish-

es in the immediate neighbourhood, where it also prevailed. The limited occurrence of small-pox epidemics is often owing to the combination of morbid influences existing in the locality thus visited. In Norwich and other places, as Edinburgh, Glasgow, Lynn, Liverpool, &c., where such epidemics appeared, many, if not all the elements of an epidemic constitution already existed, and favoured the spread of the distemper, either from isolated cases, or from an introduced infection or fomites.

100. 6th. Not only may persons be seized with small-pox, during its epidemic prevalence, who had previously escaped, although exposed to infection (§ 95, *et seq.*), but also persons who have been vaccinated, and who, after long periods, have been revaccinated, and even inoculated with small-pox without effect, may on such an occasion be attacked by variola. This was observed by Mr. CROSSE in the Norwich epidemic of 1819, when the protective influence of vaccination may be presumed to have been greater than now, a shorter period having elapsed in most cases since the process was adopted. The small-pox thus following vaccination, after periods of different durations, but generally upward of seven or eight years, although more or less modified, and commonly modified in proportion to the shortness of the period which had elapsed from vaccination, cannot be mistaken for any other eruptive disease, for, independently of the character of the eruption, inoculation with the matter from the vesicles of the modified malady has produced regular small-pox in the unprotected, as was shown by Mr. CROSSE and others. It is chiefly during small-pox epidemics that the protective influence of vaccination is tested, and it is then that the amount and duration of this protection, in connexion with proofs of an efficient and healthy vaccination, can be duly estimated. (*See art. VACCINATION.*)

101. 7th. As I demonstrated with respect to scarlet fever, when epidemic, that that malady sometimes presented a most dangerous form, in which there was no eruption, and sometimes even no sore throat (*see SCARLET FEVER*, § 26, *et seq.*), so it has been observed that an analogous form of small-pox occurs in some severe epidemics, especially in places where all the elements of epidemic severity concur to produce great malignancy. Thus it is recorded by Mr. CROSSE, in his history of the Norwich epidemic of 1819, that a number of cases of fever with petechiæ, but without any variolous eruption, appeared in May, June, and July, when the epidemic was at the worst, and all terminated fatally. The victims were mostly children, enfeebled by scrofula, or some other disease; and as several were thus seized, while others in the same family were suffering from small-pox, and as no case of this kind occurred in any one who had previously gone through small-pox, Mr. CROSSE ascribed (and, in my opinion, very justly) every case of it to the variolous infection.

102. 8th. Before the introduction of inoculation into Europe, and when variola appeared only in its natural form, the epidemics of it which occasionally appeared, especially when the numbers of the unprotected, by a previous attack, became greatly increased, were often most destructive and pestilential. The outbreaks of small-pox in London in former times frequently carried off several thousand persons in a few months. In 1720,

upwards of 20,000 persons were said to have died of it in Paris; and HORSTIUS states that the epidemic visitations of variola "aliquandò adeò sævæ et malignæ sunt, ut instar veræ et legitimæ truciæ pestis in omnem ætatem et sexum grassentur et fervirant cum multorum jacturâ et perditione;" and that in 1614 it ravaged most of the countries of Europe more destructively than the plague, "in summâ nulli parcetes regioni, unius anni curriculo totam Europam seriatiim visitârunt atque enormiter depopulârunt." It may readily be conceived that, when the distemper appeared in a district or city, after an absence of many years, when the greater number of the inhabitants were unprotected, its spread would be rapid, and its ravages great. The mortality in the epidemics which occurred previously to the introduction of inoculation must have been very great, when we consider the efficient and concurrent elements of epidemic prevalence and fatality which every where existed in those times, and the nature of the treatment generally adopted. Even in recent times, the proportion of deaths to the number attacked by natural small-pox in several epidemic visitations of the distemper has varied from one in six to one in four.

103. 9th. *The possibility of persons being attacked by small-pox a second time* has been contended by many, and doubted by others, as MEAD, HEBERDEN, MONRO, DE HAEN, &c. DE LA CONDAMINE estimated second attacks as one in ten thousand. While admitting the possibility of a second attack, I doubt if its occurrence be even so frequent as here estimated. It is only when the disease is epidemic, and the exposure to the infectious miasm has been prolonged, or the poison has been concentrated in the respired air, that it may occur. Dr. GREGORY states that very few persons ever present themselves at the Small-pox Hospital who have affirmed that they had previously undergone the disease, and of these few but a very small fraction can stand the test of rigid scrutiny. In one of the last cases that occurred, the medical man who witnessed the first seizure had misgivings as to the true nature of the case. No instance is recorded of the same person having been admitted twice at the Small-pox Hospital. As to second attacks of variola, there are several sources of error. Sometimes the first attack is incorrectly reported, sometimes the second. The same medical man very rarely has seen both attacks. Chicken-pox is very frequently mistaken for variola, and even psora, ecthyma, and even pustular syphilis, have given origin to mistakes. The case of recurring variola which made the greatest noise was that of LOUIS XV., who died of small-pox in 1774, at the age of 64, after having, as it is alleged, undergone that disease casually in 1724, when 14 years of age. But the physicians who attended him in this first attack were not agreed as to its having been small-pox; and it was known that he was abroad and well six or seven days after the eruption was out, farther evincing the non-variolous nature of the attack. I therefore agree with Dr. GREGORY in believing that the primary disorder which his majesty had was varicella.

104. VIII. OF THE INOCULATION OF SMALL-POX.—Inoculation having been abolished by act of Parliament, and the end held in view having been more satisfactorily obtained, as generally supposed, by having recourse to vaccination, it may appear unnecessary to many to make inocu-



lation of small-pox a topic of discussion at this time. Yet when all the evidence connected with the comparative merits of inoculation and vaccination in temperate and warm climates, and in different races of the species, is duly considered, some notice of this still not unimportant topic should not be omitted. At the time of my writing this, just half a century has elapsed since the discovery and introduction of vaccination; and after a quarter of a century of most transcendental laudation of the measure, with merely occasional whisperings of doubt, and after another quarter of a century of reverberated encomiums from well-paid vaccination boards, raised with a view of overbearing the increasing murmurings of disbelief among those who observe and think for themselves, the middle of the 19th century finds the majority of the profession, in all latitudes and hemispheres, doubtful as to the preponderance of advantages, present and prospective, to be obtained either from inoculation or from vaccination. In 1823, I stated in the *London Medical Repository* (see the REFER., &c.), from evidence which had come before me in families which had suffered in numbers from small-pox, that the protection afforded by vaccination was impaired by years, and wore out in twelve or fourteen years, or in a longer or shorter time, according to diathesis, &c.—that vaccinated persons were liable to small-pox, in a more or less modified form, after some years, say nine or eleven; in a mild but distinct and fully developed form from twelve to fifteen years, and to the usual states of the distemper, according to diathesis, to exposure, to infection, and epidemic prevalence, after this more advanced age. What was then predicted has since been so generally fulfilled, that revaccination has been adopted in many places, and has often failed, natural small-pox having notwithstanding appeared in the revaccinated—both in those in whom the measure appeared to have succeeded and in those in whom it failed.

105. Thus half a century has brought us to the position that we are doubtful which to prefer—vaccination, with its present benefits and its future contingent dangers, or inoculation, with its possible present dangers and its future advantages. If there were no other considerations but these which could be seriously raised in connexion with the inoculation of variola, I should, for my own part, and after a due consideration of the subject in its various bearings, be at no loss which to select for those for whom I feel the interest connected with the nearest relationship; but there is the contingent and not improbable diffusion of the variolous poison to the unprotected by inoculation to be taken into account; and there is obedience also to the laws, which is the duty of every good citizen, and is strictly observed by every well-educated physician, although systematically disregarded and trespassed by pretenders and irregular medical practitioners. Another half century, the end of the nineteenth century, will, I fear, find the physician no longer in doubt as to which he will choose, even in this climate, as he no longer can be in doubt in India and other parts of the East, and as respects the dark races, unless he be influenced by authority and prejudice—influences which are equally unworthy the high position in which his profession places him in the estimation of those whose opinions alone deserve respect and consideration.

[The profession in the United States do not participate in the skepticism manifested by Dr. Copland in regard to the prophylactic powers of *vaccinia*. Statistics, as we have shown elsewhere, gathered both from private practice and observation in hospitals, orphan asylums, and other public institutions, prove beyond all doubt the vast superiority of vaccination over inoculation, and the unspeakable value of the former as a prophylactic measure against small-pox. Hence, in many, if not all, of the states, there are laws prohibiting inoculation, and these laws have doubtless done much good in preventing the spread of small-pox contagion. There is no doubt whatever in the minds of American physicians which to prefer, inoculation or vaccination, for statistics have settled the question in favour of the latter. Vaccination has not been lauded above its merits: were the public less skeptical than they are in regard to its advantages, especially the poorer classes, we should hear far less of the ravages of small-pox than we do at present. The question of the success of vaccination has been repeatedly raised, but investigations, carefully conducted, have all resulted in its favour. These doubts were thought worthy of investigation by the French *Royal Academy of Medicine* a few years ago, and a commission was appointed by that body charged with the examination of the facts bearing on the subject. In a very candid and elaborate report, M. PAUL DUBOIS, secretary of the commission, demonstrated that, though vaccination fails under some circumstances, it nevertheless modifies, in almost every instance, the variolous affections, when it does not entirely preserve individuals from an attack of the disease. The modifying influence of *vaccinia* is so great in the United States, that it has been estimated that among individuals vaccinated that are attacked with variolous disease not one per cent. are fatal, while one half of the non-vaccinated who take the disease die.—(BILLARD.) But one death from small-pox after vaccination occurred in Philadelphia in 1827, among 80,000 vaccinated persons, during the prevalence of a malignant and mortal small-pox, while several persons lost their lives from it who had already had the disease.]

106. *Inoculation of small-pox* is the artificial insertion beneath the cuticle, or in a wound or puncture, or the application on an abraded surface of a person not previously attacked by small-pox, of a minute portion of the virus formed in the vesicles or pustules of one labouring under the malady. By this mode of communicating the malady, the system is generally infected by the smallest quantity of the poison capable of producing this effect. In the East, inoculation has been practised successfully, and in a rational manner, from a remote period—as remote as the history of the disease carries us. The following arguments have been adduced in favour of it, and, previously to the discovery of vaccination, powerfully recommended it; and even now they should be calmly weighed against the advantages of vaccination, as far as these have been yet ascertained, and as they may be valued prospectively.

107. (a) All persons not protected by an attack of small-pox are liable to be seized with this distemper at any period of life, in every circumstance in which they may be placed, and on any occasion. It therefore behoves them to obtain this protection as early as may be consistent with a safe and efficient recourse to it. Now, this pro-

tection was formerly inoculation; more recently, and at present, the only legal protection is vaccination. The former communicated a milder form of the same disease as a certain protection; the latter transmits an affection of a slight and by no means dangerous nature in itself, which is somewhat similar in certain respects, and which has the virtue of preventing an attack of small-pox for some years, and of rendering such attack milder in grade and modified in character for an indefinite period; this protection, however, is not durable, but terminates after an indefinite number of years, in some instances entirely exhausting itself, and leaving those who may consider themselves protected open to either a mild and modified, or a confluent, severe, or even fatal attack of the malady.

108. (b) The individual and collective evils resulting from the infection of natural small-pox, whether appearing in scattered or rare cases, or breaking out with pestilential prevalence, are well known. The history of small-pox epidemics, as observed in communities furnishing numbers of unprotected persons, sufficiently demonstrates the devastation which followed the entire want of any protecting power before the introduction of inoculation into Europe. When this protection was introduced, its influence was manifest, not only in respect of the persons who had recourse to it, but also as regarded the community, in diminishing the frequency and fatality of epidemic small-pox, and in furnishing protected persons to attend upon the infected. Still, there was a certain amount of evil connected with this mode of protection. The chance of communicating a dangerous or even fatal malady, and the contingent propagation, from the inoculated individual to the unprotected, of this disease, dismayed many, and furnished arguments in former times against having recourse to it. When weighed in connexion with the fact that some few entirely escape small-pox during their whole lives, although these were admitted to be very few, many were induced entirely to neglect this mode of protection, and, in more recent times, to adopt a milder method, and one which appeared to the public and to the profession, until lately, equally efficacious and permanent.

109. The chief objections here urged against inoculation were partly specious and partly just. Inoculation practised by ignorant, unskilled, and unprofessional hands, in improper seasons, ages, and circumstances, or with a total disregard of the states of health of those subjected to it, may occasionally be followed by dangerous or even fatal results. Nevertheless, it has been shown that, with all these drawbacks, and without the precautions, the science, and the care which the educated physician can employ, the proportion of deaths among the inoculated does not rise above 5 in 1000. That inoculation would spread the distemper is certainly true when a few only resort to it; but even such diffusion would prevent the recurrence of those pestilential epidemics which follow the accumulation of a great number of unprotected in one locality, and would diffuse the disease in a milder form than when it occurs epidemically; for it has been fully proved that infection from the inoculated distemper generally does not communicate so severe or dangerous an attack as infection from a natural and epidemic case. Besides, if inoculation were generally adopted at a proper age, there could not

possibly be the pabulum for an epidemic outbreak, and scarcely the occurrence of a natural case.

110. (c) Against this admitted amount of unfavourable contingency must be placed the firm confidence of protection which inoculation furnished to all persons, in all climates, and to all races within the tropics, and to the dark varieties of the species. In these climates and races vaccination (which the law has made to supersede inoculation) has been demonstrated to be inefficacious; but in all these circumstances, however diversified or opposite, inoculation has been found, and still is found, the most certain protection from the severer distemper and from epidemic outbreaks.\*

111. (d) Several *unfavourable contingencies have been urged against inoculation*; but certain of these need not be apprehended. That this measure may communicate a severe, a disfiguring, or even a fatal malady to a person who may entirely escape it if inoculation were not performed, must be admitted; but this argument was without weight before the introduction of vaccination, and now the advantages of the one mode of protection should only be weighed against the other with the view of adopting either of them, for the neglect of both is manifestly not merely improper, but even criminal. It has been urged that inoculation may not only be followed by a dangerous attack, but that it may develop other maladies, especially severe affections of the eyes, terminating in blindness, and diseases of various organs; but these would more certainly follow the natural infection of small-pox, which, without either inoculation or vaccination, could very rarely be avoided. To these contingencies vaccination is certainly not liable; but it should not be overlooked that scrofula and tubercular formations are more frequently observed after vaccination than after inoculation (see *art. SCROFULA*, &c., § 48, 49). The risk of a second attack after the inoculated small-pox has been urged; but this risk hardly exceeds a possibility, and should not be taken into account; the risk of being attacked after vaccination, or even after revaccination, being infinitely greater, especially during adult and advanced age. (See *art. VACCINATION*.)

112. (e) It has been urged by Dr. BARON and others, who are the most determined supporters of vaccination, that "the practice of inoculation, the greatest improvement ever introduced in the treatment of small-pox, although beneficial to the person inoculated, has been detrimental to mankind in general. It has kept up a constant source of noxious infection, which has more than coun-

\* Between December, 1849, and April, 1850, inclusive, 76 cases of small-pox were admitted into the General Hospital, Calcutta. Of these 20 died. Of the 76 admitted, 66 had been vaccinated. Of the 66 vaccinated, 41 had good cicatrices, and 25 had cicatrices not so well marked. Of the total 76 cases, 30 were severe and confluent, and 46 mild or modified. Of the 10 unprotected cases, 5 were severe and confluent—of whom 4 died; and 5 were mild. Of the remaining 25 confluent cases, after vaccination, 12 had good cicatrices, and 13 cicatrices not so well marked. Of those that had been vaccinated in early life, 16 died, of whom half bore good scars, and half had scars not well marked. Of the whole number, 63 were males, and 11 females; 8 were children aged five years or under, of whom 1 died. Six of these children had been vaccinated. The mortality here stated as occurring from variola after vaccination—16 out of 66, or 24 per cent.—is the highest upon record in any country, and must be attributed either to the malignity of the prevailing epidemic, to the climate and locality, or to the influence of race—probably, in part, to all these.



terbalanced the advantages of individual security."—(*Life of Jenner*, vol. i., p. 260.) This is true only to a certain extent; for if all were inoculated early in life (as by law might be enforced), there could be few or none liable to the natural infection and epidemic visitation of the malady; and according to the numbers unprotected would be the risk of such infection and visitation. Inoculation, although practised the most during the last half of the 18th century, was nevertheless as often neglected or put off, until it was too late to prevent the natural infection, and hence all reasoning respecting it became inconclusive, especially in local and other circumstances, respecting which the particulars were either imperfectly known or altogether unknown.

113. Sir G. BLANE has endeavoured to show that the proportion which the mortality by small-pox in London bore to the general mortality increased during the last century from 78 to 94 per thousand, and that the diffusion of small-pox by inoculation was more strongly exemplified in the country than in London; since there are many places where small-pox was not known for twenty, thirty, and even forty years, in which at present scarcely an adult can be found who has not had it. These arguments are, however, more specious than solid. For, as respects London, the increase of population, the diminished prevalence of all other diseases, and the prevalence of epidemic small-pox, are not duly estimated. From 1711 to 1740, when there was no inoculation, the deaths by small-pox were 65,383; from 1741 to 1770, when inoculation was coming into use, the deaths were 63,308; and from 1771 to 1800, when inoculation was the most frequent, the deaths were 57,268. The increase of population during these periods should not be overlooked. As to the escape of many places for many years, upon which Sir G. BLANE has laid so much stress, it should be known that such places were always visited at last, and without exception, by most destructive epidemics, the great number of the unprotected furnishing an abundant papulum for their malignant and fatal prevalence. It becomes, therefore, much preferable to have, even in these places, the regular adoption of inoculation by qualified persons, with even the highest rate of mortality consequent upon this measure, than the immunity of many years, with a mortality of 25 or 30 per cent., as recorded of these epidemics.

114. There can be no doubt that early in, and about the middle of, the last century, when inoculation was adopted only by a few, and even afterward, when inoculation was very irregularly practised, and when many, even the majority in many places, were left without that protection, that it multiplied the sources of infection; but this was merely a powerful argument then for universal inoculation, as it is now for the adoption either of vaccination or of inoculation, if the latter were allowed by the Legislature. On this subject, as will more fully appear when vaccination comes under consideration, writers have been partisans, rather than calm examiners of facts, as formerly or at present observed, and as faithful expositors of what may rationally be expected.

[We fear that the above statements of our author rest on very insufficient proof. Statistics carefully collected in this country and Great Britain lead us to a different conclusion. While re-

current small-pox appears to be one of the rarest events, it must be admitted that small-pox after vaccination, among adults vaccinated in infancy, is by no means uncommon. If we take, for instance, the records of the London Small-pox Hospital for the last eleven years, we find that 4090 persons have been admitted having small-pox, of whom 2168 had been vaccinated and 1924 unvaccinated, and that more than one half of those admitted had been vaccinated in early life. The majority were of adult age, a few between nine and fifteen; but below the age of nine scarcely any vaccinated person was admitted; thus showing that the susceptibility to the variolous miasm among vaccinated persons increases as life advances, while the reverse holds true in regard to the unvaccinated. In 1850–51, the total number of cases of small-pox admitted was 976, of whom 162 died, being at the rate of 16 per cent. Of the 976 admitted, 41 were infants below the age of five, all unprotected, of whom 22 died; 101 were children between five and fifteen—majority unvaccinated, of whom 25, or one quarter, died; 685 were adults from fifteen to thirty; 109 beyond that age. Total, 794 adults; the larger proportion of these had been vaccinated, of whom 115 died, or 14 per cent. Of the total number admitted—976—613 professed to have been vaccinated; 569 exhibited cicatrices; of the latter, 25 died, or 4 per cent. In 1851, the proportion of persons admitted after vaccination amounted to 65 per cent., while in 1841 it was only 44 per cent., the increase being, doubtless, attributable to the extensive diffusion of vaccination. But the mortality at the same hospital, during the last two years, among the vaccinated cases, according to Dr. GREGORY, has only slightly exceeded 4 per cent. This is a question, however, which cannot be accurately settled by hospital statistics and experience, inasmuch as the patient is not often as favourably situated, as regards recovery, as in private practice; for it has been shown by Dr. GREGORY that in one sixth of the whole number of fatal cases there were symptoms of superadded hospital disease, especially crisympelas facialis. Thus mild cases are, under hospital influences, rendered severe; discrete cases become confluent, and the general mortality is increased.

Compare the following table of Dr. GREGORY'S, in the *Medical Times* for 1849, with returns from private practitioners:

	Total.	Deaths.	Per Cent. of Deaths.
Unprotected cases . . . . .	254	103	40
Vaccinated { with cicatrices	365	38	10
{ without do. . .	63	25	39
Total vaccinated . . . . .	428	63	14
Previously inoculated . . . .	3	1	33

Thirty returns from private practitioners gave,

	Total.	Deaths.	Per Cent. of Deaths.
Natural small-pox in un- protected cases . . . . .	1731	361	20.85
Small-pox after vaccination	929	32	3.44

In a Report of the Norwich Board of Health, in a severe epidemic of small-pox, which occurred in that city in 1845, it is stated that the mortality from small-pox in the unprotected was 12½ per cent., and in the vaccinated only 3 per cent.; and it was very doubtful, in the latter class of cases, whether all had been properly under the influence of small-pox. The same report gives the result of the personal visitation of 531 fami-

lies, comprising 2170 individuals. Of these, 1664 had small-pox, of whom 1536 had not been vaccinated, while of 506 who escaped only 84 had not been vaccinated. During the last year, the Epidemiological Society of London had received 430 replies from medical practitioners in the United Kingdom to questions sent out regarding the prophylactic power of vaccination, and out of this large number only one expressed any doubt respecting the protective power of the vaccine disease. And such, also, has been the uniform opinion expressed in the annual returns by medical officers to the Poor-law Board of Great Britain; but, as Dr. GREGORY has suggested, this is a question which can only be finally settled by an appeal to facts, and to the experience of long periods resting on large data. Thus, according to Dr. GREGORY, the average of deaths from small-pox in London per 1000 deaths, for the ten years ending 1752, was 89; for the 10 years ending 1756, 95; for the 10 years ending 1770, 108; for the 10 years ending 1780, 107; for the 10 years ending 1790, 94; for the 10 years ending 1800, 77; for the 10 years ending 1810, 63; for the 10 years ending 1820, 41; for the 10 years ending 1830, 32; for the 10 years ending 1840, not known; for the 10 years ending 1850, 16; average number of deaths from small-pox per annum in London, for the 10 years ending 1750, 2036; for the 10 years ending 1850, 498. The number of deaths from small-pox in the former period is to the latter as 4 to 1, while the population of the former period was to the latter probably as 1 to 4.

According to CASPAR (*Med. Statistics*), we have the following results obtained in Prussia:

	Total Deaths.	Small-pox Deaths.	Per 1000 Deaths.	Ratio.
1783-1791=8 years,	47,367	4315	91	10
1814-1822=8 "	51,389	535	10.5	1

In 1825, the mortality from small-pox in Prussia was 5.8 per 1000 of all deaths; in 1834, 15.6 per 1000; in 1843, 10.2; and in 1849 but 3.5 per 1000 of the total deaths, which, during the last year mentioned, were 498,862, out of a population of 16,000,000, showing that small-pox was 37 times more fatal in Prussia in 1803 than in 1849. Of 435 medical men to whom queries were addressed by the Epidemiological Society of London in 1853, 266 state that they had been vaccinated, much exposed to small-pox, and had escaped; 34 had been vaccinated, not much exposed, and escaped; 38 had been vaccinated, and taken small-pox; 69 had been inoculated, and escaped small-pox; 5 had been inoculated, but taken small-pox; 3 had been inoculated, but taken cow-pox accidentally; 20 had been neither vaccinated nor inoculated, and had taken small-pox; and, with the exception of two, all the cases of small-pox after vaccination had been mild, and one case of small-pox after vaccination was severe. Of 356 replies from medical practitioners in Great Britain, 182 state that they have never seen a case of death from small-pox after vaccination; 3 state, respectively, that the cases have been "few," "very few," and "frequent;" 44 give an aggregate of 70 deaths; 127 give no statement of their experience on the subject.

The following table gives the experience of 30 practitioners on the respective mortality of, 1st. Natural small-pox; 2d. Small-pox after small-pox; 3d. Small-pox after vaccination:

	Cases.	Deaths.	Per Cent. of Deaths.
Natural small-pox . . . . .	1731	361	20.85
Small-pox after small-pox . .	58	22	39.92
Small-pox after vaccination .	929	32	3.44

In 7 of the cases of death after vaccination, the evidence of vaccination was not satisfactory, and in 6 others the deaths are ascribed to superadded diseases. Great stress is laid in the above replies to the manner in which vaccination is performed; on the importance of fresh and efficient lymph, and careful watching of each case. There is no satisfactory proof that vaccination has failed to produce the great results anticipated by its advocates. The mortality from small-pox is due to the neglect of vaccination, or the carelessness with which it is performed, not to its failure, as appears from the above statistics. In Great Britain, the highest number of vaccinations under one year amounts to only about 33 per cent. of total births, and in many parts of the kingdom it is not two per cent.; and in this country the average proportion is still less. And yet England has a national vaccine institution, and acts of Parliament for the promotion of vaccination; and while in Prussia, Sweden, and other continental nations, legislative authority has undertaken to enforce general vaccination among the people, still there are, in spite of every precaution and exertion, thousands of unprotected persons among the poor and improvident, ready to become victims of small-pox whenever exposed to its epidemic or contagious influence.

Statistics bearing on this subject in this country fully sustain the conclusion adopted by the Committee of the Pennsylvania Medical Society, in 1852, that "no circumstances exist to justify the general substitution of inoculation after the fifteenth year of age, as proposed by Dr. GREGORY," and that "vaccination still offers the only dependence for protection against small-pox.]"

115. *There are a few rules requisite to the safe conduct of inoculation that ought to be observed:* 1st. This measure should be employed for persons in good health—in those who are neither debilitated, nor plethoric, nor obviously scrofulous. Debilitated persons should previously be restored to health, and the plethoric reduced by moderate evacuations and active exercise. All the secretions and excretions ought to be natural and free; and wherever a cachectic state of system, or indications of visceral congestion or obstruction exist, inoculation ought not to be performed. 2d. It may safely be practised at any age from three months and upward, but it should not be resorted to during pregnancy and the puerperal state, on account of danger to the mother and child, nor during lactation. 3d. It may be practised at all seasons in temperate countries, and in all climates. The preferable season is that which is moderately cool, and admits of due ventilation of the patient's apartment. In warm climates, the coolest season of the year should be selected; and this season has always been selected by native inoculators in the warm climates of the East, where inoculation has been adopted from early ages. 4th. Inoculation is successful, compared with the natural distemper, in all races and climates, but more especially in the dark races and in tropical countries; for although the proportion of deaths after inoculation may be higher in the dark than in the white races, the protection furnished by it is even greater in the former than



in the latter, natural small-pox being so remarkably destructive in all dark races

116. That variolous inoculation by unqualified persons ought to be prevented by legislative enactment cannot be disputed; but there are circumstances which may render recourse to it, under due precautions, a justifiable measure, especially the following: 1st. When small-pox unexpectedly breaks out in a district at a time when vaccine virus is not to be obtained. 2d. When persons who have been vaccinated in infancy are about to proceed to intertropical climates, and are likely to visit places where small-pox either prevails or recurs epidemically. 3d. Among the dark races, when they will not adopt vaccination, or when the vaccine virus is inefficient, either as respects its local effects or its protective power. 4th. When persons are insusceptible of vaccination, from peculiarity of constitution or some other cause.

117. In the present state of our knowledge as to the protection furnished by vaccination—believing that this measure will never be generally adopted, and that, if it were so adopted, it could never altogether banish small-pox, nor prove a complete or lasting preventive of variolous infection—it becomes doubtful whether or no the amount of benefit conferred by vaccination will hereafter prove greater than would be furnished by the general adoption of inoculation: as respects intertropical climates and the dark races, the candid inquirer into the merits of both will ere long, even if not now, declare for the latter. As inoculation is still practised in some countries, as it is still in many climates preferred to vaccination, and as it is the measure to which the majority of persons above forty years of age owe their protection from the natural distemper, the more important particulars connected with its performance require to be stated; and I cannot do this better than nearly in the words of Dr. GREGORY:

118. *Inoculated Small-pox.*—Inoculation is performed by introducing into the arm, at the insertion of the deltoid muscle, by means of a lancet, a minute portion of variolous matter. The thin lymph of a fifth-day vesicle is to be preferred to the well-concocted putulent matter of the eighth day, but both are efficient. One incision only is to be made. A minute orange-coloured spot is perceptible on the second day, by aid of the microscope; on the third or fourth day, a sensation of pricking is felt in the part. The punctured point is hard, and a minute vesicle, whose centre is depressed, may be observed, surmounting an inflamed base. On the fifth day, the vesicle is well developed, and the areola commences. On the sixth day, the patient feels stiffness in the axilla, with pain. The inoculated part has become a hard and inflamed phlegmon, the subjacent cellular tissue having become involved in the inflammatory action. On the evening of the seventh, or early on the eighth day, rigours, headache, a fit of syncope, vomiting, an offensive state of the breath, alternate heats and chills, languor, lassitude, or, in the child, a convulsive paroxysm, announce the setting in of fever. The constitution sympathizes with the progress of the local disorder, and the virus has affected the whole system.

119. On the appearance of febrile symptoms, the inflammation of the *inoculated part* of the arm spreads rapidly. An areola of irregular shape is

soon completed, which displays within it minute confluent vesicles. On the tenth day, the arm is hard, tense, shining, and very red. The pustule discharges copiously, and ulceration has evidently penetrated the depth of the corion.

120. On the eighth day, spots of variolous eruption begin to show themselves in various, and often in the most distant parts of the body. In the majority of cases, the eruption is distinct and moderate. Two hundred vesicles are counted a full crop. Sometimes not more than two or three papulæ can be discovered, which perhaps shrivel and dry up, without going through the regular process of maturation. In other cases, the eruption is full and semi-confluent, passing through all the stages to maturation, and scabbing, and cicatrization, with as much perfection as the casual disease can display. Between these extremes every possible variety may be observed. The truly confluent eruption, with affection of the mucous surfaces, is very rare, and that implication of the fluids and of the nervous system, which together constitute the extreme of variolous malignity, is nearly, if not entirely, unknown. Secondary fever, therefore, is not common, at least in any intensity.

121. IX. TREATMENT.—Small-pox being a specific disease, of a determinate course as respects both the eruption and the febrile phenomena characterizing it, is less amenable to treatment than most other acute diseases. Nevertheless, rationally-devised means exert considerable influence on the course of the distemper. In many cases, little or no interference on the part of the physician may be required, but something is always expected from him when his aid is called in, and it should, therefore, be clearly known what measures may be injurious and what beneficial. In severe cases, however, medical aid is always more or less requisite and advantageous, but, to be the latter, it should be based upon sound pathological views, and upon an accurate recognition of existing morbid states. Dr. GREGORY justly remarks, that “it is a melancholy reflection, but too true, that for many hundred years the efforts of physicians were rather exerted to thwart nature, and to add to the malignancy of the disease, than to aid her in her efforts. Blisters, heating alexipharmics, large bleedings, opiates, ointments, masks and lotions to prevent pitting, were the great measures formerly pursued, not one of which can be recommended.” We may smile at the red bed-hangings, the red blankets and counterpane, the mulberry wine, the juice of pomegranates, prescribed for the malady by JOHN OF GADDESSEN; “but if either he, or GORDONIUS, or GILBERTUS were to rise from their graves, and inquire whether this is one whit worse than mesmerism, or at all more absurd than homoeopathy or hydropathy, we should, I fear, look a little foolish. Let us, then, avoid the errors of our ancestors, without reproaching them.”

122. Even in more recent times, and down to the days of SVENHAM, or even to those of VAN SWIETEN and HERBERDEN, physicians have entertained very erroneous notions as to the powers of medicine in small-pox, and as to the intentions by which they should be guided. They imagined that certain drugs possessed the power of promoting the eruption, and not only of promoting it, but of procuring a favourable sort—a power, however, which was much more frequently injurious than beneficial; and, as far as it was manifested, much

less rational and serviceable than the means employed for ages in the East in the treatment of small-pox. In this disease, we remark, as in several others, that the boasted powers of doctrinal science, when not fully advanced, are often more prejudicial than beneficial, especially when blindly adopted, and applied without the guidance of rational observation.

123. The treatment of small-pox should be directed with similar *intentions* to those recommended for the management of other fevers. Means should be employed, 1st, to moderate febrile phenomena, whenever they are severe or excessive; 2d, to prevent or remove local determinations or congestions of blood, or other concomitant affections or structural changes; and, 3d, to support the powers of life, whenever they are inordinately depressed or exhausted by the influence of the morbid poison on the nervous and circulating systems. These *indications* should never be overlooked in any form, stage, or state of the malady. In the mild or distinct form, the active adoption of them may not be required; yet even in it, the occasions which may demand their due observance should carefully be watched for, and promptly met when observed.

124. *A. The primary or initiatory fever* may not be recognised as that of small-pox in cases occurring independently of inoculation, or without obvious sources of infection, and in these the treatment of this stage must be conducted according to the principles developed under the treatment of continued fever (see *art. FEVER*, § 126, *et seq.*). If, however, it be known, or strongly suspected, that the incipient disease is small-pox, the question arises, Shall there be any difference in the treatment to be adopted from that usually employed in continued fever? But, as it is in continued fever, so it is in small-pox, the febrile action, the type and character of the fever may vary from inflammatory to adynamic, or even putro-adynamic, and display in the latter, as I have shown in respect of the former, not merely either extreme of type, but every intermediate phase. The treatment of this period, therefore, must necessarily depend upon the states of the pulse and of the general phenomena, in connexion with existing evidence of vital power; and upon the acumen and capability of the physician in recognising with precision these various and varying states, and in controlling or guiding them to a successful issue. As remarked by SYDENHAM, the fate of the patient depends upon the treatment of this stage—that is, of the first three days of the disease.

125. The patient should be removed to a large and airy chamber, which ought to be darkened and well ventilated. He should be laid on a hair mattress, and be covered by a moderate quantity of bed-clothes, his head resting on a hair pillow, as being more cool than that in common use. The temperature of the room should be, according to the amount of febrile heat, from  $55^{\circ}$  to  $65^{\circ}$ , but preferably from  $55^{\circ}$  to  $60^{\circ}$ . If the disease be distinct, and the febrile symptoms not very severe, the patient may not be confined to bed during the day, his clothing being appropriate to the circumstances in which he is placed. A dose of calomel with JAMES'S powder, or antimonial powder, should be given, and be followed, three hours afterward, by a purgative pill or draught. After these, saline draughts in a state of effervescence may be prescribed from time to time, and the bow-

els preserved in a moderately open state by the usual cooling aperients. In the slighter forms of the disease, no farther medicine will be required; the beverages, diet, and regimen of the patient being regulated as stated hereafter.

126. If the primary fever assume a more severe and inflammatory character, and if the pain in the head, epigastrium, and loins, be too severe to be allayed by the above means, and more especially if the patient be robust or plethoric, blood should be taken from the arm in such quantity as the peculiarities of the case may warrant, in addition to these means. When the brain, lungs, or liver is congested, or the pulse full, hard, oppressed, or sharp, a moderate blood-letting, relatively to the state of the patient, ought to be prescribed; and this measure will be still more requisite when the headache is intense, the face flushed, and the vessels throbbing, the irritability of stomach extreme, the breathing oppressed, and the pulse full and labouring. When the eyes are suffused, and headache is experienced, leeches applied to the temples, or behind the ears, may be sufficient; or, in the more phlogistic cases, they may be employed in aid of bleeding from the arm, and be followed by calomel, JAMES'S powder, a purgative draught or pill, and cooling draughts. Dr. GREGORY remarks, that "it has often been said that blood-letting, in the fever of invasion, interrupts the process of nature, repels the eruption, or so retards it, and so weakens the constitution, that the due concoction of the pustules is never effected. It is undeniable that a man may be bled unnecessarily and too largely in small-pox, but a moderate bleeding does no harm, and, if the fever runs high, often does great good." The propriety of having recourse to venesection, especially in the circumstances just mentioned, has been insisted on by SYDENHAM, BIENDISANT, TORRINI, DOVER, BERGER, STUBBES, FALCONET, and many others. DE VALDES recommended blood-letting nearly a century before SYDENHAM; and HECQUET advised blood-letting from the feet at this stage. HUFELAND very properly directed leeches to be applied to the temples when the disease was attended by convulsions. The quantity of blood to be drawn should depend upon the state of the pulse and other peculiarities of the case, always keeping in recollection the character of the prevailing epidemic and of physical influences.

127. *a. Emetics* have been advised by some writers on the invasion of the primary form of small-pox, and condemned by others. The propriety of having recourse to them depends upon the peculiarities of the case, the character of the epidemic, and the season in which the distemper occurs. SYDENHAM prescribed an emetic, after blood-letting, in the primary fever, and in the secondary fever with internal complication. He likewise had recourse to it as soon as the disease appeared to be confluent. But there appears to have been much vacillation in his opinions as to both emetics and blood-letting in small-pox at different epochs of his practice, or rather during the different epidemic prevalences of the malady, as shown by his brief accounts of several epidemics; and I cannot depend so firmly upon the opinions of a physician, as many are disposed to do, who did not perceive, or duly estimate, the contagious and infectious nature of the malady. That emetics are often of service, especially at the commencement of the primary fever, and when indications of biliary obstruction, congestion, or ac-



cumulations are present, and during autumn or summer, I cannot doubt; but it requires close observation and experience to determine with precision the exact circumstances and period of the malady requiring their exhibition. They have been recommended by DEDEKIND, HECQUET, LEAKE, and many others, but in a too empirical manner, and with little regard to either the peculiarities of the case, the stage of the malady, or the choice of the agent. A writer in the Berlin Medical Transactions advises repeated emetics in this disease. The effects of one, however, will show the propriety of having recourse to it, and likewise of repeating it. In the low, adynamic, or confluent states of the disease, more especially, the choice of the agent is of some importance; for in these states the more nauseating or depressing emetics, as tartar emetic or ipecacuanha, are not so appropriate as in the sthenic forms of the malady, unless they be conjoined with stimulants, aromatics, &c. In the former states the sulphate of zinc should be preferred. Some writers suppose that emetics diminish, others that they increase, the quantity of eruption; but it may be said of emetics, as of blood-letting, that they have little or no effect upon the eruption, or in lessening confluence. Their influence is exerted chiefly in promoting the excreting functions, while blood-letting diminishes inordinate vascular action, and relieves internal oppression and congestion.

128. *b. Purgatives* are generally beneficial during the primary fever, and very often also in the secondary fever; but they are required more especially when the secretions and excretions have not been duly evacuated previously to treatment, when the indications of local determinations, particularly to the head, are manifest, and when sthenic febrile excitement is considerable. In these circumstances not only purgatives, but the whole of the *antiphlogistic regimen*, as insisted on by SYDENHAM, HOFFMANN, VAN SWIETEN, BARTHOLINUS, DIMSDALE, CURRIE, EYEREL, BEDDOES, PERKINS, &c., are beneficial. Much, however, depends upon the selection and combination of these means appropriately to the peculiarities of the case. In the primary fever, *calomel* is generally most serviceable, especially when conjoined with antimonials in the more sthenic forms of the disease, and with camphor in the more asthenic; but in most cases a full dose of the calomel should be followed by a purgative draught in a few hours if it have not operated sufficiently. Dr. FOWLER supposed that when calomel was given early in the eruptive fever it diminished the quantity of eruption. But it cannot have this effect unless it be taken before the first indications of eruption exist, and then its influence must be necessarily doubtful.

129. OSLANDER very justly cautions against too much purging; for it may develop an intestinal complication in the form of either diarrhoea or dysentery, and thereby greatly endanger the patient. In the more inflammatory or sthenic cases the phosphate of soda, the citrate of magnesia, or other cooling saline purgatives, should be preferred, or such as may be compatible with the use of saline diaphoretics, as the liquor ammoniæ acetatis and spiritus ætheris nitrici; but in asthenic or confluent states of the disease, after a dose of calomel or camphor, I have preferred to give the spiritus terebinthinæ, with about an equal part of castor oil, on the surface of a suitable vehicle, in quantity sufficient to act moder-

ately on the bowels. If this dose be rejected, the effect will, notwithstanding, be more or less beneficial, and after some hours it should be repeated, or the same substances in larger doses should be administered in an enema, which may be repeated according to circumstances.

130. During the primary fever pain at the epigastrium is often considerable, or even urgent, and is frequently accompanied with irritability of stomach, and the rejection of whatever is swallowed. It may be requisite, from the severity of these symptoms, to endeavour to abate them. This object will be most readily attained by giving a full dose of calomel with a moderate dose of camphor and opium, and a little cinnamon or ginger in the form of bolus, or in that of powder mixed in a little treacle. In these circumstances, saline effervescing draughts, with or without tincture of opium, generally fail of giving relief. If the disease presenting these symptoms is of an asthenic or confluent kind, as commonly observed, or if the medicine now recommended is not sufficiently efficacious, a mustard poultice may be applied over the epigastrium, or a mustard pediluvium or semicupium may be employed. In most cases I have preferred to the mustard poultice the application over the epigastrium of equal parts of the compound camphor liniment and of the turpentine liniment, with a little cajuput oil, and sometimes with a little olive or almond oil, on the surface of flannel or spongio-piline.

131. *c. Cooling diaphoretics*, especially small or moderate doses of the solution of the acetate of ammonia, or of the citrate of ammonia, or of the citrate of magnesia, or of the citrate of soda or potash, with the spirit of nitric ether, according to the states of the surface and of the bowels, will generally be of service, and the acid may be somewhat in excess when vascular action is inordinate. Cold sponging the surface during the early part of the primary fever, or even the cold affusion, may be resorted to, as advised by BARTHOLIN, CURRIE, BEDDOES, JACKSON, and others; but when the eruption appears these should be relinquished, for I believe that the recommendation of SCHAEFFER, SWAINSON, HUFELAND, WATSON, and SELLE not to employ these means at this period is altogether judicious. MARCARD considered, and with much reason, that the tepid bath, previously to the appearance of the eruption, moderated the primary fever; and he recommended warm stimulating baths in the low and retrocedent states of the distemper. Many of the writers already named cautioned against carrying the cooling regimen too far, or employing excessive cold, in the treatment of low, confluent, or epidemic states of the disease, justly contending that a moderately cool or fresh state of the air, and a judicious recourse to restoratives or tonics were altogether indispensable in many cases, and especially in the epidemic prevalences of the malady. The treatment which appears the most appropriate to these cases will be hereafter stated (§ 143, *et seq.*).

132. Dr. GREGORY justly remarks, that "if the circulation at this period (the primary fever) be languid—if the pulse be small and feeble, the skin pale, and the extremities cold—if the patient lies on his back, sunk and exhausted, let him have immediately warm brandy and water, cover him with bed-clothes, apply mustard poultices to the centre and extremities of the circulating system, and give thirty drops of laudanum,

to be repeated in four hours if necessary. This cordial plan of treatment must often be continued for several days, when the eruptive nîsus is accompanied with depression, and nature appears so obviously unequal to the effort."—*Op. cit.*, p. 100. In these circumstances the opium should be given with camphor, or ammonia, or both; and the hot terebinthinate epithem will generally be more efficacious than the mustard poultices.

133. *B.* During the progress of the eruption, and in the remission of the fever which produced it, but little beyond a suitable regimen is required. A too officious recourse to medicine is oftener prejudicial than the contrary. The same remark applies to the secondary fever, or suppurative stage, when the disease is discrete and there is no complication. During the period of eruption and development, however, the secretions and excretions should be carefully watched and cautiously promoted, without producing irritation; and the senses and mind ought to be guarded against excitement, very light and bland beverages, and mild, weak, farinaceous nourishment, in small quantity only, being allowed. Dr. GREGORY's remarks as to the treatment of this stage are so judicious, that I shall adduce them at this place.

134. "While the pustules are in process of maturation a variety of measures may be pursued, which, without interrupting the salutary and necessary process of pustulation, lessen the patient's sufferings, and prevent subsequent difficulties. If the eruption proceeds favourably you would not do more than lessen thirst by saline draughts, and occasionally relieve the bowels by a dose of castor oil. If the maturation of a large crop of pustules excites much fever, it will be prudent to employ more active purgatives, such as calomel with colocynth, the compound powder of jalap, or the infusion of senna with salts, all which cause a drain from the blood-vessels and lower arterial action. Place the patient in a large and cool room, and cover him lightly with bed-clothes. Remove all flannel coverings which may usually be worn next the skin. If the surface be very tender, apply to it some cooling lotion, such as the decoction of bran with some spirit of rosemary. In all cases, even of moderate intensity, it is proper to cut the hair close, and so to maintain it during the whole course of the disease. The head is thus kept cool, delirium is relieved or prevented, the risk of cellular inflammation of the scalp diminished, cleanliness enforced, and an opportunity afforded for the employment of evaporating lotions, should more urgent symptoms arise. Opiates may be occasionally administered at bed-time, when there is much cuticular irritation, or great distress from want of sleep.

135. "The diet of the patient should consist of tea, bread and milk, arrowroot, rice-milk, and roasted apples. Grapes, oranges, and ripe sub-acid fruits are grateful to the patient, and useful adjuvants to the antiphlogistic remedies. Lemonade, apple-water, tamarind-water, toast-water, and milk-and-water must be the ordinary beverages. SYDENHAM permitted his patients to drink small-beer—an indulgence which may still be granted. To that able physician we are indebted for this, the cooling system of treatment in small-pox.

136. "One of the first objects which, in cases of more urgency, will attract your attention, is

the condition of the throat. Gargles of infusum rosæ comp. afford some relief. When the difficulty of swallowing is very great, and the tonsils much swollen, leeches applied to the throat, followed by poppy-water fomentations, are serviceable. Under these circumstances, some physicians counsel you to apply to the throat, by means of a camel-hair pencil, a strong solution of lunar caustic (twelve grains to the ounce), with the view of checking the advance of the mucous vesicles. I have not adopted this practice, from a conviction that it would not affect the tracheal inflammation, from which alone danger is to be apprehended."—(*Op. cit.*, p. 101.) More recently, much stronger solutions of nitrate of silver—from forty to sixty grains to an ounce of distilled water—have been applied to the pharynx, inside of the glottis, and even within the larynx and upper part of the trachea, by means of a sponge attached to whalebone, and, it is said, with success in some cases. Chlorinated lotions and gargles are generally of use when the affection of the throat and nasal passages is severe in confluent small-pox.

137. *C.* During the secondary fever, when it is severe or complicated, the treatment should be active but discriminating. The use of purgatives at this period was once a question of warm discussion. Dr. GREGORY remarks as follows: "One of the most remarkable disputes which ever arose in physie was that regarding the propriety of using purgatives during the secondary fever of small-pox. SYDENHAM, with all his boldness, never wholly divested himself of the early prejudices which the Arabians had inculcated against purgatives in small-pox. MORTON inveighed bitterly against their use, while Dr. FRIEND, with the true spirit of a reformer, advocated their free employment, especially during the secondary fever." "They are now as freely employed in the secondary fever of small-pox as in ague or in typhus. They are of the greatest service when the skin is hot and dry, when a scarlatinal rash covers the body, or innumerable abscesses give evidence of the excited state of the cutaneous vessels."

138. Agreeing with the foregoing remarks, I would add only that when too strong or too frequently exhibited, purgatives may induce a dangerous diarrhœa or dysentery, or an enteric complication, especially if the selection of the means be not sufficiently discriminating in respect of the peculiarities of the case. As long as the disease manifests but little exhaustion of vital power this care may be of less importance; but when vascular action is asthenic, and constitutional power is depressed, then such aperients as promote excretion, and, at the same time, impart tone or energy, should be preferred. Such are the means advised above (§ 128, 129), and such, also, are the compound decoction of aloes, or the compound infusions of gentian and senna, given in conjunction with the carbonates of the alkalies and aromatic tinctures, or with the citrate of magnesia, or with the carbonate or citrate of ammonia. In many cases it may be requisite to aid the operation of these by means of enemata containing the substances already mentioned, with such others as the exigencies of the case will suggest.

139. The propriety of blood-letting in the secondary fever has been denied by most writers, and contended for by others, but by these latter



under certain circumstances only. SYDENHAM, when he first wrote on small-pox, advised blood-letting in the secondary fever of the confluent disease alternately with purging; but at later periods of his practice, and when describing the epidemics of 1670 and subsequent years, which were manifestly of a most malignant character, the treatment recommended by him was of a very different kind (§ 147, 149) from that formerly directed. It would seem that the small-pox previously to 1665 and 1666, that is, before the great plague, was of a more sthenic nature than subsequently, and that after this most fatal epidemic, by which about 100,000 bodies were buried in a few months within and immediately around London, thus furnishing additional sources of contamination to both air and water for many years afterward, small-pox and other febrile diseases presented a more malignant character, and required different means of cure from those formerly employed.

140. When the pulse presents more or less tone, and vascular action is high, in connexion with internal complication—congestive or inflammatory—then blood-letting, cautiously and moderately employed, according to the peculiarities of the case, and aided by such means as may derive the fluids from the seat of complication, and promote excretion, &c., will prove of much service. But if the pulse be weak, very quick, compressible, or small and soft, and more especially if there appear any signs of putro-adymania or malignancy as respects either the state of the eruption or the constitutional symptoms, decided means of an opposite kind are obviously indicated (§ 143, *ct seq.*).

141. In the secondary fever, when uncomplicated with any internal affection or contamination of the circulating fluids, little beyond the preservation of a free state of the secretions and excretions need be attempted, aided, however, by a suitable regimen. In cases presenting prominent affection either of the brain or its membranes, or of the lungs, pleura, &c., general or local blood-letting, or both, according to the peculiarities of each case, is generally requisite, and purgatives and derivatives are farther required. The state of the surface may appear to contra-indicate a recourse to blisters, but when the pustules on the trunk, or in the situation where it is desirable to apply a blister, are few, then they may be applied; and in these circumstances, as well as in others in which they should not be resorted to, the terebinthinate embrocations or epithems, often recommended in this work, may be employed without regard to the state of pustulation in the situation to which it may be desirable to make these applications. The treatment recommended in the complications of continued fevers (*see art. FEVER*, § 529, *ct seq.*) is generally suitable to those which occur in the course of small-pox, existing pathological states furnishing the only true therapeutical indications in all forms of fever, whether simply continued, or exanthematous, or malignant.

142. Ophthalmia is one of the most common of the concomitant affections in small-pox. In many cases of this complication, the state of the system will not admit of general or copious blood-letting; but in these, as well as in most other severe cases, scarification of the conjunctiva, leeches or cupping-glasses on the temples, warm fomentations, calomel, purgatives, terebinthinate

medicines given by the mouth and in enemata, are required, and should be mainly depended on, in connexion with such other internal, constitutional, or febrifuge means as the character and state of the febrile symptoms will suggest.

143. *D. In the confluent states of variola, or even when the pustulation is profuse and general, the treatment should be such, from the commencement, as will not reduce the powers of life; and even before the eruption appears, and when the character of the primary fever, and the severity of the vomiting and pain in the back and loins, and the stinging heat of the surface, indicate a severe or confluent form of the disease, it may be necessary, especially if the pulse be very rapid, or deficient in tone, or broad, open, and very compressible, to have recourse to the more tonic of the several febrifuge medicines usually employed. In these cases, as well as in others presenting signs of putro-adymania, as petechiæ, hæmorrhage from mucous canals, a dark brown or black appearance of the eruption, whether at an early stage, or during the maturation and secondary fever, the preparations of cinchona, either with the mineral acids or with the alkalies, according to the features of individual cases, are generally required.*

144. Cinchona was prescribed in these states of the disease in various forms of preparation and combination, and was administered in enemata by GESNER, FOUQUET, BAYLEY, HIRZEL, WALL, BALDINGER, and others; and they relied upon it chiefly in the secondary fever, when accompanied with sinking of the powers of life, or with putro-adymania. HUFELAND advised the preparations of cinchona to be given with antimonial wine; but this combination is admissible only at an early stage of confluent or malignant cases, and is not suited to the more advanced stages, or when hæmorrhagic exudations are observed. In these latter circumstances, I have found the decoction of bark to be most beneficial when conjoined with the hydrochloric acid and the hydrochloric ether, or with the chlorate or the nitrate of potash and tincture of serpentaria, or with the nitric acid and spirit of nitric ether. The sulphuric acid was advised, in the form and states of the disease now being considered, by SYDENHAM, BROCKLESBY, WALDSMIDT, NOWACH, and others, conjoined with various stimulants. More recent writers have conjoined the decoction or infusion of cinchona with the sulphuric acid, and the spirits of sulphuric ether, for these and similar states of the distemper; and still more recent authors have employed the sulphate of quina in these or similar forms of combination. These means are severally of more or less service; and it may be even necessary to combine them still farther, as with the tincture of opium, or with the compound tincture of camphor.

145. The nitric acid was recommended by Dr. SCOTT for the more adynamic and confluent states of the malady; the hydrochloric acid by JAHN, and the acetic acid with camphor by MARX, THOMANN, PLINTA, and HOPF. Either of these acids, or of those above mentioned (§ 143, 144), or the citric acid, is more or less beneficial when suitably conjoined with tonics, cordials, or stimulants, according to the peculiarities of the case; and in these combinations they have been prescribed by FALCONET, RUSH, THUESSINCK, LA-FONTAINE, and others. Of the good effects of the acetic or the citric acid, conjoined with camphor,

or with ammonia, this latter being in excess, and given with the infusion or decoction of cinchona, and aided, in the more severe cases, by wine, beef-tea, &c., I can speak from experience.

146. *E.* In the *petechial form* of small-pox treatment will generally prove inefficacious. Dr. GREGORY thinks that it admits of no essential relief from medicine. He considers purgatives to be inadmissible, and mercury without influence. The loss of a little blood from the arm has appeared to him more effectual than any other measure. "The citrate of ammonia in effervescence, with port-wine or brandy, may be given when the powers of life appear to fail, but the hæmorrhagic diathesis is often accompanied by a hot skin and an excited circulation."—(*Op. cit.*, p. 104.) When the skin is hot and the circulation excited, in connexion with petechiæ, or spots of purpura, or with hæmorrhage from mucous canals, the abstraction of a little blood from the arm may prove beneficial; but these symptoms should not prevent a recourse to the means just recommended (§ 143, *et seq.*); for they often subside after a decided recourse to these means, especially when the medicines are directed to the prevention or counteraction of the contamination of the blood, and the defect of vital power, upon which they depend. When the prostration is not great, nor the hæmorrhage very considerable, nor the eruption of a dark or malignant hue, then recovery may follow a recourse to cinchona, conjoined with the chlorate or nitrate of potash, and with the carbonate of soda and cordial or stimulant tinctures; camphor, or small doses of turpentine, being given occasionally in the intervals between the exhibition of these. Instead of cinchona, the preparations of valerian may be employed. I have generally preferred them when delirium was present. If the bowels are affected, the preparations of opium, or the compound tincture of camphor, should be added to these; and if the evacuations are very offensive, as well as too frequent, pure charcoal-powder, or the chlorides in small but frequent doses, may be prescribed. When, with these putro-adyamic symptoms, the liver is inactive or congested, then the nitro-hydrochloric acids may be prescribed in the decoction or infusion of cinchona, or the infusion of valerian; and when cerebral symptoms predominate, or when low delirium, tremour, and nervous exhaustion prevail, then the tincture of *sumbul*, lately introduced into practice by Mr. SAVORY, will be found of great service.

147. In cases presenting more or less contamination of the circulation and adynamia, as those now considered usually present, small and repeated doses of *opium*, especially when conjoined with camphor, or the chlorides, or the nitro-hydrochloric acids, or with cinchona, or valerian, or *sumbul*, will generally be most serviceable. When the bowels are most relaxed, in such cases the preparations of opium are more especially required; and they may be given with milk and lime-water, or with aerated lime-water. In the circumstances just named, and more especially in the secondary fever attended by marked putro-adyamia or malignancy, WANDT and STROEM prescribed opium with the sulphate of alumina. Dr. DRUMMOND recommended the preparations of opium, in large doses, from the commencement of the eruption in confluent cases; TRALLES, GEBEL, and YOUNG adopted a similar treatment. P. FRANK considered these preparations to be de-

serving of our chief reliance in these cases, and the same opinion was entertained by HUXHAM, DE HAEN, HUFELAND, SPRENGEL, STÖERCK, and others. SYDENHAM considered them of greatest service when exhibited on the fourth day of the eruption in adults, and given in the evening or towards night. He trusted to them especially in the confluent form, and about the eleventh day, or most dangerous period of the disease. THOMANN prescribed opiates in severe cases, after the exhibition of an emetic; and QUENTIN combined them with the oxide of zinc. The preparations of opium, with the exception of the weak paregoric of the pharmacopœia, cannot be given, without the risk of producing severe cerebral symptoms, in children under the age of four or five years; and even at that age, these symptoms may occur, if they be not guarded against by resorting to cold-sponging over the scalp, and by cooling aperients. In cases which most require opium, camphor, or ammonia, or the usual aromatics or stimulants, are also beneficial, and both promote the good effects, and counteract the injurious influence, of this substance. The excellent effects of the laudanum prescribed by SYDENHAM depended upon the combination of aromatics in its preparation—a combination which has been very imperfectly estimated, even by his warmest admirers.

148. *F.* The *laryngeal and tracheal affection*, arising in the course of severe variola, is generally an extension of the specific inflammation existing in the mouth and throat, and is seldom much ameliorated by the means already noticed (§ 143–147). After having had recourse to these, emetics, especially the sulphate of zinc, or ipecacuanha conjoined with camphor, or ammonia, or capsicum, may be tried; for these have a more decided effect upon the respiratory surfaces than is generally recognised, especially in removing the viscid mucus from the trachea and large bronchi that generally collects in large quantity in these situations when the severe forms of small-pox are thus complicated. In these complications, the decoction of senega, or the preparations of squill, or of ammoniacum, conjoined with camphor or ammonia, or other substances which the circumstances of the case will suggest, may be prescribed; and if these expectorants should act as emetics, as they will generally act when given in large doses, the effect will be the more beneficial, especially in confluent, or severe, or malignant cases.

149. *G.* The occurrence of *diarrhœa* or of *dysenteric symptoms*, especially in connexion with the secondary fever and in confluent cases, requires means which should partly depend upon the appearance of the evacuations. In most cases, the medicines already mentioned (§ 146, *et seq.*), ipecacuanha with camphor and opium, or with powdered carbon and the compound chalk-powder; and the other medicines usually given for diarrhœa or dysentery, may be severally prescribed in these complications of small-pox. SYDENHAM gave boiled milk with lime-water in these cases, or with ammonia or magnesia when the stools evinced a somewhat sourish odour; and ROYER and many others adopted a similar practice. But when this complication appears in malignant, or even in the more usual confluent cases, more active astringents are required, and these should be associated with antiseptics, and absorbents, and opiates.



150. *H.* The state of the *urinary secretion* should receive due attention from an early period of the disease. The urine is often not only small in quantity, but also voided at long intervals in some instances; and it is occasionally remarkably high-coloured, and even contains albumen, and not infrequently blood, especially in the confluent and malignant cases. In the early stages of the more phlogistic cases, especially when the urine is scanty and very high-coloured, demulcents and diluents should be freely given, with the cooling diaphoretics already mentioned (§ 131), and with diuretics of a cooling and febrifuge kind, as recommended by THOMANN, LENTIN, and others. When the urine contains albumen, or blood globules, or even pure blood, then the terebinthinate embrocation or epithem may be applied over the loins, and repeated according to its effects.

151. *I. Small-pox in puerperal females*, especially when it occurs very soon after delivery, is always a most dangerous disease. Not only is it generally confluent, and attended by marked asthenia, but it is also complicated with very severe, and usually fatal, affection of the respiratory mucous surface, extending to both lungs. Of several cases of variola to which I have been called in the puerperal state, I have seen only one which was mild and uncomplicated. The treatment in these unfavourable circumstances should partly depend upon the time which has elapsed between delivery and the appearance of the distemper, partly upon the amount of hæmorrhage which has taken place at the period of delivery or subsequently, and upon the states of the lochia and of the lacteal secretion. When the discharges have been and are free, and the pulse is very frequent and soft, the severity of the laryngeal, bronchial, or pulmonary complication, or indeed of any other associated affection, should not prevent recourse to the means already recommended for the severe, confluent, and adynamic states of the malady (§ 143, *et seq.*), especially to camphor, ammonia, wine, or other stimulants and tonics; or to such as are advised for the malignant form of *puerperal fever* (see that article). When the respiratory passages are very severely implicated, the remedies already mentioned, especially senega, squills, ammoniacum, sulphate of zinc, &c., prescribed as expectorants or as emetics, according to the emergency of the case, ought not then to be overlooked. The great severity and unfavourable prognosis of small-pox in the puerperal state should not prevent a decided recourse to the most active means in the treatment of this class of cases, but, on the contrary, should induce us to employ the most energetic medicines in the most prompt and appropriate manner.

152. *ii. EXTERNAL MEANS HAVE BEEN USED TO GIVE RELIEF AND PREVENT PITTING*, but they do not always succeed as respects the former intention, and they often fail as regards the latter. When pustulation is profuse, Dr. GREGORY advises the surface to be liberally covered with some simple dry powder. Starch-powder, hair-powder, and powdered calamine are alike available for this purpose; cold cream, and mild unguents, such as the unguent. cetacei, with a proportion of oxide of bismuth, are useful when there is much cutaneous irritation with a dry surface. "Fomentations and poultices are the only means of treating those abscesses and erythematous inflammations which so harass the patient, and so

fearfully peril life in the later periods of secondary fever. All the attempts made by the use of masks to prevent pitting end in disappointment. The only effectual means of lessening such disfigurement are those which allay cutaneous action. Purgative medicines, low diet, and free exposure of the face to a cool air, are the sole measures on which reliance should be placed."—(*Op. cit.*, p. 108.)

153. While these means ought to be adopted, others may also be tried. Fresh air should be duly admitted; but, at the same time, light ought to be excluded as completely as possible. I believe, from what I have observed in several cases, that complete darkness prevents pitting, and that light increases the suppurative action in the pustules, and thereby occasions deep and permanent marks. While the patient should breathe a freely-renewed air, the vesicles should be protected from the action which the oxygen of the air exerts upon them; and this may be done by various means, either by causing the vesicles to discharge their contents before suppuration commences, and by favouring the drying of their contents upon their surfaces, the scabs thus forming a natural protection from the action of the air, or by covering the vesicles with some substance which may lessen the suppurative process, by protecting them from the air, and by lowering inflammatory action in the cutaneous surface.

154. The Arabians opened the pustules as fast as they ripened by a gold needle; and the moderns have applied lunar caustic to the pustules, so as to destroy them at an early period of their development. As to this latter practice, Dr. GREGORY remarks that, as a partial application—say to vesicles forming near the eye—he can recommend this measure; but that he cannot advise it to be employed to any large surface covered with confluent or semi-confluent vesicles. He adds, "The latest mode of treating the surface during the maturative stage of small-pox is that of applying mercurial plasters, containing calomel, or corrosive muriate of mercury, or covering the whole surface with mercurial ointment. In the French hospitals, at the present time, the latter mode is in fashion. The reports of its success are not, however, very flattering. I have seen all three plans fairly tried at the Small-pox Hospital. The ointment and calomel plasters were inefficient. The plaster of corrosive sublimate converted a mass of confluent vesicles into one painful and extensive blister; but I am still to learn what benefit the patient derived from the change."—(*Op. cit.*, p. 103.)

155. Other means have been used for the prevention of pitting, either by causing the abortion of the pustules in the course of their development, or by drying them up after they have matured. Dr. BULKLEY remarks, that, as a general rule, the more recent the eruption, the more easily it is arrested. One writer thinks that the pustules can be arrested, even after their suppuration, and another fixes the period at which this can be done as late as the seventh day. In 1825, I tried the effect of complete exclusion of light in preventing pitting, and in that case it was altogether successful. I have since had recourse to it in three or four cases with success; in one confluent case it failed. I have, in three other cases, covered the surface of the face with almond or olive oil, and excluded light, keeping the apartment freely ventilated; these have not been

marked; the eruption was very copious, but not confluent in any of these. Instead of almond or olive oil, glycerine, or collodion, as suggested by Dr. RANKING, may be employed.

156. Incising or opening the pustules, or rather the vesicles, as recommended by the Arabians, was the method of causing their abortion advised by ROGGERT, VOIGT, TOURNAY, and HUFELAND. M. VELPEAU and Dr. MORTON assert, that if the pustules are cauterized within two or three days, or even later, no marks will be left. The latter says, that if the face be frequently wetted with spirits of hartshorn, the inflammation will be abated, and the pustules will be prevented from becoming either large or irritable. M. PIORRY recommends blisters to cause abortion of the pustules, but I consider their use not required in discrete cases, and of very equivocal benefit in the more severe states of the distemper. M. MALAPERT prescribes a solution of hydrate of potassa, which, he says, dries up the pustules, without leaving either cicatrices or stains. The strength of the solution is not stated.

157. Many years ago, DICKEY directed the face to be covered with *gold-leaf*. LARREY advised the same means, and stated that this method of preventing pitting by small-pox was employed from time immemorial by the Egyptians and Arabians. It can act only by excluding light and air from the diseased surface. Drs. CRAWFORD and S. JACKSON, of the United States, say that they have found the *tincture of iodine* to succeed in preventing the marks of variolous pustules; and various kinds of ointment and plaster have been also confidently recommended with this intention.

158. *Sulphuric ointment*, rubbed lightly three times a day over the parts affected, has been recommended for the prevention of suppuration in the pustules and the consequent pitting (*Gaz. Méd. de Paris*, Avril, 1841, p. 232). The *emplastrum plumbi*, melted with oil of almonds, and laid over the face by a camel's-hair pencil, has been prescribed by Dr. CORRIGAN (*Dublin Quarterly Journ. of Med. Science*, Aug., 1846, p. 245). A mask, composed of mercurial ointment, rendered more consistent by means of starch or fecula, is employed by M. BRIQUET. He causes it to be spread over the face, and to be renewed once or twice daily. He says that it produces abortion of the pustules, and prevents the swelling attending the confluent form of variola. The same means have been recommended by Prof. BENNETT, of Edinburgh (*Edinb. Monthly Journal of Med. Science*, Jan., 1850).

159. A compound mercurial plaster, called the "plaster of Vigo," is often employed for the prevention of pitting by French physicians. According to M. BRIQUET, if mercurial plaster be applied before the fifth day of the eruption, one of two things happens—either the pustules disappear by resolution, or they are changed into vesicles or into tubercles. The latter change is more rare, and seldom takes place except on the face. When the dressing is removed, small, hard excrescences, insensible to the touch, are seen, which gradually fade, and disappear at the end of ten or twelve days, partly by resolution and partly by desquamation, and without leaving any trace. The mercurial plaster must be kept on from eight to twelve days (*Gaz. Méd. de Paris*, Avril, 1846).

160. A solution of corrosive sublimate—one

grain to seven ounces of distilled water, and a drachm of laudanum—applied by compresses kept wet with it, is also said by Dr. BULKLEY to produce very marked effects in causing the disappearance of pustules, even after they have fully matured; and he adds that simple mercurial ointment is much more frequently used, both in Europe and in America, than either the plasters of Vigo or the wash of the bichloride, and is probably equally efficacious. It may be applied freely with a brush or a camel's-hair pencil. Dr. STEWARDSON, of Philadelphia, speaks very favourably of its effects (*Amer. Journ. of Med. Science*, June, 1843. See also Dr. BULKLEY's *Notes to Dr. GREGORY's Lect. on Erupt. Fevers*. New York, ed. 1851, p. 351).\*

161. iii. INOCULATED SMALL-POX should be treated according to the principles already insisted on, and with strict reference to the type or character of the primary fever, and other features of individual cases. The SUTTONS and DIMSDALES, whose reputation for successful inoculation became so remarkable about the middle of the last century and somewhat later, insisted upon exposure of the surface of the body to cold air during the primary fever, and upon the full adoption of the antiphlogistic regimen.

162. It was recommended by many physicians who practised inoculation before the introduction of vaccination, to *prepare* the patient by treatment shortly before and after the operation, or until the primary fever appeared. Others considered any preparation unnecessary, and sometimes even prejudicial. Several eminent writers, such as THOMANN, HUFELAND, and others, advocated the propriety of correcting the secretions and excretions, and of promoting a free state of the several emunctories, especially when these appeared to require this aid, by one or more doses of calomel and antimony. FORDYCE, however, considered this practice to be unnecessary, and EYEREL, BOEHMER, and others, contended that there is no mode of preparation of any use. GMELIN recommended abstinence from animal food for some time previously to inoculation, but WEIKARD believed even this plan to be injurious. On this topic Dr. GREGORY very judiciously remarks, "Perfect health being the best condition for receiving and safely eliminating the poison, every thing that tends to diminish plethora, to lessen cutaneous action, to render the bowels free, to preserve the blood in a cool, pure, and normal condition, was found useful. Laxative medicines, a moderate diet, abstinence from all fermented and spirituous liquors, cool chambers, gentle exercise in the open air, light clothing, all contributed, in their several degrees, to the successful result. The antimonial and mercurial medicines, which the SUTTONS laid much stress

\* [It has been proved very conclusively that the application of a mercurial plaster has a decided influence upon the small-pox pustules, preventing more or less completely their perfect maturation, and diminishing the attendant swelling and soreness, the process of desiccation being completed without the formation of thick scabs, and the resulting cicatrices less marked than when the process of suppuration was left to pursue its natural course; and this is chiefly observable in cases where the eruption has not advanced beyond the third or fourth day. The same result can, however, be still more effectually attained by the use of collodion. This, however, is no new practice. Dr. DOUGLASS, in his "Treatise on Small-pox" (Boston, 1730), speaks of the use of a mask made of lead, beat thin, the inside smeared with spermaceti and a small quantity of crude mercury, as very successful in preventing pitting and scars.]



upon, were useful only to secure the co-operation of the patient in matters of more necessity, especially diet and exposure to the open air."—(*Op. cit.*, p. 110.)

[The small-pox has been a most fatal scourge to the aborigines of this continent. The disease has appeared among them periodically, from the first discovery of the continent, at irregular intervals of time, and has been one of the most prominent causes of their depopulation. This malady swept through the Missouri Valley in 1837. It first appeared on a steam-boat (the *St. Peter*), in the case of a mulatto man, at the Black Snake Hills, a trading fort 60 miles above Fort Leavenworth, and about 500 miles above St. Louis. It was then supposed to be *measles*, but by the time the boat reached the Council Bluffs it was ascertained to be small-pox, and had, of course, been communicated to many in whom the disease was still latent. In spite of every precaution, the disease spread. It broke out among the *Mandans* about the 15th of July. This tribe, which consisted of 1600 persons, living in two villages, was reduced to 31 souls. It next attacked the *Minnatarees*, who were living in that vicinity, and reduced that tribe from 1000 to about 500. The *Arikarees*, numbering 3000 souls, were diminished to some 1500. The disease spread from these to the *Assiniboin*s, a powerful tribe of 9000, living north of the Missouri, and ranging in the plains below the Rocky Mountains, towards Red River of Hudson Bay; whole villages of whom it nearly annihilated. The *Crows*, or *Upsarokas*, who were estimated at 3000 strong, shared nearly the same fate, and lost one third of their numbers. It then entered and spent its virulence upon the great nation of the *Blackfeet*, who have been estimated at from 30,000 to 50,000. The inmates of 1000 lodges were destroyed, numbering from six to eight persons in each lodge. So that at the lowest calculation over 10,000 Indians fell victims to this disease in a few weeks.

An eye-witness thus describes the scene: "Many of the handsome Arikarees, who had recovered, seeing the disfiguration of their features, committed suicide, some by throwing themselves from rocks, others by stabbing and shooting. The prairie has become a grave-yard; its wild flowers bloom over the sepulchres of Indians. The atmosphere for miles is poisoned by the stench of the hundreds of carcasses unburied. The women and children are wandering in groups, without food, or howling over the dead. The men are flying in every direction. The proud, warlike, and noble-looking Blackfeet are no more. Their deserted lodgings are seen on every hill; no sound but the raven's croak or the wolf's howl breaks the solemn stillness. The scene of desolation is appalling, beyond the power of the imagination to conceive."—(*Hist. and Statist. Information, &c., respecting the Indian Tribes of the U. States*, by H. R. SCHOOLCRAFT, LL.D., part i., 1852.)

The early history of America also contains some accounts of the ravages of small-pox among the Indians; they are but mere fragments, but are sufficient to show its frightful mortality. It prevailed among the Iroquois with great severity in 1663, as related by CHARLEVOIX. He does not give the number destroyed in this pestilence; but in a subsequent one, in 1670, near Trois Rivières, he states that 1500 were attacked, and not one recovered.—(*Hist. et Descrip. Gen. de la Nouvelle France*, vol. i., p. 378; vol. ii., p. 428.)

Small-pox in New York, in the year 1815, says Dr. JAMES STEWART (*Diseases of Children*), was so virulent as to attack almost every individual in whom the susceptibility had not been destroyed by vaccination. The proportion of deaths from the confluent kind, in the opinion of the committee of the Medical Society appointed for the purpose of inquiring into the efficacy of vaccination, was greater than was ever observed in London or on the Continent of Europe. Of 254 deaths from small-pox, recorded in the city inspector's register, somewhat more than one third were of the confluent kind. With such facts of the virulence of the disease, what would have been the condition of the city had the ravages of the disease not been controlled? Judging from what has heretofore occurred, every dwelling would have been literally a loathsome hospital, and every surviving inhabitant a terror-stricken mourner. The number of deaths in the city of New York from small-pox, from 1805 to 1853 (inclusive), is 5645, as reported; but the number must have been considerably larger, inasmuch as those removed to the country for internment are often not reported.

The following calculation exhibits the proportion of deaths in the city of New York in every 1000, from the year 1805, when the reports were first made, to the end of the year 1840: During the first period of five years, the number was 26 in 1000; in the second period, 14; in the third, 23; in the fourth, about 25; in the fifth, 18; in the sixth, 21; and in the seventh, at the close of 1840, 21. From the year 1800 to 1841, 1068 small-pox patients have been treated in the Marine Hospital at Staten Island, nearly all of whom were passengers from foreign ports; the exact mortality we are unable to state. It is somewhat remarkable that the mortality from small-pox has not been greater in New York than it has, considering that the number of emigrants has greatly increased within a few years, among whom the disease prevails with great severity. Vaccination being universally adopted by the permanent inhabitants of the city, they are by no means the class among whom the disease prevails; but it spends its violence among the transient emigrant population, where vaccination has been comparatively neglected.—(J. STEWART.)

We are chiefly indebted to LEMUEL SHATRUCK, Esq., for the following facts: The small-pox prevailed in Boston in 1649, 1666, 1678, and 1690. It proved very fatal in 1678. MATHER said, in 1698, "The small-pox has four times been a great plague upon us. Often had one hundred bills, desiring prayers for the sick, been read in one day in one of our assemblies. In one twelve-month about 1000 of our neighbours have been carried to their long home." In 1702, 313 died of the disease, being about 4.4 per cent. of the inhabitants. In 1721, the disease broke out with great violence; and 5759 persons (more than half the inhabitants) had it in the natural way, of whom 844, or 1 in 7, died. Inoculation was then for the first time introduced, but not without great opposition; 247 were inoculated, of whom 6, or 1 in 42, died. In 1730, it was estimated that 4000 cases occurred, of which about one tenth were by inoculation. Of these about 500 died. In 1752, the disease again appeared in Boston, and became very fatal. The town then contained 15,684 inhabitants. Of these 5998 were supposed to have had the disease; 1843 re-

moved out of town. All the remainder, except 174, had the disease by inoculation or in the natural way. The following table illustrates the prevalence of the disease at that period :

Persons.	Natural.			Inoculated.		
	Cases.	Deaths.	Ratio per Ct.	Cases.	D'ths.	Ratio per Ct.
White ..	5060	470	9.2	1985	24	1.2
Coloured	485	69	14.2	139	6	4.3
Both ...	5545	539	9.7	2124	30	1.4

Thus showing that the liability to death by this disease among the coloured was about 50 per cent. greater than among the whites, when taken by inoculation. The greatest number of deaths occurred in the months of May, June, July, and April. The disease occurred again in 1764, in 1776, in 1778, and in 1792. The town contained in 1792 about 18,000 inhabitants, of whom 10,655 were supposed to have had the disease; 262 removed out of town; and 221 only remained unaffected liable to the disease; the rest had it. The cases by the natural way and by inoculation were as follows :

Persons.	Natural.			Inoculated.		
	Cases.	D'ths.	Ratio pr. Cent.	Cases.	Deaths.	Ratio per Ct.
White ..	214	27	12.5	8804	157	1.7
Coloured	18	6	33.3	348	7	2.0
Both. . .	232	33	14.1	9152	164	1.8

The following table exhibits a view of the disease at different periods of its appearance in Boston since 1720 :

Year.	Cases.	Deaths.	Rat. per 100 of the Pop.		Natural.			Inoculated.		
			Sick.	Died.	Cases.	Deaths.	Ratio per Cent.	Cases.	Deaths.	Ratio per Cent.
1721 6006	850	54.6	7.7		5759	844	14.8	247	6	2.4
1730 4000	500	26.6	3.3		3600	488	13.5	400	12	3.0
1732 7669	569	48.9	3.6		5545	539	9.7	2124	30	1.7
1764 5646	170	36.4	1.1		669	124	18.5	4977	46	.9
1776 5292	57	44.1	1.0		304	29	9.5	4988	18	.5
1778 2243	61	16.6	.4		122	42	34.4	2121	29	.9
1792 8346	198	46.0	1.0		232	33	14.2	8114	165	1.8

From 1811 to 1820, only 6 deaths occurred from the disease; from 1821 to 1830, only 8; and from 1831 to 1838, only 39; and most of these cases were at the hospital on Rainsford Island. It never appeared in the city as an epidemic until 1839, after the repeal of the law in 1836, which required persons who were affected by the disease to be immediately removed from the city to the hospital. Since then no sanitary regulations have existed to prevent its extension, except vaccination; and the consequence has been that the disease has existed at all times to the present, to a greater or less extent, in the city. In 1839, 60 deaths occurred; 115 in 1840; and 185 in the last five years (prior to 1846). In the winter of 1846 it was more prevalent and more fatal than at any time during the last 50 years. Vaccination is performed gratuitously by the Port Physician, under direction of the city, and there is connected with the House of Industry a small-pox hospital, to which paupers who are affected with the disease are removed. But these sanitary regulations are insufficient to preserve the city from its loathsome and often fatal progress. So many new emigrants are constantly coming to the city, who are unprotected by vaccination, that subjects are never wanting for its successful attack.—(SHATTUCK.)

Philadelphia, according to calculations made

from the published statistics, exhibits rather less than 21 in every 1000 deaths from small-pox, during a period of 20 years; and although in some years, corresponding to those in which the disease prevailed with more than usual malignancy in New York, there was a considerable increase in the actual number of deaths, yet they bore the same proportion to the inhabitants as in the latter city. Small-pox prevailed during a few years with great severity, and the comparatively small number of deaths is an evidence of the protective power of the vaccine disease. Every variety, from the mildest varioloid to the most fatal confluent form, was to be found existing simultaneously—the former among those in whom the susceptibility had been partially destroyed, either by a previous attack or by vaccination, and the latter among those who had never been protected, all being equally exposed to the action of a high degree of contagion.

Similar results have been found in other cities of the Union, proving that the benefits of vaccination are to be seen mostly in the immense saving of human life, and not in the universal exemption of every individual vaccinated from an attack of small-pox when exposed to a highly malignant contagion. This exemption does not exist, in every instance, after an attack of small-pox itself; and individuals, with the most unequivocal evidences of having had the disease, have been again attacked, and have died, where it has prevailed with great severity.

The full benefits of vaccination, as Dr. STEWART remarks, are not to be found by seeking for them indiscriminately among the inhabitants of large cities, who are constantly exposed to the numerous causes which produce failure in the progress of the vaccine vesicle, but among those who enjoy all the benefits of professional skill, not only in the selection of proper virus, but also in ascertaining the proper development of the constitutional symptoms. We might, therefore, expect to find it in its most perfect state where these requisites are enforced, as in public institutions, and wherever the necessary measures are fully adopted. The following are a few of the results obtained from these sources, as collected by Dr. STEWART: In the year 1815 the small-pox appeared on board the U. S. frigate *Guerriere*; an inquiry was instituted by the surgeon, to ascertain whether those attacked had ever been vaccinated, when it was ascertained that none of them had ever been. Not one of the crew who had been vaccinated took the disease in any form.

In the Orphan Asylum of Charleston, S. C., which in the year 1829 contained 150 children, not a single case of small-pox or varioloid occurred during the prevalence of that disease, although no additional restriction was imposed upon their intercourse with the citizens. The aggregate number of children received into the different orphan asylums of Philadelphia, since their establishment to the beginning of the year 1841, is 4009, and among the whole there has been but one death from small-pox. This occurred some years since, out of 65 cases of the disease. The children were carefully examined, both with reference to the virulence of the affection and to their condition at the time of attack. Ten were without the usual cicatrix left by the vaccine vesicle, and the child that died was one of the number destitute of this mark.

In the city of New York, the total number re-



ceived in all the orphan asylums to 1845 was 2384; and, although the small-pox appeared in two or three of them, yet it was in a greatly modified form, and no deaths occurred from this cause. A similar result, also, is found in the House of Refuge, where 2657 children were received in 16 years; making a total number of 5041 children, inmates of these establishments, for a series of years, and not a single death from small-pox at any time occurred.

Baltimore also presents the like return, out of 3500 children admitted into the Alms House and different orphan asylums of that city during a series of years. But one death from small-pox has occurred in the entire number of children, over 11,000 in all, admitted into the above-named institutions in the course of 30 years previous to 1843, and there is no reason to believe that this child had ever been vaccinated. Compare with these the results of small-pox before vaccination was introduced, and its advantages will be readily seen.

The value of the discovery of vaccination, then, does not consist in its entirely preventing an attack of small-pox, but in disarming it of its terrors—in reducing the mortality to a very small amount—a result not obtained even by the small-pox itself, many more deaths having, as has been observed, occurred among individuals who had passed through that disease, than among those who had been protected by vaccination. The recorded statistics of Drs. MITCHELL and BELL, of the result of their experience during the epidemic of Philadelphia, in 1823 and 1824, also prove this fact, which has been noted by others. Of 248 cases of small-pox and varioloid, 155 were unprotected, of whom 85 died; 64 vaccinated, of whom 1 died; 9 inoculated, of whom 3 died; 7 previous small-pox, of whom 3 died; 13 unknown—no deaths.—(*North Amer. Med. and Surg. Journ.*, vol. 11.)

When these results of the two methods are considered, how striking are the advantages of vaccination, not only in saving human life, but also in its direct tendency to exterminate a loathsome malady altogether; and when the many causes which are known to exist that influence the proper development of the vaccine disease, and the carelessness which must prevail in the thousands of instances of vaccination, are taken into account, far from having our confidence lessened, when the results do not accord with our most sanguine wishes, these circumstances should, on the contrary, strengthen our faith in the salutary influence of a remedy which still must be regarded as one of the greatest blessings to man.—(*A Practical Treatise on Diseases of Children*, by JAMES STEWART, M.D. New York, 1845.)

Dr. PRELA, of Italy, published a work at Milan in 1825, entitled "*Il Boa di Plino congettura sulla Storia della Vaccinazione*," in which he seems to have proved, by passages from PLINY and CÆLUS, that vaccination was known in ancient times under the name of Boa, by which its origin from the cow is designated; and on this he has founded the ingenious hypothesis that the small-pox gradually developed itself by the action of the cow-pox on the constitution, so that the present removal and prevention of the complaint by vaccination is only to be considered as a return to the old state.]

BIBLIOG. AND REFER.—*Rhazes*, De Variolis et Morbillis. Goet., 1781, and edit. by Dr. Greenhill for the Syden-

ham Society, 8vo, Lond., 1850; also, *Rhazes*, De Pestilentia, lib. v., in Haller, Biblioth. Med. Pract., vol. i., p. 376.—*Avicenna*, Canon, l. iv., fcn. i., tract. 4, cap. 6.—*G. Pictorius*, De Peste et Papulis Puerorum, l. ii., 8vo. Basil., 1555.—*Fracastorius*, De Morbis Contagiosis, &c., cap. 2.—*N. Massa*, De Febre Pestilentiali, Petechis, Morbillis, Variolis, &c. Venet., 4to, 1540.—Haller, Bibl. Med. Pract., vol. i., p. 532.—*Marcellus Donatus*, De Variolis et Morbillis, 4to. Mantua, 1569.—*A. Portus*, De Variolis et Morbillis. Append. ad Lib. De Peste, 4to. Rome, 1585.—*S. Kelling*, Defensive against the Plague, Small-pox, &c., 4to. Lond., 1593.—Halleri, Bibliog. Med. Pract., t. ii., p. 311.—*Fernelius*, De Abditis rerum Causis, l. ii., cap. 12. (*Infect. of fetus*).—*Forestus*, l. vi., obser. 44. (*Infect. of fetus*).—*F. Alphani*, De Pestilentia, necnon de Variolis et Morbillis, 4to. Neap., 1577.—*A. Campolungus*, De Variolis. Venet., 4to, 1586.—*D. Lipsius*, Bericht von den Kinderblättern und Massern, 4to. Erf., 1624.—*C. Cachet*, Vray et assuré Préservatif de Petite Vérole, 12mo. Jout., 1617.—*G. Horst*, Bericht von Kinderblättern und Massern, 8vo. Giessen, 1621.—*M. Blav*, Beschreibung der Kinderblättern, 12mo. Constanz, 1633.—*G. Duinnes*, van den Kinderpocken en Massern, 8vo. Briel, 1651.—*A. Fernelius*, Observations curieuses touchant la petite Vérole, 8vo. Lyon., 1645.—*Chicot*, De Morbillorum et Variolarum Ortu et Causis, in Epist. et Dissert. Med., 8vo. Paris, 1656.—*D. Maxwell*, Nature the best Physician; a Poem (a case of small-pox), 8vo. Lond., 1656.—*T. Bartholinus*, De Variolis hujus Anni Epidemicis, 4to. Hafn., 1656.—*T. Whitaker*, An Elenchus of Opinions concerning the Cure of the Small-pox, 8vo. Lond., 1661.—*F. J. Quatroux*, De la Peste, du Pourpre, et de la Petite Vérole, 8vo. Paris, 1671.—*G. Harvey*, Of the Small-pox and malignant Fevers, &c., 8vo. London, 1685.—*Ranchin*, Traité de l'Origine, des Causes, &c., de la Petite Vérole, 8vo. Lyon, 1640.—*Sennertus*, De Febribus, l. iv., c. 12.—*J. Lampard*, A direct Method of ordering and curing People of that loathsome Disease, Small-pox, 4to. Lond., 1685.—*A. Porchon*, Nouveau Traité du Pourpre, de la Rougeole, et de la Petite Vérole, 12mo. Par., 1688.—*R. Morton*, Pyretologia, sive de Febribus inflammatoriis, Variolis, &c., 8vo. Lond., 1692.—*T. Byfield*, Discourse on the Rise, &c., of Small-pox and putrid Fevers, 4to. Lond., 1695.—*G. Harvey*, Treatise of the Small-pox and Measles, 8vo. Lond., 1696.—*D. Phillips*, Dissertation of the Small-pox (*Lat. and Engl.*), 12mo. Lond., 1702.—*J. Baagart*, Over de Kinderpocken en Masselen, 8vo. Amstel., 1710.—*W. Lynn*, An Essay towards a more safe and easy Method of curing the Small-pox, 8vo. Lond., 1714.—*Baglivi*, Prax. Med., l. i., cap. 9.—*J. Friend*, Ilistoria Medicinæ, p. 304.—*F. Bellinger*, Treatise concerning the Small-pox, 8vo. Lond., 1721.—*J. Woodward*, State of Physic and Diseases, &c., 8vo. Lond., 1718.—*W. Lynn*, Some Reflections on the modern Practisers of Physic in relation to the Small-pox, 8vo. Lond., 1715.—*Jurin*, Philosoph. Transact., No. 373.—*Mortimer*, In ibid., No. 493.—*Dodd*, In ibid., No. 470.—*Watson*, In ibid., No. 493.—*Derham*, In ibid., No. 337.—*Hunter*, In ibid. for 1780. (*Infect. of fetus*).—*E. Strother*, Experienced Measures how to manage Small-pox, 8vo. Lond., 1721.—*R. Blackmore*, A Treatise upon the Small-pox, 8vo. Lond., 1723.—*Bonet*, Sepulchret, l. iv., sect. 1, obser. 60. (*Pneumonia an often fatal complication*).—*J. Jurin*, A Letter containing a Comparison between the Mortality of the natural and inoculated Small-pox, 8vo. Lond., 1723.—*Friend*, Comment. de Febribus, p. 148.—*De Purgantibus in secunda Variol. Confluent. Febre*. Roter., 1720.—*W. Clinch*, Ilistorical Essay on the Rise and Progress of the Small-pox, 8vo. Lond., 1724.—*R. Holland*, A short View of the Nature and Cure of Small-pox, 12mo. Lond., 1728.—*J. Chandler*, A Discourse concerning Small-pox, occasioned by Dr. Holland's Essay, 8vo. Lond., 1729.—*Heister*, De Mannæ Laudibus in Malls Variol. Constitutionibus. Helmst., 1725 and 1744.—*T. Fudler*, Exanthematologia; or, an Account of eruptive Fevers, especially the Measles and Small-pox, 4to. Lond., 1730.—*J. G. De Hahn*, Variolorum Antiquitates, nunc primum ex Græcis erutæ, 4to. Brige, 1733; etiam, Carbo Pestilens a Carbunculis s. Variolis veterum distinctus, 4to. Utrat., 1736.—*T. Apperley*, Practical Observations in Physic, with a Treatise on Small-pox, 8vo. Lond., 1731.—*T. Lobb*, Treatise of the Small-pox, 8vo. Lond., 1731.—*W. Hillary*, A rational and mechanical Essay on the Small-pox, 8vo. Lond., 1735.—*W. Douglas*, Practical Essay concerning the Small-pox. 8vo. Bost., 1736.—*C. Deering*, Account of an improved Method of treating the Small-pox, 8vo. Notting., 1737.—*M. Lister*, Tractatus de Variolis, 8vo. Genevæ, 1737.—*J. C. De la Metherie*, Traité de la Petite Vérole, 12mo. Par., 1740.—*R. Holland*, A short View of the Nature and Cure of Small-pox, 8vo. Lond., 1740.—*J. Drake*, Orationes tres de Febre intermittente, de Variolis, &c., 4to. Lond., 1742.—*P. Dodd*, Several Cases in Physic (*small-pox after inoculation*), &c., 8vo. Lond., 1746.—*R. Mead*, De Variolis et Morbillis, 8vo. Lond., 1747.—*A Discourse on the Small-pox*

- and Measles (transl. by Stack), 8vo. Lond., 1748.—*P. De Violante*, De Variolis et Morbillis. Dresd., 1750.—*A. Sutherland*, Medical Essay on the Small-pox, 8vo. Lond., 1750.—*Hucham*, Opera, pluribus.—*D. Maxwell*, Nature the best Physician in treating Small-pox. Lond., 1756.—*T. Thompson*, An Inquiry into the Origin, Nature, and Cure of the Small-pox, 8vo. Lond., 1752.—*Doucet*, Traité des Fièvres malignes, de la Rougeole, et de la Petite Vérole, 12mo. Paris, 1753.—*B. Langrish*, Plain Directions in regard to the Small-pox, 4to. Lond., 1758.—*T. Frewin*, Some Reasons why a Person infected with the Small-pox need not be cured by Antidote, 8vo. Lond., 1759.—*D. Descherney*, An Essay on the Small-pox, 8vo. Lond., 1760.—*Royer*, Mém. sur l'Usage du Lait et de la Racine du Persil dans la Petite Vérole, in Gazette Salulaire, No. 44. Paris, 1761.—*S. A. Ponticelli*, Infornum del Vajuolo, e Metodo de andarne al Riparo, 8vo. Parma, 1761.—*Watson*, Account of Experiments on the most successful Method of inoculating Small-pox. Lond., 1761.—*J. Wheeler*, A Treatise upon the Small-pox and Fevers, 8vo. Lond., 1761.—*Zeviani*, Sul Uso del Cortice Peruviano vel Vajuolo. Farenz., 1767.—*W. Bromfield*, Thoughts concerning the present Method of treating inoculated Small-pox, 8vo. Lond., 1767.—*Medicus*, Sur les Rechutes et sur la Contagion de la Petite Vérole. Munich, 1767.—*T. Dimsdale*, The present Method of Inoculating, &c., 8vo. Lond., 1767.—*Morgagni*, De Sed. et Caus. Morb., epist. xlix., art. 33, et seq.—*T. Glass*, Letter to Dr. Baker on the Treatment of Small-pox, 8vo. Lond., 1767.—*Anon.*, Letter to Dr. Baker on the Means of procuring a favourable Kind of Small-pox, 8vo. Lond., 1768.—*T. Glass*, A second Letter to Dr. Baker on the Treatment of Small-pox, 8vo. Lond., 1767.—*J. G. Krinitz*, Verzeichniss der vornehmsten Schriften von den Kinderpocken, 8vo. Leips., 1768. (*Gives the modern literature of small-pox.*)—*J. F. Gloss*, New Method of treating Small-pox, rendering the natural Small-pox as void of Danger as the inoculated, 8vo. Lond., 1768.—*J. J. Paulet*, Histoire de la Petite Vérole, avec les Moyens d'en préserver les Enfants, &c., 12mo. Par., 1768; etiam, Mémoire pour servir de suite à l'Histoire de la Petite Vérole, 12mo. Par., 1768.—*Bayle*, Aphorismes sur la Petite Vérole, 8vo. Liege, 1769.—*N. May*, Impartial Remarks on the Suttonian Method of Inoculation, 8vo. Lond., 1770.—*H. A. Wisberg*, Beiträge zur Pockengeschichte, 4to. Götting., 1770.—*Brocksley*, Economic. et Medic. Observat., &c., p. 245.—*P. De Cardis*, De Variolis ejusque Causa efficiente, 4to. Rom., 1773.—*Van Swieten*, Commentaria in Il. Boerhaave Aphorismos, vol. v., p. 1, 4to. Lugd. Bat., 1772.—*J. Amar*, Instruccion curativa de las Viruelas, 8vo. Madrid, 1774.—*D. Coturni*, De Sedibus Variolarum, 8vo. Neap., 1775.—*A. von Haen*, Abhandlung von der sichersten Heilungsart der natürlichen Pocken, 8vo. Wien., 1775.—*C. L. Hoffmann*, Abhandlung von den Pocken, &c., 8vo. Münster, 1776.—*Münien*, Ergo Variolarum Inflammatio ab omnibus aliis diversa, &c., 8vo. Par., 1777.—*J. Mudge*, Dissertation on the inoculated Small-pox, 8vo. Lond., 1777.—*Haller*, Biblioth. Chirurg., vol. i., p. 408. (*Shows softening of the tissues in Variola.*)—*P. A. Fries*, Warum die meisten Pocken im Gesichte ausschlagen, 8vo. Dusseld., 1780.—*P. A. Fries*, Von der Nothwendigkeit, das Ausrufstheber der Pocken gehörig zu behandeln, 8vo. Münster, 1780.—*De Haen*, Rat. Medendi, &c., pt. ii., p. 93. (*Associated with Measles.*)—*C. Roe*, A Treatise on the natural Small-pox, &c., 8vo. Lond., 1780.—*Güchert*, In Edinb. Essays and Observat., vol. ii., p. 435. (*Opposes Inoculation.*)—*W. Black*, Observations, medical and political, on the Small-pox and Inoculation, &c., 8vo. Lond., 1781.—*Rush*, In Med. Observat. and Inquiries, t. v., No. 2. (*Var. virus will locally affect the protected when inoculated, and the pus thus locally produced will communicate the disease.*)—*T. Christian*, Beiträge zur Geschichte und Behandlung der natürlichen Pocken, 8vo. Wien., 1781.—*Ranoé*, In Act. Reg. Soc. Med. Hann., vol. iii., p. 249.—*Ström*, in ibid., vol. iv., p. 285.—*De Roussel*, Recherches sur la Petite Vérole. Paris, 1783.—*Way*, In Med. Observat. and Inquiries, &c., vol. v., p. 40. (*Pus from an inoculated sore in the protected imparts the disease.*)—*K. W. Greiding*, Epistola de primis Variolarum initiis, earumque Contagione virulentia, 4to. Lips., 1781.—*F. Asti*, Memoria sul Vajuolo popolare vagato nella Città e Provincia di Mantua. Fior., 1785.—*J. A. Unzer*, Abhandlung von den Pocken, 8vo. Halberst., 1782.—*Hallé*, In Mém. de la Société Roy. de Médecine, ad 1784 et 1785, p. 423.—*J. Haygarth*, An Inquiry how to prevent the Small-pox, 8vo. Chester, 1785.—*Kocher*, Adversaria de Tussi convulsiva et Variolis. Erl., 1784.—*W. Lynn*, Case of a Lady who communicated the Small-pox to the Fœtus, 8vo. Lond., 1786.—*Home*, Facts and Experiments, &c., p. 89.—*A. Volpi*, Medicina teorica e practica sopra la Malattia del Vajuolo, 8vo. Nap., 1786.—*De Sallaba*, De Morbis Variolarum posthumis. Wien., 1788.—*J. F. Hildebrand*, Bemerkungen über die Pocken in 1787, 8vo. Bruns., 1787.—*Hufeland*, Bemerkungen über Blättern im Jahr 1788, 8vo. Leips., 1788.—*T. M. Adair*, Candid Inquiry into the Effects of the cooling Regimen in Small-pox, with Remarks on a Method of used in Hungary, 8vo. Lond., 1790.—*Kite*, In Mem. of Med. Soc. of London, vol. vi., p. 23. (*Communicated to the factus.*)—*Turnbull*, In ibid., vol. vi., No. 27.—*Rainey*, Edinb. Med. Comment., vol. iii., p. 479.—*King*, In ibid., vol. iii., p. 480.—*Noël*, Traité historique et pratique de l'Inoculation, &c., 8vo. Rheims, 1789.—*F. G. A. Buchholz*, Analecta de Variolis, specimen I., 8vo. Gott., 1790.—*Saalmann*, Descriptio Variolar. et Morbill., &c. Münster, 1790.—*F. J. Goetz*, Traité complet de la Petite Vérole et de l'Inoculation, 12mo. Par., 1790.—*E. Umfreville*, The present State of Hudson's Bay. Lond., 1790. (*Describes the first appearance of Small-pox there.*)—*C. J. Gruner*, De Variolis et Morbillis Fragmenta medica, Arabum et Græcorum, 4to. Jena, 1790.—*T. Drummond*, In Edinb. Med. Comment., vol. xiv., p. 300. (*Recommends laudanum in confl. var.*)—*R. Walker*, An Inquiry into the Small-pox, medical and political, 8vo. Lond., 1790.—*Russel*, in Transact. of a Society for the Improvement of Med. and Chirurg. Knowledge, vol. ii., No. 6.—*J. J. van den Bosch*, Verhandeling over den Aart der Kinderpoxen, &c., 8vo. Rotterdam, 1791.—*Abhandlung über die wahre Beschaffenheit der Kinderpocken*, &c., 8vo. Stendal., 1792.—*F. Olberg*, Beitrag zur Literatur der Blättern, 8vo. Ihal., 1791.—*Fordyce*, In Transact. of a Society for Advancem. of Med. and Chirurg. Knowledge, vol. i., art. i.—*G. G. Lassi*, Del Vajuolo, e della nuova Maniera di curarlo, 4to. Rom., 1791.—*Keil*, Memorab. Clinica, fasc. iii., p. 118, et seq.—*Anon.*, Advice to Parents on the Management of their Children in the natural Small-pox, and during Inoculation, &c. Newmarket, 1793.—*Rudolphi*, Bemerkungen, th. i., p. 118. (*Says that the Jews are rarely marked by small-pox.*)—*J. W. Dede-kind*, Curat der natürlichen Pocken. Holzmind., 1791.—*F. Orlandi*, De vera variolarum Causa, et de proprio eas curandi Methodo, 8vo. Rom., 1792.—*Osiander*, Denkwürdigkeiten, b. ii., p. 116. (*Complicated with worms.*)—*J. Haygarth*, A Sketch of a Plan to exterminate the Small-pox from Great Britain, 8vo. Lond., 1793.—*Van Genns*, De Morbo varioloso, ejus Causis et Stadio vero primo. Groning., 1794. (*Experiments on the pus.*)—*W. Woodville*, The History of the Inoculation of the Small-pox in Great Britain, 8vo. Lond., 1796.—*Pallins*, Reisen, b. iii., p. 52, 242. (*Very fatal among the Ostiaks and Tungusæ.*)—*C. W. Hufeland*, Bemerkungen über die Blättern, &c., 8vo. Leips., 1798.—*J. Hamilton*, Occasional Reflections on the Small-pox, &c., 12mo. 1799.—*P. F. Hopfgartner*, Beobachtungen über die Pockenkrankheit, 8vo. Stuttg., 1799.—*Thomann*, Annalen, p. 30, 1800. (*Associated with scarlatina.*)—*R. N. Desgenettes*, Avis sur la Petite Vérole, 8vo. Kaire., 1800.—*Marsillac*, Rapport de Trav. de la Société Philomatique de Paris, t. i., p. 136. (*A dog infected by licking variolous pustules.*)—*J. Eyercell*, Praktische Beiträge zur Geschichte der Kinderpocken, &c., 8vo. Wien., 1800.—*Bruel*, Hist. Variolarum quæ sub initio Anni 1807, Helmsstädti Epidem. vagabantur, 8vo. Helmst., 1807.—*Jahn*, In Hufeland Journ. der Pract. Heilk., b. xiv., st. 4, p. 106.—*Jocrduns*, in ibid., b. xiv., st. 4, p. 100.—*P. Frank*, De Curand. Hom. Morb., l. iii., p. 204.—*E. C. Duwillard*, Analyse et Tableaux de l'Influence de la Petite Vérole sur la Mortalité, &c., 8vo. Paris, 1806.—*T. Christie*, An Account of the Ravages of the Small-pox in Ceylon, 8vo. Chelt., 1811.—*E. Jenner*, In Transact. of Med. and Chirurg. Society, vol. i., p. 269.—*J. Moore*, History of the Small-pox, 8vo. Lond., 1815.—*Bryce*, In Edinb. Med. and Surg. Journ., vol. vii., p. 410, 1811.—*A. Monro*, Observations on the different Kinds of Small-pox, 8vo. Edinb., 1818.—*J. G. Crosse*, A History of the variolous Epidemic in Norwich in 1819, 8vo. Lond., 1820. Analyzed in Med. and Chirurg. Review, vol. i., p. 300.—*J. Thomson*, An Account of the variolous Epidemic in Edinburgh, 8vo. Edinb., 1820.—*Monfalcon*, Dict. des Sc. Méd., art. Variole, t. lvii. Par., 1821.—*M. Deslandes*, In Revue Médicales, t. iii., p. 329, 1825. (*Description of the pustules.*)—*Guerent*, Dict. de Méd., art. Variole, t. xxi. Paris, 1828.—*R. Macleod*, In Med. and Phys. Journ. for July and August, 1820.—*Bampfled*, In ibid., vol. xlvii., p. 269.—*G. Gregory*, Cyc. of Pract. Med., art. Small-pox, vol. iv. Lond., 1834; and Lectures on the Eruptive Fevers, &c., 8vo. Lond., 1783; and same Work with Notes and Appendix, by *H. D. Bulkeley*, 8vo. New York, 1851.—*Hufeland*, On the Small-pox Epidemic of Berlin in 1823 and 1824, in Revue Médicale, t. ii., p. 131, 1825.—*Ibid.*, p. 20, Avr., 1824. (*Lesions in fatal cases—arachnoiditis, pustula varioloidiformis apud intestinum rectum, tunicamque bronchiorum mucosam, &c.*)—*Mey raux*, In ibid., t. iii., p. 463, 1825.—*Martinet*, In ibid., t. iv., p. 166-185, 1825.—*Tanchon*, In ibid., t. iv., p. 522, 1825.—*Dcuvilliers*, Ibid., p. 522.—*J. Kiniss*, A Report of Small-pox as it appeared in Ceylon in 1833-34, &c. In Edinb. Med. and Surg. Journ., vol. xlv., p. 230. (*Illustrative of the partial protection afforded by vaccination, and the distinct nature of variola and varicella.*)—*P. C. Delagarde*, In Transact. of Med. and Chirurg. Society,



vol. xiii., p. 163.—*T. Bateman*, In *ibid.*, vol. ii., p. 31.—*G. Gregory*, In *ibid.*, vol. xii., p. 234.—*H. Ansell*, In *ibid.*, vol. xxi., p. 148.—*Bosc*, In *Archives Générales de Médecine*, t. xix., p. 385.—*Ludors and Mohl*, In *Edinb. Med. and Surg. Journal*, vol. xxix., p. 178.—*Dance*, In *Archives Génér. de Méd.*, t. xxiii., p. 481. (*Var. post Vaccinam*).—*Babington*, In *Guy's Hospital Reports*, vol. i., p. 159.—*Schæffre*, In *Medico-Chirurg. Review*, p. 611. Jan., 1838.—*Small-pox in Vienna*, In *ibid.*, p. 500. Oct., 1836.—*Robert et Wagner*, In *Journ. Hebdom. de Méd.*, t. ii., p. 445.—*Blaud*, *Nouv. Biblioth. de Méd.*, t. i., p. 303. 1826.—*Dufresne*, *Archives Génér. de Méd.*, t. ix., p. 237.—*Polletin*, *British and Foreign Med. Review*, p. 250. July, 1836.—*Glehn*, In *ibid.*, p. 219. July, 1837. (*Complicated with scarlatina*).—*Wendt*, In *ibid.*, p. 207. Jan., 1838.—*Petzholdt*, In *ibid.*, p. 469. April, 1838.—*Streeter*, In *Lancet*, p. 611. Jan., 1838. (*Small-pox in puerperal women*).—*Dublin Journ. of Med. Science*, p. 481. Jan., 1837. (See also the *BIBLIOG. AND REFER. to art. VACCINATION*.)

[*AM. BIBLIOG. AND REFER.*—*Stephen Brown*, M.D., Prize Dissertation on Small-pox, Varioloid, and Vaccination, p. 84. Oct., 1824; and *Med. Recorder*. (Dr. B. maintains that the *kine-pox* in the cow and the *grease* in the horse are both the results of variolous infection, and that each proves equally effectual in protecting the system against the small-pox.)—*Lewis C. Beck*, An Account of Small-pox, Varioloid, and Chicken-pox, which prevailed in Albany in 1824; with Remarks on the Identity of these Diseases, and the anti-variolous Power of Vaccination, *New York Med. and Phys. Journ.*, vol. iv., p. 31.—*J. Smyth Rogers*, On the Varioloid Disease, *New York Med. and Phys. Journ.*, vol. iii., p. 66.—*John Bell*, An Account of Small-pox in New York in 1823-24, *ibid.*, p. 199.—*Henry W. Ducaecht*, On Vaccination, *New York Med. and Phys. Journ.*, vol. i., p. 42.—*E. J. Cox*, *D. Francis Condie*, and *C. D. Meigs*, Report on Small-pox in Phila., *North Am. Med. and Surg. Journ.*, vol. v., p. 400. (The committee come to the conclusion that the susceptibility to varioloid is not very greatly different under inoculation and vaccination, and they state that the varioloid attacked both variolated and vaccinated persons.)—*Moses Younglove*, On Small-pox and Kine-pox, *Med. Repository*, vol. vi., p. 372. 1803.—*Benjamin Waterhouse*, On the Inoculation of the Kine-pock, *ibid.*, vol. v., p. 373. (A very interesting account of the introduction of vaccination into this country.)—*Philemon Tracy*, Two Cases of Small-pox and Measles at same time, *ibid.*, vol. iii., p. 105.—*Joseph Hamilton*, *ibid.*, vol. iii., p. 194. Also, *Monograph*, 45 p., On Small-pox.—*Drs. Post, Hammersley, Neilson, Pascalis*, and *Watts*, Report on Epidemic Small-pox in New York in 1816, *Eclectic Repository*, vol. vi., p. 304.—*John K. Mitchell* and *John Bell*, History of the natural and modified Small-pox, or of the Variolous and Varioloid Diseases as they prevailed in Philadelphia in 1823-24, *North Am. Med. and Surg. Journ.*, vol. ii., p. 27 and 286. (A very elaborate and useful Report.)—Observations on Small-pox and Chicken-pox, with some remarks on Vaccination, *New York Monthly Chronicle*, p. 7. 1825.—*Pardon Bowen*, Facts relating to the Small-pox and Kine-pock, *Med. Communications and Dissert. of Mass. Med. Soc.*, vol. ii. 1813.—*John Warren*, *Mercurial Practice in Small-pox*, *ibid.*, vol. ii., p. 476.—*Luther V. Bell*, An Attempt to investigate some obscure and undecided Doctrines in relation to Small-pox, Varioloid, and Vaccination, 8vo. Boston, 1836; and in *Boston Med. and Surg. Journ.*, vol. xiv., p. 201.—*Pendleton*, In *New York Med. and Phys. Journ.*, vol. i., p. 320.—*Post*, *ibid.*, p. 113.—*Nathaniel Potter* and *S. Calhoun*, *Amer. Ed. of Gregory's Practice of Physic*, Phil., 1831. (Dr. Calhoun maintains the identity of chicken-pox, cow-pox, and modified small-pox, vol. i., p. 221.)—*William Douglass*, A practical Essay concerning the Small-pox, 12mo, p. 38. Boston, 1730.—*Nathaniel Williams*, The Method of Practice in the Small-pox, with Observations on the Way of Inoculation, 12mo. Bost., 1752.—*J. C. Hutchison*, On Vaccination, and the Causes of the Prevalence of Small-pox in New York in 1833-54, *New York Journ. of Med. and the Collateral Sciences*, vol. xii., N. S.—*J. S. Smith*, A Review of epidemic Small-pox, as it has prevailed in New York City at different Periods during the last fifty Years, *ibid.*, vol. xiii., N. S.—*C. A. Lcc*, Some Remarks on Small-pox, Varioloid, and Variella, as connected with their Diagnosis, *ibid.*, vol. xi., N. S.; and in *Am. Journ. Med. Sci.*, No. li., N. S. July, 1853.—*P. Macauley*, In *Am. Med. Recorder*, p. 378. Phil., 1822.—*S. A. Cook*, In *Bost. Med. and Surg. Journ.*, vol. xxxii., p. 49.—*D. B. Slack*, In *ibid.*, vol. xxix., p. 478.—*G. Dorrance*, In *ibid.*, vol. xxii., p. 46.—*J. Bigelow*, In *ibid.*, vol. xxi., p. 322.—*D. Palmer*, On Small-pox and Vaccination, In *ibid.*, vol. xviii., p. 104.—*J. D. Green*, In *ibid.*, vol. xvii., p. 325.—*James Spalding*, In *ibid.*, vol. xiii., p. 187.—*H. Chandler*, In *ibid.*, vol. xiii., p. 63.—*Thomas Wallace*, In *ibid.*, vol. xi., p. 252.—*J. A. Allen*, In *ibid.*, vol. x., p. 93.—*J. Stimson*, In *ibid.*, vol. viii., p. 25.—*B. Cox*, In *ibid.*, vol. viii., p. 33.—*J. D. Fisher*, Description of the Small-pox, Varioloid, Cow-pox, and Chicken-pox, illustrated by

thirteen Engravings, 4to. Boston, 1829.—*J. V. C. Smith*, History of Small-pox and Varioloid in Boston, &c., in *Bost. Med. and Surg. Journ.*, vol. i., p. 129, 161.—*W. B. Atmon*, In *ibid.*, vol. i., p. 7.—*B. Barrett*, In *ibid.*, vol. i., p. 113.—*B. F. Joslin*, In *ibid.*, vol. v., p. 249, N. S.—*L. Callaghan*, In *ibid.*, vol. iv., p. 302, O. S.—*W. W. Gerhard*, In *ibid.*, vol. xi., p. 368. (This paper contains the most accurate and minute account of the post-mortem appearances in Small-pox hitherto published.)—*J. F. W. Lane*, Some Statistics of Small-pox and Vaccination, in *ibid.*, vol. xxiii. (xii., N. S.), p. 119. July, 1846.—*William Kelly*, Case of Variola, complicated with Purpura, in *New York Journ. of Med.*, Jan., 1851, N. S.; and in *New York Med. Times*, vol. ii.—*S. G. Morton*, In *Am. Edit. of Macintosh's Practice*, vol. ii.—*H. G. Morton*, Lectures on Practice of Med. Edited by *Rev. H. W. Ducaecht*, New York.—*Washington L. Atlee*, Case of Small-pox Contagion, apparently conveyed by Letter, *Amer. Journ. Med. Sci.*, vol. xxvi., p. 505.—*Thos. Stewardson*, Remarks upon Small-pox admitted into City Hospital, Philadelphia, during 1840-41-42, *ibid.*, N. S., vol. v., p. 61.—*F. W. Sargent*, Report of Cases of Small-pox admitted into City Hospital, Philadelphia, in 1845-46, *ibid.*, N. S., vol. xvii., p. 349.—*Samuel Jackson*, of Northumberland, On Ecrotic Treatment, of Phil. Med. Examiner, N. S., vol. ii., p. 464.—*E. C. Banks*, of Illinois, Small-pox appearing Spontaneously, *ibid.*, N. S., vol. v., p. 518.—*Anonymous*, Observations upon Small-pox in Dover, N. H., *Boston Med. and Surg. Journ.*, vol. xliii., p. 214.—*Henry Gibbons*, Sketch of Epidemic Small-pox in Wilmington, Del., *ibid.*, vol. ix., p. 355.—*W. L. Sutton*, of Kentucky, On Etiology and Diagnosis of Small-pox, *Western Journal of Medicine and Surgery*, 3d series, vol. ii., p. 93.—*T. S. Bell*, On Small-pox and Vaccination, *ibid.*, 3d series, vol. vii., p. 22.—Report of Committee on Small-pox and Varioloid, *Transactions New York State Med. Soc.*, vol. iii., p. 40.—*William G. Meacham*, In *Buffalo Med. Journ.*, vol. ix., p. 457.—*Samuel Forry*, A Dissertation on the protective Powers of Vaccinia, the Boylston Prize Essay for 1844, in *New York Journ. Med.*, Sept., 1844.—*William P. Dewees*, *Practice of Physic*, Phil., 1833. Also, *G. B. Wood*, *R. Dunglison*, *D. Hosack*, *S. H. Dickson*, and *J. Eberle* (*Systems of American Practice of Medicine*).—*James Stewart*, On Diseases of Children, and *Transl. of Billard on Diseases of Children*.—*Lemuel Shattuck*, Report of Sanitary Commission of Mass. Mr. S. says: "The first authentic account of the prevalence of small-pox in this country is in 1631, when it spread from Narragansett to Piscataqua, and westward to Connecticut River, sweeping off whole villages of the Indians. In 1633 it also made great ravages among the natives; also in 1639, 1645, 1677, 1678, and 1702, when 44 per cent. of the inhabitants of Boston died of it. In that year inoculation for small-pox was introduced into Boston. Rev. Dr. Cotton Mather, having read in the Transactions of the Royal Society of London favourable accounts of the operation, recommended a trial of it to the physicians of Boston, but all of them unanimously and decidedly opposed it, except Dr. Boylston. This enlightened physician first inoculated his own son, thirteen years of age, then two coloured persons in his family, and all with complete success. Subsequently others were inoculated. Great controversy ensued, and the dispute ran high. Theologians maintained that such interference with the disease was sin, and should not be allowed. Dr. Douglass headed the opposition, and so exasperated were the minds of the people, that Dr. Boylston was frequently insulted in the streets, and forced to secrete himself for some time, and afterward to visit his patients only at night. Passion and prejudice on the one side, however, were met with decision and success on the other; and inoculation soon triumphed over opposition, and became general. During this epidemic, 15,759 persons—more than half the inhabitants—had the disease in the natural way, of whom 844 died; 247 were inoculated by Dr. Boylston, and 39 by other physicians, of whom 6 only died. This was 1 death in 7 of those not inoculated, and 1 in 47 of those inoculated, showing very clearly the advantages of inoculation."]

## SOFTENING OF STRUCTURE.—SYNON.—

*Softness of organs*; *Mollities*; *Μαλακότης* (from *μαλακός*, mollis); *Structura mollities*; *μαλακοςαρκος*, Galen. *Ramollissement*, Fr. *Erweichung*, *malacia*, Germ.

## CLASSIF.—GENERAL PATHOLOGY—MORBID STRUCTURE—THERAPEUTICS.

1. *An individual structure, or part, or organ, may present more or less softness, or diminution of its healthy or normal density, or of its natural state of vital cohesion*; it may be preternaturally soft, still retaining its usual amount of cohesion; it may be unusually friable, without being soften-

ed, or without losing its density; but these states are comparatively rare, for when the one property is impaired the other is also diminished, and *with softening cohesion is generally proportionately lessened*. Softness of structure is commonly not merely physical, but also vital. The structure evinces an impaired cohesion of its molecules, and a diminished vital resistance to external agents. When treating of the changes evinced by individual structures, I have always described, as one of these changes, diminution of their cohesion, or softening. Thus softening of the brain, *Mollities cerebri*, is considered in the article BRAIN; softening of the heart, *Cardiomalacia*, in that on the HEART; softening of the stomach, *Gastro-malacia*, in that on the STOMACH, &c.

2. I. PATHOLOGY OF SOFTENING OF STRUCTURE.—*Preternatural softness of structure* is sometimes recognised during life, but most frequently comes under the observation of the physician after the dissolution of his patient, and it then becomes sometimes a question how far it may be a post-mortem change. There can be no doubt that much of the softness often found in the brain or spinal cord after death is post-mortem, although the change may have commenced some time before death; and this remark equally applies to softening of the tissues of the *digestive canal*. (See this art., § 34, *et seq.*)

3. *Softening of structure may occur after death*.—1st. From the action of the gastric juice on parts with which this fluid is brought in contact soon after, or at the time of dissolution. 2d. From infiltration or maceration of effused fluids, and putrefaction.

4. Softening may take place *during life*.—1st. From congestion, and, still more manifestly, from effusion or infiltration of blood in the structure. 2d. From inflammatory action. 3d. From disease of the arteries or veins connected with the softened part. 4th. From impaired organic nervous power of the part, causing impaired nutrition, sometimes with serous infiltration, or with fatty degeneration, or with a certain amount of either of these. Softening of structure after death has been noticed when treating of changes observed in the digestive canal and in other organs; but I shall here offer a few remarks on the pathological conditions of which it is a consequence during life.

5. 1. The several changes just enumerated as most frequently producing softening of structure are chiefly concerned in causing this effect in particular organs or parts. But there are other states which occasion a *more or less general softening or loss of vital cohesion in most of the structures of the body*; and this softening may exist in a very remarkable degree throughout the whole frame, excepting the bones. It is presented to us during life chiefly in pestilential diseases and malignant fevers, and occasionally as a result of virulent poisons. The softening of the structures in these distempers is a consequence, as I have shown when treating of these distempers, 1st, of impaired and vitiated organic nervous influence; 2d, of a contaminated state of the blood, with an impaired crasis of its fibrine, and change of the blood-globules; these two prime factors of ulterior alteration acting and reacting on each other. The softening of structure in the more severe cases of the several pestilences, and in the more malignant of exanthematous and continued fevers, had been in great measure overlooked until I described it in

early parts of this work and in other places; and to what I have advanced respecting these diseases, under their several heads, I must refer the reader for my description of this remarkable change—this general diminution of vital cohesion of the tissues—at an advanced stage of the malady, or towards the close of life, with the rapid accession of putrefaction after death. This general and rapid form of softening may be called *acute general softening of the tissues*, to distinguish it from *partial or limited softening*, on the one hand, and from *chronic general softening* on the other.

6. ii. When softening of structure is *partial as to its seat, or limited to a single structure or organ*, it is a consequence of one or more of the pathological states enumerated above (§ 4).—A. It may be the result, or the concomitant, of *congestion of blood* in the capillaries of the part, or of an *exudation of blood* from these vessels, and of the infiltration of it in the substance of the part. When the vital or the organic nervous influence of the part and of its vessels is impaired, the blood is liable to congestion in the vessels, or to farther change; and, as a consequence, or as a concomitant of this state, softening of the part is liable to supervene. If, as a result of this change in the capillaries and their contents, blood be effused into the structure of the part, softening still more certainly ensues, and with a rapidity proportionate to the failure of vital power and resistance in the surrounding parts. The softening which is observed is congested and enlarged spleen, whether occurring primarily, or as a consequence of periodic fevers, and some of the cases of softening of the lungs are illustrations of the consequences, or of the concomitant effects, of congestion of a simple or asthenic kind; while the red softenings seen in portions of the brain, and the softening with ecchymoses and bloody infiltrations, observed in several viscera and structures in scurvy, purpura, asthenic hæmorrhages, and in malignant or putro-dynamic fevers, &c., show the great extent to which softening proceeds when it is accompanied with exudations of blood. In all cases, when blood is exuded, infiltrated through the structure, or accumulated in masses, and retained even for a short time, softening of an inflammatory kind, although asthenic as to tone, certainly supervenes, and extends more or less, according to the grade of vital resistance.

7. B. *Inflammatory action* is generally attended by softening of the affected parts; and when softening has not become apparent, or even when the part seems more dense, owing to the infiltration of a concrescible lymph, there is a defect of vital cohesion, as evinced by increased friability. The sthenic and chronic states of inflammation evince less softening and friability than the more asthenic and acute states. Erysipelas and other spreading inflammations, and still more the diffusive inflammation of cellular and adipose tissues, are often attended by softening, amounting to diffuence and disorganization; and in proof of these changes, I have only to refer to these maladies, and to the art. GANGRENE.

8. C. *Disease of the arteries and veins*, especially of the former class of blood-vessels, is a very common cause of limited softening of organs. Obliteration of an artery, or even specific deposits in the coats, or other changes affecting the calibre, or impairing the healthy action of the vessel, as atheromatous or fatty deposits, may impair the nutrition of the part supplied by the diseased vessel,



and thereby occasion softening and impaired vital cohesion of it. Instances of this connexion or sequence, or even sometimes concomitance of alteration, are often presented in the brain, heart, and other parts. Softening in these cases, more especially in the heart, is sometimes associated with a fatty degeneration of the structure of the organ. (See the chapter, in the article *HEART, on fatty degeneration of its structure*, § 224, *et seq.*) I have stated, when treating of *apoplexy*, that the change in the vessels of the brain, and in those of the heart, are sometimes the same at advanced age; and that whether the change be specific deposits in, or atheromatous or fatty degeneration of, the coats of the vessels, they frequently exist in the vessels of both these organs, and account for the not infrequent complication of disease of the heart with either apoplexy or palsy.

9. When the change in the arteries consists of atheromatous deposits in their coats—which deposits were described by me in 1830, when writing on the diseases of arteries, and were stated to “consist of a suety matter, greasy to the touch,” &c. (see art. *ARTERIES*, § 59)—then the structures supplied by arteries thus affected are often not merely softened, but also otherwise changed; the softened part being flabby, and as if infiltrated with serum, and with more or less oil-globules. In other cases, especially when this change in the arteries is connected with softening of the cerebral structure, serous effusion often accompanies it, especially into the adjoining ventricles, and occasionally as an infiltration of the softened structure; this effusion being probably the result of the physical condition of the organ, and either of the state of circulation in the part or in its vicinity, or of the atrophy sometimes attending softening. Whether or no softening of the cerebral structure is attended by more or less of fatty degeneration, as observed in the heart, has not been ascertained; but it is not improbable that the fatty elements, contributing in their various degrees to produce what has been recently, and not always correctly, described as fat (and of which the earliest notices are contained in various articles of this work, especially *ARTERIES*, § 59; *DISEASE*, § 135, *et seq.*; *HEART, STRUCTURAL CHANGES OF*, § 224, *et seq.*; *PLEURA*, § 100; *SEROUS MEMBRANES*), are more or less augmented above the natural standard in the softened structure of the brain; the healthy structure of the organ containing from three to eight per cent. of fat, which exists chiefly in the medullary structure.

10. Disease of, or obstructed circulation through the *veins*, produces softening of the tissues, the blood of which passes to the affected veins; but the softening generally presents peculiar characters. It is always attended by great congestion, or infiltration of serum, or ecchymoses, or by all three. The vital tone or cohesion of tissues thus circumstanced is already partially lost; and when they are subjected to any irritation, inflammatory action of an asthenic character is soon produced, which rapidly spreads, still farther softens the part, and ultimately destroys its cohesion and organization.

11. *D. The organic nervous influence* of a part is more or less impaired, either previous to, or in connexion with, the changes already noticed as productive of softening. But this influence may be impaired primarily, and chiefly, and independently of any of the changes now adduced. It is thus impaired either congenitally or hereditarily,

or by the injurious agents in operation during early life; and the consequences are a preternatural softness and flabbiness, and impaired vital cohesion of all the structures, not excepting even the bones, which, as shown in rickets and scrofula, are not only slowly and imperfectly developed, but more or less softened, especially in their spongy parts. This *chronic form of general softening* may exist in the fœtus, without being hereditary; it may be hereditary, and yet not appear until some indefinite period after birth, as when it proceeds from scrofulous parents. It may be acquired from the nature or the supply of nourishment, or from the want of pure air, &c.; the scrofulous, or rickety, or tubercular habit of body being thereby produced in young subjects, and the scorbutic at more advanced ages. *Scurvy* furnishes one of the most remarkable illustrations of chronic general softening, or general impairment of vital cohesion, advancing in a slow and progressive manner, commonly in adults, *rickets* equally illustrating it in children. The general cachexy resulting from the *syphilitic poison*, or from *mercury* acting in poisonous doses or modes, or from the use of the *ergot of rye*, or from other poisonous substances, is chiefly characterized by softening, implicating more or less the whole of the structures, although manifested especially in certain tissues, particularly the cutaneous and cellular, the osseous and periosteal, the mucous, &c., and, in certain of these, passing extensively into *ulceration*, of which softening is a general antecedent.

12. *E. Softening often depends upon the association in various degrees of the foregoing morbid states*, especially those causing partial or limited softening, and, even when thus associated, in its slighter grades it may be transitory, as when it occurs from œdema, or saturation of the tissues of a part with serum. Such saturation may proceed from local weakness of the tissue, or of the capillaries supplying it, or from more general debility, or from local changes, as obstruction in the returning circulation of the part, or obstruction of the absorbents, causing this lesion. The serous infiltration may be soon removed, or it may persist, or it may increase, and the attendant or consequent softening may also increase, and even go on to disorganization; certain intermediate changes, however, sometimes appearing, especially asthenic inflammation. In these cases, the infiltration of serum, by its macerating property, weakens the vital cohesion of the tissue, or, by the possession of an irritating quality, induces a diffusive or asthenic inflammatory action, frequently passing into gangrene. The mere separation of the intimate structure of cellular or adipose parts, by the infiltration into it of an inorganized and inorganizable fluid, if continued long, tends to loosen the vital cohesion of the part; and when this fluid contains, as often occurs, excrementitious or injurious materials, the result is both increased and hastened, especially as it often also associates with it other changes, seated in the vessels supplying the part, tending most rapidly to gangrenous softening.

13. *Œdema*, or serous infiltration of the substance of the brain, whether the antecedent or the concomitant of softening of the cerebral structure (for it may be either the one or the other), generally induces and accelerates the softening process in this structure more remarkably than in any other organ; complete disorganization,

or decomposition, being thereby often rapidly induced.\* Few parts, either by their physical condition or by the nature of their organization, are more frequently subject to serous saturation than the brain; and although the serous exudation is most frequently excessive between the membranes and in the ventricles—more or less fluid being always in these situations—still the excessive accumulation of it in the ventricles will often affect the vital cohesion of the surrounding structure, so as to predispose to, or occasion softening in this situation or in the vicinity, especially in the scrofulous diathesis and in rickety habits, in which the vital cohesion of the tissues is generally weak.

14. Congestions of blood in parts, asthenic and erysipelatous inflammations, the accumulation of excremental and irritating materials in the circulation, and the operation of animal and contaminating poisons, all in their several grades occasion more or less softening, which is most remarkably manifested in those tissues, the organization of which is most loose or yielding, as cellular or mucous structures and parenchymatous organs. In these, especially, the softening is followed by the exudation of a fluid, which is neither pus nor con-creasible lymph, even when the softening is most inflammatory, but which, in the scrofulous diathesis, is either tubercular, or curdy, or sanious, or an association of these; and in persons who are constitutionally exhausted, or whose blood is self-contaminated or otherwise poisoned, the morbid fluid, serous or sanious, infiltrates the adjoining tissues, softens them with various degrees of rapidity, and ultimately disorganizes or decomposes them. These consecutive states of softening, whether manifested in external or internal parts, in cellular and adipose tissues, or in mucous or parenchymatous organs, are presented to our observation in the course of adynamic or malignant fevers, and after the absorption of puriform and sanious matters into the circulation, and in the several forms of erysipelas; and whether puriform matter be formed in the softened part, or a sanious fluid, or a foul, contaminating serum, infiltrating adjoining parts, they always tend to farther disorganization, or decomposition or gangrene supervenes, unless vital power and resistance be re-enforced, and the contaminating state of the circulation be counteracted or remedied by suitable treatment.

15. II. THE THERAPEUTICAL INDICATIONS applicable to softening of structures should be based upon the pathological states from which it appears to proceed, or with which it is associated. But the result of treatment will entirely depend on the acumen of the physician in detecting this condition of structure and the changes in which it originates, and in attributing to each its due influence, and in adapting his means of cure to their several grades and relations. When treating, under their proper heads, of the several states of softening, as manifested in different structures, I then pointed out the measures most appropriate for each; and, reviewing this lesion as one of the most advanced, and as one of the most dangerous, I then more especially considered the treatment most conducive to the removal of the changes from

which it proceeds. Whether arising from inflammations, especially the asthenic—or from congestions, hypostatic or others—or from obstruction of vessels, arterial, venous, or lymphatic—or from morbid matters conveyed into the circulation, and thereby affecting predisposed or previously disordered parts—or from the diminution of certain elements necessary to vital density or cohesion, as phosphorus, or sulphur and their combinations—or from morbid poisons changing the states of organic nervous power, and of the circulating fluids, more or less generally—or, lastly from the nature of the food and from states of nutrition—the treatment of softening of structure has received due consideration, as respects, not only this particular lesion, but also the changes from which it proceeds. In the several articles on ABSCESS (§ 62); ABSORPTION (§ 15, *et seq.*); ARTERIES (§ 40, *et seq.*); ARTS AND EMPLOYMENTS (§ 23, *et seq.*); BRAIN, *softening of the* (§ 214, *et seq.*); CACHEXY (§ 4, *et seq.*); CELLULAR TISSUE (§ 9, *et seq.*); CHOLERIC FEVER OF INFANTS (§ 11, *et seq.*); CONGESTION OF BLOOD (§ 12, 13,); DEBILITY (§ 25, *et seq.*); DIGESTIVE CANAL, *softening of* (§ 34, *seq.*); DYSENTERY, ASTHENIC (§ 88, *et seq.*); ERYSIPELAS (§ 64, *et seq.*); FEVER (§ 559, *et seq.*); GANGRENE (§ 57, *et seq.*); HÆMORRHAGE (§ 40, *et seq.*); HEART, *softening of* (§ 216, *et seq.*); INFLAMMATION, ASTHENIC (§ 236, *et seq.*); INTESTINES, *softening of*, (§ 131, *et seq.*); ŒDEMA, PESTILENCES, especially the Hæmogastric and Plague (*in numerous places*); and SCROFULA.

16. In the treatment of softening of individual structures, as well as of the general softening of the tissues consequent upon malignant fevers, and morbid states of the circulating fluids, attention should be chiefly directed to those pathological states of which softening is the consequence; and these ought to be either removed or counteracted by means suited to these states, the most important of which have been indicated above (§ 6, *et seq.*), or more fully mentioned in the articles just referred to. But it should always be remembered that the removal of the causes—a supply of deficient elements, in medicines, aliments, and mineral waters; a suitable diet and regimen; a pure, dry, and bracing atmosphere, with free ventilation; a healthy discharge of the digestive functions; and the use of pure or appropriate mineral springs—are the chief means of cure.

BIBLIOG. AND REFER.—R. Hooper, *The morbid Anatomy of the Hum. Brain*, illustrated by coloured Engravings of Organic Diseases of that Viscus, p. 17, 4to. Lond., 1828.—Mirat, In *Dict. des Sciences Médicales*, t. xliii., p. 161.—L. Rostan, *Recherches sur une Maladie encore peu connue, qui a reçu le nom de Ramollissement du Cerveau*, 8vo. Paris, 1823.—Lallemand, *Recherches Anatomico-pathologiques sur l'Encéphale et ses Dependances*, 3 tomes. Paris, 1820.—1836, *pluries*.—R. Carswell, *On Softening of Organs*, in *Cyclop. of Pract. Med.*, vol. iii. p. 1.—A. Grisolle, *Traité Elementaire et Pratique de Pathologie Interne*, 8vo, 2 vols., 4th edit. Paris, 1850, *pluries*.—J. Vogel, *Icones Histologicæ Pathologicæ, Tabulæ Histologicæ Pathologicæ Illustrantes*, &c., Latin et Germ., 4to. Leipzig, 1843, *pluries*.—J. Vogel, *The Pathological Anatomy of the Human Body*. Transl. with additions, by G. E. Day, p. 405, 8vo. Lond., 1847.—P. C. A. Louis, *Mémoires ou Recherches Anatomico-Pathologiques sur le Ramollissement*, &c., 8vo. Paris, 1826.—Cruveilhier, *Anat.-Patholog. du Corps Humain*, &c., 2 ts. folio. Paris, 1830-42, *pluries*.—C. Rokitsansky, *A Manual of Pathological Anatomy*. In four volumes. Transl. for the Sydenham Society, 8vo. Lond., 1849-50, *pluries*.—E. A. L. Hübener, *Specielle Pathologie und Therapie*, b. 1., p. 58, 8vo. Erlang.—These, as well as other authorities, may be consulted, but different views have been taken by them of softening of structure from those enter-

\* It is not improbable that softening of the nervous centres is favoured, if not caused, by a deficiency of sulphur or of phosphorus, or both, and of their combinations, in the cerebral structure, these substances being always present, but in varying quantity in this structure, in its normal states.



tained by the author. (See also BIBLIOGRAPHY and REFERENCES to the Articles just referred to, as well as to others in which softening of individual structures is treated of.)

[S. D. Gross, Elements of Pathological Anatomy.—W. E. Horner, Path. Anatomy.]

**SPASM.**—SYNON.—*Spasmus*, *σπασμος* (from *σπᾶω*); *Hyperkinesia* (from *ὑπὲρ*, and *κίνησις*). I. Frank; *Mobilitas nervosa nimia*, Auct. var. *Ataxia Spirituum*: *Spasmes*, Fr. *Krampfe*, Germ. *Cramp*.

CLASSIF.—II. Class, II. ORDER (See Preface).

DEFINIT.—*Involuntary or abnormal actions of muscular parts; or, in other words, contractions of muscular structures, different in continuance, or in severity, or in recurrence from healthy action; constituting a generic pathological condition; and although most commonly a sympathetic, yet an important morbid state.*

1. I. VARIETIES OF SPASM.—The ancients comprised under the term spasm all convulsive affections or movements, but the sense in which the word is now and more strictly applied is the contraction or tension of a muscular structure, independently of volition, and often disposing to or followed by convulsion. Spasm, or cramp, frequently exists without convulsion; it may affect either voluntary or involuntary muscles; and in either of these situations presents varying characters; and it may be attended by consciousness, or by an abolition of sensation, or even by various derangements of sensibility and mental manifestation. The supporters and followers of the nervous system of pathology, especially STAHL, HOFFMANN, JUNCKER, SAUVAGES, CULLEN, and others, attached great importance to this morbid condition, and sometimes inferred its existence, especially in internal and involuntary structures, where there was no evidence of its presence. Although the partial revival of the humoral pathology, to which the early articles of this work have in no small measure contributed, especially those on the BLOOD, on DISEASE, on ABSORPTION, EXCRETION, INFECTION, &c., has in some degree diminished the importance which had been attached to spasm as an influential pathological state, still it performs a part of considerable interest in the general doctrine of disease.

2. SAUVAGES arranged under spasm all involuntary muscular contractions, and divided them into *tonic* and *clonic*. Under the former appellation he comprised those contractions which were more or less permanent or continued; under the latter he ranged those which alternated with relaxation; and both forms of spasm he divided into *partial* and *general*. *Partial tonic spasm*, according to him, embraced strabismus, trismus, torticollis, priapism, and cramp attacking any of the voluntary muscles. *General tonic spasm* consisted only of tetanus and catalepsy. *Partial chronic spasms* were carphologia, pandiculation, tremour, palpitation, &c.; and *General clonic spasms* were eclampsia, epilepsy, hysteria, chorea, &c. CULLEN adopted the view of SAUVAGES, in constituting spasmodic affections a distinct order of nervous diseases. PINEL, however, did not consider that the spasmodic state should be made the basis on which an order of disease might be founded.

3. It is very doubtful whether or no catalepsy should be viewed as a species of general tonic spasm, or even as a spasmodic affection at all. I have seen several cases of true catalepsy, and

in these there was no increased action of muscles apparent. In cataleptic ecstasy, however, many of the voluntary muscles are more or less contracted; and when catalepsy occurs in connexion with hysterical attacks, muscular contractions often precede the cataleptic state. In most of the convulsive affections arranged under eclampsia, epilepsy, and hysteria, the seizure is generally tonic at its commencement, and clonic towards its termination; so that it is very difficult to distinguish between those convulsive or spasmodic affections which are tonic or which are clonic, these terms being altogether conventional, and the morbid states which they are intended to represent passing gradually and insensibly from the one into the other.

4. MM. PINEL and BRICHETEAU divided spasmodic affections into those which are unattended, and which are attended by lesion of the faculties of intelligence. Dr. MASON GOOD arranged these latter under the genus "*Comatose Spasm*," assigning convulsions, hysterics, and epilepsy to it, as species. But hysterical spasm is often unattended by any comatose affection, or loss of sensibility; and here, as well as in other morbid conditions, the difficulty of classification becomes apparent. Dr. GOOD divided his order of spasmodic affections, or nervous disorders affecting the muscles, into three genera, consisting of "*Constrictive Spasm*," of "*Clonic Spasm*," and of "*Synclonic Spasm*." The first of these comprised priapism, wry neck, distortion of the spine, muscular stiff-joint, cramp, locked-jaw, tetanus, rabies, and suppressed pulse; the second, hicough, sneezing, palpitation, nictitation, subsultus, pandiculation; the third, tremour, chorea, shaking palsy, raphania and barbiere.

5. Dr. GOOD defined his genus "*Entasia*," or constrictive spasm, to be "irregular muscular action producing contraction, rigidity, or both." The genus *clonus*, or clonic spasm, he described as "forceful agitation of one or more muscles in sudden and irregular snatches," or, in other words, agitative or tremulous motions of the muscles. The genus *synclonus*, or synclonic spasm, he stated to be "tremulous, simultaneous, and chronic agitation of various muscles, especially when excited by the will," or a "multiplied conjunctive or compound agitation, or tremulous motion." The reader, upon consideration of the above definitions, will be at a loss to perceive the generic differences between the genera *clonus* and *synclonus*, and he may not be satisfied that tremour and shaking palsy should be ranked as species of spasm.

6. Spasmodic action may occur in either voluntary or involuntary muscular structures. In the former it may be limited to one or more muscles, or extended to several, or even more or less generally; it may also, when so situated, be either simple, or associated with unconsciousness. In the latter class of structures, it is always partial or limited, and is generally complicated with irritation, or congestion, or inflammatory action, in adjoining or related parts. Spasm, moreover, is most frequently and strictly a *symptomatic* affection, and is rarely a *primary* or *idiopathic* disorder, unless when it occurs in the form of cramp, or from over-exertion of the muscles affected, or from bringing muscles that have been long disused into action.

7. Spasm may be arranged into, 1st, that affecting involuntary muscular structures, or those

parts which are supplied only or chiefly by ganglionic nerves; 2d, that attacking muscles which are influenced by voluntary nerves; 3d, spasm implicating both involuntary and voluntary structures; and, 4th, spasm associated with want of consciousness. When spasm is seated in either involuntary or voluntary parts, it may be of varying duration; it may be continued for a time, and then permanently relaxed; it may be thus continued, and afterward recurrent or convulsive; or it may be recurrent or agitative from the commencement, thus presenting either of, or all the forms classed by Dr. Good as tonic, clonic, and syncronic, and being either partial, or limited, or more or less general. The limited states of spasm may be of considerable duration, and may even pass into a state of permanent contraction, although this may be a rare occurrence. Several of the unnatural positions of organs or parts, as those of the eye, extremities, &c., have been attributed to spasm of particular muscles; and probably the mal-position may have originated in this state, the contraction becoming permanent, while the spasm no longer existed; but it may have equally originated in a paralyzed condition of antagonist muscles. In these cases care should be taken to distinguish between tonic spasm, permanent contraction of muscles or parts, and the deficiency of antagonist action.

8. i. *Spasm of involuntary structures* is an element of several diseases. It is most common in the digestive canal, in various parts of which it may exist in succession, generally in a recurrent, although sometimes in a more continued form. It may be limited to this canal, or be extended to adjoining parts, or even to voluntary organs. It may, when affecting the alimentary canal, be merely an exaltation of the peristaltic motion, as in diarrhœa or dysentery; or it may be more severe, and attended by inverted action, as in vomiting, spasms of the pharynx or of the œsophagus. In these cases the spasmodic state is favoured either by extreme debility and sensibility of the seat of the disorder, or by inflammatory irritation, and is directly occasioned by any irritating substance. In any circumstance, the spasmodic action will be produced by irritations sufficiently great to excite it; and when the vital power of the parts is low, and the susceptibility great, even the accumulation of the natural secretions within these parts, or a vitiated state of the secretions, is sufficient to cause spasm, as evinced by certain states of diarrhœa, by vomitings, by colic, bilious cholera, &c. When any irritating body is brought in contact with the mucous surface of the digestive canal, whether that be gaseous, fluid, or consistent, spasm will generally affect the parts thereby irritated, or their more immediate vicinity. The same effect follows inflammatory action and ulceration, which are often followed by spasmodic action, as demonstrated in various parts of this canal, in the pharynx, the œsophagus, the stomach, the duodenum, the small and large intestines. Similar causes produce similar effects in the urinary passages, and even in the respiratory passages. In these latter the spasmodic action is often the most remarkable, and is generally followed by very manifest effects.

9. Various involuntary canals or parts have been supposed to be seats of spasm in certain disorders without sufficient reason. Thus the gall-ducts have been accused of spasm in some states of jaundice, and the capillary vessels in the

cold stage of fevers. That irritating or morbid bile, or irritants at the mouth of the ducts in the duodenum, may cause spasm of these ducts, is very probable, but there is no palpable demonstration of this effect. That there is an apparent constriction of the capillaries, especially of those on the surface of the body, is very manifest in the cold stage of fevers and in states of vital depression; but it does not follow that the constriction is the consequence of spasm. It is merely the result of the contraction of these vessels upon a deficient amount, or the entire absence of their contents, which are no longer propelled with sufficient power to fill or distend them, during these states of the frame.

10. Spasm of the parietes of the cardiac cavities has also been inferred to be present in cases of nervous palpitation, and when death has taken place suddenly, without any manifest organic lesion. That nervous palpitation is truly spasmodic, even when most exalted, is extremely doubtful. There is certainly remarkably increased action and impulse, with all the symptoms described when treating this affection of the heart (*see art. HEART, § 43, et seq.*); but morbidly increased action is not quite identical with spasm, although often nearly approaching it. With increase of action, prolongation or irregularity of the contraction is generally present in the spasmodic state. If we admit the occurrence of spasmodic or spastic contraction of the parietes of the heart of a much longer duration than that which takes place normally, death must necessarily follow; but I much doubt the existence of this lesion, especially in such grade or continuance as to occasion death. It certainly has not been satisfactorily demonstrated, although admitted by some writers.

11. ii. *Spasm of voluntary muscles or parts* is of frequent occurrence, either in the form of cramps of particular muscles, or in that of convulsive action of several or many. Cramps in the extremities may follow over-action of the muscles attacked, or be symptomatic of disorder of the digestive canal, or of latent or inflammatory changes in the brain or spinal cord, or their membranes, or of the irritation produced by the circulation of effete or injurious materials in the blood, as in cholera, gout, &c. They may even follow a certain amount of pressure upon, or irritation of the nerves, supplying voluntary parts, either at the origins or in the course of these nerves, with or without any other manifest disorder. Cramps or spasm, of the lower extremities especially, often precedes, recurring at intervals, for some time an attack of paralysis or apoplexy, particularly hemiplegia; and they often recur, in slighter grades, during the restoration of the lost power. Spasmodic actions of voluntary parts may result from irritations in their vicinity, or in situations more or less remote, from irritations immediately affecting the nerves supplying these parts, or mediately and indirectly conveyed to them from a distance, as in trismus, tetanus, &c.; and the spasmodic action may be tonic or continued, or irregular or convulsive, or clonic or agitative, or recurring at intervals and occasioning snatches or startings, and various abnormal motions; or it may pass in succession through all those, as in irregular convulsions, in some forms of hysteria, and even in some cases of epilepsy. The spasmodic state, however, is subject to so many variations and anomalies, that



it is quite impossible to describe them correctly in all their details at this place. Those diseases in which spasm, in any of its forms, constitutes a principal element are fully described, and with especial reference to this morbid condition, under their special denominations; it is requisite, however, to notice certain associations of this condition.

12. iii. *Spasm may affect both involuntary and voluntary parts.* It may extend from one order of parts to the other—most frequently from the former to the latter, if the succession of morbid phenomena be closely analyzed, although voluntary parts manifest this disorder most evidently. Spasm, even when affecting most severely the voluntary muscles, may proceed from very remote sources of irritation, as I have shown in several places in this work before the subject was duly considered by any one else. Commencing with those sources which are the nearest to the parts which are morbidly contracted, and concluding with those which are the most remote, we find that muscular structures may experience unnatural action or spasm in some one of its varying forms: 1st, from irritation in or near the seat of morbid action, as shown more especially in muscular canals—in the digestive, respiratory, and urinary passages; 2d, from irritants affecting the nerves supplying the affected muscles, as evinced in both involuntary and voluntary parts; 3d, from irritation or lesion of the spinal marrow at or near the origins of the nerves supplying these muscles; 4th, from lesion (not necessarily structural) of parts of the brain, or of its membranes, having relations with the nerves going to the convulsed or spastic muscles; 5th, from irritation of any portion of the digestive viscera and canal, or of the generative and urinary organs, transmitted by ganglionic nerves to the roots of the spinal nerves, or to the spinal cord, and reflected thence by voluntary nerves to the external muscles and members; 6th, from irritation of any of the senses—of hearing, sight, smell, taste, or touch—transmitted to those parts of the nervous centres with which they are respectively in connexion, and thence reflected upon parts intimately related to them; thereby producing startings, tremours, sneezing, cough, retchings, or convulsive movements, as either of these senses are irritated or abnormally excited. These several sources of spasmodic action have been sufficiently illustrated in the articles CHOREA, CONVULSION, EPILEPSY, HYSTERIA, SYMPATHY, TETANUS, &c.

13. II. CAUSES OF SPASM.—i. *The predisposing causes* are the same as those fully described when treating of the individual species of spasm, these causes being generally common to all the species, the exciting causes, and the several intrinsic circumstances or peculiarities of the patient determining the form of the attack. Hereditary vice or disposition, congenital conformation, a weak development of frame, the female sex, a warm and humid climate, the ages of infancy, childhood, and puberty, the critical epochs of females, premature sexual indulgence and masturbation, luxurious indulgences and voluptuous modes of living [the excessive use of tobacco and alcoholic stimulants], prolonged indulgence in bed or in sleep, inordinate devotion to music and poetical studies, excitement of the imagination, want of repose, mental anxiety, sleeplessness, exhausting discharges, the sudden suppression of

accustomed evacuations, or of external pains; the gouty and calculous diathesis; excited and ungratified, or insufficiently gratified, sexual passions; suppressed emotions; the period of utero-gestation, the puerperal states, abortions, exhausting lactation, inanition; extreme states of vascular plethora, or of anæmia, &c., severally predispose, and often directly produce, some one or other of the usual forms of spasmodic disorder, or such states of spasm as may be considered as anomalous, or different from those commonly described by nosological writers.

14. ii. *The exciting causes of spasm*, whether specific or anomalous, are chiefly influences affecting the mind, the senses, the nervous centres, the alimentary canal and digestive viscera, the sexual and urinary organs, &c.; more especially the violent emotions of mind, whether manifested or suppressed; severe disappointments and losses; strong or strange impressions of the senses, startling noises, disgusting or horrible sights, objects of terror or surprise; violent excitement and the influence of the imagination; titillation or irritation of the more sensitive parts of the surface, prolonged or violent pain; disordered dentition and dental affections; derangements of the digestive canal, particularly the presence of worms, or of acidity, or of flatus, or of morbid secretions and excretions, or of fecal accumulations; the passage of biliary calculi, or of disordered bile; irritation or excitement, or functional or structural lesions of the sexual or urinary organs or passages, calculi in the kidneys or bladder; inordinate or prolonged muscular action; various organic lesions or external injuries, implicating either the parts affected, the nerves supplying them, or related portions of the nervous centres or their membranes; sudden or extreme changes of temperature, or electrical conditions of the atmosphere; sudden suppression of discharges, eruptions, or external pain; the drying up of chronic ulcers; the nature of the ingesta, especially acid or unripe fruit, poisonous articles mistaken for food; the poison of lead, and numerous other injurious substances mentioned under the head of Poisons.

15. iii. *The immediate or efficient cause of spasm*—the pathological condition constituting this affection—has been a topic of contention among pathologists. It was generally ascribed to irritation of the nerves supplying the affected muscles, either at their origins, in their course, or at their terminations; or to a sympathetic affection of these nerves propagated from distant but related parts to those thus attacked; or to an irregular distribution through the nerves of the nervous influence or power, and determination of this influence to the affected parts. Towards the close of the last century, RITTER, SPRENGEL, and others viewed spasm as a result of an alteration of the polarization of the terminations of the nerves in relation to the muscular fibres; and this doctrine, after having been neglected for half a century, has been revived at the present day, and supported by the connexion established between magnetism and electricity. This latter theory may admit of a certain degree of practical proof, by having recourse to electricity or galvanism, or of electro-magnetism, for the removal of spasm, an energetic recourse to either of these overcoming, as it does in slighter cases, as shown by my own observation, the morbid condition of the muscles. Nevertheless, the same agencies may

be viewed as equally successful in the removal of spasms, on the assumption of their dependence upon the irritation of the nerves in any way related to the affected parts. The *juvantia* cannot always prove the nature of the affection. I have seen, as far back as 1820, the most severe cases of tonic and of clonic spasm produced by the internal strangulation of a minute portion of the small intestines, and by the irritation of worms in the bowels, the violent affection of the voluntary muscles having arisen from those causes and ceased with them, the irritation having been propagated by ganglial nerves to the roots of the spinal nerves, and thence reflected upon the muscles in which these latter nerves terminated; the history of these and numerous other cases favouring rather the old doctrine of irritation of nervous distributions than the less old and recently-revived theory of altered polarization of the nervous fibres, with relation to the muscular tissue, in producing spasmodic actions.

16. III. DIAGNOSIS OF SPASM.—The existence or non-existence of spasm is in many cases remarkably evident; but in many others, even as respects some disorders which have been viewed as spasmodic, the evidence is by no means satisfactory. As to the insufficiency of this evidence in regard of some disorders, I have already hinted. We have no proof of spasm in any quarter in cases of *cataplexy* of a true pathological form; at least, I could detect none upon a close examination of several cases. The several forms of true *tremour*, as arising either from mental emotion, or from mineral or other poisons, or from functional or structural changes, evince no true indication of spasm. The disordered motion is merely the result of an imperfect determination or transmission of nervous power to the tremulous parts, owing to an insufficient or an interrupted supply of this power from the voluntary or involuntary nervous sources, as either voluntary or involuntary parts are affected.

17. Various *paralyzed parts* may present states which may be mistaken for spasmodic affections; and the paralyzed state may rapidly pass into the spasmodic, and this latter into the former, which is much the most common. The existence, the morbid relations, and the translations of both these morbid conditions thus become extremely imperfect. *Hysteria*, the *convulsions*, and other spasmodic and anomalous affections of infants and children; diseases of the brain, or of its membranes, in the same class of subjects; diseases or injuries of the spinal marrow, &c.; epilepsy, apoplexy, paralysis, &c., either frequently or occasionally, present more or less of spasmodic action, often passing suddenly or rapidly into one of entire loss of power. The irritation, softening, effusion, compression, or other original morbid change affecting the nervous centres, while slight, or in a lesser degree, may occasion only cramps (spasmodic motions), but, when increased relatively to the state of nervous power, may cause the loss of all motion. We thus often observe that several maladies commence with more or less of spasm, or cramps in the extremities, especially the lower, and soon pass into the paralyzed state; apoplexy, epilepsy, paralysis, and various other specific and anomalous affections of the nervous system, manifest in many instances this succession of lesion and of resulting phenomena.

18. Dr. M. HALL is of opinion that the spas-

III.

59

modic affections ushering in many cases of these maladies commencing, or are seated, in the superficial muscles of the neck; and that the spasm of these muscles, by compressing the larger veins, occasion congestion of the brain, and the several consequences of congestion when the spasm is not soon relaxed. He believes that "certain causes and principles, emotions and irritations, act directly or diastatically upon the muscles of the neck," inducing what he designates "*Trachelismus*:" "if this spasm can be dissolved, all its effects cease more or less perfectly." That the muscles of the neck are affected with spasm in many cases of hysteria, especially in the more severe or paroxysmal, cannot be doubted; and that those seizures which originate in violent mental emotions are often thus characterized, or even thus originate, may be conceded; but the spasm of these muscles is not so general, nor always so early in the procession of morbid phenomena, as Dr. M. HALL supposes. When it does exist, and is either severe or protracted, the consequences which follow are generally serious; and it then constitutes an important portion of the courses of morbid actions and changes, each successive portion being the cause of that which follows it, as it is itself the consequence of that portion which precedes it.

19. Spasm of involuntary muscles must necessarily be imputed to irritation of the ganglial nerves supplying these muscles, or to some alteration in the relations subsisting between the nervous and muscular fibres of the affected part. But when spasm attacks voluntary muscles, the irritation has been generally supposed to be seated in, or to implicate, the voluntary nerves. It is, however, very doubtful whether the spasm of these muscles is so generally caused by irritation of voluntary nerves as is commonly believed. It is very probably so caused in many cases, as shown by injuries of the spinal cord, and by inflammation of this part of the nervous system or of its membranes; but there are various diseases, in which spasm performs a chief or a subordinate part, where irritation of any part of the voluntary nervous system is by no means demonstrable, either the muscular fibres or the ganglial nerves supplying them being much more probably the primary seat of such disorder. In trismus and tetanus, in which the voluntary muscles are so severely contracted, there is no proof that the voluntary nerves are primarily implicated; for volition produces no effect on the spasm, and whatever lesion these nerves present, in some cases merely, may be consecutive much more probably than primary. In the most severe cases of spasmodic cholera, in violent cases of colic or ileus, and in others where a very limited injury is sustained by a portion of intestine, as in partial strangulation, I have seen the spasm of the voluntary muscles as general as in tetanus, and continue in this state for long periods, and yet the cerebro-spinal nervous system must be inferred to have been free from all irritation but what was propagated to the spinal nerves from the ganglial nerves supplying the digestive canal.

20. IV. THE PROGNOSIS OF SPASM may be most favourable, or the most fatal, according to the seat of spasm, and the circumstances in which it occurs. A spasmodic affection may terminate the life of an infant in a few seconds, especially when it is caused by disease about the base of the brain, or near the medulla oblongata, or their mem-



branes; or it may cease in a very few minutes, where it is produced by acidity or by any other source of irritation in the alimentary canal. Clonic spasm of the diaphragm may arise, especially in young persons, from the deglutition of a hard or imperfectly masticated substance, or from acidity, flatulence, &c., or it may be the indication of a fatal issue in many acute and even chronic diseases. It may proceed from inflammatory action or irritation of one or more of the digestive organs, or from the sinking of vital power preceding dissolution.

21. Spasm affecting either involuntary or voluntary parts is not attended by danger when it occurs in hysterical or nervous females, or when it cannot be traced to disease or injury of the brain, spinal marrow, or their membranes, or to antecedent or existing visceral disease, pectoral or abdominal. When, however, it has been preceded or is attended by inflammatory action or by hæmorrhage, or even by evidence of congestion of any important organ, or by effusion into any cavity, especially if hæmorrhage has been excessive or effusion great, spasms of any part, and more particularly if they affect the diaphragm, or even the pharynx, œsophagus, or stomach, are a most unfavourable, and generally a fatal, symptom.

22. Spasms of either voluntary or involuntary muscles are always indications of great danger when they appear in the course of malignant or other fevers, and especially in an advanced stage of those fevers, or when they are present in pestilential distempers, or at the commencement of acute inflammation of abdominal organs, or at an advanced stage of chronic visceral or structural disease; the amount and imminence of danger depending upon the violence or malignity of the disease, upon the contamination of the blood, upon the stage of the malady at which spasms occur, and upon their seats and extension. Spasms affecting the muscles of the superior extremities are always much more dangerous than those of the lower extremities, and, when they extend from the former to the latter, the danger is extreme.

23. Spasms of voluntary muscles attending gout or rheumatism are readily removed when they are caused by acidity and flatulence, or accumulation of morbid secretions and excretions in the intestinal canal or in the biliary organs; but when in these diseases spasm appears independently of the disorders just mentioned, or when structural change is detected in the heart, or when the state of the urine indicates disease in the urinary organs or passages, more or less danger should be apprehended; and although present risk may be averted, a future attack, with its contingent danger, may supervene sooner or later.

24. Spasmodic attacks consequent upon protracted lactation, upon menorrhagia, or profuse leucorrhœa, or upon other exhausting discharges, or upon masturbation or venereal excesses, or upon inanition or anæmia, are frequently temporarily removed by treatment; but they return or assume a more serious aspect, if the morbid condition in which they originate be not removed by appropriate means, or they may pass from the hysterical character, in which they generally first present themselves, into the epileptic or into mania or confirmed insanity.

25. Spasms occasioned by the extent or seat

of injuries generally excite great anxiety, and are most frequently attended by danger. But the amount of danger, or even the absence of it, depends chiefly upon the nature and seat of injury, and the amount of vital shock (*see art. Shock*) attending it. When the cranium or spinal column is the seat of injury, when there is a penetrating wound or compound fracture, or when vital sinking indicates the violence of the shock sustained by the frame, the presence of spasm not merely complicates the injury, but also indicates its severity, and the imminent danger attending it.

26. V. TREATMENT.—It is obvious that the treatment of spasm should in a great measure depend upon the nature and seat of the disease, of which the spasmodic symptoms form either subordinate or a most prominent part. When the spasm is more than a symptom, depending upon some special malady—when it constitutes an early, predominant, or principal morbid condition, either with or without loss of consciousness, it presents, according to its antecedent or associated and peculiar phenomena, certain special forms, which are described under the several heads of *choræa, convulsions, epilepsy, hysteria, &c.*, and for each of which, in its several varieties, the treatment is fully described. It therefore remains only to state those general principles or indications which experience indicates or contra-indicates, under certain circumstances and morbid conditions with which spasm is generally allied.

27. It would appear, from what has been stated above, that one or other of the different forms of spasm is contingent upon, or is produced by, one or other of the following pathological states: 1st, congestion; 2dly, inflammation; 3dly, irritation caused by acid, acrid, or otherwise disordered secretions and excretions; 4thly, a contaminated state of the circulating fluids; 5thly, some structural lesion or injury affecting adjoining or remote nerves or the origins of nerves; 6thly, extreme exhaustion of organic, nervous, or vital power; 7thly, the excessive action of muscles, and the contraction of muscles independently of a co-ordinate or sufficient determination of volition to them; 8thly, punctures or other injuries of tendons, nerves, or fibrous membranes; 9thly, the irritation of the sexual or urinary organs; and, 10thly, two or more of the states conjoined. It will be seen, from a consideration of these antecedents, that spasm is most commonly a symptom of certain disordered or morbid conditions, to which attention should chiefly be directed in its treatment, and that it is only when produced as just indicated in the seventh and eighth of the above series of causes or circumstances, that spasm can be considered as a primary or idiopathic disease. (*See arts. TETANUS and TRISMUS.*)

28. A. Congestion, in connexion with spasm, may be viewed both as an antecedent and associate of this latter condition. It may, moreover, be farther associated, as with irritation or some structural lesion; and as long as these are in existence, so long may the spasm continue or recur, as various concurring causes may favour its return. The existence of congestion is often difficult to determine; for when the spasm implicates any part of the respiratory apparatus, or when it is so general as to give rise to convulsions, with or without loss of consciousness, the congestion which is then made manifest is more the result of the spasm than the cause of it.

Congestion of the brain, or near its base, especially if consciousness be lost, and congestion of the lungs and cavities of the heart, are common effects of general spasm or convulsions, especially when any part of the respiratory passages is affected. Congestion may certainly exist in either organ antecedently to either spasm or convulsion, for it is frequently the cause of both; but the spasm may increase the congestion, and it may even be the cause of relaxing the spasm when the congestion becomes extreme. This latter effect takes place chiefly in extreme congestion of the brain, when consciousness is lost; the congestion, in connexion with the circulation of imperfectly oxydized blood in the brain, both relaxing the spasm and permitting the renewal of air in the lungs. The more moderate congestion in these cases first occasions spasm or convulsions; but when the congestion of unoxysized blood, increased by the convulsions, becomes extreme, then the spasms are relaxed and altogether resolved, and either natural respiration is resumed, or death takes place from the cessation of respiration, owing to the effect produced by the congestion at the origins of the respiratory nerves. In cases of spasm, thus arising or thus associated, the treatment must be directed by the following intentions: namely, 1st, to diminish or remove congestion by means which experience has shown to be most efficacious in obtaining this object; 2dly, to prevent the recurrence of this condition and its contingent effects.

29. *a.* Spasm depending upon or connected with congestion of any vital or important organ has been too generally treated by large vascular depletions, both general and topical. In young, robust, and plethoric persons, and when the spasms have been consequent upon the stoppage of accustomed discharges, both the one and other mode of depletion may be employed, but with extreme circumspection, more especially during the attack. In most even of these cases, local depletions are the safest and most efficacious; for when the circumstances just mentioned as warranting the depletion are not manifestly present, or when the patient is of a nervous temperament, either the local depletion should be small, or it should be altogether dispensed with, and other means be chiefly confided in. When local depletions are indicated, cupping is the most beneficial; and when the loss of any blood is justly dreaded, then dry-cupping may be resorted to. The circumstances indicating depletions, as well as those contraindicating them, require for their recognition great discrimination, guided by an enlightened experience, and are such, in their natures, complexities, and varied successions and associations, as to be estimated correctly only at the moment by the closely observing physician. When, therefore, there is any doubt as to the propriety of blood-letting, it will be preferable to resort to dry-cupping, and to emetics and purgatives, conjoined with stimulants and antispasmodics—with these latter more especially when nervous energy is much reduced or originally weak.

30. *b.* *Of emetics*, especially when spasm is imminent, or when it attacks any part of the respiratory apparatus, the most energetic is the *tinctura Lobelia*, or *Tinct. Lobel. Ætherea*, given with vinum ipecacuanha to ensure its emetic operation, or with sulphas zinci. When vital or nervous power is much reduced, it may be given

with spiritus ammonia aromaticus, or with camphor.\* When blood-letting is manifestly indicated, or when congestion of, or vascular determination to, the brain is urgent, then depletions and derivatives, as mustard pediluvia, should precede the exhibition of an emetic; and the affusion of cold water on the head, or cold sponging, may also be practised, the emetic operation and the relaxation of spasm being often promoted by these means. When congestion of the liver is connected with spasm, local depletion, or dry-cupping, or both, are often required, and then the preparations of colchicum may be given, at first in a large dose, either with or without an emetic conjoined, and afterward relinquished for purgatives and antispasmodics. The operation of the first dose of colchicum should be carefully watched, particularly when large, and if vital depression follow it, stimulating antispasmodics, as ammonia, camphor, valerian, &c., be exhibited. The spasms or convulsions which sometimes occur on the invasion of exanthematous fevers are often connected with congestion, and for these an emetic and a warm bath are often of service.

31. *c.* *Purgatives* are generally beneficial, more especially when the liver or brain is congested, and when the spasm is connected with acidity and flatulence of the digestive canal, or with accumulations of morbid secretions, excretions, and fecal matters, as when spasms occur in colic, or in the course of gout, rheumatism, hysteria, hypochondriasis, &c. In these, as well as in some cases of other diseases, not only are morbid excretions thus liable to accumulate, but the blood becomes more or less contaminated by effete materials, which the impaired functions of the emunctories fail of removing. In these circumstances, purgatives should be selected, with the view not merely of evacuating the contents of the bowels, but also of promoting the functions of excreting organs. When cerebral congestion is connected with spasms, then active derivative purgatives ought to be exhibited by the mouth and in enemata, and with this view, as well as with the intention of removing spasms by one of the most powerful antispasmodics that can be prescribed, a full dose of spirit of turpentine should be given with castor oil, or with other purgatives, and administered in an enema. When the liver is congested or torpid, as may in many cases be ascertained by percussion, then calomel with camphor, and various other chologogue purgatives, will be most appropriate.

32. *B.* When the spasm is contingent upon *inflammatory action*, recourse to vascular depletions, general or local, is commonly required; and what has been stated above (§ 29) respecting blood-letting is also here applicable to a great extent. It should always be recollected that inflammations accompanied with spasm or convulsion rarely admit of vascular depletions to the same amount as will be safely and advantageously borne in pure, uncomplicated inflammation. Indeed the depletions may even increase the spasm without materially diminishing inflammation,

\* [We doubt much the propriety of administering lobelia emetics in any cases where "the vital or nervous power is much reduced." Such a condition powerfully predisposes to spasm, and it is very likely to be aggravated by such a powerful acrid as lobelia. A simple emetic of ipecacuanha, or, if sedation is indicated, combined with a small quantity of antimony, will be preferable. We have known violent spasms produced by lobelia emetics in Thomsonian practice.]



when injudiciously employed, or when confided in chiefly, and when the inflammation is of an asthenic character. In this latter state more especially, and in other circumstances of this morbid alliance, deobstruct purgatives, conjoined with stimulants and antispasmodics, are required; and even in cases where vascular depletions are most indicated, not merely such purgatives, but also stimulating antispasmodics, may be most beneficial, with other restoratives which the peculiarities of the case will suggest. In some instances an emetic, judiciously selected and combined, will also be of much service, after depletion has been resorted to, when clearly indicated. In the worst form of spasm, as in that contingent upon asthenic or cachectic inflammation, for which blood-letting is generally more injurious than beneficial, the early exhibition of an emetic, followed by purgatives, and by tonics conjoined with alkalies, antispasmodics, counterirritants, &c., will be found more certainly useful than other means.

33. Spasms of the voluntary muscles, either limited or more or less extended, are often produced by inflammation at or near the origins of the nerves supplying the affected muscles, or by inflammatory action, or irritation of the membranes in the vicinity, or by disease of the adjacent bones, as shown when treating of lesions of the brain, spinal cord, and membranes, or of the cranium or spinal column; and for these, although general or topical bleeding may be requisite, according to the nature and features of the case, purgatives, alteratives, derivatives, counterirritants, sedatives, and the other means fully set forth in these articles, are especially required.

34. *C.* The dependence of spasm on *acid, morbid, or other irritants in the digestive canal* is of frequent occurrence, both primarily and unconnected with any special malady, or so associated, as in gout, hysteria, &c. In all these circumstances, emetics, purgatives, anthelmintics, &c., as above recommended (§ 30, *et seq.*), are indispensable. In the gouty and rheumatic diathesis, equal parts of magnesia and sulphur, taken on several occasions, and followed by a more active cathartic, will be found efficacious; and if there be reason to infer the presence of worms, the spirit of turpentine with castor oil, or anthelmintics, purgatives, &c., will be generally indicated; but they should be afterward followed by chalybeates, tonics, and antispasmodics, as recommended in the article on WORMS.

35. Irritation of the higher portions of the alimentary canal by the irruption of acrid bile into the duodenum often occasions spasms of the abdominal muscles and calves of the legs, but these generally subside after the evacuation of the morbid matters; dilution of the acrid secretions by warm, emollient fluids, narcotics subsequently, and mild purgatives afterward, effecting a complete cure, generally in a short period. (See CHOLERA, &c.)

36. *D.* Spasm is not frequently occasioned by contamination of the circulating fluids, unless at a far advanced period of febrile and pestilential diseases, as in pestilential cholera, and when the functions of the kidneys are impaired, interrupted, or otherwise disordered. In these circumstances vital power requires support, while morbid matters are evacuated and the actions of the depurating organs are excited by their appropriate stimuli. We should, moreover, endeavour to change or counteract the influence of those ma-

terials which thus accumulate in the blood—to remove or neutralize them. They can be removed only by increasing the functions of the emunctories, and they may be neutralized by appropriate alkaline or mineral agents, and by antiseptic and antispasmodic medicines, as recommended when treating of the maladies in which spasms are most frequently observed.

37. *E. Structural lesions, injuries, &c.*, of the bones, or membranes near the origins, or in the course of, the nerves supplying the extremities or voluntary muscles not infrequently occasion spasm of these muscles, and require the means already recommended (§ 29, *et seq.*), modified according to the nature of the lesion or injury, and to the peculiarities of the case in other respects. In these states of disease the performance of the several excreting functions requires especial attention, and the evacuations a particular examination.

38. *F. Extreme exhaustion of vital or nervous power*, causing spasm or irregular or convulsive actions of voluntary muscles, or of involuntary parts, is often irremediable, especially when it appears at an advanced stage of pestilential or febrile maladies, or after large losses of blood, and in the course of exhausting or contaminating diseases. In these circumstances, powerful stimulants and antispasmodics—wine, opium, camphor, ammonia, oxyde of bismuth, ammoniated copper, cajuput oil, phosphoric acid, the preparations of sumbul, amica montana, the ethers, brandy, &c.—are necessary, and one or more of these may be conjoined with such preparations of iron, or of asafetida, or of valerian, of zinc, of silver, of phosphorus, cannabis Indica, or of musk, castor, &c., as the peculiarities of the case will suggest.

39. *G.* When spasm or cramp is caused by excessive action of the affected muscles, or by contraction of muscles without a due determination of volition, it generally soon ceases, and requires merely frictions and quiet. If it recur, friction with stimulant liniments, the application of warm embrocations near the origins of the nerves or portion of the spine enclosing these origins; frictions with chloroform or ether, or with turpentine and camphor, either over the affected muscles or along the spine; and subsequently the cold douche or affusion, or sponging the spine night and morning with a tepid or cold solution of bay-salt, followed by gentle friction with the hair glove, &c., will generally prevent a recurrence of the spasm.

40. *H. Punctures or injuries of tendons, &c.*, are occasionally followed by trismus or tetanus, the most continued and dangerous form of spasm, and one which requires, more than almost any other disease, the most energetic stimulants, antispasmodics, and tonics; the powerful doses of sedative and narcotic substances generally resorted to for this affection tending rather to hasten than to avert dissolution. (See *arts.* TETANUS and TRISMUS.)

41. *I. The influence of the sexual organs* in producing spasm or convulsion is especially manifested by the female. But there are often other morbid conditions present besides either irritation, congestion, or inflammatory excitement, or vascular determination of these organs. Generally nervous power, especially organic nervous power, is disordered or depressed, the secretions disordered, and the excretions insufficient or retained; consequently, assimilation is impaired, and the

blood poor. The affection of the sexual organs is readily induced by mental emotion or desire; and this affection reacts upon the brain and nervous system generally, is propagated by the ganglionic system to both the abdominal and thoracic viscera, disordering the functions of the urinary organs, occasioning spasmodic actions of the alimentary canal, respiratory organs and passages, and often exciting spasms or convulsions, or both, by the extension of the irritation to the roots of the spinal nerves, and even to the spinal marrow, medulla oblongata, and brain.

42. The treatment hitherto recommended in these cases has consisted chiefly of stimulants and antispasmodics, and have been but insufficiently directed to the sexual organs and to the mind. The morbid or irritated state of these organs should be removed, and sexual desires suppressed. Instead of stimulants and heating antispasmodics, cooling medicines, as nitre, small doses of camphor, magnesia, alkalies, &c., should be given in bitter infusions, and the mind ought to be occupied agreeably and profitably. When spasmodic affections occur in females or males, especially if the countenance become pallid or sallow, then the most noxious vice of all vices should be suspected, namely self-pollution (see *arts. DEBILITY and POLLUTION*); and unless this be relinquished, and the mind be healthily and morally regulated, medical treatment will be of no avail. (See *arts. CHOREA, COLIC, CONVULSIONS, EPILEPSY, and HYSTERIA*.)

BIBLIOG. AND REFER.—*Hippocrates*, Περὶ τῶν ἐν κεφαλῇ τραυμάτων, Opera, p. 906.—*Avicenna*, Canon, l. i. iii., fen. ii., tr. i., cap. 1, 18.—*Bokel*, Dissert. de Spasmi. Helmsi., 1537.—*Schenk*, Observat., l. i., no. 242.—*J. R. Saltzman*, De Spasmo seu Convulsione, &c., 4to. Argent., 1620.—*G. Rolfink*, De Spasmo, &c., 4to. Jenæ, 1631.—*S. Schultz*, De Motu quodum totius corporis, horrendo et diuturno, &c., in Miscell. Acad. Nat. Curios., Dec. 1, Ann. vii., p. 209.—*T. Willis*, Patholog. Cerebri, et Nervosi generis Specimen, in quo agitur de Morbis Convulsivis, &c., 12mo. 1670.—*L. Heister*, Dissectio Mulieris miris Spasmi brevi defunctæ, in Ephemer. Nat. Curios., cent. v. et vi., p. 166.—*J. M. Mueller*, in Ibid., cent. ix. et x., p. 373.—*Amatus Lusitanus*, cont. ii., cas. 9, 10.—*C. A. Bergen et Muller*, De Morbo Epidemico Spasmodico-Convulsivo Contagii Experte.—*Halleris*, Disput. ad Morb., vol. i., p. 75.—*Waldschmidt et Scheffer*, De Morbo Epid. Convuls., &c., in Ibid., vol. vii., p. 515.—*Cartheuser*, De Spasmi in Genere. Fr., 1764; et de Variis Spasmodicis Causis et Remediis. Fr., 1753.—*Bonet*, Sepulchr., l. i., sect. 13, obs. 19, 28.—*Juncker*, De Morb. Spasmodico-Convulsivis, &c. Ital., 1739; et De Spasmi eorumque Quadruplici respectu. Ital., 1754.—*F. Hoffmann*, Dissert. Compend. et Clinica Morbor. Spasmodico-Convulsivorum praxis, &c., Opera, Suppl. ii., p. 201.—*De Haen*, Rat. Medendi, &c., t. vi., p. 158. (*Continuance of the rigidity of spasm after death*.)—*M. Stoll*, Rat. Med., &c., t. v., p. 112.—*G. Baker*, in Med. Transact. of Coll. of Phys., vol. i., art. 19.—*Lentin*, Beyträge, p. 181.—*R. Whytt*, Works, 4to, ed. 1768, p. 489-712.—*J. S. Kæhler*, Morbi Spasmodici aliquot Historiæ, 8vo. Serov., 1778.—*Say*, in Mem. of Med. Soc. of Lond., vol. iii., art. 30.—*Pole*, in Ibid., vol. ii.—*Autenrieth*, Physiologie, § 735.—*J. Koch*, De Convuls. Invenem decussatim distorquentibus, 4to. Argent., 1779.—*Wilkinson*, in Med. Facts and Observat., vol. iii., no. 8.—*E. Home*, in Philosoph. Trans. for 1801, par. i.—*Marcus*, Magazin für Therap. u. Klinik, b. i., p. 324.—*J. Frank*, Prælexio Medicæ Univers. Præcepta, sect. ii., vol. ii., pars ii., p. 553.—*J. C. Prichard*, A Treatise on Dis. of Nervous System: Pt. I., Convulsive and Maniacal Affect., 8vo. Lond., 1822. Reviewed in Lond. Med. Repos., vol. xvii.—*R. Powell*, Three Cases of Convulsive Affection, 8vo. Lond., 1815.—*Villermay*, Traité des Maladies Nerveuses proprement dites, 8vo. Paris, 1817.—*Pinel et Bricheteau*, in Dict. des Sciences Médicales, t. liii., p. 251.—*J. Mitchell*, in Transactions of Roy. Medical and Chirurg. Society, vol. iv., p. 25.—*B. Travers*, in Ibid., vol. xvii., p. 361.—*B. C. Brodie*, Ibid., vol. xx., p. 132.—*R. Bright*, in Ibid., vol. xxii., p. i.—*R. Wade*, in Ibid., vol. xxiii., p. 65.—*Ackerley*, British and For. Med. Review, Jan., 1838, p. 273.—*J. Wilson*, in Medico-Chirurg. Review, vol. xxix., p. 377.—*M. Good*, Study of Medicine, ed. by S. Cooper, vol. iii., p. 235.—*J. A. Wilson*, On Spasm, Languor, Palsy, &c., of

the Muscular System, 8vo. Lond., 1843.—*M. Hall*, On the Threatenings of Apoplexy and Paralysis; Spinal Syncope; Hidden Seizures, &c., 8vo. Lond., 1851. (See also the BIBLIOGRAPHY AND REFERENCES to the Articles CHOREA, COLIC, CONVULSIONS, EPILEPSY, HYSTERIA, &c.) [AM. BIB. AND REF.—*Eberle*, *Dewees*, *J. Bell*, *Wood*, *Hosack*, and *S. H. Dickson's Systems of Practice*. Also, *Eberle*, *Dewees*, *Stewart*, *Condie*, and *Meigs*, On Diseases of Children.]

## SPINAL COLUMN, DISEASES OF.—SYNON.

—*Vertebral column*; *Columna vertebralis*; *C. spinalis*, Auct. Var. *L'épine du dos*, *Rachis*, Fr. *Der Rückgrat*, Germ. *The Spine*, *Spinal Cord*, and *Membranes*.

1. I. PRELIMINARY REMARKS.—The spinal column has attracted to itself a due proportion of attention from medical writers only in comparatively recent times. The diseases of the several tissues, of which this column and its contents consists, were either altogether unknown, or overlooked, or if partially known, undeservedly disregarded, until J. P. FRANK, in 1791, published his celebrated treatise on the great importance of this part of the frame in disease. Previously to this period, disorders and lesions of the spinal column and cord received only partial and very imperfect notices from medical and surgical writers. Some mention of the functions and diseases of these parts is to be found in the works of HIPPOCRATES, GALEN, ARÆTEUS, and CÆLUS; but the structure and functions displayed by them, more especially by the spinal cord, were very imperfectly investigated and understood, until BARTHOLIN and BLASIVS entered upon this undertaking. VIEUSSENS afterward, HUBER subsequently, and MONRO, FROTSCHER, LUDWIG, GALL, and HOME at later periods, cultivated still farther this field of research. Injuries and diseases of the vertebral column were treated of by POTT, PALETTA, SOEMMERING, C. BELL, A. LOUIS, and others; while the maladies implicating chiefly the spinal cord and its membranes were illustrated successively by VOGEL, PORTAL, BERGAMASCHI, BRERA, AUTENRIETH, MUSSY, SCHMALZ, RACHETTI, CHOULANT, OLLIVIER, BRODIE, the author, and others; but it was not until the researches of C. BELL, MAGENDIE, M. HALL, VALENTIN, STILLING, VAN DEEN, BUDGE, &c., had thrown additional light upon the structure and functions of the cord, that the diseases of this organ and of its envelops have been duly illustrated. Even at the present time, it is doubtful whether or not these diseases have received the full amount of investigation which they have so long required. The reader will find, in the sequel, an account of the works furnished not only by writers now enumerated, but also by many others, who have contributed more or less to the present advanced state of our knowledge of diseases of the spinal column, and of the very important tissues which this admirable structure contains and protects.

2. A. It may not be disadvantageous to take a brief survey of various topics connected with the pathology of the spinal column, and of the parts which it contains, especially in relation to certain agencies, and to other maladies, with which affections of these structures are often more or less intimately associated.

3. a. During the several forms and stages of fever, periodic, continued, exanthematous, and malignant, the functions of the spinal cord are more or less impaired or disturbed, as evinced by the pains in the back, loins, and limbs, and by incapability of assuming the erect posture, or even of



moving. In the early stages of these maladies, these symptoms are manifestly due chiefly to congestion of the veins and venous sinuses of the vertebral canal, and to disordered circulation in the cord and its membranes; but at more advanced stages, the morbid or contaminated state of the blood itself, and the failure of vital power generally, still farther increase the deficiency of voluntary motive power, paralyzing not only the limbs, but affecting more or less, through the medium of the branches of spinal nerves communicating with the ganglial and visceral nerves, the functions of the several internal organs, and especially of the urinary and genital.

4. *b. Rheumatism and gout*, the former especially, may attack, by metastasis or otherwise, the membranes of the spinal cord, and by the effusion of lymph between them greatly impair or entirely abolish either motion or sensation, or both, in parts supplied with nerves from or below the seat of effusion. A similar succession of disease may occur in the course of various acute eruptive maladies, although much more rarely.

5. *c. Scrofula, tubercles, and rickets* very frequently attack the spinal column, generally the bodies of the vertebræ, and produce the most serious effects not only upon these, but not infrequently also upon the membranes, the spinal cord itself, and the roots of the spinal nerves, causing the several sympathetic disorders which will be described in the sequel. The affection of the spine may, in scrofulous subjects, be the only serious manifestation of the scrofulous taint, or it may be associated with, or consecutive upon, other outbreaks of this taint, in the form of tubercular infiltration or other structural lesions.

6. *d. The affection of the spinal cord and membranes may be connected with disorder of the sexual and urinary organs*; and, although the more severe affections of the former generally disturb or abolish the functions of the latter, serious or protracted disorders of the urinary and sexual organs not infrequently excite important lesions of the spinal cord. This latter procession of morbid phenomena admits of ready explanation. Exhausting seminal and other discharges from the genitals depress vital power generally, impair the requisite nutrition and regeneration of the nervous influence of the cord; and thereby not merely weaken remarkably the functions of this organ, but affect its intimate organization, favouring softening or other structural change. Irritation also of the sexual organs, and of the urinary organs also, may be propagated by the communicating branches of nerves to the spinal cord, and, when thus extended and perpetuated by a continuance of the cause of irritation, serious lesions may be reasonably inferred to arise not only in the cord itself, but also in its several envelopes, and even in the blood-vessels lodged between these envelopes and the bodies of the vertebræ.

7. *e. Inflammatory affections of the nerves*, especially of those of the lower limbs, may extend even to the spinal cord or membranes, and produce in these similar changes to those which follow the metastasis of rheumatism or gout to these structures, or the suppression of eruptions, &c. This succession or extension of disease is rare; but a few instances have come under my observation, especially the extension of inflammatory sciatica to the sacrum and back, and the supervention of spasms, followed by loss of motion, &c.

8. *B. There are various symptoms, circumstances, and complaints, several of them appearing obscure or anomalous, which ought to direct our attention to the spinal column, and lead to a very careful examination of its state and functions.*—

*a. The voice and respiration* are often affected when the upper portion of the medulla or cord is in any way implicated in disease. I saw some years ago a gentleman who had been seized when a young man with hemiplegia, the speech, tongue, and muscles of the face having been affected. He was subsequently quite restored to health, and presented no indication of paralytic affection, and had for many years pursued his profession. But on the last occasion of his consulting me he complained of a form of hoarseness, or state of voice which had been treated by more than one physician as a chronic laryngitis. I had arrived at first at the same conclusion; but an examination of the chest, throat, and neck, attention to his articulation and voice, and the previous history of the case, convinced me that the affection was more paralytic than inflammatory, and that he was in imminent danger of an attack of asphyxia, of apoplexy, or general paralysis, from lesions about the medulla or base of the brain. The treatment was directed accordingly; a seton was placed in the nape, but he died suddenly some time afterward. The affection of the functions of respiration, and even of the actions of the diaphragm consequent upon disease of the medulla or of its envelopes, was known to GALEN.

9. *b. Since the days of GALEN (De Locis affectis, l. iii., c. 10), the influence of the medulla oblongata and spinal cord upon respiration and the actions of the heart was overlooked until VERNAY, MORGAGNI, ELLER, ZINN, LE GALLOIS, PROCHASKA, BRODIE, and, more recently, W. PHILLIP, C. BELL, and M. HALL, directed special attention to the subject.* The last-named writers, however, imputed the action of the heart entirely or almost wholly to the nervous influence of the medulla, overlooked the more important influence of the organic or ganglial nerves abundantly supplied to the heart and respiratory organs, and directed their attention chiefly to, and overestimated, the spinal nervous influence, which only re-enforces and modifies the more important and greater—the more vital—power which the heart and lungs receive from the other source just named. There is no doubt that the mechanism of respiration—the respiratory muscles, are more especially influenced and actuated by the medulla and cord; and that whatever interrupts or intercepts the nervous influence from these sources, or from the more basilar and central parts of the brain, by causing asphyxia, soon arrests the actions of the heart. That the contractions of the heart may be rendered more energetic, more tumultuous or impulsive, either by mental emotion, or by irritation of the sources of nervous influence now named; or, on the other hand, that these contractions may become more slow, more weak, and even more irregular and intermittent, until death may supervene with more or less rapidity, owing to a defective, or an interrupted, or an intercepted transmission of nervous influence from these sources, cannot be disputed. In cases, therefore, which present disordered action of the heart, of whatever kind, not only should this organ itself be carefully examined, but also the state of the spine, as far as that may be done, and the several manifestations of organic nervous influence, as

displayed by the several digestive, assimilating, and excreting functions.

10. *c.* The abdominal muscles are subject not merely to *cramps* and *spasms* when the medulla spinalis or its membranes are diseased, but, even independently of cramps, the patient often complains of a remarkable increase of the sensibility of the cutaneous surface, of a sensation of girding or constriction around the abdomen or base of the thorax, subsequently of impaired sensation and motion, with great constipation of the bowels, retention of urine, and various other symptoms, according to the portion of the cord which is implicated. (See art. PARALYSIS.)

11. *d.* The limbs are often the subjects of *cramps*, or permanent *contractions*, often with an intervening sensation of *prickings*, numbness, and peculiar modifications of sensibility, especially near the points of the toes or fingers, with a sense of weight and numbness of the legs and feet, or of the whole limb. Occasionally these sensations are felt on one side only, or in both, or more severely in one than in the other; and, although they often precede an attack of gout, they frequently are precursors of organic lesions of the cord or its membranes, and thus usher in an attack of paraplegia, or inflammation of the cord and its membranes, or accompany inflammation of the intervertebral cartilages, or caries of the bodies of the vertebræ.

12. *e.* More or less *severe pain* or *neuralgia* may be complained of in some remote part from the spine, or in one or more limbs, often in the extremities, but as frequently deep-seated in the middle of the thighs, or in the abdominal muscles, or between the ribs, the pain often admitting of being traced to the origin of the affected nerve in the spine. The effect of position upon the pains—of standing, or sitting, or lying down in the prone or supine position; and the periods of the day or night when they are most acute, ought to be carefully ascertained. In cases of inflammation of the cord, or of its membranes, or of the bodies of the vertebræ, the pain is much increased towards morning and after lying upon the back, and extends around the abdomen and down the limbs, with at first retention of urine, constipation, and subsequently loss of power of the sphincters. If, however, the inflammation be slight, and the patient has not retained the supine posture during the night, the pain may be diminished in the morning, owing to augmented capacity, by elongation, of the spinal canal.

13. *f.* The state of the *sexual functions* are often much disordered in diseases or injuries of the spine or of the cord. While masturbation, or sexual intercourse, when excessive, may impair the nutrition of the cord, and induce disease both of it and its membranes, the latter occasions, particularly when the lesion is low in the cord, loss of sexual power, and incontinence of urine. Injuries or acute disease in the cervical portion of the cord are often attended by priapism.

14. *g.* The above and other phenomena, which will attract the attention of the observing physician, will always suggest to him the necessity of having recourse to a careful examination of the spine; and even when none of the above is present, the patient, however, presenting unusual debility, or impairment of activity or motion in the lower extremities, or great weakness or trembling of the knees, with a bent, staggering, or unsteady mode of progression, emaciation of

the lower extremities, relaxation of the ligaments of the joints, &c., the experienced observer will infer impaired nutrition and function of the spinal cord, either from the exhaustion produced by masturbation or excessive sexual indulgence, or from congestion of the venous sinuses of the vertebral canal, or from incipient softening or other structural change in the cord, or in its membranes.

15. *h.* An examination of the spinal cord should be connected with a careful inspection of it in various positions—while standing erect, while the trunk is bent to either side, and when the patient is prone. The effect of bending or turning quickly to either side should be observed; for, even in incipient caries of one or more bodies of the vertebræ, the patient sometimes experiences a sensation, grating, or crepitation, on making any of those changes of position. The sensibility of the surface of the trunk and limbs, the temperature and state of the skin, and the degree of rapidity with which volition is conveyed to the extremities ought to be noted. The clavicles, the ribs, the sacrum, the crests of the ilia and hips, should also be noticed, in respect of their particular states, and of their relations to the spine; for by their aid, relative position and direction, incipient states of curvature may be ascertained. The effects of pressure and of percussion over the spinous process of each vertebra, and over the outlets of the spinal nerves, should be carefully observed. It has been supposed that the pressure of a hot sponge directed over the vertebræ will detect subjacent lesion, and point to its exact seat when other modes of having recourse to pressure will fail. I have not observed much advantage from this mode of examination, but it need not be neglected; inasmuch as the more fussy and the more particular, and the more singular the mode and means of examination resorted to, even when the nature of the case is as clear as sunshine, the more they will attract the observers, both interested and disinterested, and accord with the prevailing ad captandum minuteness and professional manipulations of the day. If there be no occasion for a graceful display of the stethoscope—and when may not such be necessary, or made apparently requisite?—and if there be no requirement for the introduction of the speculum—and when, indeed, should the phalloid instrument be neglected, if the patient be a female?—let us by all means have recourse to some other medium of communication between the patient and doctor—some new instrument of legitimate medical charlatanism—that may strike, if not amuse or gratify, the former, and recommend the latter. How is it that, amid the remarkable number of spine doctors and writers on spinal curvatures for the benefit of a discerning public, no one has invented a pocket instrument for examining and straightening the spine? Or, has one been actually invented, but, having been always applied *à posteriori*, no one besides the inventor and manipulator has yet been able to detect the excellence or penetrate the mysteries of the invention?

16. II. THE CAUSES OF DISEASES OF THE SPINAL COLUMN, MEMBRANES, AND CORD, are generally sufficiently manifest; but they are occasionally more or less obscure, especially as regards the extent of their individual influences. As the causes of disease of the several structures



composing the spine are almost common to each variety or form of malady to which these structures are liable, although certain of the causes affect one tissue in preference to the others, I shall, therefore, devote a due consideration to all of them, with such notices of their effects as may best subserve practical purposes.

17. *A. Improper physical education and clothing* comprise a great variety of circumstances and causes productive of curvatures, and even of more acute diseases of the spinal column; and, although this class of causes operate chiefly in childhood and early life, yet their effects often continue until old age, and are rendered more severe and irremediable by the regimen and clothing adopted during puberty and adult age. In this climate more especially, the frequent and sudden vicissitudes of temperature and humidity require that the body—both trunk and extremities—should be covered in such a manner as to preserve the surface in a sufficiently warm and perspirable state, avoiding any excess or extreme of cold or warmth, and to allow a free and easy exercise of all the muscles of the extremities and trunk. Thus clothed, and avoiding all cinctures or corsets, or other baneful contrivances introduced by ignorant dogmatizers, from the period of infancy upward; exercise in the open air and in sunshine; sufficient but not immoderate or improper food, are the means which will best ward off affections of the spine, and in proportion as either of these is neglected, so will a predisposition to these affections be generated.

18. The use of stays or corsets of any kind during childhood, and exposure of the joints to cold, are among the greatest evils to which the human race is liable. The former embarrasses and limits the actions of the dorsal and lumbar muscles, and of all the muscles of the trunk, weakens and relaxes the vertebral ligaments, and while it favours unnatural curvatures, endangers more or less the important parts lodged in the vertebral canal: the latter weakens and enlarges the joints, and depresses vital power. The want of due air and proper exercise from the age of five years to twenty; the mental cramming pursued during the greater part of that time; the prolonged periods of study in a crowded and insufficiently ventilated apartment; sleeping in a self-contaminated air, and in chambers over-crowded or too small for the number of occupants; insufficient, or unwholesome, or incongruous food are very generally associated causes of the delicacy of constitution, of the weak or imperfect development of muscle, and of the relaxation of ligaments, which both predispose to, and even directly occasion, spinal curvatures and disease. The vice of self-pollution, moreover, which is apt to spring up and diffuse itself in young persons about the age of puberty, when they live in considerable numbers under one roof, remarkably aids these causes in developing their effects upon the nervous system and spinal column; but to this most important agency more particular attention will be paid in the sequel.

19. In connexion with the use of stays, the usual mode of their construction requires some notice. While they are so made as to press downward and together the lower ribs, to reduce the cavity of the chest, especially at its base, to press injuriously upon the heart, lungs, liver, stomach, and colon, and even partially to displace these vital organs, they leave the upper regions of the

chest exposed—those very regions where tubercular, consumptive, bronchial, and inflammatory diseases generally commence, or are the most prone to attack—to the vicissitudes of season, weather, temperature, humidity, and external injury. These noxious and unnecessary articles of clothing—these mischievous appliances to the female form, useful only to conceal defects and make up deficiencies in appearance, are rendered still more injurious by the number of unyielding, or only partially yielding, supports with which they are constructed on every side. There are the whalebones in the back and sides, and the steel in front, extending from nearly the top of the sternum almost to the pubes. The motions of the trunk and spine are thereby restrained, and the nutrition of the compressed parts impaired; but, irrespective of the displacement of vital and assimilative viscera that follows the amount of pressure, the metal support in front has an injurious effect, which has been universally overlooked. However well it may be protected from contact with the surface, it acts as a conductor both of animal warmth, and of the electro-motive agency passing through the frame: it carries off by its polarization, into the surrounding air, especially during humid states of the atmosphere, the electricity of the body, this agent being necessary to the due discharge of the nervous functions, either in its electro-galvanic or magneto-electric state or manifestation. The injurious influence of stays on the female economy, as respects not only the diseases of the spinal column, but also the disorders of the uterine organs, is manifest to all who consider the subject, and has been ably discussed in a work by Mr. WHITFIELD of Ashford, to which I refer the reader.

20. *B. Constitutional vice and diathesis* especially favour the occurrence of, and even directly occasion, diseases of the spinal column. Of these the most influential are the scrofulous, the rheumatic, and the cancerous. Scrofula, either latent or developed—whether concealed or tuberculous—often produces disease of the bodies of the vertebrae, either in the form of scrofulous inflammation of them, or by infiltrating their cancellated structure with tubercular matter. The causes of scrofula, fully discussed in another place (see art. SCROFULA, § 13, *et seq.*), have in many instances the effect of developing disease of the spine without having previously changed the diathesis or habit of body, at least in an obvious manner. In such cases they are often only predisponents to such disease, some other agencies exciting it. While scrofula chiefly causes disease of the vertebrae, the rheumatic diathesis, or pre-existing rheumatism, favours the occurrence of rheumatic inflammation of the ligaments of the spine, or rather of the sheath and membranes of the cord. Inflammation of these tissues may appear either as a metastasis of the rheumatic attack, or primarily upon exposure to cold or wet, or to currents of cold air in this quarter. The gouty diathesis is not so frequently a cause of spinal affections as rheumatism; but congestion of the venous sinuses of the spinal canal, causing pain in the back and loins, and feebleness of the lower extremities, is a frequent complaint in gouty persons. The cancerous diathesis has probably little influence in the production of spinal complaints, although the several varieties of cancerous disease have been occasionally found to implicate one or more of the spinal structures. Children, whose par-

ents are aged or debilitated, and whose conformation is originally weak; the progeny also of the dissipated, the drunken, or the exhausted by syphilis, mercurial courses, or cachectic affections; a rapid or premature growth, and children brought up by hand, or living in large towns without the advantage of occasional change of air; are much more liable to spinal affections than others differently circumstanced, as they advance in growth or age.

21. *C. Certain previous maladies*, especially those above mentioned, exanthematous and malignant fevers, more particularly scarlet fever, the syphilitic cachexy, tuberculous disease, sexual and urinary affections, particularly in the female, aneurisms of the aorta, and internal tumours and abscesses, either favour the development, or excite disease of the spine or of its contents. Aneurisms of the aorta, and internal tumours and abscesses in some instances, by their size and pressure, occasion erosion or ulceration of the bodies of the vertebræ. Flexures of the spine and disease of the vertebræ frequently follow the more severe attacks of the exanthemata; and tuberculous disease with caries of the vertebræ, sometimes followed by abscess, is frequent not only in the scrofulous diathesis, but after tuberculous affections have been developed in the lungs, mesenteric glands, or in other parts.

22. Uterine irritation and excitement, and the several forms of hysteria, and their numerous manifestations and alliances, are often followed by congestion of the venous sinuses of the vertebral canal; by what has usually been called spinal irritation, or inflammatory congestion or irritation of the cord and its membranes; and by flexures of the spine or structural change of the contents of the column. Frequent sexual excitement and consequent exhaustion, alternating with unnatural rapidity, are the most frequent causes not only of these uterine and hysterical disorders, but also of the allied affections of the spine and its contents; and, although the one class of disorders is generally consecutive of the other, the spinal diseases with their several sympathies more commonly following the sexual, the former may be primarily manifested, especially in the male sex; masturbation about the period of puberty, and premature or excessive sexual indulgences, being the most common causes of chronic disease, the most injurious of vices, mentally and physically, and, while they most powerfully predispose to, they directly occasion, especially in weak constitutions, and when aided by other causes, one or other of the more serious maladies of the spine and its contents. (*See art. POLLUTION.*)

23. *D. The influence of physical agents*, especially of cold, currents of cold air, unusual increase of temperature, more particularly if these be applied to the back; sleeping in damp beds, or upon the ground, or in the open air, with exposure of the back; sitting in wet or damp clothes; exposure of the back or loins to much heat, especially during dinner; sudden suppression of the perspiration by exposure to cold or to cold air, as when a person is called out of a warm bed. A medical man was called out of bed when perspiring freely, and got into an open carriage insufficiently protected, during a cold night. He was soon afterward seized with inflammation of the membranes of the spinal cord. I attended him with other physicians. A corpulent female of middle age slept with her back to a window which

had been left partially open. She complained of chills, pains, and rigours during two or three following days, subsequently of acute pain in the loins, pain, numbness, and cramps in the lower extremities, and other symptoms of inflammation of the spinal membranes. She afterward became paraplegic. A gentleman from Jamaica, after a hot day, fell asleep at night on the deck of the ship in which he was making his passage to Europe. He awakened cold, shivering, and benumbed, and was soon afterward generally paralyzed. A gentleman dined at a party where he was a stranger, and did not complain of the heat of the fire at his back. The following day and the next he had frequent vomitings, violent pain in the back and loins, numbness, pain, and cramps in the legs, obstinate constipation and retention of urine, followed by paraplegia. I could adduce numerous instances similar to the above which have occurred to me during a practice of upward of thirty years. The causes which I have mentioned under this head, as well as those which follow the next to them, generally affect primarily or chiefly the membranes of the spinal cord, the affection of these and its consequences generally implicating more or less the cord itself, and the origins or roots of the spinal nerves.

24. *E. The metastasis and suppression of external disease or accustomed discharges* have been partially noticed above. During an early period of my practice, I observed several cases of this occurrence, chiefly at the institutions to which I was physician. In one case of metastasis of rheumatism to the spinal membranes, which I treated in 1820, general palsy supervened, and I had an opportunity of minutely examining the spine and its contents after death (*see Lond. Med. Repos.*, vol. xv.). Since that period similar cases have come under my observation, which have terminated either in paraplegia, or in general palsy and death. Suppression of the catamenia, the stoppage of profuse leucorrhœa and of hæmorrhoids, the drying up of accustomed discharges, the healing of chronic ulcers and cutaneous eruptions, have severally been followed by disease of the spinal contents. In many of such cases the blood has been more or less impure—has been insufficiently depurated by the several excretories; and when the manifestations of this morbid condition have been suppressed in quarters which served as safety-valves from more dangerous consequences, they have broken out in other surfaces and parts, and been followed by much more serious results; and although the spinal membranes and cord may not be frequently thus consecutively assailed, yet they are occasionally, when the suppression of the primary disease has taken place before the blood has undergone depuration by an increased action of the excreting organs. We frequently observe surgeons endeavouring to cure eruptions, ulcers, chronic discharges, &c., by lotions, ointments, cerates, and other appliances, either unsuccessfully or with the contingent result of consecutive internal disease when they succeed; whereas, a decided action on the several excreting organs, by appropriate means, by removing effete or injurious elements and materials from the blood—by counteracting or eliminating those irritating and self-contaminating matters perpetuating or causing the primary disease—would most speedily and effectually remove it, and prevent any subsequent risk from metastasis or other morbid manifestation.



25. *F. External injuries* are among the most common causes of disease of the spine, or of its contents. These injuries may be so slight as to be overlooked or forgotten, their effects being developed slowly and insidiously until they arrive at a pitch which alarms either the patient or his medical attendant. The more severe injuries by which a vertebra is broken, or its intervertebral cartilages torn, or ligaments or muscles ruptured, and the cord or its membranes either more or less injured at the same time, or consecutively affected by inflammation, effusion, &c., readily account for the great extent and danger of the effects produced. But there are slighter injuries, which sometimes slowly, and after a protracted period, occasion no less serious results. A slight fall on the back, as on descending a stair, or a fall backward, when the back, or even the os coccygis, strikes against a hard or sharp substance, is sometimes followed, if due care be not taken, by serious effects—by inflammation of the membranes of the cord, or even of the cord itself, and, if not rationally treated, and even when so treated in faulty constitutions, and if a proper regimen be not adopted, by paraplegia, often passing on to general paralysis, and ultimately terminating in coma and death.

26. Concussions of the spine occasioned by falls, or by leaping from great heights or other modes, are frequently followed by effects usually produced by the most severe injuries of the column, even although no fracture, rupture, or dislocation can be traced. The vertebræ and intervertebral cartilages may nevertheless have sustained some injury, and the minute organization of the cord and the origins of the nerves may have been ruptured or injured so as to escape detection after death upon a superficial inspection. In these cases, the severity of the effects will lead to a due appreciation of the importance of the cause. But a slight effect should not be unheeded; and even the most trivial symptom, apparently to the uninstructed or inexperienced, ought to attract to itself marked attention and care. Several instances have come under my care where the most dangerous and even hopeless consequences have followed the slightest falls and concussion, the more immediate effects having failed to attract the attention or care of the sufferer.

27. Among the less marked causes of disease of the spine or of its contents, although occasionally productive of the most important results, are muscular efforts in lifting heavy bodies, or similar efforts made suddenly or irregularly, and when volition is not duly exerted, or is directed also in a different direction. Rapid movements, torsions or bendings of the spine; undue pressure made upon one side of the vertebral bodies, by unnatural positions retained for a long time; frequent rotations of the column, and reaching to objects too high or too low, are occasionally productive of injurious effects. The most fatal injury may even follow a common or slight effort. A strong muscular man broke the second vertebra of the neck completely across on both sides when pressing his head on the pillow as a fulcrum to enable him to turn in bed, and the nature and extent of the injury were ascertained after death by Professor GRAIN and myself.

28. Curvatures of the spine often result from assuming the same position on frequent occasions—by sleeping on a high pillow on the same side,

by improper postures in writing, playing on the harp or guitar, by drawing, by carrying a weight or burden on the same arm, as in nursing, and by always using one hand more than the other. Riding on horseback produces most injurious physical and moral effects on females: it gives the spine a certain degree of twist; and the concussions imparted to the nates, pelvis, and trunk occasions a degree of excitement followed by exhaustion, which, if not amounting, often leads on to self-pollution. To these apparently slight causes, especially to their continuance, the lateral curvatures of the spine, so very frequent in females, are in great measure to be attributed.

\* 29. III. CURVATURES OF THE SPINAL COLUMN—FLEXURES OF THE SPINE—LATERAL CURVATURES OF THE SPINE—*Lateral Deflections of the Vertebral Column—Unnatural Deviations of the Spine—Distortions of the Spine—Functional Curvatures of the Spine.*

30. CLASSIF.—I. CLASS, IV. ORDER (*Author in Preface*).

31. DEFINIT.—*Unnatural curvatures of the vertebral column, occurring from other causes than from structural changes of the bodies of the vertebra.*

32. Curvatures of the spine, produced otherwise than by caries or ankylosis of the vertebra, may be divided into three varieties or forms, namely, *posterior curvature*, or excurvation, the convexity being directed backward or outward; *anterior curvature*, or incurvation, the convexity being inward or anteriorly; and *lateral curvature*, the convexity being to either side, generally the right, and, when considerable, being either double or complicated. The angular projections occasioned by caries or ankylosis of the bodies of the vertebræ are altogether different in their natures from these curvatures, and fall under a different category of lesions.

33. i. POSTERIOR CURVATURE OF THE SPINE—*Excurvation—Cyphosis*—affects chiefly the dorsal and cervical portions of the spine, and only occasionally extends to the upper lumbar vertebra. It is often caused in infancy by the common practice of raising the child by the open hands placed under the armpits, whereby the ribs are pressed inward, and the spine and sternum are pushed outward, as described when treating of *deformities of the chest* (see art. CHEST, § 2, *et seq.*), where the causes producing it are fully stated. Slighter forms of this curvature occur in young persons and in adults, owing to shortness of sight and the habit of stooping, and holding the head near objects when reading, writing, or working; and in aged persons from diminished thickness and elasticity of the intervertebral cartilages, and in these the curvature extends lower in the spine. When the curvature is considerable, the anterior portion of the ring or body of each vertebra is rendered somewhat thinner or more flattened, especially in the centre of the curvature, and, as a necessary consequence, the transverse processes, and still more so the spinous processes, are more separated. The ligaments are also affected, the posterior being more or less stretched. When the ribs are laterally compressed, so as to diminish the diameter of the chest from right to left, the sternum is pushed outward, assuming a similar position to the dorsal spine. In other cases, the sternum follows the direction of the dorsal vertebra, the ribs being curved outward, and the diameter of

the thorax being lessened between the spine and sternum. If the excurvation implicate the lumbar vertebræ, the angle formed by this part of the spine with the direction of the sacrum or pelvis is lost, and the brim of the pelvis becomes horizontal, the spine and the direction of the pelvis being in nearly the same axis. In excurvations of the spine, the capacity of the thoracic and abdominal cavities, and the position of the viscera, are more or less affected, the former being diminished, the latter being somewhat changed or embarrassed.

34. ii. *ANTERIOR CURVATURE—Incurvation of the spine—Lordosis.*—This form of spinal curvature is most rare. It is most frequently met with in a slight form in the lumbar vertebræ, and is then merely an exaggerated state of the curvature natural to this part of the spine, and is seen not infrequently in persons who, in early life, have brought their lumbar muscles into very active use. In other circumstances, however, it is occasionally observed giving the abdomen unusual prominence, and, when seated near the pelvis in females, presenting the appearance of pregnancy or of ovarian disease. When this curvature affects the dorsal vertebræ, it occasions marked deformity of the chest: the posterior angles of the ribs pass outward and backward from the spine, and the antero-posterior diameter of the thorax is diminished, unless, indeed, the sternum be also pushed forward, which is rarely the case. When the anterior curvature is seated so low down in the lumbar region as to form an angle with the sacrum, the effect in females during parturition may be serious, as it is frequently connected with a diminished antero-posterior diameter of the brim of the pelvis.

35. This form of curvature may arise from an increased force, or more frequent and developed action, of the dorsal or lumbar extensor muscles, relatively to the vital tone or cohesion of the anterior ligaments of the spine, and to the action of the recti abdominal muscles; and it may be associated with some constitutional taint or disease, as with scrofula, rickets, syphilis, or some cachectic condition, &c. When it is connected with rickets, it is most apt to occur during convalescence from this malady.

36. iii. *LATERAL CURVATURE.—Lateral deflections of the spine—Scoliosis.*—This is by far the most common form of spinal curvature, and generally appears between the ages of 10 and 18, although it may commence either earlier or later. It is most common in the upper and middle classes, and comparatively rare in the lower or harder working orders. Owing to the position of the viscera—to the heart on the left, and the liver on the right, it has been supposed that there is always a tendency to a double lateral curvature of the spine, especially in lymphatic, weakly-constituted, and cachectic persons. There can be no doubt that, whatever influence may be produced by this circumstance, it is really so small as not to deserve consideration. The upper lateral curvature has generally its convexity to the left, is small, and comprises the lower cervical vertebræ, with two or three dorsal vertebræ. The second or middle curvature is the most remarkable, has generally its convexity to the right, and is formed by the dorsal vertebræ. The third or lower curvature has its convexity to the left, and comprises the lumbar, and lowest dorsal vertebræ. The first or upper curvature may be

very slight, or altogether wanting, although the second or dorsal is considerable; but in this case this latter extends higher, and the third or lumbar is also considerable. Either the dorsal or lumbar may be the most marked, more frequently the former, which, in some instances, may appear the chief or only one.

37. Lateral curvatures may be very slight, or they may be very great: they are seldom completely lateral, but are commonly conjoined with more or less posterior curvature. It is manifest that, when the deflections of the column are very considerable, the natural rotation of each vertebra on the other must be diminished or limited in the curvatures, and that it must take place chiefly between them, or between those vertebræ which remain the nearest to the natural axis of the trunk. The sides of the bodies of the vertebræ must also experience greater pressure towards the centres of the concavities and diminished pressure at their convexities: hence will result compression of the more yielding tissues and impaired rotation at the more flexed situations. The intervertebral tissues are first compressed in the sides, which are concave, and afterward thinned. The bodies of the vertebræ are also more or less affected, and atrophied in these sides, and assume somewhat of a rhomboidal form. The articulating processes are much altered in the situations where the curvatures are greatest: they are atrophied, nearly obliterated, and absorbed in the concavities, and rendered more prominent, the spinous processes being also more protruded in the convexities.

38. When lateral curvatures are very great, the effects become still more serious. The passages between the vertebræ for the nerves and blood-vessels are straitened and almost obliterated in the concave side, and enlarged and elongated in the convex. The consequences of the constriction of these outlets must be evident in respect of both nerves and blood-vessels. They were pointed out by MORGAGNI and PORTAL, and more recently insisted upon by CHAILLY and DUGES. The pressure, also, on the sides of the vertebræ sometimes causes partial absorption or caries of the part which suffers the most from it; and in these situations, or where the concavity is greatest, ossific deposits are there formed, producing partial or lateral ankylosis, sometimes extending to the lateral, transverse, or oblique processes of articulation, and furnishing support to the most affected and weakened part of the spine. In these situations the ossific formation results from a state of chronic inflammation which is productive of this work of reparation.

39. The consequences of extreme or even of considerable lateral curvatures are often very serious. The patient is liable to severe pains, cramps, numbness, and impaired action of the muscles supplied by nerves issuing from the concave side of the spine, when the passages for the nerves and blood-vessels are narrowed. Emaciation frequently follows; and owing to the falling inward and approximation of the ribs on the concave side of the curvature, and to the bulging outward of those on the convex side, the cavities of the chest and abdomen are rendered more or less irregular or unsymmetrical, and are also much encroached on; the viscera, especially the lungs and heart, and even the liver, kidneys, and alimentary canal, are embarrassed or impeded in their functions; difficulty of breathing, amount-



ing sometimes to orthopnoea, and palpitation, or slowness, or irregularity of the pulse often occurring, with a feeling of incapability of raising the ribs, or of taking a full inspiration, especially on the concave side. Frequently the viscera accommodate themselves to their unnatural position, when the curvatures increase gradually, and comparatively little inconvenience is experienced unless upon increased exertion; but when these viscera, particularly the heart or lungs, are attacked by disease, to the causes of which their physical and vital conditions render them most susceptible, then the consequences are much more serious than when these organs are attacked in different circumstances.

40. It is very rare for the spinal cord or its membranes to experience much disorder during lateral curvature, unless the bodies of the vertebræ at the place of greatest concavity become inflamed or carious; but when either of these results ensues, chronic inflammations, effusions, and organic changes occasionally supervene, in the parts contained by the diseased vertebræ, and the usual effects, namely, severe pain, spasms, and contractions of the muscles of the trunk and extremities, and loss of motion, with or without loss of sensation, generally take place. The disease of these structures sometimes extends until the greater part of the spinal contents is invaded, and even until inflammatory action reaches the membranes of the brain, and occasions effusion within the cranium, coma, and death.

41. When the deviation is great, deformity is manifest as regards the position of the shoulder-blades, the collar-bones, and the pelvis. The muscles are also affected, those which are the least used becoming pale and atrophied; and the ribs are also more or less distorted, those on the concave side not merely being closely approximated, but, in old and extreme cases, becoming partially ankylosed. The chief curvature implicating the dorsal spine commonly presents its convexity to the right, pushing outward the shoulder-blade, and causing the left shoulder-blade to fall inward. When the chief curvature is in the lumbar region, it is generally directed to the left, and more or less posteriorly, the bodies of the vertebræ being considerably changed (§ 37), and sometimes becoming even disorganized.

42. *The progress of spinal curvature is extremely variable.* They sometimes proceed slowly and insensibly; occasionally rapidly. They have been said sometimes to occur suddenly and unexpectedly after a first confinement, and increase remarkably. It may be suspected that in such cases the curvature had existed previously, but had been concealed by the dress, the puerperal states and lactation merely augmenting the deformity. Curvatures may proceed to a certain extent, and become stationary ever afterward; or they may, upon the removal of the causes, and by proper means, be in great measure remedied. When neglected, they may be increased so as to bend the patient forward, or to either side, in a most surprising manner, the armpit almost reaching the hip-joint.

43. iv. *THE PROGNOSIS OF CURVATURES* depends chiefly upon their extent, and upon the effect produced upon the spinal contents, upon the spinal nerves, and upon the viscera of the chest and abdomen. The curvature may be very great, and yet, as long as neither spasms, nor paralysis,

nor marked embarrassment of the functions of vital or internal organs, nor other serious disorders supervene, reasonable hopes may be entertained of an advanced age being reached. The appearance of such disorder, as a manifest consequence of curvature, should suggest an unfavourable prognosis, the danger having stricter reference to the nature and extent of the consecutive disturbance than to the amount of curvature. The removal of old curvatures is seldom attained with complete success; and, unless with the view of alleviating serious disorder occasioned by them, should not be rashly attempted; for adhesions, adaptations of parts, ossific formations even, and other alterations, may have taken place, that may not be disturbed without occasioning more serious disturbance.

44. v. *THE CAUSES* which more especially occasion curvatures of the spine are the female sex, the age between 9 and 18; a lymphatic, scrofulous, or rickety constitution; an originally weak conformation of frame; an exhausted, feeble, or cachectic habit of body; insufficient food, living in low, humid, and close situations, and all the causes productive of scrofula; convalescence from acute and chronic maladies; want of pure air, light, and sunshine; a premature and rapid growth; defective or improper exercise; crowded and close apartments during night and day; the continuance of mal-positions; the too exclusive use of the right hand and arm; the use of stays, and metal or other supports, and self-pollution. MAYOW attributed curvatures to a want of harmony between the development of the vertebral column and that of the muscles; and MORGAGNI, MÉRY, and more recently GUÉRIN, believed that they are often caused by contraction of the muscles consequent upon disease of the nervous centres. MAYOW's hypothesis is incapable of support; the opinion of MORGAGNI is more deserving of attention, and may be admitted to be just in some instances.\*

45. vi. *THE TREATMENT OF SPINAL CURVATURES*, as promulgated to the public in recent times, would, in the hands of a *MOLIÈRE*, furnish a most bitter satire on medical practice—so many writers, and so much said, and yet so little information furnished—each successive author depreciating the means advised by his predecessors, and yet adding nothing to what was already known—every new spine doctor having his own

[\* The whole system of boarding-school education in this country is well calculated to predispose to and excite diseases of the spinal column. A large majority of girls who have attended one of these establishments for a few months labour under a greater or less degree of lateral distortion of the spine, a deformity rarely to be met with in boys or girls, unless the victims of fashionable boarding-school education. The efficient causes are: insufficient out-door exercise, too scanty diet, and bad postures of the body and limbs. The vertebral and intervertebral substance on their anterior part are generally compressed by the habit of bending the neck while writing or drawing, thus causing a permanent change in the form of this part of the spinal column. The elevation and action of the right arm in drawing and writing, with sedentary habits, &c., induces lateral curvature of the spine to the right. The convexity of the spine thus produced keeps the right shoulder elevated, and the left depressed. The lower part of the column is thrown to the left side, and this displacement being favoured by the disposition to rest on the left foot while standing to speak or read, there comes to be a permanent projection of the left hip. The frequent use of the harp, from the constant extension of the right arm, is known to produce the same distortions. The whole system of fashionable education is an outrage upon nature, and a most prolific source of unnumbered evils to the race. If it cannot be reformed, it should be abandoned.]

apparatus, instrument, or couch to recommend and to sell, either or both being said to be capable of curing cases which were heretofore incurable—the parading of casts of deformed trunks, rendered as symmetrical as the statues of antiquity by the newly-discovered or peculiar method of treatment—the publication of books containing merely exaggerated accounts of successful cases, without even, as in some of these publications, any notice of the methods employed—the promulgation of opinions opposed to anatomical and physical truths to subserve delusion—and large promises, but scanty performances, were among some of the means adopted by the majority of those who had chosen this *speciality*, as the best calculated to fulfil the objects of their professional mission. But it may be as well to take a brief view of the methods lately promulgated, and of the progress made (!) in this department of medical practice.

46. Mr. BAYNTON, in 1813, advocated rest for a long time in the horizontal position, on a specially-constructed couch, but furnished no particulars of treatment.—Mr. SHELDRAKE, in 1816, recommended an instrument of his own to support the weight of the head, and extension on an inclined plane, &c.—Mr. WILSON, in 1820, advocated chiefly muscular exercise directed especially to the dorsal muscles, the horizontal position occasionally; and he justly condemned all instruments which are made to act from the pelvis upward, and which were then much in vogue among distortion-curers.—Dr. JARROLD, in 1823, considered curvatures to depend upon constitutional causes, treated them accordingly, and prescribed chiefly muscular exercises, burnt sponge, and carbonate of soda internally.—Mr. BAMPFIELD, in 1824, advised muscular exercises, extension of the spine by pulling the legs and arms, frictions and shampoos, and the use of instruments to exercise particular parts.—Dr. DOPS, in 1824, objected to the inclined plane, to any spinal apparatus, and to the practice of carrying weights upon the head, as directed by some of his predecessors. He employed a concave couch to bend the whole spine forward, and to relax the spinal muscles. The success of this plan must have been astounding!—Mr. JOHN SHAW, in 1827, resorted to muscular exercises, to supports for the spine, and to extension on a couch of his own contrivance.—Dr. HARRISON, after publishing numerous cases of vaunted success, and withholding any account of the means employed, produced, in 1827, a large book, which contained nothing but unsound views, exaggerated accounts, and a mystification as to his method of treatment. This, however, was nothing more than the horizontal position on a fixed mattress, friction, &c. This last he directed, by means of assistants, in such a manner as to lead his victims to persevere, and to inspire them with hopes which were rarely realized.—Mr. STAFFORD, in 1832, advised spinal supports, the horizontal position, conjoined with exercises.—Mr. BEALE, in 1833, recommended frictions, muscular exercises, mechanical extension, and instruments in certain cases.—Mr. COULSON, in 1839, prescribed suitable exercises, and condemned, with great justice, all kinds of collars, machines, or instruments.—Mr. WARD, in 1840, resorted to the recumbent position, to exercise of the muscles of the spine and head, and objected to mechanical supports.—Mr. TUSON, in 1841, advoca-

ted principally the recumbent position on a couch of his own contrivance, that admitted of muscular exercises while recumbent.—Mr. C. R. HARRISON, in 1842, published his work to say that he cured deformities of the spine and chest by exercise alone, and without extension, without pressure—the means empirically employed by his late namesake—and without division of muscles—the division of muscles having been then brought into vogue from Germany, the fruitful parent of humbug, for curvatures, for squinting, and for every thing to which credulous fools would submit.—Mr. HARE, in 1844, wrote to recommend his couch, which acted on the spine by extension produced by pulleys and weights.—Mr. COLES, in 1845, praised the prone position, for which he constructed a couch, on which the patient reposed upon his chest and abdomen, with exercise of the muscles of the spine and upper extremities.—Mr. TAMPLIN, in 1846, confided altogether in mechanical support by means of a steel instrument, which he contrived for this purpose, based, like many of those employed by the instrument-makers who had gone before him, to rest upon the pelvis. He condemned the horizontal position and all kinds of couches.—Mr. LONSDALE, who has furnished me, in his work, with a portion of the above information, in 1847, improved greatly on Mr. TAMPLIN's instrument, adding its best and most original part, and recommended a couch which appears to be the best of all hitherto employed.\*

47. From this exordium the reader will perceive the amount of information to be obtained from books, each one of which is written to recommend the practice adopted by its author to the notice of a “discerning public.” Physicians are nowadays allowed to have nothing to say to, far less to do with, this very notable “speciality,” or indeed with any complaint respecting which speciality doctors have enlisted the “sweet voices” of the public. But physicians will nevertheless look on, and even observe closely the results, note the errors committed, mark the subterfuges resorted to, notice the delusions practised, and remark also the credulity, occasionally interrupted by passing visions of the truth, displayed by the victims during the protracted treatment of a spine doctor. The study all the while is not without interest to the philosopher; the arts and cunning displayed to conceal expected want of success, and to ensure the faith and perseverance of the patient; the resignation of the latter, and the confident dogmatizing of the former; the entire surrender of judgment, liberty, and opinion on the part of the devoted sufferer; the “hoping against hope,” and the influence gained over weak minds by the assumed confidence, the decided manner, and the repeated promises of the reputed deliverer, furnish food for contemplation, and instructive illustrations of the constitution of the human mind. In this way, months, and

[\* No country has been more fruitful in spine doctors and quacks than the United States. Every mode of treatment mentioned by our author as having been tried in Great Britain has had its advocates here, and not a few have accumulated fortunes by their base impositions and false pretensions. Numerous institutions have been established for the treatment of spinal deformities, where as many instruments of torture have been resorted to as were ever known to the Inquisition. There is no end to the metal splints, shoulder-braces, jackets, bandages, supporters, laces, corsets, stays, &c., which have been palmed upon the public by greedy and dishonest adventurers, who have reaped a rich harvest from the ignorance and gullibility of their victims.]



even years, are passed; the submission and credulity of the one keeping due pace with the domination and perseverance of the other—the hopes entertained by the patient, that future success may ultimately compensate for the losses, and sufferings, and endurance of the past, protracting still farther the period of empirical domination, until at last emancipation arrives, and the patient awakes to her condition, and arises with emaciated muscles, impaired strength, and with loss of the use of her limbs. Nevertheless, she may not confess her delusion. The power which had so long fettered her mind and body retains still a portion of its sway; and while she feels the bitterness of her delusion, she has no desire to admit her folly, or to confess the full amount of its consequences. She consoles herself with the idea, assiduously inculcated by the persevering attendant, that, without the means of which she has been the victim, the deformity might have been much worse, and with thankfulness for this assurance, she submits to her fate, until another “unfailing method of treatment” excites her attention, when the desire of recovering her shape, or of preventing extreme deformity, again induces her to enter upon another protracted period of penance, the means being different, but the results the same as heretofore.

48. Now, after the numerous repetitions of the means enumerated above—after the endless variations, modifications, combinations, denunciations, &c., which the very imperfect list just furnished presents—what can I have to recommend, who have seldom had to deal with such cases, unless in rare instances when I have considered it right to interfere to prevent the dangerous consequences which would ensue, or were actually ensuing from a vicious system? What I, therefore, advise may be briefly enumerated in the following categories:

49. *A.* To ascertain the several, and especially the chief causes of the curvature, extrinsic or physical, intrinsic or constitutional, mental or moral; to endeavour to estimate correctly their individual influences; and to direct a decisive and scrutinizing inspection on their energetically inculcated removal and avoidance. If only one of the causes of mischief continue in operation, the best devised treatment may be inefficacious.

50. *B.* To determine accurately the extent and nature of the curvature, the amount of deformity, and the degree in which it has involved the natural positions of the pelvis, shoulders, the clavicles, sternum, and ribs; to ascertain in how far the shape and capacity of the thorax and abdomen are affected; to note the states of the digestive, assimilating, and excreting functions; to examine the condition of the muscular and fibrous structures, as manifested by the muscles of the trunk and extremities, and especially by those of the spine and by the joints; to detect whatever disorder of the thoracic or abdominal organs the curvature may be associated with; to determine the state of the circulation and of the blood as respects the presence of chlorosis, anæmia, or plethora, and to ascertain the conditions of the uterine or sexual organs; and, having acquired all the information that can be obtained respecting these, and having reviewed this information in connexion with what is known as to the causes, to consider well the indications and means of cure which the whole inquiry may suggest.

51. *C.* Having commenced thus carefully to put these intentions and means into practice, decidedly but cautiously, and in suitable combinations when such are clearly indicated:—(a) To pay strict attention to the restoration of the general health; to attend to the digestive and depurating functions, to the advantages of pure air, ventilation, sunshine, and suitable exercise, both before and during the employment of other means directed more especially to the removal of the curvature; and at the same time to have recourse to such tonics and restoratives as will promote assimilation.—(b) To have recourse to instruments only when these are imperatively required, and to select such as will admit of the movements of the spinal muscles, and press upon the convexity of the curve.—(c) If couches alone, or in addition to instruments, in the intervals between having recourse to them, or after due exercise, be absolutely required, to select those which furnish pressure chiefly on the convexity of curvature, and liberate the spine from the pressure and warmth of a supine position, and facilitate a recourse to frictions and other means of restoring the tone of the spinal muscles and ligaments. To each of these I would direct a more particular notice.

52. *D.* The restoration of the general health previously to, and during a recourse to the more empirical and mechanical means adopted by those who take this particular class of affections under their generous protection, is too generally neglected. Many of the causes most influential in producing curvature act chiefly by impairing the constitutional powers and the general health, by enfeebling the digestive and assimilating functions, by impeding the excreting actions, by relaxing the tone of the nervous and fibrous structures; and hence the importance of the entire removal of these causes, and of the restoration of these functions to health. Of all the causes of curvature, the most frequent, the presence of which it is the most difficult to ascertain, and the most seldom relinquished when so long practised as to produce this effect, is *self-pollution*. Its effects in exhausting organic nervous power, in emaciating the muscles, and in relaxing the ligaments, are much more remarkable than those of any other cause. Attention, therefore, should always be especially directed to its detection and entire relinquishment.

53. Restoration of the vital functions in spinal disorders should be directed not merely to the functions of digestion and excretion, but also to the conditions of the vascular system and of the uterine and urinary functions. If vascular plethora be not present—a condition which is seldom associated with curvatures—the preparations of iron are generally of service, especially if anæmia or chlorosis also exist. If neither of these be present, bitter infusions or decoctions may be first given, and afterward the tincture of sesquichloride of iron, with or without a little hydrochloric acid, and the infusion or tincture of calumba, may be prescribed accordingly; but, in cases associated with anæmia or chlorosis, the preparations of iron should be adopted forthwith, especially if the urine be alkaline or contain much of the phosphates; and, in these circumstances, the preparation just named and the hydrochloric acid should be employed, and they may likewise be prescribed if the uterine discharge be great, or leucorrhæa be present. In other conditions, or

when the catameuial evacuation is insufficient or obstructed, the sulphate of iron, with the aloes and myrrh pill, or the compound mixture of iron, with a sufficient quantity of the compound decoction of aloes to preserve the bowels freely open, will generally prove most beneficial.

54. *E.* Without due ventilation, light, sunshine, and exercise in the open air, short of occasioning fatigue, health will neither be restored nor preserved. Large airy sleeping apartments, the light of heaven, and exercises of the muscles of the back and extremities, are the most conducive to the prevention of curvatures, and to the restoration of the health of crooked persons. These persons should never ride on horseback, nor even in a carriage, when either can be avoided. Walking is the best exercise, and next to that such exercises as will moderately engage the muscles of the arms, shoulders, and back. Various modes of exercising these muscles have been recently recommended; but, whatever plan be followed, the muscles of both sides ought to be equally exercised. Certain exercises tend more to prevent curvature than to remove it; as the skipping-rope, shuttle-cock and battle-door, the use of dumb-bells, and exercises with the rod. The Indian-sceptre exercises described by Mr. WALKER, in his work on "*Exercises for Ladies*," are the best adapted to the prevention of curvatures and to the removal of those which are slight. When the curvature is more manifest, or even very great, pulleys should be fixed, at a considerable height above the patient's head, with weights attached to them, great in proportion to her age and strength, and in a situation which will admit of their being pulled in either a forward or backward direction. A stand, also, with a cross-bar, or with more bars than one, considerably above the head of the patient, [or ladder,] may be erected in a suitable open or airy situation; and, by taking a firm hold with both hands, attempts should be made, gently and cautiously at first, to raise the body by the muscles of the arms and shoulders. When the muscular debility is great, it is generally of great service to have recourse to [electricity, or] frictions over the muscles of the spine and back with a warm stimulating liniment or embrocation, for some time previously to adopting these exercises. In 1822, the daughter of a friend had for a very long period been cased in metal instruments, and had suffered in health and strength, without any benefit as to the curvatures. I requested the instruments to be thrown aside, directed frictions to the spine and back, at night and in the morning, with the following liniment, and afterward a gradual and careful recourse to the exercises just described. The cure was rapid, complete, and permanent.

No. 355. R Balsami Peruviani, et Bals. Tolutani, āā, ʒj.; Olei Terebinthinæ, ʒj.; Linimenti Saponis, ʒjss.; Olei Cajuputi, ʒjss.; Olei Olivæ, ʒjss. vel. q. s. ut fiat Linimentum, more dicto utendum.

[We have seen very decided effects produced by stimulating the withered muscles by the common electro-magnetic machine, applied for several minutes daily, accompanied by friction with stimulating lotions. Cures may be accomplished in many cases by these local means, in connexion with obedience to hygienic laws.]

55. In many cases, sponging the back with a strong solution of bay-salt, of a tepid warmth at first, and gradually reducing the temperature subsequently, will be of service, and may be employ-

ed once or twice daily. The exercises should be carefully directed, used for short periods only, especially at first, and never so long as to cause fatigue. In the intervals between exercise, the patient should assume the recumbent position—either supine or prone, or upon either side—on a firm horse-hair couch, either horizontal or very slightly inclined, and with a low pillow. If the patient recline on the side, especially on the right side, or on that which presents the greatest convexity, she ought to place a horse-hair pillow under that part, so as to thrust the convexity towards the true axis of the spine, and retain it in that position as long as she can. Sleeping with too high a pillow, and generally on the same side—most frequently the right—often of itself produces slight curvature. In these cases a different position should be chosen, the pillow ought to be placed under the side just beneath the armpit, when that side is reposed upon, and the patient should be induced to employ the arm and hand of the side on which the dorsal concavity exists.\*

56. *F.* The use of instruments has been very generally advised by both qualified and unqualified persons. They are required only in the more extreme cases of curvature, and at intervals, or only when it is necessary that the spine should be supported or aided in carrying the weight of the head and shoulders. Mr. LONSDALE's spinal support is the best hitherto constructed, inasmuch as it both supports the weight of the upper parts and presses the convexity of the curvature inward, or towards the true axis of the spine. The chief objection to this and all other instruments is the material of which they are constructed; for a broad hoop of iron or steel encircling the pelvis as a basis for support and pressure, and the other metal parts forming the supports, springs, screws, &c., however well they may be padded, not only hamper or restrain the movements as long as they are applied, but also, and most injuriously, act as conductors of the electricity circulating through and on the surface of the body, conveying it into the atmosphere, especially during warm or humid states. The other instruments which I have seen, besides those just mentioned, are altogether undeserving any notice.†

\* [We have derived the greatest benefit in these cases from the regular use of the shower-bath, with or without salt, and its temperature regulated according to the state of vital energy present. If quite cold (60° to 70°), it should be preceded and followed by friction.]

† [An institution was opened a few years since, in the neighbourhood of Boston, for the treatment of cases of diseased spine and spinal curvatures, in which the chief reliance was placed upon metal rachets and corsets to effect a cure. The proprietor was very successful in securing patients, but quite otherwise in restoring their various deformities. Many hundred young persons, from all parts of the country, were at various times inmates of his establishment, which, by a species of puffing and fashionable delusion, became for a season extremely popular, and of high reputation. The treatment, which was identically the same as has been tried again and again in Great Britain and on the Continent, and found unsuccessful, and consequently exploded, was entirely mechanical, and the means employed to restore the symmetry of form were in the highest degree painful and unphilosophical. The secret of the temporary success of such modes of treatment may, perhaps, be found in the fact that, while patients are under treatment, by compression and extension, &c., they may grow in height, and improve consequently in figure; their hopes and expectations are consequently raised, their friends hear of the temporary improvement, and others are induced to make an attempt to restore their deformity, and undergo the same system of torture only to meet with bitter disappointment in the end. For, as soon as this



57. *G. Of couches* it is unnecessary to say much. A common horizontal couch, firmly made with horse-hair, or one very slightly inclined, is all that is required; but it should be well provided with hair-pillows of different sizes; and, when the patient reclines on the side with the dorsal convexity, a pillow should be placed under it in such a manner as to press it upward; and when she reclines in any other position as well as in this, the pillow under the head should be low, unless, indeed, she attempts to lie on the side of the dorsal concavity, when it ought to be much higher. I have recommended this use of the pillows of the common sofa or couch for upward of thirty years in the few occasional cases of curvature which I have been requested to treat for other ailments, and I believe they are used in a similar manner by Mr. SHAW. In the excellent couch constructed by Mr. LONSDALE, a broad belt passes between supports attached to the sides of the couch, and the patient, when reclining, places the belt under the convexity, and has it drawn upward; the weight of the body being in great part borne by the belt, which thus presses the convexity upward. Another couch has been employed by Mr. COLES, for facilitating the prone position and exercise with the arms when this position is retained. It is well adapted to posterior curvature or excurvation of the spine, but it should be used with great caution when this curvature is owing to disease of the bodies of the vertebræ, as will be shown hereafter.

[Dr. R. S. KISSAM, of New York, has reported a case of very bad posterior curvature of spine, from caries of the inferior dorsal and superior lumbar vertebræ, in a child of four years, cured by means of a firm corset open in front, supplied with lacings, and an aperture behind to allow the excurvated vertebræ to project, thus allowing the diseased bones to come in contact and unite, and at the same time bring the spine in an upright position.—(*New York Lancet*, vol. i., p. 178.)]

The same surgeon has invented an *orthopædic chair*, to carry out the plan of treatment suggested by M. GUERIN, of Paris, viz., overcoming abnormal curvature by mechanical power, producing moderate extension and lateral pressure, so as to produce a counter-curve. M. GUERIN effects this in a bed, the patient being in a recumbent position. Dr. KISSAM accomplishes the same result by his chair, the patient being in a sitting position, allowing the patient to read, sew, &c., while the gravity of the body is made use of to promote extension. Farther pressure of an

system of compression and extension is laid aside, for it cannot always be continued, the muscles having lost their strength (what little remained), the trunk of the body, being dependent on its artificial support, begins to settle down into its former position; the shoulder presses more and more against the corsets, the arms rest upon the top of them, the suffering and the deformity increase, the hopes of the patient and friends are gradually blighted, and the protracted suffering compels them to throw off their mechanical appliances, and they become convinced of the painful truth that they have been made willing victims of an ineffectual system of useless torture. Such is, in brief, the history of nearly all who were treated in the institution referred to, and others of a similar kind; and, as long as the organic laws of living bodies remain the same, such will be the result of similar management to the end of time. By these remarks we would not be understood as wholly condemning the use of mechanical means in the treatment of the various deformities of the body, but of so employing them, in connexion with all possible modes of exercise, as to gradually restore the healthy functions. When chiefly relied upon, and to the neglect of the important laws of health, they cannot but do great mischief, and mischief only.]

innocent nature is combined with extension and counter-curvature; the pressure upon the angular ribs promotes the counter-curvature, and does not compress the thorax. The apparatus, which is simple in its details, effects extension of the spine, contra-flexion of its curves, pressure upon the abnormal angularity of the ribs, and projecting scapula, by means of rest, in the horizontal position, pressure without extension, or Dr. GUERIN's sigmoid flexion in the horizontal position. These means, of course, are only resorted to for the purpose of bringing the spine and ribs to their natural position, while the cure is effected by producing a just and healthy balance in all the muscles which support the spinal column, by proper exercise. If the muscles are kept at rest by constant pressure, it is evident they cannot recover their tone; exercise only can increase their strength, and modified exercise only can effect a permanent cure.—(*Loc. cit.*, p. 74.)

Whatever apparatus is used (and we believe that a large majority of cases in the young may be cured by suitable modes of exercise, &c., without any mechanical means), it should be gradually imposed upon the patient, as the muscles are not to be pained or overtasked. The whole design of extension, counter-curvature, and pressure, is to *direct* the growth of the parts implicated in a proper course. The correction of the curves and restoring the lost muscular balance must be depended upon to keep the patient well. These cases most generally occur in young girls from eleven to sixteen years of age, and, if taken at this period, the growth of the bones and muscles may be easily directed. Older subjects are cured upon a somewhat different plan. The bones of the vertebræ are displaced and hardened, and the ribs are angular, and the body has ceased to grow. It requires long-continued extension and counter-curvature to produce absorption of the thickened sides of the vertebræ, and to overcome the firmly contracted muscles. In young cases, the vertebræ are not thoroughly ossified, and easily yield to pressure, and the changes are known to go on rapidly in youth; whereas, in older subjects, absorption takes place slower, and they have lost their health, which is an additional disadvantage. Girls under eighteen can generally be cured of lateral curvature; older persons may be limited, and prevented from getting worse. As to *cutting* the contracted spinal muscles, no surgeon, we presume, would follow the practice of M. GUERIN.]

58. IV. SPINAL COLUMN—NERVOUS OR PAINFUL AFFECTIONS OF THE. —SYNON.—RACHIALGIA (from *ραχις*, the spine, and *αλγος*, pain).—*Spinal irritation*, of several modern writers.

59. CLASSIF.—I. CLASS, IV. ORDER (*Author*).

60. DEFINIT.—*Pain in some part of the spinal column, generally accompanied by neuralgic or hysterical affections, unattended by fever or by other indications of inflammation, injury, or structural change of the vertebral column, or of its contents.*

61. Painful affection of the spinal column may be limited to a single point or part, or it may affect more than one part, or extend along a considerable portion of the column. It may be continued, remittent, or intermittent, or even periodic. It may be *nerveous* or *hysterical*, *rheumatic*, *gouty*, or *syphilitic*. When the pain is connected with any evidence of inflammation or injury, or structural change, it is merely a symptom of such lesion, and may be inconsiderable, or often not the most prominent symptom. It is generally

difficult, and frequently almost impossible to determine, in the present state of our knowledge, the precise seat and nature of the pain which is so severely felt in the spine in nervous and hysterical subjects; but that it is chiefly functional, and intimately connected with pain in other situations, or with some other disorder, are well ascertained facts. How far these may illustrate the nature of true rachialgia will be considered hereafter.

62. i. DESCRIPTION.—The history and description of *spinal irritation* were first furnished by the FRANKS, under the denomination of *Rachialgia*, and subsequently considered by NICOD, TEALE, BROWN, DARWALL, TATE, PARRISH, GRIFFIN, ENTZ, OLLIVIER, and BENNETT. Most of these writers have viewed the complaint more or less in connexion with neuralgic and hysterical symptoms, and have overlooked some of its other morbid relations. It is generally a consequence of pre-existing disorder, more especially of hysteria, of uterine irritation or disorder, of prolonged leucorrhœa, or of excessive or disordered menstruation, of exhausting discharges, of gout, rheumatism, and several other chronic diseases, attended by debility or nervous exhaustion. It is characterized by pain, seated as mentioned above, increased by pressure on the spinous processes in the chief seat of pain, and often accompanied by painful, anomalous, or hysterical symptoms in parts supplied with nerves from the seat of pain in the spine.

63. i. A. *Spinal Irritation occasioning Neuralgia or hysterical Affections*.—This is the chief form in which painful affection of the spine presents itself in practice, especially in females, or in weakly constituted or debilitated males. If the reader refer to the article SYMPATHY, he will there find an exposition of the connexion subsisting between the ganglial, sympathetic, and spinal nerves, and of the manner in which irritation, undue excitement, or exhaustion, or altered sensibility of any one part of the sensory circle of nervous endowment, may implicate, in some way or other, distant parts—may induce severe pain in situations remote from the seat of irritation, or spasm, or various modifications of sensibility, or other anomalous affections. I have shown in various parts of this work, that irritation or other morbid states of parts of the alimentary canal, or of the uterine or sexual organs, or of the kidneys and urinary passages, may be propagated thence to the roots of the spinal nerves, to the cord, and be reflected from these by either sensory or motive nerves to internal or distant parts; and that the original seat of irritation may produce these effects, either functionally and without developing inflammatory or other palpable changes, or it may induce these changes, owing to prolonged endurance, to its violence, and to the nature of the exciting causes. (See *arts. CHOREA, CHOLERA, CONVULSIONS, HYSTERIA, DISEASE, &c.*)

64. The remarkable diversity of painful, anomalous, and hysterical symptoms attending spinal irritation renders a detailed description of this affection unnecessary. The more prominent features are sufficient for its recognition. The distant symptoms or sympathies are often the only ailments to which the patient has directed attention, or even of which he is cognizant. But the physician, upon hearing of these, immediately infers that the disorder is merely manifested in the extreme ramifications of the nerves, and that

it is actually either seated in the origins of these nerves, or that it is transmitted to the ganglial roots of these nerves from visceral or ganglial nerves, or that it has been thus transmitted, in the first instance, but followed, owing to the intensity or continuance of the irritation, by disease at the origins of the nerves displaying the disorder. He therefore examines attentively the state of the spine, by pressure, percussion, or otherwise, especially at those situations where the nerves supplying the affected parts originate; and he often finds, although the patient has never complained of pain in any part of the spine, great pain in these situations, as well as increased disorder of the distant or external parts, when this examination is being made. Pain, more or less severe in the spine, is also excited by muscular efforts, by a sudden or quick movement or rotation of the spine, or by a jerk or slight concussion, or by taking a false step even in walking.

65. In connexion with the tenderness and pain in one or more parts of the spine, neuralgic pains, spasms or convulsive movements, great tenderness of the surface, sometimes loss or diminution of sensation, occasionally loss of motion or incomplete paralysis, and even, in severe or protracted cases, paraplegia; loss of motion being often more complete in one extremity than in the other, and sensation being but little impaired. When the spinal pain or tenderness is felt in the *dorsal portion*, it is sometimes referred chiefly to one side of the column, generally the left side, and extends to, or is felt only, beneath the left mamma, much more rarely on the right side or in the mamma itself. In these cases it is often associated with hysterical symptoms, with a sense of constriction about the thorax, or with a sense of suffocation, dyspnoea or orthopnoea, pleurodynia, palpitations, or accelerated or irregular action of the heart, spasmodic cough, and various other ailments, which present numerous changes and associations, certain of them ceasing suddenly, others appearing and becoming variously complicated, and often exaggerated by the fears of the patient, or the constant direction of the mind to them.

66. When the lumbar portion of the spine is chiefly affected, then the pains, altered sensibility, spasms, constriction, &c., are complained of in the parietes of the abdomen, or hypogastrium, and pelvis. Numbness, cramps, pains, excessive tenderness, or even more or less complete paralysis in the most severe cases, are experienced in the lower extremities, with constipation, suppression or retention of urine, or irritability of the urinary bladder or uterine organs, disordered menstruation, morbid sensibility of the genito-urinary organs, and occasionally a marked and variable alteration of the state, constitution, and quantity of the urine itself.

67. Spinal irritation of the cervical portion is not so frequent as in the situations just mentioned; but it is often connected with a similar affection of one or other of these, especially with the dorsal pain and tenderness. Sometimes the cervical pain rises as high as the occiput, and is then associated with neuralgic pains in the face or neck, with deafness or noise in the ears, difficulty of swallowing, a sense of choking, loss of voice and even of speech, spasm of the larynx or a state resembling an attack of spasmodic croup, and urgent sense of suffocation, complete aphonia, violent attack of suffocative cough, altered sensibility, or incomplete paralysis of one or both arms,



coldness and numbness of one or both hands, pricking sensations, formications, &c., in these extremities, with more or less variability and irritability of temper, and often with several of the other ailments enumerated above.

68. The spinal tenderness in some cases shifts its situation. In these, the sympathetic affections are also changed. In connexion with the symptoms already noticed, the functions of the thoracic and abdominal viscera, and even those of the organs of sense, are more or less disordered, but in various and constantly varying degrees, the seat of disorder depending much upon the portion of spine affected. When the disorder is of a very severe character; when epilepsy, convulsions, amaurotic symptoms, deafness, hesitation or difficulty of speech, retention or suppression of urine, hiccough, vomitings, gastrodynia, obstinate constipation, paralysis, &c., take place, then it becomes a matter of doubt whether or no the spinal affection has proceeded to inflammatory action, or has extended to the base of the brain, or to serious congestion of the spinal veins, with increased serous effusion; and a careful consideration of all the sympathetic and constitutional features of the case is then especially requisite.

69. *B. Rheumatic, gouty, and syphilitic forms of rachialgia*, or painful affection of the spine, especially the rheumatic and gouty, are not infrequent.—(a) The *rheumatic* occurs chiefly in the rheumatic diathesis; in persons who have suffered previously from rheumatism, and very probably is seated chiefly in the fibrous structures of the spinal column, in the ligaments of the spine, and probably also in the intervertebral structure. It is experienced principally on motion, and in portions of the spine which have been the seat of previous injury, sprain, twist, &c. It is generally diminished by the warmth of bed and by the recumbent posture; and it is often accompanied by several of the sympathetic affections already mentioned; but, when these are severe, and are obviously connected with the seat of pain in the spine—when cramps, numbness, constrictive pain in the muscles, prickings in the extremities, loss of motion, &c.—then the supervention of inflammatory action, or of effusion, or of thickening of the affected tissues, or of congestion of the vascular apparatus of the spine, should be dreaded, even if not actually existing.

70. (b) *Gouty rachialgia* is common in old gouty subjects; affects chiefly the lumbar region; is often attended by weakness or impaired motion of the lower extremities, by incontinence of urine, and by other disorders of the urinary organs, or of the urinary secretion itself, varying with the duration and amount of the spinal affection. Gouty rachialgia is chiefly to be referred to congestion of the venous sinuses of the vertebral canal; this congestion probably inducing an increased fluid effusion, with thickening of the ligaments and fibrous tissues of the vertebræ external to the canal; the functions of the cord, or roots of the nerves, being thereby more or less embarrassed.

71. (c) *Syphilitic rachialgia* sometimes occurs in the secondary or tertiary stage of syphilis. It may affect the bodies of the vertebræ, or the intervertebral structures, or the ligaments; but it is very doubtful whether or no it exists as a purely nervous affection in the course of this constitutional malady, before these structures are attacked by the changes characterizing the advanced progress of this malady. The portion of the spine

most frequently attacked by syphilitic lesion, according to my experience, is the cervical, the spinal lesion appearing to me to have been an extension of the alterations which had taken place in the throat and pharynx.

72. (d) *Scrofulous rachialgia* may be referred to slow inflammatory change, or to tuberculous deposits in the bodies of the vertebræ; and hence it, as well as the syphilitic, hardly falls under the present category, but comes more legitimately under the head of *Disease of the Bodies of the Vertebræ*.

73. ii. The **DIAGNOSIS** of spinal irritation, or pain in the spine, appearing independently of inflammatory or structural lesion, is by no means so easy as several recent writers appear to believe. Whether the painful affections of the spine are the chief disorder, or are attended by various symptomatic disorders of a more prominent character even than their parent affection, they often so nearly approach the milder grades of inflammatory action, in some one or more of the tissues of the spine, that a precise line of demarcation can hardly be drawn between them. An affection which may be, with much justice, viewed as functional to-day—as spinal irritation merely—may be inflammatory on the morrow, and be rapidly followed by the consequences of inflammation. Or a case may occasion apprehensions of inflammation, and yet, as respects its progress and treatment, prove functional merely; while another, furnishing less serious grounds of apprehension, may have been actually inflammatory, and soon furnish undoubted evidence of the usual results of inflammation.

74. The diagnosis between functional and structural rachialgia requires a most attentive consideration of all the circumstances of the case, after a careful examination of the spine, and of the whole extent of constitutional and symptomatic ailment. Messrs. GRIFFIN, who have written with much ability upon this affection, have given the following indications of its existence, especially in its nervous or hysterical form: "1st. The pain or disorder of any particular organ being altogether out of proportion to the constitutional disturbance. 2d. The complaints, whatever they may be, usually relieved by the recumbent posture, always increased by lifting weights, bending, stooping, or twisting the spine, and among the poor classes often consequent on the labour of carrying heavy loads, as in drawing water, manure, &c. 3d. The existence of tenderness at that part of the spine which corresponds with the disordered organ, and the increase of pain in the organ by pressure on the corresponding region of the spine. 4th. The disposition to a sudden transference of the diseased action from one organ or part to another, or the occurrence of hysterical symptoms in affections apparently acute. 5th. The occurrence of fits of yawning or sneezing, which, though not very common symptoms, yet, as scarcely ever occurring in acute or organic diseases, may generally be considered as characteristic of nervous irritation."—(*Op. cit.*, p. 214.)

75. These may be viewed rather as aids to the diagnosis of this affection than as establishing its existence independently of inflammatory action; for many cases, which have been viewed merely as functional, although presenting some degree of prominence of the spinous processes, in the seat of tenderness, certainly are attended by more or less inflammatory action or congestion, with swell-

ing of the vertebral tissues, the local changes being insufficient to cause very manifest constitutional disturbance, or to disorder the vital and excreting functions. When, however, these are disordered, the existence of inflammatory action or congestion should be suspected. In all cases presenting swelling or prominence in any marked degree, it will be safer to view this as a result of a mild and slow form of inflammation or congestion, or inflammatory congestion, with slight effusion, than to consider the disorder as merely nervous. (*See the Description of Disease of the Vertebrae.*)

[In 54 cases of "spinal affection" or irritation treated by him, Professor AUSTIN FLINT found that in 22 cases there was extreme tenderness over the spine; over the dorsal vertebrae alone in 21 cases; over the lumbar and dorsal, there was great tenderness in 10; over the cervical and dorsal in 3; and over the entire column in 5. The extent of tenderness varied in different cases; in some it was confined to a single vertebra, in others it embraced several, or extended over a whole division. (Dr. F., however, does not consider tenderness as essential in order to indicate an affection of the cord.) In all but 7 cases, modifications of *sensibility* were more or less prominent symptoms; in 14, pain in the head was a prominent feature; in 9 cases, pain in the chest was prominent; in 15, the location was in the abdomen, or abdominal parietes; in 6, the uterus was the seat of the principal sensations; while in 7, pain in the lower extremities was complained of; in 4, in the upper; in 2, both upper and lower were simultaneously affected; in 3, pain was felt in the spine itself; and in 2, the trifacial nerve was affected. In 19 cases there was great depression of muscular power, and it was strongly marked in 16 others; in 27 cases there was perversion of the feelings, as loss of energy and buoyancy of spirit, despondency, melancholy forebodings, great anxiety on the subject of health, susceptibility to emotions from slight causes, &c. In 37 cases, there was marked derangement of the digestive organs, and only 13 in which it was absent; of 25 females, in 6 cases there was menorrhagia; in 11, leucorrhæa; in 4, uterine pains; in 3, too frequent menstruation; and amenorrhæa in 1. Some difficulty in urinating in 8; 5 were cases of pregnancy, and the spinal difficulty was aggravated during this condition. Of the 54 cases, 15 laboured under palpitation of the heart; in 2, the pulse was intermittent; in 6, accelerated; in 16 cases the respiratory organs were morbidly affected; in 1, a sense of suffocation; in 4, dry cough; in 1, paroxysmal cough; in 2, cough without expectoration; in 4, sense of oppression in breathing, complicating palpitations; dry, hacking cough, 2; and 2, convulsive, catching inspirations, with sense of suffocation; in 6, paroxysms of sinking and prostration; in 1, giddiness and tinnitus, &c., besides numerous occasional complications.

The causes, as enumerated by Prof. F., were exposure to cold, over-exertion, severe exertion of upper extremities, remittent and intermittent fever, prolonged lactation, too frequent child-bearing, mental anxiety and afflictions, intemperance conjoined with sexual excesses, leucorrhæa, sudden cessation of the menses, deranged menstruation, development of the catamenia, sedentary positions, local injury. The probable remote causes may be divided into two classes, according as, 1st, the effect is exerted directly and primarily

upon the spine; and, 2d, indirectly and secondarily, by irritative influences transmitted through the incident nerves, or as consecutive to certain general conditions of the system.—(*Am. Journ. Med. Sci.*, vol. vii., N. S.)

We refer to Prof. F.'s paper as the most philosophical and the best resumé of facts hitherto published on this subject in our country.]

76. iii. The DURATION and PROGNOSIS of spinal irritation require but slight notice.—(a) The duration of this disorder is most variable. It may be only three or four days, or as many months, or even as many years, according to the severity, the causes, and the treatment of individual cases. There is every reason to infer that the more obstinate cases, especially where the treatment has been judicious, is perpetuated either by the continuance of their causes, or by a chronic or recurring inflammatory congestion of one or more of the tissues of the spine.

77. (b) The prognosis of this affection is generally favourable, where it is purely nervous or functional.\* But when it is attended by phenomena, local and constitutional, indicative of any degree of inflammatory congestion, the several contingencies of such disorder, as respects both the vertebrae and the spinal contents, should be kept in view, and a more cautious or guarded prognosis be given. When rachialgia occurs in connexion with rheumatism, or gout, or serofula, or syphilis, a much less favourable prognosis ought to be given than when it is more purely nervous, or simply congestive or inflammatory. In the rheumatic variety there is danger of the affection extending from the ligamentous or fibrous structure to the membranes of the spinal cord; and in the gouty form, especially if it be associated with disorders of the secretion or excretion of urine, a favourable result is often long deferred, or even unattainable in very aged persons; while in the serofulous and syphilitic states of the affection, disease of the bodies of the vertebrae, if not constantly, is generally present, and the prognosis is consequently very unfavourable.

78. iv. The CAUSES of spinal irritation have been already noticed (§ 16, *et seq.*) when treating of the causes of spinal diseases generally; but there are certain causes which are more especially productive of painful or functional disorders of the spine. These are certainly much more frequent in females than in males, the female clothing and physical education of the sex favouring, as shown above (§ 18), this result. Of 248 cases adduced by Mr. GRIFFIN, 26 only were males. It may occur at any age between 10 and 65; and the gouty and rheumatic forms at much more advanced ages. The nervous variety, the most common in females, is met with from 15 years of age to 65, but most frequently from 20 to 25; in its hysterical form from 15 to 50, the menstrual epoch of female existence. It is much more frequent in the unmarried than in the married, and is not confined to any particular habit of body or temperament; the nervous and lymphatic temperaments, however, predominating. The most common exciting causes are, self-pollution, excessive sexual intercourse, uterine disorder, affections of the stomach and bowels, the presence of worms in the intestines, or other sources of irritation, as morbid secretions, fecal accumulations, inordinate exertion, sudden muscular efforts, sprains,

\* [A large majority of these cases may be temporarily relieved, few permanently cured.]



exposure to cold and moisture, anæmia, rheumatic fevers or chronic affections, &c.\*

79. v. The NATURE of spinal irritation has been much discussed. The pain in the spine, whether it be constant or remittent, or excited only by pressure of the spinous processes in the seat of the affection, can be viewed merely as a symptom of some lesion, functional or structural, either of the tissues constituting the column, or of the cord, membranes, or nerves, and in this respect it is, like the more distant symptoms and sympathies attending it, merely an external expression or manifestation of that lesion, whatever it may be. As no opportunity of examining after death a patient who has been the subject of this affection has occurred, as far as I know, until it has passed into undoubted structural change, and become attended by either inflammatory action or by paraplegia, it is difficult to infer with any precision what is the nature and exact seat of the affection; but there is every reason to infer, with LUDWICK, HOFFMANN, and the FRANKS, that it is connected with, if not the result of, congestion of the spinal circulation. The existence of congestion of the venous sinuses of the spine must necessarily affect the capillary circulation of the cord and its membranes, and the amount of the fluid interposed between them; and, as a consequence of the amount or extent of these changes, the functions of this part of the nervous centres, both sensory and motory, and of the nerves proceeding from it, must thereby be more or less disordered. That inflammatory action, or inflammatory congestion, or, indeed, any form of chronic inflammation, or its usual results, is not the primary lesion in the purely nervous or hysterical rachialgia, may readily be admitted, when we consider the exhausting nature of its causes, and that exhaustion of organic nervous or vital power always is productive of congestion in parts on which the causes of the exhaustion more immediately act. But it may be as readily allowed, that chronic inflammation is the more prone to supervene in these parts, the greater or more persistent the congestion, especially if the usual causes of inflammation come into operation. I have seen not a few cases of rachialgia, which had been evidently merely congestive or functional at the commencement, but which, by neg-

lect, or improper treatment, had passed into chronic inflammation of the spinal membranes; and I have even seen some of these, owing to superadded causes, or to perturbing influences, pass into an acute state, the inflammation extending along the membranes, until it reached the base of the brain, and terminated in phrenitic delirium, coma, and death.

80. vi. TREATMENT.—Rachialgia, according to the local and constitutional symptoms and circumstances of the patient, requires very different, and even opposite, means of cure. The spine ought to be carefully examined, and the habit of body of the patient and the causes of the complaint fully considered, before the intentions of cure are entertained. The particulars to which the attention of the physician should be especially directed are: 1st. The presence or absence of local inflammatory signs, of general vascular disturbance, and of plethora or of anæmia; 2d. The situation of spinal pain and tenderness, and its relation to existing sympathetic affections; 3d. The presumed or ascertained causes, and the aggravating circumstances; 4th. The existence or non-existence of interrupted, disordered, or suppressed evacuations, especially the catamenial, and the hæmorrhoidal, where this latter has been often a cause of complaint; 5th. The nature and amount of uterine or sexual disorder with which the spinal affection is allied.

81. A. If there be actual evidence of inflammatory action or congestion of any of the spinal structures furnished by the local signs and constitutional symptoms, *local vascular depletions*, according to the severity of these symptoms, and the state of vascular fulness, as indicated by the pulse and condition of the veins, are obviously required, the amount of depletion being guided by the indications furnished by these sources. The situation from which the blood should be taken has been the topic of some discussion. J. FRANK considers that local depletion attracts the flow of blood to the seat of depletion, and he therefore recommends the application of leeches to the anus. If rachialgia be connected with scanty, interrupted, or suppressed catamenia, or suppressed hæmorrhoids, leeches may be applied to the anus, or below the groins. In these circumstances, there can be no objection to these situations being adopted; indeed, they are the most likely both to restore the suppressed discharge and to relieve the local affection. But in other cases, there can be but little risk incurred from cupping, or applying leeches on each side of the affected portion of the spine, or even a little above or below this part.

82. B. *Blisters and counter-irritants* of different kinds have likewise been recommended by several recent writers. J. FRANK disapproves of their application over or near the affected part of the spine. I have not seen sufficient cause for not having recourse to them, even in these situations, although they are often employed when they are not obviously required, and where recovery would take place without them. A blister, however, is often very beneficial, and its repetition may be necessary. Mr. TATE, who has very justly insisted upon the connexion of this affection with disorders of the uterine functions, prefers the inunction of the spine with the tartar emetic ointment. I have found the liniments or embrocations here prescribed much more certainly beneficial than any other local application or

\* [Cases of spinal irritation, or neuralgia of the spinal nerves, are not as frequently met with now as formerly, when they were of every day's occurrence, and for the most part in females. There can be no doubt that the principal predisposing cause was the habitual use of corsets and stays, worn tightly for the purpose of improving the form. In consequence, the muscles and ligaments of the trunk became unusually lax and attenuated; for the compression of the body by means of materials sufficiently firm to afford an unnatural support, while it supercedes, in a great measure, the necessity of muscles and ligaments about the chest and spine, prevents their accustomed growth and strength. Thus the spine, in the ordinary avocations and exposures of life, is constantly liable to injury from strains, falls, and the application of violence to the vertebrae. The medulla spinalis receives concussion, or the nerves, as they issue from the intervertebral foramina, are subjected to pressure, and disease supervenes; and this happens with more certainty if, as sometimes happens, the individual is at the time of an accident divested of her unnatural support. Still greater injury, perhaps, results, indirectly, from compression of the stomach, liver, and lungs, the injurious effects of which, acting primarily on the viscera, are thrown by reflex action on the spine. Thus CRUVEILHIER maintains that affections of the stomach, heart, liver, and lungs frequently coincide with pains in a fixed point of the vertebral column, varying according to the organ diseased, which spot he calls the *dorsal point*. To this point he recommends that remedies should generally be applied in visceral disorders.]

external irritant; and either may be employed some time after a blister has been applied.

No. 337. R Linimenti terebinthinæ, ℥ij.; tinct. opii, ℥j.; olei olivæ, ℥ss.; olei cajuputi, ʒj. M. Fiat linimentum, vel embrocatio ope spongio-pilei applicanda.

No. 338. R Linimenti camphoræ comp. et linimenti terebinthinæ, āā, ʒss.; vini opii, ℥j.; olei cajuputi, ʒss. M. Fiat embrocatio, vel linimentum.

83. Even when local depletion is required, restoratives, tonics, or antispasmodics may not be the less necessary; but in all cases the adoption and the selection of these ought to have especial reference to the ascertained and inferred causes, to the state of the urine, and to the particular character of the sympathetic affections—neuralgia, hysterical, or spasmodic. If there appear reason to infer that the affection has been occasioned by masturbation, even local bleeding will generally be injurious, chalybeates or other tonics and restoratives being requisite; but when the complaint has arisen from this vice, or from excessive sexual intercourse, even the best means cannot be of service unless these causes are relinquished. In females, both the spinal affection, and the uterine or hysterical disorder, with which it is generally associated, equally (although either of them may primarily) arise from this vice, and are perpetuated by persistence in it; and hence the use of the speculum uteri, and of other phallic instruments, is so gratifying to the patient. In all cases, the urine should be carefully tested, and the treatment regulated conformably with the states presented by it, as fully described in the article on the URINE, and on the disorders connected with this excretion.

84. C. When spinal irritation is associated with suppression of the catamenia, then the application of leeches below both groins, two or three days previously to the expected period, and the exhibition of equal quantities of the aloes and myrrh pill, and of the bicarbonate of soda, or of the compound iron mixture and compound decoction of aloes, in doses sufficient to act freely on the bowels, will frequently be efficacious; more especially if the embrocations prescribed above, or No. 311, in the APPENDIX, be applied to the spine, and repeated according to its effects. In many of these cases, not only are the catamenia irregular, sometimes excessive, but more frequently defective, scanty, suppressed, or difficult and painful; a more or less profuse or continued leucorrhœa often replacing the healthy periodic discharge. In some, these complaints are farther complicated with anemia or chlorosis, and ultimately terminate in irremediable visceral disease. The treatment of these complications, even in their milder forms, is always difficult, and in their severe forms often hopeless, especially when the vice in which they originate is persisted in. The spinal and the sexual disorder frequently act and react on each other, until ultimately paraplegia and various associated evils are produced. The uterine affection suggests either vaginal injections or an examination per vaginam; the speculum follows, and various applications are made to the os uteri, of a stimulating, astringent, or irritating nature. As the os uteri possesses an organic sensibility but little, if at all, inferior to that manifested by the clitoris in the sexual orgasm, neither the vaginal injections, nor the phallic instrument, nor the applications made by its aid, are at all unpleasant to the self-polluted female. The local irritation thus produced increases, or at the least perpetuates, by nervous

communication, the spinal affection; and after the constant attendance of "ladies' doctors" for many months, or even years, the patient having become paraplegic or generally paralyzed, and having continued in this state for months, requiring the urine to be drawn off twice or three daily, besides other aids, ultimately dies from the extension of disease to the cerebral membranes, or from organic changes in the spinal cord, or in its membranes, or in the kidneys, or in some other organ.

85. As the patient sows, in such cases, so she reaps. But let not the treatment be a perpetuation of the cause of the malady in a different form—let not the physician furnish not merely a novel mode, but even a new instrument of self-pollution, and thus minister to the accursed moral taint of his patient. In many cases, doubtless, this is done unknowingly, by his adopting a method brought into vogue by others and pleasing to the patient, and by his ignorance of this cause of these complaints—a cause which obtains in at least nine cases out of ten. In most of these the patient will confess to the vice which has occasioned the disease, if the matter be judiciously managed; and even if this vice should not be admitted, a full exposition of the consequences of persisting in it will produce a good effect; for many patients sin from ignorance, and are not conscious of the evil they are committing. I have had many instances illustrating this position brought before me. Others (but these are comparatively few) persist in this cause, and either require some restraint or go on, until a drivelling amentia, or irremediable structural disease, overtakes them. When there is reason even for suspecting the existence of this vice, the physician does not discharge his duty to his patient, and to the family of the patient, if he does not investigate the case as circumstances will suggest or admit of; for, if this cause be continued, a cure will be impossible, but by relinquishing it, remedies will be successful, and even the efforts of nature will of themselves be often efficacious. There is one circumstance, which may not be known to many of those who are so much in the habit of recommending stimulating and astringent injections, and irritating or escharotic substances, to the os uteri, by the aid of large glass or other syringes, or of specula—namely, that similar, and even many of the same, substances were thus employed by the ancients, and by the Chinese and Tartars from remote ages, to excite or to gratify the sexual desires; and that the modern treatment, by these means, of uterine disorders, whether allied or not to spinal irritation, can neither permanently cure these complaints, nor remove "a rooted evil" from the mind.\*

86. D. When the spinal affection is associated with neuralgia, then the preparations of iron, or the sulphate of iron and sulphate of quina, with

\* [Professional opinion seems to be quite unsettled as yet in Great Britain, as well as this country, with regard to the use of the *speculum*, Drs. LEE, MARSHALL HALL, COPLAND, and others being strongly opposed to its use, while Drs. BENNETT, LOCOCK, MURPHY, SIMPSON, and other high authorities abroad are its strong advocates. The objections are partly moral and partly physical. Dr. HALL says that "a woman on whom the speculum has been used is never the same, *morally*, she was before;" while Dr. LOCOCK pronounces "all the talk about the delicacy of the use of the instrument to be nonsense." While we would advocate the strictest, and all necessary delicacy, in the treatment of female diseases, and would condemn all needless personal exposure, we would never-



camphor, hyoscyamus, and as much of the aloe and myrrh pill as will keep the bowels freely open, will be of service, the embrocations prescribed above being applied to the pained portion of the spine; or the treatment advised for NEURALGIC AFFECTIONS may be adopted. If the spinal disorder have been induced by masturbation, or if it be connected with suppressed or scanty catamenia, the combination of substances just now recommended will be of service. If, on the other hand, it be associated with leucorrhœa, or with a superabundance of phosphates in the urine, or with involuntary pollutions, the tincture of the sesquichloride of iron, with a small addition of hydrochloric acid, may be prescribed, with the infusion and tincture of either *columba* or *quassia*. In most cases of spinal irritation, the treatment should depend, in great measure, upon the character of the associated or sympathetic affections—whether neuralgic, spasmodic, or hysterical; due attention being also paid to the digestive, assimilating, excreting, and uterine functions. But unless the causes be recognised and avoided, unless correct hygienic measures be also adopted, based upon the predisposing and exciting causes above insisted upon (§ 16, 78), the treatment will very frequently be inefficacious.

87. In some prolonged cases of spinal irritation or congestion, associated with uterine disorder, complete paralysis of the bladder, irritability of the stomach, constipated bowels, and paraplegia, especially as respects the function of motion, sometimes occur. This severe form of the disease generally results from self-pollution, and often resists almost every kind of treatment, if this vice be not discontinued. I have seen sev-

ertheless protest against all insinuations designed to impeach the motives, or cast reproaches upon medical men who believe that a certain class of female diseases may be treated more successfully by the aid of the speculum, than without it. Where life and health are involved, the question of delicacy or indelicacy is in abeyance; all such considerations must yield to the exigencies of the case. The only question here is, Can our diagnosis be rendered more certain by the aid of this instrument? No one will deny that we can, by its assistance, accurately ascertain the different external morbid conditions of the cervix uteri and its orifice, and in many instances the nature and extent of disease affecting its cavity; in short, that the eye, by its use, as well as the touch, is made to assist in the diagnosis of this class of diseases; for, while the latter enables us to recognise structural changes in the bulk, firmness, and sensibility of those parts, the former enables us to rectify an erroneous or perfect an incomplete opinion, by showing the nature and limits of ulceration, induration, excoriation, &c., the appearance of the cervix and vagina in various stages of disease, and the colour and consistency of the accompanying discharges, &c. Useful, then, as it sometimes unquestionably is, there can be no doubt that its use has been too indiscriminately and unnecessarily urged. In slight cases of leucorrhœa and uterine irritation, its employment is alike unnecessary and prejudicial, while in cases of chronic leucorrhœal discharges, or chronic menorrhagia, or wherever there is reason to suspect structural changes in the organ, we should not hesitate to resort to its employment. We believe it should rarely, if ever, be used in very young females; and there are certain diseases, as scateomatous tumours in the walls of the vagina, ovarian growths in the recto-vaginal septum, polypi, deep ulcerations in, or excessive sensibility of, the vagina, large cauliflower excrescences, or bleeding fungi, which contra-indicate its use. In short, to use the language of Dr. ASHWELL, "making every deduction, which the enthusiasm of some individuals in its favour demands, the speculum must be regarded as a most important addition to our diagnostic and curative means. It enables us not only to discover, and nicely to distinguish the otherwise concealed diseases of the inferior or cervical portion of the womb, but, by the light which it throws on the seat of the mischief, it affords great facilities in the exact application of remedies. It is much to be wished that the advantages which it is capable of conferring were more early and extensively realized."

eral cases of this kind, and the means which I have found most efficacious are, the assiduous application of one or other of the embrocations or liniments already recommended along the spine, and the use of the iron or myrrh mixture, conjoined with the decoction of aloes, or the pills prescribed above (§ 53, 84). Various other means have been also employed, according to the features of particular cases—as the iodide of iron in sirup of sarza, or the iodide of potash in tonic infusions, and occasionally the resinous extract of *nux vomica*, conjoined with the aloes and myrrh pill. In a severe case of this kind, attended by vomitings, retention of urine, suppression of the catamenia, &c., which I saw with Mr. FLOCKTON, a large pea-issue was made in the inside of both thighs, close to the groins, and a free discharge procured. The paraplegic and other symptoms soon disappeared, and the patient was quite recovered in the course of a very few months.

88. When spinal irritation or congestion has become chronic, it is sometimes accompanied with attacks of faintness or leipthymia, and, in rare cases, with cataleptic seizures—with the latter, chiefly when the affection has been produced by masturbation. In these, the treatment already advised, or that prescribed in the articles on these affections, will be appropriate. These disorders are chiefly aggravated forms of hysteria, and are to be treated conformably with the principles insisted on under the heads of DEBILITY, FAINTNESS, HYSTERIA, NEURALGIC AFFECTIONS, and SPASM; and for these, as well as for spinal irritation and spinal curvature, a digestible and moderate diet, at regular, but not too long intervals between the meals, gentle exercise in the open air, change of air, of scene, and of locality, a residence in a dry and temperate situation, the use of chalybeate mineral springs, or of such mineral waters as the state of the catamenia or of the urine in individual cases will suggest, are important remedies—indeed, the most requisite elements of the treatment of this group of disorders.

89. E. When rachialgia is connected with *rheumatism*, or with *gout*, or with *scrofula*, or *sypilis*, the local means already advised may be employed, according to the features of the case; but the treatment should be in a great measure based on the constitutional complaint, of which the rachialgia is merely a manifestation. In some cases, particularly the rheumatic, gouty, or scrofulous, leeches may be applied, and even repeated, to or near the affected portion of spine, and be followed by blisters or by the terebinthinate embrocations, and a constitutional or internal treatment suited to the peculiarities of the case, especially by the iodides in the preparations of sarza, the iodide of potassium with the solution or carbonate of potash, and tonic infusions or decoctions; or the bichloride of mercury, taken with a full meal, or in a tonic infusion; or DONOVAN'S solution of the iodide of mercury and arsenic, and the preparations of sulphur subsequently, or the sulphuretted mineral waters. In these forms of the complaint, as well as in the nervous or hysterical, avoidance of the causes, a due promotion and regulation of the digestive and depurative functions, and strict attention to diet, regimen, exercise, air, locality, and the purity of the water in use, are essential parts of the treatment.

[Of all the local means of treating spinal irritation, we regard cupping, with or without scarification, as generally producing the most satisfac-

tory results: Large cups are preferable, and as many should be applied as practicable, bearing them in contact as long as the patient will endure them. A single cupping will often produce instantaneous relief from local pain or disordered function, perhaps of long previous duration. Where an immediate impression is desired, sinapisms, or GRANVILLE's lotion, we have usually found very efficient; but in employing friction, care should be exercised not to employ too much force, else the difficulty may be aggravated. For permanent irritation, the *Tart. Ant. et Potas.*, combined with *Pix Burg. Emp.*, &c., so as to form a plaster, is perhaps the best. Where a less degree of counter-irritation is desirable, capsicum in variable proportions may be substituted for the antimony. Irritating applications, however, in very susceptible individuals, may possibly aggravate the local difficulty for a time; but even where the disorder is temporarily aggravated, it is often subsequently relieved by the revulsion thus occasioned. Some practitioners are in the habit of making caustic issues over the spine in these cases, but the practice has not proved very successful in our hands, and we cannot recommend it. Quinine, aloes, and iron are the most valuable internal remedies, given in various doses and combinations, according to circumstances. A strict attention to diet, exercise, and regimen, cannot be too strictly enjoined. The diet should be nutritious, of easy digestion, and of an unstimulating nature—coffee and tea being prohibited, with tobacco and alcoholic drinks. All violent exertions, and a too long continued erect posture, are to be avoided. A recumbent position during a portion of the day, at least, is advisable. Late hours, and all excitement of body or mind, are to be avoided. All vicissitudes of temperature are to be cautiously guarded against by suitable dress.]

90. V. CONCUSSION OF THE SPINAL CORD.—The nature and extent of injury sustained by the spinal marrow, in circumstances of violence which occasion concussion of this part of the nervous system, can rarely be ascertained soon after its occurrence, and sometimes not even after death.

—A. The causes of concussion are, generally, falls from a height on the back or trunk, or upon the hips, upon the ground, or even upon any partially yielding surface that may not occasion fracture or dislocation. A violent blow on the back, jumping from a height, a railway concussion or shock, or any sudden or violent succussion of the trunk, also may occasion it, in a slight or in a severe form, according to the circumstances of the case.

91. B. The symptoms vary with the violence and nature of the cause, but consist chiefly of an impairment in slight cases, and of a more or less complete extinction in severe cases, for a longer or shorter period, of the functions performed by the spinal cord. There is loss of voluntary motion and of sensation, either or both of which may be partial or complete, especially of motion; the excreting functions being generally more or less affected, and the functions of respiration and circulation much disturbed. In most cases, particularly when the concussion has been violent, diminution of temperature, failure of the pulse, pallor, and the other phenomena characteristic of *physical shock* (see art. SHOCK), are also present.

[Dr. ABERCROMBIE has recorded a case of permanent paraplegia, produced by concussion of the spinal cord, without dislocation or fracture, and a case of a similar kind has fallen under our own

observation. A Mr. P. fell from his wagon on the 28th of August, 1848, striking on his head and shoulders, and was taken up completely paralyzed in the arms and lower extremities, both as to sense and motion. The knees were inclined to fall together, the hands were flexed upon the wrists, the thumbs and fingers turned in upon the palms of the hands. The head had, in the fall, been thrown backward under the body, occasioning a violent flexion of the cervical vertebrae, and it was thought at the time that there was a partial dislocation of the 6th cervical vertebra. For a while the catheter had to be used to draw off the urine, after which both urine and feces passed involuntarily. Sensation gradually returned, but the loss of motion was permanent; extensive sloughing of the thighs, scrotum, penis, &c., occurred about six months after the injury, with anasarca and ascites, from which he gradually recovered.

In April, 1854, six years after the injury, his condition was as follows: Sensation partially restored, motion not; limbs much emaciated, flexor tendons of legs, arms, and fingers permanently contracted, surface generally cold, pulse feeble and 90 per minute, profuse sweats upon slight exertion, great weakness and debility, sits up but little, appetite poor, secretion of urine copious, and discharged involuntarily; severe and constant pains in back and limbs, extremely restless, sleep disturbed and not refreshing, bowels move but once in 48 hours, and then involuntarily; can move the shoulders and body by great exertion, obstinate sores on thighs and hips, slight cough, tongue thickly furred and flabby, digestion bad. Soon after this date, his food and drink were constantly ejected from the stomach soon after swallowing, without nausea or sickness, sloughing and emaciation increased, pain and involuntary twitchings of limbs were constant, respiration much disturbed and frequent, pulseless for several days before death, which occurred on the 7th of May, 1854. Autopsy disclosed great softening and disorganization of the spinal marrow within the fifth and sixth cervical vertebrae. There was no perceptible diminution of the vertebral canal, neither fracture nor dislocation, and the softening was confined to a portion of the cord above mentioned. The membranes were highly vascular and thickened. In short, the appearances justify the conclusion that it was a simple case of concussion of the cord, with perhaps laceration.]

92. C. The appearances after death are frequently so slight, or, even when most manifest, are altogether such as are insufficient to account for the effects in rapidly fatal cases; and, in those of longer duration, they are generally consecutive upon the change more immediately produced by the concussion. It may be presumed that, in those cases of severe concussion which are soon followed by dissolution, and yet present no appearance of lesion, the intimate organization of the cord has sustained an injury incompatible with the discharge of its functions and the continuance of life, although the injury may escape the detection of our senses. In cases of longer duration, softening of the cord, with or without inflammatory appearance, either in the cord or in the pia mater, is often observed; but frequently the softening follows rapidly upon the concussion before inflammatory action supervenes, or even before it has had time to appear.

93. D. The treatment of concussion of the spinal cord differs not in any respect from what I have



recommended when treating of SNOEK (§ 19, *et seq.*)

[As soon as reaction occurs, general and local bleeding will be generally proper to prevent inflammation and congestion, aided by the warm bath and hot anodyne fomentations. The patient should be kept for some time in a *recumbent* position, avoiding pressure on the spinous processes, and strict antiphlogistic regimen enjoined. The repeated use of purgatives will be proper, and a succession of flying-blisters over the seat of the injury, to be succeeded by stimulating liniments, and friction both to the spine and lower extremities. After the inflammatory stage has passed, electricity, tonics, strychnia, and even diffusible stimulants, will often be advisable; but the case must be regarded as inflammatory as long as pain remains in the course of the vertebral column. If paraplegia continues for a long time after the accident, caustic issues, close to the contused or painful vertebre, may in some cases prove beneficial. (*See Ed. Jour. Med.*, Jan., 1818.)]

94. VI. SPINAL COLUMN.—INFLAMMATION AND CARIES OF THE VERTEBRÆ.—SYNON.—*Inflammation of the vertebra, and of the intervertebral substances; Mal vertebral, Fr. Pott's disease of the spine; Spinitis; Inflammation and caries of the spine.*

CLASSIF.—III. CLASS, I. ORDER (*Author*).

95. DEFINIT.—*A dull and generally a continued pain in some part of the spine, with slight fever, manifested chiefly towards evening, and often attended by a sense of constriction around the trunk in a situation corresponding with the affected portion of the spine, terminating generally in caries, or in symptomatic abscess, or in both.*

96. I. DESCRIPTION.—The structures constituting the spinal column are liable to inflammatory action, from sprains, injuries, external violence, from cold, and from constitutional vice or a morbid diathesis. The inflammation thus produced may advance silently and slowly for a considerable time, and suddenly assume a more active or acute form: the affection may even be sub-inflammatory at first, and escape detection, or it may be more acutely inflammatory, and more manifestly declare itself, but it is commonly chronic, or slow in its progress. When the disease appears in the scrofulous diathesis, as it does in the majority of instances, it then consists of tuberculous deposits in the cancellated structure of the vertebra, and can hardly be viewed as inflammatory at the beginning, although it becomes so, in some measure, owing to the irritation caused by the morbid deposit. When it thus proceeds from tubercular deposits, the cancellated bodies of the vertebra are generally their seat. But it may appear, especially in weak or cachectic constitutions, independently of tubercles, although this occurrence is comparatively rare, and commence either in the intervertebral substance, or in the bodies of the vertebra, or even in the ligaments covering the spinal column, and ultimately involve the other structures. A recent writer justly remarks, that “the vertebra, in their natural structure, are extremely cancellated, and of a vascular texture; and any increase in the circulation of this part may induce inflammation. The ligaments covering the spinal column are also extremely vascular, and the vessels supplying both freely communicate; so that when any increased vascular action is set up in the structure of either, it may continue for some length of time, and vary con-

siderably in its activity, relatively to its cause. We observe an example of this in cases where the ligaments are strained by some sudden or powerful exertion. This brings on inflammatory action, in which the cancellated structure of the bones participates, owing to the free communication of the vessels of these two parts.”—E. W. TUSON, *on Curvatures of the Spine, &c.*, p. 218, 8vo. London, 1841.

97. A. Inflammation having commenced, it may continue a long time without giving rise to any severe symptom, until at last the motions of the spine, by perpetuating and aggravating the inflammation of the fibrous membrane covering the bones, cause thickening or swelling of it, which, with the products of the inflammation thrown out within the spinal canal, occasions pressure or irritation of the cord, or of the roots of the nerves, and the various spasmodic and paralytic symptoms which sooner or later supervene. Whether the disease commences in this more unequivocally inflammatory form, or in that of tubercular infiltration of the cancellated structure, on which the inflammation is contingent, the progress it makes is slow, and its nature frequently not clearly declared. There is generally pain in the portion of the spine affected; but this is the case in rachialgia; so that it is difficult, and often impossible, at an early stage to distinguish between this complaint and that, until the inflammation has induced dangerous changes. (*See the Diagnosis.*)

98. When the disease of the cancellated structure is produced by tubercular infiltration, as it is most frequently, the spinal cord and its membranes are then very rarely implicated until caries has occurred, this lesion often then irritating and affecting the ligaments and membranes, and producing the same symptoms, especially spasms, cramps, paralysis, &c., as generally, at a much earlier period, accompany chronic inflammation of the ligaments covering the bodies of the vertebra, or of the intervertebral substances. In whichever tissue the inflammation may commence, or whether it originates in this state of morbid action, or in tubercular deposits in the cancellated structure, softening of the bodies of the vertebra generally results, and the softened structures yield to the weight of the superincumbent parts of the body, and ultimately caries take place. POTT, who was the first to describe accurately this affection, viewed it as generally scrofulous. PALETTA, however, contended that this is not the case, and that it often arises independently of the scrofulous taint. In this view POTT has been supported by BOYER, DUGÈS, and others. Nevertheless, PALETTA is in the main correct, for it sometimes proceeds from the following causes, independently of scrofula, although these causes will very readily induce it in the scrofulous diathesis also.

99. B. The predisposing occasions of the malady are not infrequently severe attacks of exanthematous fevers, unwholesome or insufficient food, and a humid or impure air in childhood; masturbation about the period of puberty; a syphilitic taint, or general cachexy, and the excessive use of calomel, or of other mercurials in childhood or infancy. The most common exciting causes of the inflammatory states of the affection are exposures to cold, external injuries—as falls, blows, sprains, severe jerks, or sudden twists, or forcible rotations of the spine, and over-exertion of the muscles, especially in endeavouring to lift very

heavy bodies. A blow over the lower dorsal or upper lumbar vertebræ, particularly when a child or young person is struck in this situation, is very remarkably injurious; for the weight of the upper part of the body carries this part backward with a sudden jerk or impetus, while the parts struck are as forcibly driven forward. The results are, if the blow be severe, either a luxation or sub-luxation of two or more of the vertebræ, or a rupture of, or severe injury to, the ligaments and intervertebral substance. The more manifest effects of injuries of this nature may not become manifest until some months have elapsed from their receipt.

In such cases, inflammatory action of a slow or chronic kind is occasioned; and this is followed either by thickening, swelling, effusion, or purulent infiltration between the membranous ligaments and the bone, and, as a consequence of the latter changes, by caries of the bodies of one or more vertebræ, or by infiltration of puriform matter between the ligaments and muscles, thereby causing symptomatic abscesses. Disease of the bodies of the vertebræ, proceeding on to caries, consists, 1st, of inflammation of the cancellated structure—of an *osteitis vertebralis* of some writers, the *ostéite raréfiante* of M. GERDY; and, 2d, of tubercular deposits in this structure.

100. C. Inflammation commences with increased vascularity of the surface of the affected vertebra, followed by erosion or incipient ulceration. At a more advanced period, the body of the vertebra is swollen, injected, and of a deeper red colour. At the same time, its structure is less dense, softer, and more friable, and is hence more disposed to yield, or to be compressed or injured by the weight of the superincumbent parts, or by suddenly bending or rotating the trunk, or when lifting heavy bodies. This form of the disease may also commence in the ligaments covering the bodies of the vertebræ; and it may be connected with acute or sub-acute rheumatism, especially when commencing in the ligaments, although this is a rare occurrence; but, however occurring or associated, it may extend to the periosteum, the inflammatory products infiltrating the adjoining parts, detaching the periosteum from the bone, and thereby causing caries of the latter; or it may even originate in the intervertebral fibro-cartilaginous substance, and extend to the other structures, more especially to the bodies of the vertebræ.

101. The disease may commence in the centre or in the sides of the bodies of the vertebræ. In this case, the bone is found to have become redder, softer, and more vascular, and less capable of sustaining a superincumbent weight or pressure; and the progress of the disease is generally more rapid than when it begins in the intervertebral cartilage, or in the ligaments. If the disease commences in the membrane covering the upper and lower portions of the bodies of the vertebræ, the attachments between these become weakened, and ultimately destroyed, and the malady proceeds with considerable rapidity. When it originates in the centre or in one side, or anterior part of the intervertebral substance, ulceration frequently follows, or suppuration supervenes from the extension of the inflammation, the matter infiltrating the adjoining tissues, and either causing or extending the caries of the bone. When the disease commences in the centre of the intervertebral structure, a softened, grayish, and brownish state of the structure is observed;

and this is followed by ulceration, disease of the bodies of the vertebræ, caries, suppuration, &c. In these cases, the disease of the structure may advance anteriorly, or to either side, and, according to its direction, occasion not only a more or less angular form of curvature, but a lateral curvature also—a circumstance requiring attention in forming our diagnosis and prognosis. Thus disease of the bodies of the vertebræ may be either primary, or the consequence of inflammation, suppuration, and ulceration of the intervertebral substance, and of the ligamentous apparatus of the column.

102. D. Tubercular disease of the bodies of the vertebræ occurs either as an infiltration of the cancellated structure with tubercular matter, or as an agglomeration of the matter into masses, which are surrounded by a cyst or envelope; this latter being more frequent and most manifest. In these cases the tubercular masses undergo similar changes to those observed in the lungs; and as they pass from a crude to a softened state, excavation and ulceration of the containing or surrounding parts takes place, until the vertebra is nearly reduced to a shell, or is formed into several cells, and becomes crushed under the superincumbent weight, the spinous processes of the diseased vertebra, which at first were merely tender and prominent, rapidly becoming angular, and passing from an obtuse to a more acute form. As soon as the curvature presents a sharp or angular projection, destruction, or loss of substance of a part of one or more of the bodies of the vertebræ, may be inferred. The resulting deformity will depend upon the portion of the spine affected, and the extent of destruction which has taken place.

103. ii. THE SYMPTOMS AND DIAGNOSIS of this state of spinal disease are extremely delusive at an early stage, and before curvature becomes manifest; and it is still more difficult to determine, even at any stage of the complaint, in many cases, whether the malady results from inflammatory action, or from tubercular deposition, or from both, either having been the primary change. A knowledge of the constitution or diathesis of the patient, of the causes which have produced the disease, and of the whole history of the case, will often throw considerable, or even sufficient, light on its nature; but these data may be wanting, and the only information which can be obtained may be afforded only by the existing state of the patient, or even by the angular distortion demonstrating more or less destruction of the bodies of the vertebræ. While the serofulous diathesis, and the stealthy progress of the affection, indicate tubercular deposits as the cause in the one case, the previous occurrence of injury, and the absence of the serofulous taint, will suggest inflammatory action in the other; and, when viewed in connexion with more or less pain, and with the other symptoms, will often evince the nature of the mischief, even before it has advanced to angular projection. Pain is not, however, a constant symptom, even in the more inflammatory state of the disease, especially at an early stage, and often it never amounts to more than an aching; while in the serofulous form pain may not be much complained of, unless on some occasions. As the disease advances, pain is either more constant or more severe, especially in certain postures, or when rotating or bending the spine, and it is attended by a sense of con-



striction and pain in the base of the thorax and epigastrium, or in the abdomen, according to the part of the spine affected. Even before any marked curvature is detected, this constrictive pain is often felt, and the patient sometimes complains of a grating sensation when turning or rotating the spine, more especially when the disease originates in inflammation of the vertebræ, or of the spinal ligaments. In addition to these symptoms, nausea, vomiting, attacks of pain at the epigastrium, dyspœna, restlessness, costiveness, and evening exacerbations of fever supervene, with increased sensibility of the surface, and cramps, or sometimes numbness of the lower extremities. These may continue an indefinite, but generally a considerable period, the angular character of the curvature becoming more and more manifest. The patient now is generally unable to sustain the weight of the parts above the diseased portion of the spinal column; and he endeavours, when erect, to support himself by leaning upon his elbows or arms, or by placing his hands upon his hips or thighs. He becomes also less capable of walking, his gait being unsteady, shuffling, or peculiar and slow.

104. Whether originating in inflammation or in tubercular deposits in the bodies of the vertebræ, the angular projection of the spinous processes is not very great until caries of the bone and ulcerative destruction of the intervertebral substance have advanced. The loss of structure in a portion of the column, owing to the weight of the superincumbent parts, is attended by more or less distortion, not only of the posterior aspect of the spine, but also of the anterior regions of the trunk. According as the cervical, the dorsal, or the lumbar vertebræ are diseased, the distortion varies remarkably, and as a necessary consequence of the difference in the conformation and attachments of the vertebræ of these regions.

105. *a.* When the *cervical vertebræ* become carious—an occurrence, according to my experience, observed chiefly as a sequela of scarlet fever—the curvature or projection of the spine is not marked; but the neck becomes shortened, drawn somewhat to one side, and is moved with great pain. Partial or incomplete paralysis, chiefly of motion, is often experienced, and frequently increases or passes into general palsy, terminating in asphyxia. Yet I have seen cases in which anchylosis took place, the recovery being complete and permanent, the neck being only shortened and rendered stiff, the head being generally turned somewhat to one side.

106. *b.* When the *lower cervical and upper dorsal vertebræ* sink from loss of structure, the chest is flattened, the sternum is drawn inward and downward, and the patient generally experiences difficulty of breathing, owing to the impaired action of the scaleni and other respiratory muscles. The depression of the chest anteriorly is often very great in these cases. When the middle or lower dorsal vertebræ are diseased, the chest is either flattened anteriorly or in a lateral direction, one side falling inward more than another; or either side may be compressed while the other projects; or both sides may be flattened, and the sternum pushed forward. The thorax always approaches very close to the pelvis, and the abdomen is much shortened. The distortion varies much with the seat and extent of caries; and, according as either side of the vertebræ is more affected than the other, the posture most com-

monly assumed by the patient, and found most easy, also influencing the form of distortion.

107. *c.* When the *lumbar vertebræ* are diseased, the lower or floating ribs are sunk inward and downward, and sometimes even below the crests of the ilium. The abdominal regions fall inward, and are much diminished in their vertical direction. Owing to a greater or less amount of caries in one side of the vertebræ than in the other, or to continuing a certain posture in preference to any other, or to spasm, or permanent contraction of certain muscles, more or less of lateral curvature may be associated with angular projection of the spine, the caries being the cause of both the forms of curvature. When these cases terminate favourably, or when anchylosis takes place, this associated form of curvature may exist to a greater or less extent, and even be attended by some degree of twist, or contraction of the trunk to either side.

108. *iii.* THE CONSEQUENCES, COMPLICATIONS, AND TERMINATIONS of angular projection or curvature of the spine are: 1st, changes in the tissues external to the spinal column, or in its vicinity; 2d, changes in the structures lodged in the spinal canal, and in the nerves issuing from the canal; and, 3d, alterations of a restorative nature in the seat of the disease.

109. (*a*) When inflammation, ulceration, or caries exists in one or more of the vertebræ, the usual products of these changes frequently contaminate the adjoining cellular tissue, induce inflammatory action, and give rise to purulent formations, which pass in various directions, according to the peculiarities of the case, ultimately pointing externally, or even internally, at a distance from the original seat of disease, as fully shown when treating of *sympomatic abscess*. (See *art. ABSCESS*, § 24, *et seq.*)

110. (*b*) Although inflammation or caries of one or more of the vertebræ often exists without implicating the spinal cord or its membranes, or even the nerves proceeding from the canal, nevertheless the membranes are often affected, a chronic form of inflammation being developed, which may be followed by effusion of lymph, and by consecutive changes in the cord, or in the roots of the spinal nerves. When the membranes or cord are thus implicated, the symptoms about to be described, as indicative of inflammation of these parts (§ 120, *et seq.*), are observed, and are usually followed by incomplete or complete paraplegia, and often by the extension of the morbid action along the spinal membranes to the base of the brain, occasioning general paralysis, delirium, coma, and death. But, independently of any affection of the cord or of its membranes, the nerves may be subjected to pressure, owing to the attendant swelling of the parts surrounding their exits from the spine, or to the destruction of parts in the progress of caries. If the pressure be slight, or if it occasion merely irritation of the nerves, severe or neuralgic pains in the course or terminations of the affected nerves, or cramps of the muscles supplied with them, will be experienced; but if the pressure be greater, paralysis of motion, or of sensation, or of both, will be present. Thus, owing to consecutive affection—to the consequent congestion, irritation, or inflammatory action, tumefaction, effusion, and pressure, implicating the membranes of the spinal cord, the origins of the spinal nerves, and even the cord itself, pain, spasm, paralysis, &c., super-

vene and complicate the disease of the vertebræ; and, with or without either of these states of associated disorder, suppuration not infrequently takes place in the adjoining cellular parts, and purulent collections form, and often extend to considerable distances from the seat of caries (§ 109). In most cases, pain of a severe form is experienced in the seat of lesion, and even still more severely in the lower extremities, while the urinary functions are often more or less disordered.

111. (c) When the destruction of one or more of the vertebræ has proceeded to an indefinite extent, a reparative process—*anchylosis*—often commences, owing to a salutary change in the constitution of the patient, produced either by an improvement in the diet, or in the air, or by a judicious treatment; and a matter is exuded which becomes the seat of an osseous formation, cementing the adjoining vertebræ, and often partially filling up the spaces left by the destruction of the bodies of one or more of the diseased vertebræ. In these cases, the intervertebral and cartilaginous portions of the spine which have been destroyed are not restored, the osseous formations extending, without loss of continuity, but with varying grades of thickness, from the adjoining healthy vertebræ.

112. iv. THE DURATION AND PROGNOSIS OF caries of the vertebræ may be inferred from what has been already advanced. The *duration* of the malady is rarely less than two or three months, and it may be as many years. The *prognosis* depends much upon the habit of body and previous health of the patient; also upon the presence of suppuration, or of paralysis, or of both. Matter often forms and collects near the column, especially its anterior surface; and, in the more favourable of these cases, opens externally, the track of the matter being sometimes very long, and the external opening distant from the diseased vertebræ. The carious destruction may, even in some of these cases, be repaired by anchylosis and by the column falling together at the angle corresponding to the quantity of substance lost; but much more frequently the disease exhausts the patient, the symptoms usually showing that the spinal cord and its membranes suffer more or less. Thus the cord itself may be compressed by tumefaction of the ligamentous apparatus, by the irruption of an abscess into the canal, by dislocation of fragments, or of the whole, of a vertebra, or by the products of circumscribed inflammation of the *dura mater* of the cord; or it may be bent, pressed upon, or irritated at the spot where the angular projection is commencing; or it may waste, or circumscribed inflammation may take place in it, or diffused inflammation in its membranes. When the upper dorsal vertebræ are carious, the abscess sometimes opens into the thoracic cavity, or into one of the bronchi, and matter and necrosed or carious fragments of vertebræ are discharged through the air-passages. Caries of the abdominal part of the column is very often complicated with what is commonly called *psaos abscess*.

113. The prognosis may be farther directed by the following symptoms: if a scrofulous or syphilitic taint exist; if the constitutional or vital powers be much depressed; if symptoms of inflammation of the membrane appear; if palsy, or even cramps, supervene; and, more especially,

if the palsy extends; if febrile symptoms with delirium are present; and if the urinary functions are much disordered, an unfavourable opinion of the issue should be entertained. On the other hand, if the general health be not greatly impaired; if the several excreting functions are not materially affected; if sensation and motion are not disordered; if pain or constriction is not present, and if the digestive and assimilative functions are not much disturbed, more or less complete restoration to a healthy state, by means of anchylosis, may be expected.

114. v. TREATMENT.—The means of cure should depend chiefly upon the causes and circumstances originating the disease. If inflammatory symptoms be present at an early stage—if these have followed a blow, sudden jerk, or injury of any kind; and if constriction, severe pain, increased by motion, be complained of, the application of leeches, or of cupping-glasses, near the seat of pain, will generally be serviceable. These may be followed by a terebinthinate embrocation or by a blister, the latter being applied considerably below the seat of the disease; or the blister may follow several applications of the embrocation, or it may be kept discharging for some time. These means, however, ought to be employed, or persisted in with due caution, and a careful observation of their effects.

115. If the disease appear independently of any injury, violent exertion, or inflammatory cause; if it come on in a gradual or stealthy manner; if it occur in a scrofulous, caehetic, or syphilitic diathesis or taint; if the patient feels a grating sensation when rotating the trunk; and if indications of purulent formations in the vicinity, or of a symptomatic abscess, are present, neither leeches, nor cupping, nor blisters, will be of any service; they will much more frequently be prejudicial. In these forms and states of the disease, such means as will remove the weight of the upper parts of the frame from the diseased vertebræ, and promote vital resistance to the extension of the disease, and improve the digestive, assimilative, and excreting functions, have been found most beneficial in my practice—even in some cases of great and almost hopeless severity. A combination of these, with such as more frequently produce an alterative influence upon the capillary circulation, more especially with the preparations of iodine, or with the bichloride of mercury, or with the solution of potash, or BRANDISH'S alkaline solution, ought always to be preferred. I have often found that a change from a course of some continuance of the one, to that of another form of combination, has been of manifest benefit—that the exhibition of the bichloride, in the simple or compound tincture of cinchona and fluid extract, or concentrated compound decoction of sarza, for a longer or shorter period, according to circumstances, followed by the compound tincture of iodine, or the iodide of potassium, with BRANDISH'S solution, or the carbonate of potash, and the other preparations just mentioned, has been of very essential benefit.

116. When the inflammatory form of the disease has gone on to the production of caries, or to suppuration, and in the scrofulous, syphilitic, or rheumatic states, the above means are most deserving adoption, and may often be aided by the application of the liniment already prescribed (§ 54) along the spine, or of some one of the



other terebinthinate liniments prescribed in various parts of this work, as well as in the *Appendix*. When the disease is attended by anæmia and much debility, then the preparations of iron, especially the iodide of iron, should be given in sirup or sarza, or in other suitable forms. In the several scrofulous states of the disease, the means advised for the treatment of SCROFULA (§ 172, *et seq.*) will be of more or less service. The propriety of having recourse to issues, or setons, or moxas, or other forms of derivation, has been a subject of discussion. POTT recommended issues on each side of the projecting spinous processes, and the practice has been very generally adopted since his time, with apparent benefit in some cases, and with no advantage in others. SIR B. BRODIE, an authority of the greatest weight, states that he has seen no benefit result from the use either of these or of blisters. There can be no doubt that they are not so generally, or even so often beneficial, as they were formerly believed to be, and that an indiscriminating recourse to them is as frequently injurious as beneficial; but if due regard be paid to the form, state, or progress of the disease, they will often be of service; if, however, caries be extensive; if it be attended by anæmia, great emaciation and debility; if the digestive, assimilating, and excreting functions be much impaired; and if the medicinal and regimnal treatment be not prescribed appropriately to the state and peculiarities of each case, these and similar means will not only entirely fail, but will even accelerate a fatal issue, by lowering still farther the already depressed condition of vital power, and by increasing the extent of caries, or the amount of suppuration, or of vascular contamination. I have usually had recourse to these means only after inflammatory symptoms have been combated as far as circumstances permitted, and when the contraindications to their use were not present; and during their employment I have advised the tonic and alterative treatment already mentioned (§ 115, 116), with due attention to diet, change of air, &c.

117. While duly regulated modes of exercise are beneficial in other kinds of curvature, perfect rest is requisite in this; but rest should be aided by a wholesome air and a well-ventilated apartment. The use of those couches which facilitate the prone posture should be adopted; and, while all measures which forcibly extend the spine and risk injury to the structures contained by or adjoining the diseased vertebræ, ought to be avoided, the position chiefly maintained should, as much as possible, be such as will prevent the increase of curvature. This is as much as may be expected from couches merely; but, either with or without these, the avoidance of all motions of the vertebræ—either of flexure or rotation—ought to be studied. Forcible extension of the flexed portion, or forcible depression of the projection, may injure the early reparative changes of the diseased parts, by which ankylosis and a restoration to a comparatively healthy state are effected.\*

118. The consecutive disorders (§ 108–111), especially symptomatic abscess and paralysis, which often complicate angular curvature or ca-

ries of the spine, caused either by inflammation or scrofulous disease of the vertebræ, should be treated conformably with the views above exhibited, but appropriately to the stages and states of each case, and to the particular disorders which have been thus superinduced. As to the additional means which these latter require, I must refer the reader to what has been fully stated respecting them when treating of symptomatic abscess (see ABSCESS, § 62, *et seq.*), of Paralysis (§ 204, *et seq.*), and of Spasm (§ 313), where such measures as are most suitable to each of these associations are described.

119. VII. INFLAMMATION OF THE MEMBRANES, AND OF THE SPINAL CORD.—SYNON.—*Rachialgitis*, J. Frank. *Rachialgia Inflammatoria*—*inflammation commencing in, or extending to, either the spinal cord or its membranes, or both*.

CLASSIF.—III. CLASS, I. ORDER (Author).

120. DEFINIT.—i. *Pain in the spine, often acute, with or without rigours, commencing with increased sensibility of the surface of the body, and symptomatic fever, followed by spasms, cramps, constriction, &c., especially on motion, passing into palsy, usually in the form of partial or complete paraplegia, or general paralysis, with interrupted or disordered excretion*.

121. ii. PATHOL. DEFINIT.—*Inflammation occurring primarily in, or extended to, either the dura mater, or arachnoid, or pia mater of the cord, or the spinal cord itself, and generally implicating two or more of these, followed by thickening, effusions, adhesions, disorganization, &c.*

122. The diseases of the spinal cord, whether inflammatory or structural, present numerous analogies to those of the brain, not merely in their natures, which are frequently identical, but also in the phenomena to which they give origin. My friend, Dr. Wood, of Philadelphia, justly remarks in his very excellent work, that there is in both brain and spinal marrow the same liability to inflammation of the membranes and the nervous matter, to derangement from non-inflammatory organic affections, including hæmorrhagic and serous effusion; and these different affections in the one are not infrequently merely extensions of the same affections in the other. Like the brain, too, the spinal marrow contains nervous centres and conducting filaments, and it may suffer disease in these constituents separately or conjointly.

123. The spinal cord discharges certain offices, a knowledge of which is necessary to the diagnosis of its diseases. 1st. It receives impressions from other parts of the body, and transmits influence to these parts, either independently of the brain, or with the due exercise of the functions of the brain; 2d. It conveys influence to and from the brain; 3d. It is the medium by which impressions or influences are often conveyed from the ganglial centres to external and voluntary parts, and from the latter to the former.—(a) According to its first office, it aids the ganglia in the discharge of their functions, and re-enforces their energies; while, on the other hand, the ganglial influence is extended to it, by means of communicating or anastomosing branches. Hence, lesions of the cord or of its membranes very manifestly affect respiration, assimilation, secretion, excretion, and reproduction.—(b) Conformably with its second office, voluntary motion or sensation, or both, are interrupted, or disordered, or perverted, when either the spinal marrow or its

\* I have great pleasure in referring the reader to what Mr. BISHOP has stated on this subject, in his very able and philosophical work on Deformities of the Human Body, which appeared as this sheet was passing the press.

membranes are diseased.—(c) And, according to its *third* office, irritation or other affections of internal viscera, digestive, excretory, and reproductive, are frequently transmitted to external, distant, and voluntary parts, and from these latter to the former, as illustrated by the origins and courses of many diseases.

[It is now pretty well established that the spinal cord is neither a mere collection of tracts of nerve-fibres, nor a single nervous centre, but a collection or series of *central stations*, each of which has its own lines of nerve-fibres terminating in it, and serves to receive and to transmit, on numerous lines and in various directions, the impressions which are conveyed by the centripetal nerves abutting on it.]

124. It is manifest that the amount, as well as the character and seat of disorder, will vary remarkably with the particular structure inflamed, or otherwise diseased, and with the situation of the diseased part in the spinal canal, or with the extent of it along the cord. In estimating, therefore, the seat and nature of the malady indicated by the symptoms, certain pathological conditions should be kept in recollection: 1st. Disease or injury of the vertebræ, or of the intervertebral substance, or of the ligamentous apparatus, may, by irritation or pressure, more or less interrupt, disorder, or pervert the functions discharged by the spinal cord. 2d. The products of congestion, or of inflammation of the membranes, may, by irritation or pressure, exert a similar influence, in respect of the offices of the cord, independently of any actual or manifest disease or change in it. 3d. That inflammation, aided by its usual products, may, on the one hand, extend not only to two, or to all the membranes, but also to the substance of the cord itself. 4th. That inflammatory or other lesions of the cord itself may, on the other hand, extend to one or all its membranes. 5th. That this extension of the disease to the several structures is more frequent than the limitation of it to one only; and the extension of morbid action, more or less, along the spinal membranes and cord—or even to the base of the brain—is much more common, especially in very young subjects, than the limitation of it to a part only. 6th. That the extension and diffusion of inflammation is more rapid and general in the membranes than in the substance of the cord; and more so in delicate, scrofulous, and cachectic habits than in the robust and healthy. 7th. That, as far as my own experience enables me to judge, the extension of meningitis spinalis upward to the brain is much more frequent than the extension of it downward along the spine; and the latter mode of extension, as well as the complication of spinal meningitis with cerebral meningitis, is most frequent in very young and delicate children, and in cachectic and broken-down constitutions.

125. Although inflammation of the membranes is often associated with inflammation of the substance of the spinal cord, the disease commencing or predominating in either, still the one or the other may be separately, solely, or chiefly inflamed; and hence it is in some measure requisite to consider the phenomena which more especially belong to each, and which indicate a more prominent affection of one structure than of the other, when they are all more or less implicated. I shall, therefore, first notice inflammations of the membranes, and next inflammation of the substance of the cord.

126. i. INFLAMMATION OF THE MEMBRANES OF THE SPINAL CORD.—SYNON.—*Meningitis spinalis* — *Arachnitis spinalis* — *Meningite spinale*, Fr. *Spinal Meningitis*.

127. DEFINIT.—*Acute pain in the course of the spine, with or without rigours, attended by increased sensibility of the surface of the body, by symptomatic fever, by tonic spasms, especially on motion, followed by palsy, and often by delirium and coma.*

128. Although either of the membranes of the spinal cord may be primarily, or even separately and solely inflamed, yet the symptoms which more especially belong to the affection of each—which indicate either their separate or conjoint disease—cannot be distinguished in such a manner as to justify an attempt to form a diagnosis between them. That these membranes may be separately inflamed, although their conjoint affection is much more common, is often rendered manifest by the appearances observed after death, the pia mater displaying most frequently and most evidently the changes characteristic of inflammatory action.

129. a. The *dura mater* of the spinal cord is very seldom inflamed, unless as a consequence of injuries of the spine and disease of the vertebræ. In rare instances, however, I have found it inflamed in connexion with acute rheumatism, the usual changes consequent upon inflammation of the membrane, and of fibrous tissues in general, namely, exudation on the inner free surface, thickening, and adhesion to the arachnoid, having been found after death.

130. After injuries and caries of the vertebræ, local or circumscribed inflammation of the *dura mater* has occurred. In these circumstances, effusion of fluid has been seen exteriorly to the membrane, or between it and the bodies of the vertebræ, with or without exudations from the arachnoid lining the *dura mater*, &c. These changes have been described by BERGAMASCHI, LALLEMAND, OLLIVIER, myself, and many others.

131. b. The *spinal arachnoid*, especially in its visceral layer, forms a sac, which does not adhere closely to the pia mater, as it does within the cranium. The visceral layer, and the sac within it, are the seats of the most serious lesions of the inner membranes of the cord—of both the *arachnoid*, and of the *pia mater* of the cord. Inflammation of the arachnoid—*arachnitis spinalis*—is rarely observed without inflammation of the *pia mater* of the cord, and the vascularity is much more manifest in the latter membrane than in the former. There is, however, one change often seen in the arachnoid alone that may be viewed as a consequence of repeated or protracted congestions, or of slight attacks of inflammation. This consists of dulness, opacity, and thickening of the arachnoid, and is usually combined with chronic effusion of serum into its sac, especially the inner sac. Adhesions between the arachnoid and *dura mater* are rarely seen, unless as a consequence of injuries.

132. c. Inflammation of the *pia mater* of the cord (*meningitis spinalis*) may occur spontaneously or primarily, but it is most commonly connected with inflammation of the other membranes—frequently a consequence of inflammation of one or both, and is generally occasioned by external injuries. Spontaneous inflammation of the *pia mater* of the cord is often associated with cerebral meningitis, and is then especially



extended along the spinal cord. This complication is most frequent in infancy and early childhood. Inflammation of the pia mater is also commonly associated with inflammation of the substance of the cord with *myelitis*. I shall first notice acute spinal meningitis, subsequently the chronic states of the disease, and, lastly, the complications which spinal meningitis often presents in practice.

133. *A. ACUTE SPINAL MENINGITIS.*—*a.* Acute inflammation of the membranes of the cord, when occurring as a *primary and uncomplicated malady*, generally commences with pain or soreness in the spine, with chills or rigours, and increased sensibility of the surface of the body. In other cases the attack is more sudden and violent, with a sense of heaviness, pain, or uneasiness in the extremities. The pain is severe, and, although beginning in a particular part or region, generally extends more or less along the spine. The cervical region is most frequently attacked, especially in children, but the situation first affected depends much upon the cause in relation to the portion of the spine on which it acts. The pain is not confined to the spine, for all parts of the frame supplied with nerves proceeding from the portion affected, or its vicinity, are more or less subject to neuralgic pains or uneasiness, tingling, and formication, accompanied with spasms, and with constrictions around the corresponding parts of the trunk. These symptoms are always increased on motion, and in infants on their being moved, and when lying on the back on a warm bed.

134. When the cervical portion of the membranes is most affected, trismus, spasmodic retraction of the head, and tonic spasm of the spinal muscles, contraction or spasm of one or both arms, and twitchings or convulsive movements of the lower limbs, are commonly present. When the dorsal or lumbar portions are chiefly affected, painful constriction of the thorax or abdomen, increased pain on motion, with the other symptoms already mentioned, are present. In extreme cases the spasmodic contractions of the dorsal muscles recur, or are exacerbated at intervals, and give rise to attacks of opisthotonos. Although the lower extremities are affected by pain, cramps, or clonic spasms, and are more or less enfeebled, the power of voluntary motion is not lost at an early stage, but it becomes much impaired, and ultimately abolished at an advanced period, and when the disease is not arrested in its usual course.

135. Febrile symptoms are always present; the pulse is hard, frequent, and constricted, or sometimes small; the heart's impulse is increased; the skin hot, acutely sensitive, sometimes perspiring freely; respiration is laborious, anxious, suppressed, or painful; the bowels are constipated; and the urine is suppressed or retained.

136. The above symptoms remit and recur at intervals, but they rarely intermit; and if the course of the disease be not arrested, they return with greater violence, the local symptoms evincing the extension of the disease along the spine, if it have commenced in any part of the column, until the paralytic affections become more and more general or complete, and until drowsiness, lethargy, or delirium; irregularity, smallness, or slowness of the pulse; involuntary evacuations, retention or incontinence, or alteration of the urine, and ultimately either asphyxia or coma, or both, supervene, and indicate the extension of the

disease to the base of the brain, as well as the more or less complete abolition of the functions of the cord, by the products of inflammation of its membranes. A fatal issue may take place in four or five days, or from that time to two or three weeks from the commencement of the attack.

137. *b.* On examination after death, the dura mater is generally found of a deeper colour than natural. The arachnoid is duller, more opaque, and somewhat thickened. The pia mater is reddened, injected, and swollen, especially in its posterior aspect. Fluid is effused between the membranes, especially between the pia mater and arachnoid, which is sometimes turbid, but more frequently coagulated, or in the state of coagulated lymph, or a purulent matter, occasionally mixed with a turbid serum or lymph, is sometimes met with. These changes may be limited to a portion of the cord, but they are more frequently extended more or less along it. The substance of the cord is often more vascular than natural. It is sometimes less vascular and firmer than usual, probably owing to the pressure occasioned by the effused fluids. It is not softened, unless the inflammation has extended into it.

138. *c.* The association of spinal meningitis with cerebral meningitis—*acute cerebro-spinal meningitis*—is more common than uncomplicated spinal meningitis, especially in infants and children. The disease may commence in either the spine or within the cranium, and extend more or less rapidly from the one to the other. It rarely occurs coetaneously in both. According to my experience, it most frequently commences in or near the base of the brain in children, extending downward; and oftener in the spine in adults, advancing upward to the brain. It has been observed, in both endemic and epidemic forms, in some parts of Ireland and France; and Dr. Wood refers to Drs. HICKS, TAYLOR, and AMES, who have described its occurrence in these forms in some districts of the southwestern states of North America.

139. *Cerebro-spinal meningitis* commences, in the milder cases, with general uneasiness, a sense of fatigue, headache, pain in the neck and back, extending often along the spine, stiffness of the jaws, difficulty of deglutition, constipation, and retention of urine, or difficulty of micturition. As the disease advances, headache becomes more violent, and is attended by great sensitiveness of light and sound, by rigid spasms, retraction of the head and neck, acute sensibility of the surface of the body, by increased rigidity of the trunk, or cramps of the extremities on motion, and by convulsive movements of the limbs. The febrile excitement is great; the pulse is very frequent, constricted, or small; the skin is hot, thirst is urgent and constant, delirium supervenes, and is often preceded by vomitings.

140. In the severest attacks, chills or rigours, attended by severe pain in the abdomen and spine, and by vomitings and purging, are followed by reaction, and by all or most of the symptoms now enumerated in a more violent form. If the disease be not early arrested by treatment, more or less general paralysis and coma soon follow the above symptoms, and death ensues. The disease may run its course in forty-eight hours, but it much more frequently continues for six or seven days, and sometimes it may be prolonged to two or three weeks.

141. *d. On dissection*, the morbid appearances are said to have been comparatively slight in some of the endemic or epidemic cases, vascularity and effusion not having been great, although more or less general, and the substance of the brain and cord not sensibly altered. More frequently, however, the changes have been remarkable, especially an effusion of greenish or yellowish lymph between the arachnoid and pia mater, which was scanty or nearly absent on the cerebral hemispheres, but much more abundant at the base of the brain and in the spinal column, either investing the cord completely, or somewhat more abundant on its posterior aspect. It has sometimes extended along the whole cord to the extremity of the caudæ equina, coating even the roots or commencement of the spinal nerves. This morbid exudation has not been found in the external sac of either the cranial or the spinal arachnoid.

142. *B. CHRONIC SPINAL MENINGITIS.*—Chronic inflammation of the membranes of the spinal cord has hitherto been very imperfectly described and illustrated, and, as far as my own experience warrants the statement, it is certainly not so rare a malady as stated by several recent writers. It may occur as a consequence of an acute or sub-acute state of spinal meningitis; but I have observed it much more frequently as the primary disease, upon which an acute or sub-acute state supervened sooner or later, or as the disease extended upward to the medulla oblongata, or base of the brain. The earliest account of a case of chronic spinal meningitis, with the appearance after death, was recorded by myself in 1820; and since then I have seen a considerable number, and examined the bodies of several of them.

143. While the morbid appearances in the cases of acute spinal meningitis have been such, as far as I have observed them, as to indicate the chief seat of morbid action to have been the inner sac of the arachnoid, or between the arachnoid and pia mater, the changes in chronic spinal meningitis have shown the external cavity or sac to have been their principal or only seat, effusion of coagulable lymph between the arachnoid of the dura mater and the visceral arachnoid obliterating the cavity by adhesions of the opposite surfaces by this medium. This diversity may depend upon the circumstance of the disease assuming not only a more acute, but a more rapidly diffusive character when the inner arachnoid is attacked, or when the fluid is effused between the arachnoid and pia mater, than when the disease commences, as it probably does in chronic cases, either in the dura mater or on the arachnoid covering it. Chronic meningitis may follow the acute form, or be produced by any of the causes about to be assigned.

144. *a. The causes of chronic spinal meningitis* are the causes of chronic maladies generally (§ 16, *et seq.*), but they are more especially blows or falls on the spine, particularly on its lower regions; currents of cold air, after having been overheated, directed on the spine; sprains or bruises of the column; sleeping in damp beds or upon the ground; the abuse of alcoholic liquors; venereal excesses; the extension or metastasis of rheumatism to the membranes and ligaments of the spine; the congestion of the spinal membranes during continued and eruptive fevers; caries of the vertebrae; and various organic changes implicating the cord or the membranes.

145. *b. The symptoms*, especially the initiatory

symptoms, vary much, according to the cause, to the temperament, habit of body, and age of the patient, and to the region of the spine primarily affected. Whatever part may be first attacked, the tendency to spread, or to extend upward, as well as downward, should not be overlooked; for, although this tendency is not nearly so remarkable as in acute spinal meningitis, yet it exists more or less. It may not be remarked for months, or even for years, in the more robust and otherwise healthy subjects, the patient hardly presenting any increase of ailment, or even becoming greatly relieved; but more frequently, especially in delicate or cachectic persons, or during an injudicious treatment, the symptoms extend and become aggravated, more or less rapidly, and either pass into a sub-acute or an acute state, or indicate the extension of the inflammatory action to the base of the brain. This aggravation and extension of the malady are favoured by a recurrence of the causes which first induced it, by mental perturbation, by physical exertions, attended by sudden or frequent movements of the spine, by measures which lower the powers of life and of vital resistance, by imperfect attention to the digestive, secreting, and excreting functions, &c.

146. Chronic spinal meningitis generally comes on slowly and insidiously; and, owing to many of the most severe symptoms being experienced in parts far removed from the spine, it is often, at early periods of its course, mistaken for chronic rheumatism, for neuralgia, or for simple weakness of the limbs, or even for atonic gout. As it proceeds, it may be viewed as a form of rachialgia or spinal irritation, or as an attack of chorea, either of which may be followed by, or pass into, chronic spinal meningitis at some period of their course, even if they should not prove identical with the early progress or commencement of chronic inflammatory action in the spinal membranes, or with congestive states of these membranes, upon which the inflammatory may supervene.

147. The patient complains of aching, or of dull pains in some part of the spine, generally connected with pains in the nerves or in their extremities, corresponding with the part of the spine affected; or with pains in the extremities; or with formication, tinglings, prickings; or with a combination of these, with some degree of numbness in the lower limbs. The pain in the lower extremities is sometimes most poignant, especially in certain positions or movements; is occasionally absent, or intermittent, or remittent; and is succeeded during the intermissions by uneasiness in various forms. The gait of the patient becomes now weak, unsteady, and tottering. He moves with difficulty or uncertainty, and staggers or straddles when he attempts to walk. If the disease extends to the dorsal and cervical regions of the cord, a similar difficulty and irregularity of motion are observed in the hands. The fingers imperfectly perform their office; their motions being irregular, slow, and difficult, and articles being held by them awkwardly and insufficiently. The movements of the arms are irregular or in jerks, so that the patient is either nearly or altogether incapable of feeding himself. He may continue in this state for months, or even years. One gentleman whom I attended was nearly as now described for seven or eight years, experiencing various exacerbations, but always suffering more or less, the disease having all this time affected



the whole spine to above the nape of the neck, and being attended, as it usually is, by spasmodic contractions in various muscles, and distressing constrictions around the abdomen and thorax. During this state of the malady, flatulence of the stomach and bowels, anorexia, costiveness, or marked irregularity of the bowels, incontinence of urine, dryness of skin, or occasional sweats, and aggravation of the symptoms during the night, or when warm in bed, are more or less experienced.

148. During the progress of the disease, the pulse may not be materially affected, especially when the lower regions of the cord are chiefly or solely affected. But when the membranes of the cervical portion of the spine are attacked, the pulse is often very slow, and the actions or impulse of the heart disordered. Palpitations are frequent when the dorsal region is more acutely implicated. Difficulty of deglutition, slowness or irregularity of respiration, spasm of the muscles of the neck, with paralysis of one or both arms, or irregular motion or contractions of the arms, often supervene, particularly as the disease extends upward to the cervical membranes. Ultimately the paralysis becomes complete, especially the power of motion, at first in the form of paraplegia, and if not arrested, passes into incomplete or complete general *paralysis* (see that *article*, § 69, *et seq.*) With the progress of paralysis, impaired animal heat and nutrition, a disposition to form gangrenous sores in parts pressed upon, and the several phenomena described under that head, supervene. At last the lesion of the membranes extend to the medulla oblongata and base of the brain, and life is terminated by asphyxia, or more slowly by coma, supervening on delirium. In some cases the chronic affection of the lumbar or dorsal spinal membranes, after a protracted continuance, or even after a marked improvement of all the symptoms, is unexpectedly followed, or after evident causes, by an acute attack, extending upward to the cervical region, or to the base of the brain, and more or less rapidly causing dissolution. Of this course of the malady I have met with several instances. A few of these have been noticed under the *article PARALYSIS*, in the chapters on *Paraplegia* and *General Paralysis* (§ 48-74); others have occurred to me since that *article* was written.

149. *c. Chronic Spinal Meningitis following the acute.*—A medical friend was driven, after having been overheated, during a cold night, to some distance in an open carriage. He was soon afterward seized with pain in the lower dorsal and lumbar muscles, and with most acute pain and cramps in the lower extremities. I did not see him until several weeks after the commencement of this acute attack. He then complained of extremely severe rheumatic pains in the lower limbs, with increased sensibility of the surface, a nearly total loss of motion of the lower extremities, of tenderness on pressing the spinous processes of the upper lumbar vertebrae, of a girding sensation proceeding thence around the abdomen, with occasional cramps and paroxysms, of pains in the thighs, legs, and feet. His bowels were costive; his urine was voided regularly, but it contained much of the phosphates. The disease was viewed as acute rheumatic inflammation of the membranes of the cord, which had passed into a more mitigated and chronic form; and it was inferred that coagulable lymph was effused between the

membranes, the patient having continued paraplegic. Another medical friend, whom I soon afterward attended for some time with Dr. Watson and Sir B. Brodie, was similarly attacked. The urine was freely voided, but it abounded with the phosphates. In the course of our attendance, inflammation of the femoral veins supervened. This complication was, however, overcome; but the spinal disease became chronic. This case was also caused by exposure to cold after being overheated, and was viewed as rheumatic.

150. *d. Chronic Spinal Meningitis; Lymph between the Membranes, partially converted into adipose Substance.*—A female, aged about 50, very corpulent, complained of pain in the dorsal spine, and loss of the power of motion in the lower extremities, with tenderness on firmly pressing on the spinous processes of the lower dorsal vertebrae and with spasms of the muscles of the lower limbs. The loss of motion was gradual, was preceded by spasms and increased sensibility, and was more complete in one limb than the other, but it slowly became complete in both. There was no loss of sensibility. The bowels were costive, the urine was sometimes retained, but subsequently was often passed involuntarily. A distressing feeling of constriction around the abdomen was complained of. After some months the voluntary motions of the lower extremities partially returned, and the excretion of urine was more under command; but some time afterward the pain in the spine extended upward, the constriction being then referred to the thorax. One arm soon afterward became partially paralyzed, and she soon afterward died of asphyxia. She had imputed her attack to exposure of her back to a current of cold air when insufficiently clothed; but her habits were very intemperate. On examination after death, the venous sinuses of the vertebral canal were remarkably congested with black semi-fluid blood. Coagulated lymph, partially organized, was effused between the dura mater and visceral arachnoid; and the more organized portions presented an adipose appearance, from the quantity of oil-globules they contained. The upper portion of the cord and medulla oblongata were very vascular, and surrounded by a turbid serum and recently effused lymph.

151. The inflammation in this case, after being limited for many months, in a chronic form, to the membranes of the lumbar and dorsal portions of the cord, ultimately extended upward in a more acute form to the membranes of the cervical medulla and the medulla oblongata, the effusion of lymph from the inflamed and congested membranes in these latter situations having been the more immediate cause of death. The oleaginous change, or approach to a fatty degeneration of the more organized portions of the coagulated lymph observed in this case, was still more remarkable and complete in the following.

152. *c. Chronic Spinal Meningitis supervening upon prolonged Jaundice; Lymph effused between the Membranes, and converted into a soft, adipose tissue in the dorsal and lumbar Region.*—A lady, aged about fifty at her death, was attended by Dr. King, of Eltham, and the author, for jaundice, which had continued for several years without having been materially influenced by treatment. She had, however, retained her strength, flesh, and spirits, and was able to go abroad daily, until nearly a twelvemonth before her death, when she gradually lost the motive power of her lower ex-

tremities, sensibility having been unimpaired. She had, previously to, and about the accession of the palsy, complained of pain in the lower dorsal and lumbar spine, with constriction around the abdomen. The bowels were costive, but the excretion of urine was not materially affected. The menses were regular, and continued so up to two or three months before her death. The palsy had continued for many months, with a slight improvement during the latter months, when a few days before her death, and owing to mental and physical perturbation, signs of the extension of the spinal meningitis, in an acute form, to the cervical portion of the cord, and to the base of the brain, appeared, with paralysis of the upper extremities, delirium, and coma.

153. On examination after death by Dr. KING, and two other medical men, in my presence, the dorsal and lumbar spinal membranes were found agglutinated by a substance which presented an organization almost identical with adipose substance, but which, as it approached the upper portion of the dorsal region, presented more and more of the characters of firmly coagulated or partially organized lymph; and, in the cervical region, as far as the base of the cranium, the lymph had the usual appearance of recent effusion, and was attended by a considerable accumulation of turbid serum. In this case, as well as in others where I have observed coagulated lymph many months after its effusion between serous surfaces, the conversion of it into an adipose, or rather into a cellulose-adipose tissue—a more or less fatty degeneration of the coagulated or organized lymph—had been effected, this conversion being in some respects a process of reparation, admitting of a partial return of the functions of the diseased parts. (See *Of the Causes, Nature, and Treatment of Palsy and Apoplexy*. By J. COPLAND, M.D., F.R.S., &c. London, 8vo, p. 60, *et seq.*)

154. ii. INFLAMMATION OF THE SPINAL CORD.—*Myelitis*, from *μυελος*, the medulla spinalis.—*Myelite*, Fr.—*Markenzündung*, Germ.—Inflammation of the substance of the spinal cord may be *acute* or *chronic*, as observed in spinal meningitis, and it may occur primarily and simply, but it is more frequently associated with inflammation of the pia mater of the cord, often extending also to the visceral arachnoid. The frequency of these associations—the extension of the inflammatory action from the one structure to the other—and the circumstance that the disease rarely comes under the eye of the physician until it is advanced in its course, render the early history of myelitis difficult to be described. The older writers on medicine appear to have been unacquainted with this disease; and it is only since pathological anatomy was advanced by comparatively recent inquirers that the diseases of the spinal cord and of its membranes have received any attention, very much still requiring to be ascertained respecting the extent of function and the lesions of this part of the nervous system, and the signs and symptoms by which these lesions are manifested during life. Among the several writers of the present day who have noticed the diseases of the spinal cord, very few have endeavoured to distinguish the symptoms which are proper to inflammation of the cord, from those which more especially belong to inflammation of its membranes; and the signs, which some writers have assigned to the one disease, have been by others attributed to either.

155. *A. Acute Myelitis* commences, with or without chills or rigours, with acute, deep-seated pain in some portion of the spine that is much aggravated by motion. J. FRANK, however, says, that he has not observed this exasperation of the pain on motion. I have remarked it, but not always. The patient lies sometimes on the abdomen, sometimes on either side, but he cannot lie long on his back on a soft and warm bed. According to KLOHSS, this last position may be much longer retained on a hair mattress. The spinal pain is generally more or less limited in extent, and is attended by stupor or numbness, and prickings or tinglings in the corresponding muscles and limbs. The stupor is the more marked the more violent and rapid the inflammation, and the sooner terminates in more or less complete palsy. In some cases the patient cannot move his lower extremities, which are the seats of excessive pains, exasperated most acutely by the slightest contact. M. OLLIVIER and myself have seen the pain and sensibility so excessive as to render the contact of the bed-clothes unbearable. The retention of the fæces and urine is at first more or less complete, but their involuntary excretion is very common as the disease advances. In rare cases, or when the malady is very rapid, the alvine discharges are involuntary from the beginning. Occasionally, however, constipation continues throughout, and excretion of urine remains under the control of the will.

156. The paralysis consequent upon myelitis sometimes ascends from the lower extremities until it reaches the superior parts of the trunk, and even the superior members, causing death by affecting the respiratory nerves, and producing asphyxia. In rare cases, the disease proceeds in an opposite direction, extending from above downward. In some instances, there is only loss of motion, sensibility being slightly or not at all impaired. In others, sensibility alone is abolished; and in several, there is loss of both motion and feeling to an equal extent. These differences are owing to the parts of the cord affected. It was formerly believed that the anterior columns, presiding over motion, were affected when motion was lost, and that the posterior, presiding over sensation, were affected when sensibility was lost. Several cases, however, recorded by RULLIER, STANLEY, WEBSTER, and others, prove either that the changes observed in the posterior columns of the cord have taken place at the moment of, or immediately after dissolution, or that sensation may be transmitted through other channels besides these columns, or even independently of the spinal cord itself. But this subject has been sufficiently discussed in the article PARALYSIS (see § 179, *et seq.*). It may, however, be here remarked, that in the cord, as in the brain, the white or fibrous structure may be more especially connected with motion, the gray structure with sensation and its several manifestations. Usually paralysis commences in a single limb, and afterward extends to the opposite side. Sometimes spasms, contractions, or convulsions of various duration, precede the paralysis. When palsy is complete, the limb is flaccid as well as motionless, but when less so, permanently contracted and painful.

157. Myelitis seldom is seated in the whole extent of the cord; much more frequently in a portion only, the symptoms generally indicating the seat. If it be in the vicinity of the annular pro-



tubercance, disorder of the senses, or furious delirium, or many of the symptoms of inflammation of the brain, and even hydrophobic symptoms, followed rapidly by general paralysis and asphyxia, are often observed. If the cervical portion is affected, there are pains in the neck, and generally rigidity of the muscles of the neck and of the upper extremities, which are sometimes convulsed or contracted, and at last paralyzed. The palsy usually commences in one of these extremities only, and is preceded by numbness and prickings, at first at the points of the fingers, rising gradually thence to the hand, fore-arm, and arm, and is soon replaced by loss of motion, and often also by more complete loss of sensation. Respiration is generally laborious, painful, anxious, and performed chiefly or only by the diaphragm. M. OLLIVIER and myself have observed difficulty of deglutition at an advanced stage, this function being often painful also, especially when swallowing fluids. Singultus is also sometimes observed.

158. When the inflammation is seated in the dorsal portion of the cord, or between the two thicker portions, giving origin to the nerves of the extremities, then continued or frequent succussions of the trunk of the body, not extending to the limbs, are observed. If the thicker portions of the cord are affected, the convulsive movements extend to the limbs whose nerves originate in these portions. Respiration is short, precipitate, and performed by the diaphragm: there are likewise palpitations, and strong, frequent or irregular action of the heart. To these symptoms, according to the younger PINEL, there are joined a nearly entire abolition of the functions of the nerves originating in this part of the cord, and a state of febrile excitation of the other functions. When the lumbar portion of the cord is affected, spasms or constriction, or contraction of the abdominal muscles, paralysis of the lower limbs, involuntary stools, or retention of the urine and feces, with deep-seated pain in the lumbar spine, are observed. Sometimes priapism occurs, especially when myelitis is caused by a fall or injury. The duration of acute myelitis may vary from three or four days to as many weeks; and various febrile and sympathetic phenomena may attend individual cases; as vomiting, singultus, dyspnoea, delirium, morbid states of the urine, and a disposition to bed-sores, especially in the more prolonged cases, &c. (See art. PARALYSIS, § 64, *et seq.*)

159. B. CHRONIC MYELITIS may follow the acute, which, owing to treatment or other influences, may become chronic and slight, or sub-acute and ultimately chronic; or it may commence in a slight and chronic form, and after an indeterminate period, becomes more or less acute and rapidly fatal. The symptoms are chiefly a less intense state of those characteristic of the acute. There are generally pain, more or less slight or severe, in some part of the spine, and pains or cramps in corresponding muscles or limbs, for some time before loss of sensibility, or of motion, takes place. The paralytic symptoms may, however, be preceded by so little suffering as not to interest the patient, or come under the cognizance of the physician. There is seldom much tenderness upon pressing the spine, or increase of pain upon percussion of, or when pressing the spinous processes. After a time, and sometimes without much previous disorder, simple

diminution of sensibility or of the power of motion is experienced. This increases slowly. The patient is subject to tremour. The gait becomes uncertain, staggering, or tottering. He lifts and directs the extremities with difficulty and uncertainty. Ultimately the limbs no longer can support the body. Involuntary startings of the muscles, subultus, or rigid contractions of muscles or limbs, occur. The paralysis ascends to the trunk, affects the excreting functions, and implicates in some degree the circulating and vital functions, [as well as those of respiration, digestion, and calorification, &c.] The pulse becomes slow, irregular, or weak; the limbs flabby, œdematous, and cold; sloughs form on parts which sustain pressure. The urine is morbid, retained, or passed involuntarily, abounding in the sulphates and phosphates; and ultimately dyspnoea, coma, and death by exhaustion or by asphyxia takes place.

[Both acute and chronic myelitis, so far as we have observed, is generally preceded or accompanied by pains in the head, especially the occiput, and this symptom accompanies the disease in all its stages. The pain shoots down to the neck, back, and loins, sometimes passing over the cervical to fasten on the dorsal. Pain and rigidity of the muscles of the neck usually accompany the pain in the head, and the symptoms are greatly aggravated by motion. Though the dorsal vertebræ are most frequently the seat of the pain, it is not confined to the part, but extends over the body, disabling the patient from lifting or moving the arms or lower extremities without great suffering, while pressure over the part affected causes severe pain in a majority of cases. Other symptoms not mentioned by our author are great disturbance of the digestive functions, as impaired appetite, vomiting, constipation, disturbed sleep, a fretful, peevish, or desponding state of mind, a state of extreme lassitude and listlessness, great fatigue from slight exertion, and exasperation of the symptoms from slight shocks or jars.]

160. C. *Appearances in fatal cases of Myelitis.*—These consist chiefly of red softening of the cord in various degrees. It may extend through all the columns of a small portion of the cord, or along a large portion, and it may vary from a slight diminution of consistence to complete diffuence of the structure. It may affect only one or more columns, or it may be limited to either the white or to the gray structure, or it may extend to both. The softening is often yellowish, or presents merely a slightly red or pinkish shade. The changes in the cord may exist alone, or be associated with inflammatory changes in the pia mater and visceral arachnoid; much more rarely with changes between the dura mater and visceral arachnoid.

161. ROKITSANSKY remarks that, in the cord, as in the brain, inflammation attacks sometimes the white structure, sometimes the gray substance, occasionally both together. But myelitis of the gray substance exists in long streaks, or in the whole extent of this substance, restricting itself to this structure, and producing a peculiar condition of the cord, as well as the increase of volume, which attends softening, and a peculiar form of dropsy, in which it occasionally terminates. Red softening of the gray substance is tinted, according to circumstances, of a chocolate brown, or plum colour, or rusty brown, or yeast-

yellow, and corresponds with the central softening of the spinal cord, described by ALBERS. In chronic cases of myelitis, yellow softening of the columns, and condensations or indurations in various grades and extent, have been observed. Indurations, conjoined with atrophy, chiefly of the white columns, have also been remarked.

162. M. CALMEIL, who has paid much attention to diseases of the spinal cord, states, in relation to the comparative frequency of softening in the different regions, that, in twenty-five cases, six existed in the cervical region, eleven in the dorsal region, five in the dorso-lumbar, and two in the lumbar. In one case only was the organ softened throughout. In one instance the left half of the cord only was softened; in two the anterior columns were alone thus altered. The softened nervous structure preserved its natural colour in ten cases. It presented a yellow tint in six; a rose tint in four; a red colour in three; and a brown hue in one. The softened molecules were mingled with blood-globules in one. The pia mater was brown in one case, was injected and red in seven, and covered by false membranes in two instances. It may here be remarked, that the white and yellow softening does not necessarily proceed from inflammation; but as it gives rise to nearly the same symptoms as the inflammation, the difficulty of separating them is great.

163. iv. DIAGNOSIS.—A. It is of much importance to distinguish between *rheumatism* and inflammation of the spinal cord or of the membranes. The pain, both in the spine and in the corresponding nerves, or in muscles supplied by these nerves, will not be mistaken for primary rheumatism if this very correspondence be attended to, and if the girding or sense of constriction in the corresponding situations of the trunk be considered. The history of the case will also assist the diagnosis. It should, however, be recollected, that rheumatism may either extend or occur as a metastasis to the membranes of the cord. This has been supposed to be a very rare occurrence; but, according to my experience, although not frequently observed, it is by no means rare. When, however, it takes place, it is essentially inflammatory, assuming the sub-acute or chronic states of spinal meningitis, and hence no distinction is to be made between them in nature or treatment. It is only when rheumatism, in its usual forms, attacks parts in the vicinity of, or in nervous connexion with the spine, that the diagnosis is of importance. The spasms, the deep-seated burning sensation in the course of the spine; the tonic contractions of the muscles of the back, curving the trunk backward; the altered sensibility of the surface, with numbness or prickings in the extremities; the stupor or loss of motion will distinguish spinal meningitis and myelitis from rheumatism, which is unattended by cramps or tonic spasms, or by the constrictions or girdings of the trunk already mentioned. In the former, also, pressure or percussion, or pressure conjoined with heat, over the spinous processes, sometimes increases pain; but in the latter, pain is increased by pressure on the sides, or in the vicinity of these processes, and by motion of the affected parts.

164. B. The diagnosis between *spinal meningitis* and *myelitis* is much more difficult, inasmuch as the former generally influences more or less the functions of the cord, and inflammation of the

visceral membranes of the cord is often associated with myelitis. Spinal meningitis, however, has a marked disposition to extend itself, and is frequently complicated with cerebral meningitis, especially in children, while myelitis is generally limited to a portion of the cord only. Acute spinal meningitis may, with much certainty, be inferred from three symptoms: the first is a general contraction of the muscles of the back, varying from simple muscular rigidity to violent spasm, or tetanic rigidity, occasioning complete opisthotonos. In meningitis of the base of the brain, the head is thrown backward, or the cervical portion of the spine is sometimes retracted, but the trunk preserves its form. The second symptom is the violent pain extending more or less along the whole spine. The third is the continuance of sensibility even of the limbs, although motion may be abolished by the pressure of effused lymph on the cord and roots of the nerves.

165. The febrile symptoms are more marked or more severe in spinal meningitis than in myelitis; and paralysis of motion either does not occur, or not until effusion disorders the functions of the cord, or until inflammation extends to the substance of it. In myelitis the pain is not so severe; and the most remarkable symptoms are, impairment or loss of motion, and diminution of sensibility. In chronic myelitis the membranes often become similarly, or even acutely affected, the symptoms most characteristic of both spinal meningitis and myelitis being present.—*Spinal Apoplexy* (§ 192, *et seq.*) is to be distinguished from both these diseases by the sudden accession of the severe symptoms, and by the rapid occurrence of the paralysis of motion, and generally, also, of sensation.

166. v. COMPLICATIONS. — Spinal meningitis may be associated with myelitis, and in such cases the symptoms of the one will be accompanied with those of the other. This complication is often a consequence of severe injuries; retention of urine, priapism, paraplegia, &c., frequently being present, according to the seat and severity of the injury. (See *art.* PARALYSIS, § 50, *et seq.*) One or both these diseases may be further complicated with inflammation or caries of the vertebræ, or of the intervertebral substance; or with aneurism of the aorta, or with spinal apoplexy, or with some one or other of the organic changes implicating the spinal cord or its membranes, about to be noticed (§ 178, *et seq.*). Spinal apoplexy, when it fails of producing death in a very short period, is generally followed by spinal meningitis or myelitis, according to the seat of the sanguineous extravasation. The complication of spinal meningitis with cerebral meningitis has been sufficiently noticed above (§ 138, *et seq.*).

167. vi. PROGNOSIS.—A. *Acute spinal meningitis* is a dangerous disease, and the association of this with cerebral meningitis is still more dangerous, although not necessarily fatal when actively treated at an early stage. Chronic spinal meningitis, when it has advanced so far as to cause paralysis, is seldom altogether removed; but the symptoms, both paralytic and spasmodic, may be considerably ameliorated, whether it has occurred as the primary malady, or followed the acute. At all periods during the course of chronic spinal meningitis, an acute extension of the disease, generally upward to the base of the brain may occur, especially upon exposure to any of the causes of the malady, or even after any phys-



ical or mental perturbation, and carry off the patient. I have observed this to take place in chronic cases even of ten or twelve years' continuance. In some cases the disease may advance slowly for many years; in others it may be stationary for as long a period; and in a few an amendment more or less considerable takes place. It is chiefly before the supervention of paralysis that treatment is most efficacious; and even in this early period the best devised means often fail: much depends upon the constitution, habits of life, and previous ailments of the patient. While writing this, a gentleman whom I attended nine years ago, for acute spinal meningitis, affecting chiefly the cervical and dorsal regions, called upon me. He had been seen also by Drs. CHAMBERS and BRIGIT, in consultation with myself. His habits had been irregular, and the acute attack passed into the chronic, with paralysis of motion, which was more remarkable in one side than the other. The painful symptoms have long since ceased, and the paralysis is considerably less.

168. A lady, aged about forty, and very corpulent, was seized with acute spinal meningitis and suppression of the catamenia. She had had several children. The disease had existed three or four years when I was requested to see her. Paralysis of motion was complete from the neck downward, but sensibility was not impaired. Her spirits were good, and she still retained considerable power over the alvine and urinary excretions. She possessed only a very slight power of motion in one arm. Treatment similar to that about to be advised for the chronic form of the disease (§ 173, *et seq.*) was prescribed. She recovered gradually; could use both hands, and walk abroad. She went on the Continent; after some time she proceeded to the north of Scotland to the family seat, and continued in comparatively good health for a long time. She had, while at her residence in the North, what was supposed to have been an attack of fever, of which she died. It is more probable, from the presence of cerebral symptoms in her case, that an acute extension of spinal meningitis had supervened, and implicated the membranes of the base of the brain, and thereby proved fatal, as I have uniformly observed when the malady was thus extended.

169. A respectable tradesman complained of chronic spinal meningitis, consequent upon a fall on the lower part of the back, attended by partial paralysis of motion in both lower extremities, and constriction around the abdomen. I saw him occasionally for some years, during which time he was able to walk about with the assistance of a stick, or of the arm of a servant. After a time I was requested to see him, and was informed that he had called to his aid an irregular practitioner, who had confidently promised to cure him, and that he soon afterward became much worse, complaining of spasms, and of severe pain along the whole course of the spine. He was delirious, and generally paralyzed when I now saw him, but was soon afterward comatose. A gentleman, aged about forty, gradually became affected, as described under the head of chronic spinal meningitis (§ 159). Sensibility was not diminished, but voluntary motion was remarkably impaired in all his limbs. The bowels were always costive, and the power of retaining the urine was very much lessened, and ultimately lost. Still a full dose of opium or morphia enabled him to retain it from six to ten hours. He lived in this

state for about twelve years. He afterward became much worse, was feverish, delirious, and comatose in succession. I examined the body of both these persons after death, and found the changes as already described (§ 160). The spinal cord appeared somewhat atrophied. Recent inflammatory appearances were observed in the membranes of the base of the brain and medulla oblongata in both.

170. *B. The prognosis of myelitis, when acute*, is generally most unfavourable, death often taking place in a few days, even although the treatment may have been both prompt and judicious. The *chronic* form is less unfavourable. It may continue for months, or even years, when limited in extent; or the patient may even recover partially. In these cases it may be inferred that the resulting lesions have either been slight, or at least partially removed, so as to admit of the continuance of life for an indefinite period. An exasperation of the disease is, however, apt to take place when exposed to causes of physical or mental perturbation. Although but little hope can be entertained of effecting a cure when confirmed paralysis exists, yet we may be more sanguine as to the result at an early stage. When, however, the powers of life are evidently sinking; or when the urine is very morbid in its constitution, or as regards the functions of excretions; or when the influence over the sphincters is lost, or especially when sloughs form on parts which sustain the pressure of the body, then hopes of sustaining life much longer cannot reasonably be encouraged. The danger is always greater when the cervical or dorsal portions of the cord are affected than when the lumbar region is attacked.

171. vii. TREATMENT.—The treatment of inflammation of the membranes of the spinal cord, and of the cord itself, varies much with the acuteness, the duration, and the special characters of individual cases, and with the constitution, state, and circumstances of the patient.—*A. Acute spinal meningitis* requires very prompt and energetic means, for, if the disease proceeds so far as to occasion its usual changes, the best devised means will often prove inefficacious. Blood-letting, general or local, or both, according to the habit of the body, strength, and age of the patient, is necessary, especially very early in the attack. The amount, as well as the repetition of the blood-letting, should depend upon the circumstances just mentioned; but I have generally preferred the application of euppung-glasses along the spine, followed by terebinthinate epithems or embrocations. The bowels should be freely evacuated; and this intention may be accomplished by the immediate administration of a full dose of calomel, or of calomel and JAMES'S powder; and within a few hours afterward by the infusion of senna or other aperients, which ought to be repeated until the desired effect is produced. Terebinthinate enemata are always beneficial, not merely in procuring a full evacuation of the bowels, but also in preventing the changes usually following acute inflammation of serous membranes, and hence the spiritus terebinthinæ may be given with benefit by the mouth; for when thus exhibited, and in such a mode as will not excite vomiting, it is more certain and prompt in preventing the effusion of lymph from these membranes than the free administration of mercury.

172. Besides the above, various other means have been advised by writers, especially very

deep incisions on each side of the spinous processes, by Goss; the cold affusion, or the application of ice along the spine, by OLLIVIER; and the warm or vapour bath by others. Cupping and scarification, or dry-cupping, when the former is no longer required, should be preferred to the first of these; the benefits or the effects produced by the second have not been shown, and the advantages produced by the third are very equivocal. Warm pediluvia and manuluvia, salt and mustard having been added to the water, are generally of service. But after the satisfactory operation of the means advised above, the due consideration of what should be avoided may be of more service than the employment of means of doubtful efficacy. The patient should lie on a hair couch, on either side, so as to keep the spine moderately cool, and allow the application and renewal of such agents to it as have been advised. Vomiting, straining at stool, and motion should be prevented as much as possible; and if the urine be not duly evacuated, it should be drawn off frequently, care being taken not to allow an accumulation of it in the bladder for any considerable time. Cooling diaphoretics or refrigerants are always of service as long as febrile symptoms continue. Blisters are rarely of service, but are oftener productive of irritation of the urinary passages. Terebinthinate epithems or embrocations such as I have advised in various parts of this work, or a combination of these with opium—the tincture, wine, &c.—are very frequently of use, and may be repeated daily, or twice in the day. If the pain and sympathetic affections of spinal meningitis continue, notwithstanding the means above prescribed, the tincture or extract of *aconite* will often prove of much service, when exhibited in sufficient doses.

173. *B.* If chronic spinal meningitis either follow the acute or occur primarily, certain of the means already mentioned may be cautiously employed. In some instances, scarification and cupping, or dry-cupping, or a repetition of these, may be still resorted to, especially at an early stage of the primary chronic, or during the insidious commencement of the disease. The intestinal and urinary evacuations always require attention. Various counter-irritants have been advised, especially blisters, issues, moxas, setons, tartar-emetic ointment, the actual cautery, &c. I have very rarely seen either blisters, or setons, or issues, or the tartar-emetic ointment, of any service in this state of the disease. Of moxas and the actual cautery, I have not had sufficient experience. Dr. BENNETT states, that he has seen the latter agent produce a cure in two cases of chronic spinal meningitis, occasioned by diseased vertebrae. It is most probably in this complication that the actual cautery, setons, issues, and moxas are most likely to be of benefit. In other circumstances of the disease, the terebinthinate embrocations or epithems along the spine, or the frequent sponging of the surface of the spine with a strong solution of bay salt, have been more serviceable, according to my experience, than either of these.

174. In chronic spinal meningitis, I have not found lowering measures of much service, especially when far advanced or of long standing; and when it has produced paralysis, owing to the changes consequent upon inflammatory action, I have generally prescribed such means as seemed most likely to support vital resistance to

the extension of the disease, and at the same time to remove the structural alterations which may have already been produced. With these views I have given small doses of the bichloride of mercury, with hydrochlorate of ammonia, and either the decoction or the tincture of cinchona, and the fluid extract of sarza; and after this combination has been continued for a considerable time, but with strict reference to its effects, I have substituted the iodide of potassium and the carbonate of potash, or liquor potassæ, or BRANDISH's alkaline solution, for the bichloride and the ammonia, the other medicines being continued in conjunction with the iodide and fixed alkali.

175. *C.* The complications of either the acute or the chronic state of spinal meningitis clearly demand means such as have been advised. When acute cerebral meningitis is associated with the spinal disease, the best devised means are generally inefficacious, but those already prescribed appear the most appropriate. The complication of chronic spinal meningitis with rheumatism requires the same indications of cure, and similar means to those noticed above (§ 171, *et seq.*). But in this state of the disease, as well as in certain other chronic complications or forms, medicated warm baths, especially such as contain stimulating substances, deserve a cautious trial; and if they be found of the least service, they should be sufficiently tried. In one case in which the spinal malady appeared in the course of very prolonged jaundice (§ 152), the more severe symptoms were somewhat mitigated, notwithstanding the persistence of the primary disease. The association of spinal meningitis with disease of the vertebrae, or of the cord itself, has been treated by me according to the principles now enunciated; and I have no experience of any other means than those already noticed which appear to be of any service in those or other complications of the malady.

176. *D. Acute Myelitis* requires similar means to those already advised for acute spinal meningitis; but, even at an early stage, vascular depletion is not so beneficial, and admits not of being so freely employed in the former as in the latter. The other means, especially the internal medicines and the external applications, particularized above, may be resorted to. In addition to these, urtication, warm baths containing stimulating and rubefacient substances, anodyne and terebinthinate embrocations along the spine, and the preparations of *aconite* when spasm or pain is urgent, may severally be employed. The paralytic symptoms, which are generally much earlier and more complete in myelitis than in spinal meningitis, may be combated by the bichloride of mercury, or by the iodide of potassium, and the other remedies, as combined above (§ 174). The preparations of *nux-vomica* or *strychnine* have been recommended, and too frequently and injuriously employed in these cases. In all cases which may be inferred, from the mode of attack, or from the characteristic symptoms, to be either acute or chronic myelitis, we have few, and oftener no, means of ascertaining the nature of the changes which have taken place in the cord and its membranes; and hence those preparations, especially strychnine, which excite or irritate the spinal cord, should, if prescribed at all, be exhibited with great caution.

[We trust mainly, in these cases, whether of an acute or chronic nature, to free local deple-



tion with cups or leeches, and the constitutional action of mercury. We have known slight pyralism, maintained for a considerable time, attended with the happiest results. In one instance, the paralysis, which had been of several months' duration, began to yield as soon as the mouth was affected; and free salivation unexpectedly occurring and persisting for a considerable time, notwithstanding the means employed to arrest it, the patient continued rapidly improving, and eventually a perfect cure was effected.]

177. *E.* In the more or less *chronic* states of myelitis, various means have been tried, but rarely with more than very temporary relief. In these states especially, the preparations of nuxvomica, of strychnine, of arnica, phosphorus, &c.; electricity, galvanism, electro-magnetism; frictions, with various stimulants and irritants, and external derivatives, may severally be resorted to, according to the peculiarities of the case, but they require both discrimination and caution. It is only in the more protracted cases of either myelitis or spinal meningitis, where the symptoms indicate passive, rather than active disease—when neither acute nor painful symptoms are present—that these means should be employed. Farther remarks on the use of these and similar means will be found in the article PARALYSIS (see § 244, *et seq.*), and in my work on *Palsy and Apoplexy*, see p. 397, *et seq.*

[Patients are generally recommended to keep the recumbent position when labouring under myelitis or spinal irritation of a severe grade. But the sufferer from these diseases cannot lie long on his side, because the nerves of the arms, sides, hips, and lower extremities, the seat of the neuralgic pains, cannot bear pressure, but are made immediately more painful by it. Hence the patient involuntarily turns on his back, by which pressure is made on the seat of the disease, and though much pain may not at the time be increased by this position, yet the neuralgic affections will be aggravated by its being long maintained. The back may be the easiest part, but there will be acute pain, soreness, numbness, and neuralgic suffering throughout the course of the nerves, proceeding from those portions of the spinal cord which have been subjected to pressure. Some relief may be obtained from the careful adjustment of feather-beds and pillows, &c., but in all cases where it can be obtained we would strongly recommend *Dr. Arnott's hydrostatic bed*. Its use not only contributes vastly to the comfort of the patient, but exerts a decidedly remedial and curative influence.]

#### VIII. STRUCTURAL CHANGES OF THE SPINAL CORD AND OF ITS MEMBRANES.

CLASSIF.—IV. CLASS, III. ORDER (*Author*).

178. i. MORBID STATES OF THE SPINAL MEMBRANES.—The *dura mater* of the spinal cord is unprovided with the granulations called Pacchionian glands. It is not so firmly attached to the bones as that of the brain, and the arachnoid and pia mater are more loosely united to the cord than these are to the brain. Owing partly to these circumstances, diseases of the spinal bones less frequently affect their contained structures than those of the cranium.

179. *A.* The membranes of the cord are sometimes *distended* by fluid, *discoloured*, and present various grades of *consistence*, but not so frequently as those of the brain. *Irritation*, *vascular erythsm*, and *congestion* often are observed, especial-

ly in continued fevers, in the exanthemata, in tetanus, in rabies, in spinal epilepsy, convulsions, gout, rheumatism, &c.; but these are not to be confounded with true *inflammation*, which, however, may occur as an *epi-phenomenon* in these diseases. All the alterations consequent upon inflammation of the membranes of the brain are observed after spinal meningitis, as effusions of *plastic lymph*, or of *serous, sero-albuminous, or puriform fluids*, *thickening, induration, agglutination*, and partially organized *adhesions* of the membranes, *cartilaginous and ossific deposits*, and much more rarely *ulceration* and *mortification*. *Tabercular formations, tumours* of various kinds, *cancer*, and *hydatids* have also been found in these membranes on rare occasions.

180. *B.* *Morbid or effused fluids* are usually contained in the more external sac formed by the arachnoid membrane; but sometimes, as in the brain, between the arachnoid and pia mater; occasionally also between the dura mater and the bony parietes of the canal. Admitting that a limpid serum naturally exists between the spinal membranes, yet an inordinate as well as a morbid effusion is not infrequent, particularly in tetanus, epilepsy, some fevers and eruptive diseases, paraplegia, epilepsy, chorea, &c. The more morbid effusions between the membranes are that of *air* (OLLIVIER, BRIERE, OTTO, &c.); *large collections of water*, dropsy of the spine, *hydropachis* either in an acute or chronic form; it may take place alone or in conjunction with dropsy within the head; when great, it usually produces universal palsy, owing to its pressure on the cord; *puriform matter*, proceeding from ulceration of the spinal marrow or of its membranes, as in bed-ridden persons; or from the cavity of the skull (DENMARK, OTTO); or from carious vertebræ, as well as as effused from abscesses in the vicinity (BRODIE, VELPEAU, JACKSON, &c.); *albuminous lymph*, or a *coagulable and organic matter*, exuded by inflammation of the membranes, or by metastasis of rheumatism to them, as observed also in paraplegia, general paralysis, and in some cases of chorea (COPLAND and PRITCHARD); and, *lastly, a bloody fluid or pure blood*, liquid or coagulated, arising from injuries of the spine, from concussions of the trunk, from the breaking of an aneurism of an adjoining vessel, as of the aorta, or spontaneously from disease of the spinal vessels, or from some internal cause (HOWSHIP, OLLIVIER, CHEVALIER, &c.).

181. ii. MOREBID STATES OF THE SPINAL MARROW.—*a.* The *size and form* of the spinal cord vary materially. They generally correspond with the length and form of the spinal column: the cord may be too long or too short, in proportion to the rest of the body. Sometimes it is congenitally *thinner* or smaller, either in parts or throughout, especially in monsters with deficient or distorted heads and limbs. But it is subject to a morbid diminution of size—a true *atrophy*, as in *tabes dorsalis*—dorsal consumption. In this latter case, it is sometimes wasted more in one place than in another, being apparently indented and knotty. Atrophy is most frequently met with in extreme old age—*atrophia medullæ senilis*; in protracted cases of paraplegia and general palsy; and in the lumbar region of the cord, as a consequence of loss of the generative power, and of spermatorrhœa. It often extends upward along the cord. It may also arise from the effusion of lymph between the membranes—of this associa-

tion I have met with several instances—in chronic spinal meningitis consequent upon rheumatism, and in connexion with chorea. In some cases, the diminution of volume is associated with a dirty whiteness and toughness of the fibrous columns, and with a rusty-brown or fawn tint of the gray substance. In other instances, the cord is not only thus discoloured, but also infiltrated with serum, soft and withered (ROKITANSKY).

182. The cord may be more or less *thin* in parts, from *compression* by the adjoining bones, or by invasion of the canal, by thickening of the intervertebral substances, by bony concretions, by varicose states of the spinal vessels, by aneurisms of the vertebral arteries, by effused blood or other fluids, by hydatids, or by tubercles, or by cancerous or other tumours. The pressure of either of these may be such as almost to divide the cord, or to reduce the pressed part to extreme thinness.

183. The cord may be unnaturally *long* in new-born infants. BÉCLARD found it to descend to the tail-bones in two children born with tails. Extreme *thickness* at certain parts is only congenital; but a portion of the cord may be morbidly swollen, owing to either extreme congestion, or effusion of blood (apoplexy of the cord), or of pus, or of other fluids, in its substance. The *form* of the spinal marrow is most commonly affected by *dropsy* or *hydrorhachis*, also called cleft spine, or *spina bifida*, when connected with an open state of the vertebral canal. This is naturally a congenital malady, associated with cleft of the spinal canal, and often also with internal dropsy of the head, hemicephaly, and hydronephalocele. It generally terminates fatally with paralysis. But cases have occurred of children living many years with the disease, and even reaching puberty. PALETTA and ACREL met with it at seventeen years of age; HENDERSON at eighteen; APINUS, WARNER, and HOCHSTETTER at twenty; and CAMPER at twenty-eight. I saw a case of it, with immense tumour in the loins, in a female of about twenty. In rare instances, dropsy of the spinal cord has occurred after birth, and even in adults. This change, in connexion with the state of the spinal marrow, is more fully described in the article *Dropsy*. (See *Dropsy of the Spinal Cord*, § 178.)

184. *b. A rupture*, or rather *protrusion* of the spinal marrow, may occur from *hydrorhachis*, so that, being itself expanded by the water, or compressed between the membranes by this fluid, it may be more or less protruded through the cleft in the spine, thus forming a *rupture of the spinal marrow* (*hernia medullæ spinalis*). In very rare cases, the cord may deviate from its natural position, in consequence of caries of its bony walls (FERRO, LECAT, PHILLIP, and RICHTER). The colour of the spinal cord may vary, as that of the brain, but very seldom without change of structure, excepting in some rare instances of jaundice.

185. *c. The consistence* of the marrow is more liable to vary. It may be *simply softened*, without farther change, or it may be softened with change, of its intimate structure, forming the *pulpy degeneration* described above (§ 160), and when treating of the BRAIN (§ 71, *et seq.*). Its structure may be even entirely broken down: it may be almost liquid or diffuent, or this state may present a mixture of blood. The broken-down state, either with or without blood being

effused or infiltrated in the part, may exist only in spots, or in a considerable portion of the cord, and is to be ascribed to diseases which destroy its cohesion, especially inflammation, suppuration, watery infiltration of the substance of the part, and to a morbid or deficient state of its nutrition. Paraplegia, more or less complete, or paralysis, more or less general, is the usual result of softening, and pulpy degeneration of the cord.

186. *d.* On the other hand, the structure of the cord may be *too firm*, or even *hard*. This state is sometimes conjoined with diminution of size or atrophy in dorsal consumption, and with thickening after chronic inflammation. PORTAL, BERGAMESCHI, ESQUIROL, BIRCH, VELPEAU, and OLIVIER have found different portions of the spinal marrow nearly as hard as cartilage, particularly in epileptic, insane, and paraplegic persons. GENDRIN has observed the same cord very hard in one part, and very soft in others.

187. *e.* The *continuity* of the structure of the cord may be destroyed by disease, as by extreme pulpy degeneration, by the *laceration* occasioned by the effusion of pus or of blood, and by concussion of the spine. This lesion is, however, more commonly occasioned by wounds, violent extension, fractures, and dislocations of the vertebræ. In some of these cases the marrow protrudes through the opening in the pia mater. Small wounds of the cord may in some cases heal.

188. *f. Inflammation of the Substance of the Cord.*—*Myelitis* (§ 154) is in some instances an idiopathic disease, and in others it results from external injuries and diseases of the surrounding structures. Inflammation is to be distinguished from congestion of this part, both in respect of their characteristic appearances and of their usual consequences. Inflammation may appear in the slightest form of *vaseular irritation*, unaccompanied by any very marked change of structure, as in many fevers, eruptive diseases, rabies, epilepsy, convulsions, trismus, tetanus, painters' colic, chorea, in all of which the spinal marrow may be more or less affected. This organ may be more unequivocally inflamed either primarily or idiopathically, or consecutively and contingently, especially in the course of some cases of the above diseases. When truly *inflamed*—*myelitis*—the substance of the cord exhibits a rose-red colour, with some deeper-coloured or dusky spots and streaks, with enlargement of its minute vessels, and injection of the pia mater surrounding the part. In some cases, there is a distinct swelling, and generally some change from the natural consistence, namely, softening, or complete disorganization, or dissolution into a semi-fluid, discoloured by, or mixed with blood. In rarer cases, the inflammatory appearances are accompanied with hardening. Myelitis seldom terminates in *true suppuration*. In rare instances, small abscesses have been found in the cord. *Gangrene* is still more rare. *Ossific deposits*, or *bony concretions*, which are sometimes found in the membranes (§ 179), do not seem to form in, or even to invade the structure of the cord.

189. *g. Congestion* of blood in the spinal cord may be consequent upon, or conjoined with a varicose state of the veins, or with congestion of the venous sinuses of the vertebral column; and the congestion when extreme, and especially when connected with atheromatous or fatty degeneration of the vessels (see *art. ARTERIES*, § 59, and



my work on *Palsy and Apoplexy*, p. 266, 288), may terminate in effusion of blood in the substance of the cord, or between the membranes, or external to the dura mater, and between it and the walls of the canal (ABERCROMBIE), owing either to rupture of the diseased vessels, or to sanguineous exudations from them, produced by certain obvious causes, or occurring spontaneously, and without any assignable cause—*apoplexy of the spinal cord*.

190. *h. Hæmorrhage into or from the spinal cord*, according to the seat of the vessels whence it proceeds, may exist between the pia mater and the arachnoid—in the internal sac of the arachnoid; and, when thus seated, there being no laceration of the structure of the cord, it may be inferred that the blood has proceeded from the vessels of the pia mater. In most cases of hæmorrhage into the substance of the cord, the effusion has taken place in the gray substance, and has even been infiltrated to a great extent along the internal canal of its axis (CRUVEILHIER, *Anat. Pathol.*, livr. 3d). Circumscribed extravasations are also found in the structure of the cord, the blood effused undergoing the same changes as described in cerebral apoplexy, and the surrounding nervous tissue also presenting similar alterations (HUTIN, STROUD, GAULTIER, GRISOLLE, BENNETT, &c.).

191. *iii. APOPLEXY OF THE SPINAL CORD.*—*Hæmorrhage may take place into the external sac of the arachnoid—between the dura mater and arachnoid; or into the internal sac of the arachnoid, or between the pia mater and arachnoid.* When thus seated, the hæmorrhagic effusion has been called *Hæmatorachis* by OLLIVIER. When the hæmorrhage occurs into the structure of the cord, it has been termed *Hæmatomyélie* by this writer.

192. *A. The causes of spinal apoplexy* are chiefly injuries sustained on the spine, especially blows, falls, fractures, concussions, &c. Spontaneous hæmorrhage in either of the situations just specified, or between the dura mater and the walls of the vertebral canal, is rarely met with; and when observed, is to be attributed chiefly to pre-existing disease of the vessels (§ 186); extreme exertion or efforts of any kind, or unusual demands made upon the circulation of the cord, or whatever interrupts the return of blood from or through the vertebral sinuses, being the more immediate or exciting causes.

193. *B. The symptoms of spinal apoplexy* have been imperfectly observed, owing to the rarity of the disease and to the early progress of it having passed unobserved by competent persons. The mode of attack necessarily varies with the seat and amount of effusion. The most frequent phenomena characterizing the attack are pain, sudden and acute, in the region of the spine corresponding with the seat of extravasation, convulsion, and paralysis. Precursory shivering and pain are sometimes experienced shortly before the complete or severe seizure. M. CALMEIL adduces several cases to prove that, when the hæmorrhage takes place between the membranes, the pain is always acute, and is attended by convulsion or spasmodic contractions, paralysis being slight, or absent, unless the hæmorrhage is very considerable; and that, when paralysis of motion, or of motion and sensation, is sudden and more or less complete, convulsions being slight or absent, the spinal cord is then itself the seat of extravasation.

When the hæmorrhage occurs in the cervical region, or in the upper part of the dorsal region, then priapism is generally present, as commonly also observed when these parts of the cord are injured by dislocations or fractures. Constipation and retention of urine are observed at first, and these may be followed, if the disease be not quickly fatal, by loss of power over the sphincters; these symptoms, however, depending much upon the seat and amount of hæmorrhage. When the effusion occurs in the higher regions of the cord, paralysis of the muscles of respiration soon supervenes, owing either to the amount of effusion, and in this case death quickly supervenes, or to the changes consequent upon the effusion, and then this issue is longer in occurring. The changes may extend upward, even when the hæmorrhage is low in the spine, and cause death by paralysis of the respiratory muscles, and asphyxia. The following case, recorded by Mr. CURLING, will illustrate the symptoms and appearances after death of this malady:

194. A gentleman, aged forty-four, a stout man, of active habits, but a free liver, and subject to gout, had just got into bed about eleven P.M., when he was suddenly seized with spasms in the stomach, and found that he had lost all sensation and power of motion in the lower half of the body. An hour after this seizure the patient was found shivering in bed by Mr. CURLING, with complete paraplegia of the whole of the body below the third ribs, and strong priapism. He had perfect use of the arms, but complained of pain about the wrists. No excito-motary actions were producible. His mind was quite clear. After the circulation was restored, the treatment consisted chiefly of cupping between the shoulders, a blister at the nape of the neck, purgatives to unload the bowels, frequent doses of calomel, and regular relief of the bladder. The priapism subsided in about twenty-four hours. There was no extension of the paralysis, except numbness in the hands, and at last imperfect power of using them. During the first eighteen hours after the attack, scarcely any urine was secreted, and it subsequently continued scanty in amount. The breathing gradually became embarrassed and difficult, and the patient died the fourth day after the seizure, his intellect being unaffected until within a few hours of his death.

195. On examination after death, the muscles of the back were much loaded with blood. No fluid escaped on opening the theca vertebralis, the head being in a depending position. The vessels on the surface of the cord were very congested. An incision was made along the front of the medulla, commencing at the part corresponding to the third cervical vertebra, and terminating at the last dorsal. There were two small clots of blood, amounting together to about a drachm, in the interior of the medulla, occupying about an inch and a half in extent, and situated between the origins of the second and third pairs of dorsal nerves. The substance of the cord around the clots was somewhat soft. The medulla was more or less infiltrated and stained with blood from the site of the clots, up and as high as the third cervical vertebra, and downward as low as the last dorsal.—(*Third Report of the Proceedings of the Pathological Society of London*, p. 28.)

196. *C. The diagnosis of the lesion*, when marked, is not very difficult. The suddenness and severity of the pain, of the spasms, or of the

paralysis, and the degree of constitutional or vital shock which ushers it, distinguish it from other spinal affections, and prevent it from being mistaken for rheumatism, with which slighter and more gradual attacks may be confounded. The priapism, where the upper portion of the cord is the seat, and the states of the excretory functions, farther aid the diagnosis.

197. *D. The prognosis* is always most unfavourable when the attack is such as to admit of a confident diagnosis. But the issue may be protracted, especially when the lower portion of the cord is the seat of hæmorrhage, and is then to be ascribed chiefly to consecutive changes, which may require an indefinite period to produce their ultimate effects. When the effusion is near the pons or medulla oblongata, or even when it is in the cervical region, and especially if it is of considerable amount at any part of the upper regions of the cord, then death may occur immediately, or in a few hours, or in less decided cases in a few days. M. HUTIN found in the cervical portion of the cord two clots of blood. The person died during the night. When the hæmorrhage is very limited, restoration of the lesion, and even of the functions depending upon the seat of lesion, may take place. M. CRUVELLIER states, that a medical student lived five years after a circumscribed hæmorrhage in the left side of the cervical portion of the cord. Loss of motion was experienced in the same side—in both the lower and upper left extremity. The patient died of a much greater hæmorrhage than the first, and the seat of that was found cicatrized, the blood having been absorbed, and the movements of the side gradually restored. This case shows that hæmorrhage into the substance of the cord and the seat of hæmorrhage undergo similar changes to those observed in the nervous structures contained within the cranium—that apoplexy of the cord may be recovered from; remains of old apoplectic cysts, similar to those observed in the brain having been met with in the substance of the cord, particularly in its cineritious structure.

198. *E. The treatment* of spinal apoplexy must be founded more upon the analogy of this disease with cerebral apoplexy than upon the results of experience. It may be directed with the following intentions: 1st, to arrest, or to prevent a recurrence of the effusion; 2d, to favour the absorption of the extravasated blood; and, 3d, to keep within due bounds the vascular reaction or irritation accompanying or following upon the process of reparation in the seat of injury. For these purposes, blood-letting, chiefly by cupping-glasses applied on the spine, according to the pulse and habit of body of the patient; terebinthinate epithems or embrocations along the spine; the facial or lateral recumbent posture, perfect rest; attention to the secretions and excretions; frequent recourse to the catheter, if it should be at all required, and the earliest and utmost endeavours to prevent bed-sores by recourse to air-pillows, the hydrostatic bed, &c., comprise the chief means that will be found useful in these seizures. Most other measures will either prove inefficacious or injurious, excepting such other means as have been advised for *myelitis* (§ 171, *et seq.*), which may supervene upon the more limited or slight attacks of hæmorrhage.

199. *iv. TUMOURS OF VARIOUS KINDS, DEVELOPED IN, OR NEAR TO THE SPINAL CORD*, produce effects which terminate fatally, after having

occasioned, for an indefinite period, paraplegia or general paralysis. The tumours, or morbid productions or growths, which may implicate the cord or its membranes, are of various kinds; they may be formed either in the vicinity of the theca, or in the membranes, or even in the cord itself. Certain of these are developed exteriorly to the cord only, and others may even be primarily formed in it, although very rarely, as well as in its membranes or in its vicinity. *Aneurisms* of the aorta may produce ulceration and absorption of the bodies of the vertebræ, and ultimately affect the membranes, or even the spinal marrow itself. *Hydatids* may produce similar effects.

200. *a. Cartilaginous productions* may invade the vertebral canal, or *exostoses* may form within the canal, diminish its calibre, and press upon the cord. In a case recorded by Mr. A. KEY, the ligaments covering the intervertebral substance between the second and third lumbar vertebræ were hardened and prominent, projecting so far into the canal as to diminish it by one third of its diameter. The patient had lost the power of motion, but retained sensation of the lower extremities. In another case of loss of power of motion, numbness and tingling from the loins downward, retention of urine, and imperfect command over the sphincter ani, were experienced, terminating in sloughing of the nates and death. "The intervertebral substance above the 12th dorsal vertebra, with the ligament covering it, presented a slight ridge, projecting into the medullary canal, as if an ossification from the edge of one bone tended to unite with a similar growth from the other edge. This transverse ridge manifestly narrowed the canal."

201. *b. Tumours*, fibrous, fungoid, or otherwise organized, malignant or non-malignant, may grow exteriorly to the vertebral canal, and may invade not merely the walls of the canal, but also the membranes and cord itself; or such tumours may commence in, or be attached to, the dura mater of the cord. *Tubercles*, and melanoid and other *cancerous growths*, are very rarely found in the spinal cord, although not infrequently seen in the brain. *Tubercle* occurs only in connexion with tubercles in other organs, and chiefly in the cervical and lumbar regions of the cord, where it occupies the white fibrous structure, and sometimes the gray substance. As in the brain, so in the spinal cord, it occasions red or inflammatory softening, or yellow softening of the surrounding tissue. In some cases, several tubercles, not exceeding the size of millet or hemp seeds, are grouped together. In others, only one tubercle of the size of a pea or bean is found.

202. *c. Cancerous formations* are very rarely found in the cord, and even then chiefly in a secondary form, or in connexion with similar productions in other parts. The very extensive experience of ROKITANSKY furnished him with only one instance of true and primary cancer of the cord. But he has met with several instances of circumscribed callous induration of the white columns, of the cancerous nature of which he is in doubt. OLLIVIER mentions several examples of diffused carcinomatous growths implicating the spinal cord, as well as of so-called colloid cancer.

[*Cancer of the Spinal Cord*.—Cancerous degeneration of the spinal cord is an extremely rare disease. The French translator of MECKEL'S Anatomy (*Am. ed.*, p. 507, vol. ii.) remarks, that "we know as yet of no well-authenticated case of can-



cer of the spinal marrow." ANDRAL, although he collected 43 cases of cancer of the brain, recorded none of the spinal cord itself, from which we infer that the disease had escaped his observation. GUERSENT mentions a case of cancer of the medulla oblongata, which had principally destroyed the pyramids and olivary bodies. CRUVEILHIER has described a case of cancerous tumour under the arachnoid membrane, opposite the third dorsal vertebra, resulting in fatal paraplegia.—(*Anat. Path.*, liv. 32, Fig. 2, 2, 2.) This tumour is described as of an ovoid shape, of a grayish colour, soft in consistence, and occupying the anterior face of the cord. This seems to have been a case of cancerous tumour originating in the membranes, and only affecting the cord by mechanical compression. CRUVEILHIER remarks, that it is not uncommon to find grayish red granulations, of the same consistence as those of the brain, in the cellular tissue beneath the arachnoid of the spinal cord, just as they are met with under the same membrane below the dura mater in the brain. This pathologist also refers (*loc. cit.*) to a case observed by M. DUPLOY, one of M. ROSTAN's assistants, in a man 63 years of age, who died paraplegic, cerebral hæmorrhage supervening, with loss of sensation and motion, and where two tumours were discovered beneath the arachnoid; the lower one among the nerves of the *cauda equina*, of the size of a large filbert, grayish, soft, granular, and semi-transparent; its surface being traversed by large veins, which formed a kind of sheath. The other tumour occupied the superior and posterior part of the dorsal region; was olive-like, and of a similar structure to the tumour below. The posterior and middle portions of the spinal cord were of a pulpy consistence, grayish, and semi-transparent in their whole corresponding portions. CRUVEILHIER refers to tumours of an encephaloid nature attached to the membranes, one of which he has observed growing from the dura mater of the cord, attached to it by a pedicle of a grayish hue, soft, and enveloped by a fine membrane. In the *Trans. of the Royal Med. and Chir. Soc. of London* (2d Ser., vol. i., 1841), we find four well-marked cases of cancerous or malignant disease of the spine, described by Mr. CÆSAR HAWKINS, which constitute by far the most important additions to the pathology of this disease, as it attacks the bony column, hitherto recorded. ABERCROMBIE (*Dis. of Brain*, 3d ed., p. 369, 1836) has quoted a case from GENDRIN, in which "a firm white tumour, the size of a filbert, enclosed in a cyst, and slightly softened in the centre, was found at the lower extremity of the cord. It lay between the two columns of the cord of the left side, and in some degree encroached upon those of the right; the left anterior column, in particular, was much distended and flattened by it." CALMEIL has also recorded a similar case.—(*Article Moëlle Epinière*, *Diet. de Med.*, 2ème edit., xx., p. 52, 1839.) Another case is given by M. OLLIVIER (*De la Moëlle Epinière*, &c., de 3ème ed., tome ii., p. 503, 1837).

*Cancer of the Spinal Meninges.*—There have been a few cases recorded showing that cancerous disease may attack the various membranes of the cord, and the interspaces between them. WALSH (Nature and Treat. of Cancer, Eng. ed., p. 526) has related a case where the cellular membrane between the vertebræ and dura mater was the sole seat of the disease; and Dr. ABER-

CROMBIE found in one case a spongy tumour of a grayish yellow colour, resembling fungus hæmatodes, within the foramen magnum, attached to the inner surface of the dura mater of the cord; and in CRUVEILHIER's case (*loc. cit.*) the tumour was attached to the same membrane by a narrow fibrous peduncle. M. HARDY and M. COLLIN have published cases where encephaloid tumours have been found growing in the arachnoid cavity, attached by tender filaments to the medullary laminæ of the membrane. Cases of this disease, situated in the cellular membrane, between the pia mater and deep laminæ of the arachnoid, may be found described by Dr. R. REID, Dr. FISHER, M. VELPEAU, and M. CRUVEILHIER. (See *Bibliog. at end of Article.*)

The following case, which fell under my own observation and management, is not without some interesting features: The patient, A. C., was supposed to labour under some obscure form of disease involving the spinal cord. He was of a strongly-marked nervous temperament, thin, emaciated form, and about 45 years of age. I found him labouring under great functional derangement of all the important organs, especially the kidneys and liver; the urine was loaded with phosphatic deposits, and highly ammoniacal, while immense quantities of fine, bilious, calculeous matter and cholesterine passed off with almost every evacuation from the bowels. He moved about with much difficulty, complained of constant pain in the back and loins, and at times severe neuralgic pains would attack the muscles of the trunk and extremities, or some of the large internal organs. The pain through the loins and kidneys was so severe, that it was thought, in connexion with spinal disease, there were renal calculi in the substance of the kidneys. The tenderness over the lower dorsal and upper lumbar vertebræ, on pressure, was considerable. The disease had been coming on insidiously for nine or ten years previously, the prominent symptoms being nervous debility and hypochondriasis, general and local neuralgic pains, deranged digestion, with loss of appetite, &c., and great irregularity of the bowels. The neuralgic pains were most severe in the lumbar region, extending to the lower limbs—first to one side, and then to the other—and gradually becoming general and most excruciating, so as to require 15 grs. of *morphia* in the course of from four to eight hours, in order to procure ease and sleep. The treatment need not be particularly detailed, as it proved merely palliative, including the constitutional action of mercury, local bleeding, blisters, setons, electricity, mineral and vegetable tonics, narcotics, &c. The latter remedies alone afforded any alleviation to his agony. For the last three years his bowels had only been moved by enemata, and even the most active cathartics would not operate without their aid. About six months before his death, he lost entirely the use of his legs, which retained in some degree the power of sensation, and he was wholly confined to his bed. Previous to that time, slight motion caused exquisite pain, so that his screams could be heard at a considerable distance, though usually a man of great fortitude. He sank, at last, from gradual exhaustion. Nothing important could be ascertained with regard to his former habits of life, except his being addicted to excessive venery and the most inordinate use of tobacco.

*Autopsy*, ten hours after death, disclosed a healthy state of the thoracic and large abdominal viscera; the kidneys were somewhat of smaller size than natural, but their texture, as well as that of the liver, was natural. The colon, in several places, was contracted for the space of several inches to the size of the little finger, its coats being evidently thickened and somewhat indurated. Hard scybalous masses were found in considerable quantity above these contractions in the gut. The principal disease was found in the lumbar portion of the spinal cord, opposite the last dorsal and two upper lumbar vertebrae. At this part, for a distance of several inches, the membranes of the cord were found involved in a cancerous degeneration, apparently originating in the spinal cord itself, disorganizing its texture, especially its anterior portion, but more or less its whole substance. The spinal marrow, for the space of two or three inches, was changed in colour and density, some portions being softened, and almost diffused, and interspersed throughout were deposits of melanotic matter; while other parts were of abnormal hardness, and of a dirty white or yellowish hue, intersected with blood-vessels crossing in every direction. The pressure of the cancerous tumour on the spinal column had caused the absorption of a portion, probably two thirds, of the bodies of the two upper lumbar vertebrae; and these cavities, varying from one to two inches in depth, were filled with portions of the diseased mass. The diseased portion filled up the cancellated texture of the bones, and was separated with great difficulty, some of it being soft and semi-fluid.

It is doubtful whether there are any pathogenic symptoms of this affection. In nearly all of the recorded cases, pain, often the most excruciating, was present. Mr. HAWKINS observes, that he never saw evidence in any other disease of the spine of such exquisite suffering as in two of his cases. When with this we associate derangement of all the peculiar functions of the spinal marrow, in some cases amounting to a total abolition of the power of sensation and motion, twitchings and spasm of the muscles, with more or less derangement, also, of the functions of the liver, kidneys, bladder, &c., with extensive neuralgic pains, we shall be aided in our diagnosis. At first the pains may resemble those of rheumatism, slight, perhaps, but gradually becoming more constant and acute, pain and tenderness on pressure, an inability to lie in certain positions and perform certain movements, according to the portion of the cord affected. There may also be some external swelling, or a prominence of one or more of the spinous processes; and if the nerves have become implicated in cancer of the cervical vertebrae, pain may be expected about the neck and over the scalp: in one case there was difficulty in swallowing. Pain, numbness, loss of sensation and motion, and involuntary spasms, involving the lower limbs, have been observed in nearly every case of the disease hitherto observed. Loss of power over the sphincters of the bladder and rectum is also to be expected in severe cases, together with an alteration in the intestinal secretions, permanent alkaloscence of the urine, disposition to sloughing, œdema, &c. In this affection, death results from the cachectic state, the patient being gradually worn down by severity of suffering and failure of digestive power. The treatment can, of course, be only palli-

ative. In cancer of the *spinal meninges*, the medulla may or may not be involved. *Myelitis*, with softening, may result from the mechanical pressure, and the symptoms will vary, according to the greater or less degree of complication of the cord itself. In a great majority of cases, alterations of sensibility and movement may be looked for in the parts below the seat of the disease. At first, muscular power is lessened; then the limbs are stiff and difficult to control; tonic contraction, or painful convulsive movements, may exist in some cases, constituting a form of painful paraplegia. Sensibility or motion will be affected, according as the posterior or anterior tracks of the spinal cord are implicated. Retention or incontinence of urine, with obstinate constipation, or involuntary discharge of feces, an alkaline state of the urine, and more or less of the symptoms already enumerated, will be present.

Besides the cancerous, the spinal meninges may be the seat of at least four kinds of tumours, viz., the simple fibrous, the fibrous, tuberculous, and the acephalocystic.

*Cancer of the Vertebrae*.—We have already referred to the very important cases of Mr. CÆSAR HAWKINS (*loc. cit.*). Mr. WALSHE has also given an interesting case of this form of disease affecting the lumbar vertebrae, in one of which it originated; and where, with the progress of infiltration, the bony tissue had disappeared, and the adventitious substance had destroyed the compact tissue, and protruded posteriorly under the dura mater into the spinal canal, and anteriorly under the anterior ligament. The cancerous product was composed of a fibrous stroma, having its fibres arranged almost rectilinearly, and containing creamy, sanguineous pulp in its meshes, being of the scirrhus-encephaloid species. The cases described by Sir ASTLEY COOPER, Mr. BRODIE, and Mr. HAWKINS, were all of a similar kind, involving the cancellated tissue of the vertebrae, and of a true encephaloid character. M. SANSON (*Arch. Gén. de Méd.*, tome iv., p. 691) has described a case of general cancerous diathesis, in which almost every one of the vertebrae contained cancerous substances. It would seem to be the tendency of the cancerous disease, after having destroyed the bony structure, to grow in the direction of the spinal canal, pushing before it the dura mater, the bones being removed by interstitial absorption as the new material accumulates. The medulla and meninges undergo no alteration so long as the disease is confined to the bony structure; but when it makes its way into the spinal canal, it may contract adhesions to the dura mater, and press on the cord, causing atrophy and paralysis. These cases, as already remarked, are extremely rare. (*See Bibliog.*)

203. *d.* The symptoms produced by morbid growths and alterations of structure in the spinal cord and its membranes, or by tumours developed in the vicinity, are generally those which indicate a slowly increased pressure on the cord, or a slowly advancing interruption of the functions of this organ. They are rarely such as enable us to distinguish the nature or the particular kind of lesion producing the interruption, unless a tumour of sufficient size be formed in the vicinity, and even then the information is only partial. As in cases of *softening*, *induration*, or *atrophy* of portions, or of a considerable extent of the cord, the



lesions now being considered produce phenomena which vary much with the region in which they are seated, with the nature and extent of the lesion, and with various concurrent or consecutive changes. When the organic lesion is seated in the lumbar region, and is only slightly developed, so as neither to compress nor destroy part of the organ, there are numbness or pain, prickings, twitchings, insensibility, and difficulty of motion of the lower extremities, or even of one lower extremity only. In proportion as the disease compresses or destroys both sides of any portion of the cord, hemi-paraplegia increases and extends, and complete paraplegia is developed. At last, after a longer or shorter time, according to the nature and progress of the lesion, paraplegia becomes more complete, there being loss of motion, sometimes of feeling also, of the lower limbs. Micturition and defecation, at first difficult, become almost impossible. The catheter is constantly required, as well as the most active purgatives, which are often without effect, inflaming merely the bowels. The patient thus drags on a miserable existence, till at length escars form in the parts subject to pressure, and infiltration of the extremities and loose cellular tissue, and various consequent affections, chiefly suppression of the excretions and absorption of morbid matters, supervene, and terminate life by contaminating the circulation.

204. When the structural lesion is seated in the dorsal region of the cord or of its membranes, or spine itself, the above phenomena are often attended by difficult respiration, owing to impeded action of the inspiratory muscles from impaired influence of the intercostal nerves. And when the cervical portion of the cord is affected, besides the preceding lesions of function, the superior extremities, and even the voice, and speech, and muscles of deglutition, slightly participate in the paralytic disorder. The whole train of symptoms is often attended at first by little pain in the parts of the spine affected, unless when the lesion is cancerous. These formations are generally developed, more or less slowly, without any symptoms of vascular reaction or febrile commotion; but contractions of, or spasms, or pains in, the limbs, and severe pains in corresponding regions of the trunk with the seat of disease, are very generally experienced during the more advanced stages.\*

\* The following cases, more or less abridged from the original reports, will illustrate the history of the lesions now considered:

i. *Fibrous Tumour in the Theca Vertebralis*.—A female, aged thirty-five, felt pain in the back and side, and was very sensible of cold in her legs; the left foot and ankle soon afterward becoming weak, cold, heavy, with impaired power of locomotion. Two months afterward the right leg was similarly affected; these sensations, with numbness, now extending up to her loins. Her gait was unsteady, but there was no tenderness along any part of the spine. Five months after the first symptoms, she had darting pains in the knees, aching in the loins, and great difficulty in walking. Sensation was impaired. She had cramps in her legs. In about twelve months, she could not stand, involuntary movements of the lower extremities occurred, and she voided urine with difficulty. Fourteen months from the commencement of disorder, sensation and motion of the lower limbs were abolished, but the urinary bladder expelled its contents. Four years from the invasion, any attempt to move caused cramps of her whole frame. She had severe pain in the back and lower part of the body. Both limbs were very cold, and the right was much swollen. Five years from the date of disorder, no sensation or motion existed below the loins, but tickling the soles of the feet produced involuntary movements. She lived upward of seven years from the invasion of the paralysis.

205. c. But little can be said respecting the diagnosis of the above lesions with any truth or

On inspection after death, the body was much emaciated, extensive sloughing existing over the sacrum and hips. The brain was healthy. "At the lower dorsal portion of the spinal cord, there was a tumour, involving the substance of the cord, about the size of the last joint of a man's forefinger. It was of firm consistence, and osseous where it sprung from within the dura mater, opposite the eleventh dorsal vertebra, to the depth of a quarter of an inch, and fibrous, with rough granular matter intermixed, in the rest of its structure. Its distinct round form compressed, and was firmly attached to the arachnoid and spinal cord itself, so as to cut into and flatten the nervous substance of the cord. For about two inches below the tumour the cord was much softened, and a little behind its centre was a canal, half an inch long, within its neurine."—(SMITH and EWEN, in *Reports of Pathol. Soc. of Lond.*, 1847 and 1848, p. 160.)

ii. *Tubercles in the Spinal Marrow*.—A laundress, in a delicate state of health for some time previously, complained of pains in the back and lower extremities, with impaired power in her legs. After some weeks, she complained of tingling and pricking pains, and a fortnight afterward she had complete paraplegia, both sensation and motion being simultaneously destroyed. She now began to suffer severely from spasmodic contraction of the muscles, chiefly when about to fall asleep, or when the legs were touched or shifted in bed. The knees were then rigidly bent and drawn up to the abdomen. The introduction of the catheter into the bladder produced the spasms. The bowels were constipated; but after the action of medicine she could not retain the fæces. She had catching pains, with spasms in the lower ribs and hypogastrium, and pain in the lumbar region, with slight projection of one of the spinous processes. A slough formed on the sacrum; bronchitis supervened, and she died, about three months from the invasion of paralysis.

The examination, post mortem, displayed the membranes of the spinal cord in a healthy state; "but at two points, the upper one opposite to the eighth, and the lower to the twelfth dorsal vertebra, the spinal marrow was slightly swollen into a globular form, and felt hard; the surface, in colour, texture, and vascularity, remaining unchanged. On making a longitudinal section of the upper swelling, an oval mass of tubercular matter, three quarters of an inch in length, and about the same diameter as the spinal marrow, of the firmness of a lymphatic gland, of uniform structure, and of a pale green hue, was seen to occupy the whole interior of the organ, and was invested all round by a thin layer of medullary matter. The structure of the spinal marrow immediately adjoining the morbid growth appeared sound. The swelling a few inches lower down was caused by a similar circumscribed mass of tubercular matter, contained in the interior of the cord, but it was smaller in size. In the left cerebelli, close to the pons Varolii, and about its middle, another tubercular tumour, in colour and size not unlike the kernel of a hazel-nut, was found imbedded in the substance of the crus, at the depth of a quarter of an inch from the surface, the adjacent medullary matter being quite healthy. There was also a tumour of the same structure, and of the size of a pea, in the left hippocampus minor. Tubercles were scattered through both lungs," &c.—(MR. SHAW, in *Ibid.*, 1848 and 1849, p. 24.)

iii. *Cancerous Tumour in the Spinal Canal*.—A man, aged forty-six, of intemperate habits, could not sit erect without support. There was complete loss of voluntary power below the pelvis, and total anæsthesia in the right leg. He could feel pinching in the left. Reflex action was slowly produced by severe pinching, which easily excited erythema. There was a tenderness over all the lower dorsal vertebrae. The paralysis afterward invaded successively the abdominal muscles, and the bladder and arms, so that for some weeks before death, loss of sensation and voluntary motion was complete below the chest. Slight reflex action of the legs could be produced by severe pinching. Convulsive attacks preceded death.

On examination, the body was much emaciated. "The brain and membranes were healthy. Within the spinal canal, closely adherent to the theca externally, there existed an irregular encephaloid mass, mottled with dark spots, extending from the third to the sixth dorsal vertebrae, the bodies of which were carious, and infiltrated with cancerous matter. The tumour extended outward between the spines of the vertebrae and muscles to near the integuments. The portion of the cord beneath it was flattened, soft, and wasted. An ounce of fluid was contained beneath the arachnoid below the tumour." Cancerous matter was found also in the lungs, liver, heart, and pancreas.—(DR. C. J. B. WILLIAMS, in *Ibid.*, 1846 and 1847, p. 43.)

iv. *A fibro-carcinomatous Tumour invading the Spinal Canal, &c.*—A young lady had a tumour firmly attached

precision. It has been supposed that scirrhus, or cancer, involving the cord or its membranes, will be indicated by lancinating pains occurring at intervals, especially towards the close of the disease, by a straw yellow tint of the skin, by the presence of the same disease in other parts of the body, and by the advanced age of the patient, as it seldom appears until after the meridian of life. But, although these indications are generally observed, they are not always present. Tubercles can be inferred to be the cause of the symptoms characteristic of organic lesions of the spinal cord only when their existence in other organs or parts have been or are manifested; and when the early age of the patient, the scrofulous taint, and the absence of inflammatory symptoms farther aid this inference. The syphilitic cachexia, and the existence of osseous tumours externally, may suggest the presence of similar tumours in the spinal canal; but of this there is rarely any evidence; a supposition only can be entertained.

206. *f.* The *prognosis* in the above states of disease is always unfavourable. No correct idea even can be formed as to the term of their duration. After the paraplegic symptoms or spasms, which they produce, have appeared, a few days only may be the term of existence; or life may be prolonged for several years, as in the cases which I have here adduced. When the lesion is seated in the upper regions of the cord or its membranes, the duration of the disease is generally much shorter than when it is seated in the lumbar region.

207. *g.* The *treatment* of the structural changes just considered cannot be directed with much advantage, even if the nature of these changes were sufficiently manifest; but in most cases we proceed in the dark, although in some instances more or less light breaks upon our path. Yet, whatever may be the particular lesion in this quarter that we may be required to combat, there is one indication which should always guide our steps, and this is to support the vital resistance to the extension of disease. There are very few organic changes which are not increased by inflammatory action, on the one hand, and by debility—by impaired constitutional power, on the other. We should, therefore, endeavour to im-

prove the general health by promoting the digestive, the assimilating, and the excreting functions, and by removal to a dry, pure, and temperate air; avoiding excitement, and all sources of physical and mental irritation. It may sometimes be requisite to support the strength, and for this purpose such medicines as have the effect may be given with those which are most likely to procure the absorption of morbid growths, or to arrest their progress. With these intentions, the bitter infusions may be given with small doses of the iodide of potassium and the solution of potash, or the carbonates of potash, or BRANDISH's alkaline solution; and to these the preparations of sarza may be added; or, as circumstances may suggest, the iodide of iron may be given in the sirup of sarza. In many cases, the chief manifestation of disease—the paralysis produced by the organic change, will either be treated empirically or removed from the care of the scientific physician; and, although certain of the means thus employed may be more or less beneficial, especially electricity, galvanism, and electro-magnetism, yet they may be injurious, in some cases, when prescribed without due discrimination. Whenever the paralytic symptoms are attended by spasms or spastic contractions, then these are hazardous means; and the same may be stated respecting nux-vomica, strychnine, and phosphorus. But it is unnecessary to add to what I have advanced above, (§ 173, *et seq.*), or to what has been adduced respecting the *treatment* of PARALYSIS.

BIDLOG. AND REFER.—i. DISEASES OF THE SPINAL COLUMN, ITS CORD, OR ITS MEMBRANES GENERALLY.—*Aretæus*, De Morb. Diut., cap. vii.—*Galen*, De Symptomatum Causis, lib. i. et De Locis Affectis, l. iii., cap. viii.; liv. iv., cap. iv.—*F. Hoffmann*, Med. Ration., p. 14.—*P. Jones*, Essay on Crookedness or Distortion of the Spine, 8vo. Lond., 1738.—*J. B. Winslow*, in Mém. de l'Acad. des Sciences, p. 59. 1740.—*Levacher*, in Mém. de l'Acad. Roy. de Chirurg., t. iv. 1768.—*Ludwig*, Tract. de Doloribus ad Spinam Dorsi, in Adversaria Medico-Pract., t. i., par. 4, p. 711. 1770.—*J. P. Frank*, De Vertebralis Columnæ in Morbis Dignitate Oratio, Pavia, 1791; et Epitome de Curand. Hom. Morbis, l. ii.—*Guyenet*, Dissert. sur quelques Maladies, qui affectent la Colonne Vertébrale. Montpel., 1809.—*J. Abercrombie*, On Paralysis of the Lower Extremities from Diseased Spine, 8vo. Edinb., 1804.—*Hofner*, Diss. de Medullæ Spinalis Inflammatione. Marbourg, 1779.—*V. L. Brera*, Della Rachialgite Cenni Patologici, 4to, p. 30. Livourne, 1810.—*Desfray*, Essai sur le Spinitis, ou Inflammation de la Moëlle de l'Épine, 4to, Thèse. Paris, 1813.—*C. F. Harless*, Praktische Bemerkungen über die Myelitis, in Harless, Jahrbücher, t. ii., p. 260. 1813.—*Heer*, Diss. de Inflammatione Medullæ Spinalis. Erlangen, 1814.—*T. Copland*, Observations on the Symptoms and Treatment of the Diseases of the Spine, 8vo. Lond., 1815.—*V. Ruchetti*, Della Struttura, delle Funzioni e Malattie della Midolla Spinale. Milan, 1816.—*H. W. A. Asch*, De Vitiis quibusdam Medullæ Spinalis minus cognitis. Hall, 1816.—*Barbarour*, Diss. de Medullæ Spinalis Inflammatione, 8vo. Turin, 1818.—*J. Frank*, De Morbis Columnæ Vertebralis in Genere; De Rachialgia—De Rachialgitide, in Præfexes Med. Univ. Præcepta, p. ii., t. i., sect. 2, cap. 1, 2, and 3.—*M. Fink*, Die Rückenmarks-Entzündung, 3d edition. Bamberg, 1819.—*Ibid.*, 8vo. 1832.—*Bergamaschi*, Sulla Mielite Stenica, e sul Tetano; loro Identità, Metodo di Cura, e Malattie secondarie che ne derivano, 8vo. Pavia, 1820.—*Clot*, Recherches et Observations Pathologiques sur les Spinitis, 4to, Thèse. Montpellier, 1820.—*Macari*, Mém. et Observations sur la Spinitis, ou Inflamm. de la Moëlle Epinière, in Ann. de la Soc. de Méd. Pract. de Montpellier, t. ii., p. 5.—*S. Pinel*, Sur l'Inflammation de la Moëlle Epinière, in Journ. de Phys. de Magendie, t. i., p. 54.—*W. Earle*, Some Observations on Diseases of the Spine, in Philos. Transact., p. 2. 1822.—*Klohs*, Diss. de Mielite. Hall, 1820. Transl. into Hufeland's Journ., 1823, liv. and lvii.—*J. L. Casper*, Ueber die Verletzungen des Rückenmarks, in Hinsicht auf ihr Lethalitätsverhältniss (Extr. from Rust's Magazine, 1823), 8vo. Berlin, 1823. Trans. in Journ. complém. des Sci. Méd., t. xvi., p. 309, under this title: Sur les Lésions de la Moëlle Epinière, par Rapport à leur Degré de Lethalité.—*Gendrin*, Recherches sur les Tuber-

between the angle of the eighth rib and the spinous processes of the vertebra on the left side. It was hard, painless, and immovable, and of the size of a large orange. Five months afterward she had weakness and numbness of the legs, so that she could not stand. On the following day she was completely paraplegic; and on the day after this, she passed her motions involuntarily, and there was retention of urine. She afterward had cough, rigours, profuse perspiration, shortness of breath, and quick pulse. She had a slight convulsive fit, and soon afterward expired—four days from the appearance of paralysis.

After death, this tumour was found to be composed of carcinoma fibrosum, and was very dense. The arches of the dorsal vertebra and the spines were next raised, and upon the visceral surface of the fourth and fifth, a growth somewhat similar to the external one, and of such a size as to contract considerably the calibre of the vertebral canal, was discovered. "This growth resembled carcinoma, although somewhat lobulated. Opposite to this the theca was congested, although its normal contour was preserved. Upon opening the theca posteriorly, in the centre, the veins on the posterior surface of the cord were turgid, and the cord itself was a little flattened. When the anterior portion of the theca was divided in the centre, and reflected laterally, the anterior columns seemed to fall spontaneously on either side, and to expose the gray matter of the medulla, which was of a darker tint than usual, and very soft. This softening extended about an inch." The left thoracic cavity was invaded by a tumour corresponding with that in the dorsal region outside.—(Mr. A. KEY, in *Ibid.*, 1848 and 1849, p. 25.)



- cules du Cerveau et de la Moëlle Epinière, in Ann. du Cercle Méd. de Paris ; et séparém., 8vo. Paris, 1823.—*L. Wolff*, Beobachtung einer Chronischen Entzündung des Rückenmarks mit ungewöhnlichen Ausgang nebst Bemerkungen darüber, 8vo. Hamburg, 1824.—*Stiebel*, Ueber Neuralgiä Rachitica, und Symptom des Gegensatzes, in Rust's Magazine, t. xvi., p. 549. 1824.—*A. Velpau*, Mémoire sur une Altération profonde de la Moëlle allongée, sans que les Fonctions Nerveuses aient été troublées, in Archiv. Gén. de Méd., t. vii., p. 52. 1825.—Obs. sur une Malad. de la Moëlle Epinière, tendant à démontrer l'isolement des Fonctions des Racines sensibles et motrices des Nerfs, *Ibid.*, p. 68.—Mémoire sur quelques Altérations de la Moëlle Epinière, *Ibid.*, p. 329.—*G. F. Friederich*, Diss. de Myelitis. Berlin, 1825.—*Petronelli*, Observations et Réflexions sur quelques Lésions de la Moëlle Epinière, &c., 4to. Montp., 1826.—*Crouzet*, Recherches sur les Altérations de la Moëlle Epinière à la suite des Fièvres Adynamiques et Ataxiques, 4to. No. 139. Thèse. Paris, 1827.—*Fages*, Quelques Considérations sur les Lésions de la Colonne Vertébrale et de la Moëlle Epinière, in Ephémérides Méd. de Montpellier. Février, 1827.—*Ilutin*, Recherches et Observations pour servir à l'Histoire Anatomique, Physiologique et Pathologique de la Moëlle Epinière, in Nouvelle Biblioth. Méd. Février, 1828.—*Flourens*, Expériences sur la Réunion ou Cicatrisation des Plaies de la Moëlle Epinière et des Nerfs, in Ann. des Sc. Naturelles, t. xiii., p. 113. 1828.—*Calmeil*, Anatomie, Physiologie et Pathologie de la Moëlle Epinière, part 2. Pathol., in Journ. des Progr. des Sciences et des Instit. Méd., t. xii., p. 133. 1828.—*J. Abercrombie*, Pathological and Practical Researches on the Diseases of the Brain and Spinal Cord, 8vo. Edinb., 1828.—*Ibid.*, 8vo. 1830.—*J. F. Dezimeris*, in Archives Génér. de Méd., t. xvi., p. 40.—*C. Brown*, On Irritation of the Spinal Nerves, in the Glasgow Med. Journ., No. 11 ; 1828. Extr. in Archiv. Gén. de Méd., t. xix., p. 423.—*J. R. W. Dunbar*, An Essay on the Structure, Functions, and Diseases of the Nervous System, 8vo, p. 77. Phil., 1828.—*Darwall*, Observations on some Forms of Spinal and Cerebral Irritation. 1829.—*E. Enz*, Beobachtung über mehrere der Symptomatischen Krankheitsformen, welche bei Empfindlichkeit einer grösseren oder kleineren Stelle der Wirbelsäule vorkommen, in Rust's Magaz., t. xli., p. 195, and t. xli., p. 43 and 204.—*Bouley*, Des Maladies de la Moëlle Epinière et de ses Enveloppes chez le Cheval, in Recueil de Méd. Véter. 1830.—*R. Leonhardi*, Diss. de Myelitis, 8vo. Leipzig, 1830.—*J. Parrish*, On Irritation of the Spinal Marrow as connected with Nervous Diseases, in the American Journ. of the Med. Sci., August, 1832 ; and Trans. in Archiv. Gén. de Méd. 2me sér., t. i., p. 388.—*W. Griffin* and *D. Griffin*, Observations on the Functional Affections of the Spinal Cord and Ganglionic Nerves, &c., 8vo. London, 1834. Anal. in Medico-Chirurg. Review, No. xliii., p. 1.—*Albers*, Die Entzündung der harten Haut des Rückenmarks, Perimenigitis Medullæ Spinalis, in Journ. der Chirurgie of Graefe and Walter, t. xix., p. 347. 1833. Extr. in Gaz. Méd., p. 857. 1833.—*Hache*, Affections de la Moëlle Epinière et de ses Membranes, in Journ. Hebdom., t. xi., p. 269. 1833.—*Duparque*, Remarques et Observations sur les Maladies de la Moëlle Epinière, in Transact. Médic. Jan., 1833.—*J. Cruveilhier*, Maladies de la Moëlle Epinière, in Anat. Pathol. du Corps humain, livr. iii., vi., xvi. 1833.—*W. Coulson*, On Deformities of the Chest and Spine, 2d ed., 8vo. Lond., 1837.—*Monod*, De quelques Maladies de la Moëlle Epinière, in Bullet. de la Soc. Anat., No. 18.—*E. Stanley*, in Lond. Medico-Chirurg. Transact., t. xviii., pt. i., p. 260. Extr. in Archives Gén. de Méd., 2me sér., t. v., p. 95. 1832.—*J. P. Teale*, A Treatise on Neuralgic Diseases, 8vo. Lond., 1829.—*R. Stafford*, On Injuries, Diseases, &c., of the Spine, 8vo. Lond., 1832.—*J. Marshall*, Practical Observations on Diseases of the Heart, Lungs, Stomach, Liver, &c., occasioned by Spinal Irritation, 8vo. Lond., 1835.—*E. Constantin*, De la Myélite, 4to. Paris, 1836.—*R. B. Todd*, in Cyclop. of Pract. Med., t. iv., p. 635.—*Colbly*, Quelques Observations de Maladies de la Moëlle Epinière et de ses Membranes, in Archiv. Gén. de Méd., 2me série, t. x., p. 209. 1836.—*Grisolle*, Observations de Maladies de la Moëlle Epinière, in Journ. Hebdom., No. 3. Jan., 1836.—*G. C. F. Melher*, De Medullæ Spinalis Erctismo, 8vo, p. 82. Francfort-sur-le-Mein, 1838.—*C. P. Ollivier*, De la Moëlle Epinière et de ses Maladies, contenant l'Histoire. Anatom. Physiol. et Pathol. de ce Centre Nerveux chez l'Homme, 8vo. Paris, 1825.—*Ibid.*, 8vo, 2 tomes, 1827 ; et *Ibid.*, 8vo, 2 tomes. 1837.—*Calmeil*, Diet. de Méd., 2d edit., art. *Moëlle Epinière*.—*Anon.*, in British and Foreign Med. Review, vol. iii., p. 3, et seq.—Descriptive Catalogue of Patholog. Specimens contained in the Museum of the Royal College of Surgeons of England, vol. ii., series xiv., p. 243 ; vol. iv., ser. xliii., p. 140 ; vol. v., ser. lxvii., p. 139. ii. CURVATURES OF THE SPINE.—*G. Coopers*, Disp. Med. de Cyphosi, 4to. Franeker, 1770.—*C. V. Roy*, De Scoliosi, 4to. Leyde, 1774.—*Watzel*, De Efficacia Gibbositas in mutandis Vasorum Directionibus, fig. Utrecht, 1778.—*T. Sheldrake*, An Essay on the various Causes and Effects of the Distorted Spine, 8vo. Lond., 1783.—*A. Portal*, Observations sur la Nature et le Traitement du Rachitisme ou des Courbures de la Colonne Vertébrale, 8vo. Par., 1797.—*A. J. Vencel*, Description de plusieurs nouveaux Moyens Mécaniques propres à prévenir, borner, et même corriger les Courbures latérales et la Torsion de l'Epine du Dos, 8vo. Lausanne, 1768.—*C. H. Wilkinson*, Essay on Distortion of the Spine, &c., 8vo. London, 1798.—*J. Earle*, Observations on the Cure of Curved Spine, in which the Effects of mechanical Assistance is considered, 8vo. Lond., 1805.—Reply to the Review of M. Baynton's Essay on the Cure of Crooked Spine, in the Edinb. Med. and Surg. Journ., t. xi., p. 35. 1815.—*T. Baynton*, An Account of a successful Method of treating Diseases of the Spine, 8vo. Bristol, 1813. Extr. in the Edinb. Med. and Surg. Journ., t. x.—*J. Macartney*, Observations on Curvatures of the Spine, 4to. Dublin, 1817.—*G. Malsch*, De nova Machina Græffiana Distortiones Spine Dorsi ad sanandas, necnon Disquisitione Deformatum istum, 4to. Berlin, 1818.—*J. L. Choulant*, Dec. i. et ii., Pelvium Spinarumque deformatum, adj. nonnullis Annotationibus, 4to. Lipzig, 1818—20.—*W. T. Ward*, Practical Observations on Distortions of the Spine, Chest, and Limbs, 8vo. Lond., 1819.—*Ibid.*, 8vo. 1840.—*Vrolik*, Diss. de mutato Vasorum Sanguiferorum Decursu, in Scoliosi et Cyphosi, fig. Amsterdam, 1823.—*A. Dods*, Pathological Observations on the rotated or contorted Spine, 8vo. London, 1824.—*J. Shaw*, On the Nature and Treatment of the Distortions to which the Spine and the Bones of the Chest are subject, 8vo. London, 1822. Engravings illustrative of a work on the Nature and Treatment of the Distortions, &c. *Ibid.*, 1824, in fol. Farther Observations on the lateral or serpentine Curvature of the Spine, 8vo. 1825.—*T. Jarrold*, Inquiry into the Distortions of the Spine, 8vo. Lond., 1824.—*W. T. Ward*, Pract. Observat. on Distortions of the Spine, 8vo. Lond., 1829.—*R. W. Bamfield*, Essay on Curvatures and Dist. of the Spine, 8vo. Lond., 1824.—*L. J. Begin*, Mémoire sur les Déviations du Rachis, 8vo. Paris, 1826.—*Pravaz*, Nouvelle Méthode pour le Traitement des Déviations de la Colonne Vertébrale, 8vo. Par., 1827.—Sur l'Application des Moyens Mécaniques au Redressement des Déviations de la Colonne Vertébrale, in Arch. Gén. de Méd., t. xvii., p. 296. 1828.—Note sur des nouveaux Moyens de rétablir la Régularité du Thorax, dans le Cas de Déviation latérale du Rachis, in Mém. de l'Acad. Royale de Méd., t. iii., p. 69, and t. iv., p. 201. 1833.—*C. Lachaise*, Précis Physiologique sur les Courbures de la Colonne Vertébrale, 8vo. Paris, 1827.—*J. C. Molk*, Considerations sur les Causes et le Traitement des Courbures de la Colonne Vertébrale, 4to. Strasbourg, 1828.—*N. D. Goussy*, Diss. sur les Déviations de la Colonne Vertébrale, 4to. Thèse. Paris, 1828.—*G. A. Loret*, Essai sur les Déviations de la Colonne Vertébrale, 4to, fig., Thèse. 1829.—*M. Mayor*, Mém. sur le Traitement des Gibbosités, in Journ. des Progrès des Sciences Médicales, tome xiii., p. 169. 1829.—*A. Vernière*, Sur un nouveau Moyen Orthopédique, propre à remplacer le Traitement généralement en Usage pour le Redressement des Courbures anormales de la Colonne Vertébrale, in Journ. des Progrès, t. xiv., p. 175. 1829.—*F. W. Heidenrich*, Orthopædie, oder die Verkrümmungen der Wirbelsäule, &c., 8vo, fig., forming the 2d part of his Orthopædie. Berlin, 1831.—*J. A. Gorachuk*, De Incurvationibus Columnæ Vertebrarum abnormibus, 8vo. Vienne, 1831.—*L. Beale*, On the Distortions and Deformities of the human Body, with a concise View of the Nature and Treatment of the Malformations and Distortions of the Chest, Spine, and Limbs, 8vo, fig. Lond., 1833.—*Delpsch* and *Trinquier*, Observations Cliniques sur les Différences de la Taille et des Membres, 8vo. Montpellier, 1835.—*Bonvier*, Dictionnaire de Médecine et de Chirurgie Pratiques ; art. *Vertébrale* (Déviations de la Colonne), t. xv. 1836.—*Maison-abe*, Mémoire établissant l'Incurabilité de la Déviation latérale droite de la Colonne Vertébrale, 8vo, fig. Paris, 1837. See also his Journal des Déformités.—*Vallin*, De la Torsion qui accompagne constamment les Déviations latérales de l'Epine, 8vo, p. 46. Nantes, 1837.—*J. Guérin*, Mémoire sur l'Extension Sigmoidale et la Flexion dans le Traitement des Déviations latérales de l'Epine, 8vo. Paris, 1839.—Mém. sur les Déviations simulées de la Colonne Vertébrale, &c.—*Ibid.*, 8vo. 1859.—Sur le Traitement des Déviations latérales de l'Epine par la Section sous-entomée des Muscles du Psoas et de la Colonne Vertébrale, in Gaz. Méd. de Paris, p. 473. 1829.—Mém. sur l'Étiologie Génér. des Déviations latérales de l'Epine par la Rétraction musculaire active, *Ibid.*, p. 369. 1840.—*J. B. Serny*, Spinal Curvature, its Consequences, and its Cure, &c., 8vo. Lond., 1840.—*J. Amesbury*, Practical Remarks on the Causes, Nature, and Treatment of Deformities of the Spine, Chest, and Limbs, muscular Weakness, weak Joints, muscular Contractions, and stiff Joints, &c., 4to. Lond., 1840.—*E. W. Tyson*, The Cause and Treatment of Curvature of the Vertebral Column, 8vo, p. xiii.—263,

- and pl. xxvi. Lond., 1841.—*F. Sibson*, Effects of Curvature of Spine on the respiratory Movements, in Trans. of Med. and Chirurg. Soc., vol. xxxi., p. 379.—*Tavernier*, Considérations Pratiques sur les Déviations, ou Déformations de la Taille, in Journ. des Connaissances Médicales Pratiq., t. vii., p. 297–331. 1840.—*G. Childs*, On lateral Curvature of the Spine, 8vo. London, 1841.—*V. Duval*, Des Déviations de la Colonne Vertébrale, in Revue des Spécialités Médicales et Chirurgicales. 1840–42.—*E. Chassaignac*, De l'Appréciation des Appareils Orthopédiques. Thèse de Concours, 4to. Paris, 1811.—*Chailly and Godier*, Précis de la Rachidiorthose, 8vo. Par., 1842.—*Wenzel*, Ueber die Krankheiten am Rückgrathe, fol., fig. Bamberg, 1824.—*R. W. Bampfield*, An Essay on Curvatures and Diseases of the Spine, 8vo. London, 1827.—*Delpech*, Traité de l'Orthomorphie, t. i., p. 200.—*Jalade-Lafond*, Recherches Pratiques sur les Princip. Déformités, &c., 2d Partie, p. 142. Paris, 1820.—*J. Coles*, On Spinal Affections, and the prone System of treating them, 12mo, 2d ed. 1847. (*Curvatures merely*).—*E. Harrison*, Pathol. and Pract. Observations on Spinal Diseases, 8vo. London, 1827. (*Neither pathological nor practical, and treating most empirically of curvatures merely*).—*C. Duffin*, On Deformities of the Spine, &c., 2d ed., 8vo. 1835.—*C. Harrison*, On Deformities of the Chest and Spine, 8vo. 1842.—*S. Hare*, On Curvatures of the Spine, 2d ed., 8vo. London, 1844.—*J. Robertson*, On Spinal Diseases, with an improved Plan of Cure, 8vo. 1841.—On Spinal and Nervous Diseases, &c. 1841.—*F. Skelton*, On Curvature of the Spine, 8vo. Lond., 1840.—*R. Stafford*, Essays on Diseases of the Spine, 8vo. London, 1844.—*R. W. Tamplin*, Lectures on the Nature and Treatment of Deformities, &c., 8vo. Lond., 1846.—On Curvatures of the Spine, p. 204, et seq.—*E. Lonsdale*, Observations on the Treatment of lateral Curvature of the Spine, 8vo. London, 1847.—*J. Bishop*, The Causes and Treatment of Deformities of the human Body, 8vo. Lond., 1852. (*A most able and philosophical work*).
- iii. INFLAMMAT. AND CARIES OF THE VERTEBRÆ.—*P. Pott*, Remarks on the Palsy of the Lower Limbs, which is frequently found to accompany a Curvature of the Spine, 8vo. Lond., 1778.—Further Remarks, &c., being a Suppl. to the former, &c., 8vo. Lond., 1782.—*Paletta*, Sulla Paralizia, in Adversar. Chir. Primar., p. 139; et Exercit. Pathol. de Tuberc. Spinæ, p. 104.—*G. Gibb*, Select. of Cases of the Disorder commonly termed Paralysis of the Lower Extremities, 8vo. London, 1782.—*Loder*, Chirurg. Medic. Beobachtungen, b. i., p. 251.—*J. P. Frank*, De Cur. Hom. Morbis, l. ii., p. 48.—*B. C. Brodie*, in Med. and Chirurg. Transactions, vol. iv., p. 263.—*A. Duges*, Malad. de la Moëlle Epinière, t. i., p. 388.—*C. Hawkins*, Medico-Chirurg. Review, No. xliii., p. 557.—*Malte*, Clinique Chirurg. de l'Hôp. d'Instruct. de Strasbourg, p. 105. Paris, 1838.—*Stannius*, in British and Foreign Med. Review, vol. iii., p. 222.—*H. Nasse*, in Ibid., vol. iv., p. 415.—*G. B. Wood*, A Treatise on the Practice of Medicine, 2d edit., in two vols., 8vo. Philadelphia, 1849; vol. ii., p. 728.
- iv. EXOSTOSIS, ANCHYLOSIS, OSSIFICATIONS, &c.—*Columbus*, De Re Anatomica, l. xv., p. 484.—*A. Portal*, Traité du Rachitis, p. 211. Paris, 1797.—*Sandifort*, Exorcit. at. Acad., l. ii., p. 1; et Museum Anatom., vol. i., p. 147, et seq.—*Voigtel*, Handb. du Path. Anat., b. i., p. 223.—*A. Key*, in Guy's Hospital Reports, vol. iii., p. 17.—*Prus*, in Revue Méd., t. iv., p. 392. 1840.—*J. C. Warren*, Surg. Observat. on Tumours, 8vo. Boston, 1839.—*A. Duges*, Op. cit., t. i., p. 395.
- v. MORBID STATES OF THE SPINAL MEMBRANES.—*J. P. Frank*, De Vertebralis Columnæ in Morbis Dignitate, Paviæ, 1791.—*J. B. Mayer*, De sano et morbo Medullæ Spinalis Statu. Vindeb., 1808.—*Brera*, Della Rachialgie Cenni Patholog., &c.—*Lallemand*, Lettres sur l'Encéphale Obs., No. 50, p. 305.—*J. Copland*, Of the Causes, Nature, and Treatment of Palsy and Apoplexy, 8vo. London, 1850. (*Adhesions between the membranes more or less organized, and fatty degeneration of the false membrane*).
- vi. CARTILAGINOUS AND OSSIFIC CONCRETIONS IN.—*Chaussier*, Bulet. de la Faculté de Méd., t. v., p. 154.—*Esquirol*, Ibid., p. 426.—*Horn*, in Archiv. für Med., p. 237. Erfahrung, 1813.—*I. F. Meckel*, Hand. der Menschenlichen Anatomie, b. iii., p. 603.—*Brayne*, in Lond. Med. Reposit. July, 1820.—*Myself*, in two Cases of Tetanus.—*Velpeau*, Archives Génér. de Méd., 1825; and in *Magendie's Journ. de Physiol.*, p. 138. 1826.—*Olivier*, p. 344.—*R. B. Todd*, in Cyclop. of Pract. Med., vol. iv., p. 641.
- vii. HYDATIDS, TUBERCLES, AND MALIGNANT TUMOURS OF SPIN. MEMB.—*Lieutaud*, Hist. Anat., t. i., p. 391.—*Esquirol*, ut supra, p. 426.—*Chaussier*, Journ. de Médecine contin., t. xiv., p. 231.—*Reydellet*, in Dict. des Sciences Méd., t. xxxiii., p. 564.—*Olivier*, Traité, &c., t. ii., p. 520, et seq., 3d edit.—*Crucveilhier*, Anat. Pathol., liv. xx., p. 3.—*C. Hawkins*, in Transact. of Medical and Chirurg. Soc., vol. xxiv., p. 45.—*Lallemand*, Op. cit., Lettre v., p. 341.—*Velpeau*, in Archives Génér. de Méd., No. i. 1825.—*Abercrombie*, On the Brain and Spinal
- Cord, &c., p. 371.—*Wittfeld*, in *Horn's Archiv.* May and June, 1828.—*Knoox*, in Lond. Med. Observ. and Inq., vol. iii., p. 160.—*Reid*, in Trausact. of King's and Queen's College of Physicians in Ireland, vol. i. Also, other authorities adduced by *Plouquet* and *Otto*.
- viii. LYMPH AND VARIOUS FLUIDS EFFUSED BETWEEN THE MEMB.—*Bonnet*, Sepulchret. Anatom., l. i., sect. ii., p. 84.—*Morgagni*, Epist., iii., 2.—*Bell*, in Edinb. Med. Comment., vol. iii., p. 87.—*Albers*, in Medico-Chirurg. Review, No. xliii., p. 227. (*Inflammation, &c., of spinal dura mater*).—*Hard*, in Dict. des Sciences Méd., art. *Hydrohachis*.—*J. P. French*, De Curandis Hom. Morbis, l. vi.—*Olivier*, p. 248.—*Abercrombie*, p. 358.—*Denmark*, in Trans. of Med. and Chirurg. Soc., vol. v.—*Chevalier*, in Ibid., vol. ii., No. 9.—*J. Copland*, in London Medical Repository, vol. xv. (*After metastasis of rheumatism, lymph and adhesions between the membranes*).
- ix. MORBID STATES OF THE CORD ITSELF.—*L. C. Treviranus*, Zeitschrift für Physiöl., b. iii., p. 1, p. 3.—*V. Racchetti*, Della Struttura, delle Funzione delle Malattie della Midolla Spinale. Milano, 1816.—*Asch*, De Vitii quibusdam Medullæ Spinalis minus cognitiss., 4to. Italæ, 1816.—*Olivier*, Opus citatum, 2d edit. Paris, 1827.—*E. Stanley*, in Trans. of Med. and Chirurg. Soc., vol. xliii., p. 80.—*J. Webster*, in Ibid., vol. lxvi., p. i.—*Rolando*, Rev. Méd., t. iv., p. 316. 1824.—*Fallot*, in Archives Génér. de Méd., t. lvii., p. 96.—*Albers*, in British and Foreign Med. Review, vol. v., p. 183. (*Softening of central gray substance*).—*Hutin*, in Nouvelle Biblioth. de Méd. Jan. et Fév., 1828.—*R. B. Todd*, Op. cit., vol. iv., p. 643.
- x. ATROPHY OF, &c.—*Myelophthisis*.—*Brendel*, De Tabæ Dorsuale. Göt., 1749.—*Loewenhard*, De Myelophthisi Chronica vera et notha, 8vo. Berlin, 1812.—*W. Plouquet*, Exempulm singularis Morbi Paralytic. Tubing., 1806.—*Schesmer*, Tabis Dorsualis Adumbratio Pathologica. Ber., 1817.—*G. Horn*, De Tabæ Dorsuali Prelusio, 4to. Ber., 1827.—*Magendie's Journ. de Physiol.*, t. iv., p. 372.—*Hovuship*, Practical Observ. in Morbid Anatomy, 8vo, p. 59.—*Latham*, in London Med. and Phys. Journ., New Series, vol. i. July, 1826.—*Calmeil*, in Journ. des Progrès des Sc. Méd., t. ii., p. 81.—*Olivier*, Op. cit., t. i., p. 416–441; t. ii., p. 444, 3d edit.
- xi. CHANGES IN THE CONSISTENCE OF THE MARROW.—*Morgagni*, Epist. lxx., 5.—*J. P. Frank*, De curandis Hom. Morbis, l. ii., p. 49.—*Portal*, Cours de Anatom. Médicale, t. iv., p. 111. (*Induration of*).—*Horn*, Archiv. f. Medic. Erfahr., &c., p. 838. 1815.—*Calmeil*, Sur la Structure, les Fonctions, le Ramollissement de la Moëlle Epinière, 8vo. Paris, 1828.—*Georget*, De la Folie, p. 492. Paris, 1820.—*Rostan*, Recherches sur Ramollissement du Cerveau. Paris, 1820. (*Six cases of softening of the spinal marrow*).—*Pinel*, *Magendie's Journ. de Physiol.*, t. i., p. 154; et *Kullier*, Ibid., t. iii., p. 173. (*Uncommon softening*).—*Royer-Collard*, Ibid., t. iii., p. 157.—*Serres*, Ibid., t. v., p. 254.—*Olivier*, Op. cit. cases, 43–46, 48, and 50, 1st edit.; t. ii., p. 356, et seq., 3d edit.—*Louis*, Mémoires sur l'Anat. Patholog., p. 410. Paris, 1826.—*Jeffreys*, Lond. Med. and Phys. Journal. July, 1826.—*Molson*, in Transact. of Med. and Chirurg. Society of Edin., vol. iii., p. 1, p. 173.—*Lallemand*, Recherches sur l'Encéphale et ses Dépendances, Lettre ii., p. 309.—*Gendrin*, Histoire Anatom. des Inflammations, t. ii., p. 150.—*Bergameschi*, Sulla Mielitide Stenica, &c. Pav., 1820.—*Velpeau*, Révue Médicale, &c., t. ii., p. 247.
- xii. INFLAMMATION, ABSCESS, GANGRENE, &c.—*Hæfner*, De Inflammatione Medullæ Spinalis. Marb., 1799.—*Niel*, Sur le Spinitis, in *Corvisart's Journ. de Méd.*, p. 203. Oct., 1812.—*Brera*, Della Rachialgie Cenni Pathologici, in Atti dell' Accademia Ital. di Scienz. Lit. e Art., vol. i., p. 1, p. 246. Livorno, 1810.—*Bargamaschi*, Osservazioni sulla Inflammatione della Spinale Medulla, &c., 4to. Pavia, 1810.—*Gräf*, De Myelitis Nosographia, 4to. Reg., 1823.—*Meunier*, in Archives Génér. de Méd. Dec., 1828.—*Renaudin*, Dict. des Sciences Médicales, t. xlii., p. 247.—*Hart*, in Dublin Hosp. Reports, vol. v., p. 522.—*Thomson*, in Edinb. Medical and Surg. Journ., No. lvii. 1818.—*Desportes*, in Revue Médicale, t. i., p. 253. 1825.—*Brière*, Nouv. Biblioth. Méd., t. ii., p. 187. 1826.—*Bouillaud*, Journ. Hebdom. de Méd., t. i., p. 227.—*Potain*, in Archives Génér. de Méd., t. xiii., p. 286.—*Honoré*, in Ibid., t. xiv., p. 412.
- xiii. TUBERCLES, TUMOURS, &c.—*Phillips*, New London Med. Journ., vol. i., p. 144.—*Loewenhard*, De Myelophthisi Chronica vera et notha, 8vo. Berlin, 1817.—*Cerutti*, in Anat. Pathol. Museum, t. i., p. 11, p. 23, pl. 10.—*Velpeau*, in Archives Génér. de Méd. Jan., 1825.—*Williams*, in Report of Proceedings of the Pathological Society of London, vol. i., p. 43.—*A. Shaw*, in Ibid., vol. i., p. 25.—*A. Key*, in Ibid., vol. i., p. 27.
- xiv. APOPLEXY OF THE MARROW.—*Hutin*, in Bibliothèque Médicale, t. i., p. 170. 1828.—*Crucveilhier*, Anatomie Pathologique, livr. 3. Paris, 1828.—*Abercrombie*, On Diseases of the Brain and Spinal Cord, p. 362.—*Olivier*, Opus citatum, t. ii., p. 116, 3d edit.—*Gautier de Claubry*, Journ. Gén. de Méd. 1808.—*Chevalier*, Trans.



of the Med. and Chirurg. Soc., vol. iii., p. 102.—*Talbot*, Archives Gén. de Méd., t. xxiv., p. 438.—*Bouillaud*, in Journ. Heb. de Méd., t. ii., p. 50. 1825.—*Anon.*, Case of Apop. of Spinal Cord, in Arch. Génér., &c., t. xxi., p. 429.—*Curling*, in Report of Proceedings of the Pathological Society of Lond., vol. i., p. 29.—*J. Copland*, Op. cit., p. 62.

[XV. CANCER OF THE SPINAL CORD, MENINGES, AND VERTEBRÆ.—*Crucivillier*, Anat. Pathologique, livr. xx., art. Os; idem, livr. xxxiii., Malade de la Moëlle, p. 6. 1839.—*C. Hawkins*, Med. Chir. Trans., vol. xxiv., p. 45. 1841.—*Lecat*, Traité de l'existence du Fluide des Nerfs, p. 53. Paris, 1753.—*Philips*, New London Med. Journ., vol. i., p. 144. 1792.—*N. Knox*, Lond. Med. Observ. and Inquiries, vol. iii., p. 160. 1767.—*R. Reid*, Transac. of King's and Queen's Coll. of Phys. in Ireland, vol. i., p. 120. 1817.—*Serres*, Anat. Comp. du Cerveau, tome ii., p. 231.—*Wolfeau*, Arch. Gén. de Méd., tome vii., p. 68. 1825.—*Wolff*, Bull. des Sci. Méd. de Ferrussac, Jan., 1826.—*Olivier*, Traité de la Moëlle Epinière, p. 736. 1827.—*Calmeil*, loc. cit.—*W. W. Fisher*, Prov. Med. and Surg. Transacations, vol. x., p. 203. 1842.—*Abercrombie*, Diseases of Brain, 3d edit., p. 369. 1846.—*Gendrin*, Anat. Path.—*Walshe*, The Nature and Treatment of Cancer, p. 526.—*Sanson*, Arch. Gén. de Méd., t. iv., p. 691.—*Astley Cooper*, Surgery.—*B. F. Brodie*, On the Joints.—*Meckel*, Doane's ed., p. 507.—*C. A. Lee*, N. Y. Journ. Med. and Coll. Sci. Sept., 1849.

AM. BIBLIOG. AND REFER.—*J. B. S. Jackson*, Cases of acute Affection of the Spinal Marrow, with Dissections, Amer. Journ. Med. Sci. January, 1847.—*Austin Flint*, Observations on the pathological Relations of the Medulla Spinalis, Ibid. April, 1844 (No. 14, N. S.).—*Thomas Sewall*, Case of diseased Spine, Ibid., vol. ix., O. S.—*Isaac Parrish*, Remarks on Spinal Irritation, as connected with nervous Diseases, with Cases, Ibid., vol. x., O. S. 1832.—*R. J. Turnbull*, A Case of Spinal Irritation, Ibid., vol. xi., O. S. 1832.—*G. Dorrance*, in Ibid., vol. xvi., O. S., p. 351.—*D. L. Rogers*, in Ibid., O. S., vol. xvi., p. 91.—*Andrew Nichols*, Case of Spinal Irritation in himself: a very instructive case, Ibid., vol. xiv., O. S., p. 524; and in Bost. Med. Journ., vol. x., p. 139.—*John H. Griscom*, Remarks on the Treatment of Curvature of the Spine, with two Cases, Ibid., vol. iii., N. S., p. 116, 1842; and in N. Y. Journ. Med., On Spinal Irritation, vol. ii., p. 300.—*Isaac G. Porter*, On Neuralgia of the Spinal Nerves, with Cases, Ibid., vol. xxiii., N. S., p. 81. 1838.—*Samuel Weber*, Case of Myelitis, Ibid., vol. xvii., N. S., p. 543.—*Henry H. Smith*, On the anatomical and physiological Characters of the Spinal Column, Ibid., vol. xx., N. S., p. 322.—*Samuel Annan*, Observations on Spinal Irritation and Inflammation, Ibid., vol. xx., N. S., p. 85; and Western Lancet, vol. v., p. 334.—*J. K. Mitchell*, On Curvatures of the Spine, Am. Ed. of Bampfield on the Diseases of the Spine; and in N. Am. Med. and Surg. Journ. July, 1827.—*H. J. Bowditch*, in Am. Journ. Med. Sci., p. 354. Apr., 1854.—*A. A. Gould*, in Ibid. Apr., 1853.—*Eli Hurd*, Case of (complete) Division of the Spinal Marrow, in N. Y. Journ. Med. and Coll. Sci., vol. v., p. 165. (This is a most remarkable case of complete division of the spinal cord, with total paralysis, and a subsequent restoration of function, showing union of the cord, as in cases of divided single nerves.)—*J. B. Brown*, On Brass Rachets and Corslets in Spinal Curvature, Bost. Med. Journ., vol. xxviii., p. 119 and 239; vol. xxviii., p. 138, 314, &c.—*A. Abbe*, Mechanical Treatment of Curvatures of the Spine, Ibid., vol. xxviii., p. 152. (A defence of mechanical apparatus in the treatment of spinal curvatures.)—*Robert Capen*, in Ibid., vol. xxviii., p. 217.—*J. L. Hodges*, in Ibid., vol. xxviii., p. 283.—*J. G. Norwood*, in Ibid., vol. xiv., p. 373. (From Transylvania Med. Journ.)—*C. Jewett*, in Ibid., vol. viii., p. 188.—*H. A. Burrows*, Ibid., vol. viii., p. 70.—*Thomas Sewall*, Ibid., vol. vi., p. 56.—*J. C. Bradbury*, Ibid., vol. vi., p. 238.—*R. J. Turnbull*, vol. vii., p. 341.—*Charles Hubbard*, Ibid., vol. iv., p. 208.—*William Fitch*, Ibid., vol. iii., p. 829.—*A. S. Doane*, Am. Ed. of God's Study of Medicine.—*George B. Wood*, A Treatise on the Practice of Medicine. Phil., 1847.—*Thomas Stewardson*, Am. Ed. of Elliotson's Practice.—*R. Dunglison*, The Practice of Medicine. Phil., 1848.—*John Bell*, Lectures on the Theory and Practice of Physic (J. Bell and W. Stokes), 2 vols. Phil., 1818. (Dr. B. endorses the opinion of M. Vallichi, that what is commonly called spinal irritation is *dorso-intercostal neuralgia*, and may be detected by making moderate pressure with the finger on each side of the spinal column, at the spino-costal junction, and in the direction of the intervertebral foramina.)—*Samuel Henry Dickson*, Essays on Pathology and Therapeutics, 2 vols. Charleston, 1845. (A most philosophical and able work.)—*Wm. E. Horner*, A Treatise on pathological Anatomy. Phil., 1829. (Irritations of Medulla Spinalis, p. 389.)—*S. D. Gross*, Elements of Patholog. Anatomy, p. 369.—*Elizabeth Blackwell*, M.D., The Laws of Life, with special Reference to the physical Education of Girls, 12mo. N. York, 1850.—*Charles Chester*, Cases of cerebro-spinal Meningitis, in New Orleans Med. and Surg. Journ., vol. iv., p. 314.

—*L. A. Dugas*, Remarks on the Pathology and Treatment of Convulsions, Southern Med. and Surg. Journ., vol. i., p. 1.—*J. J. Robertson*, On Spinal Irritation, in Ibid., vol. i., p. 229.—*A. Brigham*, An Inquiry concerning the Diseases and Functions of the Brain, the Spinal Cord, and the Nerves, 12mo.—*J. Harrison*, An Essay towards a correct Theory of the Nervous System.—*E. North*, Practical Observations on the Convulsions of Infants, 8vo.—*D. Oliver*, First Lines of Physiology, 8vo.—*J. R. Verre*, Translation of Magendie's Physiology.—*A. Walker*, Pathology, and the Nervous System, Am. eds.]

## SPLEEN—DISEASES OF THE.—SYNON.—

Σπλήν, Gr. Spleen; Lien, Lat. Rate, Fr. Milz, Ger. Milza, Ital. Milt.

1. The diseases of the spleen have not attached to themselves that degree of importance to which their not infrequent severity, their prevalence in malarious localities, more especially in warm climates and in armies, and the danger often attending them, most undeniably entitle them. This may be partly owing to the uncertainty hitherto existing respecting the functions of this organ in health, and of the exact nature and pathological relations of the maladies to which it is subject. The superficial manner in which disorders of the spleen have hitherto been considered is an opprobrium, with which not English medical literature merely, but the medical literature of other countries also, is justly chargeable. When it is considered that our expeditions and armies during the last two hundred years, and in all latitudes, from Heligoland, Waleheren, &c., to Burma and China in the East, and the Monte Video in the West—that all our colonists and settlers, from Canada to Australia—that all our dependencies in both the Eastern and Western hemispheres—and that all races, both fair and dark, more especially the former, have suffered more or less, and have not infrequently been carried off by diseases of the spleen, the imperfect knowledge and scanty literature of these diseases are matters of no small surprise.

2. I. INTIMATE STRUCTURE OF THE SPLEEN.—Before proceeding to consider the diseases of the spleen, it will be advisable to offer some remarks upon the normal structure of this organ. From the time of WINSLOW to that of ANDRAL, this viscus was said to be composed of the following constituents: 1st. A fibrous structure, forming its sub-peritoneal, proper, and investing capsule or membrane, and detaching from its internal surface a number of fibrous septa and filaments, which divide and subdivide so as to form a number of cells into which the blood is effused; 2d. Veins, which throughout their whole extent communicate with these cells by an infinite number of perforations in their sides; 3d. Arteries, the small branches of which ramify on the septa of the cells; 4th. Nerves and lymphatic vessels. Sir E. HOME and BECLARD appear to have agreed with the foregoing description, and to have viewed the spleen as strictly an erectile structure.

3. More recently the microscopical anatomists, especially of Germany, have upset this account; and MÜLLER, ECKER, GÜSBURG, GLUGE, CESTERLEN, HESSLING, GERLICH, GIESKER, ARNOLD, KÖLLIKER, and others, have furnished us with very different descriptions of the structure of this viscus. These, however, by no means agree; but, as KÖLLIKER's description appears to be the most minute, and to enjoy the most credit—as it is, moreover, published in this country, and in a contemporary work, I shall endeavour to give a brief account of the results of his researches. These are, however, by no means clear, and cer-

tainly tend to throw but little light upon the diseases and lesions of the organ.

4. This author notices, 1st. The *serous* or *peritoneal membrane*, which accurately covers the outer surface of the spleen, with the exception of the *hilus*, constituting the gastro-splenic ligament, and conveying the vessels to and from the viscus; this covering is intimately connected with the subjacent fibrous and proper coat of the organ.

5. 2d. The *fibrous* or *proper coat* encloses the parenchyma of the spleen on every side, as a sac or envelope, with the exception of the *hilus*, where the two membranes diverge, and are separated by vessels, nerves, and areolar tissue. The inner surface of the coat "bounds the parenchyma of the organ, and, with the exception of very numerous solid processes, which come off from it, is limited by the *trabecular tissue*. At the *hilus* of the spleen it sinks into the interior of the organ in the shape of tubes (*vagina vasorum*), which ensheath the entering and emerging vessels, and are continued on these throughout the whole parenchyma." The fibrous coat is composed of white fibrous tissue, mixed with elastic or yellow fibres; the former of these consists of bands which take a parallel course, but do not form distinct bundles; and the latter are united in a very dense and irregular network.

6. 3d. The *trabecular tissue* consists of "white, shining, flat, or cylindrical fibres, which arise in great numbers from the inner surface of the fibrous coat, and in smaller quantity from the exterior surface of the sheaths of the vessels. These are so connected with similar fibres in the interior of the spleen as to form a network which extends throughout the organ. Between the fibres of this net exist a great number of spaces, which are connected with each other, and are occupied by the red spleen substance (5th) and splenic corpuscles (4th); and which, although very irregular in respect to their form and size, have yet a considerable resemblance to each other." The trabecular tissue completely corresponds with the fibrous coat, since it consists of white and yellow fibres; and this KÖLLIKER considers to be muscular; but if this be admitted, the fibrous tunic should be considered as muscular also; and both being viewed as muscular, the contractions of the spleen, so often remarked upon, may be accounted for. MALPIGHI and others had, previously to this writer, contended for muscular fibres in the partitions of the spleen; but KÖLLIKER appears to have been the first to demonstrate them microscopically.

7. 4th. The *splenic vesicles*, or *Malpighian corpuscles*, are whitish spherical corpuscles imbedded in the red spleen pulp (5). They are frequently not seen in the bodies of men dead of disease, although normal structures, which are invariably present in the healthy subject. The size of these corpuscles varies from one tenth to one third of a line, on an average of one sixth. They are imbedded in the red spleen substance, and, with the exception of one point, where they are attached to external twigs, they are every where surrounded by this substance. HESSLING and KÖLLIKER believe that, in the healthy spleen, they constitute from one fifth to one sixth of the whole splenic mass. Each Malpighian corpuscle possesses a special membrane and contents, and therefore is not a solid corpuscle, but rather vesicle, this membrane appearing to be only a modified portion of the vascular sheaths (§ 5) with which it is continuous. The contents consist of

a small quantity of a clear fluid, and a large quantity of morbid particles, which, according to J. MÜLLER, very much resemble the corpuscles of the spleen-pulp, and have a general likeness to the blood discs, but are irregularly spherical, often resembling the chyle corpuscles. KÖLLIKER maintains that the Malpighian bodies are closed corpuscles, and stand in no connexion with the lymphatics; that they constitute a kind of shut glandular vesicle, and that there is nothing to warrant their being regarded as glandular vesicles.

8. 5th. The *red spleen substance, pulp, or parenchyma of the spleen*, is a soft reddish mass, which fills up all the interstices between the larger partitions and the stronger vessels. Having made a section of the viscus, it is easily scraped off or squeezed out. It consists essentially of three constituents, viz., fine blood-vessels, parenchyma-cells, and small portions of fibres, to which may be added extravasated blood in various metamorphoses. The cells of the spleen pulp, or parenchyma cells, are similar to the Malpighian corpuscles, but of a darker colour, and of a more variable and smaller size. The blood effused in the spleen pulp and the blood-globules are almost constantly undergoing dissolution in the spleen and disappearing, according to the researches of KÖLLIKER.

9. 6th. The *vessels of the spleen* enter the *hilus* of the spleen, and, on arriving at the viscus, both arterial and venous branches receive, as a covering or sheath, a process of the tunica propria of the spleen, which forms the *vagina vasorum*, already noticed (§ 5). The calibre of the splenic vein, according to HOME, GIESKER, and others, is, in proportion to that of the artery, as five or six to one; while the thickness of its coats is very inconsiderable, and it has no valves. The arteries, veins, and nerves are enclosed in sheaths of the tunica propria; and not only are the trunks of entering and emerging vessels thus covered, but their finer ramifications receive a similar clothing. The arterial branches ramify minutely in the Malpighian corpuscles and surrounding red pulpy substance, into which latter part especially all the fine pencil-shaped ramifications pass; and the commencements of the veins spring from these branches. These nervous commencements or capillaries are tolerably large, anastomose frequently with each other, and scarcely have a special coat as yet. They give the cellular appearance seen in inflation of the veins of the pulp, and which, injected, form structures resembling the corpora cavernosa of the penis. The lymphatics in man are rather less numerous than in the other glandular organs.

10. 7th. The *nerves of the spleen*, proceeding from the splenic plexus, accompany the splenic artery, and divide in such wise at the giving off of its branches, that each artery receives one, or very frequently two nerves which accompany it, and here and there anastomose with each other. The nerves may be traced on the arterics which go to the Malpighian corpuscles; and by the aid of the microscope they may be seen passing into the pulp, on the pencils of minute arterics.

11. II. THE PHYSIOLOGICAL PATHOLOGY OF THE SPLEEN rests on a knowledge of its structure; and therefore I have endeavoured to give, as succinctly as possible, the results of the researches of KÖLLIKER. HEWSON has remarked, that when an organ receives more blood than it requires for its own nutrition, we may conclude,



therefore, that the blood undergoes a change from it, or a secretory process takes place, and this applies strictly to the spleen. This physiologist, and subsequently TIEDEMANN and GELIN, believed that a particular lymph is generated in the spleen, which serves to form blood-globules. But KÖLLIKER opposes this view, and contends that the interior of the spleen is quite poor in lymphatic vessels, and that the blood in the splenic veins is poor in blood-globules; and hence that it is impossible to believe in the formation of a special lymph in the organ, or a relation to the lymphatic system. He contends that no trace whatever of the formation of blood-globules can be detected, but that, at every step of his researches, indications of a dissolution or decomposition of the globules in the spleen were presented to him. He concludes, "*that the blood-globules undergo solution in the spleen, and that their colouring matter is employed in preparing the colouring matter of the bile.*"

[It is a somewhat remarkable fact that the spleen has, in numerous cases, been removed from animals, and without any perceptible effect on their health. The same has again and again occurred, by accident or design, in the human subject. Experiments on the lower animals have been performed by many physiologists, all which go to establish the fact that the spleen is not essential to the health of the economy. Of forty cases in which the spleen was removed from dogs in Paris a few years since, more than one half recovered in a short time, the remaining number perishing from abdominal inflammation. During convalescence, they ate and drank as usual, digested well, nor were any of the functions appreciably disordered. Dr. CRISP exhibited, at the physiological meeting of the Medical Society of London, November 4, 1853, a dog, the spleen of which was removed two years and a half previous. The animal was in good condition, and did not appear in any way to have suffered from the loss of the organ. The blood, which was exhibited under the microscope, presented no abnormal appearance.—(*Med. Times and Gaz.*, Nov. 19, 1853.)

Notwithstanding these facts, it is generally maintained by physiologists that the spleen is intended, in some way or other, to operate on the blood which passes through it. To ascertain what these changes are, M. BECLARD has performed a series of analyses of venous blood, which lead to some very important conclusions. His experiments entirely disprove the opinion of M. DONNÉ, that the spleen is the organ by which the blood-globules are formed; as he has found that the blood of the splenic vein (previous to its junction with the vena portæ and veins of the stomach) contains a quantity of globules inferior not merely to arterial, but even to the average of that contained in venous blood generally. On the other hand, the proportion of albumen is increased. The examination of the blood of the vena portæ shows a very large proportion of globules, and a corresponding diminution of the albumen, as is shown by the following table:

	Venous Blood from Jugular Vein.	Arterial Blood.	Blood of Splenic Vein.	Blood of Vena Portæ.
Water . . . . .	778.9	750.6	746.3	702.3
Albumen . . . . .	79.4	89.5	124.8	70.6
Globules and fibrin	141.72	159.9	128.9	227.1

M. BECLARD has established the fact, that though the constitution of venous blood varies, that of the arterial blood is constant in every part of the arterial system.—(*Annals de Chimie et de Phys.* Dec., 1847.)]

12. The contractile power of the spleen was observed by many anatomists, and an explanation of this power has been furnished by KÖLLIKER's discovery of muscular or contractile fibres in it, as shown above. Hence this viscus can dilate and contract itself by relaxation of its contractile or muscular fibres existing in its balks, coats, and vessel-sheaths; and hence it becomes turgescient, and by contraction of these it becomes small. During its turgescence, a stagnation, and possibly even an extravasation of blood, takes place in its capillaries and pulp, the globules thus more readily undergoing solution or destruction: this change takes place in the Malpighian corpuscles, and in the parenchyma cells.

13. This theory of the function of the spleen has received the support of ECKER and BECLARD, and it serves to explain the diseased condition of the viscus, and the influence exerted by those conditions on the economy. That this organ is more or less affected in the course of fevers, periodic, continued, and exanthematous, is well known, and especially when these maladies assume an adynamic or malignant character. That it is also often disordered or diseased in scurvy, purpura, chlorosis, rheumatism, and in some other chronic maladies, has been remarked; and it is generally admitted that enlargements and other organic changes of the organ, if they be of considerable continuance, are attended by more or less marked anæmia and emaciation. The emaciation, anæmia, and other changes in the blood, as a superabundance of fibrin, &c., so frequently observed in the progress of periodic fevers, rheumatism, &c., may readily be referred to dissolution of the blood-globules in the spleen during the congestions and enlargements of it in the course of these maladies. J. P. FRANK has remarked respecting the spleen that, "*aliorum fere morborum imperio turget et subsidet,*" and, in these circumstances, the changes produced by it on the blood cannot fail of being more or less considerable.

14. III. CAUSES OF DISEASES OF THE SPLEEN.—Diseases of this viscus will occur at all ages. I have seen them in infants of only a few weeks old, and in very aged persons, as well as at every intermediate age. They are very frequently met with in warm, marshy countries previously to puberty, in both the white and dark races, but more especially in the children of Europeans born in those countries. The children of English or other European parents born in the East or West Indies seldom escape some affection or other of the spleen, if they continue to live in malarious districts during the periods of childhood, or until the period of puberty. The male sex is more liable to them than the female, probably owing to the former being more exposed to the causes of splenic disease, and to the greater temperance, and to the periodic discharges of the latter. Of all causes, the *endemic* are the most influential, especially malaria from any of its various sources, and the use of marshy, stagnant, or impure water, or water preserved in tanks, or containing decayed vegetable or animal matters, or both. (See *art. ENDEMIC INFLUENCE.*) These causes, according to their concurrence with other causes, or to

the constitution of the individual, are productive of either inflammations, congestions, enlargements, or other organic changes of the spleen, generally as a complication or as a consequence of periodic fevers; but they may produce these affections independently of antecedent or attendant periodic fever. Besides these causes, others are not without influence, namely, living in low, humid, and close situations, and in wet, clayey localities, or in cold and damp cellars; debility and vital depression produced in any way; unwholesome or insufficient food; running, long walks, and fatigue; intemperance in food or drink; and whatever contaminates or alters the constitution of the blood and chyle.

15. There are certain circumstances connected with the circulation and the state of the blood which favour the production of splenic disease, although various local and constitutional causes aid in the result. Continued muscular efforts not merely increase the rapidity of the circulation, but also change, in some degree, the state of the blood itself, and alter more or less its normal distribution in the several organs and parts of the frame. During muscular exertion, the blood is thrown inward in larger quantity, and distends the visceral veins and large venous trunks, the spleen becoming in some measure a diverticulum to the venous circulation in these circumstances. Somewhat similar changes occur during the cold stage of agues, and in the period of invasion of other fevers, before reaction takes place; but, instead of the circulation being greatly accelerated, and active congestion of, or vascular determination to internal viscera being produced, as in the former circumstances, it is rendered slower than natural in the latter; *passive* congestion of the internal veins and viscera being occasioned by the partial suppression of the circulation in the extremities and on the surface. During the operation of any of the former category of causes, the active determination of blood to the organ may occasion the more acute forms of splenic disease, while during the action of either of the latter, engorgements, enlargements, and other chronic affections of the organ are more liable to result.

16. The state of the blood itself also very materially influences the nature and form of the resulting disease. As long as this fluid continues uncontaminated, or preserves its natural crasis, the splenic affection retains more or less of a sthenic character. But when the blood becomes contaminated, either by infectious emanations, or by septic or deleterious effluvia, more especially by such as proceed from the decomposition of animal matter, the spleen experiences the most serious changes, and these generally assume an asthenic or septic character, this organ being not merely congested or enlarged, but also remarkably softened, deprived of vital cohesion, and otherwise greatly altered. There is no part of the frame which sooner or more remarkably betrays, by these changes, the consequences of vital depression and contamination of the circulation, especially in warm and malarious climates and localities, than the spleen.

17. Among the most common causes of disease of the spleen, especially of an acute character, are long marches in malarial countries, running, fatigue; falls, injuries, or blows on the left hypochondrium; drinking cold fluids when the body is overheated and perspiring, unwholesome beverages, and irregularities in diet. Hence the

greater frequency of affections of the spleen, and the very acute form which these affections often assume, in soldiers in active service in warm climates. Diseases of a chronic kind, and very often those which are acute, are, in these circumstances, among the most difficult and serious maladies which come under the care of the physician; and they are not the less so that they are seldom primary, and rarely occur in persons previously healthy, they being more frequently complications, or consecutive upon, or sequelæ of other maladies, especially of periodic fevers, of obstructions of the liver, of chlorosis and uterine obstructions, of diseases of the heart and vascular system, particularly the veins.

18. Anxieties of mind, depression of spirits from any cause, discouragements, disappointments, losses of friends or fortune, nostalgia, and whatever tends to lessen the tone of the mind, or to depress mental vigour and activity, exert considerable influence both in predisposing to, and in more immediately producing disorders of the spleen. Persons predisposed by these causes are the most liable to be attacked not only by diseases of the spleen, but even more frequently by those maladies of which these diseases are either complications or sequelæ, and are much more susceptible of the effects of those endemic causes which are so injurious in hot climates. It is not great heat merely which is productive of diseases of the spleen and their allied maladies, but chiefly sudden falls, or rapid alternations of temperature [or a high dew-point.\*] At the termination of the

\* [We believe that a high dew-point has much to do in the production of splenic diseases, as well as of fevers of malarious origin, so called, and probably cholera, epidemic dysentery, yellow fever, and, indeed, most malignant diseases which prevail in warm seasons and certain localities; and we may take this occasion to remark that we were the first in this country, so far as we know and believe, to call attention to this subject. In a communication to the late Dr. S. FORRY, and published in his work on "the Climate of the United States" (1842, p. 111), I remarked, that "the state of the dew-point exerts far greater influence upon animal bodies, especially in the production of disease, than temperature itself. This arises chiefly from the circumstance that a high state of the dew-point interrupts, to a greater or less extent, the healthy function of the skin and lungs, two of the most important organs of the body. I maintain that perfect decarbonization of the blood cannot take place in the lungs with a high dew-point, and, consequently, that the vital fluid cannot receive a sufficient quantity of oxygen to fit it for those various offices which it is designed to perform in the animal economy. An atmosphere with a high dew-point, moreover, carries off the vitreous electricity, which is doubtless intended to subserve an important end as a vital stimulus. We find, accordingly, that highly malignant fevers do not prevail where the dew-point is below 60°. The same is true of malaria. If we seek for the cause of the excessive fatality of tropical diseases, we shall find it in a dew-point of 70° or 80°. This gives efficiency to the malarious poison by checking its elimination from the system, and it also checks evaporation from the surface of the body, so that the 53 ounces of fluid, impregnated with nitrogenous and other matters, given off from the skin every 24 hours, in a moderate dew-point, is retained or disposed of through some different channel, constituting a material derangement of the animal economy." "The dew-point in our climate is fortunately, as a general rule, several degrees below the temperature of the atmosphere. It is but rare, indeed, that they nearly or quite coincide; such weather is then called *close*, *sultry*, or *muggy*, and its depressing influence on the system is too well known to be described. The very colour of the skin, to say nothing of the languor of the mind and the debility of the muscular system, shows that the blood does not undergo the proper change in the lungs. The baleful *Sirocco* is nothing but an atmosphere, set in motion, having a high dew-point."

The same views, with additional remarks and illustrations, were embodied in an article on "Hygrometrical Observations," and published in the *Boston Medical and Surgical Jour.*, vol. xxvi., No. 5, p. 69. I remarked that, "from the observations of Dr. JOHN DAVY, it appears



periodic rains, and when the nights become comparatively cool or cold after hot days, the air being loaded with malaria, and the circulation determined, from the surface and extremities, upon the internal viscera, the frequent congestion of the spleen, thereby produced, or otherwise caused, as by the frequent recurrence of the cold stage of an ague, occasions either inflammatory or sub-inflammatory affections, or structural changes of this viscus—results which the impression of malaria on the nervous system, when aided by mental depression and vicissitudes of temperature, the more certainly and severely induces. In warm climates congestions or other diseases of the spleen seldom occur in females, either primarily or consecutively of periodic fevers, without being associated with disordered menstruation—without delayed menstruation or chlorosis in young females, or suppressed menstruation or leucorrhœa in females of maturer age.

IV. PAINFUL AFFECTION OF THE SPLEEN.—SYNON.—*Splenalgia* (σπλην, spleen; and αλγεω, I am pained). *Dolor lateris, obstructio lienis*, Auct. Var. *Splenis dolor*—*Splenic pain, pain in the left side*.

CLASSIF.—II. CLASS, III. ORDER (*Author in Preface*).

19. DEFINIT.—*Pain in the left side, without febrile symptoms, occurring often suddenly, and frequently ceasing as suddenly, sometimes caused by running, and occasionally being symptomatic of hysteria or uterine disorder.*

20. A. *splenalgia* most commonly occurs in the circumstances just named, and in its slightest forms it is often complained of by boys or others upon sudden exertion, especially running up hill, or against the wind, or ascending heights; and it usually ceases soon after the causes. When it appears in hysterical females, or in connexion with uterine disorder, it is much more obstinate and liable to recur. With the severity of pain referred to the left hypochondrium, there is often either shortness of breath, or a painful stitch on

that on removal from a temperate to a tropical climate, in other words, from a low to a high dew-point, the animal heat, or temperature of the body, is raised several degrees, which is doubtless owing to the fact that sensible transpiration carries off less heat from the surface than insensible evaporation. This predisposes to, and doubtless excites, fevers and other forms of disease; and hence the utility of adopting a vegetable diet and the cooling regimen on visiting such countries. In tropical climates the liver takes on a vicarious and increased action, in order to discharge from the system the extra amount of carbon, which chiefly escapes from the lungs in temperate latitudes, where the dew-point is comparatively low. Blacks are less subject to fevers and other diseases incident to hot climates, because their skin is considerably modified in texture, so as to enable it to perform a greater extent of function than that of the white. Its thick and dark rete mucosum enables it to exhale not only a larger quantity of water and carbonic acid from the blood, but it secretes a more unctuous fluid, which is believed to possess considerable influence in counteracting the effects of the sun's rays, and in carrying off the superabundant caloric, thus diminishing the heat of the body. In short, the negro skin is adapted to a high dew-point, removing from the blood the carbon and other matters which, in the white, are, to a greater extent, discharged through the lungs and the liver. By the process of acclimation, the skin of the white may, after a time, so far discharge this vicarious office, as to resist the influence of a high dew-point, and thus escape disease."

The writer has never denied, as stated by Dr. R. LA ROCHE (*On Pneumonia*, &c., Phil., 1854), the existence of malaria as a true cause of disease; he has only maintained that it owes its greater efficiency and activity to a high dew-point. Numerous observations are now being concentrated on this point, and a few years will determine whether the views above advanced, and still maintained, are founded in truth or not.]

breathing, or frequent sighing, and the pain may be mistaken for pleurodynia, or even for pleurisy; but the absence of febrile symptoms, the circumstances in which it occurs, and its sudden or quick subsidence with the cessation of the cause, sufficiently characterize the disorder, and distinguish it from inflammatory or structural disease of the viscus. When splenalgia is occasioned by running or other kinds of physical exertion, it may with justice be imputed to a rapid or sudden congestion of the spleen by a greater flow of blood into the organ than return of the fluid by the veins; the sudden distention or turgescence causing stretching and pains of the fibrous structure and peritoneal envelope of the organ. When the affection is connected with hysteria, or with uterine disorder, or with indigestion, it may be imputed either to sudden congestion, or to a morbid sensibility of the nerves supplying the viscus. It may be remarked, that the term splenalgia has been improperly implied to both inflammatory and organic lesions of the spleen—as a generic term for splenic diseases—by some modern as well as earlier writers; I have restricted it as above.

21. B. The treatment of splenalgia depends upon its causes. If induced by the nature or amount of exercise, repose will generally soon remove it. If it be neuralgic, or connected with hysteria or uterine disorder, the means advised for these affections respectively will be most appropriate. Whenever this viscus betrays a disposition to disorder, by an increased or morbid sensibility, then a restorative treatment, especially by chalybeate preparations or mineral waters, appears to be indicated. But it should not be overlooked that this affection, by persistence or recurrence, may pass into prolonged congestion or tumefaction, or into acute or sub-acute, or chronic inflammation, although this latter is not of very frequent occurrence. In these circumstances, the treatment hereafter to be noticed should be adopted (§ 62, *et seq.*).

V. CONGESTION OR SIMPLE TURGESCENT OF THE SPLEEN.

CLASSIF.—See *Painful Affections of*.

22. *Turgescence of the spleen is generally characterized by more or less pain or tenderness, by a fulness or weight in the left hypochondrium, sometimes by shortness or rather shallowness of breathing, and by various sympathetic feelings, according to its association or complication with periodic fevers, or other ailments.*

23. Congestions of the spleen are most commonly met in connexion with agues, with obstructions to the portal circulation, and with the other diseases incidental to warm and malarious climates, especially in children and young persons, and the offspring of Europeans in these climates. In its slighter states, congestion of this viscus is often a primary affection, and it then less frequently comes under the observation of the physician. It is chiefly when it occurs as a complication of malarious diseases, or when a frequent recurrence, or a prolonged continuance of congestion, has been followed by inflammation, or by permanent enlargement, or by other organic lesions of the viscus, that this disorder, or rather its consequences, comes under medical treatment.

24. A. The symptoms of splenic congestion vary much with the extent of congestion, with the rapidity of its occurrence, with the causes which produced it, with the temperament in

which it occurs, and with the disorders of which it is a complication. If its accession be sudden or rapid, there is generally more or less pain in the splenic region; if slow, or if the affection be consequent upon ague, pain may not be much complained of. But there is generally a sense of weight or uneasiness, or fulness; and more or less pain or soreness is induced by pressure or percussion of this region, with occasionally manifest enlargement, but more commonly only an indistinct fulness of this part. There is generally no fever, unless the affection be connected with some febrile disease. When the congestion is greater or of longer continuance, the digestive, assimilating, and excreting functions are more or less disturbed. The fulness or enlargement in the left hypochondrium is greater, is often attended by tension, and the pain or tenderness produced by pressure is more felt. Various sympathetic pains are then often experienced; and the patient presents a more sickly, or a more sallow or lurid, or even a partially anæmied hue. Sometimes also, especially when the disorder has been of some continuance, emaciation takes place, and the tongue becomes loaded or flabby, or indented at the edges. The skin generally remains cool; the pulse is low or weak, and the conjunctiva pale. The breathing is superficial or short, and the stools are very dark, while the urine is pale and of natural quantity. Females are generally, during the continuance of congestion of the spleen, subject to amenorrhœa, or to difficult and scanty menstruation, or to leucorrhœa.

25. If congestion of the spleen continue long or recur frequently, one or other of the affections about to be noticed generally supervenes, especially in hot and malarious localities, or when the disorder is connected with periodic fevers, or with obstruction to the portal circulation. Prolonged congestion, as well as other chronic diseases of the spleen, commonly is attended by, even if it actually be not influential in producing, a poor or morbid condition of the blood and impaired nutrition. The dark and sallow hue; the pallid lips, tongue, and gums; the general emaciation contrasting often remarkably with the fulness in the splenic region, and the deficient capillary circulation on the surface, impart a striking appearance to persons subject to chronic congestions and structural diseases of the spleen. Whether the changes produced in the blood by the spleen be such as tend to the full elaboration of the blood-globules—to the formation of healthy blood—as was believed by many pathologists, and only recently denied, or whether the spleen reduces or dissolves the blood-globules, and prevents their excessive formation, as inferred by KÖLLIKER and others, there can be no doubt that diseases of the spleen induce a poor state of the blood, and more or less emaciation. If the former doctrine be entertained, the inference must necessarily be that the splenic disease impedes the healthy or natural changes produced by the spleen on the blood. If the latter theory be adopted, it will as necessarily follow that either the diseased spleen does not cease to reduce or dissolve the red globules, or that some other organ or organs take up the office vicariously for the spleen, and that, moreover, this office is discharged to a much greater extent during diseases of the viscus than it is even in health.

26. *B.* The treatment of splenic congestion consists chiefly in the removal of, or from, the causes

producing the complaint, and in the cure or prevention of the diseases, of which it is consecutive. These causes are chiefly endemic, and hence change of air and locality is essential to a permanent cure of the complaint. Tonics, chalybeates, and stomachic aperients are generally beneficial. These secretions and excretions should be sufficiently free; but the means used to fulfil this intention ought not to be of a depressing kind. Stomachic and chologogue aperients should be conjoined with tonics, as the compound decoction of aloes with the compound mixture of iron, &c., or the compound infusion of gentian, with the infusion of rhubarb, &c.; or quinine, or preparations of cinchona may be given in various states of combination, according to the peculiarities of individual cases. In most cases, and even during residence in localities productive of congested spleen, I have found a combination of the sulphates of iron and quina, and the aloes and myrrh pill most serviceable, the last being given in sufficient quantity to act satisfactorily on the bowels. The treatment hereafter to be recommended for chronic enlargements of the spleen may also be prescribed in more obstinate cases, or when the disease is complicated with ague or with biliary obstruction. In the former morbid association, the decoction of bark, with serpentaria, or with the nitro-muriatic acids; or the infusion of calumba or quassia with preparations of iron, and sponging the surface of the abdomen with the nitro-muriatic acid solution, and an occasional recourse to a warm bath, followed by frictions with the horse-hair or Indian glove, will generally be most beneficial, due attention being always paid to the states of the intestinal and urinary excretions.

VI. INFLAMMATIONS OF THE SPLEEN.—SYNON. —*Splenitis*, Auct. Var. *Lienis Inflammatio*, Senert. *Lienitis*, Auct. *Cauma Splenitis*, Young. *Empresma Splenitis*, Good. *Splenite*, *Inflammation de la Rate*, Fr. *Entzündung der Milz*, *Milzentzündung*, Germ. *Acute and Chronic Splenitis*.

CLASSIF.—III. CLASS, I. ORDER (*Author in Preface*).

27. DEFIN.—*Pain, increased fulness, weight or oppression in the left hypochondrium and side of the abdomen, with febrile symptoms of a continued, remittent, or intermittent character, according as endemic causes and morbid associations may influence the economy.*

28. *Splenitis* is not a frequent disease, especially in an acute, and still more particularly in a sthenically acute form. Much more frequently a sub-inflammatory state, or a sub-acute, or a chronic form of inflammation exists, the last named being often long present before it comes under the notice of the physician, or not being discovered by him until its results have been fully produced, or until they have been disclosed by a post-mortem examination. The existence of acute splenitis has been even denied by some writers; but even independently of the nature of the symptoms during life, the changes found after death sufficiently indicate an acute form of splenitis.

29. The causes of splenitis are those generally which have been noticed as producing indiscriminately the several affections of the spleen (§ 14, *et seq.*); but there are some which most commonly induce the inflammatory diseases of the viscus. These are chiefly exposure to low ranges of temperature after hot and sultry days in a ma-



larius climate; the suppression of accustomed discharges, as the hæmorrhoids and the catamenia, in these circumstances, especially if the persons thus affected have lived richly, fully, or intemperately. Neglect also of turgescence or congested states of the organ may be followed by inflammatory action, those states being merely the initiatory stages of inflammation. Running, long marches, especially when followed by exposure to malaria, to the night air or dew, or by resting or sleeping on the ground; contusions, blows, or other injuries on the left hypochondrium, and previous functional disorder of the viscus, are frequent causes of the several grades of inflammation of this organ.

30. *i. ACUTE SPLENITIS, when primary or idiopathic*, is most frequently the consequence of severe injuries of the splenic region, or of the spleen itself, and of the extension of inflammatory action from an adjoining viscus, as the stomach, liver, or peritoneum, to the spleen; but it may follow any of the causes already named (§14, *et seq.*).—*A.* It usually is ushered in by chills or rigours, followed by febrile action, and this by perspiration. To these are generally added nausea, depression, a sense of tension and fulness extending from the epigastrium around the left hypochondrium, and sometimes vomiting. A feeling of weight, oppression, and of tension is soon followed by more or less acute pain, extending often to some distance around the splenic region, and sometimes to the left shoulder; this region being deeply sore, tender, and often somewhat tumid, elastic, and tense. There are generally more or less thirst and loss of appetite. The urine is at first clear and highly coloured, afterward depositing a sediment. The fever is commonly continued or remittent, with evening exacerbations. At this stage, and with the urinary deposits, or with the occurrence of a copious perspiration, or with looseness of the bowels, or with an uterine or hæmorrhoidal discharge, the symptoms may abate, and the disease subside or disappear; or the inflammation may pass into a chronic state, the symptoms having abated more or less, but the swelling continuing, or being even increased.

31. *B.* In the most acute cases, occurring in the most unfavourable circumstances, as in soldiers during long marches in malarious localities, the disease often becomes greatly aggravated when advanced as far as just described, the local symptoms, as well as the general disturbance, being much increased. The tongue is furred and dry; diarrhoea supervenes, with sinking of vital power, delirium, hicough, general tumefaction of the abdomen; or, in other cases, vomiting of blood, black or bloody stools, sunk and lurid features, general agitation and distress, unconscious evacuations, &c., and death in the course of five, eight, ten, or twelve days.

32. *C.* On examination after death, the spleen is found increased in size. The peritoneal envelope and proper coat are of a deeper or brown-red than usually seen, approaching in places to a black or deep green. They are so soft and friable as to break down easily under the pressure of the finger. The internal structure is still more softened. Some parts appear a little more dense. These present a grayish or a yellowish gray hue, and contain points of purulent infiltration, which had begun to form, death having occurred, probably from sinking of vital power and

contamination of the blood, in conjunction with the local change, before suppuration could proceed. In these cases the disease may be viewed as having gone on to gangrenous softening, or to a state very nearly approaching to this.

33. *D.* In cases less *hyper-acute*, the disease sometimes goes on to *suppuration*, and is generally of longer duration than the preceding form; but this result of acute splenitis is not frequent, unless in the unfavourable circumstances above alluded to (§31). In these, the disease, having apparently reached its acme in the course of from seven to twelve days, remits somewhat. The febrile symptoms and the pain abate, or the latter changes its character. Chills or rigours occur, terminating in flushes of heat and profuse perspiration. The swelling in the splenic region either increases or becomes more determinate or circumscribed, and the tenderness on pressure continues. The pulse is quick and soft, the symptoms varying much according to the direction the abscess may take. Generally, as the abscess advances, symptoms of partial peritonitis supervene, in the direction in which the abscess proceeds. The peritoneal envelope becomes inflamed at the part where the abscess points, and if adhesions are formed between it and an adjoining viscus, it will break into that viscus; if they be not formed, it will break into the peritoneal cavity, and general peritonitis instantly follow, and soon terminate fatally. Thus, in the course of splenic abscess, the pain in the side may become more acute, and the swelling more prominent, owing to adhesions of the external aspect of the spleen to the abdominal parietes, and to an external pointing of the abscess, which may occur in any situation between the left ribs and ilium, or between the umbilicus and left lumbar region. If the adhesion forms between the spleen and stomach, the gastric symptoms become severe, and the abscess may break into the stomach. Cases have been observed in which splenic abscesses have thus opened into the colon, into the stomach, through the diaphragm into the pleural cavity, into the lungs, &c.

34. *E.* *Abscess of the spleen* is generally, but not necessarily, fatal. Some of the cases of recovery, said to have taken place, are not very conclusive; while in a very few instances recorded, the evidence of the existence of abscess and of recovery from it is more convincing. Acute splenitis may apparently terminate in suppuration, and the above signs of suppuration (§33) may be present, and even an obscure fluctuation may be detected, and still the existence of abscess of the viscus may be disputed, or these symptoms may be even ascribed to other lesions. From this state the patient may recover; and although we may correctly infer that absorption of the pus formed in the viscus has taken place, yet the proofs of this may not be fully conclusive, although the states of the urinary, the intestinal, and the cutaneous excretions seem to warrant the inference. When the matter is discharged externally, or even by the stomach or bowels, the patient subsequently recovering, then the fact is conclusive. Dr. NASSE, of Bonn, has recorded the history of a case of splenic abscess, in which the matter made its way from the spleen through the diaphragm into the lung, and was expectorated in great quantity, the patient afterward recovering. As abscess of the spleen is comparatively rare, such cases must necessarily be much

rarer; but there is no reason wherefore abscess in this organ should be less likely than abscess of the liver to be recovered from.

35. ROKITANSKY observes that, in a favourable case, the abscesses may be circumscribed by adhesive inflammation, and, being inclosed in a sac formed by obliterated parenchyma, which has been converted into fibrous tissue, may be borne for a long period; a partial absorption of the pus may take place, and the remainder, becoming inspissated, be reduced to a calcareous, greasy pulp, or even to a hard concretion. The more common case is, that the parietes of the abscess also put on inflammatory action and suppurate, in consequence of which the abscess generally enlarges very rapidly, with symptoms of violent reaction in the shape of acute hectic fever. If the inflammation extends to the sheath of the spleen, inflammation of the splenic and adjoining peritoneal surface ensues, but is not, however, apt to spread far. He adds, "that the abscess may be discharged into the abdominal cavity, and produce circumscribed peritonitis, which causes the formation of a sac, bounded by the external wall of the abdomen and the diaphragm, the fundus ventriculi, the colon and its mesentery, the entire spleen being thus occasionally destroyed by supuration." Much more frequently, however, the discharge of the matter into the peritoneal cavity is rapidly followed by general peritonitis and death.

[Prof. DRAKE, in his able work on the "Principal Diseases of the Mississippi Valley" (1850), has recorded eleven cases of *suppuration* of the spleen as a sequel of intermittent fever, in six of which the discharge of pus was by the bowels; in three externally, in one by both modes, and in one no evacuation took place. None of the abscesses made their way into the stomach, peritoneal cavity, or lungs, nor was the discharge of pus followed by hectic. It is worth noting, too, that all the patients recovered, except one who fell a victim to imprudence in eating, and two who had sustained severe local injury. All the cases occurred north of the 35th degree of latitude.]

36. While we conclude that acute splenitis may terminate, 1st. In resolution or recovery; 2d. In chronic splenitis and various organic changes of the viscus; 3d. In gangrenous softening or destruction of the organ; 4th. In suppuration or abscess—it may be still farther inferred that splenic abscess may be recovered from, 1st, by absorption and diminution of the puriform matter; 2d, by pointing externally or into some viscus, by which it may be discharged from the frame; but that it much more frequently terminates fatally, by the vital and local changes it occasions, and the contamination of the circulating fluids it produces, or by the consecutive changes it causes in adjoining organs or parts, into which it may proceed or break, as the peritoneum, stomach, &c.

37. *F. Asthenic acute, or consecutive Splenitis.*—Acute splenitis is much more frequently a consecutive than a primary disease—consecutive of, or complicated with, adynamic fevers, but more especially, and more frequently and severely with the jungle, or remittent or continued fevers of warm or malarious climates. In these circumstances and associations, the severity or malignancy of the fever often masks the splenic complication. The affection of the spleen, if it may be called inflammatory, is of a most *asthenic* and

disorganizing kind; it implicates all the tissues of the organ, but attacks chiefly its internal structures, and proceeds in a very few days, often in three or four, to produce not only great turgescence, but a complete softening, often amounting to a liquefaction of the viscus. This form of disease is a frequent complication of the periodic fevers—intermittent and remittent—and of the continued fevers of the swampy or jungle districts of the East, and of Africa; and is often also observed in the course of these fevers in the countries bounding the Mediterranean. The *symptoms* of this form of splenitis are not severe, although the changes are most rapid and disorganizing—results which are chiefly to be ascribed to the primary fever, of which the splenitis is a dangerous complication. The extremely lurid state of the countenance and general surface, the vital depression, the swelling and tenderness in the splenic region, the decubitus on the back or right side, are among the earliest and chief signs; those which follow, especially the dry, dark tongue, the vomiting, often with discharges of blood, hiccough, delirium, rapid and weak pulse, &c., being ascribable as much to the primary fever as to this complication, but truly to both. The rapidly disorganizing course of this form of splenitis is caused chiefly by the marked depression of vital power, and the condition of the circulating fluids, the spleen being one of the most early parts of the economy to experience the effects of vital depression and of vascular contamination, the existence of these states both aggravating and accelerating the unfavourable result.

38. ii. *CHRONIC SPLENITIS* is much more frequently observed than the acute.—A. It may occur *primarily* or *consecutively* of the *acute* or *sub-acute*; for, between the most acute and most chronic or mild, there may exist, as in other inflammatory diseases, every grade of severity or duration. Chronic splenitis frequently does not come before the physician until it has given rise to changes which, although no longer entitled to the appellation of splenitis, are generally the results of inflammatory action or irritation. In malarious countries, chronic splenitis is most commonly a complication of agues, or a consequence of intermittents and remittents. In these circumstances, the initiatory inflammatory action is often masked by the primary disease. When the chronic affliction is consequent upon an acute attack, the passage of the latter into the former is often gradual or insensible.

39. Chronic splenitis, whether primary or consequent upon periodic fever, or dysentery, or hepatitis, &c., may, by muscular exertion, by prolonged or quick marches, by mental excitement, or by injury, or even by a too rough examination of the splenic region, be aggravated to such a pitch as to assume a truly acute or a sub-acute form. But in many complicated cases, in which the patient has died subsequently to attacks of these diseases, especially in miasmatic districts, chronic splenitis has not been detected, or has been merely suspected, until a post-mortem inspection has shown purulent formations in the substance of the viscus, cartilaginous or ossific deposits in its fibrous coat, false membranes, or adhesions between the peritoneal envelope and adjoining viscera, and other changes sufficiently indicative of inflammatory action, which, however, had either not been manifested during life,



or had been overlooked, especially when masked by the primary disease.

40. *B.* The symptoms of chronic splenitis are, however, in some cases more distinctly evinced. The pain, weight, and uneasiness in the left hypochondrium are more felt, especially after exertion, and in soldiers after marches. There is generally a remittent or intermittent form of fever, either connected with ague, especially its more irregular types, or simulating this complaint, the exacerbations being most remarkable in the evening or night; the skin being dry, and the pulse frequent, while the countenance is sallow, and the skin harsh. As the disease proceeds, the already existing swelling of the splenic region, or even of the whole abdomen, increases, or becomes more tense, while the extremities and other parts are more or less emaciated. There are always indigestion, disturbed dreams, and obtuse pain or uneasiness in the left side, which is increased when turning in bed or on pressure. In some cases, a dry cough supervenes, with frequent and superficial respiration, and in others palpitation; and in the more prolonged or neglected, or improperly treated cases, ascites is superadded. After an indefinite time, either recovery takes place slowly, owing to change of climate and regimen, or death occurs from sinking of the vital powers in connexion with changes in this viscus and adjoining parts, especially purulent collections and alteration of the circulating fluids.

41. As in acute, so in chronic splenitis, the variation in the severity and character of the symptoms is very great. The duration also of the latter form varies remarkably. In the course of it various complications not infrequently appear, chiefly owing to the altered state of the circulating fluid, in some cases, doubtless, produced by the absorption of matter from the spleen, or from the extension of functional or structural disease from this viscus to adjoining organs. In many cases, as the disease advances, debility and emaciation become extreme; and hectic fever, sometimes slight, in other instances severe, is generally present. Vomiting or diarrhœa often occurs, and is generally obstinate or attended by discharges of blood either upward or downward. Aching of the back and limbs, restlessness, anxiety, weight, soreness, oppression and tenderness in the splenic region, are severally more or less experienced.

42. When considerable enlargement of the viscus attends chronic splenitis, dry suffocative cough, dyspnoea, hiccough, palpitations, &c., are often complained of; and in some instances, if the inflammation have extended to the surface of the upper portion of the viscus, the peritoneal lining of the diaphragm becomes implicated, and lymph with adhesions is sometimes formed, these symptoms being much aggravated and occasionally accompanied with several of those which I have shown to characterize *diaphragmitis* (see art. DIAPHRAGM, § 2, *et seq.*). In other instances, the disease superinduces effusion of fluid in the peritoneal cavity, an occurrence often observed when chronic splenitis follows, or is associated with obstruction to the portal circulation through the liver, or structural disease of this viscus. Less frequently the disease extends to the left kidney; and in this case nephritis supervenes, with more or less disturbance of the urinary functions, and aggravation of the febrile symptoms, generally terminating in delirium, coma, and death. In rare

instances, phlebitis in some limb or organ takes place, and soon carries off the patient.

43. The variations in the severity, the symptoms, associations, as well as the duration of chronic splenitis, are very great. If the disease accompany ague, it may be so slight at first as to escape attention; but it generally becomes more severe and manifest with the recurrence of the aguish paroxysms. If neglected at first, it often becomes a painful, a prolonged, and even a formidable disease, generally continuing several months, and not infrequently lasting for some years, with periods of remission.

44. *C.* The terminations, or rather the results of sub-acute and chronic splenitis, are: 1st, resolution, which seldom occurs; 2d, aggravation of the inflammatory action to a sub-acute, or even an acute form; 3d, suppuration and abscess in the forms already noticed; 4th, softening, induration, ossific deposits, &c.; 5th, enlargement, with various associated changes. Although *gangrene* sometimes follows the hyper-acute, or the asthenically or complicated acute form of the disease, it very rarely or never follows the chronic, unless this latter have become suddenly or severely aggravated by exertion, as by long or quick marches in military service, or by external injuries. These consequences or terminations are also common to the acute form, for this rapidly passes into a sub-acute or chronic state, unless when it is complicated with malignant or adynamic fever, and terminates in fatal disorganization or gangrene.

45. Dr. VOIGT states, that *splenalgia* (synonymous, according to him, with inflammatory affections of the spleen) rarely goes on to suppuration in Bengal; but, when not fatal, it generally terminates in induration, if not cured in time. The febrile symptoms then disappear, and pain in the left hypochondrium is much diminished, but the tumour remains, and becomes hard and distinct. The health improves, and, with the exception of costiveness, a sensation of fulness and weight under the left false ribs, a dry cough, some dyspnoea, and occasionally a slight pain shooting to the scapula, the patient feels pretty well, and may live on for many years in that condition. He is, however, generally predisposed by it to fever, liver complaints, dysentery, dropsy, and cholera, and by some one or other of these he is at last carried off.

46. In its more severe states, especially when complicated, splenitis runs its course very rapidly, and it may terminate in death in three weeks or a month. Œdema of the feet and legs, ascites, dysentery, cœchyloses, severe affections of the stomach, singultus, are the general precursors of death in sub-acute cases, while diarrhœa and hectic close the scene in the more chronic form. Persons who have once had disease of the spleen are very liable to be attacked by it again.

47. *D.* In children, chronic splenitis is not an infrequent disease, even in this country, at least according to my experience, during the many years of my being physician to the Infirmary for the Diseases of Children; but it is much more frequent in warm climates, especially among the children of European parents. In them it generally commences with anorexia, restlessness or fretfulness, and often sleeplessness. They gradually lose all desire of play, and become indifferent to surrounding objects. These precursory symptoms may continue some days, or even as

long as a fortnight, when the colour of health is more or less lost, and degenerates into a pallid, sallow, or even a leaden hue, and the conjunctiva assumes a pale bluish tint. The skin, especially over the abdomen, is dry and hot, and a greater degree of debility is experienced than the severity or duration of the complaint appears to warrant. The pulse is frequent, especially in the evening, and a remittent or hectic form of fever is commonly present; general uneasiness, headache, slight difficulty of respiration, and occasionally palpitation, and pain in the left shoulder, are also complained of. There is a constant feeling of tenderness and of weight in the left hypochondrium, increased by pressure. When the patient lies on his back, and the fingers are pressed under the false ribs of the left side, a hard tumour is felt, the size being generally less than that usually termed enlarged spleen, or even that called congested spleen. The patient dislikes the erect posture, and lies chiefly on the left side, with the knees drawn up, and the trunk curved. The bowels are irregular, generally costive, the evacuations being very dark, greenish, or greenish black. The urine is usually pale and copious. After an indeterminate time, either recovery takes place, or more severe or more complicated disease, and more marked sinking of vital power supervene and terminate existence. In some cases, the emaciation becomes remarkable before dissolution, and in these, as well as in others, ascites has often existed for a considerable time previously to death.

43. iii. **DIAGNOSIS OF SPLENITIS.**—Inflammation of the spleen may be either overlooked or be mistaken for some other disorder, especially for peritonitis, pleurisy, nephritis, or even for tumours, enlargements, &c., of the kidney. — *a.* When the symptoms of splenitis are mild, and when the disease appears in the course of remittent, intermittent, or continued fever, then it is often difficult to ascertain the existence of the local affection, and it very frequently is overlooked or undetected, until it has advanced to serious organic change. In all periodic fevers, and more especially in persons who have experienced more than one attack of these fevers, and still more particularly in warm, humid, and malarial localities, a very careful examination should be instituted, in order to determine the existence of splenitis or other affections of this organ.

49. *b.* The diagnostic symptoms vary much with the nature of the affection, and with the part of the organ chiefly attacked. When the upper part is inflamed or engorged, it may then press upon the diaphragm, occasioning dyspnoea, oppression in that situation, and even pain, which may be mistaken for pleurodynia or pleurisy. If the diaphragm be pushed upward by the enlarged spleen, the absence of the respiratory murmur, and the dulness on percussion at the base of the left thoracic cavity may suggest the existence of pleuritic effusion. But the absence of aigophony and the extension of the dulness below the margins of the ribs, and the persistence of dulness on percussion in different positions of the body, will indicate the nature of the disease.

50. *c.* The character of the pulse and of the pain will generally distinguish splenitis from *peritonitis*; but when the *peritonitis* is limited to a portion of the peritoneum in the vicinity of the spleen, and the symptoms are not very acute, it is very difficult to distinguish it from splenitis.

The peculiarities of the case, the causes of the complaint, &c., will often aid the diagnosis. In *nephritis*, the history and antecedents of the disease, the state of the urine, and the symptoms characterizing it, sufficiently distinguish it from affections of the spleen. The same remarks apply to *psoriasis*, which can hardly be confounded with splenitis. There is a much greater probability of *tumours* of the omentum, especially when they appear near the situation of the spleen, being mistaken for chronic inflammation or enlargement of this organ.

51. *d.* Simple *turgescence*, or various grades of *congestion* and *enlargement* of the spleen, may occasion, owing to the stretching or distention of the peritoneal envelope and fibrous coat of the viscus, more or less pain, and may thus be viewed as inflammation of the viscus, and suggest a practice not always the most appropriate to the state of the case. The circumstances and history of the case, especially the state of the pulse and the presence of febrile symptoms, will generally evince the nature of the disease; but it should not be overlooked that the effect of the distention or swelling of the organ upon its envelopes may be such as will often pass into inflammation, if not arrested by judicious means. *Splenalgia* (§ 19), whether produced by sudden turgescence of the viscus or hysteria, or neuralgia, or uterine disorder, may be similarly misunderstood, if the causes and alliances of the disorder be not attentively considered.

52. *e.* The diagnosis of *suppuration* or abscess of the spleen is very often difficult, the indications of this change being generally obscure. The antecedent disorder, an irregular recurrence of chills or rigours, the continuance of the febrile symptoms, the softness of the pulse, and the occurrence of sweats of unusual abundance, on frequent occasions, are indications of suppuration, but not actual proofs of its existence. When, however, there is also swelling or tumour in the splenic region, with pain or throbbing, and marked disorder of the stomach, the probability of abscess is greater than when the foregoing symptoms are not attended by any increase of the size of the organ.

53. *f.* The *complications* of affections of the spleen may either render more difficult, or may facilitate the diagnosis of these affections. Antecedent periodic fevers often indicate the spleen as the organ affected, when other signs of splenic disorder are present; but much more frequently the complications mask this disorder, and render the diagnosis more difficult, especially affections of the stomach, enlargements of the liver, diseases of the heart, pleurisy and pleuritic effusions, peritonitis, partial or general, and dropsical effusions into the peritoneal cavity. When chronic obstructions of the liver, or congestions, or even inaction of this organ, are evinced, or when organic disease of the heart is present, changes in the spleen are very frequently also present, although they may not be manifested during life.

54. iv. The **PROGNOSIS** of splenitis and other diseases of the spleen depend much upon their severity, their nature, their causes, and their complications. When the affection is simple congestion, and is consequent upon intermittent fevers, the result is much more likely to be favourable than when it appears under other circumstances, or is produced by, or occurs in the course of remittent fever of a low adynamic or



putro-adyamic character. When the symptoms indicating splenic disease are obscure, of long continuance, and not amenable to treatment, the risk is much greater than when they are more acute and more deserving of reliance. When the most acute states of splenitis occur, especially when it is detected in the course of adynamic or malignant, remittent or other fevers, the danger should be considered as great; but the degree of danger or the hopes of recovery should depend very much upon the constitutional symptoms, and the states of vital power and of the circulating fluids. The effects of treatment, also, when this is rational and appropriate, ought not to be left out of view.

55. Even when the disease is sub-acute or chronic, our opinion of the result ought to depend much upon the history of the case, upon its origin, upon the state of constitutional power, upon the morbid associations it presents, and upon the evidence of the existence or non-existence of suppuration, or of the extension of disease to the peritoneum or adjoining organs. The signs of suppuration are always unfavourable, although recovery occurs in a few cases where this change has undoubtedly taken place. All the complications of diseased spleen are dangerous, especially pleuritic or peritonitic inflammations, or effusions, organic disease of the heart, obstructions, enlargements, or other structural lesions of the liver, disease of the stomach or bowels, and scurvy. Vomiting of blood, or the presence of blood in the stools, has been supposed by some to be a favourable crisis of splenic inflammations or enlargements. This may be the case in a few instances, but not in others. The occurrence of the catamenia in abundance at the natural period, and of the hæmorrhoidal discharge, is much more favourable than hæmorrhagic discharges from the digestive canal.

56. The prognosis in all diseases of the spleen should be guided also by the severity of the local symptoms, in connexion with the constitutional powers of the patient—by the state of emaciation, by the presence or absence of anæmia, by the manner in which the digestive and depurating functions are performed, by the extent of swelling and tenderness in the region of the spleen, by the duration of the complaint, and by the persistence or the removal of the causes, occasional or endemic, from which the disorder arose. As long as the patient continues to remain in the locality concerned in producing splenic disease, either a cure will be rendered difficult or abortive, or the disease will return with the season and circumstances which had previously produced it, with equal or even greater severity, and will either become more complicated, or terminate most unfavourably.

57. The children of European parents, residing in warm and malarious climates, affected with chronic splenitis, or other affections of this viscus, seldom recover completely or permanently, unless change of climate or locality be obtained for them. An amendment often takes place during the healthy season; but the complaint generally returns with or after the rainy season, either with increased severity, or in some one of the several complicated forms in which affections of the spleen present themselves in those climates, death generally, although at some remote period, taking place, often preceded by dropsy or great disorder of the digestive canal.

58. v. TREATMENT OF SPLENITIS.—A. The treatment of acute splenitis has been very rationally stated by VAN SWIETEN and SAUVAGES; but at the end of the last century and the commencement of this, the indiscriminate and often improper use of calomel, and of calomel conjoined with opium, superseded a more appropriate practice, especially in India, and was more frequently prejudicial than beneficial. More recently, the means usually employed have been both more rational and more salutary, although more discrimination in the employment of remedies against this disease than is usually evinced is still required. Calomel, or calomel and opium, general and local bleeding, &c., are still too generally prescribed, although in some cases either or even all of these may be required. The treatment mainly depends upon the stage or progress of the disease, upon the degree of either sthenic or asthenic action evinced by the local and constitutional symptoms, upon the type or character of the primary or of the symptomatic fever, and upon the air in which the patient resides. These should be severally weighed in connexion with the age and constitution, and previous disorders of the patient.

59. a. If the attack be recent, acute, more or less sthenic, and the disease be primary, and the symptomatic fever continued, a general blood-letting may be prescribed, according to the strength and age of the patient; and this will be the more required if the disease have been occasioned by injuries or causes directly affecting the spleen. In these circumstances, also, calomel, or calomel and opium, followed by a brisk cathartic, will be of service. A second general blood-letting will seldom be required, but local depletions may be necessary. In this form of disease, active purging, and diaphoretics in the intervals, are generally useful. Subsequently, the tepid bath, frictions of the surface, and the application of a terebinthinate embrocation or liniment, as advised in several parts of this work (see APPENDIX, For. 311), or a blister over the splenic region, will be of advantage. After the acute symptoms are removed, the persistence of disease in a sub-acute, chronic, or mild form, or enlargement of the viscus, will require a repetition of these external means, and a recourse to stomachic and cholagoguo purgatives, or to such other means advised for these states of the disease as the circumstances of the case will suggest.

60. b. If acute splenitis be consecutive of adynamic, remittent, or malignant, or typhoid fever; if it present asthenic characters, even when primary; if the attendant fever be periodic, the pulse quick, weak, or soft; if the vital power be very much depressed, although vascular action be excited or the stomach irritable; if the disease has been of some duration, and has arisen from malaria and its usual consequences; if it have been accompanied with diarrhœa, or by hæmorrhagic discharges; and if the patient still continue, or is likely to remain, under the influence of the air instrumental in causing the attack, bleeding and other lowering means should not be resorted to. A very opposite treatment is required in these circumstances, and should be prescribed promptly and with decision. In these, the sulphate of quinine, the sulphate of iron, camphor, &c., should be conjoined with aloe, a very small quantity of this last acting freely on the bowels when combined with sulphate of quinine.

In some cases, it may be necessary to apply some leeches to the left side, and to give a full dose of calomel and camphor at the commencement, and a stomachic purgative in a few hours afterward, especially if the evacuations betray biliary obstruction or disorder. But immediately, or soon after their action on the bowels, a dose of the following pills ought to be taken, and the embrocation applied over the splenic region, or over the epigastrium, by means of flannel or spongio-piline moistened with it, especially if the stomach be irritable; and this application should be renewed according to the state of the case, and the effects produced by it.

No. 339. R Quinæ Sulphatis, ʒj.; Ferri Sulphatis, gr. xxv.; Camphoræ, ʒj.; Extr. Aloes purif. (vel Pil. Aloes cum Myrrha), ʒss. ad ʒij.; Pulv. Capsici, gr. x.; Extracti Taraxaci, ʒj.; Olei Cajuputi (vel Juniperi), q. s. M. Contunde bene et divide Massam in Pilulas xxxvj. Capiat æger duas, bis terve in die.

No. 340. R Linimenti Terebinthinæ, ʒij.; Linimenti Camphoræ comp., ʒjss.; Olei Olivæ, ʒss.; Olei Cajuputi, ʒj. M. Fiat embrocatio more dicto utenda.

61. The ingredients in these may be varied in quantity, according to the effects produced by them, or others may be added or substituted. If sthenic action or febrile symptoms still continue, the sulphate of iron may be omitted; and if the bowels be already sufficiently acted upon, or if diarrhœa be present, opium may be substituted for the aloes, especially if pain be severe; and the vinum or extractum opii may be added to the embrocation. The warm or tepid bath; diaphoretics, frictions of the surface, and a farinaceous or emollient diet, and gentle aperients, will materially aid these remedies, and remove the disease altogether, or reduce it to a sub-acute, or chronic, or mild state. In climates where the patients continue subjected more or less to malaria; in persons addicted to intemperance in eating and drinking, or to the abuse of stimulants or alcoholic liquors; in those who have been subject to periodic fever, or to hepatic or dysenteric affections, acute splenitis often degenerates into the milder forms, or into some one or other of the organic diseases about to be noticed.

62. *B. If the sub-acute or chronic form of splenitis* be primary, if it be not a sequela of the acute, or if it do not appear in the course of intermittent or remittent fever, the treatment should depend much upon the severity of the initiatory symptoms. If these be severe, and the pulse excited, local depletion and a brisk cathartic will be of service; and if calomel be prescribed at the onset, or suggested by the appearance of the evacuations, it ought to be conjoined with a cathartic extract. I have seen in these cases, as well as in the most acute, a full dose of spirits of turpentine, with an equal quantity of castor oil, taken on the surface of cold coffee, or of milk, or of some aromatic water, and followed by the above medicines (§ 58–61), soon arrest the disease, especially when prescribed at an early period. At the commencement of these forms of splenitis, as well as in the acute, the enlargement of the viscus is generally not great, even although the pain may be considerable; but, as the disease continues, and as the more acute symptoms subside, the swelling increases, and the propriety of having recourse to those medicines which support vital resistance, and arrest the progress of the malady, becomes more manifest.

63. When sub-acute or chronic splenitis follows the acute, or occurs in the progress of peri-

odic fevers, then a decided recourse may be had to the sulphate of quinine, combined as above (§ 60), never omitting the sulphate of iron when febrile or inflammatory action is not present; or the infusion or tincture of calumba may be given with the ammonio-chloride of iron, or with the ammonio-citrate of iron, or with the citrate of iron and quinine. Previously to the introduction of quinine into practice, I had employed the decoction of cinchona with ammonia and camphor, and the compound tincture of cinchona, with advantage.

64. In the consecutive states of chronic splenitis, the administration of these medicines should not prevent an active recourse to purgatives or cathartics, but these should generally be conjoined with bitters, stomachics, or tonics; and the external means, especially the embrocations and liniments already noticed, should not be overlooked. As the disease becomes more decidedly chronic or indolent, the enlargement often increases, and if these means have been duly employed without a satisfactory result, then those about to be recommended for chronic congestion and enlargement of the organ (§ 100, *et seq.*) should be employed, especially the iodide of iron in the sirup of sarza, and the sulphate of quinine and aloes in doses which will act freely on the bowels.

65. *C. When acute, or sub-acute, or chronic splenitis* is followed by symptoms of *suppuration*, or when more precise indications of abscess of the viscus exist, then the indication already stated, viz., to support the vital powers and resistance, should be steadily adhered to, while the secretions and excretions ought to be promoted. Various means may be additionally employed, according to the direction which the abscess may take. The most hopeful terminations of this state of disease is to procure the external pointing of the matter, or the absorption of it. The former of these may be attempted by means of poultices, or the insertion of a seton or issue, while the powers of the constitution are supported by the means already advised, aided by change of air, and a suitable diet and regimen. The latter, or absorption of the matter, if the internal or constitutional means be not judicious and energetic, may be followed by phlebitis, or by consecutive suppuration or abscess in other parts; but to obtain absorption when and as we could wish, is rarely in our power. This end can be attained only by preserving and promoting the digestive and assimilating processes, by promoting the excreting functions, by preserving the bowels in a freely open state, by conjoining vegetable tonics with chalybeates, and by removing the patient to a dry and pure air.

66. *D. The complications* of both acute and chronic splenitis should receive due attention.—*a.* If the early stage of the acute or sub-acute disease be primary, and appear to extend to the peritoneal surface of the diaphragm, or pleura, or to the fundus of the stomach, or to adjoining parts of the peritoneum, or to the left kidney, the initiatory bleeding already advised is generally required, and should be in such quantity, or be followed by such an amount of local depletion, as the circumstances of the case will warrant; and calomel, or calomel and opium, in one or two full doses, may also be given. But these should be followed by a cathartic, and preferably by the terebinthinate draught prescribed above (§ 62), which may be repeated according as it may be



required, and by blisters or the terebinthinate embrocation. Vascular depletion is rarely beneficial in other states of complication, and is generally prejudicial when the splenic disease appears consecutively, or as a complication of other maladies, especially when it is associated with dysentery, adynamic or remittent fevers, with obstructions to the portal circulation, scurvy, or disease of the heart.

67. *b.* When the *stomach* is prominently affected, and indeed in the other associations of the disease, whether *gastric*, *intestinal*, or *hæmorrhagic*, the terebinthinate embrocations or liniments already prescribed will prove serviceable, if duly persisted in—if applied over the epigastrium, the splenic region, or abdomen, and renewed, as circumstances may suggest. If chronic *diarrhœa* be associated with chronic splenitis, *ipæcacuanha* may be given in the form of pill with the sulphate of iron, quinine, and the extract of hops. If the splenic disease be complicated with *disease of the heart*, our chief reliance should be placed on the sulphate or other preparations of iron, conjoined with the medicines just mentioned, or with henbane, conium, opium, &c., according to the peculiarities of individual cases.

68. *c.* The association of chronic splenitis or its consequences with biliary obstruction, or *hepatic disease*, is very frequent in warm and malarious climates, and is especially obstinate, the splenic affection generally going on to chronic enlargement. In this frequent complication, a weak dilution of the nitro-muriatic acids should be administered both internally and externally—internally with light bitter infusions, as the calumba or cheireita, and the preparations of taraxacum; and externally in foot-baths, or as tepid lotions or epithems over the hypochondria and abdomen. The preparations of iron should not be given in this complication. If *jaundice* be superadded, or dropsical effusion into the peritoneal cavity, the super-tartrate of potash may be prescribed in large doses, sometimes with small or moderate doses of the potassio-tartrate of iron, and always with extract of taraxacum, in the form of an electuary with any suitable sirup or confection; or the acids already named may be given in the compound decoction of scoparium. Whenever the liver is implicated, the preparations of iron are generally prejudicial, the potassio-tartrate being the only one admissible, and only in small doses. If the associated diseases of the spleen and liver be characterized by enlargement, or if these diseases be very chronic and indolent, the iodide of potassium may be employed, if these acids have failed, and may be conjoined with the solution or sub-carbonate of potash, and the decoction of taraxacum, or the compound decoction of scoparium. In cases such as these, the bowels should be kept freely open, and the constitutional powers duly supported.

69. *d.* For all *hæmorrhages* from the stomach or bowels, in the course of chronic splenitis, the spirits of turpentine, given by the mouth, or even administered in enemata, will be found the most efficacious in arresting the hæmorrhage, when the arrest is indicated, as it is most frequently, in splenic affections, or when it proceeds beyond what may prove salutary, or when it occurs in delicate, exhausted, or anæmied persons. This medicine may be prescribed as in the following formula, the dose being increased or repeated according to the urgency of the attack.

No. 341. R Olei Terebinthinæ, ℥jss.; tere eum Pulv. Rad. Glycyrrh., ℥jss.; dein adde, Mellis et Syrupi Rosæ Gallicæ, aa, ℥jss., et misce. Capiat æger ℥ss. pro re nata.

70. When the consequences of splenitis, especially enlargement or chronic congestion of the spleen, are connected with *amenorrhœa*, or with uterine disorder, the compound iron mixture, conjoined with the compound decoction of aloes, is most serviceable.

71. In all forms and complications of chronic splenitis, change of air is extremely beneficial, and the benefit is farther promoted when this change is conjoined with a regulated diet and a proper recourse to chalybeate or sulphureous mineral springs, or to artificial waters.

72. *E. The treatment advised by writers* on inflammation of the spleen has been stated more empirically than with due reference to the forms and stages of the disease. The early and acute stage is said, by a recent writer, to require "general blood-letting as long as the inflammatory pain is considerable, provided the patient's strength will admit of it. A moderate degree of catharsis should be kept up. A plentiful application of leeches to the seat of pain, followed by vesication, will sometimes complete the cure; but the disease is apt to remain latent: it may subside apparently, and then reappear with a violence sooner or later fatal."—(*Cyclop. of Pract. Med.*, vol. iv., p. 58.) As I have contended above (§ 60), the most acute splenitis, if it present asthenic characters, will not, however prompt or energetic the depletion may be, admit of this treatment; and even the most sthenic form of the disease requires the more cautious recourse to depletion which I have recommended, especially when the disease proceeds from endemic causes. It should be recollected that the causes are generally of a depressing nature, and if these still continue in action, too free depletion renders the disease more serious, and its consequences more difficult to remove. The reappearance of the complaint with fatal violence, here said to occur contingently, is frequently owing to the neglect of the tonic remedies which I have advised after the acute symptoms are subdued, especially when splenitis is consequent on periodic fevers, or is otherwise complicated, or when the patient remains in a malarious locality. When, however, the disease is associated with peritonitis or with pleuritis, &c., vascular depletion, general or local, as I have recommended, should not be neglected, with due reference, however, to the peculiarities of the case.

73. SAUVAGES insisted on the propriety of having recourse to tonics and to chalybeate preparations, in connexion with aperients and sedatives, as soon as the more acute symptoms were subdued. Dr. BREE advised active catharsis, and conium and other sedatives, to remove irritation. He endeavoured to subdue inflammatory action by blood-letting, antimonials, and local depletions. GROTANELLI, who lived in a country where diseases of the spleen are endemic, advised for simple acute splenitis, and for splenitis complicated with gastritis or peritonitis, or diaphragmitis, or nephritis, or psoriasis, hepatitis, or peripneumonia, general blood-letting, to be repeated if the circumstances of the case required it, or local bleeding in the nearest situation to the part most affected. As the disease subsided to a chronic state, he recommended those remedies which act chiefly by promoting absorption, and by acting

on the kidneys, and which are both antiphlogistic and diluent, as nitre, super-tartrate of potash, antimonials, digitalis, &c. If the attack followed suppression of the catamenia or of hæmorrhoids, he prescribed the application of leeches upon the recurrence of painful or severe symptoms, and as soon as all signs of hypersthénia had disappeared, the gradual use of tonics to be followed by chalybeates, especially the ammoniate of iron.

74. Inflammations, as well as other diseases of the spleen, must be treated in great measure with reference to the endemic influences which are chiefly concerned in producing them. In the miasmatic districts of Western Africa, and in many countries in the East, these diseases very frequently either are not benefited, or are aggravated by general and sometimes even by local blood-letting, especially in the dark races. In most acute cases, however, local depletions, when duly regulated, are of use. But in temperate countries, either the one or the other form of depletion, or even both, are more generally required. In those more unfavourable and depressing localities, where greater caution in the use of antiphlogistic means is requisite, and the more acute symptoms rapidly pass into asthenic engorgement and enlargement of the organ, what have recent writers advised? Before the introduction of quinine into practice, I had occasion to treat cases in these unfavourable circumstances, and I had recourse, early in the disease, to the decoction of cinchona with camphor, aided by purgatives, and epithems externally, as advised above (§ 60, *et seq.*). Subsequently, a much earlier and a much more decided use of quinine, in the course of splenitis, than hitherto advised, was recommended by NELET, CRUVEILHIER, BAILLY, PIORRY, DALMAS, and others, especially when the disease proceeds from malaria, or is associated with periodic fever; and even in the early and acute stage, a much more cautious and sparing recourse to vascular depletions and other antiphlogistics, than previously advised, was found advantageous in these circumstances. In most cases, however, purgatives are most serviceable, especially when duly selected, and conjoined with quinine or cinchona, or with preparations of iron, as I have already pointed out (see § 59, *et seq.*).

[The spleen is probably more exempt from disease than any organ of the body. Dietetic excesses and abuses, which so often light up disease in the alimentary canal, liver, kidneys, heart, and brain, do not often disturb this organ. This is remarkably the case as regards alcoholic stimulants, which so often produce disease in these organs, and especially the liver. The spleen seems to be but slightly influenced by vicissitudes of weather, nor is it apt to be affected by sympathetic relation with other and diseased organs. In fact, there is no organ of the body placed more beyond the influence of external agents, unless it be the pancreas. This is satisfactorily accounted for from its anatomical structure and relations.

While it is rarely affected by the existence of the ordinary forms of inflammatory disease, yet there are three kinds of fever, viz., yellow, typhus, and autumnal or miasmatic, in which the spleen is very apt to be more or less morbidly affected. In yellow fever, nothing is more common, in autopsy examinations, than to find this organ enlarged and softened; and this is a very common occurrence also in the typhoid fever,

though effusions of pus or lymph are rarely met with. The same pathological condition is less frequently met with in typhus fever. But it is a remarkable circumstance that yellow and typhus fevers do not, in cases of recovery, leave behind them as consequences either splenitis or enlargement of the organ, though these are so frequently the result of fevers of malarious origin.

It is in the highest degree probable that during the cold stage the spleen becomes greatly congested, from the retreat of the blood from external parts, and its accumulation in the portal circle. That this is a very influential cause, may be inferred from the fact that remittents, in which the cold stage is less violent and protracted than in intermittents, disorder the spleen much less than the latter. But, as the late Dr. DRAKE maintained, malaria has probably a specific tendency to act on the spleen, just as the remote cause of typhoid fever directs its influence on the glands of PEYER. This would seem to be proved by the great frequency of splenic disorders in autumnal fever, from the influence of sulphate of quinine in removing some of them, and from the great frequency of splenic disorders in malarious regions, even among those who are exempt from febrile attacks. Another fact bearing on this point is, that disorders of the spleen are almost incurable, as long as the individual continues to reside in the locality which generated them, but often spontaneously disappear in a more salubrious residence. To both of the above causes, then, we may safely refer the causation of splenic diseases in malarious regions; and we have never known a case of disordered spleen which was not a sequel of intermittent fever. If they are unusually protracted, such is almost always the result; the enlargement at first not being attended with any inflammatory symptoms, which, however, are apt to supervene the ensuing winter under the vicissitudes of weather, &c. The enlargement, which at first appears to consist simply in a stasis and accumulation of blood in the organ, afterward assumes a more organized appearance, and appears to be made up of the peculiar pulpy matter of the organ, with a greater or less development of fibrous structure, constituting true hypertrophy. In most, if not all, fatal cases of malignant intermittent, the spleen will be found much enlarged and softened, sometimes almost diffuent, while those who recover from severe attacks are very apt to be troubled with splenic enlargement, even where the paroxysms have been comparatively few in number. True splenitis may be seated in the capsule or parenchyma of the organ; may invest the organ with bands of lymph, or fill it with factitious tissue, thereby hardening it, or it may result in softening or in suppuration.

With regard to the characteristic symptoms of splenitis, they are dull pain in the left hypochondrium, tenderness, on pressure, over the intercostal spaces, or below and behind the cartilages of the ribs, a sense of oppression in the neighbourhood of the diaphragm, frequently a heaving cough or hiccough, and sometimes pain in the left shoulder; if the organ is enlarged, there will be dulness on percussion, and the patient can lie on the opposite side better than in hepatitis. If the capsule be chiefly affected, there will be more pain and tenderness than if the parenchyma be the seat of the disease.

The treatment we have found most efficacious



is free local depletion by cups or leeches, followed by a large blister over the region of the spleen, and calomel in two-grain doses three times a day, followed by Rochelle salts or the compound powder of jalap, or compound colocynth mass and powdered squill, equal parts, with full doses of quinine as they may be indicated. Some of the preparations of iron are very efficacious after the inflammatory symptoms have subsided.]

75. VII. ORGANIC LESIONS OF THE SPLEEN.—*Structural Changes consequent on functional and inflammatory Diseases of the Viscus, and on periodic Fevers, or other Disorders.*

CLASSIF.—IV. CLASS, I. ORDER (Author).

76. M. ANDRAL considered that the structural alterations to which this organ is liable should be sought for in one of its two component parts—the part contained, which is blood, and the part containing, which is fibrous tissue. Those affecting the latter, or which are seated in the capsule or its fibrous prolongations, the trabecular tissue and muscular fibres of KÖLLIKER, and in the pulp or parenchyma of the viscus, and in the splenic cells, he thinks, are of comparatively rare occurrence; those of the former, or which are found in the matter contained in those cells, are more important, inasmuch as they are variously modified, and, he conceives, intimately connected with the origin and nature of a number of morbid productions. The matter contained in the cells consists of blood and fibrin or lymph. This latter substance was first observed by HEWSON, and has been recently viewed by KÖLLIKER, as the fibrinous remains of the blood-globules after dissolution in the intimate structure of the spleen. The importance of this substance in the animal economy was insisted on by TIEDEMANN and GMELIN. M. ANDRAL has made no reference to the observations of these physiologists; but, to the morbid states of this coagulated matter contained in the spleen, he has chiefly ascribed, not only a number of the changes which this organ exhibits, but many also which are found in the other parts of the body. Professors TIEDEMANN and GMELIN had attributed important offices to this matter, conceiving that it was influential, when carried into the chyle by the absorbents, or into the circulation, in changing the chyle into blood; and they had recourse to pathological facts in support of this opinion. But M. ANDRAL went still farther, and conceived that “it enjoys, although not possessed of any distinct organization, perhaps, a greater sum of vitality than the fibrous tissue which contains it, and consequently is more prone to become altered in its nutrition, and to separate from its own substance various morbid products.”

77. M. ANDRAL has erred in imputing to this matter endowments and powers which it is not entitled to, and which are merely changes or modifications of this matter, owing to the states of the vital energies of the frame, especially as manifested in this viscus through the medium of the nerves supplying its blood-vessels and proper tissue—this matter itself not being the active agent in producing those changes, but the passive recipient merely of the influence exerted on it by the organic nerves supplying the organ, and undergoing changes in consequence of modified states of this influence. Besides, as I have shown above (§ 4, *et seq.*), the views of these pathologists have been disputed in the more recent researches of KÖLLIKER, who has inferred, if he

has not fully proved, that the spleen does not discharge the function which they have imputed to this organ, but, on the contrary, a very opposite one—that it produces a solution of the blood-globules, depriving them of their colouring matter, and preventing the excessive abundance of coloured globules in the blood which might otherwise occur.

78. i. THE CAUSES of organic lesions of the spleen are, chiefly and more remotely, those already mentioned (§ 14, *et seq.*); but there are others which more immediately and directly induce these lesions, and which consist of previous disease—of one or other of the affections already mentioned, or even of a combination of them: 1st, of inflammatory action in some one of its grades, affecting chiefly the fibrous and muscular tissues of the organ; 2d, of remarkable impairment of vital power and of organic cohesion; 3d, of morbid states of the blood contained in, or circulating through, the viscus; and, 4th, of various combinations of the preceding conditions. During the influence of depressing causes, moral or physical, the spleen often experiences a deficiency of vital contractile power; and it hence soon becomes turgescens, or inflamed if the causes commonly productive of inflammation are in operation, and very soon afterward engorged and enlarged, or otherwise structurally altered. When the incipient symptoms are inflammatory, this state soon passes into organic change; and it is generally impossible to ascertain during life when the former terminates and the latter begins; the one passing insensibly into the other. With these successive changes, the blood-globules become more and more altered or dissolved, and the fibrin in the blood, or the corpuscles constituting fibrin, more abundant. During the changes of the blood, caused either by agents acting primarily on this fluid, or by disorders of depurating organs, the spleen also early and manifestly undergoes important alterations, for, not only is it more or less congested or enlarged, but its vital cohesion is also remarkably impaired, as shown by its state after death from malignant or adynamic maladies. Many of its organic changes, especially those which are chronic, may be imputed to the frequent occurrence of congestion, or of acute, sub-acute, or chronic inflammatory action, or to the absorption of morbid matter, or to the accumulation of injurious elements, owing to impaired excretion.

79. ii. ALTERATIONS OF THE FIBROUS STRUCTURE OF THE SPLEEN.—A. *Lesions of the Capsule of the Viscus.*—These consist, 1st. Of an unusual injection and congestion of its blood-vessels; 2d. Of softening, in various grades, which may even be so great as to occasion its rupture; 3d. Of its thickening, either with or without some degree of induration; 4th. Of its transformation into fibro-cartilaginous, cartilaginous, or even osseous substances. These changes are independent of, although very frequently connected with, similar alterations in the peritoneal envelope of the organ, and more especially with inflammatory changes, as effusions of lymph and serum, false membranes on the free surface, or thickening of the peritoneal covering, adhesions to adjoining organs or parts, &c.

80. B. *Alterations of the Trabecular or Fibromuscular Tissues and Parietes of the Splenic Cells.*—These are but imperfectly known. This part of the fibrous structure of the organ has

been found, however, 1st, in a state of softening; 2d, in a state of enlargement, rendering the septa thicker and more apparent than natural; 3d, partially changed, in rare cases, into a cartilaginous or osseous substance. From this it will be perceived that the changes of the internal fibrous structure of the spleen are nearly the same as those of its capsule. In respect of injection of the vessels ramified to it, and other inflammatory appearances, it may be remarked that they cannot be so readily recognised in the internal as in the external fibrous structure of the viscus.

81. iii. LESIONS OF THE SPLEEN SEATED IN BOTH ITS CONTAINING AND CONTAINED PARTS.—The alterations observed in the coagulated matter contained in the cells of the spleen evidently result from a change in the vital conditions of the organ, by which the internal arrangement of the particles composing this matter is modified. The only question here is, whether this modification takes place subsequently to the formation of this matter, or at the moment of its secretion. Most probably this modification results from the influence exerted by the nerves upon the vessels producing this matter, and is not the remote consequence of changes experienced by it subsequently.

82. A. *Altered consistence of the spleen* is a very frequent occurrence, and seems to depend upon, 1st, the state of its fibrous structure; and, 2d, upon changes in the consistence of the coagulated matter and blood contained in its cells and capillaries. M. ANDRAL refers alterations in its consistence, as well as other lesions of this organ about to be considered, to the state of the blood which fills the splenic cells and capillaries. This is substituting the effect for the cause, although, doubtless, a dissolved state of the blood which the spleen contains will materially diminish its natural firmness. It is much more likely that changes of this kind, as well as the greater number of the lesions of this viscus, depend more upon the state of its organic nervous influence, and upon the vital cohesion of its fibrous structure, than upon the condition of the blood contained in its cells. It may be allowed that the coagulated matter and the blood contained in the spleen experience important changes; but these are surely not primary, but the effects of that influence to which I have now referred them. This view of the subject is supported by the physiological researches of HOME, TIEDEMANN, GMELIN, SCHMIDT, PROUT, and BÉCLARD, and by the experiments of M. DEFERMON.

83. a. *Softening of the spleen* is a very frequent lesion, particularly in fevers. In this state the natural cohesion of the capsule and of the fibrous and muscular septa is diminished, and the coagulating matter and the blood contained in the cells, pulp, and capillaries of the viscus have lost their natural crasis, so that they are readily washed out, leaving the fibrous structure entire. In some cases, the blood and the coagulating matter formed in the spleen are quite fluid, and the internal structure of the viscus so weakened and injured, generally from its diminished cohesion and great distention, that an indistinct sense of fluctuation is given upon examining the viscus externally. The spleen, when softened, is seldom diminished in size; it is generally either enlarged, sometimes greatly, or it preserves its natural volume. Softening with enlargement of this viscus is one of the most frequent lesions occasioned by adynamic or malignant fevers.

84. b. *Increased firmness or induration* of the spleen seems to result from augmented cohesion of the fibrous structure of the spleen and blood-vessels, or from a modified state of the coagulating matter contained in the cells of the viscus. In many cases of this description, the blood seems particularly dense, and, together with the coagulated matter, gives to the spleen, when divided, the appearance of a slice of the liver. When the increased firmness of the organ amounts to *induration*, the change may be attributed partly to a cartilaginous degeneration of portions of the fibrous structure, to thickening or hypertrophy of this structure consequent upon protracted inflammatory irritation, and partly to the formation of an organized or partially organized lymph, or to a fibrinous deposit in the parenchyma of the viscus. Increased firmness or induration is frequently associated with alterations of size, especially *enlargement*. *Alteration of the size* of the spleen is chiefly referable to the same causes as changes in its consistence, viz., to the vital cohesion of its structures, and of the blood and coagulated matter contained in it, and to the action of its different vessels.

85. iv. ENLARGEMENTS OR TUMOURS OF THE SPLEEN may proceed, 1st, from the diminished cohesion and yielding state of the fibrous substance; 2d, from diminished action of the veins and lymphatics; 3d, from a greater quantity of blood being accumulated in the capillaries and cells than is carried out by the veins; and, 4th, from a greater quantity of the coagulated matter being formed in than is removed from this organ. It is evident that the effect in question seldom proceeds from one only of the above causes, but generally depends, more or less, upon two or even a greater number of them.

86. A. When the spleen is much enlarged, it often ascends in the left hypochondrium, thrusts the diaphragm upward, and, becoming more closely applied to the surface of the ribs, occasions as dull a sound on percussion as is heard in the right hypochondrium from the presence of the liver. Sometimes the enlarged spleen, pressing thus upward, does not project beneath the margins of the ribs. In this case its enlargement can only be determined by percussion and auscultation. But more commonly it descends below the margins of the left ribs, occasioning a tumour, varying in dimensions and form. This tumour occupies the left hypochondrium, and may be so large as to extend to the left flank, to the epigastrium, and to the umbilical region. In some cases I have seen it so much enlarged as to extend to the right side of the abdomen. It should, however, be recollected that the spleen may form a tumour below the ribs without being materially enlarged, owing to the diaphragm being pressed downward by an effusion of fluid into the pleural cavity. Instances of excessive enlargement of the spleen, with or without induration or increased firmness, have been recorded by authors. COLUMBUS and SCHENCK record cases in which the viscus weighed twenty pounds, the fibrous envelope being nearly cartilaginous. BURROWES saw one which weighed twelve pounds, and J. P. FRANK one that was sixteen pounds weight. The more chronic cases of enlargement are frequently attended by some degree of induration; while the more rapidly formed instances of enlargement, as frequently observed in the more pestilential or miasmatic climates, are characterized by more or less softening or friability of the viscus.



87. *B. Chronic tumours or enlargements of the spleen*—vulgarly *ague-cakes*—are very different from the enlargements of the viscus which take place from *vascular congestion* (§ 22, *et seq.*), and which occur not infrequently in the course, or as a sequela of adynamic or exanthematic fevers, or other diseases. These tumours differ in character, and are owing partly to hyperæmia, partly to the deposition of the anomalous fibrous product already noticed in the parenchyma of the spleen. The consistence of the organ varies greatly. The tumour or enlargement is most probably at first soft, but becomes harder, according as the deposit is more coagulable, and as the more fluid parts are absorbed. The colour of the swollen or enlarged viscus is probably at first reddish, but becomes paler as the colouring matter is absorbed, and as increased vascularity yields, and gives place to the fibrous deposit.

[*Hypertrophy or enlargement of the spleen* may be caused by such mechanical obstacles as impede the return of venous blood to the heart, and by such conditions of the blood as give a tendency to hyperæmia. Accordingly, we frequently meet with it in cases of organic disease of the heart. It is likely to occur whenever there exists any serious impediment to the circulation through the vena cava, where there is constriction or impermeability of the vena portæ, and where there has been suppression of menstrual or hæmorrhoidal evacuations. In all blood-diseases, as typhus, typhoid, cholera, &c., the spleen is frequently not only enlarged, but also altered in structure. In intermittents, hypertrophy of the organ is doubtless owing to its repeated hyperæmic condition. Not unfrequently is it found enlarged in BRIGHT's disease, so as to weigh from 16 to 20 ounces, and so hard and brittle that, as in intermittents, it may be easily cut into thin slices or broken into fragments; presenting, on section, a coarse granular structure, nodules of the size of pepper-corns being imbedded in its substance, of a bluish red or dark violet colour, becoming bright red on exposure to the air. Its form, too, is somewhat changed, its inner border being broader, and firmer than natural. The fibrous capsule is not firmer than usual, and there are no morbid adhesions to the peritoneum, although these conditions are frequently found in the enlargement following intermittents. It is probable, as has been suggested, that this condition arises from a deposition of albumen in the substance of the organ, it remaining in the Malpighian bodies after the absorption of the watery elements.

There are some pathological lesions of the thoracic and abdominal viscera, usually existing in connexion with enlarged spleen, which deserve notice. They are, infiltration of the inferior and posterior parts of the lungs, with dark-coloured blood, congestion of the capillaries of the inner wall of the right ventricle of the heart, and accumulations of dark grumous blood in its right cavity; distentions of the veins surrounding the Malpighian pyramids of the kidneys; sanguineous effusions into the peritoneal cavity, into the external cellular tissues, and, in a majority of cases, into the intestinal canal also, which may have been attended during life with bloody evacuations, tenesmus, &c.]

88. *C. Diminished volume of the spleen* sometimes occurs, but much less frequently than increase of its size. Occasionally it is very much diminished. M. ANDRAL has seen it no larger

than a walnut. In cases of this description, the consistence of its fibrous structure, and of the contents of its cells, may be either increased or diminished. With the causes of atrophy of the spleen, and of the particular circumstances connected with it, we are altogether unacquainted.

89. *D. The colour of the spleen* is occasionally considerably changed. In some cases it is of a bright red, deepening through all the shades to a blackish hue. When this occurs in spots only, the organ presents a speckled appearance. It sometimes also assumes, in certain portions, a whitish or yellowish tint; these portions either retaining the same consistence as the rest of the organ, or being harder or softer than it. It is difficult to say whether this change of colour depends more upon diminished vascularity of the fibrous structure of the part thus affected, or on change of the colour and consistence of the coagulated matter and blood contained in the parenchyma and cells of the viscus. M. ANDRAL imputes it entirely to the latter cause, and thinks it does not result from the formation of any new production.

90. *V. MORBID FORMATIONS.*—1st. *Purulent matter* is sometimes found in the spleen, either in isolated drops disseminated through its parenchyma, or in abscesses of various dimensions. These latter may here, as in the liver, be separated from the surrounding parts by a false membrane or cyst, or may be in immediate contact with, or pass insensibly into, the sound parts. Abscesses devoid of any cyst sometimes acquire a large size, occupying the greater part of the internal structure of the viscus. In these cases, the surrounding parenchyma is generally soft, pulpy, and readily breaks down, notwithstanding the utmost care. In the parts most distant from the collected matter, the capsule and fibrous tissue generally remain unchanged; but when the capsule comes in contact with the purulent matter, it also loses its vital cohesion, and allows the collected matter to find its way through it, either into the peritoneal cavity, or, having formed adhesions to adjoining viscera, into them. Abscesses of the spleen may thus burst into the stomach, the colon, the thorax, and even into the urinary passages. Cases have also been described wherein they have found their way, externally, through either the anterior abdominal parietes, or the back, or even the loins; but such occurrences are extremely rare.

91. Infiltration of purulent matter into the parenchyma of the spleen, as well as its collection in distinct abscesses, may coexist with similar depositions in other parenchymatous organs. Thus pus has been found in the spleen, liver, and lungs, and even in the brain also, of the same subject. It is sometimes found in one or more of these organs, and in the cavities of the joints in the same case. In all these cases the pus is formed in some other part, as in the veins, in the sinuses and cavity of the uterus, &c., whence it passes into the current of the circulation, and is either deposited in these situations, or occasions an inflammatory state of these parts, rapidly followed by the suppurating process. For reasons assigned in another place (see *arts. ABSORPTION, ABSCESS, symptomatic, and VEINS, diseases of*), I believe that the latter more commonly obtains. In some instances, as in phlebitis, metritis, &c., purulent matter is formed in the part primarily affected, and subsequently appears in the spleen

only; but more generally it is also found in some other situations at the same time. The majority of instances in which purulent matter is found in the spleen are of the above description. Those instances in which the pus has proceeded from inflammation, acute, sub-acute or chronic, originally affecting the substance of this viscus, are not common, unless as a complication of remittent and intermittent fevers; but in these cases of primary formation of matter in the spleen, according to my experience, a distinct abscess or abscesses are found, and rarely infiltration only, this latter being always a consecutive deposition or formation.

92. 2d. *Tubercular matter* is not infrequently found in the parenchyma of the spleen, generally in the form of minute grains, either isolated or clustered together. Tubercles of this organ are much more common in children than in adults; but they seldom are found in it, at any age, unless they exist in other organs at the same time. Tubercles are very common in the spleen of the lower animals.\*

93. 3d. *Cysts*, of various kinds, are occasionally found in this organ. Their simplest form is that of small vesicles filled with a serous fluid, existing either singly or in clusters. These vesicles are sometimes found in great numbers. M. ANDRAL states, that they are not confined to the splenic cells, he having found them within the splenic veins, some floating loose, others attached by peduncles to the sides of the veins, and others again lodged between their coats. He has also observed cysts of a much more complicated structure in the spleen: these consist of a serous or sero-fibrous tissue, containing either a honey-like matter, or a substance resembling suet, interspersed with hairs. *Hydatidic* cysts are sometimes found in the spleen, but not so frequently as in the liver. Their mode of development in the former is in every respect the same as in the latter. (See art. LIVER, § 232.)

["The spleen," says Professor GROSS, "is not unfrequently the seat of *calcareous concretions*; they are always isolated, usually not larger than a grain of mustard, of a rounded shape, and of a whitish or pale yellow colour. Their number varies from two to ten or fifteen. BONETUS mentions a case in which the organ appears to have been literally filled with them. The manner in which these bodies are formed is not well understood. My own opinion, founded upon careful and repeated examination, is, that they are developed in the branches of the splenic vein, from which, as they increase in size, they gradually escape into the parenchymatous substance. This view is countenanced by the fact that they are often seen in different stages of their formation, as the fibrous, the fibro-cartilaginous, cartilaginous, and osseous. The splenic tissue around these concretions is always unchanged. There is a variety of *osseous* concretion of the spleen, which occasionally acquires a very large bulk. Its mode of origin is unknown. It is of a pale, yellowish colour, rounded, oval, or more or less angular in its shape, and either solid, or partly solid and partly porous. In a case mentioned by MORGAGNI, a concretion of this kind weighed 21 drachms, and was arranged in concentric lay-

ers. Parallel examples are recorded by VALSALVA, BAADER, and BARTHOLIN."—(*Elements of Path. Anat.*, 2d ed., p. 681.)]

94. As to the origin of the above formations much difference of opinion exists. M. ANDRAL supposes that they are nothing else than the blood contained in the splenic cells modified in its qualities. "The experiments of M. GENDRIN," he observes, "seem to prove that the blood may be converted into pus. The result of my own observations has convinced me that, by a simple alteration of its colour and consistence, it may be converted into a substance perfectly analogous to the encephaloid tissue described by LAENNEC. Let us go a little farther, and suppose the blood in small circumscribed masses deprived of its colour, and diminished in its consistence, so as to become curdy and friable, and we have then all the essential characters of tubercles."—(*Anat. Path.*)

95. The changes which M. ANDRAL supposes to commence in the blood contained in the spleen should rather be referred to an alteration of the coagulated matter or lymph formed by the vessels ramified on the parietes of the splenic cells; both because the morbid deposit is more immediately produced by the vital action of this viscus and of its vessels, and is not a fluid circulating merely through it, and there arrested in its course; and because the morbid productions to which this author has referred, particularly tubercles and encephaloid tissue, have closer points of similarity to this particular coagulated matter than to the blood itself. Besides, we have no proofs that blood ever undergoes changes, similar to those for which M. ANDRAL contends, from being contained in, or circulating through, the capillaries or cells of an erectile tissue. Whatever changes the splenic blood may undergo must result either from the state of organic nervous or vital influence, with which the spleen is endowed, or from the condition of the blood circulating in it, or from the properties of the coagulated matter which it is engaged in forming, supposing that this matter mixes with the blood taken up by the splenic veins. These causes may combine to produce the ultimate effect; but the first should be viewed as primarily and chiefly influential, and the latter as early results, inducing farther effects.

96. The proximate causes of the foregoing lesions of the spleen may depend, 1st, upon irritation in various grades up to acute inflammation; such as increased vascularity, induration, ossific change, primary formation of matter, &c.; 2d, on a diminution of the nervous and vital influence of the organ, affecting the action of its vessels and its functions, and the state of the blood contained in the capillaries of its proper structure and cells—as softening, changes of colour, congestion, enlargement, &c.; 3d, an obstructed return of blood through the veins, as from organic disease of the liver or of the heart, especially congestion, enlargement, induration, &c.; 4th, on a tendency existing in the system to the formation of the matters found in the spleen—as pus, tubercles, cancerous matter, cysts, &c. This tendency may depend on the local or general states of vital influence; or the substance found in the spleen may be conveyed through the channel of the circulation, and deposited or secreted in this situation. It is possible, also, that both these may coexist.

97. vi. HÆMORRHAGE IN THE SPLEEN.—*Apo-*

\* [The spleen has occasionally been found affected with *menalosis* and *encephaloid*, also with a deposit of oil globules in its tissue; but these lesions are comparatively rare.]



*palsy of the Spleen, CRUVEILHIER.*—This able pathologist has described the hæmorrhages sometimes met with in the substance of the spleen, especially in the course of intermittent fevers. Hæmorrhagic deposits of various sizes, rounded in form, and exhibiting all the changes which the blood undergoes in apoplexy of the brain or other organs, are the appearances usually presented in cases of splenic apoplexy. Oelvy-brown cicatrices and fibrous cysts of the same colour, observed in rarer instances, may be viewed as the remains of former hæmorrhages, with breach of substance. Hæmorrhagic effusion into the parenchyma of this viscus should not be confounded with pulpy softening of this viscus, from which it is altogether distinct. M. CRUVEILHIER remarks, that, at every strong muscular effort, the blood rushes into the structure of the spleen, distending it, and thereby causing rupture. What renders this opinion the more probable is the frequency of hæmorrhage in the spleen of the horse. M. BAILLY has also adduced cases of spontaneous hæmorrhage into the substance of the spleen from age.

98. vii. The DIAGNOSIS of organic diseases of the spleen is extremely difficult as regards certain of them, and very easy as respects others. Enlargement and induration of this viscus are readily recognised, unless they be slight or incipient. The existence of *abscess* of the spleen is to be inferred from the history of the case and the symptoms mentioned above—especially when the acute disease has passed the sixteenth day, the viscus increasing in size—if fever be exasperated towards night, with increased heat in the soles of the feet and palms of the hands—if rigours appear, followed by flushes, perspirations, and a soft pulse—and if the complexion become more pallid, leaden, or sallow, and the bowels more relaxed. The existence of the other organic lesions of the spleen is often not manifested during life, and can very rarely be inferred with the least precision, either from the history of the case or from the symptoms complained of. Pulpy softening, however, when accompanied with more or less tumefaction, may be suspected from the softness and tenderness of the swelling and the antecedents of the case, but the examination ought always, in such instances, to be conducted with gentleness and care; for the spleen may be ruptured during life by a rough examination, especially in the advanced stage of remittent fever, during which this state of the spleen chiefly occurs.

99. viii. The PROGNOSIS of structural changes of the spleen entirely depends upon the nature of these changes, many of which cannot be ascertained during life. The existence of *abscess* is always dangerous, but not always fatal, as recovery may take place in the manner already mentioned. *Enlargements* of the viscus are always serious maladies; but when they are not excessive, are not associated with obstructed liver or disease of the heart, are not accompanied with a boggy or pulpy feel upon examination, or extreme hardness, they may either be removed, or the patient may live some years without change in the tumour or in his general state. If the enlargement be pulpy or boggy, if it be attended by much tenderness or pain, or by extreme hardness, or accompanied with protracted diarrhoea, or with exhausting hæmorrhages from either the stomach or bowels, or with disease in the liver or other

organs, or with abdominal dropsy, the prognosis should be very unfavourable. In all cases of inferred alteration of the spleen, the constitutional symptoms and the complications should guide the prognosis, especially the apparent amount of vital power, of vascular fulness, or of anæmia, and the connexion existing between it and diseases of other organs.

100. ix. The TREATMENT of structural diseases of the spleen has been in great measure stated when noticing the treatment of chronic splenitis. The chief and most common changes of this viscus, which come under the care of the physician, are *enlargement* and *induration*, and these are the usual consequences either of acute, sub-acute, or chronic splenitis, or of repeated attacks of congestion, caused by obstinate agues, especially in miasmatic localities. After having recourse to purgatives, in the combinations already mentioned, more especially with sulphate of quina, sulphate of iron, &c. (§ 60, *et seq.*), and to liniments and embrocations applied over the splenic region, these morbid conditions generally disappear; but if they still continue, the *iodide of potassium* may be prescribed in connexion with such other means as the peculiarities of the case may suggest, as with the compound decoction of aloes, or the compound mixture of iron, or with both; or the iodide of iron may be taken in the sirup of sarza. In those cases, frictions of the surface of the body, especially over the hypochondria, with the liniments already mentioned, will prove very beneficial. During the treatment of these chronic and obstinate diseases of the spleen, due attention should be directed to the disorders which are so frequently associated with them, and more especially to obstructions or other affections of the liver, and disorders of the stomach and bowels.

101. In many cases of chronic enlargement or induration of the spleen, especially when associated, as either lesion very frequently is, with chronic disease or torpor of the liver, the *nitro-muriatic acid*, taken in the infusion of chereita or of calumba, with extract of taraxacum, and the external use of this acid, either as a bath to the extremities, or as lotion, wash, or epithem over the hypochondria, will prove most beneficial. If hæmatemesis or discharges of blood from the bowels occur, the state of the case should be duly weighed. If the patient have lived fully or richly, if he be young, plethoric, or robust, the hæmorrhage may prove more or less critical, and should not be prematurely arrested. In different circumstances, or when it proceeds too far as respects the condition of the patient, the arrest of it may be generally accomplished almost immediately by the spirits of turpentine, taken either in a full, or in small and frequently-repeated doses, as prescribed above (§ 62, 69).\*

102. When amenorrhœa or chlorosis is connected with enlargement of the spleen, the combination of the compound steel mixture with the decoction of aloes, or the aloes and myrrh pill with the compound galbanum pill, may be prescribed and continued for some time, or the other medicines just now recommended may be taken, but due reference should always be had to

\* [Prof. GINTRAC recommends the sulphate of manganese in hypertrophy of the spleen, as a substitute for, and adjuvant of chalybeate remedies in splenic enlargements, attended with an anæmic state of the blood. He has related cases where 1½ gr. of this salt, given in the form of pill, twice daily, has effected permanent cures.]

the history of the case and its various morbid relations.

103. *Change of air* is the most important means of cure in all chronic affections of the spleen, and more especially when the patient resides in a low, humid, or miasmatic locality, or in a hot and aguish or sultry district. Change to a more healthy climate, as far as this may be effected, or even a sea voyage, is essentially necessary to a complete or permanent recovery. When change of air can be associated with the use of *chalybeate* and *deobstruent mineral springs*, or artificial mineral waters of this kind, then the advantages of change will be very materially enhanced. Many of the chalybeate, saline chalybeate, and sulphurous waters of this country, of Scotland, Germany, &c., will prove very serviceable in completing a cure of splenic disease; but the particular spring which should be adopted ought to depend upon the peculiarities of particular cases.

104. The *diet* and *regimen* of the patient require strict attention, and should be duly regulated. If the patient live in, or have been removed to, a healthy air and locality, an abstemious or moderate and digestible diet, with temperance in the use of vinous or other beverages, will of itself, in due time, effect a cure; but this regimen should generally be only brought in aid of the treatment already advised, adapted with discrimination to the circumstances of each case. Care ought to be taken never to overload the stomach. Farinaceous articles of food should be taken in due proportion, and animal food only once in the day, in moderate quantity. Instead of the usual kinds of flesh meats, the more digestible kinds of fish—white fish—may be substituted twice or thrice in the week; but the fish ought never to be fried. Cocoa should be preferred to tea or coffee. Moderate exercise in the open air and in sunshine ought not to be neglected, more especially when splenic affections are accompanied with *anæmia* or *chlorosis*.

[Affections of the spleen are extremely common throughout our Western and Southern country, and in nearly all the sequelæ of intermittents. They are also most efficient causes in producing relapses in the same disease. The treatment is often wholly empirical, made up of antiphlogistic measures—emetics, cathartics, diuretics, quinine, iodine, chalybeates, counter-irritation, &c. It is generally agreed that the patient should be supported by nutritious diet throughout the whole course of treatment, and that the activity of the skin should be promoted by stimulating baths, frictions, flannel, &c. A change of locality to a non-malarious region is, in all cases, highly to be recommended. The remedies on which we place our chief reliance are cups and leeches, blue mass, blisters, sulphate of quinine, iodide of iron, aloes, colocynth, and taraxacum, alone or variously combined. The iodine paint, tincture, or liniment, applied freely over the splenic region, should in no case be neglected. In some cases, the iodide of mercury ointment may be advantageously substituted. With regard to the treatment of chronic splenitis, Prof. S. H. Dixon states, that "the mercurial treatment, formerly so much relied on, has fallen into comparative disuse, and that a majority of our physicians prefer to depend on the continued exhibition of drastic cathartics, as the combinations of aloes, with rhubarb, colocynth, &c.; and that some, borrowing from the practice of the Hindoos, who

give vinegar and steel, while they purge the patient actively, have added tonics to their purgatives, and prescribe both iron and bark alternately with their cathartics. For my own part," says Dr. Dixon, "I cannot recommend any particular formulæ with great confidence in this obstinate malady. I think I have found most benefit from the use of iodine combined with mercury, as in the deutiodide of mercury and potassium, while the patient's bowels were kept soluble by the employment of blue pill with rhubarb, in such doses as were requisite, never pressing this matter very far. Cups or leeches over the tumour relieve pain. Fomentations applied to the side are useful. The diet of the patient should be light and nutritious. Tonics may be occasionally required, in which contingency I have been disposed to prefer iron, especially the new preparation known as the *Tinct. aëth. acct. Ferri*. If the pain be constant and annoying, I do not hesitate to resort to anodynes and sedatives. Many have recommended conium and hyoscyamus, but the preparations of opium and the salts of morphine are the only articles of this class that deserve the least reliance."—(*Loc. cit.*)

For an admirable account of the various diseases of the spleen, common to our malarious districts, see Dr. DRAKE'S work on the "Principal Diseases of the Valley of North America."

A very favourite prescription in St. Louis, and many parts of the Western States, for intermittents with enlarged spleen, is the following:

R Sulph. Quinæ, ʒij.; Aqu. Quinæ, ʒij.; Tr. Opil: Solutio Fowleri, aa, ʒij.; Sulph. Acid. Arom., ʒj.

Dose, a tea-spoonful every two hours during the intermission. In severe cases, a solution twice the strength of the above is used with great success. The plan of treatment recommended by M. VORSIN, of Limoges, has proved quite successful; viz., apply a mercurial plaster over the diseased organ, in which is incorporated six or eight scruples of the sulphate of quinine, to be renewed when exhausted, and worn for several weeks.]

BIBLIOG. AND REFER.—*Hippocrates*, περί πλῆθῶς, p. 241. —*Celsus*, l. iv., cap. 9. (*Recommends chalybeate water*.) —*Oribasius*, Synopsis, l. ix., c. 24. —*Avicenna*, Canon, l. iii., Fen. xv., tr. i., cap. 1, 4-9. —*Primerosi*, De Morbis Mulierum, l. iii., cap. 12. —*Columbus*, De Re Anatom., l. xv., p. 498. In *Haller*, Bibl. Med. Pract., t. ii., p. 125. —*Zacutus Lusitanus*, Pract. Admir., l. ii., obs. 42. —*Balloonius*, Opera, vol. i., p. 85. (*States the great prevalence of splenic disease in Autumn*.) —*Schenck*, l. iii., sec. ii., obs. 91, 92. —*Bianchi*, Historia Hepatidis, &c., p. 112. —*F. Ulmus*, Libellus de Liene, Svo. Lut. Paris, 1578. —*C. Drelincurtius*, Dissertatio de Licnosit, 4to. Lugd. Bat., 1693. —*L. Velthusius*, Tractatus de Liene et de Generatione, 12mo. Traj. ad Rhen., 1657. —*M. Malpighi*, de Liene, in Exercit. de Structura Viscerum, 12mo. Ainst., 1669. —*M. Z. Pellin*, Ordo et Methodus cognoscendi Scirrhum Lienis, 4to. Jen., 1667. —*N. Grew*, Observations on a Diseased Spleen (Phil. Trans.), 4to. London, 1684. —*F. Lambert*, Explication des Accidens que la Rate cause dans le Corps Humain, &c., 12mo. Toul., 1684. —*F. Hoffmann*, Dissertatio de Morbis Lienosis (Opp. Suppl., ii.). Hal., 1704. —*W. Stukeley*, Of the Spleen, its Uses and Diseases, fol. Lond., 1723. —*J. V. and J. G. Scheid*, Observations Lienum disruptorum (Hall. D. ad M.), 4to. Argent., 1725. —*C. F. Kaltschmid*, De Liene raræ magnitudinis (Hall., Diss. iv.). Jen., 1751. —*Morgagni*, De Sed. et Caus. Morb., Ep. xx., 52; Ep. xxxvi., 17, 23, 29. —*Schroeder*, De Splenis Usu, Morboque Splenico. 1761. —*Mayer*, Dissertatio Vomice Lienalis Historiam exponens (Doering, l.). Fr., 1781. —*Lieutaud*, Hist. Anatom. Med., l. i., obs. 796. —*Bang*, in Acta Reg. Soc. Med. Haun., t. ii., p. 65. —*Ruckstuhl*, Dissertatio de Morbis Lienis (Doering, l.). 1781. —*Chalmers*, On the Diseases of South Carolina, p. 21. (*Splenic disease endemic there*.) —*Burrows*, in Medical Facts and Observations, vol. vii., art. 18. —*De Haen*, Rat. Med., p. ix., cap. 2. —*Merck*, De Anatomia et Physiologia Lienis ejusque Abscessu. Giess., 1784. —*L. and J. P. Assolant*, Recherches sur la Rate, 8vo. Paris, 1800. —*M. Baillie*, Series of Engravings, &c., Fasc.



vi., pl. 1.—*A. M. Pleischl*, De Splenis Inflammatione, 8vo. Berlin, 1805.—*Portal*, Cours d'Anatomie Médicale, t. v., p. 335.—*K. W. Ammon*, Unterricht für Thierärzte über den Milzbrand, 8vo. Aushach, 1808.—*Marcus*, Ephemeriden, b. iii., 1.—*Zeviani*, in Mem. della Società di Verona, t. v.—*R. Bree*, On Pains of the Side from Diseased Spleen, in Med. Chir. Trans., vol. ii., p. 85; et vol. iii., p. 155.—*J. P. Frank*, De curandis Hominum Morbis, l. ii., p. 284; et l. v., par. ii., p. 377.—*C. H. Schmidt*, Commentatio do Pathologia Lienis, 4to. Goett., 1816.—*C. F. Heusinger*, Ueber den Bau und die Verriethung der Milz, 8vo. Thionv., 1817.—*M. F. M. Audouard*, Des Congestions sanguines de la Rate, 8vo. Par., 1818.—*A. Contrelli*, Lettera sopra la Suppurazione della Milza, 8vo. Miss., 1819.—*Pinel*, Nosographie Philosophique, t. iii., p. 546.—*C. F. Heusinger*, Betrachtungen über den Entzündung der Milz, 8vo. Einsin., 1820.—*Ribes*, Diet. des Sc. Méd. (art. Rate), t. xlvii.—*F. Tiedemann* et *L. Gmelin*, Versuche über die Wege, &c., 8vo. Heidelberg, 1820.—*S. Grotanelli*, Animadversiones in acutæ et chronicæ Splenitidis Historiam, 8vo. Flor., 1821. Rev. in Lond. Med. Repos., vol. xvii.—*M. E. M. Bailly*, in Revue Méd., t. iv., p. 211. 1825. (Rupture of the spleen.)—*Schmidtman*, Observat. Med., t. ii., p. 264-275.—*A. Moreschi*, Del vero e primario Uso della Milza, 8vo. Milan, 1823.—*W. Powell*, in Journ. de Progrès des Sciences Méd., t. xi., p. 157.—*Miller*, in Ibid., t. xi., p. 255.—*Strauz*, in Ibid., t. xvi.—*Andral*, Diet. de Méd. (art. Splenite), t. xix. Par., 1827.—*Schultz*, in Archives Génér. de Médecine, t. xx., p. 429; et *Strauz*, in Ibid., t. xvi., p. 122.—*Crucivier*, in Nouv. Biblioth. Méd., t. ix., p. 159. (Pulpy softening.)—*Bouillaud*, in Ibid., t. ix., p. 174. (Hydatids in spleen.)—*Olivier*, Diet. de Méd. (art. Rate), t. xvii. Par., 1827.—*Hodgkin*, Trans. of Med. and Chirurg. Society, vol. xii., p. 68.—*J. O. Voight*, On Dis. of the Spleen as they occur in India, in Biblioth. for Læger., No. 2, 1334; and in Med. Gazette, vol. xviii., p. 268; and Brit. and For. Med. Rev., vol. i., p. 564.—*W. Twining*, Observations on Diseases of the Spleen, particularly on the Vascular Engorgement of that organ common in Bengal, in Trans. of the Med. and Phys. Soc. of Calcutta, vol. iii., p. 351. 1827.—*A. Campbell*, in Ibid., vol. viii., pt. Ist. 1836.—*P. A. Piorry*, Sur l'Engorgement de la Rate dans les Fièvres intermittentes, in Gaz. Méd. de Paris, p. 378. 1833.—*R. Bright*, in British and Foreign Med. Review, vol. vii., p. 468; On Diseases of Spleen, Ibid., vol. iii., p. 345; vol. viii., p. 248; Ibid., vol. xiii., p. 363; vol. xix., p. 31.—*Nepple*, Lettre sur l'Engorgement de la Rate dans les Fièvres intermittentes, in Gaz. Méd. de Paris, p. 613, 1833; Mémoire sur les Altérations de la Rate, in Journ. de Médecine de Lyon, Nos. 4 and 5, 1842; and Traité des Fièvres intermittentes, &c.—*M. Marcus*, De Functione Lienis, 8vo. Gryph., 1838.—*P. Pèzerat*, Mém. sur l'Etat de la Rate dans les Fièvres périodiques, &c., in Arch. Gén. de Méd., 2me série, t. v., p. 199. 1834.—*Bigsby*, Cyc. of Pract. Med. (art. Spleen), vol. iv. 1834.—*A. Dalmas*, in Diet. de Méd. (art. Rate).—*C. F. Quittenbaum*, Comment. de Splenis Hypertrophia et Historia Extirpationis Splenis Hypertrophici cum Fortuna adversa in Femina viva factæ, 4to. Sig., 1836.—*Felici* et *Panizza*, in Med. Chirurg. Review, p. 531. April, 1837.—*V. Nivet*, Recherches sur l'Engorgement et l'Hypertrophie de la Rate, in Archives Gén. de Méd., 3me série, t. i., p. 310; and t. ii., p. 25. 1838.—*Andral*, in Med. Chirurg. Rev., p. 235. July, 1838.—*Raikem*, in Ibid., No. xxiii., p. 452.—*C. Rokitsansky*, A Manual of Pathological Anatomy, vol. ii., transl. by *E. Sieveking* for the Sydenham Society, p. 167. London, 1849.—Descriptive Catalogue of Pathological Specimens contained in the Museum of the Royal College of Surgeons of England, vol. iii., series xxii., p. 173. (Cancer of Spleen, 1484. Tubercle of, 1485-7.)—Descriptive Catalogue of the Anat. Museum of St. Bartholomew's Hospital, vol. i.; Pathological Anatomy, series xxii., p. 351. [AM. BIBLIOG. AND REFER.—*Daniel Drake*, Principal Diseases of the Interior Valley of North America. Cincinnati, 1850.—*S. H. Dixon*, Essays on Pathology and Ther. Charleston, 1845.—*Samuel Forry*, The Climate of the United States. New York, 1842.—*C. A. Lee*, in Ibid., p. 111-113.—*William B. Herriek*, Fatal Case of Rupture of the Spleen, Illinois Med. Journal, 1845; and Boston Med. and Surg. Jour., vol. xxxi., p. 78.—*N. Chapman*, Lectures on the more important Diseases of the Thoracic and Abdominal Viscera. Philadelphia, 1844. (Contains a lucid account of splenic diseases.)—*D. B. Slack*, On the Function of the Spleen, Boston Med. and Surg. Journal, vol. xxix., p. 59; and vol. xxviii., p. 498; and in New England Med. Jour., 1827.—*D. J. Macgowan*, An Account of *M. Piorry's* use of quinine for enlarged Spleen at La Pitie, where, in some cases,  $\frac{zj}$  was given in two doses, with the effect of reducing the spleen from 6 inches 6 lines in length to 5 inches 5 lines; ten days after, the size of the organ remaining the same,  $\frac{zj}$  quinine, given at one dose, reduced it to 3 inches 6 lines, which size it retained, and the patient was discharged cured 5 days after. Several instances are given where

the spleen was reduced several inches in length in the course of 10 to 20 minutes, after giving from 40 to 60 grs. of quinine. Piorry contends that the "fever is not the cause, but the manifestation of the pathological condition of the spleen, and that, if the remedies are directed to this organ, so as to reduce it to its normal volume, there is no danger of a relapse, and that there can be no radical cure unless this be effected." (Boston Med. and Surg. Journal, vol. xxv., p. 393.)—*William Ingalls*, On the Structure, Functions, and Pathology of the Spleen, Ibid., vol. xxii., p. 149, 170, 185; and Fracture of, vol. i., p. 296.—Case of Excision of the Spleen in the human Subject, with subsequent enjoyment of good Health, Ibid., vol. xviii., p. 175.—*B. W. Dewey*, Case of enormous enlargement of Spleen, in Ibid., vol. xvi., p. 104.—*J. R. Brown*, Enlargement of Spleen, in Ibid., vol. xiv., p. 28.—*W. H. Webster*, Abs. of Spleen, Ibid., vol. xiv., p. 5.—*H. C. Gillette*, Enlargement of Spleen, Ibid., vol. x., p. 77.—*N. S. Davis*, Chronic enlargement of Spleen, Am. Jour. Med. Sci., vol. iv., N. S., p. 367.—*John Neill*, Case of Spontaneous Rupture of Spleen, Ibid., vol. iv., N. S., p. 369.—*A. G. Welch*, in Ibid., vol. v., N. S., p. 503.—*J. B. Potter*, Spontaneous Rupture of Spleen, in Western Lancet, Jan., 1845; and Am. Jour. Med. Sci., vol. ix., N. S., p. 523.—*J. B. Stuart*, in Am. Medical and Phil. Register, vol. xi., p. 131.—*J. W. Heustis*, On the Functions of the Liver and Spleen, in Am. Jour. Med. Sci., vol. iv., O. S., p. 73.—*William M. Lee*, Splenitis, in Ibid., vol. xii., O. S., p. 383. There are other essays and detached articles on the physiology and pathology of the spleen scattered throughout our other American journals and periodicals, which the editor does not deem it necessary to refer to more particularly. See also different works on the Am. Practice of Medicine.]

STAMMERING. See art. VOICE AND SPEECH, DISORDERS OF.

STERILITY. See IMPOTENCE AND STERILITY; also, POLLUTION, VOLUNTARY.

STOMACH, DISEASES OF—COMPRISING CARDIA AND PYLORUS.—SYNON.—STOMACH, Γαστήρ, στομάχος; Ventriculus, Stomachus; Magen, Germ. Ventricle, Estomac, Fr. Stomacho, Ital.

1. The stomach not only sympathizes most intimately with other organs, but also exercises over them a most powerful influence: it is not merely a passive sufferer of disorder on numerous occasions, but is, on many others, itself either actively diseased, or the most influential agent of the disorder of other organs. Hence, in many diseases, even of the most serious kind, the stomach is either chiefly affected, or most intimately sympathizes with the organ which is the seat of the disease. (See art. SYMPATHY.)

2. In most affections of the stomach, and in many diseases with which this organ sympathizes, there are certain prominent symptoms which may be, 1st, functional, or independent of any appreciable structural change of the organ or of any other part; 2d, or be caused by inflammatory, or by organic lesion of the viscous; 3d, or arise from disease of some allied organ or part, or even of the frame generally. These prominent and frequent symptoms are—*flatulence, acidity, heartburn, acrid cruetations, water-brash or pyrosis, rumination, gastrodynia, nausea, and vomiting*, &c.; and as several of these may depend upon disorder of other viscera as well as of the stomach, the special consideration of them has been assigned to different heads, chiefly to MORBID APPETITE, FLATULENCE, INDIGESTION, DIGESTIVE CANAL, GASTRO-ENTERIC DISEASE, PYROSIS, RUMINATION, VOMITING, &c.; and to these articles I beg to refer the reader for various topics intimately connected with those involved in the present subject.

3. In our investigations of diseases of the stomach, the organization, the structural, the nervous, and the vascular connexions of the organ, the viscera bounding, and in close contact with it, and the varying states of its fulness and vacuity,

should severally receive attention, especially in connexion with habits and modes of living, with diet and regimen, with age and sex, and with artificial or injurious modes of dress. These severally, or more or less associated, modify not only the states, but also the position, not of the stomach merely, but also of surrounding viscera. The functional disorders of the stomach have been duly discussed under certain of the heads now enumerated, especially *flatulence* and *indigestion*; but before I proceed to consider the inflammatory and structural diseases of the organ, I shall offer a few remarks on the more painful affections usually referred to this organ, and which have generally been termed *gastrodynia* and *gastralgia*.

4. I. PAINFUL AFFECTIONS OF THE STOMACH.—SYNON.—*Gastrodynia* (from *γαστήρ*, stomach; and *δύειν*, pain). *Gastralgia* (from *γαστήρ*, and *ἀλγέω*, I suffer pain). *Cardialgia*, *καρδιαλγία*, Sauvages, Darwin, Pinel, &c. *Spasmus ventriculi*, *Cardiaca passio*, Auct. *Limosis Cardialgia*, Good. *Morsus ventriculi*, *dolor ventriculi*, Auct. Var. *Dolcur de l'estomac*, *Colique d'estomac*, Fr. *Magenschmerz*, *Magenkrampf*, *Magendrücken*, Germ. *Mal di stomaco*, Ital. *Pain in the stomach*; *cramp or spasms in the stomach*; *nervous affection of the stomach*.

CLASSIF.—II. CLASS, III. ORDER (Author in Preface).

5. DEFINIT.—*Severe, sometimes violent, pain in the region of the stomach, often of sudden occurrence, and, after an indefinite continuance, generally quickly ceasing; frequently eased by pressure, and unattended by tenderness or fever; commonly symptomatic, and very rarely primary, unless produced by injurious ingesta.*

6. The very painful seizures, commonly referred to the region of the stomach, and usually termed *gastrodynia*, or *gastralgia*, or *gastro-enteralgia*, are very generally viewed as affections of the nerves supplying this organ, such affections being often accompanied by more or less spasm of the muscular coats of the viscus. This view is probably correct, although the evidence in its support is by no means demonstrative; for the morbid sensibility constituting the seizure may have its origin either in the nerves distributed to the stomach, or in the ganglia or plexuses, whence these nerves proceed, or in those in the more immediate vicinity, as in the diaphragmatic nerves; or it may even be caused by the irritation and spasm produced by biliary calculi. The existence of spasm of the gastric muscular coats is often doubtful; in some cases the pain presents spasmodic features; in others it is not thus characterized. That the pain occasionally extends to both stomach and bowels, as inferred by some writers, the affection being in such cases called *gastro-enteralgia*, may be admitted; as it is difficult in all instances to dissociate the affection of the nerves of the stomach from a similar affection of the intestinal nerves, either co-existing or supervening the one on the other. This more extended affection will thus very nearly approach to the severer forms of colic or ileus, especially when the suffering in this latter affection is more or less referred to the epigastrium.

7. *Gastrodynia* occurs under a variety of circumstances: 1st, it may be altogether nervous or functional, and unconnected with any evidence of inflammatory or structural lesion; 2d, it may depend upon various grades or kinds of inflam-

matory action; 3d, it may proceed from any of the structural lesions about to be considered; and, 4th, it may be connected with gout, appearing in the form of atonic, misplaced, or metastatic gout, or even with rheumatism, although very rarely with this latter. It may, moreover, occur sympathetically of various other diseases, especially those which are seated in the abdominal viscera. The first of these manifestations of *gastrodynia* chiefly interests us at this place. In this state of the disease, as well as in the other, the secretions poured into the stomach are often much disordered, most frequently they are more or less acid. The acidity in these cases is either the cause of the pain, or the consequence, in the first instance, of the functional disorder, of which morbid sensibility constitutes a chief part, the pain being increased by the acid or morbid fluid and gaseous secretions produced during the impaired organic nervous or vital power of the stomach.\*

8. This affection may occur in very different or even opposite states of the stomach. It may appear during inanition, or, at least, during an empty state of the viscus, or after repletion or an overloaded condition of the organ. It may be connected with anæmia, or with great vascular fulness. It may be referred to the nature or incongruity of the ingesta, or to flatulent distention; and it may be associated with any of the functional or structural affections of the stomach already noticed (§ 2, 7). In its severer forms, gas-

\* The following remarks, pertinent to the subject, have been published by DR. BENCE JONES, who has most ably investigated this and many other topics in animal chemistry:

"In 1785, CARMINATI first observed the acid reaction of the digestive fluid. WERNER, in 1800, confirmed the observation. PROUT proved, in 1824, the presence of hydrochloric acid during digestion and in indigestion. TIEDEMANN and GMELIN found, in 1826, by irritation of the stomach, that acid was secreted, chiefly hydrochloric acid. They found also traces of acetic acid; and in the horse, they found also butyric acid. About 1830, BERZELIUS states that the acid reaction of the contents of the stomach is chiefly from hydrochloric acid, and the acids next in importance are the lactic and butyric. He concluded, from his own experiments, that lactic acid existed in all animal fluids, either free or combined. In 1844, LIEBIG showed that this conclusion was not correct—that there was no lactic acid, even in milk, until it began to decompose; and this he showed to be true of other animal fluids. In 1845, I (DR. BENCE JONES) observed that when much acid is secreted by the stomach, the urine is found to be alkaline. The excess of acid in the stomach was hydrochloric acid; and the free alkali in the urine was fixed alkali, and not ammonia. In extreme cases, the alkalinescence lasted for four hours. As the free acid was absorbed from the stomach the urine became acid, and this reaction increased until it was intensely acid to test paper. Thus, then, in health and disease, hydrochloric acid is liberated in the stomach. Acetic acid is sometimes present in small quantities, and perhaps lactic and butyric acids may occasionally be found. Phosphoric acid has not hitherto been proved to exist in the gastric fluid.

"The progress of animal chemistry leads to the expectation that many more organic acids will be found to be present in the stomach in disease. Starch and fat are two of the three great constituents of the food of man, and each gives origin to a long series of organic acids, the last of which, in either case, is carbonic acid, the product of respiration.

"The varying circumstances of disease render it probable that, in disorders of the digestive organs, many of the intermediate acids may be produced; that, although in the state of health the starch passes readily into carbonic acid and water, yet, in the state of disease, lactic acid, acetic acid, and formic acid may be produced. So, also, one or many of the fatty acids will most probably be found to result from indigestion. Thus butyric, caproic, and caprylic acids, closely related to each other in composition, are not unlikely to be present in the secretions of the stomach in disease"—(See DR. SEYMOUR, on the *Nature and Treatment of several severe Diseases*, &c., vol. i., p. 3.)



trodynia is sometimes associated with a morbid appetite or with gout, and in this latter state it often assumes the form of *cardialgia*—a form which many writers have described as a combination of gastrodynia with leipothymia, the distress being referred equally to the epigastrium and the præcordia. Gastrodynia, in its less violent forms, is often an attendant upon difficult or scanty menstruation, but it still more frequently assumes the form of gastro-enteralgia, or even of colic, in females who experience catamenial or uterine disorder. The more sudden and violent accessions of pains, with the shorter continuance and more rapid cessation of suffering, has been referred to cramp or spasm of the viscus; but, even admitting this condition to exist in these cases, a neuralgic state of the nerves of the viscus, or of those in the immediate vicinity, owing probably to some temporary irritant, may equally constitute the pathological condition; in either case the one morbid state will hardly exist, with much violence, without the other. BROUSSAIS and his followers would not admit the existence of either of these conditions independently of inflammatory action or structural change. This view of the complaint is sufficiently controverted in the article on GASTRO-ENTERIC DISEASE, and in what will appear in the sequel; the most severe states of gastrodynia often appearing under very different circumstances from those of inflammatory action or structural lesion.

9. i. THE CAUSES of gastrodynia are remarkably numerous, and nevertheless it is sometimes difficult to assign the attack to any particular cause. The affection is frequently connected, more or less, with temperament and habit of body—with the nervous, irritable, or bilious; and is hence somewhat hereditary. It is much more frequent in the female than in the male sex, especially during uterine activity, and in the form of spasm or of cramp; in the nervous and susceptible; in persons of sedentary habits; in the insufficiently or unhealthily fed; and in those who are subjected to anxieties of mind and to the depressing emotions. Females are most liable to it about the period of the catamenia, and during gestation; also after large losses of blood, and prolonged leucorrhœa. It is often associated with anæmia or chlorosis. Gastrodynia, in its severer forms, is one of the most frequent consequences of masturbation in either sex; of a vegetable, poor, and indigestible food; of taking cold and acid beverages or fluids, especially during an overheated state of the system; or acid and unripe and stale fruits; of living in low, humid, and unwholesome localities; of intemperance in the use of spirituous or vinous liquors [and tobacco]; and of the more indigestible or incongruous articles of diet, or of excessive repletion, produced either by food or drink. The causes enumerated under the head of APPETITE, MORBID; FLATULENCE; INDIGESTION, &c., are equally productive of the affection now being considered.

10. ii. THE SYMPTOMS of gastrodynia consist of the character, mode of accession and duration of the pain, and of the associated phenomena. The pain may be acute, pungent, lacerating, cutting, burning, or obtuse, dull or aching. It may be sudden, rapid, or slow in accession; and after continuing momentarily, or for a very short, or even an indefinite time, cease suddenly, quickly, or slowly. It may remit or intermit, or occur at irregular or indeterminate periods. It may oc-

cur at any period of the day or night, especially the former, and in every state of the stomach, more particularly when empty or overloaded. It may be attended by great distress and appearance of suffering; by constant restlessness, agitation, tossing, or even convulsive or spasmodic movements; by extreme anxiety, anguish, palpitations, tumultuous or irregular action of the heart, or by epigastric pulsations; by groaning, moaning, and irregular states of respiration, both diaphragmatic and voluntary; by choking in the throat, eructations of flatus, or partly of flatus and of acid, rancid or even alkaline matters, or the more forcible rejection of nidorous or variously disagreeable fluids. There are frequently borborygmi, flatulent distention at the epigastrium, and often in the other abdominal regions, sometimes with irregular spasmodic contractions, and efforts to vomit, the attempts being either abortive, or partially inefficient. The skin is often cool, especially the extremities, and the sufferings occasion a free or cold perspiration. Pressure of the gastric region generally affords a temporary ease. The countenance is anxious or partially sunk; the tongue is not materially changed from pre-existing states; the appetite may be morbid, ravenous, or lost, with or without nausea or retching. Thirst may or may not be experienced; and the bowels may be costive or irregular, and the stools more or less morbid. The urine may be pale and abundant, especially in females, when the gastrodynia is associated with uterine disorder. The pulse may not be materially affected, or it may be slow, intermittent, or irregular; or it may be small, quick, and irregular, while the action of the heart is hurried and tumultuous. Retchings or vomitings may or may not be present; but when the latter are observed, they are such as are described in that article.

11. iii. DIAGNOSIS.—It is often difficult to determine whether the pain, attended by more or less of the above symptoms, be purely nervous, or the more prominent phenomenon, caused by spasm, or by inflammatory or organic disease of the stomach, or of a closely-adjointing part. The history, the concomitants, and the grouping of the symptoms of the case, will chiefly guide the physician. The causes of the attack ought to be carefully investigated before a positive opinion be formed or given. Attention to these: the absence of fever, of tenderness on pressure, or of tension, or of increased heat near the seat of pain; the state of the urine, and of the secretions generally; the free perspiration and coolness of the surface; the character of the pulse, and even of the pain in most instances; the existence of the nervous temperament, or of the hysterical or gouty diathesis; the *juvantia* and *lædientia*, the effects of treatment, the habits, modes of life, the cravings, and the diet of the patient, will severally assist the diagnosis.

12. When the pain is caused chiefly by, or is connected with, *spasm or cramp of the stomach*, the morbid action, as Dr. MACFARLANE has shown, in a very excellent paper on this subject, is communicated by the nerves to the muscles, inducing the most acute pain, with a feeling of rigid contraction, violent twisting or tearing in the epigastrium, soon followed by painful or interrupted breathing, difficult articulation, pallid countenance, small, hurried, and contracted pulse, and occasionally with coldness of the extremities, and rigid contraction of the recti abdominis and

gastrocnemii muscles. Pressure on the gastric regions in these cases, instead of increasing the pain, as in inflammatory and organic diseases of the stomach, generally affords more or less relief in this affection, which in some instances is followed by an attack of hiccough.

13. In all cases of gastrodynia, the nature of the ingesta, not only for a few hours previously to the attack, but also for several days, ought to be ascertained as accurately as possible; for the poisonous, injurious, or incongruous nature of these may have occasioned the attack; and, although inflammatory action may be the concomitant of the gastrodynia, this latter may be the chief lesion, the former being either asthenic, or of a kind which should be viewed as altogether subordinate. The nervous character of the complaint is sufficiently manifest in many cases; but in certain circumstances, especially when occurring in the gouty or rheumatic diathesis, or in the form of displaced gout, it is sometimes associated with congestion, or with asthenic inflammatory action; and much greater importance is frequently, in such cases, attached to these latter pathological conditions than to the state of the organic nervous power and vital resistance, which are too often allowed to sink, or which are even hastened to collapse by lowering or inappropriate means.

14. iv. The Prognosis of gastrodynia is generally favourable when the attack is not attended by tumultuous, or irregular, or intermittent action of the heart, or by leipothymia, or by a sense of fatal sinking, or a presentiment of approaching dissolution. These often accompany misplaced or metastatic gout, or the occurrence of severe gastrodynia in the gouty diathesis, or an attack in a person who is already the subject of organic disease of the heart, and should be viewed as extremely dangerous symptoms, although no indications of inflammation or structural change be present, or may be detected in the stomach or collatitious viscera after death. Several instances of this kind have come before me, one of them in a medical man. If the attack occurs in a person far advanced in life, or addicted to the abuse of spirituous or vinous potations, the existence of organic disease in this organ, or in its collatitious viscera, may be inferred, especially if singultus be present, and a prognosis may be formed accordingly. Nevertheless, the attack may not be the less nervous, this being the most important part of the disease as respects the existing suffering, and that to which immediate attention should be directed, as respects both the prognosis and the treatment. In the severer form of gastralgia, attended by the symptoms of cramp or spasm of the stomach, a cautious prognosis should be given. In a case, published by Dr. MACFARLANE (*Glasgow Med. Journ.*, vol. ii., p. 182), of cramp of this viscous, the coats at one part were found completely torn asunder, so as to produce a large opening, no appearance of disease having been detected in the vicinity or in the margins of the aperture.

15. v. TREATMENT.—The indications of cure are: 1st, to allay the suffering of the patient; and, 2d, to prevent a return of the attack by ameliorating or removing the morbid conditions occasioning it.—A. The first of these is often best accomplished by ascertaining and expelling the cause of disorder, more especially when poisonous or injurious ingesta have produced it. In such cases the treatment should be directed as

very fully stated, with reference to the individual poisons, at the places where these are considered; for the removal of these by an emetic, or by mechanical means, as there advised in respect of numerous injurious substances, or the neutralizing or counteracting their actions, is most essential to the obtaining of relief, whenever the attack can be traced to these causes. If the attack be attended by vomiting or by eructations, the state of the matters thrown off should receive attention; and if these furnish indications of acidity, the combination of antacids with emollients and anodynes are required. If the gastrodynia be characterized by cramp or spasms, rather than by acidity, antispasmodics and emollients should be given in frequent or large doses, with opium, camphor, ether, ammonia, &c. The following will generally afford relief:

No. 342. R Magnesiæ Calcinae, ℥ij.; Tinct. Opii, ℥xxxvj.; Spirit. Carui, ʒij.; Aquæ Flor. Aurantii, Aquæ Pimentæ, aa, ʒijss. Misce. Capiat æger cochl. iij. larga, omni horâ, vel bishorio.

No. 343. R Mist. Amygdal. dulc., ʒvss.; Acidi Hydrocyanici diluti, ʒss.; Tinct. Opii, ʒss.; Spirit. Lavand. comp., ʒij. M. Fiat Mist., cujus sumantur cochl. iij. larga, secundis vel tertiis horis.

16. While these or other appropriate medicines, as may be found in the APPENDIX (see *Form.* No. 357), are being employed, either of the *embrocations* there prescribed (see *Form.* 311) may be applied by means of warm flannels or spongipiline over the epigastrium. When the pain is attended by retching, it is sometimes beneficial to promote vomiting by copious draughts of warm emollient fluids, in order to dilute and promote the discharge of irritating ingesta, or of morbid secretions. After these have been duly evacuated, it is often requisite to allay both the irritability and the morbid sensibility of the organ by giving, along with each dose of either of the above medicines, one of the pills now prescribed.

No. 344. R Creasoti, ℥ij.; Pulv. Cretæ comp., ʒij.; Syrupi Papaveris, q. s. M. Fiat Pilulæ xij. Capiat unam vel duas, pro dose.

17. When the gastrodynia is accompanied with much flatulence, or assumes a milder and more chronic form, or recurs frequently, the following may be taken, and repeated according to circumstances:

No. 345. R Magnesiæ Calcinatæ (vel Sodæ Carbon.), gr. xij—xvj.; Pulv. Rhel. gr. viij.; Pulv. Cascariellæ (vel Pulv. Calumbæ), gr. v.; Pulv. Cinnamom. comp., gr. iij.; Aquæ puræ, ʒss. Misce. Fiat haustus.

No. 346. R Bismuthi Nitratis, et Magnesiæ Carbonatis, aa, gr. x. ad xij.; tere cum Mucilag. Acaciæ ʒss.; dein adde, Aquæ Flor. Aurantii, ʒij.; Spirit. Anisi, ʒj.; Tinct. Hyoscyami, ℥xxv.; Aquæ puræ, ʒx.; Syrupi Tolutani, ʒss. Misce. Fiat Haustus statim sumendus et horas post tres repetendus.

18. If the pain in the stomach be connected with biliary disorder, a full dose of calomel and opium may be given at first—from five to ten grains of calomel, and from one to two of opium; and afterward magnesia and rhubarb may be given in any aromatic water. If there be reason to infer that hydrochloric acid is present in the stomach, either vomiting should be provoked, or absorbents exhibited previously to the calomel; and if the retention of the latter by the stomach be doubted, a drop of creasote may be given in addition to opium or morphia. The gastrodynia caused by the retrocession or suppression of gout requires very decided means. I have seen several cases of this kind, and each one was somewhat different from the others in its features, and in the effects produced by treatment. In one



case (of a medical man), the attack was associated with enteralgia; in another, it was complicated with marked biliary disorder; in a third, it was attended by great disorder of the urinary organs. For the first, magnesia, camphor, opium, and capsicum were freely given in conjunction; for the second, magnesia, calomel, and opium; and for the third, the carbonate of soda, with camphor, carbonate of ammonia, and hydrocyanic acid. For all of them, terebinthinate embrocations were directed to the abdomen, and mustard cataplasms to the feet. The results were favourable in all. The treatment should vary with the peculiarities of each case; and these are so many, and often so different, according as the pain is associated with disorder of organs with which the stomach is connected by position or sympathy, that it is impossible to state all the means or combination of means which will be quite appropriate to all.

19. *B.* Having removed the present attack, it is requisite to ascertain, as fully as possible, the conditions of the several digestive and excreting functions, and to trace the influence which disorder of any of these may have in favouring a return of this affection. In most cases of gastrodynia, more or less indigestion or weakness of the digestive functions generally, or impaired action of the liver, and disorder of the excreting functions, are present, not merely for a short period, or contingently upon some manifest cause, but in a chronic or protracted form; and for these a well-devised course of treatment is necessary both to remove them and to prevent their recurrence. Biliary accumulations or obstructions should be removed by chologogue purgatives; weakness of the stomach, by bitter infusions, or other tonics; torpor of the liver, by mild mercurials, taraxacum, or the nitro-muriatic acids, according to circumstances; impaired excreting function, by diuretics, diaphoretics, aperients, emmenagogues, warm baths, &c. Acidity of the *prima via* ought to be prevented by antacids, as the fixed and volatile alkalies, magnesia, chalk, &c., conjoined with tonics or aperients, or even with both. Antispasmodics, carminatives, and anodynes may be added to these, according as indications for their use may appear, with a view of preventing, as well as of removing, an attack of gastrodynia, which may occur in females, especially about the period of the catamenia, or in nervous or irritable persons from errors in diet, although no very manifest disorder of any of the abdominal organs can be detected.

20. There is no disorder for which a duly regulated diet and regimen are more required than for gastrodynia. As to the *diet* which is found the best in this complaint, it is most difficult to determine. Articles of food which agree well in some cases, disagree in others. Pure cocoa, black tea in small quantity, farinaceous articles of diet, animal food in moderation, and chiefly mutton or game, and abstinence from saccharine substances, from pastry and from heating beverages, are generally deserving of adoption; but it is unnecessary to add to what is already advanced on this subject, and on *regimen* and the use of *mineral waters*, when treating of INDIGESTION (see § 55, *et seq.*), with which the complaint is so intimately allied, and of which it so frequently forms the most distressing part.

21. II. INFLAMMATIONS OF THE STOMACH.—*SYNON.*—*Gastritis* (from *γαστήρ*, the stomach); *Ventriculi Inflammatio*, Boerhaave. *Febris Sto-*

*machica Inflammatoria*, Hoffmann. *Cardialgia Inflammatoria*, Tralles. *Gastritis*, Sauvages, Vogel, Cullen, Parr, Pinel, &c. *Cauma Gastritis*, Young. *Empresma Gastritis*, Good. *Gastrite*, *Inflammation de l'Estomac*, Fr. *Entzündung des Magens*, *Magencntzündung*, Germ. *Inflamazione del Stomaco*, Ital.

CLASSIF.—1. *Class*, 2. *Order* (Cullen). 3. *Class*, 2. *Order* (Good). III. *Class*, 1. *ORDER* (Author in Preface).

22. DEFIN.—*Anorexia*, *nausea*, with pain in the region of the stomach, with or without chills or rigours; followed by febrile symptoms, by vomitings soon after the ingestion of substances, by a desire for cold fluids, by increased pain and tenderness on pressure, and, in the severer cases, attended by an internal sense of heat or burning, by extreme anxiety and dejection of mind, and by irrepressible vomitings or retchings.

23. It is of some moment, upon entering on the consideration of inflammations of the stomach, to keep in recollection the organization and the connexions of the organ, and more especially the intimate structure of its villous coat, the nerves which supply it, which actuate its vital functions, and which form the bonds of sympathy between it and the brain, spinal cord, and associated viscera; and the relations, functional and structural, between the enveloping serous covering and surrounding viscera, on the one hand, and the internal surface of the other portions of the alimentary canal on the other; duly to consider the very intimate connexion subsisting between this viscus and the chief ganglionic centre; the analogy, presented by the digestive canal and vessels proceeding from it, to the roots of plants; and the general type of conformation existing, in respect of this organ, throughout the whole animal creation.

24. Before proceeding to discuss the several forms or states in which gastritis occurs, I shall consider the causes of the disease, as they are chiefly concerned in producing or modifying these states, the morbid effects generally presenting a more or less manifest relation to the causes or concurrence of causes producing them.

25. i. CAUSES OF INFLAMMATIONS OF THE STOMACH.—These are often the same as occasion inflammation of other organs; but there are many causes which most frequently and especially produce one or other of the forms of gastritis.

26. *A.* The predisposing causes of gastritis are more especially such as favour the occurrence of inflammation generally; as depression or exhaustion of organic nervous power, functional disorders of the digestive, assimilating, and excreting organs; alterations of the circulating fluids, especially imperfect depuration of the blood, and vascular plethora; high ranges of temperature, in connexion with a humid or malarious atmosphere; habitual excesses in food and spirituous or vinous liquors; sedentary employments, or occupations which are followed in a stooping position; mental application and the depressing emotions; the suppression of eruptions or accustomed discharges, of periodic losses of blood, or of external painful affections; convalescence from fevers or other acute maladies; sympathy with diseases of other organs or structures; and tight-lacing in females, or close cinctures, &c.

27. *B.* The occasional exciting causes are chiefly those which consist, 1st, of injurious ingesta; 2d, pre-existing disease; and, 3d, mechanical

agents or physical influences.—(a) Excesses in food or drink, beyond the usual quantity of either, or as regards the incongruous nature of the articles; irritating and indigestible food, especially dried, preserved, or long-kept animal substances; various kinds of fish, more particularly shell-fish, in certain idiosyncrasies; a too high or too low temperature of the articles taken into the stomach, especially when taken in large quantities and in predisposed states of the frame, unnatural distention and oppletion of the stomach; the excessive use of any stimulant, particularly alcoholic liquors, tinctures, cordials, &c., of aromatics, spices, rich sauces, highly-seasoned dishes, &c., or of vinous, saccharine, acid, or fermenting beverages; an inappropriate recourse to irritating emetics or purgatives, particularly in large doses, as when the former has been thus given in order to procure the expulsion of narcotic or other poisons; the ingestion of any of the numerous articles comprised in the classes of irritant, acid, and narcotico-irritant poisons (see *art. Poisons*); the use of various resinous, oleaginous, alkaline, or acid medicines in too large or frequent doses, or of various vegetable or other concentrated principles; spoiled, putrid, or rancid, or unwholesome kinds of food, or impure, stagnant, or contaminated water; rancid, fatty, or oleaginous articles; and unripe, acid, or stale vegetables or fruits.

23. (b) Pre-existing disorders or diseases may run on to some form or other of gastritis, either by their increased severity, or by their extension to one or more of the tissues of the stomach. Thus, flatulence and other forms of indigestion, pyrosis, morbid appetite, or rumination may pass into gastritis, either spontaneously, or more commonly after errors of diet or regimen, or after a recourse to injudicious remedial means, or to unwholesome or unsuitable food or drink. Biliary disorders, particularly accumulations of acrid bile in the gall-bladder or ducts, may occasion gastritis, the irruption of the bile into the duodenum, and partially into the stomach, irritating or inflaming both these viscera. Disease or severe injury of distant organs, with which the stomach is most disposed to sympathize, as the brain, kidneys, uterus, skin, &c., may not only predispose, but even excite this viscus to inflammatory action. More frequently, however, the stomach becomes implicated either by continuity of structure or by contiguity of position. Thus inflammation of the œsophagus may extend to the stomach, or both diseases may be coæteaneously induced, as when vomiting has been procured by large quantities of mustard; and of this result I have seen two or three instances. The villous coat of the stomach and small intestines may be affected either more or less extensively, or in a limited extent at first, the inflammation extending afterward more or less in either direction, according to the predisposition and to the nature of the exciting cause. The stomach not infrequently, also, becomes implicated in the course of inflammations of the liver, diaphragm, peritoneum, spleen, gall-bladder, &c., chiefly in consequence of contiguity of position. In these cases inflammatory action of a portion of the peritoneum extends to the opposite part of the peritoneal coat of the stomach, occasioning an exudation of lymph, and adhesion of the opposing surfaces, with more or less disease of this viscus. This succession or extension of inflammation from the surrounding viscera to the stomach is often ob-

served in warm climates, especially among Europeans who have migrated thither.

29. Gastritis may be induced by powerful mental emotions, [as rage, grief, horror, anxiety, vexation, or other moral influences of a perturbing or depressing nature,] or mental shocks; or by the suppression of rheumatism or gout, or of any accustomed discharge; and these diseases may either be a predisposing cause (§ 25), some exciting cause having occasioned the gastric attack; or they may be the only efficient cause which can be detected, the gastritis even occurring without any circumstance which could account for the suppression or retrocession of either of these maladies. Most commonly, however, the stomach is attacked in the course of these, owing to errors of diet or regimen, or to the exhibition of irritating or inappropriate medicines or doses. Gastritis becomes, moreover, a prominent feature or complication of several fevers, especially those which have been denominated bilious by some writers, or gastric, owing to this feature, by others; and which are common in autumn or summer, or in warm climates. These fevers may assume a bilio-gastric character at these seasons, and may be either continued or remittent—the latter chiefly in malarious and warm climates. Indeed, there are few kinds of fever, especially in these seasons and climates, in which the stomach is not more or less prominently affected; and still more particularly in the exanthemata and in pestilential and malignant fevers. (See *arts. FEVERS*, § 387, *et seq.*, and *PESTILENCES*.)

30. (c) Mechanical agents may produce gastritis by having passed into the stomach, or by acting externally. Broken glass, or various sharp or rough substances accidentally or intentionally swallowed, have produced this disease, [also lobelia and other acrid emetic substances]; while blows on the epigastrium and region of the stomach, falls, bruises, &c., and the reaction consequent upon such physical shocks, have been followed by similar results. Atmospheric changes and vicissitudes of temperature, especially when extreme; exposure to cold after the body has been overheated, and even any form of exposure when prolonged, have been considered sufficient to induce what some authors have described as a catarrhal form of gastritis, affecting the villous surface of the organ—various physical influences, as electrical states of the air, &c., being supposed by them to aid the operation of vicissitudes of temperature.

31. ii. DESCRIPTION.—*Gastritis* has been variously considered, in respect of its *seats and varieties*, by different writers. It has been divided into the *phlegmonous* and *erysipelatous* or *erythematic*, by CULLEN, PINEL, GOOD, and J. P. FRANK; by some writers into the *acute* and *chronic*, the phlegmonous being most frequently the former, the erythematic the latter, but to this division there are many objections; and to this correspondence of morbid states there are numerous exceptions. HILDENBRAND admitted three species, namely, the *phlegmonous*, the *catarrhal*, and the *rheumatic*, either of which may be *acute* or *chronic*, these latter characteristics having reference only to severity of attack and period of duration. The catarrhal form of this writer corresponded with the *erysipelatous* of others. BROUSSAIS and ARMSTRONG distinguished two species, *sero-gastritis* and *mucos-gastritis*, assuming the serous and mucous coats of the stomach



to be respectively the seats of the phlegmonous and erythematous forms of the disease.

32. Of the accuracy of these divisions of gastritis very reasonable doubts may be entertained, arising from the phenomena observed during the life of the patient, and from the changes seen after death. The manner in which the disease appears, the state of vital energy at the time of attack, and the causes which have induced it, severally aid in determining the forms in which it may be arranged. If the disease supervene upon inflammation of the liver, or omentum, or peritonæum, it may be reasonably inferred that the serous coat of the stomach is first implicated, although it will be difficult to determine how far the other tissues are affected. Or, if gastritis arise from irritating substances taken into the stomach, from the regurgitation of acrid bile, or in the course of a severe dyspepsia, it is obvious that the villous surface is primarily and chiefly affected, although the other tissues constituting the parietes of the viscus often subsequently become more or less implicated. That inflammation may thus extend from either surface to one or more of the several tissues, of which the parietes of the organ are formed, will be admitted; and that this extension of the inflammation is more frequent than the simultaneous seizure of all the tissues or coats of the viscus, will also be allowed. But it is not improbable that this latter state of the disease may sometimes occur in a most severe or intense form, and when the causes are of an energetic or poisonous kind. In such cases, although the morbid impression may be directly made upon the villous surface, the whole of the tissues may, through the medium of either the connecting cellular tissue or the organic nerves, soon become affected, the villous coat, however, generally displaying the most marked alterations of structure, or the most evident signs of inflammatory action.

33. *Phlegmonous, or acute, or active gastritis*, therefore, is not, as *post-mortem* examinations fully prove, limited to the serous covering of the stomach, although often this coat is the tissue primarily or chiefly affected, as when gastritis supervenes upon, or is complicated with, inflammation of one or other of the adjoining viscera. But in the majority of instances of acute gastritis, occurring primarily or spontaneously, nearly all the coats of the organ are more or less affected, probably in a part only of the parietes, and especially the cellular tissue uniting the coats, and forming the matrix in which they, as well as the nerves and blood-vessels, are imbedded. That all cases of acute gastritis, however, do not commence in this manner, but that many, and these even the most severe, may originate in the villous surface, has been stated above (§ 31). Hence it follows that the *chronic* form of the disease is not the only form which is seated in this surface, and that, although most frequently thus seated and even thus limited, inflammation of the other tissues may also be possessed of this character.

34. Viewing, therefore, the several forms and states of gastritis, with reference to their causes, and to the modifying influences of season, climate, constitution, diathesis, and previous disease, it may be inferred, 1st, that gastritis, either in its commencement or progress, is not necessarily limited to a single tissue or coat of the stomach, although it may originate in one or other, or affect one or two or more of these tis-

sues in a more marked manner than the rest; 2d, that the terms *phlegmonous, adhesive, erythematous, erythematous, catarrhal, &c.*, are not precise as respects the seat and nature of the disease, nor appropriate when we regard the meaning usually attached to these terms; 3d, that *acute* and *chronic* have no reference to the particular tissue of the organ affected, but refer merely to the severity and duration of the disease; that these terms are extremely arbitrary, and that we have no absolute and precise range of activity and chronicity in respect of this disease, more than of any other; for gastritis may affect the more external or the more internal coats of the organ, as well as several or all of them, in every grade of severity and of duration, between the opposite extremes of activity and duration of existence.

35. In the following description of gastritis, I shall consider, 1st, the slighter forms of the disease, especially as they occur in the villous surface of the organ; 2d, the sub-acute or severer states of inflammations, as either supervening on the former, or commencing primarily, and extending to more than one of the tissues of the viscus; 3d, the most severe, malignant, or exasperated attacks of gastritis; 4th, the more prolonged or chronic forms of the disease; 5th, the complicated and consecutive states of gastritis; 6th, the terminations of gastric inflammations, &c. The diagnosis, prognosis, and treatment of the disease will afterward be considered in succession.

36. *A. The milder or slighter form of gastritis* may chiefly be referred to the villous or internal surface of the stomach. It is generally connected with a weak and sensitive state of the nerves of the organ. It is often consequent upon indigestion, especially when this affection is prolonged or improperly treated; and is then, as well as when it occurs primarily, occasioned by errors of diet, by unwholesome articles, by excesses in food or stimulating liquors, or by hot spices or sauces. In this form of gastritis, the patient complains of general uneasiness, referrible chiefly to the stomach, and especially after having taken food; of nausea, flatulence, distention, sense of heat in the organ; of thirst, dryness of the tongue or fauces; of acid, acrid, or rancid eructations, causing a sensation of acidity or an unpleasant irritation in the throat and fauces, and occasionally vomiting, especially after fluids are taken into the stomach. The tongue is red at the point and edges, and often loaded at the root and centre. Chilliness, general malaise, incapability of exertion, heat of the palms of the hands and soles of the feet, a slight acceleration of pulse, and tenderness at the epigastrium on firm pressure, costiveness, lowness of spirits, anorexia, loathing of food, excepting what is relishing or stimulating, and which, when taken, increases the complaint; sometimes vertigo and palpitations are more or less experienced.

37. This mild form of gastritis may occur primarily from the causes mentioned above (§ 25, 26), or consecutively upon indigestion; or in connexion with severe catarrhal or bronchial attacks, with which, especially with catarrhal fever and influenza, it is often a more or less prominent *complication*. It also forms a very marked pathological condition, in connexion with others, during the incubation and development of the exanthematous fevers, especially scarlatina and small-pox; and it is a more or less marked com-

plication or pathological condition in gastric, in gastro-enteric, and bilious fevers, and at the commencement of several other fevers. (See *art. GASTRO-ENTERIC DISEASE*.)

38. In this form it is presumed that the villous or mucous membrane of the stomach is only affected, and that this tissue is merely in a state of irritation or hyperæmia, and either partially or to a greater or less extent as respects this surface of the organ. It is often relieved or entirely removed in the course of a few days by abstinence, or the use merely of emollient articles of food taken in small quantities; but it is often also of much longer duration, either becoming *chronic* or passing on to more serious disease—to either a sub-acute or an acute form of gastritis, or to very dangerous organic change. These results most commonly follow, more or less slowly or insidiously, although sometimes rapidly upon injudicious treatment—upon the use of stimulants and tonics, or upon habitual excesses in food and intoxicating beverages. In many cases, the disease continues for months without much increase; in others, the inflammatory action becomes more general over the villous surface, or extends more deeply in the parietes of the organ. The morbid irritation may, moreover, become concentrated in the mucous follicles, and after an indefinite, but generally a protracted period, may lead to ulceration, and even to perforation of the viscus. In young subjects, especially those who are imperfectly nourished and respire an unhealthy atmosphere, the form of inflammation, existing in an asthenic state, may induce softening of the villous and sub-cellular tissues, with either thickening or even thinning of the coats of the organ.

39. Attacks of mild gastritis, in varying grades of severity, are frequent in persons subject to dyspepsia, or who are guilty of excesses in eating and drinking; and they often subside or disappear spontaneously, shortly after the causes are no longer in operation, the secretions and exhalations from the villous surface and follicles of the organ favouring the occurrence of resolution of the inflammatory condition. Hence abstinence or a moderate abstemiousness is the best mode of cure, unless medicines be prescribed with much caution, and be carefully suited to the morbid conditions, which are generally not merely inflammatory irritation or hyperæmia of the villous coat and follicles, but also weakened or exhausted energy of the ganglial nerves actuating the organ. As respects either state, it is better that it should be allowed to recover itself, through the influence of vital resistance, than that it should be perpetuated by irritants or otherwise inappropriate means.

40. *B. Sub-acute gastritis* is generally limited to the villous surface, or probably is extended in parts to the sub-villous cellular tissue. It generally results from the same causes as have been already noticed (§ 25, 26), and may be present as a prominent affection or complication of the same exanthematous and febrile maladies (§ 23), and in the advanced stages of tubercular consumption. It may occur primarily, although not frequently; or it may follow the milder form of gastritis, owing to errors of diet or regimen, or inappropriate treatment. \* It sometimes is consequent upon, or is associated with œsophagitis, or pharyngitis, or both; and not infrequently it is accompanied with inflammatory irritation or action in the duodenum and small intestines (see

*art. GASTRO-ENTERIC DISEASE*). It is in most respects, as regards its causes, associations, symptoms, and terminations, similar to the mild form already described, the difference being only in the greater severity of the symptoms characterizing this.

41. In sub-acute gastritis there are pain, or sense of heat at the epigastrium, frequent retchings and vomitings, especially after substances, in any considerable quantity, are taken into the stomach, and the matters brought off the stomach are generally ropy, colourless, and abundant, or coloured by bile of a yellowish or greenish hue. Chilliness or slight shiverings often precede and attend the pain and vomitings, with a sense of anxiety at the præcordia, and tenderness, fulness, or distention at the epigastrium, depression of spirits and of strength, a dark or sallow circle around the eyes, a loaded tongue, the point and edges being red or indented by the teeth, or the surface more generally red, and the papillæ elevated, with great thirst and desire of cold fluids. The bowels are costive; and the urine is scanty, high-coloured, and generally presents an acid reaction. The pulse is frequent, soft or broad, open or compressible; the skin dry and feverish. The breathing is frequent and shallow, and the patient either sits up for a time or lies on his back in bed. All kinds of food, especially animal food, are loathed; or, when tasted, excite nausea or vomiting, which generally also follows warm drinks, especially tea.

42. This form of gastritis is often *complicated* with inflammation of adjoining portions of the digestive villous surface; but it also sometimes occurs *primarily*, and in an uncomplicated form, especially in young subjects, after debauches, or the excessive ingestion of spirituous or vinous beverages; or after copious draughts of cold fluids when the body is perspiring, or even in other states of the frame. It generally subsides when a suitable abstemiousness or abstinence is enforced, or when otherwise judiciously treated. But it may lapse into a more *mild*, but often a more *chronic* state; and even go on to a more severe, or a disorganizing form, ultimately *terminating* in some one or other of the structural lesions, which will be described hereafter. When associated with inflammatory irritations of the intestinal villous surface, the bowels are more or less relaxed, the febrile symptoms sometimes more marked and attended by frontal headache, and by pains in the back and limbs (see *GASTRO-ENTERIC DISEASE*). Sub-acute, as well as mild gastritis, although it may affect the coats of the organ to some depth, and in parts only, very seldom proceeds so far as to implicate the serous surface, unless the mucous follicles have become ulcerated, and the ulceration has reached the peritoneal membrane. In this case, the sub-acute state of disease has generally degenerated into the chronic before this advanced lesion has taken place.

43. *C. Acute or severe gastritis* occurs, 1st, primarily or directly from its occasional causes; 2d, consecutively upon the milder forms of the disease already noticed, owing to the persistence of the causes or to improper treatment; and, 3d, from the extension of inflammation from adjoining viscera. It may present various grades of severity or violence, owing to the greater or less extension or intensity of the morbid action, and virulence of the exciting cause, relatively to the



state of constitutional power; and, in any of these grades, it may be a prominent affection in the course of the more malignant forms of the exanthemata, of fevers and pestilences. Acute gastritis is rare as an idiopathic malady, and unassociated with inflammation of any other organ, unless when it is produced by poisons, or by substances which, from their quantity or condition, act as poisons, as the ingurgitation of spirits, or of very cold or very hot fluids, &c. M. ANDRAL records a case in which fatal gastritis followed a severe mental shock, the stomach alone presenting the results of inflammatory action.

44. (a) When gastritis is produced by *irritant poisons* (see art. POISONS, § 109, *et seq.*), the local symptoms are instantly developed, and when the poisons are of an acrid or corroding nature, they assume the most intense features. The pain at the epigastrium is most violent, burning, pungent, or lacerating; often extends from the pit of the stomach to the spine, or to both hypochondria, and is attended by extreme anxiety, mental and physical depression; by constant retchings, the matters ejected varying with the contents of the stomach at the time of ingestion of the cause, and with the nature of the cause (see POISON, § 54). The retchings aggravate the sufferings, and return on each occasion when the irrepressible thirst impels the patient to drink. The breathing is shallow, and increases the pain; the supine position, with the knees drawn up, or a semi-recumbent posture, being generally assumed. The slightest pressure increases the patient's sufferings. The vomitings are most painful, and, after the contents of the stomach are thrown off, consist chiefly of the fluids last taken, sometimes coloured by bile, and containing a little mucus, or glairy matter streaked with blood. With the intensity of the symptoms, the prostration of the patient increases, and the features are more sunk, and expressive of greater anxiety. The epigastrium and hypochondria are generally tumid or tense, and the temperature of these regions is much augmented. The skin is hot, dry, and harsh at an early period, and the cheeks sometimes flushed, while a dark circle surrounds the eye, and sometimes also the mouth, the countenance being expressive of extreme anguish; and distressing anxiety is referred to the præcordium and epigastrium. The tongue is either red throughout, or only at the point and edges, the middle and base being covered by a thick fur. The pulse is frequent, and at first constricted or small. The urine is scanty and high-coloured. The bowels are costive; but when the cause, especially when it consists of some poisonous substance, has passed the pylorus, and inflamed the intestinal mucous surface also, diarrhœa and purging may accompany the retchings and vomitings.

45. As the disease proceeds the symptoms assume a worse character; and, according to the intensity of the cause, especially when this is of an acrid or corrosive nature, the progress of the disease is rapid, and its duration short; a fatal termination sometimes taking place in a few hours, although most frequently not until the second, third, or fourth day, unless in the most violent cases. When the disease proceeds thus unfavourably, the pulse becomes rapid, very small and thready, sometimes irregular, intermittent, or slow. The extremities are clammy or cold, while the trunk is still hot and even dry. The features are sunk or pinched, pallid or sallow. The thirst

and burning heat in the region of the stomach continue, and the pain is attended and aggravated by frequent stultulent eructations, or by hiccough accompanied by eructation, and at intervals, or soon after fluids are taken, by vomiting without much effort, or without retching, the matters thrown off being as if eructated from the stomach. During the disease the desire of cold fluids, or of iced water, continues; and ultimately, after hiccough has been present for a short time, the pain is diminished, or ultimately ceases; but the features, pulse, and temperature sink more and more. The extremities and surface become more clammy and cold, and the pulse disappears. Death rapidly follows, the mental faculties being unaffected, or continuing without manifest impairment until the last, unless the cause of the attack has been of such a nature as not only to inflame the stomach, but also to disorder the nervous and mental manifestations. When the disease and the operation of its cause are limited to the stomach, or to this viscus and adjoining portions of the digestive canal, death is the result of the extent of lesion or disorganization, being such as exhaust or depress organic nervous and vital power to such a degree as is incompatible with the continuance of the heart's action; the intimate connexion of the affected viscus with the centres of organic nervous power rendering all severe affections of the former most depressing to the latter, and ultimately annihilating its manifestations when they reach a certain grade.

46. When acute gastritis is produced by less intense causes, or when it is consequent upon inflammation of the liver, or of some other part, the serous membrane becoming implicated, the history of the disease is modified from the foregoing, gastric symptoms supervening, with more or less severity, upon those characterizing the primary malady. The consecutive gastritis thus developed, although often both acute and severe, is seldom so intense as the form now described; and a fatal termination, which is very frequently the result, is generally longer delayed than when gastritis is produced by the more intense causes, especially by acrid or irritant ingesta. When the disease extends to the serous membrane from adjoining parts, a portion only of this membrane is at first attacked, although the inflammation may soon be much farther extended. Whereas, when a deleterious substance is taken into the stomach, the injurious effect is more widely extended, and more intense, unless this substance be in great measure intercepted by the contents of the viscus, and thrown off with these contents by vomiting (see art. POISONS, § 51, *et seq.*). When acute gastritis is consecutive of inflammation of adjoining parts, and is not arrested or relieved by treatment, it presents more or less of the characters described above (§ 44, 46), generally in a somewhat less intense and less rapid form, death, however, often occurring in the course of a few days, or sometimes being delayed to two or three weeks. In some cases the disease may lapse into a subacute, or even chronic form, and be prolonged to some indefinite period.

47. Acute gastritis may supervene upon either the mild or the sub-acute form; or gastritis in a slight and chronic state may have long existed, and ultimately an acute attack may be developed, owing to the operation of one or more of the causes already enumerated. In some cases, a judicious treatment may reduce the acute attack to

the state which preceded it, but more frequently the severe symptoms depress and ultimately exhaust the patient. Primary acute gastritis, when early or judiciously treated, or even when treated in such a manner as may not interfere with the salutary changes brought about by the efforts of nature and by vital resistance, terminates favourably in many cases, a cooling and soothing treatment, with abstinence, bringing about resolution. But not infrequently the disease either proceeds in the manner above described (§ 45, 46), or in a less intense or rapid form, to dissolution; or it is so far ameliorated as to assume a sub-acute or a mild form. In either of these latter cases, it may be farther relieved or altogether removed, or it may continue in a chronic state.

48. *D. Chronic gastritis* is most frequently either the mild or sub-acute state of gastritis rendered obstinate, or prolonged by neglect, or errors of diet or regimen, or by injudicious treatment; it more easily follows an acute attack. In whatever form gastritis occurs—whether mild, sub-acute, or acute—if the cause which produced it be removed, and judicious means be used, the natural secretions of the viscus, by their free and abundant exudation, favour the occurrence of resolution. But if food or drink of an exciting, heating, or irritating kind be administered, inflammatory action is increased or perpetuated, and continues in some one of various grades, and attended by diversified symptoms for a very indefinite period. In its course, moreover, farther disorder or disease is developed, or pre-existing disorder is aggravated, and various complications arise.

49. The symptoms referrible to the stomach are often an aggravation of those characteristic of indigestion, or similar to those of the milder forms of gastritis. More or less pain is felt, is generally aggravated by food, or by much fluid, and is attended by heartburn, a sense of distention, and by tenderness on pressure. Anorexia and nausea are present, and occasionally vomiting occurs, the matters consisting of such as have been more recently taken, or of a glairy fluid with mucus. Instead of pain, a sense of gnawing, of craving, or of sinking is sometimes experienced; and either of these may be accompanied with flatulent or acrid eructations, with fulness or tension at the epigastrium, or with a feeling of distention or of heat, and general discomfort. The appetite is either altogether lost, or it is craving, gnawing, and morbid, articles which are most inappropriate being desired. These articles generally aggravate the pain, or occasion vomiting, and increase the thirst, which is generally present. A foul, or loaded, or furred tongue, the point and edges being red, or indented by the teeth; an unpleasant taste in the mouth, or a vitiated taste; heartburn, or a sense of acidity of the stomach, with frequent acrid, acid, fetid, or rancid eructations; costiveness, or an irregular state of the bowels, the stools being often deficient in bile, or of a very dark bilious appearance, and offensive, are generally experienced. The urine is either scanty, clear, and high-coloured, or paler, turbid, or phosphatic. Chilliness and feverishness, frequently with frontal headache; a dry, harsh, or scaly state of the skin; general malaise, want of physical power, and defective mental energy and application, are commonly complained of.

50. With the continuance of the complaint,

numerous sympathetic feelings and disorders are manifested. The several senses are often slightly affected. The mind is always engaged with the bodily feelings, which become exacerbated, or are exaggerated by the constant attention directed to them, the disorder often approaching the character of hypochondriasis, or even passing into this complaint. The temper is irritable and uncertain. In many cases, the pharynx and fauces present a similar state of chronic irritation, with congestion or inflammation, as may be presumed to be present in the stomach, and the irritation sometimes extends to the epiglottis or larynx, and is perpetuated by the acrid eructations which occur. In these cases, a dry stomachic cough is complained of, a fit of which sometimes is followed by retching or even vomiting. Palpitations, with increased frequency or irregularity of the pulse, are often experienced. Occasionally the tongue presents patches, as if deprived of its epithelium in parts. It is generally loaded or furred at its base, and the follicles swollen. Sometimes the surface is red, smooth, and shining throughout, or it is variously fissured. The gums are swollen or spongy, and fall or recede from the teeth. According to the severity and duration of the disease, numerous other sympathetic affections are developed, continue for a time, and disappear, or become permanent. The disease thus proceeds for an indefinite time, and is either ultimately relieved or removed, or it exhausts and emaciates the patient, and superinduces organic lesions of the stomach, especially at the cardia or pylorus, or disease of the liver, lungs, pancreas, or kidneys, the complication often terminating life.

51. ii. APPEARANCES ON DISSECTION.—The changes produced by the milder forms of gastritis—by the mild and sub-acute—are rarely observed, unless when they occur at an advanced stage of some chronic disease, as tubercular consumption, hectic fever, &c. These changes, as well as those which are produced by acute gastritis, have been very fully described when treating of the morbid anatomy of the alimentary canal (see *art. DIGESTIVE CANAL*, § 21, *et seq.*) and of the effects of Poisons, under which head the alterations produced by the several corrosive, irritating, and other poisons in the stomach are circumstantially detailed. In the more sub-acute and chronic states of gastritis, especially as observed in drunkards, or in persons addicted to excesses in eating, are chiefly a dark, reddish-brown, or slate-gray, or blackish-blue discoloration of the villous membrane, thickening, increased condensation, or induration of this membrane—a hypertrophy, presenting itself in various grades (see *art. DIGESTIVE CANAL*, § 27, *et seq.*). The pyloric portion of the stomach is generally the chief seat of the more chronic inflammation of the stomach, the sub-mucous cellular tissue and the muscular coat participating in the hypertrophy in various degrees, the parietes of the viscus chiefly in and near this portion presenting increased thickness and hardness. In some of these cases, the stomach contains, or presents on its internal surface a grayish or colourless glairy mucous secretion in considerable quantity. In cases of acute gastritis complicating exanthematic fevers, or caused by some kinds of poisons, flocculent exudations, or even partial formations of false membrane, are sometimes found on the mucous surface.

52. Idiopathic inflammation of the internal



coats of the stomach, involving chiefly the sub-mucous and connecting cellular tissue, and terminating in suppuration, is very seldom observed. Inflammations thus seated and thus terminating are oftener met with consecutively or associated with some other malady. In these cases, the parietes of the stomach are thickened, owing to the sub-mucous tissue being distended with pus, this tissue being softened and friable. The mucous membrane itself is generally injected and red. In some parts this membrane is perforated by numerous irregular cribriform openings, through which the pus escapes into the cavity of the stomach. The various organic lesions of the stomach consequent upon gastritis, or upon constitutional or other causes, are fully described under the head DIGESTIVE CANAL (§ 18, *et seq.*), and, as respects their symptoms and treatment, are considered in the sequel.\*

53. iii. DIAGNOSIS OF GASTRITIS.—*Peritonitis*, especially when circumscribed or limited to the viscera or regions of the upper part of the abdomen, may be mistaken for gastritis, as the prostration, pain, vomitings, retchings, &c., may be as great in the one as in the other. But the situation of the pain, the great tenderness, especially at the epigastrium, the sense of burning there, the character of the thirst, and desire of cold or iced fluids; the mucous and glairy, or ropy matters vomited, sometimes streaked with blood; the appearance of the tongue, and the not infrequent recognition of the exciting cause, generally indicate the nature of the malady. When gastritis is consequent upon hepatitis, or splenitis, or omentitis, or diaphragmitis, as sometimes observed, especially upon the first of these, the diagnosis may be more difficult. But the history of the case, and the appearance of severe gastritic symptoms during the course of hepatic disease, or of the other inflammations, will indicate this extension of the morbid action. When more general peritonitis is present, the diagnosis is more manifest; inasmuch as the painful symptoms extend much lower; while in gastritis they ascend to the base of the thorax, and are generally attended by

a greater amount of anxiety, extending frequently to the præcordia. When inflammation affects the opposing peritoneal surfaces of the stomach and liver, as not infrequently found after death, especially in warm climates, the symptoms are often equivocal in respect of either organ. The complication may, however, be inferred from the characters of the early symptoms, and of those more recently developed.

54. The diagnosis of the milder and more chronic states of gastritis is much more difficult than that of the acute. The not infrequent temporary relief of pain and other symptoms of the former, by stimulants and carminatives, frequently suggests the existence merely of indigestion or morbid sensibility of the organ, whereas a mild or chronic state of inflammation of the mucous surface may exist nevertheless. But when pain is present in the region of the stomach, and is increased by pressure, or by food, and by warm fluids; when vomiting of a ropy and abundant mucus takes place; and when the throat, fauces, and gums are red or inflamed, this form of gastritis may be truly inferred. The aggravation of pain, or the production of vomiting, by warm tea, or other warm fluids; a dry and scaly state of the skin; the presence of papular or other eruptions on the skin; the relief following the use of cooling fluids, and an abstemious or low diet; the spongy or inflamed gums; the red papillated, aphthous, or fissured states of the tongue; or a dry, red, or smooth and shining appearance of this organ; and heat in the palms of the hands, or soles of the feet, are severally indications of mild or chronic gastritis, especially when observed in connexion with slight febrile symptoms, and an alteration in the secretions and excretions.\*

\* [Prof. N. CHAPMAN remarks, that "the signs hitherto considered as most characteristic of *gastritis*, nausea and vomiting, a sense of heat and burning in the organ, with intense thirst, tenderness of the epigastrium on pressure, and a florid tongue, are equivocal or fallacious, and the latter two especially. Examples of actual phlogosis occur, in which no tenderness can be detected, this oftener, though not always, happening where there is extreme obesity, the stomach being so protected by a cushion of adipose matter over it, that the effects of pressure, or even punching, do not reach it. Conversely, such is the sensibility of some attenuated persons, that they will flinch, and complain of pain in a perfectly healthy condition of the organ. Some of the highest of the French authorities seem to attach scarcely any importance to the indications from the tongue. By ANDRAL we are told that no constant relation can be established between its appearances and the states of the stomach; that the one is often entirely natural, when the other is greatly diseased, and, contrarily, it may manifest every aberration in the soundest ventricular condition. No doubt such is the fact, having seen proof of it, and especially in relation to a scalded-like appearance of the tongue. But here it may be remarked, that this appearance is uniformly preceded by much gastric distress, nausea or vomiting, with a sense of burning heat in the stomach, all which is relieved on occurrence of the affection of the tongue; and hence it may be inferred that the phenomenon is owing to metastasis of the irritation of one to the other organ. Nor is it improbable that this explanation is of more general application in cases of the kind. Certainly I have seen gastric disturbances of every variety, where mitigation or entire relief was afforded from the assumption of the primary irritation by the tongue, the mouth, the throat, or even the face. These parts, on such occasions, perform the office which is more commonly done by the general tegumentary tissue, in the form of a wide-spread eruption. LOUIS, however, affirms that, whatever may be the state of the tongue, it has no concern with the disorders of the stomach, it exhibiting the same appearance in the most opposite conditions of the viscus, in the healthy and depraved; and, indeed, declares, that in those instances where the 'mucous membrane presented the greatest suffering, the tongue was unaffected.' Granting this fact, which is not improbable, the explanation of it is to be sought in the circumstance of the continued conceal-

\* [Prof. W. E. HORNER, in his able article, "Inquiries into the healthy and diseased Appearances of the Mucous Membrane of the Stomach and Intestines" (*Am. Journ. Medical Sci.*, vol. i., 1838), showed very clearly that an acute inflammation of the stomach may persist many days, and even terminate fatally, and yet present no very striking redness of the internal membrane, and, consequently, that it is impossible to estimate the state of irritation of an organ during life solely by the quantity of blood left in it after death. Dying seems to have the effect of concentrating more and more towards the heart the vital powers and the fluids, or, in other words, withdrawing them from the circumference to the centre. "In speaking with Dr. PRYSEK," says Prof. H. (*loc. cit.*), "on affections of the stomach, he told me that his experience led him to think that the highest grades of its irritation were attended neither by pain nor vomiting. The state of inflammation is so exalted, that its effects approximate those of the most deleterious poisons, which cause sudden death, without local pain, fever, or any very sensible derangement of the functions, except mere weakness and a sense of illness," and cases are given in illustration of this. We have observed instances of this kind, especially where a large dose of some powerful irritant had been swallowed, but such cases are rare. It is very true, as Prof. H. states, that the traces of acute inflammation are, in many cases, very fugitive, and entirely disappear upon death, because, the local irritation which attracted the blood and accumulated it having ceased, the blood abandons that part, and retires towards the centre of the circulation. We can seldom tell by the appearances, 24 hours after death, the quantity of blood which has penetrated an inflamed membrane, as the cellular and mucous membranes, peritonæum, &c. "The eruption of measles and the redness of sore throat disappear on the death of the patient."] ]

55. iv. The PROGNOSIS in the milder forms of gastritis, and even in the chronic states, before serious complications have been developed, is generally more or less favourable, provided that a judicious treatment, especially in respect of diet, regimen, and air, be adopted and persevered in. When, however, organic disease of some vital or important organ has either preceded or been developed in the course of these states of gastritis, a very unfavourable issue may be anticipated, or may be near at hand; mild, sub-acute, or chronic gastritis, or gastro-enteritis, or even gastro-æso-phagitis, with troublesome irritation of the pharynx or fauces, very commonly characterizing the far-advanced stage of hectic and organic visceral diseases.

56. In acute gastritis, the prognosis depends much upon the exciting cause. When this is of a very corrosive or acrid nature; when it has not been entirely removed from the stomach, and when this viscus was empty when it was taken; when the injurious matter is not only acrid or irritant, but also depressing to the organic nervous energy, a very unfavourable issue may be expected, even at an early period of the disease. If, however, the cause be altogether removed, and a diminution of the sufferings or of the vomiting be remarked; and if appropriate means be retained on the stomach—if the painful symptoms abate, and none of the most dangerous appear—if the matters vomited be neither streaked with blood nor sanious—if neither singultus nor cold perspirations be present—if the anxiety, distress, and restlessness be relieved—if the character of the pulse, respiration, and of the sympathetic disturbance improve; and if the disease be primary or uncomplicated, a favourable issue may reasonably be expected, if no error in diet or regimen be committed, so as to increase or to rekindle the inflammatory action. When acute gastritis appears in the course of exanthematous or other fevers; or when it is consecutive of hepatitis, or of inflammation of one or other of the adjoining viscera, the prognosis should be extremely guarded, for the extension and complication of disease may be attended by great danger, although the symptoms may not appear very severe. In these cases especially, the extent and exact seat of lesion are not easily determined, the degree of prostration, the character of the pulse, the state of the abdominal surface and of the extremities, the anxiety and appearance of the countenance, the position of the patient, and the nature of the retchings and matters vomited, severally guiding the prognosis.

57. v. TREATMENT.—The treatment of the several forms of gastritis should be conducted with the same intentions for each; namely, 1st, to remove the exciting cause; 2d, to subdue the inflammatory action produced; 3d, to avoid whatever may irritate or excite the stomach by its properties, or the quantity taken; and, 4th, to restore the healthy functions of the organ.—A. *The milder forms of gastritis* are generally caused by errors of regimen, especially in respect of food

tration of the irritation in the stomach, no part of it having escaped to the tongue. But PIERCY asserts, that 'in numerous instances of pure gastritis the tongue continues pale.' While I admit, generally, that the indications of the tongue have heretofore been too implicitly relied upon as criteria of gastric disturbance, I am not prepared to go to the extent of coinciding in the decision of the writers whom I have quoted."—*Lectures on the more important Diseases of the Thoracic and Abdominal Viscera.* Philadelphia, 1844.]

and drink, and in many cases they require merely abstinence, or a mild, farinaceous, and abstemious diet for their removal. But in some constitutions, and in others where abstemiousness is not observed, the complaint, although mild at first, becomes either chronic or exasperated, and, in addition to a strict regimen, various other means are required. These means should be suited to the age, constitution, and power of the patient, and the severity of the disease. Generally, the application of leeches over the epigastrium, followed by rubefacients, especially the ter-ebinthinate embrocation, and the administration of emollients, with refrigerants, &c., are sufficient to remove the milder states of disorder. Small doses of the nitrate of potass, given in the *mistura amygdalæ*, with hydrocyanic acid, are usually of service. The bowels should be kept freely open by means of cathartic enemata. A moderate dose of calomel may be given at bed-time, early in the disease, especially when the functions of the liver are impaired; and its operation may be increased by about twenty or thirty grains of calcined magnesia in the morning, followed by a glass of lemonade immediately after the magnesia is taken; or a drachm of citrate of magnesia may be prescribed in any mild vehicle. Even when retching or vomiting is present, the above means usually afford relief in a short time, especially when the *third* indication is duly enforced and abstinence is observed, the mildest farinaceous articles only being taken in small quantity.

58. B. In the more *acute* or *severe* cases of gastritis, the removal of the exciting cause should be instantly attempted; and if this be of a poisonous nature, the means advised for this purpose in the article Poisons ought to be employed. Vascular depletion should be promptly ordered, the amount being regulated by the age and strength of the patient, by the state of the pulse, and more especially by the nature of the exciting cause. In most acute cases, and at an early period, one general *blood-letting*, which may be followed by the application of leeches to the epigastrium, or by a repetition of the local bleeding, and by a blister, or a rubefacient embrocation or epithem, is requisite. In some cases, especially when the disease is not occasioned by poison, a full dose of calomel, at an early period, is of much service, and tends remarkably, especially when given with magnesia in the form of powder, to allay the irritability of the stomach; but medicines should be sparingly given by the mouth, those already mentioned (§ 57) being the most appropriate. When the vomiting is urgent, and the sense of heat at the stomach great, the nitrate of potash may be given, as above combined, more frequently, and two or three drops *tinctura opii* may be added to each dose. But the quantity of the vehicle should be small and emollient or mucilaginous, and effervescing mixtures or large draughts avoided. Small morsels of ice, [frequently swallowed,] and the citrate of ammonia, or of soda, or of magnesia, in weak solution and in small quantity, are generally beneficial, the latter especially when the bowels are not sufficiently open.

59. At an advanced stage of acute gastritis, when vomiting is almost constant and without much effort, or when blood is brought up with other matters, or when the pulse is sinking or irregular, it becomes a question what means should be adopted, or whether any can be of service. In



these almost hopeless circumstances, where fatal disorganization of the stomach is expected, I have sometimes prescribed the spirits of turpentine by the mouth, in small and repeated doses, in the form of an electuary with aromatics (see *art. SPLEEN*, § 69), and a turpentine epithem to be applied at the same time over the epigastrium and abdomen. In many instances, such doses of tinctura opii as the peculiarities of the case may suggest, and very small doses of creasote, may be added to the electuary. (*See Author on the Use of Terebinthinate Remedies in Disease, in Lond. Medical and Physical Journal for 1821.*) In several instances, when this treatment has been prescribed in these circumstances, the vomiting has ceased almost immediately, and the patient has ultimately recovered.\*

60. *C. The chronic states of gastritis* require means which their antecedents and causes chiefly should suggest. In some cases, especially when indications of exacerbation from errors in regimen present themselves, leeches applied on the epigastrium are necessary, and the repetition of them, after various intervals, should not be overlooked. Generally, a few leeches, and a frequent repetition of them, are more beneficial than a great number applied at one time. After these, warm embrocations, rubefacient plasters, [croton oil,] or even blisters, are of service. But in most of the chronic states of the disease, whether simple or complicated, diet and regimen should receive the strictest attention. In some instances, the mild preparations of mercury, suitably combined with gentle laxatives or aperients, are of great service, and when the liver is torpid, they can hardly be dispensed with. When chronic gastritis is complicated with enlargement of the liver, calomel, or other mild mercurials, conjoined or alternated with purgatives, [or, rather, mild laxatives,] and aided by the deobstruents advised for this state of the liver (see *LIVER*, § 245, *et seq.*), should not be omitted.

61. *D.* In most cases, when *pain or spasm* is referred to the stomach in the course of this state of disease, hydrocyanic acid, in mucilaginous or emollient mixtures, or with a weak solution of any of the alkaline carbonates, or with lime-water and milk, is generally productive of benefit. In these cases, also, the nitrate of bismuth, or the oxyde or nitrate of silver, combined with very small doses of ipecacuanha (from the sixth to the quarter of a grain), and opium or henbane, is of great service. The oxyde or the sulphate of zinc, in small doses, is also very beneficial, when combined with anodynes. Dr. Wood remarks, respecting the nitrate of silver, that from a quarter of a grain to a grain is often administered two or three times a day with advantage. Cures in most obstinate cases have been obtained from this substance. It has appeared to be most serviceable in those cases which are attended by vomiting, and in which the tongue is smooth and glossy, as if deprived of the papillary structure. I have, for many years, been in the habit of prescribing the nitrate intimately triturated with narcotics in these cases, and in the chronic states of gastritis complicated with palpitation, or with irritation of the intestinal mucous membrane.

62. When convalescence commences and advances, the mild vegetable tonics, especially the

infusion of columba or of chireita : subsequently the chalybeate preparations ; and the diet, regimen, and mineral springs, or artificial mineral waters, advised when treating of INDIGESTION and HYPOCHONDRIASIS, should be resorted to, according to the circumstances of each case. In most instances, travelling, change of air and of scene, gentle but agreeable mental occupation, relaxation from the anxieties and mental tension of continued application to business, moderate exercise in the open air, and diversion of the mind from such feelings and slight dyspeptic disorders as generally attend convalescence from gastritis, are generally most beneficial, and always requisite for a very considerable period after inflammatory affections of the stomach.

### III. ORGANIC LESIONS OF THE STOMACH.— CLASSIF.—IV. CLASS, I. ORDER (*Author in Preface*).

63. *Alterations of structure* seated in the stomach are frequently the consequences of inflammation ; but they may, in other cases, result from chronic irritation, and, in different circumstances, from vital depression, or from constitutional taint. Cancerous lesions proceed chiefly from this last cause, aided probably, or at least in some instances, by prolonged irritation, or by impaired vital power. Organic lesions of the stomach may thus be viewed as the more or less remote results of *Indigestion, of Hypochondriasis, of Morbid Appetite, of Pyrosis, and of the Nervous, Spasmodic and Inflammatory affections* now passed in review. Consequently, the *CAUSES* of these organic changes are those which are productive of the primary affections from which they spring.

64. The *Stomach* is liable in a very marked, and in a very special manner, to all the lesions which I have fully described when treating of the *structural alterations* of the *DIGESTIVE CANAL*. To that article I must refer the reader for a general description of the lesions implicating the stomach ; but some of those are so frequently seated in this viscus, or in its cardiac and pyloric orifices, and occasion special forms of suffering, as to require particular consideration at this place. Of these lesions the most important are, *ulceration and perforation, softening and disorganization, thickening, scirrhus degeneration, and carcinoma, of the parietes or of the orifices of the stomach*.

65. i. *ULCERATION AND PERFORATION OF THE STOMACH.*—*A.* Ulceration is very rarely an acute disease when seated in the stomach, and it is generally single, or very seldom consisting of more than one, unless when seated in the follicles. The *form* of the ulcer is usually round or oval, but it is sometimes irregular, rarely linear. It may exist in any part of the viscus. Its *margin* is either grayish, pale red, or of a deep brown, and of natural thickness and consistence, or softer, thinner, harder, or thicker than natural. In some cases, the surrounding sub-villous tissue is thickened and indurated. The *bottom* of the ulcer consists of different tissues, according to the depth the ulceration may have penetrated. In some instances, it is so slight as to appear as an abrasion ; more frequently, however, the villous coat is penetrated, and in some the sub-mucous, the muscular, and even the peritoneal coats, are successively penetrated. When this last tunic is reached, as well as previously to this stage, various appearances and changes are developed which are fully described under the head

\* [We have derived very great advantage from minute doses of creasote in these cases. The oil of copaiba is also often useful.]

**DIGESTIVE CANAL** (§ 37, *et seq.*). The ulceration may thus proceed to perforation, without or with adhesion of the opposite surfaces of the peritoneum, around the seat of perforation. In anæmied or cachectic persons, and not infrequently in chlorotic or anæmied females, adhesions are not often formed, and the ulceration proceeds, without manifest signs of inflammation or increased vascularity, and the coats are corroded, as in phagedenic ulceration, until the peritoneal lining is either softened, or ruptured from distention of the stomach, or during an attack of vomiting following a meal, and a portion of the contents of the viscus passes into the peritoneal cavity, causing peritonitis and death in a short time. The ulcer in many of the cases presents the appearance as if the ulcerated portion were punched or stamped out of the gastric parietes, the margins often presenting no farther changes than slight discoloration or injection, sometimes with thickening of the cellular tissue.

66. The ulceration may be *cicatrizied*, as shown in the article just now referred to (§ 39), or it may proceed onward, after adhesions have been formed between the opposite portions of the peritoneal membrane, and thus the ulceration may proceed not only to perforation of the stomach, but also to perforation of a contiguous portion of the digestive canal, as the colon, or to more or less ulceration or perforation of another organ. In a female under my care during two or three years for severe dyspepsia, with recurring attacks of chronic gastritis, attended by vomiting, the paroxysm of vomiting being ultimately accompanied with discharges of blood, and the patient having been carried off by a violent attack of hæmatemesis, a large and deep ulceration was found in the stomach, which passed far into the substance of the liver, the peritoneal surfaces being firmly agglutinated around the perforation, and several of the vessels of the liver eroded. Where the bottom of the ulcer thus becomes agglutinated to an adjoining viscus, the contents of the stomach are thereby prevented from passing into the peritoneal cavity.

67. Of the various modes in which ulceration may take place, and of the consequences of this lesion, I cannot add anything to what I have minutely stated elsewhere (see **DIGESTIVE CANAL**, § 37-44). I may, however, briefly remark, that, although usually commencing in the villous surface, ulceration and perforation may originate in a different situation, and proceed in an opposite direction, as when an abscess in the liver or in the spleen opens into the stomach, by the adhesions and perforations produced by the purulent collection. But there is even a *third* mode, not hitherto described, in which atheromatous or fatty deposits in the coats of an artery favour rupture of, or exudation of blood from, the diseased portion of vessel, whereby the villous coat is perforated or torn, and hæmorrhage into the stomach takes place. In rare cases, the hæmorrhage ceases, but the part from which it proceeded becomes the seat of ulceration, which may advance more or less, or even terminate in perforation. Ulceration and perforation of the stomach thus presents the following varieties: 1st. Erosion of the mucous membrane only, consequent upon chronic gastritis. 2d. Small ulcers, with *rec* margins, more or less numerous, and scattered over an uninfamed surface, resulting from irritation or inflammation of follicles. 3d.

Much larger ulcers, penetrating the muscular, or even the peritoneal coat, and often having the surface or substance of an adjoining viscus, as the liver, for their bottoms, or perforating a different portion of the canal, adhesions having formed around the ulcers: these are commonly single, oval or round, are most frequently seated in the small curvature, or near the pylorus, and present no cancerous characters. 4th. Ulcers with ragged and inflamed margins, caused by corrosive poisons, and seldom penetrating the parietes of the stomach. 5th. Ulceration and perforation from without inward, generally caused by an abscess of the liver opening into the stomach, adhesions of the peritoneum having formed around the ulcerated portion. 6th. One or more small ulcers, caused by atheromatous or fatty changes in the coats of the vessels, and by rupture of the villous membrane. 7th. Gelatiniform softening of the coats of the viscus. And, 8th. Carcinomatous ulceration, &c. (§ 77, *et seq.*).

68. *B.* The *symptoms* of ulceration of the stomach are very equivocal. Several cases of this lesion have come under my observation; most frequently, however, when they have gone on to perforation and its consequences. They have occurred most frequently to females engaged in needlework, or as domestics. In most instances, the patients have been more or less anæmied, or subjects of chlorosis, or of irregular, or painful, or scanty menstruation; and, although they had previously complained, for a longer or shorter period, of attacks of gastrodynia, or of spasm of the stomach, or even of attacks of vomiting, or of hæmatemesis, they have generally been able to pursue their avocations, and to take their food, up even to the period of the fatal seizure. The painful symptoms in these cases, as well as the attacks of vomiting or of hæmatemesis, usually followed a meal; and even when anæmia or cachexy was very manifest, no emaciation was generally present, the patient presenting much plumpness with the anæmia. The forms of ulceration and perforation, from the external to the internal tunics, and from disease of the vessels, are seldom observed, unless in persons of middle age, or far advanced in life; whereas the foregoing occurs most frequently in young females, although it is also met with in persons far advanced in age, and in males. In these there are generally evidences of a cachectic condition, and of a poor or morbid state of the blood. In addition to the symptoms already mentioned, in some cases, a gnawing sensation at the epigastrium, emaciation, flatulence, and various other dyspeptic disorders are experienced; but the appetite is often not much impaired, and, in some instances, neither the pain nor the vomiting is severe until the peritoneal covering is reached, or until perforation and its consequences occur. The attacks of hæmorrhage, in connexion with one or more of the symptoms already mentioned, are among the most certain indications of the lesion. But it should not be overlooked that hæmatemesis occurs chiefly when much blood is poured out from the ulcerated part in a short time; for when the hæmorrhage is slight, frequent, and prolonged, the blood may pass the pylorus, and either be partially digested or more or less changed, and, mixing with the stools, be altogether overlooked. In this way, much of the anæmia observed before the fatal issue may be produced, hæmatemesis being either



slight or altogether absent. When the hæmorrhage is not great, the matters vomited often have the appearance of coffee-grounds; and in most cases, even when vomiting does not occur, the stools present a black or pitchy hue. These symptoms also attend malignant ulceration or carcinoma of the organ; but the absence of circumscribed hardness or tumour, and of the other symptoms of this latter malady (§ 78, *et seq.*), will assist the diagnosis.

69. *C. Treatment.*—The indications of cure are the same as advised for chronic gastritis (§ 60, *et seq.*). Mild farinaceous articles of food, or such diet as the patient finds to agree the best, and a judicious recourse to sedatives or narcotics, are the means most generally appropriate. The vomitings, especially of blood, often require to be arrested, and, with this intention, the means advised for hæmatemesis (see *art.* HÆMORRHAGE, § 174, *et seq.*) may be resorted to; or the spirits of turpentine may be exhibited in any suitable form, with or without small doses of creasote. If indications of perforation are manifested, by the occurrence of the symptoms of circumscribed or general peritonitis, large or repeated doses of opium, as recommended by Dr. STOKES, are chiefly to be relied upon, with such other aids as are advised when treating of this subject in the article on PERITONITIS.

70. ii. SOFTENING AND DISORGANIZATION OF THE COATS OF THE STOMACH.—This subject has received attention when treating of the organic lesions of the DIGESTIVE CANAL (§ 35, *et seq.*).—

*A.* This lesion occurs, as a primary disease, frequently in infants and children, most commonly soon after weaning, or after a change of diet; but it may take place at any age from two months and upward, in children that have been improperly fed, or nursed by unhealthy females, especially in low, humid, close, and otherwise unwholesome localities. It supervenes also in the course of other infantile diseases, by which it is often masked, or which it may to some extent replace; and it is occasionally observed in the diseases of adults, but generally as a consequence or a contingency of their far advanced progress, as of tubercular consumption, &c. It is, in children, often a severe form of what has been commonly called the “Weaning Brash,” or the “*Atrophia Ab lactorum*,” of Dr. CHEYNE. This disease was first correctly described by M. CRUVEILHIER, and termed *gelatiniform softening of the coats of the stomach*; and by Dr. JOHN GAIRDNER, of Edinburgh. About the same time, it was also noticed by JÆGER, ZELLER, and others referred to in the *Bibliography*. The softening extends, more or less, to all the coats of the viscus, and is most frequently observed in the vicinity of the spleen. The coats may not only be softened, but they may even be so eroded as to give rise to *perforation* at one or more points. In most cases, however, it is very difficult to determine how far the softening and disorganization have existed during life, and how far they may have been a *post-mortem* change. I have met with many cases of this malady, both primary and secondary, at the Infirmary for Diseases of Children, under the circumstances just mentioned, and I believe that the softening often exists to a considerable degree previously to death; but the advanced stage of disorganization, and more especially erosion and perforation, are early consequences of dissolution, which

the fluids of the stomach may have been, more or less, concerned in producing.

71. *B.* This disease is met with most frequently in children between the ages of four and eighteen months, owing to the causes just mentioned; and it appears to be more prevalent in July, August, September, and October, than in the other months of the year. From the localities which favour its development, and the seasons which influence its prevalence, this lesion may be said to be almost endemic in certain places, and epidemic in some seasons. It may appear in the course of infantile remittent fever, of hydrocephalus, or of chronic bronchitis; or it may follow the cholera infantum, or scarlet fever, or diarrhœa, especially after weaning, or when the infant has not enjoyed the advantage of a healthy nurse, or is being brought up by hand.

72. *B.* The *symptoms* of softening of the gastric tunics are, during the earlier stages, chiefly, loss of appetite, mucous or muco-bilious vomiting, and diarrhœa, the stools being liquid, green, or curdy, and offensive; excessive thirst, progressive debility, prostration, pallor, flaccidity and coolness of the skin; occasional flushes of heat, alternating with chilliness; somnolency or lethargy, attended by uneasiness; a disposition to doze, with the eyes half shut, and the pupils turned upward, &c. When the disease is more fully formed, the countenance expresses pain or uneasiness; the look is languishing or sorrowful; and the child whines frequently and is fretful. He is roused from his somnolency by the slightest touch, and if any one looks steadily at him, even from a distance, he cries, and changes his position. His faculties and senses are unimpaired, but he is peevish and distressed. The absorption of fat is excessive; the eyes are sunk in their sockets; the pupils are contractile, and there is no strabismus. Emaciation and flaccidity of muscles proceed rapidly; the lips and tongue become dry and cracked; and the vomiting of the food is frequent; the stools still continuing green, with shreds resembling spinach and slime: the urine is generally scanty. The pulse is at first slow, sometimes intermitting, but it becomes very quick and small towards the close. Flatulence and hiccough sometimes accompany the vomiting, and cough is not infrequent. The respiration is not materially affected until near the termination of the malady, when it becomes quick and laborious. The abdomen is rarely much swollen, although it generally is flatulent, and resonant on percussian. Ultimately, a pallid and shrunk countenance, red or inflamed eyelids, emaciated, flaccid, and cold extremities, a fluttering pulse, very quick breathing, restlessness, or somnolency, passing into insensibility, terminate life, generally in a very few days, and sometimes even in a few hours.

73. *B. On Dissection*, the appearances observed vary with the circumstances and associations of the disease—as it is primary or consecutive of some other malady—and with the period which has elapsed from dissolution. Although the changes cannot be altogether ascribed to dissolution, on the one hand, or to the action of the gastric juices on the other, they may be heightened by either, or even by both. That they exist, to a greater or less extent, in respect even of all the coats of the stomach, but especially the villous and cellular tissues, and that they amount to a

very manifest loss of the vital cohesion of these structures, I have been convinced by a careful observation of the phenomena preceding death, and by examination made as early as ten or twelve hours after death. The softening and dissolution produced by the gastric juices after death have been described under the article DIGESTIVE CANAL (§ 41), and are chiefly observed in the most depending parts of the viscus. But the gelatiniform softening found after death in cases which have presented the above symptoms, either as a primary malady, or as an epi-phenomenon in the course, or at the close, of some other disease, has evidently commenced with the development of these symptoms, and has advanced until it was incompatible with the continuance of life. As it is generally the only or chief lesion found on dissection in the primary cases, and as it has been found in a very marked form even when the examination has been made a few hours after death, there is every reason to infer that it has commenced and existed previously, although it may have advanced farther after death had taken place. The situation of the softening, in some cases, precludes the opinion that it could have been produced by the action of the gastric juices; and if it have been thus caused, to what other lesion can the severe, rapid, and fatal symptoms characterizing the primary cases be imputed, seeing that none besides it can be detected either in the digestive organs or elsewhere, at least none sufficient to produce death? It should not be overlooked, also, that similar softening, although much less remarkable and extensive, is sometimes found, in these cases, in some portions of the duodenum or of the small intestines; and is to be referred to the same states of vital action, &c. (§ 74), as produce this lesion in the stomach.

74. Viewing, therefore, this alteration of the coats of the stomach as a primary, as well as a consecutive disease, the question arises as to the nature of the change—whether is it inflammatory, or is it the result of a vital impairment of the coats of the organ? or is it an association of both, a form of asthenic or cachectic inflammation? That it is not inflammatory is shown by the absence of vascular injection. That it proceeds chiefly from vital exhaustion, with impaired nutrition and cohesion of the tissues, may be inferred from the appearances after death; but it cannot be admitted that the whole amount of change is thus produced, as it may have been heightened immediately, or soon after death, especially when the change is most remarkable. This lesion, however, should be carefully distinguished from *solution of the coats of the stomach by the gastric juices after death*. This *post-mortem* change, which has been described when treating of the alteration found in the DIGESTIVE CANAL (§ 35, *et seq.*), may occur after death from any cause, and in cases that have presented none of the symptoms attending the disease now being considered; but it may take place also in cases of this disease, and may either increase the softening previously existing, or even attack another portion of the parietes of the organ to which the gastric juices have gravitated.

75. *C. The Treatment of the combination and procession of morbid phenomena constituting this disease, whatever may be the amount of organic change existing previously to death, or occurring subsequently, is the matter of chief importance.* For cases frequently occur (and I have

seen many of them, both in public and private practice) presenting all the symptoms of this disease, in greater or less severity, and proceeding with proportionate rapidity, for some of which treatment has been successful at an early period, others having gone on to a fatal issue, and manifested softening of the coats of the stomach, without either vascular injection or thickening, and often with diminished vascularity and unusual pallor of the tissues (*see DIGESTIVE CANAL, § 35, et seq.*). When an opportunity is afforded the physician to treat the early stage of the disease, or even a more advanced state, more or less benefit will be derived from a healthy and young wet-nurse, the infant always sleeping in her arms. If, however, such a nurse cannot be obtained, or if the child cannot take the breast, ass-milk, warm from the animal, slightly diluted either with simple water or with lime-water, should be given at regular intervals; and various tonics, astringents, and antacids be exhibited in the intervals. The diet, consisting of various farinaceous articles, should be carefully attended to, taking care not to load the stomach, so as to favour the occurrence of fermentation or acidity. When the ass-milk is taken in sufficient quantity, but little more food is required, and sweets should always be avoided. The medicines which I have found most beneficial are cretaceous mixtures or powders, with small doses of cascarilla, cinnamon, and a very minute quantity either of creasote, or of tannin, or of capsicum. In some cases, especially when the urine has been ammoniacal, or contained much of the phosphates, I have prescribed small doses of the pyroligneous acid in an infusion of cascarilla or cinchona, or of the nitromuriatic acids in the same or similar vehicles, or the muriated tincture of iron, with infusion or tincture of calumba. The great difficulty in these cases is to arrest the vomiting and diarrhoea; but this cannot be accomplished by sedatives, and narcotics are most injurious to young children. In some cases, however, especially in older children, the hydrocyanic acid may be given in suitable doses, with the sesqui-carbonate of ammonia, and with tonics and astringents. The irritability of stomach in this disease is more readily relieved by stimulants and tonics than by other means; and even the oleum terebinthinæ will often arrest this state when other means have failed. In most instances, also, aromatics should be given with cretaceous and alkaline medicines, and a terebinthinæ embrocation may be applied to the epigastrium. If these means should confine the bowels, the risk of increased irritability of the stomach may be thereby incurred, and therefore suitable enemata ought to be administered, if the stools be insufficient or much disordered. In other respects the treatment should be directed, and the regimen conducted, as advised for INDIGESTION, and above for nervous or functional affections of the stomach (*see § 14, et seq.*). In every instance, the more remote causes of this malady, arising either from the locality or the circumstances of the case, ought to be carefully ascertained and removed, as far as possible, and change of air, especially to a temperate, pure, and dry air, should be advised, with the use of chalybeate medicines or waters, or such other means as are most likely to improve the vital cohesion and tone of the coats of the stomach.

76. When we have any reason to infer from the state of the stools, or other symptoms, that more



or less softening, or loss of vital tone, extends to the mucous surface of the intestines, the means now advised, aided by such others as have been recommended when discussing the treatment of *chronic DIARRHŒA* (§ 29, *et seq.*), or of *asthenic DYSENTERY* (§ 88, *et seq.*), will often be found appropriate and successful.

77. iii. **SCIRRHOUS, CANCEROUS, OR MALIGNANT LESIONS OF THE STOMACH.**—*Cancerous and Cancroid Growths*, Prof. BENNETT. — A. *Carcinomatous and malignant formations of various kinds* are formed in the stomach, especially in or near the cardiac and pyloric orifices, and probably commence, especially the scirrhus and scirrhocarcinomatous kinds, as I have contended when describing them under the head **DIGESTIVE CANAL** (§ 50, 51), in hypertrophy of the sub-villous cellular tissue. The scirrhus change either originates in, or is superinduced by, degeneration or modification of nutrition and secretion, consequent upon prolonged irritation, morbid diathesis, advancing age, and depressed vital power. The several kinds of malignant growths have been found in the coats of the stomach (see *arts. CANCER, and SCIRRHOUS AND OTHER GROWTHS*). The scirrhus forms are most frequent in the pyloric extremity of this viscus; while the medullary, the milt-like, the fungoid, the colloid, the hæmatoid, and other modifications of the encephaloid form of cancer, may commence in the cardiac orifice, or in any part of the gastric parietes.\*

\* [In the *Anatomical Museum of the Boston Society for Medical Improvement* are many well-preserved specimens showing organic disease of the stomach.

No. 474 exhibits an ulcer in the body of the stomach, about an inch in diameter. The organ adhered to the spine at this part, and, on dissecting it up, the base of the ulcer was cut away. Subject, a female, 35 years of age.

No. 475, an ulcer of the stomach, near the pylorus, and about one third of an inch in diameter.

No. 476, two chronic ulcers at the pylorus, of a circular form, about half an inch in diameter, situated opposite each other, a large opening into the peritoneal cavity being seen in the base of one of them. Between the ulcers is something like a yielding of the parietes of the stomach, forming a shallow, ill-defined cavity, and which might be mistaken for the remains of another ulcer; and opposite to this, on the duodenal side of the pylorus, is the same appearance, only to a less extent. The pyloric portion of the stomach was somewhat rough, with slight follicular disease, and two small, ill-defined ulcerations. In the peritoneal cavity was found some recent lymph, besides the liquids and gas that had escaped from the stomach. The patient was a merchant, 63 years of age, who had been dyspeptic for a long while, but for the last one or two years much less so, if at all; not subject to vomiting. On the 3d of May, 1845, he complained at noon of a great sense of weight at the epigastrium; at 11 P.M. he sent for Dr. M. WYMAN, of Cambridge, on account of pain in the abdomen, and this continued as a marked symptom, though it was by no means urgent, as is usual in these cases; the pulse was 72, afterward became more rapid, with symptoms of collapse, which continued till death on the following evening, at 10 o'clock.

No. 477, a specimen of *ulcers at the pylorus*, death from hæmorrhage. Patient, a middle-aged man, complained of pain in his stomach, diminished appetite, constipation, and general indisposition. Hæmatemesis succeeded the operation of a cathartic, and he sank speedily. The ulcer is of an oval form, an inch in length, and near the small curvature of the stomach, in the vicinity of the pylorus. The edges are not thickened and indurated, as is usual in these cases. In the base of the ulcer is seen the open orifice of a ruptured vessel. (1835.)

No. 478 is a specimen of *chronic ulcer of the stomach*, with perforation, and attended with hæmorrhage during life. The ulcer is one inch from the pylorus, in the small curvature, of an oval form, and measures two inches in length: the base, when recent, was of a dark, brownish colour, probably from the hæmorrhage, and in it is seen the perforation, about one third of an inch in diameter, and looking, as in similar cases, as if a piece had been *punched out*. The patient, a labouring man, aged 44, had been for many years very intemperate. For some months he had had pains in the region of the stomach after eating, and

While scirrhus and scirrhocarcinomatous degeneration is generally of slow progress, and occurs in advanced age, the medullary, encephaloid, or fungo-hæmatoid (see *art. FUNGOID DISEASE*), occurs at any age, but more especially in early age, is more generally developed in the form of distinct tumour, is more rapid in its progress, and often appears simultaneously or consecutively in different parts. *Perforation* of the stomach may occur as a termination of malignant disease, especially of the carcinomatous form of ulceration (see § 86, *et seq.*)\*

in the night had frequently vomited. Severe hæmorrhage, followed, after a few days, by acute pain, supervened, and he gradually sank into collapse. On dissection, a great quantity of liquid and solid food was found in the cavity of the abdomen, but there was no peritonitis.

No. 479, deep cancerous ulceration of the last two and a half inches of the œsophagus, with thickening and contraction; a scirrhus affection of the small curvature of the stomach, extending to the pylorus, from a man 72 years of age. About eight or ten months before death, he began to have difficulty in swallowing solid food, and soon had to abstain from it altogether; pain and a sense of oppression were felt beneath the lower end of the sternum after swallowing. Soon after, he began to vomit his food, with much distress, and these symptoms continued, though when the stomach was empty he was sufficiently comfortable. Patient of Dr. JOHN HOMANS.

No. 480, scirrhus disease involving the pyloric portion of the stomach, small curvature, and altogether one half or more of the entire organ, ulceration having commenced near the pylorus. The muscular coat in the healthy portion was not hypertrophied, as described by M. LOUIS. The whole organ was much contracted in size, and seemed to be drawn into the left hypochondrium, the tumour, which was felt during life, being quite to the left of the median line, and sometimes fairly beneath the cartilages of the ribs. The omentum was also scirrhus. A small scirrhus mass was also found in the liver, where it adhered to the stomach. From a gentleman 36 years of age. About three years before his death, he began to spit up his food, without nausea, the taste being scarcely altered. This came on, not at any stated time after eating, but whenever he began to move about, and the quantity thus thrown off was sometimes very great. This attack lasted three or four weeks, and he afterward had a second, his health during the interval being quite good. The principal symptoms for five months preceding death were, spitting up his food, an inordinate appetite, obstinate constipation, and great emaciation; he had an uncomfortable feeling at the epigastrium, but could bear no pressure there. The tumour was first felt six weeks before death.

No. 481, a case of scirrhus stomach, from A. L. PIERSON, of Salem. The disease is in the body of the organ, about midway. The entire circumference is affected, and the contraction such as hardly to allow the passage of the finger, the stomach appearing as if tied round by a band. In the large curvature is a superficial ulcer an inch in diameter. The patient was Dr. HOLYOKE, of Salem, aged 100 years and 8 months. About four months before his death, he met with an accident, from which time his health gradually declined, and he suffered from pain in the epigastrium, depression of spirits, and other symptoms of disease.—(See *Memoir of Dr. HOLYOKE*, by Dr. PIERSON.)

No. 482, a specimen exhibiting extensive and deep cancerous ulceration in the pyloric portion of the stomach. In the midst of this mass of disease, a strip of healthy parietes remains, guarded on each side by a broad, prominent, cauliflower-looking excrescence. An aged woman, who died in the almshouse.

No. 483, scirrhus of the pyloric portion of the stomach; also, much disease in the cellular membrane, and in the omentum connecting the stomach with the arch of the colon, the intestine at one part so contracted as not to allow the passage of the little finger. There was extensive ascites, and a peculiar, perhaps malignant, disease of the ovaries. Patient, a female 41 years of age, had been two years in the Massachusetts General Hospital, with dyspepsia and hepatic symptoms. About a month before death, there came on a vomiting and spitting up of food and dark-brown matter, with eructation, and much distress at the stomach. Described by J. B. S. JACKSON, M.D., Curator of the Museum.]

\* [Scirrhus tumours of the pylorus are extremely frequent in some parts of the United States, as in Maine and other parts of New England. One practitioner of great eminence in that state (Dr. JAMES M'KEEN), informs us that he has seen in his own practice, or in consultation, nearly two hundred cases of this affection. Making allowance for the absence of precise statistics, it is very cer-

78. *B.* The *symptoms* of malignant disease of the stomach are often very equivocal during the early progress of its several varieties, and it is often not until the lesion is far advanced that they can be relied upon. The chief symptoms are, 1st. Pain at the epigastrium or its vicinity; 2d. Indigestion, loss of appetite, flatulence, acrid eructations, nausea, and vomiting; 3d. The presence of a tumour in or near the gastric region; and, 4th. Emaciation and a cachectic or yellowish anæmic hue of the surface, and various other constitutional phenomena.

79. (*a*) The *pain* at the epigastrium is generally gnawing or burning, sometimes lancinating. Occasionally, and at first, it is not much complained of, unless pressure is made on the stomach; and often the slightest pressure cannot even then be long endured, although no acute pain is thereby produced. The pain may be increased either by an empty or by a full state of the viscus. Sometimes the pain recurs at intervals, and becomes remarkably severe. In many cases it extends to the hypochondria, or to the back, or along the œsophagus. In others, especially the cancerous or carcinomatous, a lancinating pain is present at an early period, and is among the first symptoms to announce the nature of the malady. In the fungoid or encephaloid disease, pain is often slight or almost wanting.

80. (*b*) The *symptoms of indigestion*, as anorexia, nausea, vomiting, &c., are often among the earliest; but they cannot be relied upon, as they may be absent to the very close of the malady. MM. CHARDEL, CRUVEILHIER, ANDRAL, and FERRUS state that they have met with cases in which no more severe symptoms than those of slight indigestion had been present up to the period of dissolution. Such instances are very rare; but I have seen cases in which vomiting had not occurred until very shortly before death, the matters vomited having been then very dark and grumous, or sanious, from the exudation of blood from the diseased part. The vomitings which accompany malignant disease of the stomach have been ascribed to obstruction of the orifices of the viscus. They doubtless very often are dependent upon this cause, but they often also occur where these orifices are free, or where the lesion is seated in other parts of the parietes. When vomitings are not frequent or are absent, it may be presumed that the pyloric orifice is free. When, however, vomitings occur some time after the ingestion of food, with marked frequency or constancy, and nearly after the same interval, then disease of this orifice may be suspected.

81. After the ingesta are returned immediately after having been swallowed; when deglutition is followed by a sensation of obstruction under the lower part of the sternum, or by a feeling that the food does not pass into the stomach; when the aliments are ejected instantly without change, and mixed with some glairy mucus; or when there is much nausea, without much evacuation by the mouth, excepting glairy matters; then it may be inferred that the disease is seated in the cardiac orifice of the stomach. In these cases the pain is more limited to the epigastrium

and beneath the sternum, often extending to the back.

82. The characters of the vomited matters vary with the seat, nature, and progress of the malady. When the pylorus is the seat of lesion, the matters thrown off may be more or less digested, but at a far advanced period, or shortly before death, the ejected matters contain altered blood, and present numerous brown or black minute flakes, ultimately passing into the appearance of coffee-grounds, or nearly resembling the black vomit of pestilential fever. In the fungoid or encephaloid form blood is often poured out in larger quantity, and occurs in a purer form or less altered in the ejected matters, thus closely resembling the hæmatemesis of simple ulceration of the stomach, from which, however, it is generally distinguished by the existence of tumours in the gastric region, in this malignant form of lesion.

83. (*c*) The presence of *tumour* in or near the epigastrium is an important symptom of malignant disease of the stomach. When scirrhus induration or other form of malignant tumour exists in the pylorus, then it may not be detected at the epigastrium; but, owing to its density or size, and to the extreme distention of the viscus, it may have descended much lower, or even somewhat to either side, according to the position of the patient. Malignant disease may, however, exist in any portion of the parietes of the organ without occasioning much tumour, and even when it does to a moderate extent, it may not be detected, unless when the patient is very much emaciated, which is not always the case; and when it is detected, it is often difficult to distinguish it from tumour of the pancreas, or of the liver, or spleen, or of the omentum.

84. (*d*) The *cachectic* and anæmic character of the countenance and general surface, and the peculiar earthy odour sometimes exhaled from the body, are observed chiefly at an advanced stage of malignant disease, and are to be attributed chiefly to the constitutional taint, and to the alteration and deficiency of the blood, these changes not being always attended by emaciation, although they are more frequently thus attended. This appearance, however, very generally accompanies malignant lesions of other organs; and it is, therefore, from the association of it with the other symptoms already noticed that the seat of the present malady can be inferred.

85. (*e*) During the *progress* of the malady the symptoms often vary much: certain of them become more severe, others are alleviated, and the severity of the disease is for a period somewhat abated. But after an uncertain period, and after some error in diet and regimen, or after mental emotion, the symptoms recur with increased severity, or even additional phenomena are observed, especially aggravated pain, vomitings, eructations, borborygmi, hiccup, constipation of the bowels, colicky pains, &c. When the disease is seated in the pylorus, its progress is not merely slow, but the character of the vomiting is generally different. Food may not be thrown off the stomach during the early course of the malady, or not until the orifice becomes much contracted or obstructed, or near the close of life; and generally vomiting does not occur until a considerable period after food has been taken. Very frequently, also, articles which have been taken several or many hours previously are thrown up

tainly a frequent form of gastric disease in that region of country, as we have had abundant occasion to observe. We are inclined to attribute its great frequency to crude and indigestible articles of food, and the constant irritations thus set up, resulting in organic disease.]



more or less digested, while those which have recently been taken are retained. This, very probably, is owing to the circumstance of the latter being directed to the fundus of the viscus, while the former, having been digested, and having reached the diseased pylorus, are thrown backward and upward to the cardia.

86. (*f*) The duration and progress of the malady depend much upon the seat and nature of the lesion. If it be seated in or near the cardia, and if it be the encephaloid or fungoid variety, the duration is much shorter than when it is of a scirrhus or scirrho-carcinomatous nature, and is seated in or near the pylorus. In the former, also, the pain is less acute, and the hæmorrhage is earlier and more distinct than in the latter. Cancerous ulceration may supervene in either variety of malignant disease, and may go on to perforation; but in these, neither is lymph thrown out, nor are adhesions formed, so as to prevent a communication with the peritoneal cavity. Perforation, however, seldom occurs, death generally taking place before the carcinomatous ulceration has proceeded so far. During the progress of the malady, costiveness, or even constipation, is a most troublesome symptom; but occasionally, when the pylorus is not obstructed, or when its valve is destroyed by ulceration, a portion of the sanious discharge from the ulcerated parts passes into the intestines and occasions colicky pains, diarrhœa, or dysenteric stools, and accelerates the fatal issue. When perforation of the parietes of the stomach is produced, violent peritoneal symptoms are immediately occasioned, and soon terminate life.

87. The duration of the malady can rarely be ascertained with precision; for dyspeptic symptoms, of greater or less severity, and more or less numerous, always precede the manifest development of malignant diseases, which even may not be distinctly declared until shortly before death. The antecedent dyspeptic symptoms are generally thus present for years before the nature of the disease can be ascertained, and when ascertained death may ensue in a few weeks or even days. The duration of the malady is, however, rarely less than several months, and is generally as long as several years. When it is seated in the cardiac orifice, and nearly obliterates the passage into the stomach, the duration is much shorter, and the sufferings of the patient most distressing, and the emaciation greater; but several months, or even years, may elapse before the lesion has advanced so far as to amount to this extreme pitch.

88. *C.* The *Diagnosis* of cancer of the stomach is sometimes very difficult; for when there is no tumour detected it may be mistaken for chronic gastritis, or for simple ulceration of the stomach; and when there is tumour, the pancreas, liver, or spleen may be its seat. For either instance it is impossible to assign infallible diagnostic signs. The history of the case, the association and procession of the symptoms, the nature of the causes and antecedents, the *juvantia* and *lædientia*, and the constitutional symptoms, in either state of disease, will chiefly guide the attentive observer. Generally, the discharge of blood from the stomach is much greater in simple ulcerations than even in the hæmato-fungoid variety of malignant disease. In the great majority of cases, also, no blood is found until a far advanced stage, or until shortly before death, and

then the blood presents the coffee-ground or minute flaky appearances already noticed, occasioned by its minute quantity and altered character. If considerable hæmorrhage occur in the advanced stage of fungo-hæmatoid cancer, or of other varieties, there is generally more or less tumour or hardness, which may often be detected upon a careful examination. But it must be admitted that hæmatemesis may and does often accompany tumour of the spleen, liver, and pancreas, more especially the spleen and liver. The various circumstances and peculiarities of the case, of its progress, and of its concomitants, will be duly considered by, and will guide, the cautious and observing physician.

89. *D.* The *Causes* of malignant disease of the stomach are chiefly those which I have fully stated when treating of CANCER (§ 23, *et seq.*) and FUNGOID DISEASE (§ 16, *et seq.*). To these places I refer the reader; but I may very briefly notice at this place the causes which act more especially on the stomach. Cancer of this viscus is much more frequent in males than in females, probably owing to intemperance, and to depressing emotions of the mind, being more frequently and more permanently experienced by the male sex. Scirrhus or scirrho-carcinomatous forms of malignant disease of the stomach are seldom observed before middle age, and are most frequent in the advanced epochs of life. Hereditary predisposition, or constitutional taint, derived from a parent, has evidently a considerable influence in favouring the occurrence of the malady when other causes concur to develop it. This predisposition was remarkable in the case of the great NAPOLEON. In what this diathesis consists is not clearly shown; but the temperaments in which it has been supposed most frequently to occur are the nervous and lymphatic, or those mixed with the sanguine or bilious. The ranks of life in which it is most frequently observed are the middle and higher ranks, owing probably to their greater liability to anxieties of mind, and the depressing mental emotions, which, with inaction, protracted abstinence, excessive application to study, business, &c., are the most influential causes of the malady. Protracted functional disorders of the stomach, the air and water of certain localities, the abuse of spirituous liquors, frequent or constant pressure on the gastric region, and the other causes mentioned when treating of CANCER, frequently aid profound or prolonged chagrin and anxieties of the mind. Various trades, professions, and occupations have been said to favour the occurrence of the malady, but with insufficient reason, or in no very appreciable degree. (See *arts.* CANCER and FUNGOID DISEASE.)

90. *E.* TREATMENT.—During the commencement of cancerous affections of the stomach, there is seldom sufficient evidence of the nature of the disease to induce the physician to employ means for its arrest; and even when its nature is suspected, or correctly inferred, there is no known remedy which is capable of producing this effect. At this period, when the symptoms are chiefly those of chronic indigestion, or of chronic gastritis, the means which have been found most beneficial for these diseases, and such diet and regimen as the patient experiences the most benefit from, are also most serviceable in cancerous affections of the stomach. Even if these affections were recognised at this early period, there would

be very great difficulty in devising more suitable means than those usually found most serviceable in functional disorders of the organ. If the malady be inferred to exist at this early period, or if it have more manifestly declared itself at an advanced stage, all that can be expected from treatment is, 1st, to alleviate the more distressing symptoms; and, 2d, to retard the progress of the malady; and these ends may generally be partially attained.

91. It has been very justly remarked by M. GIBERT, and adopted by Dr. HOUGHTON, that "our predecessors, who were less acquainted than we with the fatal progress of organic lesions, succeeded, perhaps, oftener than we do in palliating the symptoms and prolonging the lives of patients, by applying themselves incessantly to oppose the most obvious symptoms. Their attention was not entirely preoccupied, like that of the anatomist-physicians of the present day, with the incurability of the local lesion which is the source of the disease." But while the fulfilment of the intentions proposed to ourselves, when treating this malady, should be kept in view, the predisposing and exciting causes, mentioned above, and under the article CANCER, ought to be removed or counteracted by treatment, medical and regimenal, as far as may be possible. Whenever obstinate or prolonged dyspepsia, or symptoms of chronic gastritis, occur in an individual whose parent or grandparent died of this malady, then suspicions of incipient cancer of the stomach should be entertained, and the treatment ought to be directed accordingly. If these suspicions should not be confirmed, the means advisable for the more dangerous malady would not be inappropriate for the more slight; indeed they will generally prove the most rapidly beneficial.

92. There are few causes which more injuriously affect the digestive and assimilating functions than the depressing mental emotions and anxiety, and therefore these should be avoided by relinquishing avocations which involve such emotions. The greatest care ought also to be exercised in the choice of food. The patient should be guided in this by his sensations and experience; but generally the farinaceous articles of food, taken in moderate quantities, and not after too long intervals, yet in sufficient quantity to duly nourish the frame and support organic nervous power, will be found the most suitable. These may be taken in or with animal broths or soups, in small quantities, or with jellies, &c. I have often recommended new-laid eggs, merely warm, and asses' milk, warm from the animal, with a small portion of lime-water, with much benefit. The great object in the treatment of inferred cases of malignant disease of the stomach is to furnish bland and unirritating nourishment in sufficient quantity, without exciting or distending the organ. But while these and other articles of diet are allowed, with such others as are mentioned when treating of INDIGESTION (§ 42, 55, *et seq.*), or are found by the patient to agree with him, the more painful symptoms should be allayed by suitable narcotics, or by hydrocyanic acid, prescribed in conjunction with emollients, demulcents, or mild bitter tonics. I have met with cases of inferred internal cancer, for which I have prescribed a vegetable and farinaceous diet, distilled water for all the purposes for which water is required, as advised by Dr. LAMBE, and residence in a dry and mild air, and very great benefit has been derived from the treatment.

93. As to the use of the several narcotics, but little can be added to what has been stated under the head CANCER (§ 30, *et seq.*). I have preferred the more common preparations of opium to either the acetate or muriate of morphia, in malignant disease of the stomach, the latter frequently proving injuriously depressing without affording any countervailing advantage. The combination of narcotics, as of conium with henbane or poppy, or of opium with hop, or the infusion of hop with henbane or hydrocyanic acid, has often been serviceable. As the disease advances, the necessity of having recourse to palliative means increases, and the doses of these require also to be augmented. But it will be found that these remedies, however great the dose, frequently fail in preventing or arresting the vomiting in the advanced stages of the malady, if solely relied upon. They should, therefore, be conjoined with such stimulants and aromatics as may be found most serviceable in such circumstances, as creasote, musk, sumbul, &c. I have very rarely observed much benefit to accrue, beyond a very temporary relief, from aconite, belladonna, or stramonium. Nevertheless they may be tried in similar combinations to those just now mentioned. If acidity or flatulence of the stomach be much complained of, ammonia, magnesia, or other antacids may be given with narcotics and aromatics; or lime-water may be taken with boiled milk, or with asses' milk. The iodide of potash, in small doses, may also be tried in conjunction with the carbonate of potash, or the solution of potash, or BRANDISH's alkaline solution, and with narcotics and aromatics; but I have seldom seen any benefit derived from it in malignant disease of the stomach. If hæmorrhage from the stomach be indicated by black or pitchy stools, or if hæmatemesis occur, the spirits of turpentine may be prescribed in such forms or combinations as have been recommended above (§ 59, 69, 75), or where HÆMORRHAGES of these kinds are considered.

94. The constipation attending malignant diseases of the stomach often proves a great source of trouble or distress to the patient, and a great difficulty to the physician. Enemata should be daily employed; but, however active the substances which may be administered in these, they often fail of producing satisfactory results. Calomel is often too depressing, as respects the vitality of the stomach, especially when repeated, and irritating or drastic purgatives ought to be avoided. The preparations of senna or of rhubarb may be conjoined with vegetable tonics, with magnesia, or with manna, or phosphate of soda, citrate of magnesia, &c., or with such other aperients as may be found to be retained by the stomach.

95. The thirst, heat at stomach, nausea, and vomitings, which are often so distressing in the course or near the termination of the malady, can seldom be altogether allayed, although they may be sometimes partially relieved, by exhibiting effervescing beverages with bland nutrients, or mild stimulants, as Seltzer-water with milk, and a small quantity of weak wine, as hock, Barsac, &c.; or soda-water, or effervescing lime-water, with the same articles; or spruce-beer, or small quantities of weak tar-water, with milk, &c.; and by making these the vehicles in which the medicines most appropriate to the case may be given. The retchings and vomitings are sometimes relieved by combining creasote with opium and cre-



taccous powders or mixtures; and epithems, with the vinum opii, or with one or other of the warm embrocations prescribed above (§ 59), to which the opiate is added, may be applied over the epigastrium. If diarrhœa, or extreme vital depression, or spasms, supervene, these means, aided by the more powerful stimulants, absorbents, and astringents, may be administered; but no farther advantage than a temporary relief can be expected from them.

96. iv. OTHER ORGANIC LESIONS OF THE STOMACH are occasionally observed, but they can rarely be distinguished during life; and, when met with upon dissection, the only particulars which can generally be obtained as to their origin and the symptoms attending them, are such as usually accompany chronic gastritis, or scirrhus or malignant diseases of the organ. These lesions have been fully described in the article DIGESTIVE CANAL (§ 27, *et seq.*), and to that I beg to refer the reader.—A. Those alterations which are most frequently observed are generally consequent upon prolonged irritation, and upon excesses in eating and drinking, and consist chiefly of *hypertrophy of the villous and muscular coats and of the connecting cellular tissue*, existing either singly or in combination. They may not be attended by any serious symptom, and be detected only after death from some other disease. When, however, they are seated in either the cardiac or pyloric orifice of the organ, and are attended by much thickening of the part, they occasion more or less disorder, according to the amount of obstruction they produce; and in such circumstances they may be mistaken for, although different from, malignant disease of the viscus. It is very rarely that very serious symptoms are occasioned by these alterations, unless ulceration supervene in some part of the thickened or hypertrophied structure; and in such cases, it is very difficult to determine whether or no the alteration be truly scirrhus, which it most probably often is, if the hypertrophy or thickening be chiefly seated in the sub-mucous cellular tissue.

97. In these cases, whether they result merely from prolonged irritation, excitement, or inflammatory action, or whether they be incipient cancer, the treatment should not be materially different from that which has been advised for other diseases of the stomach, namely, to improve the general health, to promote the constitutional powers, and to remove or to relieve the symptoms which are either most important or most urgent. With these intentions, change of air, travelling, the use of mineral springs, or waters suited to the symptoms most complained of, and attention to diet and regimen, should be recommended.

98. B. *Alterations of the capacity of the stomach* are sometimes observed (see DIGESTIVE CANAL, § 52, *et seq.*).—a. *Increased capacity* is generally a consequence of more or less obstruction at the pyloric orifice or its vicinity. In cases of scirrhus or cancerous pylorus, the stomach is often remarkably increased in capacity; and when the pylorus or upper portion of the duodenum is constricted from other alterations, increased capacity of the viscus is also generally observed. In a case in which inflammation of the concave surface of the liver extended to the pylorus and head of the duodenum, and was followed by false membranes and adhesions of these parts, the subsequent organization and contraction of the morbid productions had so completely constricted the py-

lorus, as to prevent the passage of a quill through it; the patient having died under my care with symptoms which were referred to scirrhus pylorus, and with enormous dilatation of the stomach. In some cases, the increase of capacity is attended by hypertrophy of the muscular and villous coats; but this is observed only in some of the more chronic cases of scirrhus of this orifice. In others, the increased capacity is attended by remarkable thinness of the coats. Greatly enlarged capacity of the organ, with hypertrophy of the coats, has been observed in some cases in which habitual gluttony had existed during life. In such instances, increased function or action had developed the growth of the structures and the size of the organ.

99. b. *Diminished capacity* of the stomach is also sometimes seen (see DIGESTIVE CANAL, § 53), but most frequently in consequence of inanition, or in connexion with hypertrophy of the coats, or with scirrhus or other malignant diseases of the organ. It may be occasioned also, although very rarely, by the cicatrization of ulcers, or by the contraction of false membranes, or of organizable lymph thrown out upon the serous surface of the organ. Extreme diminution of capacity is caused by the passage of acrid, corrosive, or astringent poisons into the stomach, especially the mineral acids, and is then not infrequently attended by abrasions of the villous coat. KIERLANDER observed it after poisoning by nuxvomica.

100. C. *Attenuation of the gastric tissues* is not often observed without any other change. It is most frequently seen in cases of obstruction of the pylorus, and then is often associated with increased capacity, especially at or near the fundus of the organ. But it is met with, also, without any increase of size. Several other alterations of structure have been found in the stomach, namely, *anomalous fibrous and fibro-cartilaginous formations, tubercular ulcerations, fatty or lipomatous tumours in the connecting cellular tissue, fistulous openings through the coats of the stomach and parietes of the abdomen, or some other part of the digestive canal, and various displacements of the organ, &c.* But these are of very rare occurrence, and seldom admit of diagnosis or of relief during life. (See arts. DIGESTIVE CANAL, CANCER, DISEASE, &c.)

101. D. *Rupture or laceration of the coats of the stomach* has been observed after vomiting or retchings in the course of disease or of ulceration, especially when the coats have been attenuated or softened in parts, or where ulceration has penetrated the muscular coats, and nearly or altogether reached the peritoneal surface. The same result has followed from distention of the viscus by ingesta, or more probably from the reaction of the parietes upon the distention. Rupture of the stomach is not infrequent after falls, or violent blows on the region of the stomach, especially when distended by a full meal.

102. E. *Wounds* penetrating the walls of the organ are generally fatal; but in some instances recovery has taken place from them, either with or without a fistulous opening in the abdominal parietes. While lacerations are always fatal, wounds may fail of proving fatal, the coats contracting, so as to prevent the passage of the contents of the viscus into the peritoneal cavity, and closing up and ultimately cicatrizing; or if continuing open or fistulous, the lymph exuded

around the wounded peritoneal surfaces agglutinating them, and preventing the consequences observed in other circumstances.

103. *F. Numerous foreign bodies*, which have been swallowed, may be retained for prolonged periods in the stomach, and produce various effects, according to their natures or their chemical or mechanical properties or conditions. They may irritate, inflame, ulcerate, or even perforate the viscous. The irritation may be soon followed by their rejection. Even blood, effused from ulcerated parts, or diseased vessels, of the organ, or that which has passed into it from the nares, fauces, or pharynx, when present in considerable quantity, will be thrown off; but when it is present only in small quantity, it will pass the pylorus into the intestines, and give the stools the characters of mæna. Cases on record are numerous in which foreign bodies have been retained for weeks and even months in the stomach, and either have been afterward thrown up, or found there on dissection, or have caused ulceration and perforation, not only of the stomach, but sometimes also of the adjoining viscera or parts.

BIBLIOG. AND REFER.—*Celsus*, l. iv., cap. 12.—*Galenus*, De Loc. Affect., l. v., cap. 6; et Method. Med., l. vii.—*Ætius*, Tetrab., l. iii., 93; l. iv., 81.—*Alexander Trallianus*, l. iii., c. 9.—*Paulus Ægineta*, l. iii., c. 37.—*Avicenna*, Canon., l. iii., fen. 13, tract. iv., cap. 1.—*A. Fumanellus*, De Ventriculi Affectibus præter naturam, Opera, p. 513.—*J. Heurn*, De Morb. Ventr. Opera. Lugd. Bat., 1608.—*J. Van dæus*, De Morb. Ventriculi, l. iii.—*J. Varandæus*, De Morbis Ventriculi, l. iii., 8vo. Monsp., 1619; in *Haller's* Bibl. Med. Pract., t. ii., p. 386.—*Zacutus Lusitanus*, Prax. Admir., l. ii., 68; l. iii., 25.—*Glisson*, De Ventriculo et Intestinis, tr. ii., cap. 22.—*B. Swalwe*, Ventriculi Querelæ et Opprobria, 12mo. Amst., 1664.—*Diemerbroeck*, Anat., l. i., c. 7.—*Waldschmidt*, De Ventric. et Intest. Morbis. Marb., 1684.—*Bonet*, Sepulchretum, l. ii., sect. vii.—*Huxham*, in Philosoph. Transac., No. 382; et Opera, vol. iii., p. 9. (*Displacement from a tumour in the omentum*).—*Haasius*, De Tunica Villosa Renovatione, 8vo. Altenb., 1735.—*F. Hoffmann*, De Inflammatione Ventriculi frequentissima. Opera, t. vi., p. 223, 227. (*Gastritis produced by violent anger*).—*G. A. Langguth*, De Tabæ ex Pylori Angustia, 1750, in *Haller's* Diss. ad Med. Pract., vol. iii.—*Haller*, Morbi aliqui Ventriculi in Cadav. observati. Gæt., 1749.—*Lieutaud*, Hist. Anatom. Med., t. i., obs. 74, 139, 141. (*Perforations and external fistula*).—*B. J. Dacher*, Essai sur l'Influence de l'Estomac en toutes les Opérations de l'Economie Animale, 12mo. Amst., 1783.—*Burrows*, in Medical Facts and Observat., vol. v., No. 17.—*J. Beutland*, De Difficili aut Impeditu Alimentorum ex Ventriculo in Duodenum, &c., 4to. Lugd., 1787.—*Whytt*, Works, 4to, p. 577. Edinb., 1768. (*Two cases of ulceration and perforation of stomach*).—*Vetter*, Aphorismen, t. i., p. 172.—*Levelling*, De Pyloro Carcinomatoso. Inq., 1777.—*A. Portal*, in Mémoires de l'Académie des Sciences. Ann. 1771.—*M. Stoll*, Rat. Med., t. i., p. 252.—*J. Hunter*, Philosoph. Transact., vol. lxiii., p. 444; and Observ. on Animal Economy, p. 226. (*Digest of coats by their juices*).—*Bang*, in Acta Reg. Soc. Med. Haun., vol. i., p. 243 (*Central contraction as if bifid*); et Diarium, t. ii., p. 367.—*Ranof*, in Act. Reg. Soc. Med. Haun., vol. iii., p. 247.—*Bang*, in Ibid., vol. ii., p. 80 et p. 279. (*Gastritis caused by violent mental emotions*).—*Delaroche*, in Bullet. de la Soc. de Méd., p. 224. App. ad Journ. de Méd. Contin., t. xi. (*Contracted in the middle*).—*Halle*, in Hist. de la Soc. Roy. de Méd. 1780. (*Thickening of the coats*).—*Anderson*, in Edin. Med. Commentaries, vol. ii., p. 301.—*Thilenius*, Medic. und Chirurg. Bemerkungen, t. i., p. 202. (*Thickening of the coats of stom. after gout*).—*Sandifort*, Observat. Anat. Pathol., l. iii., cap. 3; l. iv., p. 27, 45. (*The stom. contracted in the middle, so as to form a double organ*).—*Morgagni*, De Sed. et Caus. Morborum, ep. viii., 25; xvi., 4; xvii., 10; xxi., 24, 36, 44; xxix., 8; xxx., 2; xxxix., 15. (*Great distention or enlargement of*).—*Stoerck*, Annus Medicus, l. p. 113. (*Great distention of*).—*Saillant*, in Mém. de la Soc. Roy. de Méd., t. viii., p. 105. (*The frequency of gastritis in children*).—*Nebel*, De Ulcer. in Ventricul. Penetrat., &c. Heidl., 1782.—*J. N. Petzold*, Vom Verengerung und Verhärtung des untern Magenmundes, 8vo. Dresd., 1787.—*C. G. Boehme*, Anleitung die vorzüglichsten Krankheiten der ersten Wege zu heilen, 8vo. Lipsa., 1788.—*G. F. Hildebrandt*, Geschichte der Unreinigkeiten im Magen und in den Gedärmen,

8vo. Braunsch., 1789.—*Walshman*, in Mem. of the Med. Society of London, vol. v., p. 182. (*Complicated with erysipelas in children*).—*Fearon*, in Ibid., vol. ii., art. 38.—*Daubenton*, in Mém. de la Soc. Méd. d'Emulation, t. ii., p. 179.—*C. Webster*, Facts tending to show the Connexion of the Stomach with Life, Disease, and Recovery, 8vo. Edin., 1793.—*M. Baillie*, Series of Engravings, &c., fasc. iii., fig. 6, 7; and Morbid Anatomy, &c., p. 76.—*Ferro*, in Med. Archiv. von Wien. 1800, 1801.—*A. Portal*, Cours d'Anat. Médéc., t. v., p. 78, 180.—*Leroux*, in Journ. de Médecine Continue, t. xv., p. 239. (*Perforation passing into the spleen*).—*A. Pujol*, Œuvres de Méd., t. i.—*Wiessner*, De Spasmo Ventriculi. Vit., 1802.—*J. Helm*, Zwey Krankengeschichten, ein Weib mit einem Loch in dem Magen, &c., 8vo. Wien, 1803.—*A. Gerard*, Des Perforations spontanées de l'Estomac, 8vo. Paris, 1803. (*Adduces a variety of cases*).—*A. D. Stone*, A Pract. Treatise on the Diseases of the Stomach, &c., 8vo. London, 1806.—*Drake*, in Edin. Med. and Surg. Journ., vol. ii., p. 417. (*Great contraction and thickening of walls*).—*P. A. Prost*, La Médecine Elairée, &c., 2 vols., 8vo. Paris, 1804.—*J. C. Speer*, General Views relating to the Stomach, 8vo. London, 1818.—*J. Elliottson*, Cases illustrative of the Efficacy of Hydrocyanic Acid in Affections of the Stomach, 8vo. London, 1820.—*Cullen*, Works, edited by *Thomson*, vol. ii., p. 465.—*Chardel*, Monographie des Dégénérationes Skirrheuses de l'Estomac, 8vo. Paris, 1808.—*J. P. Frank*, De Curand. Homin. Morbis, l. v., par. ii., p. 391 (*Enormous distention of*). l. vi., pars i., p. 60; et Acta Inst. Clin. Vilm., ann. ii., p. 72.—*G. Rees*, Pract. Observat. on Disorders of the Stomach, 8vo. Lond., 1810.—*Jaeger*, in Hufeland u. Hymly Journ. der Pract. Heilk., p. 1, 22. May, 1811.—*Ratheau*, Essai sur les Affections Organiques de l'Estomac, 8vo. Paris, 1812.—*Burns*, in Edin. Med. and Surg. Journal, vol. vi., p. 129. (*Perforation by gastric juices*).—*Helm*, in Horn. Archiv., p. 12. Jan., 1812. (*Spontaneous perforation of stom. during life*).—*E. Barlow*, in Edin. Med. and Surg. Journ., vol. x., p. 435.—*Marcus*, Ephemeriden der Heilkunde, b. i., 2. heft.—*Caldani*, in Memorie di Fisica della Soc. Stat. a Modena, t. xii., p. 2. (*Ulceration and adhesion to the pancreas*).—*Zeller*, De Natura Morbi Ventric. Infant. Perforantis, 1818.—*G. Laennec*, Considérations Médico-Légales sur les Erosions et Perforations Spontanées de l'Estomac, 8vo. Paris, 1819.—*Pemberton*, Pract. Treatise on various Diseases of the Abdominal Viscera, 4th ed., p. 128. 1820.—*Meckel*, Tab. Anat. Patholog., fasc. iii., tab. 20.—*R. Duglinton*, Commentaries on Diseases of the Stomach and Bowels of Children, 8vo. Lond., 1824.—*T. Hare*, A View of the Structure, Functions, and Disorders of the Stomach, 8vo. Lond., 1823.—*Chaussier*, Nouv. Journ. de Médecine, t. iv., p. 295. (*Perforation of the walls of*).—*Thompson*, Annals of Medicine, vol. i., p. 417.—*Rullier*, in Archives Génér. de Méd., t. ii., p. 380. (*Cancerous perforation of stom.*).—*Louis*, in Ibid., vol. iv., p. 536 (*Cancerous pylorus and hypertrophy of the muscular coat throughout*); and in Ibid., t. v., p. 5.—*Ebermaier*, in Ibid., t. xviii., p. 427. (*Ulcerative perforation*).—*Hédiard*, in Journ. des Progrès des Sciences Médicales, t. xvi., p. 250. (*Destruction of muscular coat and vomiting till death*).—*Laennec*, in Revue Médicale, t. i., p. 379, 1824. (*Cancerous perforation of stomach*).—*Bourdon*, in Ibid., tom. ii., p. 209. 1825.—*Cannet*, in Ibid., t. iv., p. 527. 1825. (*Perforation of stomach*).—*Crampton*, Trans. of College of Phys. of Ireland, vol. i., p. 1. (*Ulceration and rupture of stom.*).—*Pickels*, in Ibid., vol. iv., p. 189, 441; and vol. v., p. 171. (*Discharge of insects from the*).—*Cheyne*, Dublin Hospital Reports, vol. iv., p. 252.—*Blaud*, Nouv. Biblioth. Méd., t. ii., p. 5, 1826. (*Foreign bodies lodged in the stom.*).—*Sestie*, in Journ. Hebdomad. de Méd., t. i., p. 216.—*Blasius*, in Ibid., t. iii., p. 69. (*Gelatiniform softening of stom. in children*).—*Schmidtman*, Observat. Med., t. ii., p. 288, 451.—*Jaeger*, in Lond. Med. Repository, vol. x., p. 426. (*Softening and erosion of coats*).—*Journ. Complémentaire des Sciences Méd.*, t. xxviii., p. 189.—*Lobstein*, Anatom. Pathologique, t. i., p. 557.—*Broussais*, Histoire des Phlegmasies Chroniques, t. ii., ch. 1.—*Guerrent*, Dict. des Sciences Méd., t. xvii., art. Gastrite.—*Dieffenbach*, Dégénération Cartilagineuse de l'Estomac, in Rust's Magazin, t. xxvi.—*J. North*, in London Med. and Phys. Journal, vol. iii., p. 457.—*Gendrin*, Hist. Anat. des Inflammations, t. i., p. 493, 659, 691.—*Rousscau*, in Archives Génér. de Méd., t. vi., p. 321. 1824.—*Louis*, in Ibid., t. iv., p. 536; t. v., p. 5; et t. xii., p. 487.—*Andral*, in Nouveau Journ. de Méd., t. xv., p. 193.—*Rigot* et *Trousseau*, in Archives Génér. de Méd., t. xii., p. 169, 583.—*Pasquali*, in Ibid., t. x., p. 437.—*Lebidois* et *Cottelreau*, in Ibid., t. xiii., p. 365.—*R. Prus*, Recherches Nouvelles sur le Cancer de l'Estomac, &c., 8vo. Paris, 1828.—*Chomel*, Dict. de Méd., t. x., art. Gastrite.—*C. Billard*, De la Membrane Muqueuse Gastro-Intestinale dans l'Etat sain et dans l'Etat Inflammatoire, 8vo. Paris, 1825.—*P. C. A. Louis*, Du Ramollissement, &c., de la Memb. Muqueuse de l'Estomac, 8vo. Paris, 1835; et Recherches sur la Maladie, connue sur le Nom de Gastro-Entérite, 2



tomes, 8vo. Paris, 1829.—*Pitschaaft*, in *Rust's Magazin für die gesammte Heilkunde*, 2d Heft, 1826; and *Edinb. Med. and Surg. Journ.*, vol. xxvi., p. 451.—*J. Sym*, Case of Perforation of the Stomach, in *Edinb. Med. and Surg. Journ.*, vol. xxvi., p. 290.—*Soemmering*, in *Ibid.*, vol. xxvi., p. 212 and p. 214. (*Melanosis of*.)—*J. Sym*, in *Ibid.*, vol. xlv., p. 113.—*Beilby*, in *Ibid.*, p. 257.—*W. Brown*, in *Ibid.*, p. 259.—*Craigie*, in *Ibid.*, p. 262. (*Ulceration of*.)—*J. Gardiner*, On Softening and Perforation of the Stomach, in *Transact. of Med. and Chirurg. Society of Edin.*, vol. i., p. 311; and vol. ii., p. 331.—*E. J. Seymour*, in *Transact. of Med. and Chirurg. Society of London*, vol. xv., p. 222.—*J. N. Weekes*, Of Rupture of the Stomach, in *Ibid.*, vol. xiv., p. 447.—*Yelloly*, in *Ibid.*, vol. iv., p. 371.—*Crampton*, Rupture of the Stomach, in *Ibid.*, vol. viii., p. 228.—*Elliotson*, in *Ibid.*, vol. xiii., p. 26.—(*Ulceration and rupture*.)—*B. Travers*, in *Ibid.*, vol. viii., p. 231.—*T. Chevalier*, in *Ibid.*, vol. v., p. 93.—*Leymmer*, in *Edinb. Med. and Surg. Journ.*, vol. xxvi., p. 212.—*J. Macfarlane*, in *Glasgow Med. Journ.*, vol. ii., p. 170. (*On spasm or cramp of: an instructive memoir*.)—*Anon.*, in *Ibid.*, vol. ii., p. 341. (*An excellent paper on spontaneous perforation of the stomach*.)—*Barras*, *Traité sur les Gastralgies et les Entéralgies*, &c., 8vo. Paris, 1827.—*C. Billard*, *Traité des Maladies des Enfants Nouveaux-nés et à la Mamelles*, &c., p. 319, 8vo. Paris, 1828. (*Gelatiform softening*.)—*K. Carswell*, *Edin. Med. and Surg. Journ.*, vol. xxiv.—*J. Abercrombie*, *Pathological and Practical Researches on Diseases of the Stomach, the Intestinal Canal, the Liver, and other Viscera of the Abdomen*, 8vo. Edin., 1828.—*J. Johnson*, *Essay on the Morbid Sensibility of the Stomach*, 8vo. Lond., 1829.—*A. Pompart*, *Traité des Mal. des Voies Digestives et leurs Annexes*, &c., 8vo. Paris, 1829.—*A. Monro*, *Morbid Anatomy of the Gullet, Stomach, and Intestines*, 2d ed., 8vo. Edin., 1830.—*Andral*, *Clinique Médicale*, 2d ed., t. iii. et iv.—*Cruveilhier*, *Anat. Pathol. du Corps Humain*, fol., livrairs iv., vii., et x. Paris, 1836.—*C. B. Chardon*, *Pathologie de l'Estomac, des Intestins, et du Péritoine*, 2 vols. 8vo. Paris, 1832.—*W. Stokes*, in *Med. and Surg. Journal*, Feb., 1834.—*M. Hall*, in *Ibid.*, vol. iii., p. 141.—*W. E. Horner*, in *London Med. and Phys. Journ.*, vol. lix., p. 113, 208, and 304.—*Ebermaier*, in *Ibid.*, vol. ix., p. 302, 422.—*Rostan*, *Cours de Médecine Clinique*, t. ii., p. 6, et *plurics*.—*Recamier*, *Recherches sur le Traitement du Cancer*, 2 tomes, t. ii., p. 44. Paris, 1829.—*Graves*, in *Dublin Medical Journal*, vol. ii., p. 175. (*Fungoid disease between the orifices without sign of organic disease of stomach*.)—*J. Armstrong*, *Morbid Anatomy of the Bowels, Liver, and Stomach*, plates, 3 fasc., 4to. London, 1829.—*Thomson*, *Annals of Médecine*, vol. i., p. 437, and No. 13, p. 387.—*Henderson*, *Edin. Med. and Surgical Journ.*, p. 94. July, 1836.—*R. Bright*, *Guy's Hospital Reports*, vol. i., p. 598. (*Displacement of stomach*.)—*Addison*, *Lancet*, Nov. 12, 1836; *Ibid.*, p. 43. Oct. 1, 1836. (*Cancer of stomach not indicated by symptoms*.)—*Crisp*, in *Ibid.*, p. 432. Dec. 16, 1837. (*Perforation of*.)—*Whitehouse*, in *London Medical Gazette*, p. 610. Jan. 13, 1838. (*Perforation of*.)—*L. Parker*, in *Med. and Chirurg. Review*, vol. xxix., p. 97, 641.—*Lefevre*, in *Brit. and For. Med. Review*, p. 221. July, 1838. (*Spontaneous perforations of*.)—*W. Stokes*, *Cyclop. of Pract. Med.*, art. *Gastritis*; *Descriptive Catalogue of the Pathological Specimens contained in the Museum of the Royal College of Surgeons of England*, vol. iii., p. 51–62, Nos. 1139 and 1175.—See also the *Bibliography and References to arts. COLON, DIGESTIVE CANAL, DUODENUM, INDIGESTION, and PYROSIS*.

[AM. BIBLIOG. AND REFER.—*Julius Vogel*, *Am. Ed. Path. Anat. of the Human Body*. Phil., 1847.—*S. D. Cross*, *Path. Anatomy*.—*W. E. Horner*, *Path. Anatomy*, and in *Am. Jour. Med. Sci.*, vol. i., p. 1.—*R. Duntison*, *Practice of Med.*—*S. G. Morton*, *Am. Ed. Macintosh's Practice*.—*John Bell*, *Lectures on Pract. Medicine* (Bell and Stokes).—*T. Stewardson*, *Am. Ed. Elliotson's Practice*.—*A. Sidney Doane*, *Am. Ed. Good's Practice of Med.*—*N. Chapman*, *On Diseases of Thoracic and Abdominal Viscera*; and *Monograph on Diseases of the Stomach*, in *Am. Jour. Med. Sci.*, vol. xxv., N. S., p. 77.—*Wound of the Stomach and Removal of a portion, with Recovery*, *West. Journ. Med.*, April, 1838.—*G. O. Sumner*, *Cancer of Stomach*, &c., *Am. Jour. Med. Sci.*, vol. xx., N. S., p. 388.—*Benjamin Rush*, *Medical Inquiries*, vol. iii., p. 172. Phil., 1809.—*P. S. Physick*, *Med. Repository*, vol. v., p. 129. New York.—*C. A. Lee*, *Pathological Appearances of the Stomach, produced by alcoholic Drinks*, in *Boston Med. and Surg. Journ.*, vols. xxvi., xxvii.—*L. Pierce*, *Perforation of the Stomach without Ulceration or softening of its Coats*, *Am. Jour. Med. Sci.*, vol. xiv., O. S., p. 305.—*Levi Rawson*, *Perforation of the Stomach by Ulceration*, in *Ibid.*, vol. vi., p. 391.—*H. W. Roberts*, *Seirrhous of the Stomach*, *Am. Med. Recorder*, p. 235. 1828.—*Wm. Beaumont*, *Experiments in the Case of A. San Martin*, *Am. Med. Recorder*, Jan., 1825 and 1826; and *Experiments and Observations on the Gastric Juice and Physiology of Digestion*.—*D. Atkins*, *Medical and Surgical Cases and*

*Observations*, plates, 8vo.—*S. H. Dixon*, *Essays on Path. and Ther.*, 2 vols. 8vo.—*William M. Carpenter*, *Perforation of Stomach*, New Orleans Med. and Surg. Journal, 1845.—*J. M. Paul*, *Trans. Phil. College of Physicians*, 1845.—*L. Phinney*, *Ulceration and Perforation of the Stomach*, *Bost. Med. and Surg. Journ.*, vol. xxiv., p. 159.—*J. G. Graves*, in *Ibid.*, vol. xxiv., p. 181.—*Thomas Miner*, *Indigestible Substances in the Stomach*, vol. ix., p. 123.—*J. C. Howard*, in *Ibid.*, vol. v., p. 348.—*Ibid.*, Editorial, vol. xi., p. 762.—*J. G. Porter*, *Cancer of Stomach*, *Am. Journ. Med. Sci.*, vol. xxx., p. 377.—*David Prime*, *Transposition of the Stomach and Duodenum*, in *Ibid.*, vol. i., p. 558.—*J. B. S. Jackson*, in *Ibid.*, vol. i., p. 365.—*Review of Langston Parker*, *On the Stomach in its Morbid States*, &c., in the *New York Journal of Medicine*, vol. xi., p. 167 (By *H. D. Bulkeley*); and on *Perforations of the Stomach from Poisoning and Disease*, in *Ibid.*, vol. i., p. 466.—*George B. Wood*, *Practice of Medicine*.—*J. Stewart*, *Am. Ed. Transl. of Billard on Diseases of Children*.—*James Jackson*, in *Memoirs of*, Bost., 1835.]

STOMATITIS.—SYNON.—*Stomatitis* (from *στόμα*, the mouth). *Stomacac*, *Oris Vitium*, *Buccitis*. *Buccite*, *Stomatite*, *Inflammation de la Bouche*, Fr. *Inflammation of the Mouth*.

CLASSIF.—III. CLASS, I. ORDER (Author in Preface).

1. DEFIN.—*Inflammation affecting the mouth, especially the gums and cheeks, attended by more or less constitutional disturbance, and characterized, as respects the local changes, by the nature of this disturbance, by the causes, and by the state of vital power.*

2. Inflammation of the mouth, or stomatitis, may be either a primary, or a secondary, or sympathetic affection. It is rarely limited to the gums and cheeks, but extends more or less, in most of its forms, to the fauces and pharynx, and even partially to the tongue and lips. According to the sthenic or asthenic character of the inflammation—to the local changes and the constitutional disturbance—to a previously healthy, or to a cachectic or contaminated state of the system—and to the influence of the exciting causes, stomatitis presents several *species*, more or less distinct, and hence deserving of being treated of as specific affections, yet, owing to their seat, and not infrequently to their consequences, requiring to be viewed as generically related to each other. The several affections which may be classed under the present head appear, either primarily or consecutively, under so different circumstances, that it may be truly stated that there are few diseases affecting the same parts so dissimilar to each other as these are. This dissimilarity, arising, as just stated, from the different exciting causes of each, from the states of vital power and of the circulating fluids, from the nature of pre-existing disease, and from the age and various other circumstances of the patient, gives occasion for the arrangement of the several forms of stomatitis into the following *species*: 1st, simple or erythematous, *stomatitis simplex*; 2d, vesicular, *st. vesiculosa*; 3d, pustaceous, *st. pustacea*; 4th, mercurial, *st. mercurialis*; 5th, pseudo-membranous, *st. pseudo-membranacea*; 6th, ulcerated, *st. ulcerata*; 7th, gangrenous or phagedenic, *st. phagedenica*. The second and the third of these *species* I shall describe under the head THRUSH, the term usually applied to them; the others will be briefly treated of at this place.

3. I. STOMATITIS SIMPLEX, simple or erythematous inflammation of the mouth—*Buccite*, *Aphthes érythématiques*—is characterized by redness, heat, dryness, pain, and slight swelling of a part or of the whole of the mucous membrane lining the mouth. It is most frequently limited to either the arch of the palate, to the tongue, to the gums,

or to the cheeks. It is often extended to two or more of these, but it more rarely invades the whole of the buccal surface. It frequently extends backward to the isthmus of the fauces, to the pharynx, and even to the upper part of the œsophagus. It is not an infrequent complication of gastritis, or gastro-enteritis, or of bronchitis, and is generally more or less remarkable in the exanthematic fevers and in an advanced stage of hectic. When the inflammation has followed a local irritant or poisonous substance, then the pain, heat, and swelling are often very severe, and the effect more diffused. In some instances the inflammation is attended by dryness, in others by a discharge of a ropy mucus, mixed with saliva, more or less abundant, according to the nature of the exciting cause. Occasionally the irritation extends along the Eustachian tube to the ear, and in many instances the tonsils are more or less affected.

4. *A. Simple stomatitis* thus presents numerous phases or states, as it is more or less general or limited, or according to its severity, to its complications, to the age of the patient, and more particularly to its cause. It may be general or diffused, or limited to patches or to parts, or consisting of numerous points. It may or may not be attended by the symptoms of general fever, which usually assumes either an asthenic or sthenic character, according to the severity of the attack and the constitutional power of the patient. It generally presents acute features, and terminates in a few days by resolution, without either suppuration or ulceration, the epithelium being commonly detached. But suppuration is occasionally produced when the inflammation has been intensely excited by an energetic irritant poison, or even by the more common irritants in unusual quantities. I have thus seen a very general stomatitis, with profuse suppuration, follow the introduction of a quantity of mustard into the mouth. Ulceration is more frequent than suppuration, and is seen chiefly in the gums, insides of the cheeks, and on the surface of the tonsils. Generally, however, the inflammation has become chronic before ulceration to any considerable extent takes place.

5. *B. The chronic state* of simple stomatitis is chiefly confined to the gums, and is often kept up by carious teeth or stumps of teeth. In the worst of such cases, the gums not only ulcerate, but the alveolar processes, either partially or more generally, become absorbed, and the teeth fall out. These cases are commonly symptomatic of general cachexia, or of prolonged disorder of the digestive organs, especially chronic dyspepsia or chronic gastritis.

6. *C. The treatment* of simple stomatitis is generally easy, when the affection is produced by a manifest irritant cause; for the removal of this cause, and rinsing the mouth frequently with cooling and demulcent fluids, will be efficacious in the course of a few days. When this affection is a part only of a more general and a more serious complaint, the local means can be subservient only to more constitutional and energetic remedies, and these must be such as the nature of the complaint will warrant. The state of the alimentary canal and of the digestive organs should receive particular attention, and morbid secretions and excretions, and fecal accumulations, be freely evacuated. In many cases, washing out the mouth with camphor water, or with a decoction of marsh-

mallows, containing a little nitrate of potash or sulphate of alumina, or, in more painful cases, holding the open mouth over the vapour of hot water, into which some vinegar and scraped camphor has been put, will be sufficient to remove the disorder, especially when aided by suitable purgatives. In more chronic and obstinate cases, especially if ulceration have taken place, strong solutions of the nitrate of silver, or weak solutions of the bichloride of mercury, may be required. Most of these states of the disorder, even when unconnected with secondary syphilitic disease, depend upon cachexia and chronic disorder of the digestive organs, and to these latter the treatment should be mainly directed. For these obstinate and complicated states, the means about to be prescribed for a severer variety of this complaint will be found appropriate (see § 31, *et seq.*).

7. II. PSEUDO-MEMBRANOUS STOMATITIS.—*Stom. Pseudo-membranacea*.—*Stomatite Couenneuse, St. Diphthérique, Diphthérie Buccale, Fr.*—This peculiar form of stomatitis, as it affects either the mouth or throat only, or as it extends not only to both, but also to the pharynx, larynx, and even to either the trachea or œsophagus, was first accurately described by M. BRETONNEAU, and subsequently by M. TROUSSEAU and Dr. MACKENZIE, by whom it was observed to occur in an epidemic form. In some districts of France, especially the more extended or diffused state, it was on several occasions a remarkably prevalent and fatal malady, and was considered by the best informed writers to have been propagated by infection. This very severe and epidemic form of *angina* will receive due attention when the diseases affecting the THROAT are described. I shall, therefore, notice at this place only the less severe and limited form of the malady, which affects the mouth primarily, and is most frequently confined to this part.

8. *A. Pseudo-membranous stomatitis* has been confounded with various other affections of the mouth. It may assume either an *acute* or a *chronic* form, and is generally more or less diffused when acute, and limited to one part when it assumes the latter form. It is observed chiefly on the gums, insides of the cheeks and lips, and on the point or around the tongue. In the *acute* state, it first appears in the interior of the mouth in the form of small, irregular, rounded or oblong membranous patches of a grayish-white colour. Around these patches the surface is red, and the parts are painful and hot, a sense of heat or burning being complained of. The breath is fetid, and the submaxillary glands enlarge. As the disease proceeds, the patches of membranous exudation extend, become more or less detached, and are succeeded by others, and the intervening surfaces are red and swollen. The tongue is swollen. The mouth is continually open, allowing the escape of altered saliva. The enlargement of the lymphatic glands increases; the face swells; the breath becomes more fetid; and the pulse more quick or rapid, and generally soft, open, and full, or weak. With the increasing severity of the accompanying fever, the disease extends to the throat, and even to the respiratory and digestive mucous surfaces, thereby occasionally great or very imminent danger.

9. This form of stomatitis may be confounded with the THRUSH, or with *mercurial stomatitis*, from which latter it may be distinguished by absence of the cause, and of the mercurial fetor



of the breath. It is more closely allied to the thrush, from which it differs chiefly in the larger patches of exudation at the commencement of the disease, in the more rapid and continuous extension of these patches, in the greater amount of fever and of swelling of the adjoining parts, and in the more advanced age of the children most frequently attacked, the thrush occurring generally, or oftentimes, in much younger children than this form of stomatitis, commonly in infants during or soon after lactation.

10. Pseudo-membranous stomatitis may terminate in resolution, the swelling and redness diminishing, and the membranous exudations being either detached or absorbed; or it may pass into the chronic state; or it may go on to ulceration, or even to gangrene. The first of these terminations is the most frequent, the parts healing without leaving any cicatrix. But the affection is not infrequently chronic, usually after a more or less acute state. In the acute form, it often extends to the pharynx and respiratory passages, and sometimes also to the digestive mucous surface; and, when thus complicated, it generally terminates fatally. In the chronic state, it is usually limited to the mouth, and may continue for several weeks or even months.

11. Relapses are frequently observed in weak cachectic children, especially when confined in an unwholesome air or crowded apartment. M. GUERSENT states that the cases of this complaint in the hospital for children in Paris are very subject to relapses.

12. *B. The causes of pseudo-membranous stomatitis* are chiefly those which lower the constitutional powers and impair the assimilating functions. This complaint may occur at any age, but it is most frequent during the second dentition, and during the evolution of the molar teeth. It is very rare during lactation, but becomes more frequent from the first year of age, until the second dentition is completed. It is observed chiefly in autumn and winter; and in these seasons especially, and not infrequently also in the spring, it is almost endemic in some countries, whose climates are cold and humid, and in districts subject to inundations. In these particularly it may even become epidemic.

13. The *predisposing causes* are whatever impairs the general health, as impure air, unwholesome food, insufficient clothing, and want of cleanliness; living in cold, low, and humid cellars; crowded apartments and sleeping-places; want of exercise in the open air; and privation of light and sunshine, and of due ventilation. M. GUERSENT states that this form of stomatitis is almost endemic in the hospital for children in Paris, especially in the wards appropriated to ophthalmic, cutaneous, and scrofulous affections; and that boys are more affected than girls. It has been supposed to have been propagated by contagion, in circumstances favourable to this mode of communication; but the evidence of the possession of this property by this affection is not always conclusive, although cases have appeared to warrant a belief in the existence of it, especially when the disease is prevalent.

14. *C. Treatment.*—VAN SWIETEN advised the application of the hydrochloric acid in a proportion of honey, varying with the severity of the case (from one fourth or one third to three fourths of the former), by means of a small piece of sponge attached to a small stick, to the mem-

branous exudations. But care should be taken that this application should extend as far as the exudation. Generally one or two applications in the twenty-four hours are sufficient. At the same time, a terebinthinate embrocation, such as No. 296, or No. 311, in the *Appendix*, should be applied by means of flannel or spongio-piline around the throat, or along the sides of the lower jaw. After a few applications of the acid and honey, or, in the intervals between the application of them, a gargle or wash, consisting of the decoction of cinchona and hydrochloric acid, or any other astringent gargle, may be employed. In some cases, I have found a varying proportion of borax and honey efficacious; and when the patients have been old enough to use a gargle, then a saturated solution of borax, in any suitable vehicle, has also been used. A strong solution of alum, or alum in fine powder, with acacia-powder or mucilage, has also been recommended by BRETONNEAU and others; while the nitrate of silver, in various states of solution, or even in substance, has been advised by many. More recently, the chlorides, especially the chloride of lime and the chloride of zinc, in varying grades of solution, according to the severity of the disease, or in the state of powder conjoined with other substances, have been severally prescribed by myself and others.

15. If the disease have advanced to simple or to phagedenic ulceration, the above means should be employed in more energetic or concentrated forms; and such other means should be used as will support the vital powers and resistance, and thereby change the morbid action locally. In all cases, indeed, but in these especially, internal and constitutional means ought to be appropriately prescribed. Some writers have advised the application of leeches to the throat or neck, &c. I have often been called to patients after recourse has been had to them, but I have rarely seen much benefit derived from them. I would not say that they should not be applied in the more sthenic cases, or in robust or plethoric patients; but these latter are rarely attacked by the disease; and when they are, the employment of leeches for them is likely to be of service, especially when the applications to the mouth and the embrocations to the throat and neck, advised above (§ 14), are also duly resorted to. In most cases, the preparations of cinchona, with ammonia, or with the fixed alkalies, or with diaphoretics, as the liquor ammoniæ acetatis and spiritus ætheris nitrici, are beneficial, especially when the pulse is quick and soft, and the flesh is flabby or soft. In some it will be requisite to administer the most powerful tonics and stimulants, as the preparations of cinchona with hydrochloric acid and hydrochloric ether, tincture of serpentaria, &c.; and even to allow a sufficient quantity of wine in arrow-root or sago. The bowels should be freely opened by the usual means, or by equal quantities of castor oil and oil of turpentine, administered by the mouth, or in enemata, or in both ways, according to the urgency of the case. If the disease assume a *chronic form*, internal or constitutional means are always required; and of these means, change of air, especially to a warm and dry locality, is one of the most important and successful, especially when aided by an appropriate use of one or more of the remedies already noticed.

16. III. STOMATITIS MERCURIALIS—*Mercurial*

*stomatitis*—is one of the more common forms in which the poisonous effects of mercurials manifest themselves. It has, therefore, been described, and fully treated of, in connexion with other injurious effects of mercury, in the article *Poisons*, from § 562 to 594 inclusive; § 569, 580–587, and 593, more particularly relating to mercurial stomatitis.

17. IV. STOMATITIS ULCERATA—*Ulcerated Stomatitis*.—*Cancrum Oris*—may be an advanced stage of either simple stomatitis or of pseudomembranous stomatitis.—A. It may also commence with inflammation of the external surface of one or more of the gums, most frequently of the lower jaw, and generally on both sides. With the inflammation, swelling and œdema are often very considerable, ulceration soon appearing over the alveolæ and near the teeth. The cheeks and face are swollen; the sub-maxillary glands are tumefied; the mouth is opened with great difficulty; and saliva with mucus fills the mouth, and prevents a satisfactory view of the diseased surface. A coppery, unpleasant taste is complained of, and a peculiar fetor of the breath is remarked. Heat, tenderness, and swelling of the face increases, and ulceration extends over the gum, sometimes exposing the alveolar processes, and often to the cheeks, if the disease be not early checked. It may remain stationary for some days, especially when partly controlled by treatment. In some cases more or less hæmorrhage takes place from the ulcerated parts. The febrile symptoms are generally of an asthenic or low character, the pulse being soft, weak, frequent, or small, and the skin cool or natural, excepting that of the face and neck, and the bowels confined or irregular.

18. This form of stomatitis is most frequently seen in children between the first and second dentition, after weaning, and during recovery from exanthematous fevers, especially from scarlet fever. It generally occurs in cachectic and debilitated subjects, and in the children of the poor, that are ill-fed; and live in low, close, and crowded and ill-ventilated apartments. It is not infrequently superinduced by disorders of the stomach and bowels, and should be viewed as a very serious malady, especially when it appears in the circumstances now mentioned, and more particularly when it occurs after scarlet fever; the prognosis, however, should depend chiefly on the constitutional symptoms, especially when these are correctly interpreted, and upon the absence or presence of visceral complications.

19. B. A variety of ulcerative stomatitis sometimes occurs in adults, consecutively upon exhausting discharges, and as a sequela of other diseases. It occasionally appears in delicate females during lactation, and in the course of debility, or of debility conjoined with cachexia, produced by other depressing or exhausting causes. The disease in these cases usually commences with inflammation of one, seldom of both, sides of the tongue, and extends to the inside of the cheek. In some cases, one or more very small, hard, and painful sores first appear on the side of the tongue, which ulcerate, with hard and elevated margins, and are followed by a more extended inflammation; and in others these ulcers supervene upon previously existing inflammation. As the disease proceeds, the interior of the mouth appears red and inflamed, is very painful, and so tender that fluids only, and these

of the blandest kind, can be received into it. The tongue is red, smooth, or glossy, and a copious flow of saliva takes place from the mouth. There is at first neither loss of appetite nor fever; but as the affection extends over the internal surface of the mouth, cheeks, and tongue, fever supervenes, and the stomach and bowels become irritable, the morbid irritation extending to the pharynx and along the œsophagus to the stomach and bowels; diarrhoea, emaciation, and extreme exhaustion sometimes supervening, and even terminating in death. Drs. HALE, BACKUS, WILSON, and HOLT, of the United States, have described this variety of stomatitis, and state that it occurs chiefly in women when suckling, or in an advanced stage of pregnancy. But it is not peculiar to them, cases of it occurring, on rare occasions, in the circumstances already stated, especially when debility is associated with more or less visceral disease.

20. C. The treatment of ulcerated stomatitis should be mainly constitutional, means being used to improve the vital powers of resistance, and to prevent the extension of the local changes. The states of the excretions should be carefully ascertained, especially of the urine, and the treatment directed accordingly. In some cases, the treatment is beneficially commenced with an emetic of sulphate of zinc; and a purgative powder or draught, suitable to the state of the bowels and appearances of the stools, is often afterward required. The decoction of cinchona, with muriatic acid and muriatic ether, or with the nitromuriatic acids, or with ammonia or the fixed alkalies, according to the state of the urine, is always more or less of service. It may be necessary to have recourse to wine in addition to these or other tonics, or to the sulphate of quinine given in the compound infusion of roses, &c. The bowels should receive due attention during the progress of the case; and the occasional administration of an enema containing oleum terebinthinæ will generally be of service, as respects not merely the state of the bowels, but also the system generally.

21. The local affection has too commonly been viewed as local merely—as simply inflammatory; and the inflammation has too frequently been considered as of an ordinary sthenic kind, instead of asthenic, and requiring very opposite means to those often employed. Because there have been swelling, increased redness, enlargement or engorgement of the adjoining glands, leeches have often been prescribed, and have either increased the mischief or have had no beneficial influence on the disease. Cold applications to the neck or the throat have not been of greater service. I have generally employed, with benefit, embrocations to these situations, consisting chiefly of the terebinthinated and camphorated forms prescribed in various parts of this work and in the *Appendix*, and such applications or gargles to the affected parts as the age and circumstances of the case suggested. When the patient can use a gargle, then the decoction of cinchona, with hydrochloric acid, or with hydrochlorate of ammonia, or with alum, or with tincture of myrrh, or of krameria; or strong tar-water; or various fluids containing creasote; or even the chloride of zinc, or of lime, in small quantities, may be severally tried, according to the peculiarities of the case and the effects produced.

22. Washes, lotions, linctuses, &c., are like-



wise of great service, especially when the former are applied directly to the parts by means of a sponge attached to a small stick or piece of whalebone. Washes or lotions may contain either the nitrate of silver, or the sulphate of zinc, or the chloride of lime, or the chloride of zinc. When a linctus is preferred, then the substance should be such as may be passed into the stomach not only without danger, but with benefit. Thus a linctus may be prescribed containing either the hydrochloric acid, or the oleum terebinthinæ, or the tincture of cinchona or of myrrh, or red wine, &c.; and when an emetic effect is desired, then the sulphate of zinc may be given in this way.

23. The *variety* of ulcerated stomatitis described by the American physicians as peculiar to pregnant and puerperal females requires also a restorative and tonic treatment. Dr. BACKUS advises, as local applications, mild astringent infusions, or a solution of nitrate of silver. Suckling in these cases ought always to be relinquished. Dr. HOLT states that the disease has invariably yielded to iodide of potassium, given in doses of five grains three times a day, a cure having been obtained in a very few days, often in two or three. Dr. WILCOX says that he has met with uniform success from the decoction of *Polygonum punctatum* of ELLIOT, made by boiling an ounce of the dried leaves and tops in a pint of water for twenty minutes, and employed as a gargle almost hourly.

[Dr. E. HALE has given a very good account of this form of the disease (*Trans. of the Mass. Med. Soc.*, vol. v., and *Amer. Journ. Med. Sci.*, April, 1842), which is chiefly copied by our author. After a gentle emetic of ipecac, Dr. H. rests the cure chiefly on tonics, such as the lime-water infusion of bark, &c. Carbonic acid, as in bottled beer, porter, and effervescing salts, was also found useful. Where there was much debility, sulphate of quinine was used with advantage. All stimulating tonics were found injurious, especially tinctures. Dr. H. attaches little value to local remedies. Dr. BACKUS, of Rochester, recommends chalybeates combined with rhubarb and aloes, as follows:

R. Carb. Ferri, grs. lxx.; Pulv. Rhei et Aloes, ãã, grs. xv. M. Ft. mass. in pil, 50 divid. Two to be taken twice or three times a day, or often enough to regulate the bowels.

We have found great benefit in this affection from the use of nitrate of silver locally, and the internal use of citrate of iron, aloes, and hydriodate of potash. The food should be chiefly milk and farinaceous articles.]

24. V. STOMATITIS PHAGEDENICA.—SYNON.—*Cancerum Oris*—*Cancer Aquaticus*—*Stomacac Maligna*—*Noma*—*Gangrenous Stomatitis*—*Water-canker*—*Sloughing Phagedena of the Mouth*.—This most dangerous and very often fatal affection presents, from the commencement, very different characters from those of the other forms of stomatitis. The gangrene or sloughing, which occurs consecutively of the forms of stomatitis already noticed is merely an occasional termination of these, owing either to neglect, or to general cachexia, or to extreme exhaustion or depression of vital power; but this malady is primarily and idiopathically distinct from the gangrena oris—from the gangrenous terminations of the other kinds of stomatitis.

25. A. The *literary history* of phagedenic stomatitis is briefly as follows: The disease appears to have been noticed by C. BATTUS, a physician

in Amsterdam, as early as 1620; and VANDER Woorde soon afterward designated it by the term *water-kanker*. ARNOLD BOOT, in 1649, described it by the names of *labrosulcium* and *cheilocace*, very probably confounding it with other forms of stomatitis. VAN RINGH assigned it the name of *scorbutic cancer*; and VAN LILL called it *noma*, *ulcus noma*, and *stomacac*. CALLISEN designated this malady *stomacac gangrenosa*; LENTIN, *ulocace*; and WENDT, *sphacelus of the mouth*. LUND, a Swedish physician, saw eleven children with this malady, which he named *noma*, and of these ten died. MEZA described it as he observed it in Denmark. Drs. COATES and JACKSON met with it in the United States, the former calling it *gangrenous ulcer* of the mouth, the latter, *gangagrapsis*; but they probably did not distinguish between it and other forms of stomatitis. It has also been noticed by C. F. FISHER, SIEBERT, C. G. HESSE, RUST, SCHMALZ, HILDENBRAND, GIRTANNER, JOERG, REIMANN, WEIGAND, HUETER, &c. The most detailed accounts of the disease have been furnished by A. L. RICHTER, GUERSENT, BLACHE, TAUPIN, RILLIET, and BARTHEZ. The first of these has described three varieties of this malady: 1st, the *noma scorbutica*; 2d, the *noma metastatica*; 3d, the *noma gastrica*—divisions which are more imaginary than real. The two last of these writers have adduced twenty-one cases of the disease, and, as well as M. GUERSENT, have appropriated much of what has been advanced by RICHTER. M. TAUPIN has described thirty-six fatal cases which occurred in the hospital for children in Paris.

26. B. The *symptoms* of phagedenic stomatitis are commonly swelling and hardness of one cheek or lip—of the cheek most frequently—without marked increase of heat or redness, and without much tenderness or pain, even on examination. Owing to the absence of acute or active symptoms at the commencement, the disease is often overlooked at first, or until it has made a dangerous progress. The tumefaction externally is, however, early attended by a waxy and glossy appearance, which is so characteristic as to direct the instant attention of the physician to the disease, although it may have been overlooked or unattended to by the friends of the patient. On examining the mouth, little or no redness or mark of inflammation is observed; but, in the internal surface of the swollen part, an ash-coloured or whitish eschar or slough of small size may be detected in the centre of the cheek, or in the commissure of the cheek and lower jaw, surrounded by hardness and swelling. The tongue is pale, flabby, or slightly loaded; the gums are pale and spongy. There are more or less marked indications of debility, exhaustion, and cachexia, with languor and fretfulness. The pulse is generally small, soft, and quick, but without much increase of temperature, until towards evening. The evacuations are unhealthy and offensive.

27. If the disease come under treatment at this early stage, a judicious treatment will frequently arrest its progress. But as it advances from this stage the danger increases. The slough or eschar on the inside of the cheek soon spreads, and even extends to the lips and gums, and is attended by a copious discharge of saliva, which is clear at first, but soon becomes turbid and mixed with mucus and a sanious matter. The breath is now very offensive. As the gangrenous disorganization thus extends, the external appearances indicate

the invasion of the integuments about the centre of the tumefaction. A vesicle or a pale or ashy spot appears in this situation, and soon becomes livid and sloughs. The discharge from the diseased parts is now remarkably contaminating and corroding, the lower lip, the angles of the mouth, and the alveolar processes, being not infrequently destroyed by it. The teeth often fall out, with dead portions of the alveolæ; and if death does not previously occur, both sides of the face may become affected, or the gangrene may extend to all the soft parts of the mouth and face, and even to the maxillary, the palatal, and the nasal bones.

28. As the malady thus proceeds locally, the constitutional symptoms are chiefly those of increasing vital depression and contamination of the circulating fluids. The cachectic indications are more and more apparent; the pulse more rapid, feeble, and small; and the bowels, which at first were confined, generally become much relaxed and extremely offensive. The urine is offensive, alkaline or phosphatic, or soon becomes ammoniacal. The general surface is usually cool; the extremities become cold; and life gradually, but quickly, ceases. From an early period, the disease may be complicated with more or less internal disease, more especially with latent or congestive pneumonia, or with an asthenic gastro-enteritis; but these are only contingent or occasional associations.

29. *C.* The *diagnosis* of phagedenic stomatitis is, from the commencement, sufficiently evident. The hard, indolent swelling, and the peculiar glossy or waxy appearance of its outer surface, and the small slough in its internal surface, are quite characteristic of this malady. The *prognosis* should be unfavourable or stated with great caution from the first. If the disease be seen at the early or œdematous stage, and be treated in, or can be removed to, a wholesome situation, a judicious treatment may arrest its progress; but if gangrene be established, although recovery may take place, disfigurement cannot be prevented; and if sloughing and the constitutional symptoms have advanced and are severe, recovery cannot be expected. When the disease appears in hospitals for children the issue is generally fatal.

30. *D.* The *causes* of phagedenic or gangrenous stomatitis are those already noticed as occasioning the other forms of stomatitis, more especially pre-existent cachexia, depression of vital power, or exhaustion by previous disease, by exanthematous fevers, by protracted disorder of the pulmonary, the digestive, and assimilating organs, and by living on unwholesome and insufficient food. Low, cold, and humid apartments, particularly cellars, ground floors, &c., are also not infrequent concurrent causes of the disease. The specific action of mercury may favour or more directly occasion it, although it more frequently appears independently of this mineral, and when none of its preparations have been taken. It occurs chiefly between the ages of two and nine years, but most frequently from three to six years of age. The air of hospitals for children is most commonly productive of this malady; and, when treated in the wards of these hospitals, recovery rarely takes place. M. TAUPIN has seen thirty-six cases in the hospital for children in Paris, and they were all fatal.

31. *E. Treatment.*—Prompt and decided measures are required for this form of stomatitis. The patient should be removed into a dry, warm, and

well-ventilated apartment, and the causes of the disease as far as possible avoided. The state of the cheeks and mouth should be very carefully ascertained, and means appropriate to the existing changes instantly applied. If no slough have as yet appeared in the interior of the cheek, the terebinthinate embrocation (§ 14, 21) should be applied externally, and the internal surface be washed by a lotion of strong tar-water. If the latter cannot be readily obtained, one part of oleum terebinthinæ ought to be mixed in three of honey, and applied to the inside of the cheek and gums twice or thrice daily. In some cases, I have given a warm stimulating emetic of sulphate of zinc, and a small quantity of capsicum, with marked advantage, and subsequently a stomachic aperient draught, the operation on the bowels having been promoted by a terebinthinate enema. During the treatment of the early stage of the malady, the decoction of cinchona, with muriatic acid and ether, or with ammonia, or with chlorate of potash, or the quinine or other tonics, as advised above (§ 20), should be given at duly regulated periods, between the administration of suitable nourishment.

32. In a farther advanced stage, when a slough has become very manifest in the mouth or cheek, the part ought to have solid nitrate of silver, or strong hydrochloric acid applied to it, the surface being frequently washed by the lotions already mentioned, or by a strong solution of nitrate of silver, or muriate of ammonia, or with washes containing the chloride of lime, or of zinc, or creasote, with camphor and myrrh. These latter will tend to arrest the sloughing, will correct the fetor, and will counteract the contaminating influence of the discharge from the diseased part. During this period, cinchona and other tonics, in combinations already mentioned, should be prescribed; and beef tea, with rusks; the yolks of eggs, with wine or brandy; turtle soup, and other nourishing, digestible, and restorative articles ought to be freely supplied. Instead of wine, or in addition to it, in the more extreme cases, the *mistura spiritus vini Gallici* may be administered in doses suitable to the age of the patient. From 1821 until 1825 or 1826, I frequently had recourse to the chlorate of potash in this and in other asthenic diseases, at the Infirmary for Children; but I seldom found it of great service when given alone at advanced stages of these maladies. It was, however, often prescribed in conjunction with other remedies with much benefit, and especially in the forms stated in early parts of this work—with the decoction and compound tincture of cinchona, or with cascarrilla, camphor, &c.

33. When sloughing has made still farther progress, the local means already advised ought to be more frequently employed, and in more concentrated forms. Turpentine mixed with honey, in equal quantities, or thickened with liquorice powder, should be applied to the part, and if the external surface of the swelling become livid, the same application ought to be made to it; or an incision should be made into it, and the incised part frequently injected with either of the lotions or washes already mentioned. MM. BARON, BILLARD, and others, have recommended the actual cautery, at a white heat, to be applied to the incised part. Of this last I have no experience and little hope. The other means I have found successful when the constitutional powers have been duly supported, and when the disease had not



advanced to a hopeless condition before medical aid was obtained. When great irritability and distress have appeared in cases of this malady, I have generally conjoined some preparation of opium with the local means, and prescribed it internally with camphor and other remedies, having due regard to the age of the patient, and directing it with much caution at an early age.

[The formula of Dr. B. H. COATES, of Philadelphia, has been found very successful in the treatment of these cases.

R Sulph. Cupri, ʒij.; Pulv. Cinchonæ, ʒss; Aquæ, ʒv. M. To be applied twice a day very carefully to the ulcerations and exoriations.

The Sulph. Zinc. (ʒj. to ʒj. water) is also useful as a local application; but the most important indication is to support the constitutional powers by a free internal use of stimulants and tonics. All the cases of this disease that have fallen under our observation have been among the children of the poor, and of orphan asylums, in whom the breathing of impure air, and the use of crude and innutritious diet, had brought on such condition of the fluids as to powerfully predispose the system for such forms of disease.]

BIBLIOG. AND REFER.—*C. Battus*, Manuel de Chirurg. Amst., 1620.—*J. Mays*, Prax. Chirurg. Rat. 1684.—*A. Boot*, Observ. Med., &c., Svo. London, 1649.—*Huxham*, Reports. July, 1745.—*Van Swieten*, Comment., &c., t. iii., p. 197.—*A. L. B. Jourdan*, Traité des Maladies de la Bouche, &c., 2 tomes, 8vo. Paris, 1778.—*Berthe*, Mém. de l'Academi. Roy. de Chirurg., t. v. p. 381. (*Gangrène Scorbutique*, &c.)—*Colombier*, in Hist. de la Soc. Roy. de Méd., p. 186. 1779. (*Stomacacæ Maligna*).—*Meza*, in Acta Havn., t. ii., p. 117.—*Lentin*, Beyträge, p. 246.—*F. A.*, Tratado de las Enfermedades de la Boca, 4to. Madrid, 1793.—*J. B. Gariot*, Traité des Maladies de la Bouche, 8vo. Paris, 1805.—*Alard*, in Corvisart's Journ. de Médecine, &c., p. 354. 1812. (*States the disease to be contagious*).—*Mende*, in Hufeland and Himley Journ. der Pract. Heilk., p. 24. Oct., 1809. (*He considers the disease to be contagious*).—*Baron*, Bulletins de la Faculté, &c., t. v., p. 145. Paris, 1816.—*M. Hall*, in Edin. Med. and Surg. Journ., vol. xv., p. 547.—*Cumming*, in Dublin Hospital Reports, vol. iv., p. 18.—*Evanson* and *Mainsell*, A Practical Treatise on the Management and Diseases of Children, 2d ed., Svo. 1838.—*A. L. Richter*, Der Wasserkrebs der Kinder, Berlin, 1823; et in Journ. des Progrès, t. iii., p. 1. 1830.—*Hucter*, in Journ. des Progrès de Sc. Méd., t. xviii., p. 1. 1829.—*Billard*, Traité des Mal. des Enfants, &c., Svo. Paris.—*H. Hunt*, in Transact. of Med. and Chir. Society, vol. xxvi., 142.—*C. Hawkins*, Ibid., p. 151.—*B. H. Coates*, North Amer. Med. and Surg. Journ., vol. ii., p. 20.—*Murdoch*, in Journ. Hebdom. de Méd., t. viii., p. 232. Paris, 1832.—*Taupin*, in Journ. des Conn. Médico-Chirurg., t. vi., p. 137. Paris, 1839.—*F. F. Backus*, in Am. Journ. of Med. Sciences, Jan., 1841.—*H. D. Holt*, in New York Journ. of Med., vol. x., p. 372.—*R. Wilcox*, Amer. Med. and Surg. Journal, N. S., vol. xvi., p. 248.—*Rilliet et Barthéz*, Traité des Maladies des Enfants, t. ii., p. 152.—*G. B. Wood*, Treatise on the Practice of Medicine, 2d ed., vol. i., p. 469.—*Symonds*, in Library of Practical Medicine, vol. iv., p. 34.—*Guerrent et Blache*, in Dict. de Méd., art. *Stomatite*.

[AM. BIBLIOG. AND REFER.—*J. Bell*, Lectures on the Practice of Physic, 2 vols. Phil., 1848. (Dr. B. has treated the subject of *Stomatitis* in a very able and judicious manner through three lectures.)—*B. H. Coates*, N. Am. Med. and Surg. Journ., vol. xi., p. 20.—*F. F. Backus*, Am. Journ. Med. Sci., vol. i., N. S., p. 114. 1841.—*W. P. Dewees*, Am. Pract. of Med.—*J. Stewart*, Trans. of Billard.—*G. B. Wood*, A Treatise on the Practice of Medicine, 2 vols. Phil., 1847.—*Levis Shanks*, On Endemic Sore Mouth and Diarrhoea peculiar to nursing Women, Amer. Jour. Med. Sci., vol. iv., N. S., p. 300. (Dr. S. maintains that the predisposing cause of the disease in nursing females is malaria, combined with humidity of the atmosphere, and is preceded and attended with deranged secretions of the stomach and liver. He recommends alteratives of mercury, iron, ipecac, and aloe, with alkalies; diet, rice, barley, arrow-root, stale bread, and boiled milk; as a wash, the infusion of blood-root with borax or burned alum. The child to be weaned in bad cases.)—*E. Hale*, Med. Com. of Mass. Medical Soc., vol. v., p. 1, 1830; and copied in Am. Jour. Med. Sci., vol. iii., N. S., p. 511.—*J. Hays*, in Ibid., vol. iii. (In noticing Dr. Hale's article, Dr. Hays states that the late Dr. Dewees never met with it in Philadelphia, nor any of his friends with whom he

had conversed on the subject; and yet it is a very common disease in many parts of our country.)—*B. W. Taylor*, Remarks on a Species of Sore Mouth peculiar to nursing Women, Am. Jour. Med. Sci., vol. v., p. 119.—*C. B. Hamilton*, in Ibid., vol. viii., O. S., p. 357.—*M. L. North*, Nurses' Sore Mouth cured by Congress Water of Saratoga, Boston Med. and Surg. Journal, vol. xxii., p. 201.—*T. M. Tweed*, Observations on Cancrum Oris, Western Lancet, vol. vi., p. 12.]

STOMATORRHAGIA.—*Hæmorrhagia Oris*.—*Hæmorrhage from the Mouth*.—See art. HÆMORRHAGE, § 85, et seq.

SUCCUSSIO.—SYN.—*Successio*; *Secousse*, *Succussion*, Fr. *Das Schütteln, die Orschütteln*, Germ. *Hippocratic Succussion of the Trunk*.

CLASSIF.—GENERAL PATHOLOGY—SEMEIOLOGY.

1. *Succussion of the trunk of the body* was mentioned by HIPPOCRATES in several parts of his works, and was employed by him to ascertain the presence of purulent and other fluids in the cavities of the chest. MORGAGNI, in noticing this mode of diagnosis, admitted its frequent failure, but in such a way as evinced his ignorance of the circumstances to which failure is owing. LAENNEC first clearly demonstrated the conditions upon which the evidence furnished by succussion depends, and since his time this mode of investigating diseases of the chest has been resorted to whenever they have been supposed to have been attended by effusion of fluid into the thoracic cavities. It is chiefly in *pneumothorax* that succussion produces the sound of fluctuation in the pleural cavity, for it is necessary to the production of this sound that, along with the fluid, more or less air should also be present.

2. *Succussion* is performed, as recommended by HIPPOCRATES, by seizing both shoulders of the patient while he is seated, and, having applied the ear to the side of the thorax, by jerking the trunk, or by abruptly turning or shaking the trunk, a sound resembling the splashing or fluctuation of water is then heard, if a fluid and air be contained in the cavity. If the cavity contain no air, although filled by a liquid, no sound will be produced, for the collision of the fluid with air is requisite to the production of sound, and the greater the quantity of air the more distinct will be the sound of fluctuation or splashing. Care should be taken, during this mode of investigation, to distinguish between the sound of fluctuation produced by succussion in the stomach, when this organ contains much air and liquid, and that which is produced in one of the thoracic cavities. A mistake will be prevented by the slightest attention, for the seat of fluctuation is generally easily manifested. In many cases, the patient himself can perform succussion; and it is often useful to cause him to perform it while the physician applies his ear to the presumed seat of effusion. Succussion is useful chiefly in the diagnosis of pneumo-hydrothorax or pneumothorax. (See art. PNEUMOTHORAX, § 17.)

BIBLIOG. AND REFER.—*Hippocrates*, *phurics*.—*Morgagni*, De Sed. et Caus. Morb., Epist. xvi., 37.—*Laennec*, De l'Auscultation médicale, &c., t. ii. Paris, 1819.—*Martin Solon*, Dict. de Méd. et Chirurg. Prat., art. *Succussion*.—*W. Stokes*, A Treatise on the Diagnosis and Treatment of Dis. of the Chest, Part 1., p. 532.

SUPPURATION.—See arts. ABSCESS and INFLAMMATION, § 44, et seq.

SYCOSIS.—SYNON.—*Sycoma*; *Sycon*; *Sycosis* (from συκον, a fig); *Mentagra*; *Picus*; *Sycosis menti*; *S. barbæ*; *Mentigo*; *Varus Mentagra*; *Phyma Sycosis*; *Roscola flosca*; *Dartre*

*pustulose mentagre*, Fr. *Barber's Itch*; *Chin-walk*; *Whelk*.

CLASSIF.—IV. CLASS, IV. ORDER (*Author in Preface*).

1. DEFIN.—A chronic pustular eruption, either scattered singly, or clustered, over the chin, upper lip, or lateral parts of the face; the pustules being pointed and seated chiefly in the hair-follicles and connected tissues, and being sometimes propagated by contagion. (See art. SKIN, § 78.)

2. i. DESCRIPTION.—This chronic eruption of the skin appears chiefly on the hairy parts of the face, and sometimes on the nape of the neck, and much resembles acne. It seems to be developed in the hair-follicles and sebaceous glands, and their connected tissues, giving rise to conical elevations, which become pustular. The pustules are generally traversed by the shaft of a hair; are of a pale yellow colour. Their evolution is usually attended by a sense of heat and tension of the affected parts. When disseminated they appear as very small red points, which gradually become more prominent, until about the third day, when their tops become white, and soon afterward are filled with a yellowish pus. These pustules seldom much surpass the size of a millet-seed. From the fifth to the seventh day each pustule bursts spontaneously; its sides shrink, and a slight oozing takes place, producing a brownish crust, which is very slightly adherent, and passes at its edges into the epidermic exfoliation from the inflamed surface immediately surrounding the pustule.

3. When the pustules are clustered or grouped in numbers, the inflammation then extends to the subjacent cellular tissue, and occasions small, hard, and red inflammatory tumours, covered with pustules, or inerustations of considerable thickness, and of a mixed yellowish and greenish-brown hue. Most frequently, sycoosis appears, like rosacea, in repeated partial eruptions, succeeding each other at irregular intervals. When the pustules break out repeatedly on the same places, the inflammation of the subjacent tissue occasions indurations and thickenings, which, with similar changes in the corion, present the appearance of large tubercles. These are most frequently observed in aged, cachectic, or leucophlegmatic persons, in whom resolution of the pustular inflammation is imperfect. When the eruptions have been extensive, or have succeeded each other rapidly, these tubercles increase in number, and spread over the skin or other hairy parts of the face. The pustules which continue to be evolved on the surfaces of these tubercles, or in the intervals between them, evince the nature of the affection. This advanced state of the eruption—this admixture of pustules, tubercles, and inerustations—imparts a disgusting appearance; and at this stage, sycoosis is always obstinate, a cure being never obtained but with great difficulty.

4. Sycoosis may be confined to the upper lip; the agglomeration of pustules on this part occasioning a thick brownish or blackish scab, greatly elevated above the surface. When the disease is prolonged or extensive, the skin often becomes much altered by it, and so swollen in parts as to appear covered by moist and vegetating tumours. The bulbs of the beard often participate in the inflammation, and the hair falls out; but subsequently, when the disease is cured, lighter and weaker hair is reproduced, and acquires

greater strength. In very chronic and severe cases, the loss of portions of the beard is permanent.

5. When the disease yields to treatment, new pustules cease to appear; the inerustations are detached, and the tubercles or small tumours decline in hardness and size. Slight desquamations occasionally take place from the points formerly affected, which continue for a long time red or livid, especially in cachectic habits and aged persons, and in these particularly the affected parts retain their thickened and tuberculated appearance through the rest of their lives.

6. The duration of this eruption is never less than one, two, or three months: it often continues for years, notwithstanding the most rational treatment; and is apt to recur, after having been cured, in persons of faulty constitution, in those advanced in age, and after errors in diet and regimen. The continuance or recurrence of the causes of the eruption tends also either to prolong or to reproduce it.

7. ii. DIAGNOSIS.—The conical form of the pustular elevations, the bright red of the bases, the deep-seated connexion of the pustules, and the purplish and indolent tubercles which succeed them, are characteristic of this eruption, which, however, may be mistaken for acne, ecthyma, impetigo, boils, and syphilitic eruptions. The situation and the relations of the pustules of sycoosis to the hair distinguish them from acne. The pustules of ecthyma are larger and more highly inflamed than those of sycoosis. The scabs following ecthyma are also broader, thicker, and more adherent, and are unconnected with tubercular elevations and indurations. The small pustules of impetigo figurata hardly rise above the level of the surface, and are not pointed like those of sycoosis; they also differ from the latter in the greater rapidity of their evolution, and the more acute symptoms attending their progress. Although both these pustular eruptions may be disposed in groups, those of sycoosis are most frequently isolated and distinct, while those of impetigo figurata are generally clustered. The pustules of the latter burst on the third or fourth day, and the fluid from them is quickly changed into continuous yellowish inerustations, which increase in thickness in the course of a few days. Those of sycoosis, on the contrary, do not burst until the fifth, sixth, or seventh day, and the scabs which succeed are thin, slight, and isolated. All these features are, however, obscured when the pustules of sycoosis are copious and extensive, and give rise to a pale yellowish-green secretion, or when sycoosis is severe and acute, and the pustules confluent or crowded; but even then the thickening, swelling, and induration of the subcutaneous cellular tissue and corion, imparting a tubercular character to the affected part, will prevent any mistake. In furuncle the inflammation commences in the cellular tissue and extends to the skin, much pus and a sloughy core being expelled through an opening which leaves a scar. But in sycoosis the inflammation first affects the hair-follicles, and the pustules discharge only a small quantity of pus by a minute opening, which is speedily effaced without leaving a scar.

8. Syphilitic pustules very rarely are confined to the lower or hairy parts of the face. They most frequently appear on the ala of the nose, forehead, and near the angles of the mouth. They are much flatter than those of sycoosis, and,



instead of arising from bright red bases, as the latter do, they spring from coppery, dirty, and almost flabby bases; and they are not preceded by the smarting or painful tension ushering the eruption of sycosis. The tubercles of sycosis may be more readily confounded with the tubercular syphilitic eruption; but those of the former are more conoidal, their bases are seated more deeply, while the syphilitic are more rounded, have a shining appearance, and are more superficial. They are, moreover, primary in their formation, while those of sycosis are consecutive of the pustules. The syphilitic eruptions are also preceded and attended by a variety of other morbid phenomena, which farther serve to distinguish them, as sore throat, inflammation of the conjunctivæ, nocturnal pains, &c.\*

9. iii. The PROGNOSIS of sycosis is most uncertain; for it is impossible to state with certainty the period of its duration; and even when the decrease of the eruption and the appearance of the affected parts promise a speedy cure, fresh pustules often break out, without any apparent cause. In other cases, when the extent and severity of the eruption lead to the expectation that the disease will prove most obstinate, an active and judicious treatment may remove it in a comparatively short time. M. RAYER considers that those cases generally prove the most rebellious which, in the chronic state, preserve the pustular and primitive form.

10. iv. CAUSES.—The contagious nature of sycosis has been contended for by some writers, and denied by others. PLINY states that the disease, which he described by the name of *Mentagra*, spread in Italy by contagion. If this disease was actually not sycosis, it was very closely allied to it. M. FOVILLE states that he has seen several of the insane patients in the hospital of Rouen successively attacked with this affection from having been shaved with the same razor. Admitting the disease to be contagious, circumstances cannot often favour such an occurrence, especially in such a manner as will demonstratively manifest the fact. Sycosis most frequently appears in adult males (very rarely in females) of a sanguine or bilious temperament, who have thick and strong beards; and occasionally among the aged, more especially among those who have been habitually used to strong heats, as cooks, founders, refiners, and workers in glass and metals. The abuse of spirituous liquors, indulgence in the luxuries of the table and highly-seasoned food, and similar causes, have been supposed to occasion it; but these may more rationally be

considered as causes which concur to perpetuate it, or to render it more remarkably chronic, than to originally produce it. The want of due cleanliness, irritating applications to, or rancid matters allowed to remain in contact with the parts affected, the use of a foul, or blunt, or rough-edged razor, are much more likely to excite this eruption than those other causes to which it has been sometimes imputed. It appears more frequently in spring and autumn than at other seasons.

11. Dr. GRUBBY, of Vienna, has lately contended that favus is occasioned by a vegetable formation, and that such a formation, of the cryptogamic kind, is found in the roots of the hair of the beard in this affection, and around that portion which is contained in the hair-follicle. The seeds of this vegetable formation, for which he proposes the name of *mentagrophite*, he believes to be the source of the contagious nature of the disease. On examining this affection with the microscope, the scales appear to be composed of epidermic cells, but the whole of the dermic portion of the hair is surrounded by cryptogamic formations, which constitute a vegetable sheath around it, in such manner that the hair may be likened to the finger surrounded by a glove. These cryptogamia never rise above the surface of the epidermis: they originate in the matrix of the hair and in the cells of which the follicle is composed, and they ascend so as to surround all that portion of the hair included within the dermis. "They present every where a prodigious number of sporules, which are adherent on the one side with the internal surface of the follicle, and on the other with the cylinder of the hair; to the former they are very closely connected. Each plant is composed of a stem of several branches, and of sporules."

12. v. TREATMENT.—The causes, both exciting and concurring, should be removed, and the hair cut close with curved scissors, particularly if the use of the razor aggravate the affection. In some cases an emetic will be given with advantage, but it should be followed by stomachic purgatives. If the local inflammation be considerable, leeches may be applied; and if the patient be plethoric, a general blood-letting may precede them. Local emollient applications should be first employed, and these ought to be followed, especially as the disease becomes chronic, by applications which contain the chloride or bichloride, or the proto-nitrate of mercury, in the form either of ointment or lotion. Ointments containing the iodide of sulphur, or the iodide of potash and sulphur, or even sulphur only, are most successful, especially when emollient applications, or vapour douches, or warm-water douches, are used in the intervals between the employment of these ointments. In some cases a restorative or tonic constitutional treatment is required, and alterative mineral springs and waters are often of service. The hair, especially when it becomes loose, should be removed from the seat of eruption; and if the affection become very chronic and obstinate, the application of the mineral acids, or of the caustic alkali, or the nitrate of silver, or even of the chloride of zinc, may severally be tried. Great care should be taken in this affection, as well as in others for which ointment may be required, that they are recently made. In a case to which I was lately called, the zinc ointment was prescribed after the

\*["The chronic miasm which we designate by the term *Sycosis*," says HAHNEMANN (*Chronic Diseases*, translated by HEMPEL, vol. i. p. 111), "has only prevailed from time to time, and has given origin to the smallest number of chronic diseases. *Sycosis* was especially spread in Germany, between the years 1809 and 1814, during the war with France; ever since then the disease has been decreasing. *Sycosis*, being supposed to be homogeneous with syphilis, has heretofore been treated with mercury internally, and externally by cauterization, burning, cutting, or ligatures." HAHNEMANN confounds sycosis with syphilis. "Both the gonorrhœa and the excrescences of sycosis," says HAHNEMANN, "are cured in the most thorough and durable manner by the internal administration of a few globules of the decillion preparation of *Thuya (arbor vite)*, which ought to be allowed to act for the space of fifteen, twenty, thirty, or forty days! After this lapse of time, you give an equally small dose of nitric acid, letting it act during an equally long period. These two remedies are sufficient to cure both the gonorrhœa and the excrescences of sycosis." The above will serve to show sufficiently both the diagnostic and therapeutic skill of the father of Homeopathy.]

use of emollient applications, and was found quite rancid and most injurious at five different chemists' in the outskirts of the town where it was had; but when this ointment was procured from a respectable chemist in town, it was quite successful.

[In the treatment of sycosis we have chiefly depended on the repeated application of leeches behind the ears or under the jaw, where the eruption was abundant and the inflammation violent, local emollients, an antiphlogistic regimen, and the preparations of iodine and iron as internal alteratives. Acidity of the stomach and the secretions generally is to be cautiously guarded against by a regulated diet, cutaneous frictions and the shower bath, and the use of alkalis. Douches of simple steam frequently applied to the diseased part will often accomplish a cure. We are not much in favour of caustic applications, as the nitrate of silver. Mercury, as an alterative, in very minute doses, will sometimes succeed, if the other measures are employed at the same time. M. BIETT, of the Hospital St. Louis (Paris), cured many cases by the internal use of the *muriate of gold*, used in doses of one third to half a grain, by frictions on the tongue. All alcoholic stimulants and exposure to fire are to be avoided.]

BIBLIOG. AND REF.—*Celsus*, Do re Medica, L. vi., cap. iii. — *Plinii Secundi*, Natur. Hist., L. xxvi., cap. i.-iv. — *Ætius*, Tetrab., i., serm. 5, cap. 80, 190. — *Pauli Æginetæ*, lib. ii., cap. 22. — *C. Johrenius*, De Mentagra, 4to. Franc., 1662. — See the Works of *Willan*, *Bateman*, *Rayer*, *Plumbe*, *E. Wilson*, and others, referred to in the several Articles on Chronic Cutaneous Affections, and especially in that on the *Pathology of the Skin*.

#### SYMPATHY AND SYMPATHETIC ASSOCIATIONS OF DISORDER. — SYNON.

MORBID SYMPATHIES. — Συμπαθία or συμπαθεια, (from συν, with; and παθεω, I feel or suffer; or παθος, feeling, affection, suffering); *Sympathia*, Lat. *Consensus nervorum*; *Partium Consentio*, Auct. *Die Mitempfindung*, *Sympathie*, Germ. *Sympathic*, Fr. *Simpatia*, Ital. *Morbid Sympathies*.

CLASSIF.—PHYSIOLOGICAL PATHOLOGY—GENERAL PATHOLOGY—SEMIOLOGY.

1. DEFINIT.—Sympathy cannot be more correctly defined than it has been by Dr. KLEIN GRANT, as follows: "*That relation of the organs and parts of a living body to each other whereby an action excited in one part induces a corresponding action in another part.*"

2. BAGLIVI attributed the sympathies to membranous connexion, BORDEU to the cellular tissue, WILLIS and VIEUSSENS to the agency of the nerves, and WHYTT and BROUSSAIS chiefly to the brain. REGA divided the sympathies into those of sensibility and those of contractility—a division which has much to recommend it. BICHAT made some excellent observations on the relations subsisting between the sympathies and the different parts of the nervous system; but, although these observations were calculated to lead to a more correct arrangement of the sympathies than had formerly been offered, they have not yet produced this result. The writings of UNZER, far in advance of their age, had previously furnished much that was calculated to increase our knowledge of sympathetic phenomena; but this was physiological rather than pathological, and without sufficient practical application. BICHAT appears to have been ignorant of the works of UNZER. Contemporaneously with the former,

PROCHASKA examined physiologically sympathetic phenomena, when treating of the sensorium commune and the consensus nervorum, in his treatise on the Functions of the Nervous System; and while he recognised what had been done by WILLIS, WHYTT, STAHL, UNZER, and others, explained the phenomena by means of the sensorium commune, to which he referred the consensus nervorum.

3. In 1824, I defined sympathy to be, *that state of an organ or texture having a certain relation to the condition of another organ or texture, in health and disease; or, a related state of the vital manifestations or actions in different organs or textures, as, when one part is excited or affected, others are likewise affected or disordered*. I then classed sympathies into the reflex and the direct; the former taking place through the instrumentality of the sensorium, the latter being independent of it, and occurring through means of the ganglial nerves, and chiefly of those which form communicating cords between the viscera and of those which are distributed to the blood-vessels.

4. Subsequently, Dr. M. HALL referred many of the phenomena usually ascribed to sympathy, especially those which I denominated reflex, to a reflex function of the spinal cord, which function he considered to occur independently of the brain, or even of the sensorium, that is, supposing the sensorium to be seated in the brain. But that the sensorium commune is actually seated only in the brain, has been, and still is, doubted. WILLIS considered that there is a rational and a corporeal sensorium, and UNZER long subsequently adopted the same idea, or nearly the same idea, which was more fully developed and modified by PROCHASKA. This last writer subdivided this principle into two elements—namely, the sensorium commune of the soul, which is seated in the brain only, and reflects those impressions of which we are conscious, and the sensorium commune of the body, which is seated in the brain, spinal cord and ganglia, and plexuses of the sympathetic system. But, wherever seated, there is evidently only one sensorium commune, which takes cognizance of impressions, and reflects them to distant parts, or, by means of which impressions, movements, &c., become sensations, or objects of consciousness or sentient operations, whether lively or faint, thereby constituting the class of reflex sympathies attended by consciousness. That this great principle may be seated in the basilar or central parts of the brain and medulla oblongata is very probable, but that it extends also to other or more distant parts, and is independent of these centres of conscious or sentient actions, is not so admissible; for it is more reasonable to infer that those movements or actions which are unattended by consciousness may be the results of a direct consensus of nervous action, or of a reflected consensus from ganglial or subordinate nervous centres, that either is not conveyed to, or does not reach the seat of conscious sensation, or which, owing to the state of this principle, or of its seat, fails to excite, rouse, or affect it.

5. It is obvious that, if we attempt to arrange those sympathies which depend upon a consensus of the nerves, the classification must be made either independently of any reference to consciousness, or with so strict a regard to this principle as to assign to it a higher attribute than that which a simple nerve-action involves. If,



however, we neglect such reference, any arrangement of nervous sympathies must be imperfect; and if we pay due regard to it, the difficulty of classification is greatly increased, seeing that the simplest and most direct consensus, such as those which concern the ganglial nerves, and which ordinarily occur independent of sensation, may become objects of the most intense sensation, the same change also taking place in respect of reflected sympathies, which may or may not be attended by consciousness, according to the intensity of the cause producing them, or to the state of the sensorium or of its seat. Hence it may be preferable to arrange sympathies with reference to the superadded attribute of consciousness, but not to assign an order of sympathies alone manifesting this attribute or principle, seeing that there are few or no nervous sympathies which may not, by intensity or otherwise, be attended by it, or excite it. Conformably with this view, therefore, I have offered the following arrangement, which I have more fully developed in the sequel: 1st, *direct sympathies*, transmitted directly, either by nervous communications or by continuity of structure, &c.; 2d, *indirect or mediate sympathies*, conveyed by vascular communication, by states of the fluids, &c.; 3d, *reflected sympathies*, occurring through the media of the several orders of the nervous system, with or without consciousness.

6. From the time of WILLIS until those of UNZER and PROCHASKA, sympathy and consensus of the nerves were generally viewed as synonymous; and this consensus being supposed to depend upon the sensorium, it became a great difficulty to explain how this consensus took place with consciousness in some cases, and without consciousness in others. It was therefore inferred that the consensus which involves this principle takes place in the brain, and excites or impresses the mind or soul; and that the consensus which fails of impressing the mind is seated throughout the frame in the several parts of the nervous system; the former being the mental consensus, and depending upon a mental or soul sensorium, the latter being a corporeal consensus, and depending upon a bodily sensorium. Thus these physiologists divided the sensorium into two essences or manifestations, the one with, and the other without consciousness, the latter, however, being only nerve action, or the vital manifestations of the nervous system, which are unattended by consciousness, and which constitute an important, indeed the most extensive and important part of those phenomena, which are comprised under the head of morbid sympathies.

7. The subject cannot be better illustrated, nor the observations I intend to offer on sympathy better introduced, than by adducing the remarks of PROCHASKA respecting it; and these cannot be more clearly conveyed than in the words of Dr. LAYCOCK, who has most ably translated and edited the dissertation of this writer on the Nervous System for the Sydenham Society. "That point of the nervous system is termed the common sensorium (*sensorium commune*), in which external impressions meet, and from which internal impressions are diffused to all parts of our body; in which, consequently, the consensus of the nerves takes place that is necessary to life, and in which external impressions are reflected into internal impressions, according to the law

of self-conservation, with or without consciousness.

8. "That sensorium in which impressions are reflected with the consciousness of the soul, may be termed the soul sensorium; and the other, the corporeal sensorium; just as WILLIS has already divided it into the rational and the corporeal soul.

9. "The brain only is the seat of the soul sensorium; the seat of the body sensorium is the brain, spinal cord, and (as all observation shows) the ganglia and plexuses of the nerves. That external impressions can also be reflected in the brain, without consciousness, is shown by the involuntary convulsions of voluntary muscles. Monsters, born without brain and spinal cord, and which live up to the moment of birth, show that the consensus of the nerves necessary to this form of life, imperfect though it be, may take place, and that there may be a corporeal sensorium independently of the brain and spinal cord, and which, consequently, must be constituted by the plexuses and ganglia of the nerves. The movements observed to take place on irritating the nerves of a headless frog, and seen also in decapitated men, prove the same thing. The sympathetic nerve appears likewise to reflect its impressions in its ganglia and plexuses without the consciousness of the soul.

10. "In accordance with this consensus of the nerves, as well in the brain as in the spinal cord, ganglia, and plexuses, the operation of a stimulus is not limited to the nerves immediately irritated, but is extended to distant nerves, in known or unknown connexion with the irritated nerves; and this is demonstrated by innumerable examples of consensus of nerves (*consensus nervorum*), as, for instance, the irritation in the pregnant uterus often causes nausea, vomiting, headache, toothache, &c.

11. "Both the soul sensorium and body sensorium operate according to the law of self-conservation, a truth which may be illustrated by numerous examples. For instance, the irritation or impression of too strong a light goes to the optic nerve, from whence it can only get at the ciliary nerves through the brain, and induce contraction of the pupil, so as to exclude the too vivid light from the eye, and obviate its unpleasant impression."

12. By most writers, the term *consensus nervorum* has been viewed as synonymous with those nervous sympathies which occur in healthy persons, or which are not essentially morbid; while sympathy, according to its etymology, is considered by many as applicable only to associated morbid phenomena. The word *sympathy* has been viewed in both lights, and however correct the one may be, the other being the reverse, I shall respect common usage as regards it, and, in order to prevent any misapprehension, use frequently the prefix *morbid*, when discussing its numerous manifestations.

13. In attempting to illustrate *morbid sympathies*, or those associated states of disorder which most frequently present themselves to the physician, I shall first endeavour to classify them, conformably with the view above stated (§ 5, 12); and afterward proceed to notice those which come more prominently before the medical practitioner, as fully as the plan and limits of my undertaking will permit. Many topics can be only briefly and imperfectly considered, while others may be barely enumerated, and offered to the reader, or to fu-

ture inquirers, more fully to discuss or to illustrate.

14. ARRANGEMENT OF MORBID SYMPATHIES OR ASSOCIATED DISORDERS.

- i. Definition of sympathies.
- ii. Preliminary anatomical physiological observations.

- A. The great extent and importance of the ganglial or the organic nervous system.
- B. The connexions subsisting between the organic and cerebro-spinal nervous systems.

I. INQUIRY INTO THE MEDIA BY WHICH SYMPATHETIC AND SYMPTOMATIC PHENOMENA ARE EVOLVED, AND MORBID CONDITIONS ARE ASSOCIATED.

i. *Direct or immediate sympathies.*

- A. Direct communications by means of ganglial nerves.
- B. Influence of ganglia on different organs or parts.
- C. By direct communications by means of the cerebro-spinal nerves of sense and motion.
- D. By continuity of surface or tissue.
- E. By contiguity of organs and structure.

ii. *Indirect or mediate sympathies.*

- A. By vascular communications.
- B. By states of the circulating fluids.
  - a. The chyle and other absorbed fluids.
  - b. The blood.
- C. Owing to the conditions of the secretions and excretions.
  - a. By the various secretions.
  - b. By the excretions.

iii. *Reflected sympathies.*

- A. Reflected from nervous ganglia, often attended by spasm and altered sensibility of involuntary parts.
- B. Reflected through the media of the ganglionated roots of the spinal nerves, and affecting the movements of voluntary parts.
- C. Reflected through the medium of the spinal cord, and inducing morbid sensations or motions, or both.
- D. Reflected through either the medulla oblongata or the brain, or both, and causing various disorders of sensation, of perception, and voluntary action, &c.

II. CIRCUMSTANCES INFLUENCING THE CHARACTER, NUMBER, AND INTENSITY OF SYMPATHETIC PHENOMENA.

- i. *Race and temperament.*
- ii. *Habit of body.*
- iii. *Sex.*
- iv. *Age.*
- v. *Physical power.*
- vi. *Occupations, &c.*

III. CLASSIFICATION OF MORBID SYMPATHIES, OR OF SYMPTOMATIC OR ASSOCIATED DISORDERS.

i. ASSOCIATED AFFECTIONS OF DIGESTION AND ASSIMILATION.

- A. *Disordered states of digestion and of assimilation associated with each other.*
  - a. Associated disorders of the stomach and liver.
  - b. Associated disorders of the liver with the intestines.
- B. *Morbid sympathies between the digestive organs, and the secreting and excreting functions.*
  - a. Between the functions of digestion and the urinary functions.
  - b. Between the digestive functions and the skin.

- c. Between the functions of digestion and fœcation.

C. *Sympathies between the digestive and circulating and respiratory functions.*

D. *The sympathetic and symptomatic relations between the digestive organs, the brain, and the organ of sense.*

E. *Sympathies between the functions of digestion and locomotion.*

F. *Associated disorders of the digestive and the sexual organs.*

ii. SYMPATHETIC AND SYMPTOMATIC PHENOMENA CONNECTED WITH THE CIRCULATING AND RESPIRATORY FUNCTIONS.

A. *Mutual influences of these functions.*

- a. From nervous connexions.
- b. From the nature of the functions themselves.
- c. From their actions on, and the reactions of the blood.
- d. From physical agents acting on the blood and on the respiratory and circulating organs.
- e. From mechanical and other impediments to the circulating apparatus.
- f. Influences of these functions, and their symptomatic relations in acute diseases.
- g. Symptomatic relations of these functions in chronic diseases.

B. *Morbid sympathies of the circulatory and respiratory functions with the digestive functions.*

C. *Sympathy between the vascular and respiratory functions, and the brain and organs of sense.*

D. *Associated morbid states of circulation, secretion, and excretion.*

E. *Association of disordered excreting function, with disorder of the vascular, nervous, and muscular systems.*

iii. ASSOCIATED STATES OF DISORDERED SENSATION AND SENSIBILITY.

A. *Sympathetic and symptomatic states of the several senses.*

- a. With the organic functions.
- b. With states of the cerebro-spinal centres.
- c. With the reproductive organs.

iv. ASSOCIATED AFFECTIONS OF VOLUNTARY MOTION.

A. *Sympathy between the functions of sense and locomotion.*

B. *Associations of mental emotion and locomotion.*

- a. Arising from the exciting emotions.
- b. From depressing emotions.

C. *Sympathies between organic and animal or voluntary motions.*

- a. Organic or involuntary motions extending to voluntary muscles or organs, and rendering the actions of these involuntary.
- b. Voluntary motions affecting the organic or involuntary actions.
- c. Associations of the organic and voluntary motions in the functions of reproduction.

v. SYMPATHIES OF THE ORGANS OF REPRODUCTION.

A. *Sympathies between these and the digestive and assimilative functions.*

B. *Between the several organs and the cerebro-spinal functions.*

- a. Between these organs and the brain.



b. Between these and the spinal cord and voluntary organs.

C. *Between these organs and the functions of sense and general sensibility.*

vi. CONCLUDING REMARKS.—As to the importance of observing closely sympathetic and symptomatic phenomena, and of tracing their origins and relations, with reference not merely to diagnosis, but also to prognosis and treatment.

15. A due recognition of morbid sympathies, or of those associated states of disorder which most frequently present themselves in practice, of the media of their connexion, of the modes of their supervention, and of their extent, is of the greatest importance to the physician in enabling him to form a correct diagnosis and prognosis in most of the diseases which come before him, and to arrive at rational indications of cure.

16. i. DEFINITION. — *Morbid sympathies may be defined to be associated states of disordered function, or of diseased action; the disorder or disease of one system, or organ, or part, affecting other systems, organs, or parts, according to their organic connexions, their functional relations, and their several tendencies, or acquired or constitutional predispositions; the consecutive sympathetic disturbance often being more prominently manifested than the original or efficient morbid condition, and thereby frequently concealing or masking this condition.*

17. ii. PRELIMINARY OBSERVATIONS. — It is necessary to a due consideration of this subject, that, before I proceed to notice the more remarkable morbid associations occasionally presenting themselves in practice, I should take an *anatomico-physiological view of the media or channels by which one organ or part sympathizes with, or becomes affected by, the morbid conditions of another organ or part.*

18. The modes of explaining these morbid associations or sympathies, adopted by previous writers, are various and unsatisfactory, and have been generally based upon the prevalent doctrines of the day; consequently the recognition of sympathetic, symptomatic, or associated morbid states has been imperfect, the classification of them arbitrary or conventional, and the chains of connexion existing between them imperfectly or erroneously traced.

19. Dismissing, therefore, all reference to the few writers who have considered the subject, I shall view it conformably with the inferences at which I have arrived, from researches which have engaged my attention on various occasions during the last thirty years.\* But I can only imperfectly accomplish my intention within the limits to which I am confined, and must merely touch on certain points, which, to do them justice, would require a much more extensive elucidation.

20. A. There are certain circumstances in the anatomy of the organic nervous system, which, when kept in recollection, serve remarkably to explain many phenomena hitherto imperfectly ac-

counted for. Much difficulty and misapprehension, in tracing the connexion of the sympathetic or associated morbid states, have arisen from the usual modes of viewing the large nervous masses, as giving origin to the nerves, or as being themselves a congeries of ganglia of a peculiar constitution. It would be much more conformable with a comprehensive view of the nervous system through the various grades of animal organization, and with the development of this system in the more perfect animals, if the nerves, and especially the sensory and those of organic life, or ganglial nerves, were viewed as originating in the several tissues or structures themselves, more particularly in the organs of sense, in the cutaneous and mucous membranes, in the serous and fibrous tissues, &c. This idea, entertained and published by me many years ago, subsequent observations and reflections have tended to confirm.

21. Another important circumstance, one which I have also insisted upon for many years, which was formerly disbelieved, but is now fully confirmed by recent researches—namely, that all secreting organs are supplied with organic or ganglial nerves. The modes in which the viscera, both abdominal and thoracic, are supplied, are well known—namely, *first*, by fibres proceeding from numerous ganglia and plexuses, or, according to the view just stated, by fibres originating in the organic or ganglial corpuscles, which, by microscopic aid, have been detected not only in the softer ganglia and nerves themselves, but also through the muscular tissue, the skin, the serous and the mucous surfaces; or, in other words, from fibrils originating in organic or ganglial corpuscles, and proceeding centripetally to form plexuses or ganglia in the various abdominal, thoracic, and pelvic viscera. *Second*, by the organic or ganglial fibrils interlacing and surrounding the coats of arteries. As far back as WINSLOW, the soft or ganglial nerves were traced in the large arteries, and he represented them as forming a net-work around these arteries. In 1816, 1817, and 1819, this subject engaged my attention; and I was enabled by the microscopes then in use, which were of weak power, to trace the ganglial nerves, when the parts had been macerated for a short time in spirits of turpentine or spirits of wine, or diluted acetic acid, as far down as the lower third of the femoral artery; and my more recent researches have shown that numerous fibres proceed from the sympathetic ganglia to the gangliated roots of the spinal nerves, and thence are ramified, on the one hand, to the cord itself, and on the other, along with the spinal nerves, to the extremities and general surface. When they reach the extremities, especially near the surface, and in the vicinity of the several joints, and even as low as the ankles and wrists, they become intimately associated with sensory nerves, forming, with them, small or minute ganglia, and supplying with minute fibrils the synovial surfaces. The obvious intentions of this organization may be inferred to be, 1st, that the sensory function and the ganglial functions should be associated; and, 2d, the vessels furnishing the secretion to the synovial surface shall be re-enforced by organic nervous energy, for the promotion of synovial secretion. The communications of the ganglial nerves with the sensory nerves and spinal cord, the numerous branches proceeding from the splanchnic ganglia to the sympathetics, and thence to the ganglionated roots of the spinal

\* I should not now have here entered so fully as I have done on the present inquiry; but certain views comprised by it engaged much of my attention, and not a little of my time, many years ago. And when they were first published (in 1822 and 1824), they were considered by many as heterodox and visionary. They have, however, received support from the more recent researches of several eminent inquirers; and they alone of existing doctrines are capable of accounting for the sympathies or associations of morbid function and action, although so succinctly and imperfectly considered in this article.

cord, and to the cord itself, explain many of the phenomena remarked in the course of diseases of the abdominal viscera, on the one hand, and of diseases of the spine, spinal cord, and joints on the other. When diseases of the joint go on so far as to produce disorganization of the parts, we commonly find that the digestive organs sympathize more or less with them, so that loss of appetite, and even vomiting, not unfrequently supervene.\*

22. I have elsewhere contended that the nerves supplying the synovial and mucous surfaces and integuments should be viewed as originating in the nervous corpuscles distributed to these parts; or, in other words, that delicate fibrils arise in, and are connected with, these corpuscles, coalesce in the extremities with the sensitive fibres, form minute ganglia with these latter, and run thence, or rather converge, towards the spino-cerebral axis. Thus, while the *splanchnic and sensitive nerves* may be viewed as arising in, or commencing from, the nervous corpuscles already noticed as existing in the several surfaces, viscera, and organs, and as interlacing or communicating freely with each other, and with nerves of motion, as well as supplying the circulating systems, the *motory nerves* proceed in an opposite direction. The *former converge* towards the centre, communicating with the encephalon and nerves of sense; the *latter diverge* from the spinal centre to the periphery, also communicating with the brain, from which proceed the impulses of volition by which they are influenced. The *one* class is acted upon by mental impressions or volition; the *other*, by physical causes or agents.

23. The nerves may thus be divided into *three classes*, namely, 1st, the splanchnic or visceral, or those of digestion, assimilation, circulation, and secretion; 2d, those of general and special sensation; and, 3d, those of volition, or muscular action or motion.

\* [The composition of the ganglionic or sympathetic nerves is essentially similar to that of the cerebro-spinal nerves; consisting of a series of nerve-fibres bound together by areolar tissue, which forms their neurilemma. This sheath is, however, denser than in the cerebro-spinal nerves, so that the nerve-fibres are more difficult of separation, and the fasciculated character is not so obvious. It consists almost entirely of white fibrous tissue, longitudinally disposed, which are crossed by some fine circular fibres of yellow tissue, surrounding the nerves at various distances from each other. When a nerve is torn up by needles, and treated by acetic acid, numerous small oval cell-nuclei are seen lying in and among the fibres, with their long axes parallel to the latter.]

It is a significant fact that the sympathetic nerves contain the fibres of both kinds, the tubular and the gelatinous, in very variable quantity in different nerves; the former being numerous in the ramifications of the solar plexus and in the cardiac nerves; the latter almost exclusively composing one of the fascicles by which the sympathetic communicates with the spinal nerves. The frequent formation of ganglia in the course of their trunks, and of their ramifications, constitutes also a remarkable feature. The branches, as stated by our author, and as demonstrated by Scarpa, attach themselves to the exterior of arteries, forming very intricate plexuses, which entwine around them. Along these vessels the nerves are conveyed to the tissues; but of the mode in which their filaments connect themselves immediately with those textures we are at present entirely ignorant. Todd and Bowman believe that the ramifications of the sympathetic are limited to the trunk and head, and that it has probably little or no connexion with the extremities. Its connexion with the brain and spinal cord takes place through the cerebro-spinal nerves, certain filaments connecting each spinal nerve to some portion of the ganglionic chain, which lies on each side of the spinal column; while a similar connexion takes place between ganglia of the cephalic portion of the sympathetic and the encephalic nerves.]

24. *B.* But it is important to bear in mind the character of the communication between these orders of nerves, inasmuch as such communications give rise to numerous states of healthy or morbid action, and occasion, mutually, various affections of the large or nervous centres. The connexions between the organic nerves and the roots of the spinal nerves, and the nerves of sensation, have not been investigated till recently, and even now not so fully as is required. This much, however, may be remarked generally, that the organic or ganglionic nerves are more or less connected with all the nerves of sensation; and where the connexion is formed, or where these different nerves closely approach each other, we generally find minute ganglia.

25. It has been a subject of discussion, viewing the brain as the secreting organ, as it were, of the manifestations of the mind, how the brain itself is supplied with organic or ganglionic nerves. We know that the vessels of the brain, the carotids and other arteries, are all surrounded by ganglionic or soft nerves; still, this is an insufficient supply of these nerves, if we consider the analogy existing between this organ and the other organs of the body—if we view the brain to be like other viscera; inasmuch as we find in other viscera, that, beside the ganglionic nerves, thus distributed to the blood-vessels, there are also special ganglia, which are intended for the farther supply of nervous energy to them. Take, for instance, the liver; there are, besides the organic or soft nerves supplying the blood-vessels, several ganglia and plexuses supplying the structure of the viscus itself. Take the kidneys; there are also specific ganglia devoted to the maintenance of a certain and constant amount of nervous energy, probably modified in kind, or suited to the functions of these organs. It is not, however, so manifest that the brain enjoys a similar supply of ganglionic and ganglionic nerves, or that the supply of these nerves, furnished through the medium of the blood-vessels, is at all sufficient for the several functions or manifestations of the brain, viewing these functions as depending upon the organic nervous ganglia and ganglionic ramifications, as observed in respect of secreting viscera and organs. Hitherto the sufficiency of the supply of ganglionic nerves sent to the brain with the blood-vessels has not been demonstrated, and hardly admitted; and special sources of such supply, as exist in connexion with the other viscera, have not been satisfactorily shown, granting that the organic nerves supplying the blood-vessels of the brain are insufficient for the discharge of the functions of this organ.

26. It has been considered, and most probably with truth—indeed, I have on several occasions contended—that the pituitary and the pineal bodies are, in fact, organic nervous ganglia, inasmuch as there are communicating branches or fibrils running between the other ganglia, at the neck and about the base of the skull, and these bodies. But, in opposition to this view, it has been argued that these bodies are different from other ganglia in the body. However, as all the ganglia may be considered to have a minute special organization, according to the functions to be performed by the organ which they supply, and as the functions of the brain are so very different from those of other parts of the body, so may the ganglia distributing their prolongations and fibres to this organ be reasonably considered to differ



also from others. These bodies are connected likewise with the soft commissures and gray substance of the brain. In fact, these bodies, like the ganglia, as well as the gray substance of the brain and spinal cord, which are the active portions of these organs, abound with organic nervous corpuscles; and they are connected, by means of delicate gray fibrils, with the plexuses surrounding the arteries, and with the ganglia in the head, especially with the ganglia of RIBES, CLOQUET, and MECKEL. The difficulty has been to trace this connexion; and unless it be admitted that these bodies are, in fact, ganglia, devoted to the office of supplying vital energy to the brain, to enable this organ to discharge its functions, we are at a loss to account for their functions. These bodies are lodged more securely than other parts from danger; they are placed near the base of the brain, and in situations the least likely to suffer from injury; and they are in connexion with the commissures of the brain, where it is believed the functions of volition connect themselves with those of perception and intellect.

27. Although it is difficult to trace the connexions of the ganglial nerves with the brain and the nerves of special sense, it is not so difficult to ascertain the connexion of the ganglial nerves with the spinal cord and spinal nerves. The spinal nerves, especially those of volition, are all white and tubular, and are not provided with the organic nervous corpuscles seen in the ganglia and their nerves; while the latter are soft, gray, and ramify in an irregular and indeterminate manner, compared with the former. Now the ganglial or gray nerves, as already stated, may be traced from the sympathetics into the gangliated roots of the spinal nerves, and fibrils proceed thence to the cord itself, while others may be traced in an opposite direction, or from these roots, along with the spinal nerves, to the extremities and surface of the body.\* On the other hand, ramifications of the white or spinal nerves run to the ganglia of the sympathetic nerves, and in some situations, especially in the pelvis, may be traced into the splanchnic ganglia. Thus there are, 1st, communicating branches of gray nerves running from the ganglial system to the spinal roots and cord; and, 2d, communicating branches of white or spinal nerves proceeding from the cord to the sympathetic and ganglia. Hence the functions of each department of the nervous system are mutually aided; and impressions made upon one part of either system are extended in a more or less sensible manner to other parts.

28. The ganglia placed on or near the pelvic viscera admit of the clear recognition not only of the intimate structure of the splanchnic ganglia, but also of the presence of white nerves, which either terminate in them or proceed through them, and which come in greater numbers, or more palpably, from the spinal cord to them, than to any other ganglia. Thus the generative and urinary organs are supplied not only with ganglial or splanchnic nerves, but also with spinal nerves, a supply of nerves from both nervous systems being necessary to the due discharge of their functions; and the supply of each of

these different orders of nerves to each of these organs is in due relation to the functions which each discharges. Thus, also, the generative organs are supplied not only with the organic nervous influence, but also with the nervous influence generated by the brain and spinal cord. And, moreover, the special ganglia devoted to these organs are mutually connected by means of communicating branches, both with the other splanchnic ganglia and with the cerebro-spinal axis.

29. I have been thus particular in directing attention to the communications between the different systems of nerves, because we are thereby enabled to explain many phenomena which occur in the course of disease. It may be, therefore, inferred, in brief, that these different orders of nerves communicate mutually by means of branches going from one to the other; and generally ganglia or plexuses are formed at or near the points of communication. There thus arises an interchange of influence, tending to the proper discharge of function; and mutual sympathy is developed when an impression is made on any one part of the circle formed by this communication and organic connexion, the effects varying with the nature of the impression.

30. C. It is impossible to arrive at just conclusions as to the sympathy or mutual dependence of parts without reference to the *vital property of irritability*, and the relations of this property with the nervous system. Almost up to the present day, especially from the days of HALLER, irritability was considered as a function of the muscular fibre—as a *vis insita* in that fibre, and not dependent upon the nervous system. Many years ago (in 1819, 1820, and 1821), I directed particular attention to the subject of irritability of different structures, and tried many experiments, especially in some of the lower animals; and from these experiments and observations, I then came to the conclusion that the irritability of fibrous and muscular parts depends upon the organic nervous system; and much more recently, this doctrine was advocated by Dr. FLETCHER, in his works on Physiology, he making a due acknowledgment to me as having originated it.

31. In the first place, all irritable fibres present, when under the microscope, a more or less abundant supply of those corpuscles in which organic nerves may be said to originate, and, in fact, from which the organic nervous fibres have been detected by the microscope to take their origin—from which they arise or proceed, and with which they abound. The involuntary muscles, and the fibrous membranes of the hollow or tubular viscera, are supplied only with soft nerves—have no other nerves than ganglial; and they possess great power of contraction, both in health and disease. This power may be traced, to a certain extent, even in the membranous portion of the trachea and bronchi; and if we refer to the comparative anatomy of these parts, especially to the trachea of some of the higher animals, we find a singular conformation of the cartilaginous rings, remarkably well calculated to antagonize the contractile force of the fibrous structure of the membranous portion of the tube. These rings are, indeed, the antagonists of the contractile power of the fibrous structure, preserving at the same time a patent state of these tubes, and admitting of a certain degree of contraction when

\* ["The ramifications of the sympathetic nerve," say TODD and BOWMAN, "seem to be limited to the trunk and head. It has probably no connexion, or at most a very limited one, with the extremities."—(*Physiological Anat. of Man*, p. 223.)]

this structure, or the soft nerves supplying it, are irritated. This conformation is very remarkable in ruminating animals, and well calculated to prevent the tracheal canal from being diminished or injuriously pressed upon during deglutition and rumination.

32. Although involuntary fibrous structures are supplied only with organic or soft nerves, and notwithstanding that the structures receive no white or voluntary nerves, nevertheless they are impressed or acted upon by the electro-galvanic influence. In 1820 and 1821, I instituted some experiments to determine the contractility of fibrous membranes, but the galvanic agency did not appear to produce much effect unless the power was very considerable. When, however, this agent is applied to the nerves of motion proceeding to voluntary muscles, the effect is very remarkable. It would appear that the voluntary muscles are supplied with voluntary or spinal nerves in addition to the supply of soft nerves received or possessed by all fibrous structures, bestowing thereby upon these muscles a voluntary and a greater power of contraction; the power and character of contraction thus varying with the nature and conformation of the muscular parts, and with the nervous centres which supply these parts with nerves. I can scarcely follow this subject farther, inasmuch as I have to notice other topics that will occupy much of my limits; but it is more fully discussed in my notes to RICHARD'S *Elements of Physiology*, and in the articles "IRRITATION" and "IRRITABILITY." I have there contended that irritability depends on the organic or ganglial nervous system, and that it is exalted in the voluntary muscles by the terminations of the motor or voluntary nerves.

33. The irritability of the heart is very remarkable. I have had opportunities of investigating it in the hearts of a number of animals, and in several fishes—the halibut, the skate, the turbot, the cod, ling, &c. From all these the heart may be cut out, and it will still contract for a short time after it has been separated from all nervous and vascular connexions; thus showing that not only does it take a considerable time for the influence of the ganglial nerves supplying an involuntary organ to be exhausted, but that the numerous plexuses and small ganglia, formed by these soft nerves under the serous linings and in the structure of the heart itself, and in the vicinity of blood-vessels, still continue to supply nervous power to the muscular structure, and are of themselves sufficient for the continuance of the phenomena of irritability for a short time. Moreover, the heart appears to be plentifully supplied in its structure with those ganglionic corpuscles which, as I have already stated, are intimately and organically connected with the soft, gray, or ganglial nerves, and which most probably also administer to its irritability. Owing to these provisions, a short period is required to exhaust the irritability of the organ, even when thus isolated or removed from all its connexions. It is not surprising, therefore, when viewing the morbid relations of irritability, to find this vital property most remarkably modified—to observe it exalted in one case, and depressed in another, or even otherwise altered in its condition, by agents which impress the organic nervous system, by changes in the vascular system, especially by alterations of the blood, and by the state of the cerebro-spinal nervous influence.

34. *D.* But it is not in connexion with *irritability* only that the functions of the ganglial and sympathetic nervous system should be viewed. This part of the nervous system, or, more correctly, this distinct and separate system—this organic or primary nervous system—presides also over secretion and excretion, as I have already stated. If we view the digestive canal, which possesses both the vital property of irritability, and the no less vital property of secretion—the former in connexion with its muscular tunics, the latter with its villous coat and glandular apparatus—we shall find that every part of this canal, more especially the stomach, duodenum, &c., is supplied with soft or splanchnic nerves; and that this supply is not limited to those fibrils which surround the arteries of these viscera, or to others which proceed from the semilunar ganglion, and aortic plexus; but that these viscera, as well as other secreting viscera, possess in addition numerous minute ganglia and plexuses under their serous and proper coverings, and near to the situations of the principal blood-vessels, which minute ganglia and plexuses are more especially devoted to the functions discharged by the organ or part in which they are situated.

35. Whether the splanchnic or ganglial nerves originate in these corpuscles distributed through an organ or membrane, and successively form themselves, first into fibrils, next into plexuses and minute ganglia, and afterward into larger branches and more manifest plexuses and ganglia, until they converge into the semilunar and other ganglia; or whether they originate, as believed heretofore, in the ganglia themselves, and depart thence to their destinations in the tissues, may not be readily decided; but it is indisputable that they constitute a distinct system; that they send their fibres with the blood-vessels, and with the spinal nerves, to all parts of the body, especially to secreting organs and parts; that they supply both the brain and the spinal cord; and that they form more numerous plexuses and minute ganglia in the several viscera, than have hitherto been described or even supposed; while, on the other hand, the intimate connexion existing between these nerves and the cerebro-spinal nerves is reciprocated by numerous ramifications proceeding from the spinal nerves—from the intercostal, lumbar, &c.—which run to the ganglia and plexuses of the organic nerves, and either proceed through these, or terminate in them, or accompany fibrils from them to various parts, retaining more or less evidently their white and tubular appearance. In viscera possessing more or less of voluntary power in addition to the organic, as the urinary and sexual organs, the vicinities of the sphincters, and the outlets of canals, &c., the supply of the white and tubular nerves—motor and sensory spinal nerves—to the ganglia and plexuses more especially devoted to the functions of these organs and parts, is more abundant and more manifest than in others, these organs combining and requiring the influence of both these nervous systems in the discharge of their functions.

36. II. MEDIA OF MORBID SYMPATHIES.—Having thus directed attention to those preliminary topics which should be duly recognised before we proceed to inquire into the several media by which one organ or part sympathizes with another, or by which the morbid condition of one organ affects another, I now proceed to a general



view of the MEDIA AND MODES OF MORBID SYMPATHY, for there are not only different *media*, but to a certain extent different *modes*, by which these sympathies take place. Associated morbid states or sympathies have been above *classed* into, 1st, the *direct*; 2d, the *indirect*; and, 3d, the *reflected*.

37. i. The FIRST CLASS has for its *media*, first, the *direct communication of nervous fibres*, more particularly the organic nervous fibres; and here the influence of the nervous ganglia in the viscera becomes a matter of very interesting consideration: every important organ is supplied with these ganglia and plexuses, which are, there is every reason to believe, peculiar or modified in size, form, and minute organization, according to the functions each organ has to perform; second, continuity of surface or tissue: thus the state of the mucous membrane of the stomach affects the mucous surface of the mouth, the fauces, the pharynx, &c.; and, third, the *contiguity of one organ or tissue to another*: during a state of distention the colon presses on the diaphragm, so as to affect the action of the heart and other parts; and flatulence of the stomach disorders the functions of the heart and diaphragm, &c. These constitute the chief direct *media* of sympathy between different organs—namely, nervous communication, continuity of surface, and contiguity of situation.

38. ii. The SECOND CLASS, or *indirect modes and media* of morbid sympathy, are, first, by *vascular communication*. It must be obvious that when a portion of a vessel is affected, another portion of it will experience more or less of disorder. We know, in cases of inflammation or irritation of a lymphatic vessel, how readily the morbid condition extends along it and affects the glands. Here vascular communication, even in these vessels, is a ready medium for conveying morbid action; and it is still more remarkably evinced in respect of the arteries and veins.

39. *Second*, by the states of the circulating fluids. This is one of the most important modes in which morbid action is propagated, and it is one which forms, as it were, the basis—the groundwork, of the system of *humoral pathology*, which for many years was believed in so generally throughout the civilized world. When the morbid affections of the nervous system were so much insisted upon by HOFFMANN and CULLEN, the humoral pathology became obscured, but closer observation and less addiction to theory have shown that the circulating fluids are readily and early disordered in the course of disease, and, being thus disordered, they become sources of a more general malady—of disease not limited to particular organs, but extending more or less to the whole economy.

40. iii. The THIRD CLASS under which I have arranged morbid sympathies is the *reflected*. That this is not a very recently recognised class of sympathies is shown by the fact that it was so denominated and discussed by UNZER and PROCHASNA, and more fully by me as early as 1824. The reflected sympathies are propagated or developed, first, by fibrils proceeding to, and communicating with, ganglia or plexuses, and supplying by means of these sources contractile and secretory viscera. Thus irritation occasions the contraction of a portion of intestine; the irritation being propagated most probably to a nervous

ganglion, and then reflected in the form of contraction. But it is not improbable, and my recollection of the phenomena I have observed upon irritating visceral parts of the lower animals seems to warrant the inference, that irritation is followed by contraction in a more direct manner, or, at least, in the manner less obviously indirect, than that now mentioned; and contraction may follow irritation without the irritating impression being conveyed to ganglia remote from the organ or part irritated. Thus, when the hearts of some fishes are removed from all their connexions, they will contract, upon irritation, for a short time, the minute ganglia and plexuses in the structure of the organ thus enabling them to react; and so on as regards other hollow organs admitting of a sensible reaction upon irritation.

41. *Second*. The reflected sympathies are developed by means of the communications of the organic or ganglial, or soft nerves, with the roots of the spinal nerves. I was first led to describe the mode in which sympathetic irritation is thus propagated to the muscles of voluntary motion by a singular case which came under my care in 1821, at the Surrey Dispensary. A female, of middle age, presented herself with violent contraction and relaxations of the abdominal muscles, alternating rapidly, regularly, and constantly. The spine evinced no tenderness when examined, no pain nor any other morbid phenomena; and the functions of the extremities and of the urinary organs were unaffected. Conceiving that the affection might be sympathetic of worms in the intestines, I prescribed full doses of turpentine and castor oil, which brought away enormous quantities of lumbricus teres and faeces; and as soon as these were evacuated the morbid action ceased. The irritation of the extremities of the nerves of the digestive canal evidently was in this case conveyed to the roots of the spinal nerves, and was thence reflected by the nerves of motion upon the abdominal muscles. It does not appear necessary to infer that, in this case, the irritation was conveyed to the spinal cord itself, inasmuch as neither morbid sensibility nor other disorder could be traced to it. We can explain the phenomena by considering that morbid irritation was transmitted merely to the roots of the spinal nerves by the ganglial and sympathetic nerves, and that the irritation thus transmitted to these roots produced this affection of the abdominal muscles. The second class, then, of reflected sympathies are those reflected by the ganglionated roots of the spinal nerves.

42. *Third*. Irritations, or impressions are reflected from internal viscera and internal parts, by means, or through the *media*, of the spinal cord and nerves to the voluntary muscles and extremities of spinal nerves, motion, or sensibility, or both being thereby affected, as shown in several diseases, more especially in hysteria, chorea, neuralgia, tetanus, &c.

43. The fourth, or last order of reflected sympathies, are those which take place through the medium of the *medulla oblongata* or brain, or of both. It has long been proved that impressions made on the organs of sense will occasion reflex actions. Indeed, all the phenomena of mind may be said, so far as they produce any sensible motion or action in the economy, to be reflected. This class of sympathies are attended generally in the waking state by consciousness, although not necessarily and uniformly; but during sleep, sensibility, or

consciousness is only occasionally and obscurely excited.

44. III. CIRCUMSTANCES INFLUENCING SYMPATHETIC PHENOMENA. — Having sketched the several modes in which morbid actions or states become associated, and, at the same time, considering that these associations are often brought about through more than one channel, I proceed next briefly to advert to the well-ascertained fact, that irritations, or morbid conditions of any other kind, may exist in organs or parts without producing those sympathetic or symptomatic phenomena which we observe in other persons in a more or less marked degree; and that *sympathetic phenomena vary not only in degree, but also in some measure in character and variety, or number, with the temperament, with the habit of body, with the sex, with the age, with the physical powers, and with the occupations of the individual.*

45. i. It is difficult to determine in what degree or mode the various sympathetic phenomena manifested by the human subject may vary in the *different races of the species*. Judging from my own observation, I am inclined to infer that they are most diversified, numerous, and manifest among the most highly cultivated and luxurious of the Caucasian race, and that they are the least diversified and the least manifest in the negro and the hyperborean races.

46. ii. *Temperament, idiosyncrasy, or diathesis*, has evidently a great influence upon the sympathies—the nervous and irritable temperaments evincing the most varied and most numerous and prominent sympathies; the phlegmatic limiting their range and diminishing their intensity. In nervous, impressible, and excitable persons, irritation or excitement on the one hand, or depression or exhaustion on the other, in whatever part of the economy it may exist, but more especially in sensitive and vital parts, is soon followed by various sympathetic changes, which either would not appear, or not appear to the same extent, in phlegmatic, robust, and muscular persons.

47. iii. Much, however, depends upon the *habit of body* and the vascular conditions of the individual. It may be difficult to determine correctly whether or no fat or very lean persons evince the more prominent range of morbid sympathies. Most probably thin or lean persons are not only more susceptible of sympathetic phenomena, but also evince them more prominently than those who are the subjects of greater or less obesity. A similar difficulty exists respecting the greater influence exerted by vascular plethora, or by deficiency of blood. Probably both extremes, or even an approach to either extreme, may favour the development of morbid sympathies much more than a healthy state of the vascular system—than when a due relation subsists between the contained fluid and the containing vessels—between the healthy quality of the circulating fluids and the tone and energy of the moving powers.

48. iv. *Sex* has a most manifest influence upon the number, character, and prominence of the sympathies. In females, especially those of a nervous and impressible temperament, both the range and the intensity of these phenomena are most striking, and the phenomena developed are most frequently connected with irritation of a particular organ or part, and are attended by more or less morbid sensibility, the nervous systems being generally the media by which their sympathetic affections are developed. In proportion as nerv-

ous power is impaired, exhausted, or originally defective in this sex, the more remarkably are susceptibility and excitability manifested, and their more remote consequences evolved. The same remark applies also to males, but the sympathetic phenomena are not so manifest in them, unless in cases of great exhaustion of nervous power.

49. v. *Age* has also a very manifest influence upon the sympathies; the earlier the age, the more readily and rapidly are they developed by the primary morbid affection, and the less frequently are they connected with organic lesions. As life advances, sympathetic phenomena are less frequently and less rapidly evolved; and structural changes either proceed farther without producing them, or produce them less frequently, with less severity, and in less variety. This is especially the case after fifty years of age, and after the latter climacteric age of females. At the period of female puberty, and about the period of the latter sexual change in this sex, sympathetic affections are frequent, prominent, and varied; and in many they continue, at intervals, to partake more or less of this character throughout the whole epoch of uterine activity. After the periods of dentition are passed, when the sympathies are most remarkable, owing to the relations subsisting between the state of the gums and both the ganglial and the cerebro-spinal nervous systems, the most important epoch of both healthy and morbid sympathy—or rather of synergy or physiological sympathy—is the epoch of puberty; after which sympathetic affections diminish in frequency and intensity in this sex, unless in crowded towns, in persons following sedentary occupations, and in the debilitated.

50. vi. The state of *physical power* has manifestly no mean influence upon the sympathies. Where this power has been originally great—where it is associated with nervous energy, and with perfect states of the digestive and assimilative functions—there sympathetic affections are least frequently and least severely complained of, and the least complicated. When organic nervous power is depressed or exhausted, more especially when the exhaustion has proceeded slowly and continued long, a very different result is observed; the irritation of a particular organ or part then develops various affections, sometimes of the same, at other times of a different character, in different or several parts of the frame. Numerous instances illustrative of this pathological position present themselves in practice among both sexes, especially about puberty, and for many years afterward, more particularly in the female sex.

51. vii. The *occupations* of life exert great influence upon the liability to severe or complicated sympathies. It is obvious that sedentary persons, or those occupied in ways which preclude the due exercise of the body in the open air, more especially if they pass much of their time in large towns, or in the impure air of factories, or in unhealthy localities, and those who exert the mind upon abstruse or abstract subjects, will sooner or later acquire an increased susceptibility of morbid impressions and irritations, and these irritations will in them develop a wider range, and a more intense grade of sympathetic affections than in others not similarly circumstanced, all other things being equal. It is incompatible with my limits to pursue this subject farther, or to illustrate my positions by referring to acknowledged facts. This,



as well as what I shall have hereafter to advance, must be viewed rather as suggestive, than as sufficiently illustrative of the subject.

52. IV. SPECIAL CONSIDERATION OF SYMPATHETIC OR ASSOCIATED DISORDERS.—I next proceed to consider, in a more special manner, some of the sympathies most frequently observed in practice, and briefly to notice, or merely to enumerate others. In the view I am about to take of *sympathetic* or *associated morbid states*, I shall consider in succession, *first*, the associated morbid states of digestion and assimilation; *second*, the sympathetic phenomena connected with the circulatory and respiratory functions; *third*, sympathies, or associated morbid states of sensation and sensibility; *fourth*, associated functions, or sympathies of animal motion; and, *last*, the sympathies, or morbid states of the organs of reproduction. I should not have directed attention to this subject, if I had considered that former writers had discussed it fully; but I believe that it will be found, upon referring to pathological writings, that not much has hitherto been said satisfactorily upon it. That morbid sympathies are propagated through the channels I have attempted to point out, receives so frequent a confirmation, and is indeed so constantly observed in practice, that we may conclude that a person labouring under any specific disease, as described by nosological writers, is seldom seen without presenting important morbid associations and sympathetic phenomena. We rarely meet, in the course of medical practice, with a disease implicating one particular tissue or organ, without involving more or less during its progress, distant, although related (related in the manner I have attempted to point out), functions or organs—without displaying various sympathetic phenomena, or associated morbid sensations, conditions, or actions, owing to the several relations which I have here attempted to establish. I now proceed to consider the *first Class*.

53. i. ASSOCIATED SYMPATHIES OR AFFECTIONS OF THE DIGESTIVE OR ASSIMILATIVE ORGANS.—These organs are most important as respects vitality; they are observed throughout the animal kingdom, and, as being intimately connected with the origin and perpetuation of life, demand our more immediate consideration. The sympathies, or associated states of digestion and assimilation, are to be referred, *first*, to the circumstance of these organs being supplied with the same system or order of nerves, the ganglial, and even, according to the view I have suggested, of these nerves partly originating in the villous surfaces and parenchyma of these organs, as shown by the microscope; and to the presence of the organic nervous corpuscles, and their incipient arrangement into fibres, in these tissues and organs. The circumstance of the organic or soft nervous fibres originating thus, and the extension of these fibres to plexuses and ganglia, and thence to the nervous system of animal life, serve to show, or at least go far to explain the fact, that disorders affecting these organs, especially the alimentary canal, affect more or less distant parts, remote organs or parts thereby sympathizing with them. *Second*, to the similarity and continuity of structure existing through a large portion of these organs, particularly the digestive canal. *Third*, to the contiguity of their position. *Fourth*, to the association of function and normal action. *Fifth*, to the several vascular connexions exist-

ing between them. Thus it is not through one channel only that these associations are kept up, for no less than five may be considered as contributing to the several states of morbid sympathies or associations which the digestive and assimilative organs present in practice.

54. *First*, the associations of the morbid states of the organs of digestion and assimilation with each other are among the most frequent and prominent in the human economy.—*A*. When we view the intimate connexions existing between the digestive canal and its allied viscera, especially the liver and pancreas, by means of the splanchnic ganglia, plexuses, and ramifications, and of the vascular system, the frequency of these morbid associations cannot remain a matter of surprise. When we consider also the relations of the portal circulation, and view it (as it really is) as independent, in a great measure, of the action of the heart, indeed, so much so as that the return of blood from the liver is much more under the control of the heart, than the supply of blood to the organ by the portal vein—or, in other words, that the return of blood from the hepatic vein is owing more to the action of the heart, than the circulation through the portal system is owing to this organ—we must necessarily infer the operation of some other agency than the heart in carrying on this circulation. Now the capsule of Glisson, and the ganglial nerves, with which both it and the portal vein are provided, are, in my opinion, the chief agents of this important and independent circulation—agents which operate through the medium of their distributions throughout the organ along with this vein, and which influence not only the circulation of it, but also the circulation of the bile along the ducts. That this capsule at least contributes to, if it does not entirely discharge, this function, may be inferred from its organization; for it is abundantly supplied with ganglial corpuscles and fibrils, and it may therefore be considered as exercising important vital functions. When, therefore, we reflect upon the nervous and vascular connexions of the digestive organs, we must admit that affections of one of the series will be readily propagated to others, and that disorder of the functions of one will necessarily affect more or less the rest. We frequently observe in practice that disorders of the stomach or bowels impede or otherwise affect the functions of the liver; and that torpor, obstructions, congestions, or other disorders of this organ, are followed by affections of the stomach, by congestions of the digestive mucous surface, and indeed of all the vessels which combine to form the portal system; and we have, as more remote consequences, when the original mischief remains, increased exhalations, hæmorrhages, hæmorrhoidal affections, jaundice, and even serious effusion into the peritoneal cavity.

55. Morbid states of the intestinal canal also remarkably affect the functions of the liver, through the medium of the splanchnic nerves, and by influencing the states of the portal system. Irritation of the mucous surface of the intestines, especially of the duodenum and jejunum, is readily propagated to the portal system, and this effect is the most rapidly developed in warm climates, where active determination of blood to the liver, and congestive and other forms of inflammation of it, are thus observed frequently to supervene. The intimate connexion subsisting between these viscera pathologically is evinced also in fevers;

and in these, both in the mode just adverted to, and in another of a different kind. In the course of fevers, hæmorrhages from the digestive mucous surface are not infrequent occurrences, and are most unfavourable as respects the vascular system generally, the portal circulation especially, and the vital powers. In yellow or hæmagastic fever, a fatal termination is generally by a black vomit, which consists chiefly of the blood that has exuded from the mucous surface of the stomach, and often to such an extent as to leave the liver of a pale yellow colour, or altogether bloodless, upon dissection. In these cases, the blood, instead of being carried into the portal vein, is exuded from the digestive mucous surface, leaving the liver in a state of anæmia, especially as regards this vein. (See § 128, 129.)

56. *B. Contiguity or proximity of position* has a great effect in complicating diseases of the digestive organs. This is evidenced by inflammations and inflammatory fevers, more especially when the serous surface of either of these organs is affected. Owing to contiguity, the inflammation is rapidly propagated from one surface to another, not so much by continuity of surface as by contiguity of position. When making post-mortem examinations, I have often found that the opposite surfaces of different organs had become inflamed; that lymph had been thrown out from both at the place of contact, and yet the intervening portion of surface, where contact did not exist, presented no change—that is to say, the inflammation was not propagated by continuity, but by the contact of opposite surfaces: the lymph thrown out from the primarily-inflamed surface had acted as an irritant to the vessels of the opposite part, with which it came in contact, and given rise to inflammation; false membranes, or exudations of lymph, adhesions, &c., being the consequences.

57. Owing to the continuity of surface and similarity of structure, disease extends—more especially erythematous, or asthenic, or cachectic inflammations—along the mucous and serous surfaces, varying in severity in different viscera or situations. Thus inflammations extend not only downward, but also upward—from the stomach to the intestines—from the cæcum to the colon and rectum—from the stomach to the œsophagus, pharynx, and fauces—and from these latter to the trachea, bronchi, &c. Irritations or inflammations of the mucous surface of the duodenum may extend to the mucous surface covering the ducts, especially in weak or cachectic constitutions, in which this extension is most likely to occur; the extension of inflammatory action being most likely to take place in debilitated and cachectic persons, producing inflammation of the ducts, and even of the viscera, from which these ducts proceed; and the limitation of this action being equally favoured by vital or constitutional power.

58. *C. The state of the muscular tunics of the digestive canal* frequently gives rise to important sympathetic phenomena. When the colon is much distended with flatus, or irritated by sordes or morbid secretions, or accumulated fecal matters, various changes occur, not only in the portion of the canal above the seat of these affections, but also in other parts in the vicinity. I have pointed out already that, in such cases, owing to the nervous communication subsisting between the intestinal canal, the splanchnic gan-

glia, and the spinal nerves, numerous sympathetic disorders frequently also arise, especially pain in the joints, and various spasmodic affections. I refer merely to the very common phenomena of spasms of the limbs and lower extremities, occurring in bilious colic or in common cholera, and in poisoning by corrosive or irritating substances.

59. *D. When the circulation is interrupted through the liver*, the digestive canal becomes materially affected; and when the latter is deranged, then the former is disordered, and the portal circulation is also more or less deranged. Not only are the functions of the liver and digestive canal thus mutually disturbed in a very remarkable manner, but these disturbances also affect the urinary excretion and the kidneys. When the chyle is not sufficiently assimilated, or when the ingesta are of a character likely to produce inordinate excitement, or other derangement of the vascular system, there are not only associated affections of the liver, through the portal system, but also, in consequence of the morbid changes taking place in the blood, farther changes, more or less extensive, occur in the urinary excretion and organs, particularly in the kidneys. When individuals are otherwise in health, and the kidneys are enabled by nervous power to execute their functions, morbid matters, carried into the blood, are readily eliminated from it by these organs, producing various changes in the urinary excretion; but when the vital powers are weak, either from lesion of the spinal cord or nerves, or of the ganglia supplying those organs, or from general nervous depression or exhaustion, then there will be observed more or less serious disorder of the urine, or even the kidneys themselves.

60. Even in comparative health we find a very intimate connexion existing between the states of other excreting organs and the kidneys. For instance, when the functions of the kidneys are but temporarily obstructed, the blood to a certain degree becomes impure, and very important and deleterious elements, which should have been eliminated from the blood by these channels, are then either vicariously removed by other emunctories, the circulation being the while often more or less disordered, or the blood becomes contaminated and the vessels congested. Again, when the function of the cutaneous surface is materially deranged—when it is suppressed—if the individual is otherwise healthy—if there is no disorder connected with the urinary organs—these organs perform an increased function, and matters which should have been carried out of the system by the skin are removed by the kidneys, and often no severe disorder arises; but not unfrequently serious derangements take place, owing to suppression of the cutaneous function. Thus disease of the skin, or suppressed perspiration, or disorder of the urinary functions, often produces a number of morbid actions—at first vicariously—occasioning increased action of the one emunctory as the action of the other is impaired or obstructed, and subsequently very serious changes, both of the blood and of vital organs and parts, if the impaired or suppressed function be not restored.

61. The most serious and rapid derangements are produced in the circulating fluids, and consequently in other parts of the economy, by impeded or obstructed function of the kidneys. In all



lesions of these organs, especially in that which is called "Bright's disease," very important changes take place in the circulation; and, owing to these, farther changes are produced in distant and different parts of the economy: the heart and the liver, the mucous and serous membranes, owing to the state of the blood, and more particularly to the circulation of effete or injurious elements in it, become irritated; and organic changes, especially asthenic or spreading inflammation, the exudation of lymph, and more frequently of a serous or albuminous fluid, take place on the surfaces of these organs and of these membranes.

62. In connexion with disorder of the digestive organs, we very frequently find the appearance of the skin more or less changed, even independently of the actual existence of jaundice. It would appear that, when the liver is torpid or inactive, or when affections of the liver are connected with disorder of the stomach, or of the spleen, or of the bowels, the blood becomes more or less impure, or even deficient in red globules; and, consequently, the external surface and the countenance are more or less sallow, lurid, or without the vital glow of health. The liver performs not only secreting but excreting functions; it eliminates certain elements from the circulation, which, if allowed to remain, would produce more or less disorder: it thus depurates the blood to some extent; and hence we find that, in torpid affections of the liver, these elements accumulate in the blood, and, independently of true jaundice, produce slight pseudo-jaundice, or a lurid state of the skin and countenance, which is attributable to the impaired excretion of materials which usually contribute to the formation of bile. But in cases of jaundice, where the obstruction is more serious, owing to the excretion of bile from the liver being impeded or prevented, or to the presence of calculi in the ducts or in the gall-bladder, or to numerous organic changes that take place in the organ, there are certain constituents of the bile absorbed into the circulation, and certain of these more abundantly in some cases than in others. In some instances the colouring matter only is present, while in others, the resinous portion of the bile, or the *bilin* of modern chemists, is carried into the circulation. It is very rarely that bile can be detected in the blood, but it has been detected in the urine; and we may therefore infer that it must have passed through the circulation before it arrived there, and that the kidneys, by the active discharge of their functions, have carried it out before it could accumulate in the blood so as to enable the chemist to detect it by the taste of the blood, or by the usual tests. I have already adverted to the effect of congestion, or interrupted circulation in the liver, on the abdominal organs generally, especially upon the digestive canal. I believe that this morbid association is not sufficiently attended to, particularly in respect of the diseases most prevalent in malarious and warm climates, and in fevers and disorders of the bowels in temperate countries; but my limits prevent me from pursuing this topic any farther at this place.

63. ii. THE SYMPATHY BETWEEN THE DIGESTIVE ORGANS AND THE FUNCTIONS OF THE HEART AND LUNGS, owing to the media of association above described, is so marked, that disorder of any one of these organs naturally produces a reciprocal disorder in the other organs. Thus, increased

excitement of the nervous system occasions excitement of the vascular system; and exhaustion or debility of the organic nervous system produces a similar state of all the organs which this system actuates. It may be considered an axiom, that increased excitement, or its opposite, namely, exhaustion or debility, however produced, is attended by a co-ordinate grade of such state in the several vital organs. So obviously is this the case, that it is unnecessary to enlarge upon it.

64. *A. By contiguity of position*, the digestive, circulating, and respiratory organs are often very materially affected. Distention of the stomach or alimentary canal mechanically impedes the function of the other organs, and heightens inflammatory or structural lesions. Hence arises a deranged state of the circulation and of respiration in individuals in whom the nervous energy is weak, and where the contractile power of the parietes of the heart is to a certain extent weakened also. The contractile actions of the heart are much influenced by the distention of contiguous viscera. Flatus distending the stomach, and rising to the œsophagus, often produces intermittent or irregular pulse and various consecutive phenomena. This is frequently seen in cases of flatulency of the digestive organs. Very serious affections supervene in the case of hysterical and nervous patients, where the flatus rises up in the form of globus hystericus, producing inordinate distention of the œsophagus, with spasm above or below, or both above and below, the seat of this distention. The phenomena remarked in hysteria, in colic, and in flatulent distentions of the colon, may farther illustrate the influence of mechanical distentions of parts of the digestive canal upon the functions of the heart and lungs; and hence it is, when the nervous and muscular powers of the heart are impaired, or when the vital expansive power of the lungs is weakened, that flatulent distentions of the stomach or of the colon increase the mischief. The number of morbid sympathies that I shall have to mention in the confined space to which I am limited prevents me from illustrating fully this subject.

65. *B. In considering the relation of the circulating and respiratory functions*, it is unnecessary to do more than to notice the very great influence which the latter exerts upon the former; the remarkable changes produced by the atmosphere during respiration, and the advantages that accrue from respiring pure air, not only in promoting a normal state of the blood, but in strengthening the locomotive functions. Air and exercise are the best restoratives that we possess—the principal tonics that we can employ in removing disorder. Those medicinal tonics which are frequently substituted for these, owing either to the circumstances of the case or to the views of the physician, are generally more or less stimulants also, and may be injurious, and indeed are often hurtful, when injudiciously employed. But when the patient can have change of air—when he is able to undergo a change, and can be duly exposed to the air and to the sun's influence, and more especially when he can take sufficient exercise in the air—due assimilation of the food, healthy changes in the blood by the respiratory organs and cutaneous surface, and the development of nervous and vital energies, are the usual results.

66. *C. I need only briefly refer to the intimate sympathy between the digestive and the respira-*

*tory functions, surfaces, and organs.* It rarely occurs that the respiratory mucous surface is much affected without the digestive mucous surface being also more or less disordered, or that the latter is seriously deranged without some disorder or susceptibility of disorder being manifested by the former, the association being clearly referable to the nervous system in the more immediate effects, and to the vascular system in the progress of the disorder. But affections of the mucous or villous surfaces of these distinct organs, although often thus appearing in succession—the one arising or depending upon the other—often also occur contemporaneously and co-ordinately. This form of association frequently is the result of endemic causes and of epidemic influences; the morbid impression of these causes often extending rapidly, and manifesting its effect upon the digestive organs soon after it has acted upon the respiratory functions. Catarrhs, influenza, whooping-cough, and other epidemic disorders which proceed from or are influenced by the states or vicissitudes of the atmosphere, and prevail at certain seasons, especially manifest this association; and those more formidable epidemics which arise from an atmospheric contamination, caused by the emanations proceeding from the sick, or from numbers of living creatures confined in a limited space, or from dead vegetable and animal matter, evince the same association, although in a much more remarkable manner, and are greatly heightened by contamination of the fluids and soft solids of the body.

67. When the atmosphere contains only a small or moderate amount of malaria, or of animal emanations, or a quantity insufficient to contaminate it to a pestilential extent, or even to cause agues or remittents, then disorders of the digestive organs, associated with affections of the respiratory and circulating functions, frequently result. In large towns and cities, especially where a humid and close air is more or less contaminated with animal exhalations, the prevailing disorders of the digestive organs are very often associated with affections of the respiratory organs, more particularly with chronic or asthenic bronchitis, or with congested states of the lungs. This association is most frequent among the children of the poor; either affection predominating over or masking the other, owing to the intensity or combination of the causes.

68. Whether those causes affect children, adults, or the aged—more especially if the more ordinary physical conditions and vicissitudes of the atmosphere have added to them, animal emanations, putrid effluvia, and insufficient ventilation—the effects produced seldom consist of a simple or specific state of disease, but of an association of maladies; one or two assuming a more distinct or prominent form, according to the intensity of the efficient agent, to the nature of concurring influences, and to the state or predisposition of the patient's constitution. This complication becomes still greater, and much more serious, if these causes not only injuriously impress the organic or ganglionic nervous system, but also, either through the medium of this system, or still more directly, contaminate the circulating fluids—the contamination arising both from the impairment of depurating processes performed by the various excretories, and from the passage of injurious agents into the blood during respiration.

69. Physicians who observe closely the morbid

conditions constantly coming before them must have remarked, especially in large towns, where numerous injurious agents are in almost continued operation, and among persons who attend the least to the healthy states of the digestive and excreting functions, that when the digestive functions are much impaired, or when the digestive mucous surface presents those phenomena which may rationally be referred to chronic irritation, numerous associated disorders soon present themselves. The hepatic functions are deranged; often also the bowels are affected; and ultimately even the excretions from the skin and kidneys betray more or less disorder. The results of these morbid conditions, or more frequently the contemporaneous mischiefs, comprise changes in the nervous and vascular systems—functional changes in the organic nervous system, being followed by impairment of the excreting or depurating actions, and this impairment by an altered state of the blood itself; this last acting upon the former, and aggravating them. As long as vital power or resistance to the injurious agents is not entirely overthrown, various vicissitudes occur in the course of functional disorder, in the states which the several organs implicated present, and in the consequences which accrue in respect of each, under the influence of either aided or unaided vitality. But not unfrequently various serious phenomena, threatening the duration of life, appear, owing to contingent causes and morbid predispositions. It is thus we so frequently observe in practice, among persons who have been previously out of health, who have been intemperate and dissipated, who have suffered from functional disorders of the stomach, or liver, or bowels, or kidneys, or from an association of two or more of these, that far more serious maladies are superinduced; that, owing to the morbid state of the blood from impaired action of the excretories, and to the disposition of irritation or inflammation of membranous parts to spread in these circumstances, erysipelas thus often appears in the seat of an abrasion or injury, especially in certain atmospheric conditions; that the pharynx or fauces, or both, sometimes with their connected glands, become affected with a spreading or asthenic inflammation, that the lesion, owing to continuity of texture and weakened vital resistance, proceeds either along the œsophagus to the stomach, or, what is still worse, it extends from the pharynx to the epiglottis, or even down the trachea, causing distressing paroxysms of cough, or threatening, and even causing suffocation from closure of the glottis, or fatal congestion of the lungs. The lesion, thus first manifesting itself in the fauces or pharynx, may actually even commence in the stomach, and extend upward along the œsophagus to the pharynx, without the œsophageal affection being either recognised or prominently developed, until the more sensitive and susceptible pharynx is reached. Indeed, it is not unfrequently observed that acrid excretions from a dyspeptic stomach, or owing to a state of gastro-enteric irritation, excite an asthenic form of inflammation of the pharynx and posterior fauces, which sometimes spreads in one or other of the directions just pointed out, either involving merely, or chiefly, the upper portion of the œsophagus, or implicating more especially the epiglottis and larynx, or even also the trachea. These are some of the more serious or extreme morbid associations ob-



served between the digestive and respiratory organs; but others of a slighter grade are much more common; these are stomach eough, the *catarrhus stomachicus*, *catarrhus saburralis*, &c., of older writers; the association of gastro-intestinal irritation with catarrh, or with bronchitis, or other affections of collatitious or even of distant viscera, &c.

70. iii. THE SYMPATHIES OF THE DIGESTIVE ORGANS WITH THE BRAIN AND WITH THE ORGANS OF SENSE, AND OF THE LATTER WITH THE FORMER, are sufficiently manifest. But it is very frequently by no means easy, when the associated morbid conditions come before us in practice, to determine the organ primarily affected, and most probably the source or centre of the associated affections.—A. The *media* of morbid association in many of these complications are obviously and primarily the ganglial and the cerebro-spinal nervous systems, as already explained. But cases are not few, which acknowledge, not only these media, but also the vascular system—a morbid condition of the circulating fluids. When the blood is loaded with effete matters, or is not sufficiently acted upon in the liver, or changed by the several depurating organs, or by the lungs, or by the kidneys and skin, it affects the brain, producing, more or less, disorder according to the nature of the existing impurity. This state of the blood, in its slighter grades, may give rise only to lassitude, or to a state of apathy, or more or less lethargy. It is not improbable that the lethargy observed after a full meal is partly caused by the passage of chyle into the blood, which, to a certain extent, changes the state of this fluid, and affects the brain. When the blood is more seriously altered, when it is affected by obstruction of the excretion of bile, and when it is still more remarkably changed, both in quantity and quality, by disease of the kidneys, the effect upon the brain is often serious, and in the latter case even fatal. In more common cases and circumstances, and in those of much more frequent occurrence, impaired digestion is followed by imperfect assimilation of the chyle; this latter, more or less, affects the blood, and the state of the blood thus produced often affects the sensibility of the brain and nervous system, either temporarily or at intervals, even before the actions of the emunctories are manifestly impeded or otherwise disordered.

71. B. The *organs of sense* often sympathize with disorders of the digestive organs. Those of sight, hearing, smell, and taste are severally weakened or rendered more susceptible of impressions, in some instances, or less so in others, when the functions of digestion are imperfectly performed, owing to impairment of the ganglial nervous power, actuating the digestive organs, having extended to the nerves and organs of sense, with which the ganglial nerves are intimately connected, especially as respects the cerebral and cervical ganglia and plexuses. Nor should it be overlooked that, when the influence or power of the ganglial nerves, which supply the vessels and membranes secreting the fluids which enable the nerves of sense to perform their functions, is insufficiently exerted or is depressed, these fluids are then insufficiently secreted, the membranes imperfectly nourished; and consequently, the sensorial surfaces, and the terminations of the nerves of sense in these surfaces, are not in a fit state to receive impressions, and are

incapable of transmitting them so vividly and perfectly as if the organic or ganglial nervous system duly discharged its duty.

72. iv. THE LOCOMOTIVE APPARATUS SYMPATHIZES MORE OR LESS WITH THE STATE OF THE DIGESTIVE AND ASSIMILATING ORGANS.—The former, however, may not be much affected when the latter are slightly disordered; but if the disorder of the digestive functions continue long, or if it be great—if the organic nervous or vital energy of these organs be much reduced or exhausted by previous excitement, and, still more remarkably, if this depression of vital energy have, owing to its continuance or severity, given rise to a morbid condition of the circulating fluids, or to an excrementitious plethora, the locomotive power always suffers more or less. The joints are particularly disposed to manifest disorder when the digestive and assimilating functions are imperfectly performed, and the secreting apparatus of the joints then suffers more especially. When urea, or its elements, accumulate in the blood, or, indeed, when either these or other excrementitious elements accumulate in the circulation, or when mal-assimilated or other injurious matters are conveyed into the circulating fluids, and more particularly when the functions of the liver, of the bowels, and of the kidneys betray disorder, the joints then often become seriously affected. If the history of various diseases affecting the joints be carefully traced, and their several morbid relations observed, it will very often be found that impaired digestion and assimilating function, as well as impeded excretion, has long preceded, and often still more remarkably attends the affection of the joint. *Gout* furnishes the most remarkable instance of this morbid association; but rheumatism also displays it. Other disorders hereafter to be mentioned, as hysteria, also betray the connexion between them and affections of both the joints and the digestive organs. The sympathy in these morbid associations is obviously dependent upon the ganglial nervous system and its connexion with the sensory spinal nerves, and is increased and rendered more permanent, especially in gout, by changes in the circulating fluids, and by imperfect elimination of effete materials, or of the ultimate products of assimilation and animalization, by the several emunctories.

73. v. THE SYMPATHIES OF THE REPRODUCTIVE ORGANS WITH THE FUNCTIONS OF DIGESTION are often obvious. They will be more particularly noticed in the sequel; but I may now observe that debility of the latter often deranges the former, or predisposes to most of the disorders to which the reproductive organs, especially of the female, are liable. There is, however, a mutual action and reaction between disordered conditions of these organs and the organs of digestion; and even in these cases, which occur so frequently in practice, where the association of these disorders is very remarkable, it is often very difficult to determine which of these organs is primarily in fault. Many cases of chlorosis, of amenorrhœa or dysmenorrhœa, or even of menstrual obstruction, of hysteria, and of leucorrhœa, are more or less dependent upon disordered digestion and assimilation, while others originate, as will be mentioned hereafter, very differently, and consequently derange the digestive functions.

74. V. THE SYMPATHETIC AND SYMPTOMATIC PHENOMENA CONNECTED WITH THE CIRCULATING

AND RESPIRATORY FUNCTIONS.—I shall here offer some observations on the importance of considering morbid action with reference to the state of the circulating fluids.—i. Having discussed, as fully as my limits permit, the nervous connexions giving rise to numerous and obvious sympathies, I shall now take a general view of *alterations of the blood itself*, as being productive of diseased action, either in succession or contemporaneously, in two or more distinct or distant organs, or more or less throughout the frame. In disorders of the circulating fluids, particularly of the blood, the most extensive and serious associations of disease often arise to which the animal economy is liable.

75. The circulating and respiratory functions are intimately associated with each other, not only by nervous and vascular connexions, but also by position and by the nature of the functions themselves; a certain amount of change of the constituent elements of the blood always taking place during respiration, and also a reaction of the blood on the respiratory organs, and on the heart and blood-vessels. These vital functions, although presenting more or less prominent relations to disorders of other or distant organs, are often, owing to these circumstances, jointly and correlatively affected.

76. A. Before I take a cursory view of the results of chemical researches into the morbid changes of the blood, I shall briefly notice the *healthy composition of this fluid*. From a series of analyses, SIMON considered that 1000 parts of healthy blood consist of 795 3-10ths of water, and about 204 3-10ths of solid residue. In the latter there are 2 1-10th of fibrin, 2 3-10ths of fat, 76 6-10ths of albumen, 109 3-10ths of hæmato-globulin, and about 12 parts salts and extractive matter. These being the mean proportions in health, it has been attempted to establish the deviations which take place in these constituents in disease. A number of chemists and physiologists have performed experiments on the blood both in health and in disease, but there is a considerable difference between the results at which they have arrived; still there is sufficient agreement to warrant the importance of attention being devoted to the subject.

77. In *disease*, the water varies from 888 parts in 1000 to 750 parts; the solid residue from 250 to 112. Of the different matters forming the solid residue, fibrin varies from 9 1-10th to a trace merely; the fat, from 4 3-10ths to only 7-10ths; the albumen, from 131 to 55 1-10th; the hæmato-globulin, from 115 4-10ths to 31 2-10ths; the extractive matter and salts, from 16 5-10ths to 7 6-10ths; these results thus showing a very considerable variation in the quantities of the several constituents of the blood in disease.

78. *Healthy blood*, again, according to LECANU, consists of 790 parts in each 1000 of water, and 210 parts of solid residue. Of the latter, 3 parts consist of fibrin, 127 of blood-corpuscles, 72 of albumen, and 8 of extractive matter and salts, or what he calls inorganic matter. According to ANDRAL and GAVARRET, taking this to be the standard of health, these constituents vary in *disease* as follows: The water from 915 parts in each 1000 to 725; the solid residue from 275 to 85. Of the latter, the fibrin varies from 10 5-10ths to 9-10ths only, the blood-corpuscles from 185 to 21; the albumen from 114 to 57.

79. It must be evident that the blood which is

taken from young, healthy, or robust persons, especially those of the sanguine temperament and the phlogistic diathesis, will exhibit a large proportion of blood-globules or corpuscles, and also of fibrin; while the blood of leucophlegmatic or of chlorotic and anæmied persons will furnish the smallest proportion of these constituents and the largest quantity of water. When the blood is removed, or being removed from a vein, and especially as it circulates in the vessels, there certainly exists in it more or less carbonic acid, although the exact quantity—probably of various amount with the varying state of the system—can hardly be shown by experiment. It is, doubtless, given off so immediately, on being removed from a vein, that its exact quantity scarcely admits of demonstration. The blood also presents a certain *odour*, either independently of, or connected with the halitus, or vapour, or carbonic acid, which it exhales, when drawn from a vein or artery; and this odour is very remarkable in malignant and infectious diseases, and especially in pestilential fevers.

80. It is very manifest that the blood, when circulating in the system, possesses a vital endowment, derived from the organic nervous influence, bestowed by means of the organic nerves on the blood-vessels, and on the tissues and parenchyma of organs through which the blood circulates. This vitality of the circulating fluids, thus derived, may be traced in the chyle, and is manifested by this fluid as soon as it begins to circulate in the lacteals, inasmuch as it presents analogous changes to those evinced by the blood itself, as respects coagulation, when removed from these vessels.

81. The globules of the chyle present the first appearances of organization; or, in other words, assimilation and organization, commencing in the chyle and manifesting themselves in the conformation of the globules formed in this fluid, proceed as the chyle passes through the glands, becoming more distinct and perfect as the chyle advances and reaches the ducts conveying it into the blood. The globules of the chyle, being thus more perfect and more numerous the nearer they approach the venous circulation, and after having passed through lacteal glands and having derived some vitality from the vessels and glands through which they have circulated, possess in consequence a vital relation with these parts, tending, not merely to promote their circulation onward to the blood-vessels, but preparing them also for farther changes—for a more advanced grade of organization, when they have reached this goal, and for the assumption of the character of perfect blood-globules.\* It is not at all improbable that the assimilation or the organization of the

\* Since this article was written, the researches of Mr. WHARTON JONES on the blood have been published in the Philosophical Transactions. From these it would appear that the chyle-corpuscles pass through the following phases of development before, or by the time of, their reaching the venous circulation. *First phase*, that of granular cell, the first stage of this phase being coarsely granular, the second stage finely granular. *Second phase*, that of nucleated cell, the first stage of this phase being uncoloured, and the second being coloured. He considers that the *nucleated cell*, in its second or coloured stage, passes into the *red corpuscle*, in the fully-formed blood of man and the mammalia, and that the nucleated cell is thus changed into the fully-formed red blood-corpuscle, by the cellæform nucleus of the nucleated cell being set free by the bursting of the cell itself, the nucleus having become filled and red by the secretion of globuline and colouring matter into its interior.



globules of the chyle, as well as of those lymph-globules circulating in the lymphatics, either originates in, or is advanced by, the glands in the course of both lacteals and lymphatics; and it may also be inferred that the farther organization of the lymph-globules—both those carried into the blood from the lacteals and those from the lymphatics—or their conversion into the fully-formed red blood-corpuscles, is owing to the vital operation of those glands which are not provided with excreting ducts; as the spleen, the supra-renal glands, and the thymus, and probably also of the liver. The facts long and frequently remarked by me of anæmia, or deficiency of red-globules, being always the consequence of torpor, enlargement, or other disease of the spleen or liver, favour this view of the influence of these viscera in the assimilation or development of the chyle and lymph-globules into red blood-globules. It may therefore be inferred, from the organization of the lacteal and lymphatic vessels and glands, and of those non-excreting glands just mentioned—from the circumstance of these organs being abundantly provided with ganglionic nerves, blood-vessels, and absorbents, that the fluids carried to, and circulating through them, undergo an assimilation, and that this assimilation amounts to a progressively increasing organization of the globular constituents of these fluids—this being the function of the organs now referred to.

82. Organization thus commencing in the chyle or lymph, as respects the perpetuation of the individual animal, it must necessarily follow that these fluids participate in the vitality existing in the vessels and organs through which they circulate. This vital endowment, whether existing in the fluids as a simple emanation from the containing structures, or actuating them more efficiently through the medium of their globules, is evidently concerned in the phenomena displayed by these fluids, as well as by the blood when removed from the vessels, as I contended many years ago; the changes observed to take place in these fluids, and more especially their coagulation, being the consequences chiefly of the loss of the vitality, or of the organic nervous influence or emanation endowing these fluids. If, therefore, it be admitted—and it cannot be rationally disputed, or with a due recognition of healthy and of morbid phenomena—that the circulating fluids are thus vitally endowed, it must necessarily follow that this endowment is dependent upon, and co-ordinate with, the vitality or the organic nervous energy of the frame; and, farther, that whatever contaminates these fluids must necessarily co-ordinately affect the vitality of the frame through which the contaminated fluids circulate.

83. *B.* Contamination of the circulating fluids may commence, 1st, in the lacteals, through the medium of the digestive canal; 2d, in the lungs, through the medium of the respiratory surfaces; 3d, in any part of the external surface of the body; and, 4th, in any part or tissue of the frame, by a self-contamination; and, thus originating, the contamination may manifest itself either generally, coetaneously, and co-ordinately throughout the frame; or prominently, and especially upon particular organs or parts, other organs or parts betraying comparatively but little disturbance. Of these sources of contamination I shall take a very brief and passing view, as far

as they may elucidate the associations of disease.

84. 1st. If the lacteals communicate with veins concurring to form the portal circulation, as some assert, and believe that they have demonstrated, and whether this communication take place before or after they have passed through their glands, or does not take place at all, the injurious influence of a contaminated or unwholesome chyle upon the circulation, and the organs through which it passes, will readily be admitted. If the contaminated chyle passes more directly into the blood circulating to the portal vessels, and without pursuing the longer route to the general venous circulation, it must necessarily follow that the functions, and even the organization of the liver and its vessels, will be placed in great jeopardy; and it may be farther inferred that, whatever may be the route which the chyle takes, the globules will not undergo their wonted healthy advances towards complete organization either before they reach the blood, or after they have entered into it. It is even very probable that the blood, thus abounding in an unwholesome or contaminated chyle, and with imperfectly assimilated or organized chyle or lymph-globules, will disorder the functions, and ultimately the organization of those structures and organs more immediately concerned in perfecting these globules, or transmuting them into perfect red blood-globules.

85. 2d. The second channel of contamination, or that through the respiratory organs, hardly requires any notice, it being so obviously one through which the most injurious agents are conveyed into the blood itself, thereby infecting or contaminating this fluid, and, through its medium, either remote parts, with which the particular agent may have especial relations, or the whole frame. It is through the respiratory surfaces that the emanations from numerous sources infect the system—effluvia from the soil and its productions, and exhalations from dead animal matters and from diseased bodies; and although this source of contamination and infection is the most obvious to every one who is capable of speculating respecting the causation of disease, especially when considered in connexion with the functions of the respiratory organs, yet it has been most frequently overlooked or insufficiently estimated. The blood is affected not only by the physical constitution of the air as respects temperature, humidity, electrical conditions, but also by those foreign gases, vapours, and emanations from living and dead organized bodies existing on the earth's surface. These severally, sometimes variously associated, affect both the vital conditions of the lungs—the organic nervous energy of the organ—and thus directly, as well as indirectly, modify the changes which take place in the blood circulating through the lungs, or otherwise contaminate this fluid in modes more or less specially related to the nature of the causes or agents which operate through this channel. (See *art. INFECTION.*)

86. 3d. The third or cutaneous channel of contamination is certainly less frequently influential than those already passed in review. Still, all the physical conditions of the atmosphere, and all the foreign gases, vapours, and emanations floating in the air, which so readily and injuriously invade the system through the respiratory organs, also affect the functions of the skin, and

thereby the conditions of the blood, and the states of the several internal viscera, and more particularly of the other excreting organs. The most serious contaminations of the circulating fluids, and of adjoining parts produced through the medium of the cutaneous surface, arise from the septic influence of a foul or infected air upon this surface when it is punctured, abraded, or deprived of that protection at any one point which the cuticle or epithelium is destined to afford, or when mucous surfaces, and especially serous surfaces, are exposed to this cause. In these circumstances, the skin itself, in some instances; the lymphatics or veins, or both, in other cases; or the cellular tissue, in some; and even all these, in a few, are seriously affected, and ultimately the blood itself is more or less contaminated; remote parts, and even the whole frame, becoming thereby implicated in the foul, septic, and disorganizing process thus commenced and most rapidly propagated. And here I may advert to the influence of the air in many situations, but more especially in towns and ill-ventilated places and houses, in extending disease originating in, or chiefly consisting of, lesion of the cutaneous surface; and the insufficient attention usually paid in practice to a due protection of exposed points of the cutaneous surface from the influence of the air, and to the exclusion of this fluid from deep-seated injuries or diseases. Nature provides a spontaneous remedy against the endosmosis or imbibition of infectious or contaminating agents existing in the air, by throwing out lymph, which, by coagulating, protects the exposed or injured point or surface; but the powers of life, as manifested by the capillary system, are not always adequate to this effect, and the consequences are the imbibition of septic matters, which contaminate the surrounding tissues and the fluids taken up by the absorbing vessels, and occasion a spreading, or asthenic, or diffusive inflammation of these vessels, of the lymphatic glands, and of the adjoining cellular tissue, the most manifest changes in the blood itself, and not infrequently extensive disorganization of remote organs and parts.

87. The changes thus arising in, and propagated from, the third channel of contamination, sometimes equally originate in and are propagated from deep-seated or internal parts, through the medium of circulating fluids and vessels, to distant situations, where they may be manifested only or chiefly. In the articles ABSCESS, ABSORPTION, BLOOD, DISEASE, and INFECTION, I have fully shown the manner in which morbid secretions or other depositions may contaminate not only the adjoining tissues, but also the circulating fluids, and ultimately occasion disorganization, and the formation of puriform or other morbid collections or lesions in distant organs or parts. I have so fully enlarged, in the places just indicated, on the views and doctrines which these consecutive lesions involve, that I need not allude to them at this place, more especially as they have been adopted by subsequent and recent writers; not always, however, with a due acknowledgment of the original sources.

88. It having thus been shown that the formation and perfection of the chyle and lymph-globules are probably owing to the vital influence of the vessels and glands through which they circulate, and that the metamorphosis of these globules to perfect red blood-globules is due to the

functions of the glands not possessing excreting ducts, and of the liver, it necessarily follows that the absorption or passage of injurious, imperfectly assimilated, or other morbid matters into this fluid must occasion disease in the organs more especially devoted to these functions; while impaired function of these organs, or structural lesions of them, must also impede or interrupt the progressive changes of these globules, and the formation of perfect blood-globules; the conditions of the blood itself becoming thus more or less imperfect or diseased, and incapable of undergoing in the lungs those changes which are requisite to the due nutrition of the frame, and healthy condition of the several viscera.

89. What the exact conformation of the several globules existing in the chyle, lymph, and blood may be, is not, perhaps, yet fully determined, or, at least, admitted, by the numerous observers who have attempted to investigate the subject. But it may, at least, be inferred that these globules undergo a progressive organization, and that the organs already mentioned are instrumental in producing it; but it should likewise be considered that the changes produced in the blood in the lungs and in the general circulation, as well as the influence of the air upon the blood, are also more or less intimately connected with the perfection of these globules, as well as with whatever alterations they may undergo subsequently to their full development. Neither microscopic nor speculative physiologists have shown the nature of the relation existing between the atmospheric elements and the blood-globules and other constituents of the blood, so as to explain the phenomena of nutrition and the sustentation of nervous or vital energy. Certain of the more manifest phenomena have been remarked, but not accurately traced or irrefragably demonstrated. It may be asserted that the oxygen of the air combines with the blood-globules, and gives rise to changes necessary to nutrition, to nervous endowment, and even to the circulation of the blood itself. But it is quite as difficult to prove as to disprove this proposition, with the subordinate relations between these globules and the several general systems and special organs which this proposition involves.

90. At the present day, the chemical changes which occur in the blood have become subjects of discussion, and too generally with an entire neglect of those alterations which arise from the states of vital power. The former can seldom be recognised in practice, and are often unappreciable even in the most dangerous diseases; while the latter are generally the most manifest and characteristic, and present themselves in this manner to the unaided senses. To these latter, therefore, our attention should be directed, inasmuch as they indicate not merely the states of the blood itself, as respects its more important constituents, but also the conditions of organic nervous or vital power—conditions of the utmost importance to be correctly estimated by the physician. It should not, moreover, be overlooked that even the most gross and evident chemical changes are merely the results of vital power and vascular action controlling the changes which are imputed to chemical affinities; but which are truly the results of a vital chemistry, or of affinities controlled by vital forces. Whatever may be the nature of the intimate chemical changes which take place in the blood, either in the lungs,



or in any other organ, there is every reason to assert that these changes would not result if the organic nervous influence were removed from the organ in which they take place in health; and farther, a close observation of the causation of the changes observed in the blood during disease leaves me to infer that most of those changes are more or less influenced or produced by conditions of nervous energy or vital power, chemical action or affinity having nothing to do with the matter, farther than in favouring the combinations of alkaline bases with oxygen, and of these or other compounds with acids; and those combinations even are favoured or controlled by the vital powers.

91. In speculating upon the changes taking place in the blood, the chief places are assigned, as agents, to the oxygen of the air, and to the carbonic acid or its constituents, as existing in the blood. What change, if any, may be effected by the nitrogen of the atmosphere, is not ascertained. It is supposed that azote produces little or no alteration of the blood; yet it is not unlikely that, although the amount may not be appreciated or appreciable—at least there is no admission of appreciation by chemists—there is, nevertheless, a change produced by it, both on the fluids which are carried into, and on the fluids which circulate in the system.

92. *C.* In the various speculations on the changes occurring in the blood in health and disease, until the appearance of the article BLOOD in this work (in 1832), and to which article some more recent writers have been much more indebted than they are willing to admit, the alterations of the blood—the pathology of the blood—have been very imperfectly and worse than superficially treated of. And while physiologists and pathologists have directed some attention to the processes of sanguification, they have altogether neglected to show how the destruction or waste of the hæmato-globuline or red corpuscles takes place, so as to prevent, during assimilation and nutrition, an exuberance—a morbid plethora—of this constituent of the circulating fluid from occurring.—*a.* A topic which has not been considered with reference to the healthy state can hardly be supposed to have been investigated in connexion with disease. But it cannot be unreasonable to infer, that in health the waste may proceed from the following sources: 1st, from a partial vital decomposition and conversion of the hæmato-globuline or red-corpuscles to supply by nutrition the waste of the several tissues; 2d, from the conversion of a portion of the globules in the portal vessels into bile; 3d, from the action of the mucous follicles, especially of those seated in the lower portion of the small, and in the whole of the large bowels, upon the blood conveyed to them; 4th, from the operation of the other emunctories, although in a much less degree, especially the kidneys and skin, the epithelium-cells, thrown off by these, being transformed blood-globules, either before or after they had acquired their colouring matter or property; and, 5th, from the elaboration of the sexual fluids and discharges in both sexes.

93. *b.* During disease, the waste of the hæmato-globuline or red corpuscles may be either hastened, increased, or impeded, more rarely the latter. It may be hastened or increased, 1st, by insufficient assimilation, owing to impaired organic nervous or vital power; 2d, by morbidly increased action of the liver; 3d, by increased action or

elimination of the emunctories, especially of the intestinal follicles and surface of the skin and of the kidneys, owing to the impaired vital endowment of the globules and crasis of the blood having provided these emunctories with an increased pabulum, or material whereby their actions are augmented; and, 4th, by the morbid or increased action of the sexual organs in either sex. Owing to the excessive action of these sources of waste, the blood may become poor or deficient in hæmato-globuline and red corpuscles; and accordingly we find, not only where assimilation is deficient, owing either to inanition or impaired vital power, but also where either of these sources becomes inordinate for any continuance, that a poor state of the blood or anæmia takes place. In low or adynamic fevers, in diarrhœa or dysentery, in some affections of the kidneys, in leucorrhœa, in self-pollution, and in excessive sexual intercourse, in acute rheumatism, especially when attended by excessive perspiration, this state of the blood generally supervenes. As respects rheumatism, this result escaped the observation of previous writers, until I mentioned it when treating of this disease. (See *art.* RHEUMATISM, § 84, *et seq.*)

94. *D.* During the process of circulation, in consequence of the changes that take place in the chyle and blood-globules, of the absorption of chyle from the digestive canal, and of effete matters from the several tissues, considerable changes must necessarily take place in the blood, and, as the result of these, numerous phenomena must be produced in, and evinced by, the excreting organs—the skin, the lungs, the liver, the intestinal canal, and the kidneys. There appears to be a very intimate sympathy between the functions of these organs. Many years ago, I had an opportunity of putting that subject to the test. In 1814 and 1815, I was engaged in a number of experiments on the effects of temperature upon respiration and the blood in different states of the system, and the results of those experiments were afterward published. Subsequently, when visiting an unhealthy and warm climate, I had an opportunity of observing the changes there produced in the air by the respiration of individuals of different races, and found that, during cold states of the atmosphere, and soon after digestion, the greatest changes took place in the blood—the greatest consumption of oxygen, and the greatest amount of carbonic acid then appearing in the expired air; while in a very warm state of the atmosphere, and several hours after a meal, when the vital powers are depressed, the smallest amount of oxygen was consumed, and of carbonic acid existed in the expired air; and these latter effects were most manifest when the system was subjected to the influence of malaria. It was also farther considered that the cutaneous function was, to a certain extent, supplemental to the function of respiration; that, in fact, as observed in some of the lower animals, the cutaneous function is, to a considerable degree, one of respiration. This, even in the human species, appears to be the case, more especially as regards negroes. I made several experiments, in a very warm climate, on the respiratory functions of this race, and found that the quantity of carbonic acid given off from the lungs in this variety of the species was almost one third less than that given off by the lungs of an European of the same size, and at the same temperature; while in the former,

the changes taking place on the cutaneous surface were greater in degree, and more extensive in kind, than in the latter—the supplemental respiratory function of the skin of the negro being not only more remarkable as regarded the formation of carbonic acid and the exhalation of watery vapour, but also peculiar as respected the amount of animal matter and effluvium impregnating the exhaled vapour and watery fluid.

95. I attempted at that time to account for the prevalence of fevers, and disorders of the biliary functions, &c., so prevalent among Europeans migrating to a warm climate, by the state of the blood consequent upon the diminished changes produced by the air on the blood, and by the superabundance of the elements from which bile is formed existing in the circulation; the liver thus for a time performing a vicarious action to the lungs—the deficient function of the lungs, in an European in warm climates, being made up by the greater activity of the liver. However, this exists in individuals only for some time after they arrive in a warm climate, and very frequently it is not so remarkable after a year's residence there. Active exercise, also, in a warm climate, by increasing the functions of respiration and cutaneous exhalation, remarkably relieves the increased function of the liver, and prevents many of the consequences of this disorder.

96. There is also a very intimate connexion existing between the state of the blood and the depurating offices of the mucous surface of the intestines, especially of the large intestines. This surface, and more particularly the follicular glands, may be considered as eliminating from the blood redundant or decomposed blood-globules (§ 92), and much effete materials, and as thereby contributing, with the other emunctories, to the purity and healthy condition of this fluid. The connexion subsisting between the functions of excreting viscera, not only as altering the condition of the blood, but also as affecting each other individually—the influence which the state of one depurating function exerts upon the others, through the medium of the blood, as well as through that of the organic nervous system, and the mutual and conjoint operation of all these functions, not merely in changing the physical appearances and constitution of the blood, and the states of vital influence, but also in occasioning structural alterations, are among the most important topics comprised by a rational system of pathology. Without due consideration being devoted to them, the morbid changes constituting the progressive periods of disease, the media of connexion subsisting between affections of distant parts, and the passage of one alteration into another, cannot be traced; and the association of disease of one organ, with equal or even greater disease of another organ, cannot be explained, and neither anticipated nor guarded against in practice.

97. *E.* It is of great importance to the physician to observe closely the *physical appearances or sensible characters of the blood*, when removed from the subject of disease, both immediately upon and some time after its removal. It is hardly possible for him to devote his attention to the analysis or *chemical constitution* of this fluid, inasmuch as this requires considerable time and diversified experiments to arrive at satisfactory conclusions; and, besides, many of the changes observed are truly vital, or at least the results of departing vitality,

and are either very imperfectly, or not at all, indicated by chemical analysis or tests, although frequently manifested by distinct physical characters. The physical appearances of the blood, when removed from the body during the life of the patient, are of the utmost importance, as indicating not only the conditions of this fluid *per se*, but also the states of vital power; and as furnishing the chief indications of cure. My limits will not admit of my noticing, otherwise than in very general terms, the principal alterations of the blood, which tend both to associate alterations of distant parts, and even to contaminate more or less the soft solids of the body. The perusal of what has been done by chemists, even down to the present day, to demonstrate the chemical changes of the blood, even in the advanced stages of disease, will furnish but little information which can be used practically, compared with attentive observation of the physical changes of this fluid. These latter changes I have fully described in another place (see *art. BLOOD*), and therefore I shall not even briefly advert to them now, but merely notice two or three topics connected with the subject more immediately under consideration, some of which have not received sufficient attention from other writers.

98. *a.* Various changes as respects the *colour* of the blood, both at the time of removing it from the vein and afterward, have been observed. The blood may present every shade of colour, from a pinkish hue, or a pale or florid red, to a deep red, or a brownish or dark red, or dark violet, or even to a brownish or black, or dark greenish hue. The first of these colours is observed chiefly in cases of anæmia; the latter of them in congestive diseases; and the last chiefly in pestilential or malignant maladies, or in cases of poisoning—indicating not only a contaminated state of the blood, but also impaired organic nervous influence of the vessels and vital organs.

99. *b.* But it is not merely the colour of the blood, but also the rapidity and mode of its *coagulation*, and the *state of the coagulum*, that requires the attention of the physician. The relative proportions of coagulum and serum; the firmness, or the flaccidity or softness of the former; the presence of cupping of the coagulum, or of the buffy coat, and the thickness and density of the buff, are circumstances which will be duly estimated by him, as indications of organic nervous energy or excitement—of states of increased vascular action and of vital resistance. He will, from these conditions of the blood, infer existing states of the whole vascular system, and of the organic nervous system as actuating the vascular—viewing these conditions as the results of the states of these; and while he estimates them all at their true value, he will not attribute undue importance to any one condition apart from the rest. He will not, as in a case to which I was recently called, after taking away between thirty and forty ounces of blood, again take away nearly as much within a few hours, merely because the latter cupfuls of the former bleeding were cupped and buffed, and thus nearly destroy the patient; but experience will soon show him, if education have not taught him, that, in inflammatory affections of serous or fibrous tissues, and in diseases attended by vascular excitement, without loss of vital power or resistance, or infectious contamination of the blood, the fibrin continuing abundant, the coagulum may present these appearances



to the last, and even although it may be relatively small to the amount of serum.

100. But in different states of the organic nervous influence or vital power, and owing to these states either primarily or consecutively, the blood presents very opposite physical characters. It coagulates more rapidly and more imperfectly, or even hardly coagulates at all, or at least does not separate into any coagulum distinct from the serum. These characters are usually observed in depressed states of vital power and resistance, and in contaminated or poisoned conditions of the blood, and are owing either to absorption of contaminating and morbid matters, or to interrupted depuration by the several emunctories. In some malignant diseases characterized by extreme depression of vital energy, with a rapid state of the circulation, the change in the appearances of the blood has been most remarkable and sudden or speedy in its accession. In the worst form of puerperal fever—a disease which I have seen go on to a fatal issue within twenty-four hours from its accession, and for which blood-letting was often most improperly and fatally employed, because it had been recommended by some dangerous because ignorant writers—the blood has, in some instances to which I was called, subsequently to its abstraction, presented the appearance of a straw-coloured and very thin jelly, without any coagulum, the colouring matter being precipitated to the bottom of the vessel of a black hue, and in the manner of a powder which had been mechanically mixed in the fluid which had suspended it, and without the least cohesion between its particles. In these cases, as well as in some other maladies characterized by extreme depression of vital power, and a poisoned state of the blood, the coagulation is not only imperfect, but is of a peculiar kind; the colouring matter being detached from the other constituents of the blood almost as soon as the blood passes from the vein, the fibrinous elements forming a thin jelly with the serum of the blood. The small amount of vitality possessed by the blood in these cases is lost immediately upon its abstraction from the body; and the fibrin, although it may exist in tolerable quantity, is incapable of contracting or adhering so as to form a coagulum, yet often uniting so loosely in the serum as to form a thin gelatinous mass.

101. *F.* The quantity of blood in the system has also a very important influence in associating diseases of distant organs or parts; and this influence becomes still greater and more general if the blood either abound in excrementitious elements, or be in any way poisoned or contaminated. The quantity of blood may be diminished as respects either the general amount, or the colouring constituents, or hæmato-globulin; and it may be deficient in a single organ. It is not unusual to observe in cases of general anæmia an irregular distribution of the blood, some organ or part experiencing an excess, while the diminution is still more remarkable in other parts. This is usually observed when, with anæmia, there exists local irritation, or excitement of the organic nervous influence of a particular organ. In this way distant parts often present consentaneous morbid phenomena, and the organ which has received to-day a more than proportionate supply of that blood which is deficient either in general amount, or in colouring matter, or in fibrin, or in all these together, may present on the morrow more than usual defi-

ciency; and thus a new combination of disorders may arise. This is not unfrequently met with in nervous, susceptible, and hysterical persons, in whom the distribution of blood is always more or less under the control of the nervous system, more especially the ganglial.

102. If the influence of these states of the circulation be remarkable in associating disorders of distant parts, that produced by the opposite state, or too great fullness, is not the less so, more especially if the fullness be attended by an excess of effete or excrementitious elements. Vascular plethora, as long as the blood is duly changed by the emunctories, favours active determination to particular organs, especially to those liable to irritation or nervous excitement—not unfrequently also to acute inflammations and active hæmorrhages, according to the diathesis and the nature of exciting or concurring causes. But if excrementitious fullness supervene, owing to the imperfect discharge of some depurating function, as that of the kidneys, some distant organ is placed in great jeopardy, or effusion takes place in shut cavities, or in the cellular tissues. But these results may equally occur although the amount of blood in the system previously had been in due relation to the frame, and to the capacity and state of the vascular system. It frequently is observed in practice, that a previously healthy person, in respect of his vascular system especially, is exposed to causes which arrest the cutaneous excretions, and he experiences a slight attack of fever, or local determination to some predisposed organ, or diarrhœa, or some other affection, especially if the kidneys have not performed a vicarious office in supplying the suppressed function of the skin. A healthy person, also, is exposed to causes, as infections, which depress organic nervous energy, and thereby impair or suppress the more important depurating and secreting functions. The consequences as respects the blood are obvious. This fluid soon abounds in effete and injurious elements, increasing both the amount of vascular contents, and oppressing and irritating the whole vascular system, although certain organs may manifest these effects in a more prominent manner than others, until a salutary crisis is observed, and the morbid state of the blood is removed; or until the soft solids are changed, their vital cohesion is loosened, and disorganization ensues.

103. *G.* I need not pursue this subject farther, seeing that I have fully discussed it in several parts of this work; but I wish to direct attention to one topic more particularly connected with it, and which, in its relations to various maladies, has been most unaccountably overlooked—namely, to the probable want of correspondence, on some occasions, between the capacity of the vascular system and the amount of its contents, between the area of the containing vessels and the amount of fluids contained.—*a.* This presumed want of adaptation, or of accordance, may be great, quite irrespective of the quality or condition of the circulating fluid; the tone of the containing vessels being so remarkably deficient, owing to depression of the organic nervous power, as not to occasion the due accommodation between the vessels and the blood circulating in them—as not to admit of that amount of vital contraction and adaptation of the vessels necessary to the due performance of the circulation, and to the retention in them of the more fluid parts of the blood,

which, either alone or with more or less of the hæmato-globulin, readily escape from the relaxed capillaries in the more yielding surfaces and crec-tile tissues. Now a due correspondence between the containing vessels and the contained fluids, and the mutual influences, both vital and mechanical, resulting from this correspondence, and from the healthy conditions of both the vessels and the fluids, are obviously wanting, in a more or less remarkable manner, in many maladies, especially in several malignant and pestilential fevers, more especially where the vital powers are remarkably depressed; and it is chiefly owing to this depression that the vascular system is incapable of accommodating itself to the amount of its contents. In these circumstances, the pulse is at first broad, open, soft, and compressible, although it is subsequently small, feeble, creeping, or undulating; and the abstracting of even a small quantity of blood, or the loss of it by the passive hæmorrhages or exudations, which often occur very rapidly, sinks the patient, by increasing the want of correspondence, now pointed out, between the capacity of the vessels and the amount of blood they contain.

104. *b.* This want of correspondence, or of vital accordance between the blood-vessels and their contents, may arise also from a different pathological condition, namely, from the blood being so deficient in quantity, as not to impart the requisite state of *tension* to the coats of the vessels; and hence, when the vital tone of the vessels is impaired at the same time that the blood is deficient in quantity, the current of the circulation is irregular and languid; and vascular action, which was already asthenic when the vital tone of the vessels was impaired, becomes much more asthenic when the blood is also deficient in quantity, fatal congestion and sinking of the vital powers ultimately supervening.

105. In pestilential maladies, and even in other malignant diseases, the tendency to death is to be imputed as much to this increasing want of accordance—to the progressive defect of vital and mechanical adaptation, between the vessels and the blood, as to the changes which have actually taken place in the constitution of the blood; and several of the associated phenomena, characterizing the advanced and last stages of these maladies, are to be ascribed to this circumstance—to this pathological condition existing so generally throughout the vascular system. Thus, in the hæmagastic pestilence, or true yellow fever, the phenomena observed in its progress, and the acceleration of death by passive hæmorrhages, or the black vomit in its last stage, are readily explained according to this view; while the more successful mode of treatment for this malady is that which is directed to these changes in the vascular system, and to the state of organic nervous influence upon which these changes originally depend.

106. That this want of accordance between the amount of blood in the vessels and the capacity of the blood-vessels, this deficient vital adaptation of the vessels to the amount of their contents, is a most important pathological condition existing in the progress of several malignant diseases, and associating the affections of distant organs; and, moreover, that death in these diseases is to be imputed rather to this circumstance, to this condition, than to the poisoned or altered constitution of the blood, heightened as it often is, at an ad-

vanced stage, by passive hæmorrhages, are facts illustrated by the course of several maladies, and demonstrated by what is observed after death from hæmorrhages and from hæmagastic pestilence. In the last stage of this latter malady, and as the altered blood—altered as regards its vital condition, physical appearances, chemical condition, and in the loss of the greater part of its fibrin—exudes from the mucous surfaces and outlets, the circulation becomes remarkably slow, the vessels appear and feel soft, relaxed, flaccid, and imperfectly filled; the blood returns to the right side of the heart in deficient quantity and celerity; absorption of fluid from the digestive organs is arrested; and ultimately the heart's action ceases, from an insufficient return or supply of blood to the right auricle. Upon examination after death, the digestive canal contains much black grumous matter, consisting chiefly of altered blood, or of matters similar to those thrown off from the stomach and bowels for some time before death; the abdominal vessels, and especially those contributing to the portal system, the ramifications of the vena porta, and the hepatic veins, are empty, and the liver is remarkably pale. The whole vascular system is deficient of blood. Analogous changes characterize the last stage of other maladies, as pestilential cholera, plague, &c., the chief difference being that, in the former especially, the watery parts of the blood are those principally lost, the parts which are left being not only insufficient for the maintenance of a due correspondence between it and the vessels, but also unsuited to capillary circulation, and to the sustentation of the vital functions; the soft solids being also more or less deficient in vital cohesion, and rapidly passing into dissolution, as I have shown on several occasions, and especially when treating of these maladies.

107. *H.* It being admitted, and the fact cannot be disputed, that changes in the quantity and quality or state of the blood, and, still more remarkably, changes in both quantity and quality, associate disease of several organs, both those intimately connected anatomically and those more distantly related physiologically, it must necessarily follow that not merely functional disturbance of these several remote as well as proximate organs is thereby produced and associated, but also structural changes and the most extensive disorganizations of these organs often result. But it is not sufficient for us to take for granted these changes in the blood and vascular system, in thus complicating or associating disorders and distempers, and in developing various sympathetic ailments: it is of importance to us to trace these changes to their sources, and to view their relations, in order that we may the more fully comprehend their extent, and hence be enabled the more satisfactorily to prevent their accession, to arrest their progress, or to counteract their effects. I have already pointed out, briefly and inadequately, several of these sources and their pathological relations, and referred to the parts of this work where these topics are more fully discussed, and therefore I shall now merely enumerate the several conditions to which attention should be directed in our investigations of the sympathies, or the morbid associations and complications resulting from alterations of the blood and vascular system.

108. *First.* The state of organic nervous influence in relation to the agents affecting it, and



to the resulting influences and changes upon the vascular system and blood.

109. *Second.* Imperfect chymification and chylification, owing to the unwholesome nature of the ingesta, or to impaired digestive function, or to morbid states of the digestive mucous surface; the chyle being either imperfectly elaborated, or of so unhealthily a constitution as to affect the glands and viscera through which it circulates while passing onward to the blood, and after it has mixed with this fluid.

110. *Third.* The absorption of morbid secretions, excretions, or other matters, either from the digestive canal and mucous surfaces, or from cellular parts, or parenchymatous organs or other structures, these matters often inflaming the blood-vessels or the absorbents and glands, contaminating the blood, producing chronic or hectic fever, irritating or inflaming remote vessels and organs, or giving rise to abscesses or purulent deposits, diffused or encysted, primary or secondary, in distant parts, as more fully shown in the articles "*Abscess*," "*Absorption*," "*Blood*," and "*Disease*," in this work, and in my paper on the "*Pathology of the Veins*," in the MEDICAL GAZETTE.

111. *Fourth.* Suppression, interruption, or diminution of any of the eliminating or depurating functions—of either of the excretory actions, by which effete materials are removed from the blood, and this fluid is preserved in a healthy condition; interruption of one or more of these functions, altering the state of the blood, changing the healthy relations subsisting between it and the heart and vascular system generally, disordering the other excreting organs, exciting general vascular disturbance, and superinducing various changes, contaminations, effusions, and even disorganizations in several organs or parts, or generally throughout the frame.

112. *Fifth.* The exciting or depressing emotions of mind—all influences, excitants, or agents, affecting either the cerebral, or spinal, or the ganglionic sensibility—all inordinate excitations of the mind, passions, or sentiments; or of the senses and muscular movements; or of any of the organs requisite to the continuance of the life of the individual, or the perpetuation of the species, are liable to be followed by sympathetic disorder of distant but related parts, owing to the organic nervous connexions already pointed out, to the changes frequently produced in the fluids—the chylous, lymphatic, and sanguineous—to the consecutive changes of nervous power, and electro-motive conditions of the general systems of the body, and to the *unity*, as well as to the special systems and conditions of the frame.

113. From one or other, or from two or more, of these, numerous associated morbid conditions result, some of which conditions have been variously estimated and classed, with the narrow but vain view of giving them the individuality and identity displayed by the genera and species of the animal and vegetable kingdoms, characteristics which they are altogether incapable of evincing, owing to the diversified features, associations, and complications resulting from these five great sources, and their innumerable states, modifications, and progressive changes. The most common, at the same time the most uniform of the special results, proceeding from these sources, the most frequent of these sympathetic associations and morbid complications, in which changes throughout the whole frame are most remarkably

produced, and most intimately dependent upon each other, through the *media* especially of the organic nervous system, and of the vascular system and blood, are the following:

114. 1st. Sympathetic or symptomatic states of vascular excitement or action, resulting from changes in the organic or cerebro-spinal sensibility of parts; or from local injury, or from inflammation, pressure, or other local changes—*symptomatic fevers*. The *media* of general disorder in these are, first, the nervous systems, and consecutively the vascular system and blood, the several concomitant and intercurrent changes, varying in different cases with the nature of the causes, and the numerous circumstances connected with these causes, and with the individual affected.

115. 2d. Chronic or hectic febrile conditions, resulting generally from a persistent source of irritation implicating primarily the organic nervous function, and consecutively changing the nutrition and secretions of the part, and ultimately altering the states of vascular action and of the blood; followed frequently by absorption of morbid, or puriform, or tubercular matters into the circulation, by consecutive deposits, abscesses, &c. *Hectic and chronic fevers*, consequent upon local irritations, tubercular deposits, encysted abscesses, carious bones, and malignant formations, &c., are all of this description, and are ultimately accompanied by altered conditions of the blood, imperfect assimilation, anæmia, &c.

116. 3d. Periodic fevers, or febrile and painful states of the system, arising from malaria, and varying in character with the concentration of the effluvium, and with the proportion or amount of emanation from dead animal matter which is conjoined with it. The morbid impression in these diseases is made primarily upon the organic nervous system, the vascular system and blood being consecutively affected, and various visceral affections often ultimately resulting.

117. 4th. Adynamic, typhoid, and putrid fevers, or those arising from the emanations proceeding from living or dead animal matter. The morbid impression is made by those emanations primarily and principally upon the organic nervous system, although the blood may also be primarily contaminated, as it obviously is consecutively, the soft solids generally becoming, through these *media*, ultimately more or less implicated.

118. 5th. Exanthematous and pestilential fevers, or those fevers arising from specific morbid poisons. The morbid impression is generally made in these distempers in ways similar to those now stated (§ 117), and the results are equally general and serious, often most rapidly fatal, particular fevers presenting peculiar characters.

119. In all these maladies, although the organic nervous system, in the usual mode of exposure to these exciting causes, receives the first morbid impression, especially when the poison is inhaled with the air into the lungs, the blood soon becomes contaminated, owing either to the absorption of a portion of that poison, or to the influence of the primarily induced morbid condition of the organic nervous system, in impairing the several secreting and excreting functions, and in altering in this way not merely the healthy constitution of the blood, but also the vital adaptation of the vascular system generally and of the amount of blood to each other; and, moreover, in destroying, both by the primary impression on

the organic nervous system, and by the consecutive effects, the vital cohesion of the several simple tissues, structures, and compound organs.

120. These several classes of disease, whether viewed individually or in the aggregate, remarkably illustrate the great extent to which not merely functional disorder, but structural disease, and even more or less general disorganization, may be associated, when a poisonous influence impresses any one portion of the congeries of ganglia and plexuses constituting the organic nervous system, or contaminates the circulating fluids; the effects being the more rapid, the more general, and the more fatal, the more concentrated or intense the poison, and the more unequivocally and immediately the primary changes are produced, both in this system and in the blood and vascular system.

121. The influences affecting the circulating fluids, may therefore, be classed under four heads: *first*, that of the nervous systems, more especially the organic nervous influence; *second*, the state of the chyle resulting from the nature of the ingesta; *third*, the absorption of morbid or poisonous matters into the circulation, from any surface, organ, or part; *fourth*, interrupted excretion.

122. Important and extensive changes are produced on the blood by the several eliminating organs, by the liver, the digestive mucous canal, the respiratory surface, especially the lungs, the skin, and the kidneys. An interruption to either or several of the functions of these organs more or less alters the circulating fluids; but when the constitutional powers are not materially affected or depressed, a slight interruption to the discharge of one excreting function is very frequently followed by vicariously increased action of another excreting function, and thus the system is preserved without experiencing much detriment, in many cases of such interruption.

123. *I.* The importance of considering the state of the blood, with reference to the causes affecting it, is remarkably great, particularly with reference to fevers. In the different forms of fever, where disorders of function, and ultimately structural changes in the organs themselves, become the most extensive, it is seldom that we find one organ implicated alone, but several in rapid succession, or contemporaneously. Inflammatory lesion of a particular tissue or organ, with which the system sympathizes through the channels pointed out—namely, nervous organic influence, the blood, continuity and contiguity of surface or structure—implicates the whole frame. The functions of the most remote organs become affected thereby, and generally in proportion to the extent to which the circulating fluids are disordered. If vascular action, and especially if the circulating fluids be materially affected, co-ordinate disorder of the urinary and digestive organs, and also of the functions of the brain, generally ensues. Owing to the bonds which unite the frame into a whole, and intimately associate all the viscera, it has been supposed that all fevers are merely the general or sympathetic disturbance of this whole, arising from a more or less prominent affection of one organ. Several writers have attempted thus to localize all forms of fever, and to consider them merely as modifications of inflammatory fever; but I need not allude to these attempts, as they have been disapproved when treating of the pathology of fever.

124. It would be interesting, if space allowed, to trace the manner in which the several systems of the frame become affected during the progress of fevers. In respect of periodic fevers, or those which arise from malaria, it may be briefly remarked, that the causes producing them seem to affect primarily and especially the organic nervous system; and that the fluids and abdominal viscera become more or less disordered secondarily. Intermittent and remittent fevers may not appear until weeks after the individual has been exposed to malaria, and then the paroxysms occur at intervals. We know that morbid impressions, or irritations, or other morbid conditions of nervous parts, usually assume a periodic character. If it were the blood which is primarily affected in these cases, it must follow that the state of the blood which existed during the paroxysm would continue during the intermission, until removed; and that, instead of presenting intervals when comparatively little disorder is felt, the disease would be continued; for, in proportion as the blood becomes affected in fever, so does the disease assume a more and more continued type. There are various lesions prominently affecting particular organs, and which give fevers a variety of character: thus we have gastric fever, intestinal fever, bilious fever, and so on. If we proceed to the consideration of the worst forms of fever—for instance, typhus or pestilential fever—not only is the nervous system affected, the organic nervous system being probably the first to be impressed with the cause of the disease; but also the blood itself soon becomes more or less contaminated and altered—becomes physically changed.

125. Now the question is, whether this change, produced so early in the blood in typhoid and pestilential fevers, arises primarily from the absorption of the cause into the blood, or whether it proceeds from the morbid impression made primarily on the organic nervous system, owing to which impression the excreting or depurating functions, which are under the influence of this system, are impaired or arrested, and the circulating vessels and fluids become thereby affected, and ultimately changed? I have shown how copiously the vascular system is supplied by the organic nervous or ganglionic system, and hence we may expect, *à priori*, that causes affecting this system will, to a co-ordinate extent, affect the vascular system and the fluids circulating in the vessels. We find that, in the progress of fevers, the blood becomes changed; and the change may arise partly from the impression made by the emanations causing the fever upon the organic nervous system, and partly from the absorption of the emanation—of the morbid poison itself—into the circulating mass. I believe that the infecting or morbid effluvium, being received into the lungs with the air, injuriously affects the organic nervous system supplying these organs; hence the blood in the lungs is not sufficiently changed by respiration. Possibly, also, partial absorption of this effluvium may take place into the blood itself; but if it does not, there is a still stronger reason to infer that the morbid impression extends throughout the organic nervous system, impairing or otherwise altering the influence of this system upon the vascular system, and in the secreting, assimilating, and excreting viscera. The organic nervous power being depressed, it naturally follows that the organs sup-



plied by this system become impaired in function; and hence we find that, in the first days, or within the first twenty-four hours of fever, the functions of the excreting organs are very remarkably diminished, or even suppressed, and the consequence is, that the blood, which may have been hitherto unaffected, is more or less changed; or, if it have been already affected by the cause of the disease, or by the impression on the ganglial system, becomes still farther changed. Thus the one change reacts on the other, and promotes it, until at last the changes in the organic or vital nervous influence in the vascular system, and in the circulating fluids, become so great, that the blood is not only altered sensibly as respects both its physical characters and its chemical qualities, but the tissues and organs themselves become more and more disorganized, or evince a remarkable loss of their natural vital cohesion, especially in putro-adyamic fevers, and distempers of a malignant character. This subject is so fully illustrated in the articles BLOOD, DISEASE, INFECTION, FEVERS, and PESTILENCE, that it is unnecessary to pursue it farther at this place.

126. ii. *The influence of obstructed circulation through, or of other lesions of, the heart itself, independently of any material change in the constitution of the blood in complicating diseases,* and the intimate connexion existing between the circulation through the heart and that through the lungs, has been already adverted to; but so much have we been in the habit, in consequence of the modes of teaching and writing generally adopted, of viewing disease nosologically, and of regarding one species as being altogether distinct from another; and so injuriously has this acted in the practice of medicine, that we have been thereby actually prevented from seeing the connexion subsisting between different diseases, and of observing how intimately they are associated, and how readily the disorder of one organ induces or passes into that of another, until experience and repeated observation have destroyed the impressions of erroneous education and of false precepts. We often observe persons with short or hurried respiration on the least exertion, which has often been considered as a form of asthma, and the disease has been looked for in the respiratory organs. The patient has been said to have spasm of the bronchi or the trachea, or some disorder of the respiratory passages, which has produced this disordered respiration. But now that we have traced out more intimately the relation of the disorder of one organ to another, we have found that in these cases the lungs may be free from disease, farther than congestion arising from interruption to the circulation through the heart; and we have discovered that, in the majority of such cases, the lungs are only secondarily affected, and that the heart is primarily in fault. This condition of the respiration is most frequently owing to this cause, even where there is but slight disease in the heart. Thus, in weakened, nervous, and susceptible persons, the affection of either organ soon extends to the other. If the lungs are disordered, the heart becomes affected; or if the heart is primarily affected, the lungs become disordered—the least excitement of one organ extends to the other. In many persons of lax fibre, or of a lymphatic or leucophlegmatic constitution, the parietes of the heart are deficient in tone, or are partially changed in their intimate structure, and

dilatation of the cavities or other alterations often take place, so as to give rise to imperfect or irregular, or interrupted circulation, and consequent congestion, with or without effusion, either in the vicinity of the congested viscera or in more distant parts; *the subordinate circulating apparatuses, or the subordinate orders of the vascular system, namely, the vascular apparatuses of the liver, brain, and lungs, especially suffering derangement.* Numerous instances present themselves in practice of consecutive affections, of a complicated character, appearing as the disease advances, during hooping-cough, dry catarrh, asthma, &c.; the heart, the brain and spinal cord, and their membranes, the portal circulation, &c., becoming secondarily affected, in addition to organic changes, often also produced in the lungs themselves, and in their investing membranes.

127. The connexion subsisting between dilatations, often slight, of one or more of the cavities of the heart, and between lesions of the valves and orifices, and congestions of the subordinate orders of the vascular system just specified, more especially those of the lungs, liver, and brain, is sufficiently obvious, particularly when the heart betrays any of these lesions. But there is every reason to infer that congestions of the lungs may actually take place to even a fatal extent, without any very obvious organic lesion of the heart, or lesion of such an extent as can account for the occurrence. Thus severe shocks to the nervous system, mental or physical, severe injuries of vital parts, and agents acting with great intensity, and either inordinately depressing or exhausting vital power, occasion remarkable congestion of the lungs, sometimes also of the other subordinate orders of the vascular system, more especially in persons already the subjects of a fatty, dilated, or relaxed state of the parietes of the heart's cavities. Congestion of the lungs, however induced, even in slighter grades, is a serious morbid condition, inasmuch as it arises from, or is connected with various other lesions, either of vital action or of structural change, especially of the parts now stated; and as it generally leads on to farther alterations, to inflammatory action, to hæmorrhages, and various organic lesions, especially when neglected or improperly treated.

128. iii. *The sympathies between states of the circulation and those of the digestive organs* are so obvious as hardly to deserve notice. The functions of digestion and assimilation languish when those of circulation and respiration are impaired; and when the respiratory, and especially the circulating actions, are morbidly excited, distaste of food, nausea, thirst, and costiveness are common consequences. In these circumstances, the digestive villous surfaces become injected or congested, and the vascular disorder is often imputed to, instead of being viewed as causing, this change. Wherefore, it may be asked, are these surfaces often so prominently affected in cases of general vascular excitement? Because the vascular excitement does not always extend to the portal circulation, and the return of blood from the related viscera through the portal and hepatic veins is not so rapid and complete as the circulation through the arteries supplying the digestive canal; hence the congestion in many acute and chronic diseases of the digestive villous surface, and the rapid disorganization often consequent upon it, especially when organic nervous power is depressed, as in malignant or pestilential fe-

vers, in gastric remittents, and in typhoid, adynamic, and intestinal fevers.

129. The liver also often experiences consequent congestion or other disorder when the general circulation is either much accelerated, as above, or much impeded, as in cases of cardiac or pulmonary disease. The frequent occurrence of congestion of the liver in the course of these and other maladies, especially of those affecting the organic nervous influence, is a matter deserving notice. This congestion may be, in a great measure, owing to the circumstance of the circulation through the portal vessels being almost entirely removed from the influence of the heart. The circulation through these vessels appears to be owing to the organic nerves which supply them, and when the influence of these nerves is depressed, the circulation in the liver is co-ordinately impaired or impeded. I believe, also, that the capsule of GLISSON is also very influential in promoting this circulation, and this capsule is abundantly supplied with soft ganglionic nerves, whereby the vital action of the portal vessels is re-enforced with nervous influence. In all cases where there is cardiac disease, and congestion of the lungs consequent upon it, there is generally congestion of the liver. Both organs are intimately associated by means not only of the vascular system and the circulating fluids, but also of organic nervous influence, both organs being supplied by the same class of nerves. Again, the circulation through the liver, to which I have already partially adverted, is very much influenced by the state of the fluids and matters absorbed into the circulation even from the stomach itself, but principally from the intestinal canal. Stimulating, irritating, or imperfectly assimilated matters, when carried into the portal circulation, must necessarily irritate or excite the liver, and thereby ultimately produce changes of its structure.

130. iv. *The sympathy existing between the cardiac and pulmonary circulation and the brain* need only be mentioned to be admitted. The effect of disordered circulation through the heart upon the brain is a matter of very great importance, and one which, until recently, has not been sufficiently adverted to. The subject, however, has been fully discussed in the articles on APOPLEXY and DISEASES OF THE HEART, where it was shown that a number of cases of congestive apoplexy, of hæmorrhagic apoplexy, and of palsy, are occasioned by interruption to the return of blood from the head, owing to lesions of the parietes of the heart's cavities, or of the valves and orifices of the heart, with or without congestion of the lungs, according to the side of the heart in which the primary lesions are seated. This is a complication of very great importance, inasmuch as the symptoms are usually referred to disease of the brain, and are often considered premonitory of apoplexy or palsy, and are often treated as such without reference to the state of the heart, the pulse being tolerably regular; and yet, on examining the heart by auscultation, serious disease of this organ is found. I have had many patients who have long complained of symptoms referable entirely to the brain, the heart betraying to them not the least disorder, and yet in this latter organ was seated the primary, and often the most extensive disease.

131. Owing to insufficiency of the valve, or to dilatation of the right auriculo-ventricular orifice, or to what is a still more rare occurrence,

to disease of the valves at the commencement of the pulmonary artery, occasioning obstructed circulation, there is regurgitation of blood from the ventricle into the auricle, and then a series of changes supervene, as respects the circulation not only in the brain, but also in the liver and kidneys. At first, lesion of the functions of these organs, or of one of them in a more prominent manner, is observed, with more or less remarkable congestion; and subsequently structural change, with either serous or sanguineous effusion, anasarca, hæmorrhages, &c. The blood being partly thrown back at each contraction of the ventricle into the auricle, the regurgitation into the vena cava superior and inferior occasions congestion of the brain, liver, and kidneys, and its consequences, as just assigned. When there is dilatation of the right auriculo-ventricular orifice, or insufficiency of the valve, the effect upon the venous circulation is made manifest in the pulsation of the jugular veins, and the consecutive lesions just mentioned soon supervene. I have observed these associated changes in the cases of three eminent medical men who were under my care, and in two of whom I had an opportunity of making a post-mortem examination.

132. When these lesions occur in the left side of the heart, and which situation is much the most frequent, they interrupt the circulation through the lungs: congestion of the lungs takes place, and, in consequence of it, I have seen the changes supervene that I have now mentioned with reference to the right side of the heart. The congestion is usually to a great extent, and there is either effusion into the pleural cavities, or hæmorrhage of the lungs, or pulmonary apoplexy. There are other associated changes which require merely to be mentioned, but I shall allude only to organic diseases of the heart and kidneys. When treating, in the article KIDNEY, on granular degenerations of this organ, I fully showed that they were the results of a cachectic inflammation of the secreting structure of the kidney, especially of the Malpighian tufts, consequent upon a morbid state of the blood, and were sometimes also connected with organic changes in the heart and other viscera.\*

\* The article KIDNEY was published in 1840, and since the publication of that article views entirely identical with those which I then stated and illustrated have been brought forward by some very recent writers, as previously unpropagated by any other. I think it, therefore, due to myself to state, and to refer to the parts and the sections of this work, and to the dates where my statements as to the topics connected with albuminous urine and granular disease of the kidney, or *Cachectic Nephritis*, as I have termed this disease, may be referred to: the granular degeneration being the advanced stage of the cachectic inflammation. In 1832, I stated, when describing the states of the urine in connexion with dropsies, that "renal disease may exist without the urine being albuminous; and the urine may be albuminous without the kidneys being particularly implicated." Also, that I have often found the urine albuminous in the acute diseases of children, where no alteration of the kidneys existed; and that this condition of the urine is frequently observed after the exanthemata. (See art. DROPSY, § 34-36.)

When treating of the Diseases of the KIDNEY, in 1840, I entered very fully on the consideration of the pathology of the changes, which, when advanced, have been called "granular degeneration" of this organ; and showed that these changes, and consequently this degeneration, depend upon, or are intimately connected with, a morbid state of the blood; that, therefore, this particular disease of the kidney should be called, "*Cachectic Nephritis, Nephritis Cachectica; or Nephritis Sociata, associated or complicated Nephritis; or Nephritis from constitutional vice; or Nephritis from a morbid state of the blood, or Inflammation of the Malpighian bodies or tufts,*" rather



133. In briefly adverting to the association of disorder of the circulating, nervous, and muscular systems, I need only remark that, when the chyle or blood is disordered, these other systems are all more or less affected—the muscular system chiefly through the medium of the nervous. Irritation of lymphatic or lacteal vessels, either at their origins, or by the fluids which they imbibe and transmit, affects the glands through which they pass, or in which they terminate. When the lacteals are irritated, especially at their origins in the small intestines, the irritation is often propagated to the mesenteric glands, or to the portal veins and liver. Indeed, the digestive mucous membrane is seldom affected, especially in children, without causing disease of the mesenteric glands, particularly if the malady goes on to ulceration. It has been believed that, not only under these latter circumstances, but also in chronic dysentery, more especially as it occurs in warm climates, the consecutive abscess of the liver, frequently met with, is not merely owing to the absorption of morbid matters, purulent or acrid, from the digestive mucous canal, which irritate or inflame the liver or its vessels, but is actually the result of a true phlebitis, commencing in the veins of the mucous surface, and propagated along the veins contributing to the portal system, and thence to the ramifications of the vena portæ. In disordered states of the blood, when this fluid becomes vitiated, not only the muscular system, but the joints are also often affected. I have already hinted at this connexion, as arising from the circumstance of the ganglial nerves not merely supplying the blood-vessels of the extremities, but also being distributed to the joints, in the vicinity of which they form minute

ganglia; and hence, when the organic nervous system is much depressed or weakened, there is always great weakness of the joints. In this way may various phenomena that occur in many diseases be explained. Thus, gout and rheumatism arise not merely from the morbid condition of the blood, but also from the state of the organic or ganglial nerves supplying those parts, and from the connexion of these nerves with the cerebro-spinal sensory nerves.

134. V. SYMPATHIES OF SENSATION AND SENSIBILITY, OR ASSOCIATED STATES OF MORBID SENSATION AND SENSIBILITY. — After my endeavours to point out the intimate association of the ganglial with the spinal nerves and nerves of sense, it will be unnecessary to revert to the channel of communication in the associated affection of this class. It is only requisite to notice certain of these associations. Owing to the intimate connexion of the fifth pair of nerves with the nerves of sense—with the optic, lingual, auditory, and olfactory—a change affecting the roots or trunk, or even the ramifications of the fifth pair of nerves, to a certain extent impairs one or more of the senses on that side on which this nerve may be affected or implicated. Thus, in cases of tumour or abscess pressing upon the gangliated portion of the fifth pair of nerves, not only is the sensibility of the surface affected, but also the circulation and secretions of the organs of sense on that side are either disordered or impaired. Inflammation of the conjunctiva readily supervenes, and the senses of smell and taste are affected partly in consequence of diminished secretion from the surfaces of their respective organs. All the functions of sense are more or less affected, not only by disease implicating associated nerves, or parts from which the nerves take their origin, but often also by disease in distant situations. Even depressed energy of the organic nervous system generally, and especially of those parts of it which preside over digestion and assimilation, impairs the functions of sense. This association of remote organs—this unity of the frame—is displayed not only by one class of functions, but by all the manifestations of life in the different organs constituting the individual living being. I need not advert to the association of morbid sensibility of different parts of the cerebro-spinal nervous system. We are all aware that, when irritation exists at the origins of the nerves, it is not there that we may expect to find sensibility principally affected. When the irritation even is greatest at the roots of the nerves, little or no pain or alteration of sensibility may exist there: it will be felt chiefly at the sentient extremities of those nerves. This is manifested by *tic douloureux*, in which the morbid condition exists near the base of the brain, or is connected with the dura mater, or is caused by exostosis of some portion of the bones of the cranium. There may be pressure, or irritation caused by ossific deposits, but the morbid change is evinced principally at the remote or distal extremities of the nerves.

135. The same circumstance obtains with regard to the spine. In cases where the individual may not suffer the least uneasiness in the seat of pressure, or in any part of the spine, yet there may be extreme pain in the surface of some part supplied by nerves from that portion of the spinal cord which is implicated in the existing irritation or other change. Although the patient

than the appellations conferred on it. (See the *Synonyms adduced under this head*.) And conformably with this doctrine I have defined the disease, pathologically, as follows: "A morbid state of the blood, characterized chiefly by the presence of urea and deficiency of albumen and of hematosine, in connexion with lesion of the circulation in the minute glandular or Malpighian bodies and structure of the kidneys, with various organic changes in other viscera, and generally with serous effusion into the cellular tissue and shut cavities." (See art. KIDNEY, § 81.)

I afterward proceeded to investigate and to describe various topics connected with the pathology, complications, and treatment of this malady, especially the particular tissue of the kidneys primarily affected; the connexion subsisting between this disease and morbid states of the blood; and between it and other visceral maladies, and the origin of the changes of the blood, on which this disease of the kidneys is consequent (see § 82). I next described the physical appearances and states, and the chemical changes of the blood in the several stages of the acute and chronic forms of this disease (§ 93-97); and afterward noticed the sources and causes of this state of the blood (§ 140, 141). I would most particularly refer to *par* 142 of that article, where the reader will find this topic explained, and the reason of both kidneys being always affected in Cachectic Nephritis.

Now Dr. FINGER, of Prague, Dr. WALSHE, and Dr. GEORGE JOHNSON, have, long after the publication of the article on the diseases of the kidneys, adopted my views as to this malady, without any reference to them whatever; Dr. FINGER stating that "the blood is first diseased;" and Dr. WALSHE (*Lancet*, July, 1849) that the lesions of the kidneys are the consequences of previous alterations of the blood. Still more recently, Dr. GEORGE JOHNSON, in his Gulstonian lectures (see *Medical Times and Gazette* for March and April, 1852), has adduced the same doctrine of the origin of this disease; and I am, therefore, entitled to conclude that the adoption of my views, and of the results of my investigations, by these very able pathologists, is a strong confirmation of their general accuracy. The several associations and complications of this malady, in connexion with the progressive changes of the blood and of the kidneys, were more fully described in that part of this work than they had previously been.

may not feel pain in the part especially affected, yet he may be suffering under inflammatory irritation, or congestion, or other organic changes implicating the spinal cord and membranes or the roots of the nerves. The suffering experienced in the extremities in gouty persons is not always owing to the changes in the extremities only, but partly also to congestion of the venous sinuses of the spine; and the partial palsy of the extremities, especially the lower, generally passing on to complete palsy, arises often from congestion of these sinuses, followed by effusion or other organic changes. These are facts which I have had occasion to verify in several instances by inspection after death. When the change implicating the cord, its membranes, or origins of the nerves, is such as irritate, excite, or similarly affect these parts, pain is usually manifested in the extremities of the corresponding nerves, and sometimes also by other nerves more or less intimately connected with them; but when the primary change goes on to the production of pressure, or to the destruction of parts, then loss of function, impaired sensibility, or difficult or impaired motion, or a combination of these, supervenes, and increases with the augmenting organic change.

136. Not only may irritation or pressure at or near the origins or roots of the nerves of sense and of motion affect the senses, the sensibility, and the motions, even to the remotest parts, but irritation, originating in or affecting the ganglionic nerves, will produce serious disorder not only in the seat of irritation, but also in most distant places, which places often evince the chief disturbance, either in respect of their sensibility or their movements, or both. These occurrences are not unfrequently verified by post-mortem examinations, the existing lesion being sometimes found in parts which evinced but little or no disorder during life, the severity of the sympathetic affection having attracted the entire attention of both patient and physician. The irritation produced by a calculus in the kidney, by sabulous matter in the tubuli of the organ, often produces disturbance of the organs supplied with nerves from the ganglion and organic nervous plexuses of the organ, extending even to the associated ganglia, and affects not only the urinary functions generally, but also the digestive, occasioning nausea, vomiting, constipation, colicky pains, &c.; and the extent of disorder is sometimes even not so limited, but still farther extended. By means of the branches or fibrils of ganglionic nerves proceeding from the renal ganglion to the roots of the spinal nerves, and even to the cord itself, as well as by means of spinal nerves proceeding to the sympathetic nerves and ganglia, a sympathetic affection—one consisting chiefly of pain, or morbid sensibility of a painful kind—is sometimes also experienced in various parts of the external surface, or in the course of a nerve, as it ascends to the shoulder or arm of that side, or more frequently down the lower extremity; occasionally with a peculiar numbness or imperfection of the voluntary movements. I have had opportunities of observing such cases, in some of which the pain was as severe as in neuralgia, where also the cause was suspected during life, and no appropriate treatment had previously been adopted. In two instances of recent occurrence, an examination was made after death, and large calculi were found in the kidney. Irritations of the ova-

ria or uterus, as will be noticed hereafter, develop even a still wider range of sympathies.

137. VI. SYMPATHETIC DISORDERS OF ANIMAL MOTION.—These are of great importance, and present the same relations as have now been pointed out; but I can only imperfectly advert to them at this place. Many disorders, even several that are seated in the abdominal cavity, may affect the locomotive functions; of this we observe daily proofs. Fæcal accumulations, or morbid matters, or worms, in the intestinal canal, often irritate the ganglionic nerves, and the irritation is propagated to the roots of the spinal nerves, or even to the spinal cord itself, and is thence reflected by these nerves to the voluntary muscles, to the extremities, or to the external surface. In this way, chorea, infantile convulsions, and various symptomatic disorders, often of an anomalous character, implicating the muscles of voluntary motion, alterations of sensibility on the surface and in the extremities, various affections of the organs of sense, and many of the phenomena observed in cases of intestinal and gastric disease, are frequently developed. (See *arts. CHOREA, CONVULSIONS, EPILEPSY, &c.*)\*

138. There are numerous sympathies or associated morbid states indicated in the *synopsis* or *classification* (§ 14) of the topics comprised in the very extensive subject here attempted to be discussed, but I must content myself with the mere indication of them thus afforded. The pathologist will readily recognise the importance of most of them, and the medical practitioner will readily furnish illustrations of them from his own experience. One of the chief objects I have in view is, to point out the principal channels of sympathy, or the media by which disorders become associated or complicated; the channels or media having been recognised, the resulting phenomena, as actually occurring in practice, may more readily be referred to their sources, although they are too various and numerous to be adduced and illustrated in the space to which I am limited. Passing over, therefore, some of the subordinate orders of sympathies, which may be ranked under the preceding classes, I shall conclude with a brief consideration of a class of sympathies to which sufficient importance has not always been attached, and which, indeed, has not always been rightly interpreted or understood.

139. VII. THE SYMPATHIES EVOLVED BY THE REPRODUCTIVE ORGANS appear about the period of approaching or fully-developed puberty. The influence of the sexual organs upon the economy is evinced at this period by the more rapid growth of the whole body, and by the more complete development of all the structures and organs, and of all the manifestations of mind; and this evolution of the physical and mental constitution of the individual is the more perfect and complete when, circumstances being favourable in all other respects, these organs have not been prematurely excited, exhausted, or abused; for accurate observation will confirm the position, that abuse, or premature excitement of these organs, or excess

\* [For a very satisfactory description of the sympathetic disorders of animal life we must consult the recent works of MARSHALL HALL. In addition to the diseases mentioned as examples of spinal irritation, may be mentioned epilepsy, puerperal convulsions, tetanus, hydrophobia, hysteria, spasmodic asthma, tenesmus and strangury, abortion, spasmodic strabismus, spasmodic tic and torticollis, spasmodic respiration, &c.—(See M. HALL on *Diseases of the Nervous System.*)]



of such excitement, diminishes or weakens the growth of the body, or impairs the energy of both the organic and the cerebro-spinal nervous systems; and, with other injurious effects, often carried to an alarming extent, impairs or even altogether destroys the chief manifestations of mind, and develops several constitutional maladies and numerous special diseases, with their still more numerous sympathetic associations. The evil is not limited to the delinquent alone, but extends to the offspring of him or her who has indulged in the vices to which reference is now especially directed—if, indeed, such creatures be capable of reproducing their species. If this power be still retained, it is generally manifested weakly, imperfectly, and insufficiently, as regards the constitution, physical and moral, of the offspring.

140. While the perfection of mental and bodily function, as well as of corporeal development, thus results from the full evolution of the sexual organs, or from the reciprocal influence exerted between them and the nervous systems, numerous disorders, evincing more or less extensive sympathies and associations, are produced by the causes now alluded to—by abuses of these organs. The exhaustion thereby caused affects not one organ merely, but the whole frame. This generally extended sympathy—this universally diffused state of disorder—is to be explained partly by the exhaustion consequent upon inordinate excitement, and partly by the excessive secretion and excretion of a recrementitious fluid—of a secretion intended not merely for the perpetuation of the species, but also for the support and development of the structures, and of the nervous power of the individual. This functional abuse extends its consequences thus generally, through the medium of both the organic and the cerebro-spinal nervous systems, impairing digestion, vital action and tone, sensation, perception, memory, volition, muscular motion, &c., and hence all these functions not merely languish, but also betray, in varying forms and associations, numerous sympathetic disorders, increased susceptibility of impressions, morbidly increased irritability, &c., while nervous power, and endurance, and vital resistance are diminished. Impaired assimilation and nutrition, and a general cachexia, are also among the usual results, even when no particular or specific form of disease is developed. Ultimately, the organs thus prematurely or inordinately excited either have their functions entirely exhausted or assume an increased susceptibility of irritation, and become the seats either of very frequent or constant disorder, or of organic lesions, whence numerous sympathies irradiate. The morbid state of one of these organs partially extends to all; that of the ovaria affects the uterus and the mammae, or that of the latter extends to the former. Irritation of either of these organs extends through the medium of the ganglionic nervous system to the urinary organs, to the digestive canal, and to the secreting and excreting organs generally. Thus we perceive disorders supervene of the secretion or excretion of urine, flatulence, borborygmi, the globus hystericus, with other affections of the bowels and stomach, and even interruptions of the cutaneous, biliary, and intestinal secretions and excretions.

141. These disorders are almost universally experienced in these circumstances, and as the irritation of the sexual organs increases either in duration or intensity, or as the causes which occa-

sion the irritation are persisted in, the sympathetic disturbances advance still farther and more generally by means of the nervous communications already described; and ultimately, in consequence of superinduced alterations of the vascular system and circulating fluids, they are manifested in numerous modes in distant parts of the economy. The individual who has thus devoted himself or herself—it may be said to the infernal gods—soon afterward, and owing to the sympathy manifested by the ganglionic system, complains of palpitations or irregularities of the heart's action, of shortness of breathing, and other signs of pulmonary or cardiac disease, of indigestion or morbid states of the appetite, and of various anomalous pains or alterations of sensibility in different parts of the body. Owing to the connexions subsisting between the organic nervous system, the spinal nerves and cord, and the brain and nerves of sense, and owing to the association of the ganglionic and spinal nerves in the organization of the reproductive organs, disorder in various forms is extended to, or is manifested by, the organs of sense, and the muscular and tendinous structures. Volition is often languidly or imperfectly transmitted by the voluntary nerves; the muscles become more and more unable to execute the weak or inadequate volitions; the fibrous and tendinous structures evince impaired vital tone, while sensibility and irritability present various aberrations. In conjunction often with these, or more or less independently of some of them, various congestions in different places, either in succession or coetaneously, or irregular distributions or determinations of blood, take place, and either heighten preceding ailments or develop novel forms or combinations of disorder. Congestions of the venous sinuses of the spinal column frequently occur, and disorder the urinary functions or affect the sensibility or movements of the extremities, producing partial, or even complete palsy, either of sensation or of motion, most frequently of the latter. The irritation existing in the primary seat of disorder is often propagated to the roots of the spinal nerves or to the cord itself, and is thence reflected upon the surface of the body, or in the extremities, in the form of neuralgia, or in other states of altered sensibility, or in various forms of hysterical spasm, convulsion, or disorders of motion. The senses, especially sight, hearing, and touch, are variously obscured or modified, and the mind becomes more or less disordered. The individual whose organic and mental energies have become weakened by the causes alluded to, is envious of those who possess powers which he either never had or has lost; is censorious; indulges in scandal or in the depreciation of others; is mean, spiteful, or sanctimonious; or he becomes the subject of some variety of partial or even of general insanity, or of idiocy and general palsy.

142. The most dangerous and advanced maladies resulting from the morbid condition referred to—the most serious and complicated mischief thus produced—varies with the constitution, predisposition, and concurring causes and circumstances affecting the individual. In many, asthmatic or pulmonary affections, tubercular consumption, and tubercular formations in different organs; in others, various forms of insanity; in some, organic disease of the heart; and in some, structural change in the brain or its membranes, occasioning epilepsy, palsy, &c., are the more re-

mote consequences. Indeed, almost every form of special disease, with their numerous sympathetic associations, may be simulated, and actually produced, especially when aided by concurring causes, when irritation of the reproductive organs is either frequently repeated or inordinately perpetrated. At first numerous functional disorders are developed, which are continually changing their aspects and their associations, and varying in severity and character. Subsequently, and as these are neglected, or as the cause is continued, or as the original morbid condition increases, disorders which were formerly functional become ultimately organic or structural, chiefly in consequence of the influence which disordered states of organic or cerebro-spinal nervous influence exert upon the vascular actions, upon the assimilating and nutrient functions, and upon the several secreting and excreting organs.

143. Having thus attempted to direct attention to the sympathetic relations of disease, and to the channels through which diseases become associated or complicated—my limits, however, obliging me to leave many topics connected with the subject altogether untouched—I wish to impress upon the reader the advantages to be derived in practice, from tracing, as accurately as possible, the bonds of connexion which associate or complicate the more specific and primary states of disease, and render morbid phenomena often difficult of interpretation, and as often difficult of removal. Having ascertained as accurately as possible the primary source of disorder; having traced the succession as well as relations of morbid manifestations, and the connexion of the whole with antecedent and existing causes; having, moreover, considered the probable extent of nervous disorder and of vascular disease, and of alteration or contamination of the circulating fluids, a rational basis is thereby formed for therapeutical indications and remedial measures; and, as respects both the general intentions and the particular means, these will be the more appropriately and successfully adopted.

144. I believe that the physician who thus enters on the study of each case which comes before him, and endeavours to connect the effects presented to his view with their causes, and to trace the bonds of union subsisting between those frequently distant effects, will generally exercise his profession successfully and honourably; for, being acquainted, as he should undoubtedly be, with the nature and operation of the remedies he employs, he will apply them appropriately to the removal of those morbid conditions which he rationally infers to be present. A physician whose mind is thus tutored and practically engaged will be neither skeptical of the effects of medicine on the one hand, nor empirical and rash in the use of it on the other. This extensive and practical knowledge, being always appropriately applied, will prevent him from lapsing into a skepticism which, entertained by any member of our profession, is not degrading to the profession itself—for truth and honour cannot be degraded—but which is most degrading to a skeptic himself, inasmuch as he admits himself to be deluding the public, while he boasts that he is not himself deluded, and thus vaunts his own dishonesty. Neither will the enlightened and rational physician lapse into a state of blind empiricism, and wield the weapons employed against disease in such a manner as will not only endanger the

life of the patient, but also injure his own reputation.

145. I have been anxious to entertain the subject now imperfectly discussed, because it has hitherto failed of obtaining an attention in any way commensurate with its importance. My limits have obliged me to omit several topics more or less intimately connected with it. The observations, therefore, which I have offered will, I hope, be viewed as *suggestive* only, especially in respect of various subordinate topics, for as my space did not allow me to illustrate, I could suggest merely.

[Most of the sympathetic phenomena, in health and disease, appear to us to depend on known laws of action of the cerebro-spinal nerves, independent of the sympathetic, as those of the radiation and coincidence of sensations, and of associated and reflected motions, &c. Where, *e. g.*, secretions take place in distant parts, in consequence of impressions on sensitive nerves, the brain and spinal cord, as MÜLLER states, are probably the mediums of communication, as where sweat is brought on by drinks. But where, in a secreting membrane, an impression made on one part is extended to the whole, as by an enema, the phenomenon is best explained by the communication of organic fibres with each other; and we have an instance of reflected action of the organic fibres of one part upon those of another, where inflammation of one organ gives rise to a similar condition in another. The *vegetative influence*, as MÜLLER calls it, is distributed to the organs through the medium of the ganglia of the sympathetic, as when inflammation of the eye is caused by an injury to the first cervical ganglion; and this radiating influence is in a certain degree independent of the brain and spinal cord, as the embryo may be developed while the brain and spinal marrow are destroyed. The latter are, however, as MÜLLER states, the main source whence the power of the organic nerves is gradually renovated. This is shown by the fact that certain affections of the brain and spinal cord, attended with paralysis, are likewise productive of atrophy. We are, however, as yet in the infancy of our knowledge regarding the functions of the sympathetic or ganglionic nerves; so much so, that MAGENDIE hesitated to regard it as a nerve. For the best account of its motor action, and its organic functions, as well as the sympathies, generally, we are indebted to the researches of MÜLLER.—(See *Elements of Physiology*, Am. ed. By J. BELL. Phil., 1843.)]

BIBLIOG. AND REFER.—Fracastorius, Liber de Sympathia et Antipathia Rerum; Opera, P. i., p. 1: et Theatrum Sympatheticum, p. 651.—A. Jessen, De Sympathia et Antipathia Rerum Naturalium Causis. Witteb., 1599.—Peucer, Oratio de Sympathia et Antipathia Rerum in Natura, 8vo. Francf., 1574.—Schuelling, Disser. Sympathias et Antipathias Historia physice explicata. Brem., 1682.—T. Willis, Pathologiæ Cerebri et Nervosi Generis Specimen, in quo agitur de Morbis Convulsivis, &c., Opera, 4to. Amsteld., 1682.—S. Rattray, Aditus novus ad Sympathia Causas, 8vo. Glasgou, 1658.—J. A. Ender, Theatrum Sympatheticum in quo Sympathia Actiones exhibentur, 12mo. Norimb., 1660.—F. Bayle, Dissertations Médicæ tres; de Sympathia partium cum utero, &c., 4to. Tolos., 1670.—P. Brisseau, Traité des mouvements Sympathiques, &c., 12mo. Montp., 1692.—H. M. Herwig, The Art of Curing Sympathetically, &c., 12mo. London, 1700.—H. J. Rega, De Sympathia potissimum ventriculi in statu morbo, 8vo. Haerl., 1721.—J. Crawford, Practical Remarks on the Sympathy of the Parts of the Body (Edin. Med. Ess., vol. vi.), 8vo. Edin., 1740.—Harmens, Sympathia Explicatio, &c. Holms., 1741.—Lansel de Magny, Traité de la Sympathie des Parties du Corps dans les Maladies, 8vo. Paris, 1771.—T. Kirkland,



A Treatise on Child-bed Fevers, with a Dissertation on Sympathy, &c., 8vo. London, 1774.—R. Whytt, Works, 4to. Edin., 1768.—B. Waterhouse, Dissertatio de Sympathia, 4to. Lugd. Bat., 1780.—Kretschmar, Darstellung der Wirkungen der Arzneien, B. i., p. 153, 162.—A. Vater, De Consensu Partium Corpor. Hum., 4to, Viterbo, 1741; et in Halleri, Disput. Pathol., t. ii., No. 45.—J. H. Schulze, in Halleri, Disput. Pathol., t. vi., No. 219.—D. Langhans, in Ibid., t. vi., No. 220.—E. Platner, Diss. de Causis Consensus Nervorum Physiologicis, 8vo., Leips., 1790, et in Ludwigs Script. Neurol., t. ii.—S. H. Jackson, A Treatise on Sympathy, 8vo. London, 1781.—M. W. de Neufville, Versuch einer Praktische Abhandlung von der Sympathie des Verdauungs Systems, 8vo. Gott., 1786.—J. P. Michell, De Sympathia Inter Caput et partes Genitales (Schlegel, Opusc., de Sympathia, part iii.), 8vo. Lips., 1787.—J. C. Schlegel, Sylloge Opusculorum de Sympathia, 8vo. Lips., 1787.—D. Veegens, De Sympathia inter Ventriculolum et Caput (Schlegel de Sympathia), 8vo. Lips., 1787.—Fremling, De Sympathia et Antipathia, London, 1789.—J. H. Rahn, Exercitationes de Causis Physiis Sympathia, 4to. Turici, 1788.—J. H. Rahn, De miro inter Caput et Viscera Abdominis Commercio (Ludw. Script. Neurol., iv.), 4to. Lips., 1795.—D. Veit, De Organorum Corporis Humani Energia et Sympathia, 8vo. Hal., 1797.—F. Charmeton, Essai Médical sur les Sympathies, 8vo. Paris, 1803.—P. I. Roux, Mémoire sur la Sympathie, in Mélanges de Chirurgie, 8vo. Paris, 1809.—A. H. F. Guffeldt, Ueber das Verhältniss der Wechsellagerung, Nervenwirkung, &c., 8vo. Goett., 1803.—C. Rocher-Deratte, Mélanges de Physiologie, &c., contenant un Traité sur les Sympathies, 8vo. Paris, 1803.—G. M. R. Luzuriaga, Von der Wechsellagerung Thätigkeit des Blutes und Nervensystems, 8vo. 1804.—J. P. Michell, Ueber die Mitleidenheit der Geschlechtsteile mit dem Kopfe, 8vo. Wien., 1804.—J. Loew, Ueber die Sympathetische Wirkung der Dinge, 4to. Landrh., 1809.—P. I. Roux, Mémoire sur la Sympathie (Mélanges de Chirurgie), 8vo. Paris, 1809.—R. H. J. Dutrochet, Théorie nouvelle de l'Habitude et des Sympathies, 8vo. Par., 1810.—F. Hufeland, Ueber Sympathie, 8vo. Weim., 1811.—A. Wilson, Practical Observations on the Action of Morbid Sympathies, 8vo. Edin., 1818.—Barthos, Nouv. Elémens de la Science de l'Homme, Journ. Génér. de Méd., t. xxv., p. 312.—Dutrochet, Nouvelle Théorie de l'Habitude et des Sympathies, Paris, 1820.—F. Hufeland, Ueber Sympathie, 8vo. Weimar, 1811; et Bibliothek der Pract. Heilk. Sep., 1811.—Barthos, in London Med. and Phys. Journal, vol. xlv., p. 246.—R. Harrison, in Ibid., vol. xlv., p. 105.—Alison, in Transact. of Med. and Chirurg. Society of Edin., vol. ii., p. 165.—I. A. Unzer, The Principles of Physiology, transl. by T. Laycock, for the Sydenham Society, pluris.—G. Prochaska, On the Functions of the Nervous System, in Ibid. London, 1851.—A. F. Stauffer, Sympathie des Menschen, 8vo. Constanz., 1819.—Moufalcon, Dict. des Sc. Méd. (art. Sympathie), t. liii. Paris, 1821.—M. Fodera, Recherches sur les Sympathies, &c., 8vo. Paris, 1822.—F. M. Gelcen, Des Sympathies des Organes du Corps Humain, 8vo. Paris, 1822.—P. Reis, Des Sympathies considérées dans les différens Appareils d'Organes, 8vo. Paris, 1825.—Adelon, Dict. de Méd. (art. Sympathie), t. xx. Paris, 1828.—C. Lambert, Examen Médical des Sympathies, 8vo. Paris, 1825.—I. M. A. Michu, Des Sympathies Morbides, et des Phénomènes Secondaires dans les Maladies, 4to. 1830.

[AM. BIBLIOG. AND REFER.—Marty Paine, The Institutes of Medicine, 8vo.—Med. and Phys. Commentaries.—S. H. Dixon, Essays on Pathology and Therapeutics.—D. Hosack, Essays on various Subjects of Med. Sci., 3 vols. 8vo.—Am. Ed. of C. W. Hufeland's Enchiridion Medicum, the Result of 40 Years experience, 12mo.—S. Jackson, Principles of Medicine, founded on the Structure and Functions of the Animal Organism, Nervous System, Documents and Dates of Modern Discoveries in the Nervous System, by Walker, Bell, Magendie, Whytt, Prochaska, Hall, Müller, Copland, &c., 8vo. Phil.—E. North, Outlines of the Science of Life, 8vo.—Benjamin Rush, Med. Inquiries and Observations, 2 vols. 8vo.—J. Stewart, On Diseases of Children.—Condie, Meigs, Eberle, On Diseases of Children.—W. Sweetser, Treatises on Consumption and Digestion, and on Mental Hygiene.—J. Thacher, American Modern Practice, 8vo.—C. Ticknor, On Medical Philosophy, 12mo.—Essays on Practical Medicine and Surgery, by Drs. Chapman, Baché, Coates, Giddings, Griffith, Mitchell, Wood, Dunglison, Condie, Dewees, Hays, Jackson, Patterson, Hodge, Horner, &c., 2 vols. 8vo.—W. and D. Griffen, Observations on Functional Affections of the Spinal Cord and Ganglionic System of Nerves, in which their identity with sympathetic, nervous, and imitative Diseases is illustrated, 8vo.—George B. Wood, A Treatise on the Practice of Medicine, 2 vols.—Am. Ed. of Müller's Physiology. Phil., ed. by J. Bell.]

SYMPTOMATOLOGY, comprising DIAGNOSIS and PROGNOSIS.—SYNON.—Symptomatology,

Symptomatology (from συμπτωμα, a symptom, and λόγος, a treatise); Semeiology (from σημεϊον, a sign); Semeiologia—Semeiice; Symptomatology, Semeiologie, Semeiotique, Fr. Die Zeichenlehre, die Symptomatologie, Germ.

DIAGNOSIS.—SYNON.—Διαγνωσις (from διαγνώσκω, I distinguish); Diagnosties; Diagnostice; Diagnose, Fr. Kennzeichen, Erkennung der Krankheit, Germ. Diagnostica, Ital.

PROGNOSIS.—SYNON.—Prognosis (from προ, before, and γινώσκω, I know); προγνωστικόν, Hippocrates; Præcognitio, Prænotio, Præscientia, Prædictio, Auct. Prognostic, Fr. Die Vorherhersagung, die Prognose, Germ.

CLASSIF.—GENERAL PATHOLOGY.

1. In the article DISEASE, I gave an ample sketch of the *Causation of Disease*, or *Etiology*, not only mentioning the several occasions of disorder, but also arranging them and showing their modes of operation. I afterward considered the *general doctrine of disease*, or *PATIOGENY*, and described the changes constituting disease, as they proceeded more immediately from the causes producing them; noticing in succession the simpler or dynamic changes, the more complicated or qualitative alterations, and the effects of these changes upon the secretions and excretions, upon the circulating fluids, and upon the nutrition of the several structures. After a sufficient consideration of the numerous topics comprised under these heads, I noticed the *Procession and duration of morbid phenomena*; the *Types or forms of disease*; the *Terminations of disease*; the *Relations, successions, and complications of disease*; the *Metastases or conversions of disease*; and, lastly, the *circumstances modifying the Form, complication, duration, and termination of disease*. I thus developed, under the article DISEASE, a *system of pathology*, which, in certain of its parts, is more fully illustrated in the several articles on special topics—on the *blood*, on the *structural lesions* of the several tissues and organs of the body, &c.; and which, when connected with others, and with the article now commenced, will furnish the reader with comprehensive views of morbid actions, will demonstrate the relations and connexions of these actions, and will enable him to arrive at rational conclusions as to their natures, and as to the indications and the means most appropriate for their removal, for their alleviation, or for their control. Having discussed the numerous topics referred to, I have now to notice the *symptoms and signs* by which the *forms and states of morbid action* are recognised and duly estimated, especially as respects the *seats*, the *natures*, and the *results* of such actions.

2. A knowledge of disease comprises not only a recognition of existing symptoms and signs, but also a due estimation of the value, importance, and source of each, the comparison of one with the others, the relations subsisting between them, the connexions between them and their antecedents and causes, and the results which may be expected from them, and their various combinations and groupings. In estimating the importance of symptoms, as showing the seats, the limitations, and issues of morbid action, they require due consideration both in the aggregate and individually, and not merely as regards the associations they present, but also as respects the absence of others, which are indicative of the seat, nature, extension, or issue of other special diseases, or of distinct but allied or similar states of

morbid action; absent manifestations of disease should be taken into account in our estimation of the value or importance of those which are present.

3. *The manifestations of disease*—the symptoms and signs by which the seats and natures of diseases are indicated—are, 1st, vital or spontaneous, or strictly sympathetic and symptomatic; or, 2d, physical or artificial. The former of these only are comprised in this article; the latter have been fully discussed in the articles ABDOMEN, AUSCULTATION, CHEST, SUCCUSSION, &c. In treating of the *Sympathetic and Symptomatic Manifestations of disease*, or of *Symptoms* more especially, I shall, first, notice those which appertain to the *appearance and attitude of the body*, and to the *Animal, Locomotive, and Sensory functions*; second, those which belong to the *Respiratory and Circulating Organs*; third, those which are manifested by the *Digestive and Assimilating Organs*; and, lastly, those which concern the *Urinary and Sexual functions and organs*.

4. I. SYMPTOMS AND SIGNS APPERTAINING TO THE ATTITUDE AND APPEARANCE OF THE BODY, AND OF THE ANIMAL FUNCTIONS.—Numerous changes in the attitude and appearance of a patient at once strike the experienced observer, and suggest a general and often a correct idea of the nature of the disease which he is called upon to treat.—i. THE ATTITUDE AND GENERAL APPEARANCE OF THE BODY furnish signs both of the nature and of the tendency of the disease. A constantly retained position on the back indicates depression of vital power, and in febrile diseases extreme exhaustion or asthenia. It is most remarkable in low, typhoid, adynamic, or pestilential fevers, and in the last stage of acute maladies, especially when, with extreme exhaustion of organic nervous power, there is either low or muttering delirium, or unconsciousness, or coma, or more or less contamination of the circulating fluids. When this position is long retained, especially without due attention to cleanliness or dryness of the surface, the more prominent parts, or those most pressed upon, become inflamed, ulcerated, or gangrenous; and the results are often fatal, unless the local and constitutional treatment be active and appropriate. If this position be attended by a sinking or falling down in bed, owing to a tendency of the body to gravitate to the lower or more depending parts of the bed, and to lost power of the extensor muscles, the positions of flexible parts being somewhat bent, and the head gravitating in the direction where the support is the least, the exhaustion of vital power and the consequent danger are the greatest, especially in the maladies just named. When the patient becomes capable of recovering his position when he feels himself falling down in his bed, or falling from his pillow, and especially when he is able to turn to either side, and to retain for a time a position on his side, or even partially on his side, it is one of the earliest indications of returning powers in low or adynamic febrile maladies. The supine position, with the knees drawn up, so as partially to relax the abdominal muscles, and to keep off the pressure of the bed-clothes, indicates morbid sensibility or inflammation, or both, of one or more viscera in the abdominal cavity, and more especially peritonitis, enteritis, gastritis, &c. In these cases, the supine position is retained, not so much in consequence of exhaustion, as in order to remove the

pressure of the contiguous viscera from the diseased parts.

5. The sitting attitude, the inability to lie down in bed, the necessity of being shored up in bed, and various sitting positions, are important indications of the diseases to which the physician's investigations should be particularly directed. The sitting position can hardly be relinquished in dyspnoea, asthma, in organic diseases of the heart, in extensive effusion into the pleural cavities, in bronchitis of both lungs, in laryngitis, in many cases of congestive or asthenic pneumonia, and in severe or complicated cases of epidemic influenza. In the worst states of these especially, the patient is unable to repose on either side without great increase of his sufferings, inasmuch as the weight of the upper regions of the trunk upon the side on which he rests greatly impairs the respiratory functions of that side, while the action of the side left free is insufficient for the respiratory changes, and for the purposes of the economy. In less severe or urgent cases, the patient retains a semi-supine position, by having the shoulders and head elevated by pillows. In the more extreme cases of these maladies, the patient is obliged to lean forward, and often to place his elbows or arms on the table in order to procure a fixed point for a stronger contraction of the muscles of respiration. In protracted cases of this kind, the shoulders acquire an unnatural elevation, and are directed upward and to the ears.

6. A restless mode of lying down accompanies severe states of thoracic inflammation and acute rheumatism, and several organic maladies. A quiet position on lying down, with perfect consciousness and returning strength, indicates a favourable termination. This position, however, is retained in rheumatism in order to avoid the pain occasioned by removing. Lying on the abdomen, and tossing from the prone to the supine position, or from side to side, attend violent colicky pains, and ileus, or the passage of gallstones, and hysteria. Patients often prefer to lie on the right side in health, and generally in pneumonia, in bronchitis, and in cases of pleuritic effusion of this side, after pain, or the more acute symptoms have subsided; also in splenitis and psoriasis of the left side. They generally lie on the left side in pneumonia, bronchitis, and when effusion has taken place into the pleura of this side, and the pain has ceased. At the commencement of pleurisy, patients lie either on the back, or in the semi-recumbent position, or on the side opposite to that affected, while the pain continues, and before effusion has become great; they also frequently prefer to lie on the back, or in a raised position, in organic affections of the heart and large vessels.

7. ii. THE EXPRESSION OF THE FACE AND STATE OF THE FEATURES.—The facial expression is of great importance in recognition, diagnosis, and prognosis of disease; and sometimes, especially in children, it is the chief means of evincing the nature of the malady. In them the appearances of the countenance may be observed with advantage while they are asleep, as well as when they are awake; and, in many cases, it is of use to observe the expression immediately upon awakening them. Although the experienced observer will be guided in his diagnosis by the expression of the face of children, yet he will generally find great difficulty in describing the appearances which thus influence his opinion.—a. The knit-



ting of the *brows*, or frowning, in children usually indicates inflammatory irritation of the brain or membranes, or of both. And with this expression is often conjoined a contraction or approximation of the eyebrows and zygomatic arch. Relaxation of these parts, with a relaxation, drooping, or falling of the eyelids, is a sign of vital exhaustion, or of effusion or pressure on the brain.

8. *b.* A dark circle surrounding the eyes, and most remarkable beneath the eyes, often with more or less sinking of these organs into their orbits, is often observed in connexion with organic diseases, especially those of a malignant or contaminating nature. It is also very manifest in females who are subject to uterine or ovarian diseases, or to severe or prolonged leucorrhœa, or who addict themselves to masturbation. A *puffy* or *œdematous* appearance of the eyelids, or below the eyes, is observed in diseases of the heart, especially those implicating the valves, and in granular lesions of the kidneys, as well as in connexion with several forms or seats of dropsy. Sudden or rapid *sinking of the eyes* inward, with increase of the dark circle surrounding the eyes, is a most remarkable and most unfavourable sign in the stage of collapse of pestilential cholera, in an advanced stage of adynamic, hectic, and malignant fevers, and in the last or most unfavourable periods of gastritis, enteritis, dysentery, and of purulent, tubercular, or cancerous contamination of the circulating fluids.

9. *c.* The *nose*, especially in connexion with the *cheeks*—the *nasal* and *genal* expression—furnishes much information as to the seat and issue of disease, especially in children. A pinched appearance of the nose, with a retraction or dimpled state of the cheeks, often is observed in an advanced, or in an unfavourable course of diseases of the digestive organs; and a remarkable dilatation and contraction of the *alæ nasi*—a *working* of the nostrils, with or without a retraction of the angles of the mouth—attend not only the most dangerous forms or stages of disease of the respiratory organs, but most of those maladies in which the organs of respiration become more or less implicated at an advanced period, or towards a fatal termination. In severe or dangerous inflammation of the diaphragm, or of the serous membranes reflected over this part, those signs are most prominently manifested. The *alæ nasi* and cheeks are drawn upward and outward in the most painful and spasmodic affections of the digestive canal and diaphragm, especially in spasmodic gastralgia and enteralgia, in cholic, ileus, and during the passage of biliary calculi.

10. *d.* The *lips* and *mouth*, with the *chin*, furnish important indications—the *labial signs*.—Retraction of the corners of the mouth, so as to produce the sardonic grin, is very remarkable when the diaphragm is inflamed or implicated in the manner just now stated, and in very painful and dangerous affections of the stomach, bowels, and tendinous aponeurosis. The lips are thin, retracted, or apparently stretched over the teeth and gums, in the last stage of hectic, especially when caused by pulmonary disease; the actions of the nostrils being also remarkable and unnatural. The face in these cases, particularly when emaciation has made great progress, is pinched in, retracted, and diminished, the chin becoming sharper and more prominent. The lips often are

surrounded by a dark circle in chronic affections of the stomach, bowels, or liver. The lips lose their ruddy hue, or become more or less *pallid*, in anæmia, however produced, after hæmorrhages, in chlorosis, in diseases of the spleen, and in uterine and ovarian maladies. They often, at the same time, present a less erectile or tumid appearance, and are more disposed to crack, or become irritated or sore. Soreness of the lips, and eruptions on them externally, are frequently observed in the course of chronic affections of the digestive canal and abdominal viscera, especially in children at a far-advanced stage of those diseases. The lips are often similarly implicated, but in a slighter degree and in a more fugitive manner, in connexion with catarrhal affections. They often *swell*, especially the upper lip, in connexion with latent or developed scrofula and tuberculosis, and in cases of intestinal worms. A *dark* or a *purple hue* of the lips is generally present when the blood is imperfectly changed to the arterial state, owing to disease of the lungs or heart, or of the respiratory passages, especially congestive bronchitis and broncho-pneumonia, or to effusions of fluid into the thoracic cavities. When this change of colour is observed in those maladies, it ought always to be viewed as a most dangerous appearance.

11. *e.* The *general expression* of the countenance may be bashful, downcast, painful, anxious, terrified, enraged, or joyful. A bashful, downcast appearance, or an inability to look the person addressed fully in the face, is a certain indication of nervous exhaustion by masturbation and of impotency. This down-look in patients complaining of chronic disorders, or of diseases of debility, at once indicates the cause in which they have originated. The expressions of pain and anxiety are readily recognised in connexion with pain, extreme soreness, difficult respiration, palpitations of the heart, injuries, and inflammations of vital organs or parts. The expression of terror or extreme fear is observed chiefly after severe or dangerous accidents or operations, during excessive hæmorrhages, in rabies, in delirium tremens, and insanity. The expression of rage occurs chiefly in mania, rabies, phrenitic delirium, and monomania. The countenance is vacant or unconcerned in true hæmagastic pestilence, when it becomes also of a pale lemon colour, in anæmia or idiocy, and in general paralysis. It is tumid or bloated, all the features often appearing enlarged and exaggerated, in congestive and sanguineous apoplexy, in obstructive circulation from disease of the heart or valves, and in connexion with dropsical effusions from such disease, and from diseased kidneys.

12. *f.* The *tint, hue, or colour* of the countenance furnishes important signs of disease. A pallid or anæmied hue of the countenance attends deficiency, thinness, or poverty of blood, especially when observed in connexion with pallor of the lips, gums, and tongue; this state of the circulating fluid being either a primary ailment, or variously associated, or consecutive of numerous maladies—being thus either a *primary*, an *associated*, or a *consecutive anæmia*. *Primary* owing to inanition, to want of sunshine, light, and pure air: *Associated* with torpor, inactivity, or exhaustion of the sexual organs, and characterized by a pale greenish yellow tint of the face, as in chlorosis; with disease of the uterus or ovaria;

with tuberculosis of the mesenteric or bronchial glands, with disease of the spleen, or with wasting or structural lesions of the testes: *Consecutive* of all fevers, of acute rheumatism, of inflammatory and structural diseases of the digestive organs, and of the absorbent system, and of tubercular and cancerous maladies.

13. A *dark, lurid, or murky* tint of the countenance is commonly attended by a similar hue of the general surface, especially in low, adynamic, typhoid, or malignant forms of fever. It indicates a morbid condition of the circulating fluids, the blood being more or less contaminated and insufficiently changed from the venous to the arterial state. Along with this hue other tints may be associated, as that of *lemon tint*, as in the hæmagastric pestilence, the features still retaining their fullness or plumpness; or a deeper *yellow* or jaundiced hue, as in severe bilious remittents, the features being more or less sunk; or a *greenish yellow*, or dark *green hue*, when the liver and biliary passages are completely obstructed, or the former disorganized throughout. A continued *sallowiness* or *murky pallor* of the countenance is commonly an attendant upon torpor and chronic affections of the liver, and upon disease of the spleen. The face, the general surface, and especially the extremities and nails of the fingers and toes, assume a *lead* or *lurid tint* in the stage of collapse of pestilential cholera; and this tint often becomes deeper and darker as the patient sinks, the features being collapsed, and the eyes sunk deep in their sockets. A livid hue of the countenance, most remarkable in the lips, and commonly with lividity of the nails and fingers, occurs in the last stage of pneumonia and general bronchitis, in congestion of the lungs, in obstructive diseases of the heart, and in dropsy of the thoracic cavities; and it is always a most dangerous, and generally a fatal sign.

[The *yellow* colour of the tissues depends on two very different causes: 1st, the bile-pigment, which is met with in cases of jaundice, where it accumulates in the blood and passes thence into all the fluid secretions, colouring all the solid and fluid parts of the body; 2d, a change of the hæmoglobin of the blood when extravasated, as by blows, and in sugillations, pulmonary and cerebral apoplexy, and similar morbid processes. In the former instance, we sometimes observe under the microscope, that the tissues are merely saturated with a yellowish fluid, while at other times we discover a firm, granular, accumulated deposition, of a deep yellowish red colour, between the interstices of the primary histological elements of the tissues. Independently of icterus, the elementary cells of the liver frequently appear to be tinged yellow, and to be filled or covered with minute deeply yellow granules.]

14. A *pink hue* of the cheek, or a *pinkish red*, sometimes limited to the more prominent part of the cheek, is usually seen in hectic, especially the hectic of pulmonary disease. A generally diffused redness of the face attends inflammatory fevers, and is often observed during inflammation of the lungs, and occasionally in phrenitis. A persistent redness of the face sometimes occurs in persons advanced in life, who are accustomed to live fully or to drink port-wine too freely, the features being usually at the same time large or developed. Redness of the face, with unusual fullness of the features, is often

present in sanguineous apoplexy. The redness of the features which accompanies eruptive fevers is readily distinguished by the history and circumstances of the case, by the pulse, and by the state of the general surface. A circumscribed patch of redness on one or on both cheeks is sometimes observed in chronic visceral diseases, and in low or hectic fever attended by alteration of the blood.

15. *g.* The *size* of the features generally—of the whole face—is often very considerably altered in disease. It is apparently *augmented* in sanguineous or congestive apoplexy, in acute mania, in phrenitis, and in convulsive diseases, especially epilepsy, in obstructive diseases of the heart, particularly those accompanied with dropsy, in acute and congestive pneumonia, and in the acute states of vascular action, observed in the hot stages of fevers—periodic, continued, or exanthematous. The size of the face is *diminished*; the features being shrunk or pinched, in the cold stage of periodic fevers, in pestilential cholera, in advanced states of visceral disease attended by emaciation, especially of phthisis and of hectic fevers. When the shrinking of the features becomes very remarkable in the advanced stages of either acute or chronic maladies, or approaches to what has been termed the *facies Hippocratica*, it is always a most unfavourable, and commonly a fatal sign.

16. iii. STATE OF THE GENERAL SURFACE OF THE BODY.—*A.* The *colour* or *hue* of the surface frequently partakes of that of the countenance. Where the latter is ruddy, healthy, and animated, the former is neither altogether pallid or white, nor dusky, lurid, or dark, unless in the darker races. In the European, particularly of northern latitudes, the hue of the surface is that of white animated by a slight tint of carnation or pink. In the anæmic and chlorotic, and often in the leucophlegmatic and anasarctic, it is pallid, or a dead white, sometimes slightly tinted by yellow or pale yellowish green. The colour of the skin is more than naturally sallow, pallid, or murky in functional and organic diseases of the liver, spleen, often in chronic diarrhœa and dysentery, in obstructions of the mesenteric glands, and sometimes in organic diseases of the uterine organs. In the several forms of jaundice noticed above (§ 13), the hue of the general surface is yellow, of various grades to a yellowish green, or even to a murky or deep green. A pale yellow or lemon tint, with greenish or livid streaks or patches as the malady advances, characterizes hæmagastric pestilence; while a jaundiced yellow often attends remittent fevers, the tint becoming more deep or lurid as the disease assumes more and more of a putro-adyamic character. The hue of the surface is dark, dirty, or lurid in continued fevers of an asthenic or adynamic type; and it becomes darker or more foul as the disease advances, and as the powers of life sink. In the cold or formative stage of fevers, the hue is pallid, and the surface rugose, presenting the *goose-skin* appearance. As reaction supervenes, this disappears, and passes, with the increase of reaction, into the warm and carnation glow of health. When, however, no such healthy reaction occurs, as in adynamic, typhoid, putro-adyamic, and pestilential fevers, the pallid hue of the general surface passes into a lurid, harsh, or foul appearance; and this either becomes deeper and more remarkable, or, as in the choleric per-



tilence, assumes a peculiar leaden or livid aspect as the malady approaches a fatal issue.

[The green colour is sometimes met with in the lungs, intestinal canal, and the muscles. In many cases it is impossible to discover the cause of the colour. The different tints of green probably belong, for the most part, to post-mortem changes. Some may depend, perhaps, on sulphuret of iron, which in a very finely divided state sometimes exhibits a blackish green colour; while most of them result from the effects of putrefaction, of which we are mainly ignorant. Many of them, doubtless, depend on the bile-pigment, which permeates the walls of the gall-bladder after death, and tinges the surrounding parts, and sometimes organs, at a considerable distance. This may be known from nitric acid changing the green first to blue, then to violet, and lastly to purple and pale red. Many abnormal colorations, it must be remembered, depend on matters which have been taken into the system in the shape of food, medicine, or drinks.—(See HODGKIN'S "*Lectures on the Morbid Anatomy of the Serous and Mucous Membranes*," vol. i., p. 297-327.)]

17. *Deeper or other discolorations of the skin* are either partial—in spots or patches; or more marked in some situations than in others. These consist either of very limited exudations of the colouring particles of the blood under the cuticle, in one or other of the tissues composing the skin, or of exanthematous or other eruptions. The former constitute the characteristic of purpura, of scurvy, and of some forms of fever. When the vital cohesion or tone of the capillaries is relaxed in certain tissues, as in the vascular rete of the skin, and when, at the same time, the healthy crasis of the blood is much impaired, as in those maladies, minute exudations, containing more or less of the colouring matter of the blood, take place, in the form either of punctæ or of larger spots or even patches; and, according to the states of vital power and of the exuded fluid, present various hues, from a bright or scarlet red to a livid or blackish colour—*petechiæ, vibices, &c.* (See art. FEVER, § 470, 471.) These seldom undergo farther changes unless in the extremities, where, from neglect or improper treatment, the exudations may be followed by ulceration, especially in scurvy, and by sphacelation, as in the putro-dynamic states of fever.

18. *B. The eruptions on the surface of the body* furnish most important indications as respects not merely the nature of the disease, but also its progress and issue. Exanthematous, acute, and chronic eruptions have been very fully discussed in the several articles on the diseases which are characterized by them. It is hence unnecessary to take farther notice of them, than to remark, in general terms, that the less general or copious the eruption, and the less the functions of the skin are impaired by it, the more may the result be considered favourable; and that the more diffused, general, and confluent the eruption, and the deeper the colour, the more unfavourable should be the opinion as to the issue. As respects all eruptions, but more particularly as regards the exanthematous, deepness of hue—lividity or darkness of colour—should be viewed as being much more dangerous than the amount or extent of eruption; for, even when extensive, the risk may not be materially increased as long as the hue is that of a lively red; but in propor-

tion to the deepness of the tint, and as it approaches to lividity or blackness, the danger becomes extreme.

19. *C. The temperature of the surface* varies remarkably with the grades of vital power and of vascular action, and the character of the temperature is much modified by the state of the perspiratory function.—(a) A general depression of temperature often attends sinking of vital power; and when this sinking becomes extreme, it is commonly accompanied with cold perspirations, which are most remarkable in the extremities, as in the last or fatal period of most diseases, and over the whole surface in the choleric pestilence; the depression of temperature being also great, especially in this malady, and manifestly increased by the evaporation of the perspired fluid. Coldness of the surface ushers in many febrile and inflammatory diseases—especially the cold stage of periodic fevers and of visceral inflammations; but the coldness in these maladies exists more in the mind of the patient than to the perception of the physician; and it is generally attended by peculiar phenomena and sensations—by chilliness, horripilation, shivering, rigours, or horrors, which may be viewed as grades of the same sensation, and which are accompanied with a remarkable feeling of cold extending from the occiput along the spine, and with constriction and dryness of the integuments. In these cases, the sensation of coldness, when thus characterized—by horripilation or shivering—is altogether morbid, the temperature of the general surface either not being depressed, unless in the extremities, or being sometimes even much increased, especially over the trunk. The sensation of coldness and the shivering, both in these maladies and in cases of internal abscess, or where matter is being formed, are to be imputed chiefly to the concentration of the morbid action internally, or to the determination of the circulating fluids to internal or vital organs, and but partially to the diminished temperature of the extremities and surface, and to the constriction of the integuments; for, even when the sensation of coldness or chilliness is very considerable, and the horripilations amounting even to shivering, the heat of skin, especially over the trunk, may be excessive; but in these cases the surface is not only hot, but also dry and constricted; and either reaction is being about to be developed, or a copious perspiration is about to supervene, as when these symptoms indicate the formation of an internal abscess. When they occur in very aged persons, and depend neither upon the invasion of a febrile paroxysm, nor upon any visceral irritation or inflammation; and even when, in those persons, they recur at intervals, and alternate with sensations of heat or flushing, they are dangerous symptoms, generally issuing in dissolution.

20. (b) The coldness of the surface, whether actual, or existing chiefly in the sensations of the patient, whether marking the invasion of a febrile paroxysm, or the commencement of inflammatory action, or the formation of abscess in an inflamed organ or part, should be viewed chiefly as a change in the state of organic nervous power or influence upon the vascular system; this influence being more or less depressed or impaired in the extremities and periphery of the frame, and either determined to, or increased in vital or internal organs, the vascular system being similarly affected, owing to the organic

nervous influence on it. If this influence be so powerfully impressed as to be incapable of restoration, or so overwhelmed by the cause impressing it as to sink progressively, coldness of the surface becomes more general, more manifest and actual, and death ultimately takes place; but when the organic nervous or vital influence is morbidly impressed, without being overwhelmed or destroyed altogether, the concentration of that influence in vital organs, or the remains of it in these, enable them to react upon the blood which is superabundantly returned or determined to them, and thus the circulation is kept up, and secretion and excretion are promoted, until the morbid impression and its various consequences are removed. One of the earliest of these consequences is depression of the animal temperature, with constriction of the integuments, which is followed by reaction when the vital influence is not altogether overpowered. According to the nature of the morbid impression, or of the irritating cause, the temperature of the surface, and the sensations and other phenomena characterizing the state of the cutaneous surface, vary remarkably; and, while the temperature may be absolutely lowered, with or without a sense of chillness or coldness, or horripilations, in some cases, with shivering or rigours in others, and even with horrors and distressing tremours, it may not be materially depressed, unless in the extremities, these attendant phenomena occurring nevertheless. The rigours, and the still more severe manifestations of tremours or horrors, are indications of the severity of the morbid impression, or of the cause of irritation on the nervous system, and more especially upon the spinal cord and nerves proceeding from it. We often observe irritation of mucous or serous surfaces by various causes, as by the passage of a calculus along a duct, and even by the introduction of a catheter or bougie along the urethra, followed by constriction and coldness of the surface, by horripilations or rigours. In these cases the cause of irritation, acting upon a single part of the circle of organic nervous endowment and influence, disturbs the healthy distribution of the blood, depresses or diminishes the circulation in the periphery of the frame, concentrates it towards internal parts, while the irritation existing in a part of the organic nervous system is propagated by communicating nerves to the spinal cord, or to the roots of the spinal nerves, and is reflected thence by the spinal nerves to the muscles of voluntary motion, occasioning rigours, tremours, and horrors, which cannot be controlled by volition, until the more general diffusion of the primary morbid impression or irritation, and the reaction and the consequent equalization of the circulation remove the morbid effects extended to the spinal nerves and the muscles supplied by these nerves. (*See* § 22, *et seq.*)

21. Coldness of the surface of the body is attended by various modifications, as respects both the sensations of the patient and the perception of the physician, according to the cause which produces it, and to the function or state of the skin at the time. When the coldness proceeds from depression or irritation of organic nervous influence, in connexion with manifest disturbance of the circulation, then the surface is generally also dry and constricted, as in the invasion of diseases proceeding from causes which primarily simply depress or irritate; but when, with this change in the nervous system of organic life, there is also

loss of vital tone or cohesion—when, owing to the excessive irritation or depression, or to the loss of vital cohesion, or to poisonous contamination, there are also relaxation of the integuments, and increased perspiration, then the coldness of the surface is not merely augmented, but it is characterized by a peculiar sense of rawness as well as of coldness—partly augmented by evaporation, and partly by impaired circulation. Colliquative perspirations which are not consequent upon heats or flushings, and the state of the surface in the last stages of low fevers, in the choleric pestilence, and after poisoning by numerous depressing, contaminating, and irritant poisons, furnish various modifications of this condition.

22. (c) *Increased temperature of the surface* is an important sign of disease, whether it occurs primarily, or consecutively of more or less depression; and, according to the character of the increased heat, so may not only the state of vascular action be partly inferred, but also the condition or amount of vital power and resistance. Heat of the skin is rarely so great when it occurs primarily as when it supervenes upon chills or rigours. In the former case, it is more moderate, generally subsides sooner; and, unless when it is caused by the infection of some animal poison, is more free from other morbid phenomena manifested in the general surface. When heat of skin follows rigours, the reaction of the vascular system, upon which it chiefly depends, influenced, however, by the organic nervous power, carries the temperature several degrees above the standard of health, and this high range is often increased or prolonged by the constriction and dryness of the skin, and by the morbid state of the blood itself—morbid in consequence of deficient action of the emunctories during the preceding depression, coldness, chills, and rigours; the augmented quantity of effete materials in the blood irritating the blood-vessels and vital organs, and morbidly exciting the nervous system of organic life. The result, as respects the surface and integuments, is not merely an increase of temperature, but also, and chiefly, owing to the dryness of the skin, and to the state of the circulation now mentioned, a peculiar sensation imparted to the hand of the observer, and characterized by a harshness, acridity or burning, and sometimes by a feeling of stinging or tingling to the patient himself.

23. When the circulating fluids are not greatly altered or contaminated, and the organic nervous influence not seriously depressed or perverted, the excitement of the vascular system, producing augmented heat of surface, gradually subsides, and with it this particular effect. As the excited vascular action abates so the skin relaxes, secretion and excretion, in the several emunctories, either returning or increasing, and with the return of the functions of the skin the temperature of the surface falls. A fit of ague furnishes an apt illustration of the states of the surface of the body in different febrile and other morbid conditions of the frame, and of the succession of these states, and of the influence of the antecedent, in producing the consequent condition.

24. A harsh, fiery, or burning heat of surface is always an unfavourable sign, especially in visceral inflammation; and if, at the same time, the patient complains of a sense of burning at the præcordia, or of internal heat, with anxiety, jactitation, or restlessness, the extremities becoming cool



or cold, or being covered by a cold perspiration, a fatal result, especially by gangrene, may be expected. Increased heat of head indicates frequently a disposition to apoplexy in the aged, to inflammation of the brain or its membranes in the young and middle-aged, and to convulsions or meningitis in children. A burning or acrid heat of surface in the hot stage of periodic, and of hectic fevers, augurs a malignant or dangerous form of the one, and a fatal termination of the other, especially when diarrhœa is also present, or when the heat of skin is followed by excessive colliquative perspiration. The temperature of the surface is always highest over a sthenically inflamed organ;\* and, as respects the extremities, it differs more or less in different sides in hemiplegic or partial paralysis, as shown when treating of that malady.

25. iv. THE PERSPIRATORY FUNCTIONS of the skin are variously affected by disease, and aid more or less in evincing the nature and the result of the malady. Interruption to, or entire suppression of, the perspiration, as shown by dryness of the skin in the earlier stages of fevers, and of inflammations, is of much importance as respects the states of the circulating fluid and of vascular action. This state of the surface may be attended by depression of temperature (§ 19, *et seq.*), as in the cold stage, or in the invasion of these diseases, or by increased temperature (§ 22, *et seq.*), as in the hot stage, or when vascular action is excited; but, however associated, or accompanied by each in succession, suppression of the perspiration is indicative of the invasion or commencement of fever or of inflammation, when attended by coldness of surface or by chills or rigours, and of a farther advanced state of these maladies when the skin is not only dry, but also hot. The amount of dryness, and of either coldness or heat with which dryness is associated, and the duration of these states of the surface, are matters of much importance, in our estimation, of the nature and extent of disease, and of the probable issue; for if the suppression of the excreting function of the skin be more or less complete, and of considerable duration, and no other excreting organ or emunctory supply vicariously the defective function—if the injurious elements and materials usually eliminated by the skin are not partially or altogether carried out of the blood by other organs, it must necessarily follow that the prolonged suppression of the perspiratory function will contaminate or poison the blood; and that the primary or local disease will be thereby exasperated, or a morbid state of general vascular action will be developed, varying with the changes produced on the blood by the other emunctories, and giving rise to farther alterations, both functional and organic.

26. A. A *perspirable and humid state* of the cutaneous surface, when attended by a soft, natural, slightly unctuous, and moderately warm condition of it, is always a very favourable sign, especially when it is general, and not limited to a single region or part; but when the perspiration is spontaneously excessive, and results not from unusual

exertion or from medicine, &c., more or less disorder, sometimes of a very dangerous nature, is then present. The *quality* and *odour* of the perspiration require attention as well as the quantity; and the circumstances and occasions of excess ought also to be noted. It should not be overlooked, also, that the cutaneous perspiration is not always or altogether suppressed when it is no longer manifest to the senses; for an insensible perspiration generally exists, which may vary with the state of the patient, with the temperature of the skin, and with the dryness, humidity, and electrical states of the air. The perspiration which may be insensible in dry states of the air, may become sensible, or collect on the surface, in the form of sweat, when the air is moist and relaxing. During health the perspiration is more insensible than sensible, and, along with the exhalation of fluid from the surface, a secretion takes place from the follicular apparatus of the skin, which softens, and even partially lubricates the cuticle, especially in the negro race, and promotes both the insensible and sensible perspiration by disposing the surface to the transmission of its accustomed exhalation. The sensible and the chemical qualities of the perspiration vary considerably in different regions of the body, owing partly to the greater admixture of the secretion from the follicular or sebaceous apparatus. The difference is most manifest in respect of the perspiration from the axillæ and the groins, &c., the organic or solid constituents being most abundant in the sweat of these regions. But before any notice should be taken of morbid states of the perspiration, the healthy condition of this excretion ought to be mentioned.

27. B. *In health*, the perspiration, when too copious to be carried off in the atmosphere, without becoming sensible, or in the state of insensible vapour, is condensed in the form of fluid or sweat, 1000 parts of which consist of from 993 to 995½ of water (ANSELMINO, BERZELIUS, SIMON, &c.). The remaining solid constituents consist, 1st. Of substances soluble in water—watery extract, phosphate of lime, and occasionally an alkaline sulphate. 2d. Substances insoluble in water—desquamated epithelium, and, after the removal of free lactic acid by alcohol, phosphate of lime, with a little peroxide of iron. 3d. Substances soluble in ether—traces of fat, sometimes including butyric acid. 4th. Substances soluble in alcohol—alcoholic extract, free lactic acid, and acetic acid, chloride of sodium, lactates and acetates of potash and soda, lactate and hydrochlorate of ammonia. In addition to carbonic acid, nitrogen is exhaled from the surface in constant but varying proportions, according to the nature of the diet and the amount of exercise. The functions of the skin may be divided into, 1st. The *Physical*—the exhalation of pure water and gas. 2d. The *Organic*—the product of animal excretion, or the secretion of cells. The cutaneous excretion is in antagonism with the pulmonary, with the urinary, and with the intestinal; an excess of either diminishes more or less the amount of it.

28. C. *The amount* of the insensible and sensible (sweat) perspiration has been variously estimated in health, but not with that approach to precision which would warrant a positive statement. It is very remarkably increased or diminished in disease, the diminution being more difficult of estimation than the increase. In the

\* [In cholera, I have frequently found the temperature over the epigastric region as high as 106° Fahrenheit, while the temperature of the mouth was 90°, or even lower. The same fact is noticed by Dr. PAINE, in his "Lectures on Cholera Asphyxia" (p. 95). Perhaps this may constitute an exception to the remark of our author, as no one will contend that there is actual acute inflammation of the stomach in this disease.]

cold states of disease, the diminution may be very remarkable, or scarcely to be estimated, and in some cases, as in those characterized by sinking vitality, the perspiration may be excessive, as observed in pestilential cholera. In hot states of the surface, the temperature may prevent a more than natural transpiration from being condensed into a sensible fluid, the perspiration being excessive and yet being insensible. But whether sensible or insensible—whether diminished or increased, but more remarkably when increased, the perspiration is attended by very different kinds of *odour*, the odour often depending upon the chemical constitution and organic constituents or elements of the excretion, and being generally peculiar to each specific disease, although different observers have described the odours differently, or have assigned to them different resemblances.

29. The *increase of sweat* is very remarkable, not only in different maladies, but also in different periods of the same malady. Thus, while perspiration is diminished or almost suppressed in the cold and hot stages of ague, it is remarkably increased in the sweating stage. The same is observed in the paroxysms of hectic, in remittent fevers, and in continued fevers, but in prolonged stages, and even in inflammations. The most remarkable increase occurs in acute rheumatism, in the advanced stages of pulmonary consumption, in pestilential fevers, and in most maladies characterized by sanguineous contamination or poisoning, or infection of the fluids; and, in these especially, the *quality* and the *odour* of the perspiration are much altered.

30. *D. The quality of the sweat* is changed in most febrile diseases; but the change of quality, with reference to each, has not been satisfactorily shown.—*a.* The free *acids* may be much increased. Lactic acid, the ordinary free acid, is usually more abundant than in health, in cases of rheumatism and gout, and probably, also, uric and acetic acids. Dr. PROUT detected the last in hectic fever, and both it and lactic acid may be present in the puerperal states of fever and in erysipelas. ANSELMINO found free acetic acid in women during their confinement, and STARK, an increase of the lactic acid in scrofula, rickets, and in several cutaneous eruptions.

31. *b. Ammonia* does not appear to exist in the sweat in a free state, but chiefly in the state of lactate or hydrochlorate, although it may be found soon after the fluid is excreted, and during its retention in the armpits and groins. As to the actual presence of ammonia in the perspiration during disease, the statements of chemists and other observers are devoid of precision; for we still require to know whether or no the ammonia exists in a free state at the time, or even after the formation of the sweat, or whether it is evolved by the combination of the acid which neutralizes it with another base. ANSELMINO found a larger proportion of ammonia in the sweat after an attack of gout than in any other case. BEREND states that the sweat in putrid and typhoid fevers is ammoniacal. That it sooner becomes ammoniacal in these maladies than in any others, owing to a greater amount of animal matter contained in the perspiration, appears to be nearer to the truth. It may, however, be admitted, that all sweat of a putrid odour either contains free ammonia, or sooner becomes ammoniacal. According to NAUCHE, the sweat in nervous diseases soon becomes alkaline. On this, and other top-

ics connected with the chemistry of the secretions and excretions, SIMON and others are loose in their statements and in their authorities.

32. *c. The salts* are often much increased. PROUT observed a great increase of the chloride of sodium. After attacks of gout, and in the gouty and rheumatic diathesis, the phosphates of lime, as well as the urates, are increased as respects either their proportions in the sweat or the absolute quantity excreted. In critical and in colliquative sweats, the proportion of the usual solid constituents differs remarkably, although the amount of difference is not ascertained; and there is every reason to infer that in these, and in exanthematous, low, putrid, and pestilential maladies, there is a considerable change, especially an increase in the fatty, extractive, and saline ingredients of the perspiration; and that, moreover, substances not usually found in the sweat may, in these diseases particularly, be detected in it. ANSELMINO and STARK say that *albumen* has been found in the perspiration in cases of rheumatism, and in gastric, putrid, and hectic fevers. *Fat* has been found in the perspiration in colliquative and low maladies by myself in several cases; *uric acid* and urate of soda have been detected in the sweat of arthritic persons, and cases of gravel; *bilin* and *biliphain*, in the perspiration of persons who are jaundiced; and the red colouring matter of the urine, *uroerythrin*, in the perspiration in rare cases of fever. The colouring particles of the blood have been seen in the perspiration in scorbutic cases, and in putrid and pestilential maladies, in rare instances.

33. *d.* Various substances foreign to the economy have been detected in the perspiration after their ingestion. The chief of these are sulphur, mercury, iodine and iodides, asafetida, garlic, saffron, indigo, prussian blue, turpentine, &c. These may be partially altered, or combined with other materials; and many other substances, even when digested, during their partial excretion by the perspiration, or by means of certain of their constituents, impart an odour to this excretion, by which even the nature of these substances may be recognized. Although these circumstances are of little importance as signs of disease, yet they should be held in recollection when the *odour* of the perspiration is estimated as a means of recognising certain maladies, and they ought to be viewed as furnishing proofs of the part which the skin performs as an excreting organ.

34. *E.* The *odour* of the sensible and insensible perspiration has not been sufficiently attended to in the recognition and diagnosis of disease. An experienced and closely observing physician will often at once perceive the nature of the malady, from the *odour* of the effluvium proceeding from the body of the patient, even before he may have seen it or approached it. This is especially manifested by exanthematous and pestilential fevers; and although many, whose sense of smell is not acute, are incapable of distinguishing disease by this sense, others are often at once thus enabled to recognise the nature and even the progress of the malady. Most of those specific diseases which are propagated by the effluvia proceeding from those already suffering from them by infection, impart a more or less peculiar, and generally an offensive odour; and although this odour and its resemblances may be familiar to the observer, yet he will rarely be able to describe it in terms which



will make it accurately known to another. The effluvia from persons in pestilential cholera is especially offensive and sickening, and it always imparts a sense of depression to those who perceive it. That from small-pox, or scarlet fever, or measles, differs from each other, or is peculiar to each. The odour of the sweat of persons in putrodynamic fever and scurvy is generally of a putrid character. That of rheumatic and gouty persons is usually acid. Females in puerperal fevers exhale a peculiar sweetish acid odour. Persons whose intestinal excreting functions are insufficiently performed—whose bowels are much confined, are often subject to a particularly offensive, as well as an increased perspiration. The determination of the odours of the perspiration in diseases is, however, quite subjective, and different observers generally describe them by different resemblances, which are not always assigned with accuracy. Thus the perspiration of persons with itch is said to have a mouldy odour; that of scrofula to resemble the smell of sour beer; that of syphilitic patients to have a sweet odour; and that of ague is said to smell like fresh-baked brown bread. The odour of the perspiration in disease, especially in respect of infection, has been imperfectly attended to, although deserving of attentive observation.

35. *F. The other sensible or physical qualities of the perspiration* consist chiefly in those which have been partly noticed when describing its chemical conditions. An acid or an alkaline state of the sweat may readily be ascertained by the usual test-papers; but the acid or alkali present is determined with much greater difficulty. The appearance of the linen generally shows the presence or absence of the colouring matter of the bile; and even common bibulous paper will often demonstrate the existence of fatty or oleaginous matters. A watery and copious sweat is commonly produced, in the previously healthy, by exertion, by increased temperature, and by diseases of simple vascular excitement, when the other emunctories are duly discharging their functions. In these circumstances, the perspiration is warm, copious, watery, and without morbid odour. In low, putrodynamic, colliquative, and pestilential maladies, the sweat may be abundant, thick, clammy, cold, and variously altered in chemical constitution, especially in the amount of animal extractive matters, in epithelium scales, in saline ingredients, in odour, and in the changes it evinces soon after being collected; but in all these particulars, farther and more accurate observations than we yet possess are required.

36. *v. THE NUTRITION OF THE BODY* is one of the first circumstances which attracts the attention of the physician, the character as well as the amount of nutrition appearing to him of great importance. The diminution or abundance of adipose substance; the amount of emaciation or of obesity; the size and tone of the muscles; the rigidity, firmness, or flaccidity of the flesh; the colour and state of the integuments, and the presence or absence of intumescence, œdema, anasarca, or leucophlegmasia, are appearances which always interest the medical observer.—*A. Emaciation* is, when very remarkable or excessive, of great consequence in our estimation of the nature and ultimate issue of disease. In all cases when it is considerable, and especially when very great, it requires close consideration, in respect both of its causes and of its morbid relations.—*a. Emaciation*

increases rapidly in low, continued, remittent, and hectic fevers, the degree of emaciation and the rapidity of its progress indicating the severity and danger of the malady. In organic diseases of the lungs, stomach, and digestive organs generally, emaciation is always present, the acceleration of its course, and the degree to which it has advanced, furnishing proofs of the danger to be expected, especially when it is attended by quickness of pulse and other febrile symptoms. In acute or febrile phthisis, the rapidity and the extreme degree of emaciation are among the most prominent and fatal indications furnished by the malady, and may be the most remarkable when cough and expectoration are the least observed. In all diseases which tend to inanition—in structural changes in the œsophagus, cardiac and pyloric orifices of the stomach, and in the mesenteric glands, emaciation advances more slowly, but to an equally great extent. In the more chronic states of phthisis, in diseases attended by augmented secretion or morbid discharges, emaciation is slower in its progress, but it also becomes extreme, if the malady receives no check, or is not removed by treatment. In continued fever emaciation seldom is apparent until the period of vascular excitement subsides, but after this period it advances rapidly—the more rapidly the greater the danger, more especially in the intestinal or gastric complications of fever. When with rapid or extreme emaciation there is also a dusky, lurid, or livid hue of the surface, the danger is very great; and if eschars, &c., form on parts which are pressed upon, it is still greater.

37. *b. Partial emaciation* is observed chiefly in paralyzed limbs or diseased parts, and depends upon the inaction of the muscles of these parts for a long period. In many cases the muscular emaciation is concealed by a degree of œdema or leucophlegmasia, which often affects the paralyzed limb. In all cases, therefore, it is of use to know to what extent the emaciation is that of the adipose tissue, or of the muscular structures. In the slighter forms the adipose tissue only is diminished, while the muscles are but little diminished, but in extreme cases the muscles also become extremely flabby, and ultimately wasted.

38. *c. Arrest of the progress of emaciation*, and a more or less marked restoration of the flesh, and especially if there also be a restoration of strength and of the natural hue of the surface, are among the most favourable indications of returning health, and of the removal of the pathological conditions upon which emaciation depended. *The superabundance of adipose tissue* is noticed in the articles ADIPOSE TISSUE and OBESITY.

39. *B. Flaccidity of the soft-solids of the body* may precede or accompany emaciation, or even œdema, anasarca, &c. But, however attended, it is always an indication of debility or exhaustion, and often in connexion with impaired nutrition. In fevers especially, flaccidity of flesh is attended by discoloration of the surface (§ 16, 17), and, as they proceed, by alteration of the blood, especially as respects the hæmato-globuline and saline constituents, by anæmia, by absorption of the adipose substance and emaciation. During low fevers, and in the more inflammatory states of fever, after the stage of vascular excitement has abated, flaccidity of muscles, absorption and emaciation proceed rapidly. Nutrition is arrested from the commencement of the malady;

and, although the arrest is not manifest at an early stage, it has, nevertheless, taken place, the capillary turgescence arising from febrile or vascular excitement preventing it from being apparent.

40. Where flaccidity is most remarkable, emaciation not having advanced far, the flesh has often unnatural *softness*, especially in the leucophlegmatic temperament; and in some cases, the softness and flaccidity are either unattended by apparent emaciation, or characterized by turgescence, the unanimated or partially discoloured hue of the surface suggesting the idea of an unhealthy, watery, or semi-liquid state of the adipose and cellular parts below the integuments. This condition is intermediate between the natural and the edematous or anasarcaous state, and is aptly called *leucophlegmasia*. When partial, it often passes into œdema, intumescence being then very considerable, the surface *pitting* from pressure; and, when more general, it may pass into *anasarca*, the watery effusion into the cellular and adipose tissues being such as to produce great distention of the integuments, with pitting, &c. This *leucophlegmasia* is always an important sign of disease, and is often attended by anæmia, or rather by poorness of the blood—by a deficiency of hæmato-globulin. When this state is very marked, whether there be emaciation or intumescence, chronic disease of the digestive and assimilating organs may be inferred, and consequently impaired or morbid nutrition. Attention, in these cases, ought to be directed not only to these organs, but also to the functions of the kidneys and to the cardiac signs. In females, the uterine functions are generally more or less disordered when this sign of disease is present, and when there is also a yellowish or jaundiced tint of surface, organic change in the biliary apparatus may be inferred, which commonly terminates in ascites, or even in more general dropsy.

41. vi. THE ORGANS OF VOLUNTARY MOTION—the *locomotive organs*—are variously and seriously affected by disease, owing chiefly to the states of the nervous centres, by which the muscular apparatus is actuated, but, in many maladies, to the conditions also of organic nervous energy of the muscles themselves, and of the blood. Loss of motion or of sensibility, or of both, in a part, or in one half, or in the whole of the body, has been fully treated of under the head PARALYSIS. But the locomotive organs may be more or less paralyzed, or similarly affected, in maladies which have not been usually termed paralytic.—A. In adynamic, putro-adynamic, typhoid, typhus, and exanthematous fevers, the loss of muscular power is very marked, even from the commencement; and in these maladies it is not to be so much imputed to the state of the brain, spinal cord, and their envelopes, as to that of the organic nervous system, the muscles themselves, and ultimately the blood, being influenced by this system. So remarkably are the locomotive organs affected in these, and in all low or malignant fevers, as to render them incapable of retaining the standing or sitting position, or even a position on either side, the patient being constantly supine. The degree in which voluntary muscular power is prostrated is remarkably great in all these fevers, the amount of danger being partly manifested by the degree of prostration, and the inability to lie on or turn to either side. Among the most favourable and earliest signs of

recovery, is the return of the power to lie upon either side, and afterward the capability of turning from the one to the other. (§ 4, 5, 6.)

42. B. But muscular power is not only *lost* or *prostrated*, in the modes evinced by palsy and low fevers, but is also otherwise affected, and in various ways. Owing to changes implicating the nervous centres of animal life, the muscles are frequently capable only of imperfect, uncertain, intermediate, or irregular contractions, the motions of the limbs or members being similarly characterized. These morbid states of voluntary motion are apparent only upon efforts at locomotion, or on volition; but other morbid states of motion occur, and continue in opposition to volition, and consist, 1st. Of continued tremour; 2d. Of frequent or continued contraction and relaxation, with uncertain or imperfect voluntary motion, as in chorea; 3d. Of spasm or cramp, of short or momentary duration; 4th. Of spastic or permanent, or continued contraction of one or more muscles; 5th. Of more or less general spasm, followed by partial or more general relaxation or irregular action, as in epileptic and convulsive seizures; and, 6th. Of continued general spasm, as in tetanus. These states of locomotive function present numerous associations and relations, which serve both to characterize specific forms of disease, and to indicate the issue of the disease in which they are observed.

43. a. The *prostration* of muscular power observed in low fevers is always attended by flaccidity of the muscles, indicating impaired rigidity and tone of the muscular fibres, and loss of irritability; and by a harsh, discoloured, or lurid hue of the surface, evincing a morbid state of the blood, and of the functions of the capillaries. These states show the propriety of having recourse to such agents as will most efficiently promote or rouse organic nervous energy, restore the excreting or depurating functions, and counteract the morbid or contaminating changes taking place in the blood. Unless the conservative influence of life be supported by these measures—unless vital resistance to contaminating or hurtful influences be thus promoted, prostration of muscular power, and sinking of vital function, proceed with increased celerity, and soon terminate in dissolution; a favourable crisis taking place on some occasions only, by means of vital resistance, and the spontaneous action of an important emunctory thereby developed under the favourable circumstances of locality, of constitution, and age.

44. b. The *imperfect and indeterminate contractions* which follow volition are generally occasioned by exhausting discharges, by masturbation, or premature or excessive sexual indulgences, and are followed by general palsy, and often also by imbecility. The general palsy of the insane is of this nature, and, although life may be protracted for years, it is generally shortened in the manner shown in the articles on INSANITY (§ 170) and PALSY (§ 65, *et seq.*). In these cases the cerebro-spinal centres are often more or less wasted or altered in their intimate organization, and frequently little or no aid is derived from medical treatment, or even from diet or regimen.

45. c. *Continued tremours*, or constant shaking of a part—of the head, of an extremity or limb, &c.—or frequent twitchings of a muscular part, are commonly indications of irritation at the origins of the nerves supplying the affected parts,



or of some changes disturbing these nerves. When this sign consists of either shaking or tremour, it may continue for many years, the patient often reaching the usual duration of human existence; but it is rarely or never controlled by medical treatment, although life may be prolonged by a regular and abstemious regimen and diet. The *twitchings* which sometimes affect one or more muscles, especially the muscles of the face, are generally much more serious signs, and although they may continue for years, yet they generally terminate sooner or later in apoplexy or palsy.

46. *d. Cramps or spasms* may depend upon irritation of the bowels by acidity or flatulence, and, when they affect the lower extremities in the gouty diathesis, they generally proceed from this source, and are often connected with the presence of morbid or effete matters in the circulation. More *permanent or protracted spasms* generally proceed from inflammatory action in those portions of the nervous centres where the nerves originate that supply the contracted muscles; and these are often the forerunners of palsy, are sometimes associated with palsy of adjoining parts, or of opposite limbs, and are often followed by apoplexy or coma.

47. Cramps or spasms, varying in character with existing pathological conditions, occur in various diseases. They often affect the muscles of the lower extremities when the intestinal canal is violently irritated, and often also the abdominal muscles. Although indicating a severe state of disease, they are seldom attended by danger, unless they extend to the superior extremities, or are symptomatic of pestilential cholera, or of the ingestion of acrid, or of irritant and depressing poisons (see *art. Poisons, pluries*). When they occur in the course of phrenitis, of apoplexy, or of palsy, they are unfavourable symptoms, and indicate at least a severe form of disease, passing into organic changes in parts of the nervous centres. They are also most serious indications when they occur in fevers and in puerperal females. The same remarks apply to *convulsions* appearing in the circumstances now mentioned, unless they are symptomatic of hysteria. (See *arts. CONVULSIONS, EPILEPSY, HYSTERIA, &c.*)

48. Muscles are sometimes singly affected, or the affection extends merely to such muscles as are supplied by a single or by a pair of nerves; and the affection may be either that of *paralysis*, or of *spasm*, or the latter followed by the former. These partial or limited affections are often important indications of the early stages of structural changes in those parts of the nervous centres connected with the origins of the nerves supplying the affected muscles. When one or more of the muscles of the face are thus affected, unless a manifest cause exists in the course of the nerves supplying them, then more serious results may be expected, in the form either of apoplexy, or of convulsive coma, or of more complete or general palsy. If the muscles of the tongue or of the pharynx be implicated, in either of the modes just stated, structural changes at the origins, or in the course of their nerves, may be inferred, which will sooner or later terminate in an apoplectic seizure, or in hemiplegia. When these muscles are so affected as to prevent articulation, or deglutition, or both, an apoplectic attack, rapidly terminating in death, generally ensues after no very long interval. Prolonged spasm or contrac-

tion of the hands or feet, or of both, is observed in infants and children, in connexion with cerebral disease, and often also with laryngismus: it is always a very dangerous symptom.

49. Muscular movements are affected by disease in every form or grade from complete loss of the power of contraction to impaired, weak, or irregular, or uncertain contraction, involuntary twitchings, clonic or atonic spasms, or convulsive movements, spastic or protracted contractions, and tonic or tetanic contractions of a prolonged and general kind. These grades of diseased muscular action are not progressive; they are seldom consecutive or progressive, but one or other generally appears independently of the rest, and, if one state or form supervenes on the other, that of spasm is most frequently followed by paralysis, this latter being rarely followed by spasm. These several and very different forms of muscular affection are common in infants, in children, and are not infrequent in adults and aged persons. In young subjects, especially in children, they are more frequently sympathetic of irritation of the digestive canal, of teething, of intestinal worms, although sometimes proceeding more directly from alterations in the nervous centres or their envelopes; while in adults and aged persons they more frequently arise from these latter morbid conditions. But whatever changes of a structural nature may induce them, they may severally appear in different or even in opposite states of the vascular system—in states of *anæmia* or deficiency of blood, or of natural fulness, or of excessive plethora; and these different conditions of the vascular system are not especially allied to particular forms of disordered muscular action, for, with vascular *anæmia*, loss of motion, or impaired or uncertain motion, or clonic spasm, or convulsions, or even protracted spasm, may take place, although clonic or atonic spasm or convulsion is the most common. The same remark applies to other states of the vascular system, for, even when loss of motion may be most complete, vascular fulness may be greatest, and even when spasms are most general and protracted, as in tetanus, and in its several modifications, the vascular system may be equally exempt from deficiency and fulness of blood. All disorders of the muscular movements require close observation and most particular investigations into the pathological states producing them. They are of the most serious import, especially in adult and aged subjects, unless when symptomatic of hysteria or gout, and even then they ought not to be undervalued; and, unless they are referred to inflammatory action in some part of the nervous centres or thin envelopes, they are seldom benefited by large vascular depletions; or, if depletions be indicated, they ought to be employed with caution, those which are local or derivative being the most serviceable. Much more frequently very opposite means to vascular depletions are required, especially tonics, antispasmodics, stimulants, &c., variously conjoined with other means, according to the changes inferred in each form of these disorders, and in each case which comes under treatment.

50. *C. The joints and ligaments* furnish signs which are intimately connected with constitutional diathesis, and with disorders of the digestive and vital organs. In the gouty and rheumatic diathesis, they are not only the most frequent seats of disease, but also the parts to which at-

tention should be directed in forming an opinion as to the recurrence of disorder or the means of averting it. A tumid-condition of the joints, and relaxation of their ligaments, whether appearing singly or in conjunction, are certain indications of predisposition to disease, even when little disorder besides is manifest. The former of these, especially when associated with a marked development of the lymphatic system, or with enlargement of the glands, or fairness of skin, &c., is a certain sign of the scrofulous diathesis; while the latter is connected with constitutional debility, and is very frequently the consequence of masturbation. Primary debility and consecutive exhaustion, in these manifold conditions, are always attended by a weak or unusually flexed state of the joints; and, whether appearing in childhood or in later periods of life, the joints and ligaments most prominently betray these conditions. The more vigorously the joints and ligaments perform their offices, the more perfectly are the several vital functions performed. When the joints swell, or are puffed, in the advanced course of the severer cases of small-pox or of scarlet fever; or at an advanced stage of puerperal phlebitis, or even in other forms of phlebitis, or in erysipelas, secondary inflammation and consecutive suppuration in these parts may be considered to have either commenced or somewhat advanced. There are no external parts which more certainly evince depression of organic nervous or vital power, or more frequently experience the injurious effects of infection or contamination of the blood—whether animal or external infection, or self-contamination by suppressed excretion or morbid absorption—than the joints, as I have shown and explained when treating of the SYMPATHETIC ASSOCIATIONS OF DISEASE (§ 21, 72).

51. Not only the large, but also the small joints are objects of attention in disease. The latter are often the seats of painful affections, especially in females after the menstrual epoch of life, or during far advanced age, these affections partaking more or less of a rheumatic or of a gouty character, or of both. They are generally dependent upon disorder of the digestive and biliary organs, and impairment of the excreting functions of the skin and kidneys. The last joints of the fingers are often enlarged in phthisis, while their ultimate extremities are wasted, and the nails are uncated or bent over the wasted tips of the fingers. In most diseases of debility or exhaustion, and in febrile maladies, the motions of the joints, and especially the remarkably impaired power of sustaining the weight of parts superimposed when the limbs are extended in attempting to stand erect, evince the degree of vital depression, and the loss of muscular and nervous energy.

52. The extremities also beyond the larger joints become the seats of emaciation, or of *œdema*—of the former in protracted chronic diseases and in those just named, of the latter especially when the limbs are depending, or when the venous or lymphatic circulation is interrupted by pressure, or by vital exhaustion or other causes. When *œdema* or swelling of one or more extremities occurs from the pressure of internal tumours, or appears in the last stage of phthisis, it is an unfavourable sign; in the latter disease especially, it generally ushers in a fatal issue. It is a very prominent sign of inflammation of the

lymphatics, or of the veins, or of both; and it sometimes occurs in arteritis. In phlegmasia alba dolens, the swelling is very great, with little or no pitting by pressure, the veins and lymphatics being generally obstructed, and the adipose and cellular tissues loaded with a semi-coagulated lymph. *Œdematous* swellings of the extremities are always unfavourable signs when they appear in the course of prolonged internal maladies, especially upon diseases of the heart, kidneys, lungs, liver, or spleen; or upon ovarian disease, or aneurism, or internal abscess, or tumour. If *œdema* affect one arm, it is generally unfavourable, although no disease of the heart, lungs, or pleura can be detected. Swelling of the arm is a very important sign of tumours, especially cancerous diseases of the mamma, as showing that the lymphatics, or even the veins, have become affected. *Œdema* of the lower extremities, when owing chiefly to debility, or to a depending position, or to both, or to the pressure of the gravid uterus, or of fecal accumulations in the cæcum or sigmoid flexure of the colon, generally disappears after the removal of the cause.

53. The *nails* of the fingers and toes, and the *hair* are often affected by internal as well as external maladies. The *nails* frequently manifest cachectic states of the system. They become elongated and uncated, or bent over the wasted tips of the fingers in phthisis; often also blue in this malady and in other diseases of the lungs and air-passages, when the blood is not sufficiently changed by respiration, and in congestion of the heart or lungs. They, with the fingers, assume a still more livid hue towards the fatal termination of these diseases, and during the collapse of pestilential cholera. The nails and matrix, or secreting structure of the nails, are altered, the former becoming thick, or brittle, dry, &c., in several chronic cutaneous affections, especially in psoriasis lepra, pityriasis, &c., evincing an obstinate form of those affections. The nails partake, to some extent, of the alterations of the cuticle, in acute and chronic diseases attended by exfoliation of this tissue; the hair also becoming implicated.

54. In acuto or febrile phthisis, in exanthematous and in continued fevers, the *hair* falls out, becomes thin, dry, weak, and straight. This affection of the hair is not very marked in chronic phthisis, and it does not occur until the most advanced stages of, or in the course of, convalescence from these fevers. The hair falls out more slowly in consequence of the syphilitic and mercurial poisons, of masturbation, of premature or excessive sexual indulgences, of mental exertion, and the depressing passions. It becomes prematurely *gray* from pityriasis, from sudden mental shocks, from the depressing emotions, from excesses of all kinds. Loss of the hair, premature grayness, and exuberance of the hair, are severally more or less hereditary in families. The loss, grayness, or want of lustre of the hair, depends upon defective nutrition or atrophy of the follicular bulbs of the hair. (See *art. HAIR*.)

55. II. SYMPTOMS AND SIGNS FURNISHED BY THE SENSES AND NERVOUS SYSTEM OF ANIMAL LIFE.—The *signs* furnished by the organs of sense are dependent on the states of the brain, although often more or less influenced by the organic nervous system. The intimate dependence of the senses upon the brain is evinced most remarkably by the *eyes*, and less so by the function



of *hearing*. The sense of *smell* is influenced by the respiratory functions and states of the brain and respiratory passages, while the brain is often affected through the medium of this sense. *Taste* is very closely connected with the digestive and organic functions. The sense of *touch*, while depending on the brain, requires the media of transmission to the brain to be capable of conveying the impression which touch produces. In all cases, it is necessary to *perception* through the medium of any of the senses; 1st, that an impression be made on the sense; 2d, that the nerves of sense should be in a state capable of transmitting the impression to the brain; and, 3d, that the brain should be able to perceive the impression which has thus been made. The impression made on the senses may fail in either of those quarters or channels.—(a) The impression may fail owing to the *organ* of sense not being in a state to receive it at all, or to receive it in a normal manner—as the eye or ear from disorder or disease; or the organs of smell and of taste from diseases of the respiratory and digestive organs, with which they are connected.—(b) It may not be perceived, from the circumstance of the nerves of sense not being capable of transmitting the impression to the brain, as in cases of atrophy, injury, wounds, &c., of these nerves, or of tumours, morbid deposits, &c., pressing upon them; and (c) the impression may not be perceived, although received and transmitted, owing to the condition of the brain at the origins of these nerves in the brain, or at the seat of conscious sensation.—(d) While these are the requisites for the discharge of the functions of sense, diseases of other organs influence these functions in one or other of these three quarters—by implicating or disordering either the organ of sense, or the nerves communicating with the brain, or the brain itself.

56. Disorders of the functions of sense are of importance according to the sources to which they may be traced. They are most serious or dangerous when they can be referred to the brain; much less so when they proceed from the nerves of sense or from the states of the organs of sense, and least so when they are sympathetic, or depend upon the digestive functions. Owing to diseases of one or more of these quarters or sources, the functions of sense may be suspended, destroyed, diminished, depraved, or exalted; these several conditions depending upon any one of these sources, or upon two or more of them. They may be abolished or suspended in fevers, apoplexy, palsy, &c.; they may be depraved or altered in nervous fevers, and in diseases of the respiratory and digestive organs; they may be diminished or impaired in these and many other maladies, and they may be exalted early in fevers, in inflammations of the brain, spinal cord, or their membranes, and even in hysteria and hypochondriasis. It is so far favourable when the senses continue unaffected in acute diseases; and a return of their functions after a crisis in these diseases, or in conjunction with other early favourable symptoms, is a fortunate concurrence.

57. I THE SIGNS PRESENTED BY THE EYE are among the most important which are furnished by the senses. The volume, the position, the motions, the colour, the brightness and expression, the states of the several tissues, and the functions of the eyes demand a particular notice. The pathological changes of the organ are described in

the article EYE; the sympathetic and symptomatic indications furnished by it are now only to be considered.—(a) The *size* of the eye is changed chiefly in hyperæmia of the tissues of the organ, in congestions of the brain or of the heart or lungs, by impending suffocation; in apoplexy, in phrenitis, in the paroxysms of epilepsy and convulsion, in delirium tremens, &c.; but the increased size is not great, the apparent increase being caused more by the prominence given to the organ by congestion or turgescence of parts posterior to it, than by the distention of its tissues. In these cases, the volume and prominence of the globe are rapidly or acutely increased; but they may be augmented in a much slower and more remarkable manner in several chronic structural changes of the organ. (See art. EYE, *pluries*.)

58. (b) The eye may be *protruded* slightly by turgidity of the tissues behind it, giving it also an apparent increase of size; and more remarkably by tumours, by aneurisms, by exostosis or osteosarcoma, by disease of the periosteum or of the lachrymal gland, by structural changes of the membranes, bones, &c., and by inflammation of the adipose tissue behind the eye. The position of the organ may be variously altered by these maladies. The eye may be directly protruded, or it may be forced or turned to one side.—*Sinking* of the eye (§ 8) is caused by absorption of the adipose substance behind the globe, by diminished turgescence of the vessels, and partially by an atrophy or lessened fulness of the tissues and humours of the organ. Sinking of the eyes is generally equal as to both, as it depends upon constitutional causes, and, when very remarkable, it is always a sign of a severe or dangerous malady. Where only one eye is sunk, a local affection of the brain, or atrophy of the nerves of the eye, or paralysis of these nerves, may be inferred.

59. (c) The *motions* of the eye may be affected by paralysis, or spasm, or by debility, exhaustion, &c. Immobility and wrong direction of the globe may arise either from paralysis or spasm, and are signs of disease of the brain or of its membranes, especially congestion, effusion of fluid, hæmorrhage, softening, or any of the alterations productive of apoplexy, palsy, coma, convulsions, &c. Immobility is observed chiefly in catalepsy, apoplexy, and profound coma, and indicates a severe or very dangerous state of the latter. A faulty direction of the eyeball, when permanent, depends chiefly on paralysis of the muscles on the side opposite to that to which the eye is turned, and more rarely to contraction of the muscles of that side. Squinting is a sign of organic alteration of the membranes or substance of the brain; is most frequently seen in hydrocephalus, in convulsions, apoplexy, cerebral inflammations, palsies, and is a most unfavourable or fatal sign of these maladies, the exceptions to this issue being few. During crises, or when it is observed in cases of worms, or in the paroxysm of epilepsy or hysteria, it is not so dangerous as in the foregoing maladies. Congenital or acquired squinting—acquired from habit—has no semeiological import.

60. Distortions of the eyes, of a passing or temporary kind, are produced chiefly by spasms of the ocular muscles, and occur chiefly in convulsive affections, in the diseases just mentioned, and in several acute maladies. When they are observed on the invasion of acute diseases, espe-

cially in any of the exanthemata, as small-pox, a most severe or dangerous attack is then indicated. If they appear in an advanced stage of cerebral diseases, of exanthematous or continued fevers, or in low or putro-dynamic fevers, the prognosis is still more unfavourable, or even fatal.

61. (*d*) The colour of the conjunctiva should not be overlooked: redness of this coat is, a sign of congestion or inflammation, either of it, or of congestion or inflammation of the brain or its membranes. The redness is most frequently the result of irritation from mechanical causes, or of catarrhal inflammation. When it is produced by acute sthenic inflammation, then the conjunctiva is also much swollen. In the asthenic states of conjunctivitis and in scurvy, the colour is a dark red. In apoplexy, in cerebral fevers, and in typhus, the conjunctiva is generally more or less congested and red; and frequently also in cases of vascular determination to the brain, especially in the morning before leaving bed. *Echymoses* of the conjunctiva are sometimes also observed in these maladies, and after epileptic or other convulsive attacks, these changes of this coat indicating a severe or dangerous disease. If the injection or congestion of the conjunctiva present a dirty brownish or livid hue, not only cerebral congestion, but also alteration of the blood may be inferred, and a most unfavourable or fatal prognosis may be formed, especially in putro-dynamic fever, typhus, small-pox, scarlet fever, and measles. Other changes in the eye connected with simple, gouty, or rheumatic inflammation, and the several alterations of structure of this organ, are described in the article *EYE*.

62. (*c*) The form and size of the pupil are much affected in cerebral diseases, and in other maladies, through the medium of the sympathetic nervous system. A contracted pupil is observed in active vascular determination to the brain, inflammation of this organ or of its membranes, in the early stage of irritation or scrofulous disease of the brain, before passing into effusion, in retinitis, and in poisoning by opium. When it occurs in apoplexy, or when one pupil is contracted while the other is dilated, either in apoplexy, palsy, or epilepsy, an unfavourable prognosis may be formed. A dilated pupil occurs in an advanced stage of hydrocephalus, in coma, and in all diseases of the brain attended by effusion or pressure, as apoplexy, the last stages of phrenitis, and meningitis. It may occur also after epilepsy, convulsions, and hysterical fits; and it may be produced by some narcotic poisons. Its connexion with amaurosis and cataract should also be recollected. Dilatation of the pupil is observed in cases of intestinal worms, and often in scrofula, the early stage of phthisis, and in several chronic abdominal affections, especially in children. When it follows rapidly on a contracted pupil during cerebral affections, effusion or organic alterations may be inferred, the latter especially if any difference in the state of both pupils be remarked.

63. The motions of the iris should always be noticed in connexion with the size of the pupil. The iris may be unaffected by light, owing either to spasm or paralysis; this want of motion being most frequently remarked in the cerebral maladies already mentioned, and in typhoid and low fevers. In these, as well as in other maladies of a severe or dangerous nature, this is a most unfavourable sign. Increased sensibility of the iris, with quick dilatation or contraction, is ob-

served chiefly in hysterical and irritable or sensitive states of the frame, and in the early periods of exanthematous or other fevers. It is also remarkable in diseases of debility, or in cases of vital depression, when the functions of the brain are unimpaired.

64. (*f*) The lustre of the eye depends chiefly on the state of the brain. It is increased in active determination of blood to, and in inflammations of, the brain or its membranes, until effusion, exhaustion, or coma supervene. Increased lustre is sometimes observed in apoplexy; it precedes and accompanies the delirium of fevers; and attends several states of insanity. The lustre of the eye is impaired on the invasion of most infectious maladies, in congestive affections of the heart, lungs, or brain, and in severe diseases of the abdominal organs. The lack of lustre is farther increased in the last stages of acute diseases, especially when the blood is contaminated, as in malignant or pestilential maladies, and is always a very unfavourable sign. It is often a fatal indication in inflammations of abdominal organs, and in these it evinces the occurrence of gangrene or fatal sinking. A glazed appearance of the eyes generally precedes dissolution.

65. (*g*) The expression or look of the eye, or the impression made by the eyes of the patient on the observer, is generally either that which is natural or usual, or that of anxiety, of terror, fright, or despair, or of wildness or madness. The expression of the eye generally harmonizes with that of the countenance. The natural look of a patient's eye is always a favourable circumstance in both acute and chronic diseases. A *timid* or *mild* expression is observed on the invasion of acute diseases, and before vascular reaction is developed, and towards the termination of dangerous chronic maladies. It is also seen in hysteria, in disorders caused by self-pollution, and hypochondriasis. A *timid*, *furtive*, *downcast*, or *unsteady* look is common in the disorders of the mind. An *anxious* expression is observed in diseases of the heart and of the respiratory passages, when the respiratory efforts are difficult, and in inflammations of the stomach, bowels, or liver. A look of *fright* or *despair* occurs in alarming cases of hæmorrhage, in violent colic or ileus, in strangulation of the bowels, in pestilential cholera, sometimes in acute inflammations of the digestive canal, and in accidental poisoning. It is always an unfavourable, and frequently a fatal sign. A *wild*, *terrified*, or *maddened* expression characterizes the paroxysm of rabidity, the accession of delirium and mania, delirium tremens, and phrenitis or meningitis.

66. (*h*) The function of vision is variously affected in disease, either with or without increased or diminished sensibility of the eye to light. Increased sensibility to light (*Photophobia*) is observed in many diseases: 1st, in diseases of the eye, especially in inflammations of the internal tissues, and in scrofulous, gouty, and rheumatic affections of the organ; 2d, in diseases in which affections of the eye become prominent phenomena, as small-pox, measles, catarrhs, &c.; 3d, in affections of the brain or of its membranes, especially in inflammations or irritations of, and vascular determination to, this organ, whether primary or associated with febrile or other maladies. Photophobia is generally observed during the early stages and progress of these, and before effusion or other organic changes consequent



upon inflammatory action or irritation have supervened. It also occurs in delirium, in mania, and several states of insanity; and, 4th, in various diseases, in which the nervous systems generally, both organic and animal, evince increased susceptibility and sensibility, as hysteria, hypochondriasis, rabies, and during recovery from many acute maladies. *Impaired sensibility* of the eye to light often occurs in far advanced stages of the diseases, in the earlier periods of which increased sensibility is observed. The *sensibility* of the eye to light, whether increased or diminished, should not be confounded with increase or loss of the power of vision; for vision may be very remarkably impaired when the sensibility to light is most acute, and the reverse is as frequently observed.

67. (i) *Diminution or loss of vision* may arise from a variety of pathological states: 1st, from changes in the tissues and humours of the eye itself; 2d, from disease of the brain, of its membranes, or of the optic nerves, or of changes implicating either these nerves or the ophthalmic branches of the fifth pair of nerves; and, 3d, from sympathy with disease of any of the abdominal organs: from intestinal worms; from hysterical, hypochondriacal, and of the nervous affections; from faintings, and from general or local debility or exhaustion (see *arts. EYE and AMAUROSIS*). When loss, or even diminution of sight occurs during delirium, or in the course of fevers, and in affections of the brain, the supervention of coma, or of apoplexy or palsy, or of both, may be expected.

68. (k) *Morbid or altered vision* presents various forms and phases. *Near or far sight* depends on the different degrees of convexity of the cornea, and on the states of the anterior humours or parts of the eyeball. *Near sight (Myopia)* is often congenital, and continues through life, or nearly so. It may, however, be acquired from the constant or frequent use of the eyes at near objects, or at the same near focus. *Far sight (Presbyopia)* may occur from habitually directing the eyes to distant objects, and is common in sailors. It is still more common in advanced age. It is owing chiefly to diminished convexity of the cornea. *Interrupted and half vision* occurs either from a partial paralysis of the retina, which is sometimes temporary and sympathetic, or from a more permanent change in the humours or nerves of the eye. It is generally symptomatic of disorder of the digestive functions when it is not continued; but when it is constant or increases, it is caused by a change in the optic nerve, or optic thalamus.

69. *Double vision* generally proceeds from disease of the brain or membranes, from effusion of fluid within the cranium, or from alterations implicating the medulla oblongata or base of the brain. It is an unfavourable sign whenever cerebral disease is indicated, especially phrenitis, apoplexy, palsy, epilepsy, &c. It may usher in a dangerous attack of apoplexy or palsy, or precede anaurosis, or it may follow the severer paroxysms of epilepsy or convulsions. It sometimes occurs on metastasis of rheumatism or gout to the brain; and it occasionally supervenes upon, or attends disease, especially inflammation of the spinal cord or its membranes, and it is then a most dangerous sign, inasmuch as it evinces the extension of disease to the base of the brain. Double vision may accompany intox-

ication, intestinal worms, and disorders of the digestive organs, faecal accumulations, hysteria, &c.; but it is then associated with symptoms which indicate its nature, and is commonly temporary or soon removed.

70. *Vision* may be deformed—objects being seen in inverted, crooked, disfigured, or distorted forms. This state of vision occurs chiefly in cases of chronic organic diseases of the brain, membranes, or bones of the cranium. Objects may also appear brighter or darker than they really are, or different colours, or certain colours may not be distinguished. A *brighter* or *redder* appearance of objects than natural sometimes accompanies irritation or inflammation of the brain or its membranes. A *dim* or *dark* state of vision may proceed from debility of the retina, or from slight turbidity of the humours, or congestion of the posterior structures of the eyes. An inability to distinguish colours, or to perceive certain colours, indicate congestion, or alteration of the intimate structure of the retina. *Scintillations*, sparks, lights, or little fiery balls (*Photopsia*), occur in congestions, hyperemia, and inflammation of the brain or membranes, and they sometimes precede epistaxis, apoplexy, palsy, amaurosis, epilepsy, &c.; but they may also proceed from irritation of the retina and optic nerve, and from congestion or inflammation of the more internal tissues of the eye.

71. *Dark points*, figures or nets, or reticulated spots (*Musca volitantes*), before the eyes, sometimes proceed from congestion, irritation, or inflammation of the retina and adjoining parts, but more frequently from slight capillary congestion of the interior structures, especially the capsules of the humours, or turbidity of the humours, or varicose states of the extreme or lymphatic vessels. These appearances, as well as others of a similar kind, may sometimes depend upon congestions within the cranium. The states of the organ from which they chiefly proceed are generally sympathetic of disorders of the digestive organs, and are often associated with chronic cutaneous eruptions. They are also symptomatic of intestinal worms, of hypochondriasis, and hysteria. They are most frequently experienced by persons who have strained or over-exerted their sight on small or near objects. These disorders of vision may be more or less manifest for many years—for thirty or forty years—according to my experience, without much disorder of the general health, when they are not made the subjects of local treatment by speciality doctors or surgeons, to whom, owing to the alarm of patients, they have often furnished rich harvests.

72. (l) *The seeing of objects which have no existence—illusions of sight*—are common in delirium, especially the delirium of fever, in states of fright or terror, in morbid states of the imagination, in delirium tremens, in states of intoxication, in the several states of acute or chronic insanity, in meningitis, and in rabies. It occurs chiefly from irritation or congestion of the encircling portions of the brain, and is common in typhoid, low, continued, and exanthematous fevers, and in the last moments of sinking vitality, in acute and chronic maladies.

73. (m) The functions of the *lacrimal glands* are often disordered in disease. The secretion of tears is generally impeded in fevers, especially during the early stages, when all the secretions are scanty; the dryness of the conjunctiva in

these diseases, as well as in exanthematous fevers, favouring the occurrence of inflammation of this membrane. Increased secretion of tears may be either apparent only or real. It is often the former, when the carunculae lacrymales are red, swollen, or partially obstructed by inflammation, catarrh, &c. It is the latter in hysteria, hypochondriasis, in low and mentally depressed states of disease, in nervous fevers, and in the depressing mental emotions. An increased flow of tears is often most beneficial in severe mental shocks, and on occasions of mental distress; it is, however, frequently produced at pleasure, or in paroxysms of temper, by females.

74. ii. THE SENSE OF HEARING furnishes signs, which have reference, 1st, to diseases of the organ itself; 2d, to diseases of the brain, with which this sense holds intimate relations; and, 3d, to diseases of more distant and less obviously related organs. The first of these have been treated of in the article EAR, and *diminution or loss of hearing*, from diseases of the organ, or of the brain, or of more distant parts, has been fully considered in the article HEARING. There remains, therefore, but little farther to say respecting the signs of disease furnished by this sense. Noises in the ears, and *earache*, are also severally symptoms of disease, either of the ear itself, or of parts in the vicinity, as of the throat or pharynx, or of distant parts, or of the system generally, especially continued fevers.—a. The former often precede the accession of delirium, and attend and aggravate delirium tremens. Noises in the ears also accompany anæmia, especially that consequent upon protracted rheumatism occurring in far advanced life; and they frequently attend diseases of the uterine organs, or large losses of blood either by hæmorrhage or by excessive blood-letting. In plethoric persons they sometimes usher in an attack of apoplexy, or of epistaxis, and they should be viewed as unfavourable signs. When they are experienced in very aged persons, especially in females who pass sedentary lives, without exercise in the open air, although not indicating danger, they resist all means of cure, if exercise in the open air be not regularly and perseveringly taken. (See article EAR, *Nervous affections* of.)

75. b. *Earache* is an unfavourable symptom in continued and exanthematous fevers, especially in scarlet fever and small-pox. In these, as well as in other constitutional maladies, and even in secondary syphilis, it indicates the supervention of a local inflammatory complication, generally extending from the throat along the Eustachian tube to the ear, and frequently either destroying the organ, or, after effecting this, extending to the membranes and substance of the brain, as I have shown to occur on many occasions, in connexion with these and other maladies (see art. BRAIN, § 146, *et seq.*). The importance of giving due attention to earache, and other affections of the ear, with reference to their pathological and semeiological relations, is more fully shown in the articles on EARACHE, and on *Inflammation of the EAR*.

76. iii. THE SENSE OF SMELL has intimate relations with the brain and respiratory functions.—A. *Acuteness of smell* (hyperosmia) is often present at the commencement of irritation or inflammation of the brain or its membranes, or of nervous, typhoid, and exanthematous fevers, and in hypochondriasis, hysteria, uterine affections,

and often in epilepsy. It sometimes precedes the accession of mania or delirium.—B. *Want of smell* (anosmia) is occasioned by affections of the nasal membrane, in catarrhs, influenza, inflammations, &c.; and by chronic diseases of the brain, or of the membranes, or of the bones of the cranium; or by secondary syphilis, or by the progress of low or exanthematous fevers.—C. *Perversion of this sense*, or smells which are different from those perceived by other persons, or which are peculiar, or unusual, sometimes precede an attack of apoplexy or of epistaxis, or of paralysis. It sometimes attends disorders of the digestive organs, hypochondriasis, hysteria, uterine diseases, secondary syphilis, and organic diseases of the brain and cranial bones.

77. D. *The secretions of the nose* are affected in catarrh, influenza, in scrofulous affections, in continued and exanthematous fevers, in syphilis, in worms, and in various disorders of the respiratory and digestive organs.—a. *Itching of the nostrils* is a sign of the presence of intestinal worms, especially of the small thread-worm; and in females, of irritation of the sexual organs, often connected with masturbation. It occasionally precedes epistaxis, and in aged persons it sometimes is a prelude of dangerous cerebral disease.—b. *Hæmorrhage from the nose* (epistaxis) occurs under circumstances which have been fully described in the article HÆMORRHAGE (§ 65, *et seq.*). It is often a critical discharge in febrile, inflammatory, and congestive diseases, especially in congestions of the heart, lungs, or brain, and in active determinations of blood to the last-named organ. The occurrence of it may avert an attack of apoplexy or of palsy, when not injudiciously suppressed, especially at advanced periods of life. Passive epistaxis, the vessels being defective in tone, and the blood deficient in crasis, or poor, or contaminated, as often observed in cachectic habits, or in putro-adynamic states of fever, in scurvy, purpura, &c., is often attended by much risk, especially when these conditions of the blood and of vital power are prominently marked, and decided measures the most calculated to arrest the discharge are then required. (See art. HÆMORRHAGE, § 15, 16, 17, *et seq.*)

78. iv. THE SENSE OF TASTE is often affected in connexion with disorder of the sense of smell. It is either acute, impaired, lost, or vitiated in disease.—a. It is rarely more acute than natural. Acuteness of taste is most frequently observed in hysteria, hypochondriasis, in nervous affections, and occasionally in nervous fevers.—b. Taste is *impaired or lost* in catarrhs, catarrhal fevers, influenza, in acute or inflammatory indigestion, in chronic gastritis, or gastro-enteritis; in a loaded or saburral state of the digestive mucous surface. In congestive or inflammatory states of the brain, and in low, continued, and exanthematous fevers. When taste is restored early during convalescence from these maladies, a favourable issue may be expected; when it does not return during advanced convalescence from apoplexy or other diseases of the brain, or from gastric or cerebral fevers, a renewed attack or a relapse may be dreaded, especially if the sense of smell also does not return.

79. c. A *vitiated taste* is very common in all disorders of the digestive organs; frequently in nervous disorders, and often in affections of the respiratory passages.—d. The taste may be *insipid* in catarrhal affections, in periodic fevers, in



mucous fevers, and in cases of intestinal worms.—*e.* It may be *bitter*, in bilious disorders, in bilious fevers, in jaundice, and in chronic and structural diseases of the liver, spleen, or pancreas, especially if it continue, notwithstanding the ingestion of wholesome food.—*f.* *An acid taste* is experienced during heartburn, indigestion, and disorders of the digestive organs generally. It is often caused by gout, or rheumatism, or calculous affections, by flatulence, or by eructations from the stomach.—*g.* A *salt*, or a *sweetish-salt taste*, is occasioned by the presence of small quantities of blood in the mouth, and by the expectoration of matters from the lungs containing either blood or purulent matter; and is thus present even in the early stages of pulmonary disease, especially phthisis.—*h.* A *putrid* or *foul state* occurs in gangrene of the lungs, and in syphilitic and scorbutic affections of the nose, gums, or throat. It is caused also by caries of the teeth or gums, by the expectoration of puriform matters, and by the discharge of abscesses by the mouth. It is an unfavourable sign in pulmonary, constitutional, and cachectic diseases, and in chronic maladies, especially where there is much debility or emaciation. It may occur in gangrene of any part of the digestive canal, and in adynamic dysentery, and then it should be viewed as a fatal indication.—*i.* A *metallic taste* is caused by the constitutional operation of mercury, and it often precedes the accession of salivation, or mercurial affection of the gums. It is also sometimes produced by other metallic poisons; and in rare instances it is experienced in agues and in chronic abdominal disorders. The states of the *tongue* are various, with or without the above alterations of taste, but they will be noticed in the sequel (§ 101, *et seq.*).

80. v. THE SENSE OF TOUCH may be more or less altered, either in one limb or extremity, or in two or more.—(*a*) *Acuteness* of the sense of touch is observed in irritation or inflammation of the brain, spinal cord, or their membranes. It sometimes precedes mania, delirium, and apoplexy, and often attends hysteria, rheumatism, gout, and hypochondriasis.—(*b*) *Diminution* of the sense of touch, in various degrees, is observed in organic diseases of the brain, spinal cord, or their membranes, and especially when these changes are consequent upon inflammatory action, effusion or softening, or tumours. When loss of touch proceeds from these pathological states, the result is generally unfavourable. It may occur in hysteria, hypochondriasis, in chronic affections of the skin, epilepsy, delirium, syncope, &c., and then a less unfavourable opinion may be entertained. It may precede a crisis in fevers; but no dependence should be placed upon it as a sign in these cases.—(*c*) *Perversion* of this sense occurs in chronic changes in the brain, spinal cord, or their membranes, in nervous affections, and in misplaced gout affecting the brain or its membranes. In these cases of perversion, the sensation of some body intervening between the points of the fingers and the objects touched is generally experienced.

81. vi. THE SIGNS FURNISHED BY SENSATION OR SENSIBILITY depend, as those evinced by the senses, either upon the state of the affected part, upon the channels transmitting sensation, or upon the medulla oblongata and parts in the centre or base of the brain, which are more especially connected with the perception of sensation, or

with conscious sensation. *Sensation*, whether *animal* or *organic*, is either exalted, impaired, or perverted, or suspended in disease. It may, moreover, be variously exalted and perverted in the same case, this conjoined alteration giving rise to a variety of feelings which have been recognised by distinctive appellations. These may severally proceed from the same pathological conditions as have been mentioned in connexion with alterations of the sense of touch.—*a.* *Exaltation* of sensibility is observed in irritation and inflammation of the spinal membranes, medulla oblongata and cord, in similar affections of the cineritious structure of the brain, in hysteria, hypochondriasis, rabies, &c.

82. *b.* *Diminished, or suspended, or lost sensation* occurs in apoplectic, convulsive, paralytic, epileptic, and cataleptic seizures, during syncope, and in all changes of the brain, medulla oblongata, spinal cord and membranes, occasioning temporary or more permanent loss of consciousness, or anæsthesia. It may accompany, in its less manifest states, continued fevers; and in its more extreme grades, it may follow delirium in the form of *sopor* or *coma*, in these and all other fevers. In all these maladies it is an unfavourable, and in many a most dangerous sign. Impaired or lost sensibility to the common wants of the economy, or to the usual and natural irritants or stimulants, or the loss of sensibility in parts not liable to the deprivation of it, is always a dangerous indication.

83. *c.* *Perverted sensibility*, or depraved sensation, is more generally associated with exaltation than with diminution of sensation. While exalted and impaired sensation should be referred chiefly to the cerebro-spinal nervous system—to *animal sensibility*, depraved sensation, as respects its chief manifestations, depends upon *organic sensibility*—upon the state of the organic or ganglionic nervous system. Perverted sensations referable chiefly to animal sensibility, are itching, formication, stinging, tingling, pricking, tickling, burning, &c. They are felt in the integuments and in the extremities—in the latter, during organic affections of the brain, spinal cord, and their membranes; and previously to, or upon recovery from, an attack of apoplexy, palsy, epilepsy, convulsions, gout, &c.—in the former, in exanthematic fevers, either previously to, or during the appearance of the eruption, and in numerous acute and chronic cutaneous diseases. Tickling or titillation, or a sensation intermediate between this and itching, is often experienced in the soles of the feet or palms of the hands, and sometimes in other places, without any disease being either present or expected. The former of these situations may, however, be artificially tickled so as to induce violent convulsions; and, if this cause be persisted in, the result may even be fatal. Spontaneous sensations of itching and tickling may also become so distressing as to occasion convulsions, delirium, or even mania, in hysterical and nervous persons, but this is very rarely observed. A sense of burning in the soles of the feet and palms of the hands is frequent in the gouty and rheumatic diathesis, in hectic, and in morbid states of the circulating fluids.

84. *B.* *Perverted sensations*, which are referable chiefly to the organic nervous system—or *perverted organic sensibility*—vary very remarkably, from a sense of uneasiness and restlessness

to that of distress, anxiety, and acute pain.—(u) *Uneasiness or discomfort* occurs in the invasion of most acute maladies, and more especially of those produced by infection; but it also is observed after the suppression of any of the secretions and excretions, and on the appearance of any eruptive disorder. It also attends most chronic complaints, especially hysteria and hypochondriasis. *Restlessness* may be considered as a higher degree of discomfort, and is generally present in the circumstances just stated, or it follows uneasiness, during the accession of disease. A most distressing state of restlessness, or that attended by more or less anxiety, is observed at a far advanced stage of chronic and often also of acute diseases. Restlessness at the commencement or at an early period of acute disease is always an indication of a most severe or dangerous attack. If it appear in the course of febrile complaints, it is often occasioned by the accession of some important complication, especially in children, as inflammation of the brain, spinal cord or membranes, or carditis or pericarditis. It may, however, usher in a critical discharge; but if it continue, or appear after a crisis, in acute maladies, or at a far advanced period of either acute or chronic diseases in connexion with vital depression or exhaustion, or with frequent, or difficult, or anxious respiration, it is always a very unfavourable or fatal sign—usually fatal when it is referred to a state of internal feeling of distress or anxiety.

85. (b) Discomfort may proceed to restlessness, thence to distress, and thence to a feeling of *anxiety*, which is merely a more extreme sensation of distress. These grades of morbid organic sensibility vary somewhat in character and severity, according to the region or organ chiefly affected. The distress or anxiety attending asthma, pneumonia, effusion into the pleural cavities—*anxietas pulmonalis*—is different, and distinguished by the patient as different, from that which proceeds from disease of the heart, pericardium, and large vessels—*anxietas cardiaca*—and from that which is occasioned by acute disease of the stomach, liver, diaphragm, or by the ingestion of acrid poisons, or any of the more dangerous maladies 'of the abdominal viscera—*anxietas præcordialis*. Always keeping in recollection the differences between mental and bodily distress or anxiety, the latter should be referred especially to the morbid impression or suffering experienced by the organic nerves of the affected organ. This suffering may either exist in one of the organs just noticed, or be extended to several of them, or it may also implicate the nervous system of animal life, and occasion the *anxietas nervosa*, as in hysteria, hypochondriasis, rabies, tetanus, nervous fevers, &c. A feeling of *anxiety, distress, or suffering*, may accompany the cold stage of periodic fevers, or the invasion of malignant or pestilential maladies, or it may accompany the accession of a crisis. In these cases, although a most severe attack may be expected, inasmuch as this sign is an indication of the serious morbid impression made upon the organic nervous system, one of the prime factors of life, yet the danger is not so great as in those cases in which this feeling supervenes in a far advanced stage of the diseases above mentioned. When it thus occurs in this stage, when it follows closely upon acute inflammation, or when it is of long duration, the danger is very great, and even ex-

treme in pestilential maladies—*anxietas moribundorum*.

86. (c) *A feeling of cold*, as already shown (§ 19), may exist independently of any depression, and sometimes even in connexion with an increase of the animal temperature. It may be attended by shiverings, shudderings, rigours, or even horrors, according to the grade or intensity of this feeling. The severity of this sensation is generally an indication of the severity of the consecutive attack when it ushers in an acute disease—either inflammatory or febrile; and it is no less an indication of danger when it occurs in the advanced course of inflammations, of eruptive fevers, and even of chronic visceral disease. Rigours are often the forerunners of dissolution when they occur in diseases in which debility or exhaustion is very remarkable (see above, § 20, *et seq.*). An internal feeling of cold, if experienced on the accession of disease, indicates a very severe and dangerous attack; if felt at a far advanced stage, it proceeds from fatal sinking.

87. (d) *An internal sensation of unusual heat* is frequent in acute or inflammatory diseases, and it may be present when the surface is actually cooler than natural. The feeling of heat may depend upon states of internal or central parts which do not reach the periphery even of the trunk; and it, as well as the feeling of cold, is to be referred chiefly to the changes in the organ or part in which the sensation is felt, the organic nervous system participating in these changes in an especial manner, inasmuch as it is instrumental in the performance of the calorific process. A sensation of heat, or even of burning heat, may be concentrated in internal or central parts, may accompany either open or latent inflammatory attacks, and may exist, especially in the latter, although the external surface or the extremities be cool or even cold. Local feelings of heat are indications of irritation and local vascular determinations of blood, or of inflammation, or of approaching hæmorrhages. A general feeling of heat attends the more sthenic forms of fever, both periodic and continued, especially in the stage of vascular excitement. A local sensation of heat is much more dangerous in these fevers than a general feeling of heat, and when it is experienced in these diseases it should be viewed either as the precursor of a crisis by hæmorrhage, or as the indication of the supervention of a prominent affection or complication. If the cessation of internal heat be attended by free secretion or excretion, the prognosis is favourable; but if it occur suddenly, or is followed by a feeling of cold, the prognosis is bad. The sensation of heat may change its seat, especially in nervous fevers, influenza, hysteria, hypochondriasis, and diseases of the abdominal viscera; but the amount of danger in these complaints depends upon the concomitant symptoms and signs; and chiefly upon the other conditions of the surface, with which the sensation of heat or of cold is generally associated (see § 22, *et seq.*).

87½. (e) Feelings of *muscular fatigue*, of *general malaise*, or of *exhaustion*, or of *vital depression*, or of *sinking*, are chiefly modified grades of that depression of vital power accompanying either the invasion of acute diseases, or the debility consequent upon great excitement. When these feelings are very remarkable on the invasion of acute maladies, they augur a very dangerous attack; and when they become extreme at a far



advanced period, they are then attended by great danger, and they require the administration of very active restoratives, appropriately to the circumstances of the case. (See *arts. DEBILITY and DISEASE* § 67.)

88. *C. PAIN* is a most important symptom, as indicating the seat, the nature, and even the probable result, of disease. It is a warning furnished by nature to convey this information; it both puts the patient on his guard to remove the cause of suffering, and disposes him to use the means for this purpose. It farther tends to rouse the conservative influence of life—to excite the vital resistance—against the extension of disease, to prevent dangerous or fatal sinking, and to bring about a salutary reaction. In order, however, that pain should have these salutary effects, it should not be allowed to be excessive or intense for a prolonged period, or without having recourse to means to assuage it; the expression of it, when excessive, ought not to be suppressed; and the effect of its continuance, as well as the several phenomena which accompany it, should be closely observed, and carefully compared and estimated. In our investigations into the nature and seat of pain, there are several things to be ascertained, especially its *duration* and mode of *accession*, its exact *seat* and *relations*, its *character* and *severity*, and the influence produced upon it by different degrees of *pressure*, *percussion*, and *temperature*.

89. *a. Pain* may be either *dull*, *obtuse*, or *heavy*, or *aching*, in connexion with congestions and chronic inflammations, or with acute or chronic inflammations of parenchymatous organs and mucous membranes, in cases of effusion into internal cavities or of internal tumour, and sometimes in the congestions and vascular determinations preceding hæmorrhages.

90. *b. A gnawing or lacerating pain* generally accompanies rheumatism, gout, cancerous disease, &c. A *perforating* or *boring pain* is felt chiefly in diseases of the periosteum and bones, in secondary or tertiary syphilis, in scurvy, especially at night, in the long bones and joints. A *burning pain* attends gout, severe or intense inflammation of the integuments, erysipelas, carbuncles. A *pungent* or *tensive pain*, often with more or less of a sensation of burning, is experienced in acute inflammations of serous membranes; and in its most violent or stabbing form, in inflammation of fibrous or sero-fibrous tissues, and in those affections of the nerves which have usually been termed neuralgic, and which proceed either from inflammation of the sheath or neurilemma, or from irritation at or near the origin of the nerve. This kind of pain, also, especially when occurring at short intervals and of brief duration, and characterized by violent dartings, accompanies the passing of gall-stones, or of calculi along the ureters. A *cutting* or *darting pain* also attends cancer, and inflammation of nerves, in which latter it is often accompanied with a sense of numbness in the parts distant from the seat of pain, and is often, in this as well as in the other maladies just mentioned, characterized by a feeling of heat or burning.

91. *c. A pulsating pain* indicates extreme congestion of a parenchymatous organ, or the passage of inflammation into suppuration—commonly this latter when it is attended by horripilations, chills, or rigours (§ 19). When this pain is preceded by a feeling of tension, the existence of

abscess, or of effusion into a shut cavity, may be inferred. A *pricking*, *stinging*, or *tickling pain* may accompany acute eruptions on the skin, gout, organic diseases of the brain, spinal cord, or their membranes, especially when these pains are felt in the extremities, and are attended or are interrupted by a feeling of numbness (§ 41), also hysteria and hypochondriasis. A *violent twisting*, *spasmodic*, or *gripping pain* accompanies dysentery, ileus, gastralgia, enteralgia, strangulated hernia, and obstructions in the bowels. A *forcing*, *acute pain* often also attends these maladies, the passage of concretions along canals, and diseases of the uterus and ovaria.

92. *d. The seat and duration of pain* suggest interesting considerations. The *seat*, however, should not always be received as a correct indication of the seat or origin of the disease; for, even in inflammations, the pain may be referred to parts at a distance from the seat of disease: thus, in pleuritis, the pain may be felt in the iliac regions, or below the false ribs; and, when a limited portion of the spinal cord or membranes is influenced, the pain may be referred to the distant extremities of nerves having relations with the seat of disease. This topic is, however, more fully illustrated in the article *SYMPATHY*.

93. The *duration* or continuance of pain is most various. It may be *transient*, *wandering*, *intermittent*, *remittent*, or *permanent*. *Transient pains* occur in hysteria, in gout, rheumatism, hypochondriasis, in catarrhal fevers, and influenza, from irritation of the digestive organs, from accumulations of bile in the ducts or gall-bladder, and from irritation of the nervous centres of animal life. *Intermittence* or *remittance* of pain shows its seat in the nervous system, especially of animal life, and occurs chiefly in those diseases in which this system in some part of its ramifications is more or less implicated, as in neuralgia, periodic fevers, rheumatism, gout, hysteria, &c. *Continued* or *fixed pain* indicates the more or less permanent nature of the malady, as inflammation, disorganization, rheumatism, syphilis. *Wandering pains* occur during the accession of acute or febrile diseases, in hysteria, hypochondriasis, syphilis, rheumatism, atonic gout, and in functional disorders of the digestive organs, especially the liver and stomach.

94. *c. Pressure* and *percussion* produce certain effects on pain which are extremely important in diagnosis. *Tenderness*, or incapability of enduring pressure, or increase of pain on pressure, is a sign of inflammation or of organic change. But in nervous, hysterical, and hypochondriacal persons, the tenderness may not be connected with increase of pain on pressure—may be merely a morbid, superficial sensation, or an intolerance of touch; for, when pressure is made, when the patient's attention is distracted, or firmly or forcibly, the pain is either not increased or is diminished, showing the true nervous character of the tenderness or pain in these. *Diminution* of pain on pressure characterizes colic, chronic rheumatism, and nervous pains or pure neuralgia, when not occasioned by inflammation of the nerve or its sheath. *Increased pain* on pressure attends inflammation, organic changes, the results of, or the attendants of inflammation, and vascular congestion. *Increased* or *continued pain*, the skin being hot or dry, and the pulse hard or rapid, is a sign of progressive inflammatory action; and if the pain become pulsating, with chills,

heats, and sweats, the sweats not diminishing the pain or changing its pulsating character, suppuration may be inferred. *Prolonged pain*, with more or less tenderness on pressure, indicates organic change, especially if emaciation advances, and if the secretions or excretions be disordered. A *decrease* of pain after the secretions and excretions become free or augmented is always a favourable sign. A *cessation* of pain coinciding with remission of fever and increase of the natural discharges is also a favourable symptom; but a sudden cessation, without abatement of the other symptoms, or with the appearance of others which are unfavourable, indicates the occurrence of gangrene, or of rapid vital sinking. *Pain or spasm*, or the association of both, in parts which are paralyzed either as to motion or sensation, is an indication of inflammatory action, or of inflammatory softening in or near those parts of the nervous centres, with which the nerves of the affected parts have intimate relations. Severe pains or spasms in a different extremity or part from that which is paralyzed, indicate the presence or extension of inflammatory action to those parts of the nervous centres connected with the origins of the nerves of the pained extremity. (See *arts.* HEADACHE, IRRITATION, NEURALGIA, PARALYSIS, SPASM, &c.)

95. ix. THE MENTAL MANIFESTATIONS furnish numerous signs, in respect both of their individual conditions and morbid associations, and of their connexions with acute and chronic physical disease. But these have been noticed, as far as my limits admit, when treating of DELIRIUM, COMA, SLEEPING, and SLEEPLESSNESS, and of the different grades and forms of INSANITY, in which latter especially, as well as in the other articles, I believe these subjects have been fully discussed.

96. III. THE SYMPTOMS AND SIGNS OF THE DIGESTIVE FUNCTIONS AND ORGANS.—These functions and organs are essentially vital, and are under the dominion of the organic nervous system—the primary or chief factor of life—excepting at the entrance to and outlet from these organs; and to these situations accessory influences are imparted from the cerebro-spinal or animal nervous system. The states and disorders of these functions and organs, from the entrance to them by the mouth to the outlet by the anus, are intimately connected with the conditions of the organic nervous system; while this entrance and this outlet are controlled by the cerebro-spinal nervous influence. Thus the functions of the several digestive organs are manifestations of the conditions of organic nervous power, and the functions of these portals are indications of states of cerebro-spinal influence. The symptoms and signs furnished by the digestive functions and organs comprise those evinced by the *teeth and gums*, by the *tongue and throat*, by *deglutition*, by the *appetite for food or drink*, by the functions of *digestion*, by *fecation and defecation*, and by the *abdominal regions*.

97. A. THE MOUTH, &c.—(a) *The teeth* are perfect and enduring in persons of sound constitution, their soundness often continuing to advanced age. Their early decay indicates either constitutional vice, or impaired constitutional power, or prolonged disorder of the digestive functions. The teeth are variously affected by acute or chronic maladies. *Chattering* of the teeth occurs in the cold stage of fevers and inva-

sion of acute diseases, and indicates a severe form of the supervening malady. It is also observed in hysteria, but in rare instances, and in dangerous shocks of the nervous system. It is most remarkable in the cold stage of agues. *Grinding* of the teeth during sleep is common in children, and is a sign either of intestinal worms or of cerebral disease. If it occur in children in connexion with brightness of the eyes, contracted pupils, flushing of the cheeks, or startings in sleep, then convulsions, cerebral meningitis, serofulous softening of the brain, or other changes may be apprehended. In aged persons it sometimes precedes an attack of apoplexy or palsy. If it occur in continued or in exanthematous fevers, it renders the prognosis more unfavourable, as evincing a serious cerebral complication. It may, however, take place in irritable persons and children, without any serious disorder, especially during dentition in children.

98. The teeth are often covered with a grayish mucus in catarrhal fevers, in gastric disorders, and in inflammations of the digestive and respiratory organs. They are more copiously covered by mucus or sordes of a dark or brown colour, often extending to the lips and gums, in low, adynamic, or putro-adynamic fevers; the quantity and darkness of the colour evincing the amount of danger. The accumulation of tartar or cretaceous matter around the teeth, at the margins of the gums, shows a disposition to calculous, gravelly, or gouty affections.

99. The teeth sometimes become inordinately sensitive in nervous disorders, in disorders of the digestive organs, and in acidity of the stomach. They are loose in scurvy, in purpura, and in mercurial salivation. They appear elongated, owing to retraction of the gums, in scurvy, sometimes in scrofula, and often in chronic gastritis and other prolonged disorders of the digestive organs. They become carious owing to the excessive use of saccharine and acid substances, especially in early life, to the abuse of mercury, to chronic indigestion, and to rickety and serofulous habits of the body. Improper diet, at an early age, favours the occurrence of this change in the teeth; diseased teeth are always an indication of pre-existing disorder of the digestive organs, often connected with the abuse of spirituous liquors, or of sugar in its various uses; and they generally evince impaired vital power and resistance.

100. (b) *The gums and lips* are pale in anæmia and chlorosis, and after excessive hæmorrhage or injudicious blood-letting. When they are covered by a similar mucus to that observed on the teeth (§ 98), the diagnosis and prognosis are as above stated. They present a blue margin in cases of slow poisoning or contamination by the preparations of lead; and a red, spongy, and swollen appearance from the use of mercury, from prolonged disorder of the digestive organs, in diabetes, in incipient scurvy, and in purpura. They become of a darker hue, more spongy, more retracted, and more disposed to bleed in scurvy and in chronic stomatitis. They are still more seriously affected in the ulcerative, gangrenous, and phagedenic forms of this malady. (See *art.* STOMATITIS.)

101. B. THE TONGUE presents diversified appearances, depending, 1st. Upon the states of the several digestive functions; 2d. Upon the nature of the disease; and, 3d. Upon the existing constitutional disturbance, chiefly as respects



organic nervous power, vascular action, and sanguineous contamination. In estimating the signs furnished by the tongue, it should not be overlooked that it may be coloured by medicines, by food, and by drink, and be rendered drier than natural by breathing through the mouth; but it is much less disposed to be affected by these causes in health than in disease.

102. *a. The mode of protruding*, of holding out, and of withdrawing the tongue is always deserving attention. The tongue is protruded with difficulty in comatose, apoplectic, and paralytic cases, owing chiefly to a weakened or paralyzed state of the organ; and, in the more dangerous states of these diseases, it is either imperfectly protruded or not at all. In this latter case, either the existing insensibility prevents any attempt to execute the command, or the muscular power is so paralyzed as to prevent the act of volition from being performed; and if it be executed, the tongue often remains protruded. A slow or tremulous protrusion, or tremor during the protrusion, of the tongue, is observed in many nervous complaints attended by debility or exhaustion, and more especially in low, typhoid, or adynamic fevers. A ready, quick, and steady protrusion and withdrawal of the tongue occur in diseases of excitement, in inflammatory affections, and whenever organic nervous power is not materially depressed, or when the cerebro-spinal influence is not impaired or suppressed, as in the stupor or sopor of low fever, or in comatose states. As long as the perceptive faculty is unimpaired and muscular power is not remarkably reduced or paralyzed, these acts are usually naturally performed. The tongue is protruded to one side in cases of paralysis, especially in hemiplegia; but there is no certain correspondence between the side to which it is protruded and the affected side.

103. *b. The size of the tongue varies in different diseases, and with variation in size there is often also variation in form.* Increased size is caused by inflammatory action chiefly, this action being either *primary* (see TONGUE, inflammation of) or *consecutive*. It is the latter chiefly as a complication of angina, or scarlet fever, small-pox, of hysteria, epilepsy, syphilis, and as a consequence of mercurial action or of poisons. The enlargement may, instead of being acute, as in these cases, be chronic, and the result of an hypertrophy or increased irritation of its tissues. With the enlargement may be connected several other appearances, which indicate prolonged chronic or visceral disease, as well as impaired constitutional or organic nervous power. The chief of these are, 1st. A broad, flabby state, with more or less intumescence, and with indentations by the teeth on the edges of the tongue; 2d. A fissured or sulcated condition, the tongue appearing lobulated as well as enlarged; and, 3d. A tumid and livid state, the surface being covered by a yellowish load, or a milk or cream-like mucus. The first and second of these occur chiefly in prolonged disorder of the digestive organs, or as consequences of mercurial action, or in connexion with hepatic disease, &c.; the third more frequently as a result of diseases of the lungs, heart, and urinary and uterine organs. Swelling of the tongue is a dangerous sign in cerebral affections, and in cases of poisoning. It is also very unfavourable in exanthematous or continued fevers, especially the putro-adynamic and pestilential,

and in scurvy, particularly when the swelling is great, or when the tongue is dark or livid, or is covered by a sanguineous or sanious exudation.

104. *c. Diminution of the size of the tongue is usually much less remarkable than enlargement.* The diminution may be more apparent than real, owing to contraction of the organ laterally, as well as to a partial retraction. In these cases the tongue is narrow and pointed, and indicates a most dangerous state of typhus, typhoid, and adynamic fevers, of acute irritation or inflammation of the digestive organs, or of the brain or membranes, especially when it is also dry and red at the point and edges. Actual diminution of the size of the tongue is comparatively rare, as emaciation, even when extreme, affects but little this organ.

105. *d. The form of the tongue is not materially different from that already stated—the chief modifications being in the breadth of the organ in relation to the length, in the narrowness and thickness of it, and in the fissured or lobulated appearance of its upper surface.* But this surface may present other conditions. It may be so deeply indented or furrowed, or fissured, along the centre, from the root to nearly the point, as to appear almost divided into two halves, the sides of this indentation sometimes being more or less furrowed (§ 110). This state occurs chiefly in chronic disease of the abdominal viscera, especially of the digestive organs, and indicates a most obstinate, although not a dangerous disease. The tongue, when protruded, may present either a convex or a concave appearance of its superior surface, or a double convexity, owing to the furrow along the centre. When either of these states is very remarkable, then more or less irritation or inflammatory action of the abdominal organs is very frequently present. The lobulated state of the upper surface of the tongue is caused by more or less numerous fissures or indentations in various directions. It is generally connected with a tumid and convex condition of this surface, and is most frequently seen in chronic diseases of the liver or other digestive organs, in diseases of the heart, and in disorders of the female sexual organs.

106. *e. The humidity of the tongue proceeds from the salivary secretion poured into the mouth, and very partially from the mucous secretions in the vicinity, and from the exhalations taking place in the surface of this part and the vicinity.* The presence or absence of this humidity—the moisture or dryness of the tongue, is most important as respects the other states of this organ, and as regards the secretions and excretions, and the conditions of vital power and of the circulating fluids. *Humidity of the tongue is often very remarkable in cases of debility when all the secretions are free, and the blood uncontaminated.* When it is very considerable, and is attended by *softness* of the organ, and by a flattened state of the fur, when fur has been present, as in convalescence from acute diseases, either tonics are required or lowering means should be avoided. When the tongue has been dry or furred, or both, then returning humidity and softness are always excellent signs, and especially when the surface becomes also more clean, or when the fur disappears or is flattened, the tongue and mouth being sufficiently moist, &c. In acute diseases, the humidity appears first at the sides of the tongue, and gradually extends, the other changes advancing

with the increase of humidity, and being favoured by the state of the salivary secretion. As long as the tongue and mouth continue moist in acute maladies, a favourable opinion as to the issue may be entertained.

107. *f. Dryness* of the tongue is as unfavourable a sign as humidity is favourable. Dryness, however, may be occasioned by breathing through the mouth; but this will seldom produce it in a very marked degree, if febrile or inflammatory action be not present. Dryness is most common in continued fevers, in the exanthemata, in inflammation of the abdominal viscera and of serous membranes, and in various other diseases of an acute and febrile nature. It is most remarkable, and presents either roughness, owing to the parched state of the papillæ, or fur, or a fissured or burned appearance, often with a deeper or darker hue, in the most dangerous states of these maladies. The more extreme of these conditions of the tongue, and especially when they are not attended by thirst, are generally fatal indications. When the tongue has been furred and loaded, and subsequently becomes dry, rough, or hard, and, at the same time, very dark, the furred surface being both dry and dark, or even black, a malignant or almost hopeless state may be inferred, owing chiefly to exhaustion of vital power and contamination of the circulating fluids, with arrest of the secretions. Humidity of the tongue rarely supervenes upon this extreme state, unless this dark appearance has been heightened by the substances taken into the mouth; but in the less remarkable cases the occurrence of humidity often takes place, and is a most favourable sign, inasmuch as it shows a return of the salivary secretion and of the secreting functions generally, especially when the skin also becomes less hot and dry, or more natural or perspirable.

108. *g. The colour* of the tongue should always be observed. The *natural* hue is favourable, and a return to it is an indication of a favourable crisis or change. The tongue may be more or less *pale*, and the pallor is commonly associated with a similar hue of the gums and lips, in cases of anæmia, of chlorosis, after large blood-lettings or hæmorrhages, and during prolonged chronic diseases, and affections of the spleen, owing either to a deficiency or to a poorness of blood. A very *red* tongue occurs chiefly in inflammations of the throat and pharynx, and in the exanthemata. A limitation of the redness to the point and edges is very general in acute irritation or inflammation of the digestive mucous surface, in gastric and bilious fevers, and in remittent and continued fevers, but in those latter the surface and base of the tongue is at the same time loaded, coated, or furred. If the tongue, after having been coated or furred, becomes *very red and clean*, in gastric fevers, and inflammatory or other acute diseases of the digestive or abdominal viscera, without returning strength or other favourable symptoms, a dangerous prognosis may be inferred; and more especially if the febrile symptoms be not abated, if the tongue be dry, and if the redness assume a glossy or varnished appearance. If, with this change, the tongue presents a yellowish red hue, and becomes glossy, dry, and clean, great danger should be anticipated, especially in severe remittents, in bilious fevers, in putro-remittent or adynamic fevers, and in acute diseases of the liver and digestive canal. If the redness pass into a *brown, livid, or bluish* or deep

*leadén hue*, whether the surface of the tongue be also moist or dry, or soft or hard, or furred or coated, or rough, or smooth and glossy, &c., an imperfectly changed, an insufficiently oxygenated, or a contaminated state of the blood may be inferred. This appearance, thus variously associated, according to the nature and stage of the malady, is observed in the most dangerous cases of asthenic or congestive pneumonia and bronchitis, especially when both lungs are affected, in organic diseases of the heart, in asthma, hydrothorax, in dangerous cases of whooping-cough, in the malignant or putro-adynamic, or asthenic forms of exanthematous and continued fevers, in pestilential maladies, in scurvy, and in the last stages of other diseases, or shortly before dissolution.

109. *h. A white* tongue is common in catarrhal and febrile disorders, in functional disturbances of the digestive and respiratory organs, and in the premonitory and invading stages of fevers—periodic, exanthematous, and continued—and of inflammations. A *clammy* state of the tongue, with a whitish, or yellowish-white, or milky load on the surface and base, with more or less humidity, is frequently seen in visceral diseases, in inflammatory affections of mucous surfaces, in the early stages of fevers, in connexion with redness of the point and edges, and in puerperal fevers accompanied with a flabby and lurid appearance of the organ. A *loaded* tongue, the load varying in quantity, colour, and consistence, occurs in bilious diseases, in the early stages of periodic and continued fevers, and in most of the maladies in which a clammy state is observed. These states, especially a loaded condition, are frequently complained of in the morning, soon after waking, by persons who are dyspeptic, or whose digestive organs—stomach, liver, or bowels—have been much disordered; or who have been in the habit of taking suppers, or of smoking, or of drinking malt or other liquors previously to retiring to bed.

110. *i. A furred* tongue is always a serious indication. The fur resembles the pile on the surface of cotton velvets, and varies in length and thickness. It is often covered by a clammy or dirty mucus, the tongue being also coated on the surface and base by a load of fur and mucus. The colour of the fur varies from a grayish white to a brown or black, the surface generally becoming thus coated, and dry or parched, before the darker hues are observed. The origin of the fur has not been satisfactorily explained; but it may be attributed to a morbid development of the filiform papillæ of the tongue, which become elongated during the progress of disease, and covered by the inspissated and dark mucus, which generally collects in the mouth during the disease in which the tongue is furred. The surface of the fur, especially when thus coated, presents a more or less dark brown or black hue, according to the duration, severity, and danger of the disease, the deepness of the hue, however, being often much increased by the colouring properties of the substances taken into the mouth.

111. A furred state of the tongue is common in inflammations, especially of parenchymatous organs; in severe irritation of mucous surfaces and canals; in continued, exanthematous, typhoid, or adynamic fevers; in diseases of the brain or of its membranes; and in most other acute maladies which advance to a dangerous



condition. In the early stages of inflammations and continued fevers, the filiform papillæ are merely erect and somewhat developed in length, giving the tongue a whitish hue. In the early stages of exanthemata, especially in scarlatina, the fungiform papillæ on the sides, point, and middle, are very much enlarged, and appear very manifestly dispersed through the fur produced by the filiform papillæ. This appearance is also observed in many of the diseases of children, more particularly in those of the digestive organs. The dirty or clammy mucus, so frequently accompanying a furred tongue, loads the papillæ; and, with the progress of these maladies, especially as they proceed to an unfavourable or dangerous state, forms a darker or deeper coat, which often covers the whole upper surface of the organ, either in a continuous crust, or with more or less slight fissures in various directions.

112. The depth of colour, the dryness, the contraction or diminution of the surface of this fur and coating, and of the tongue itself, are important circumstances, and require close attention in the progress of acute diseases. An increase of either, and especially of all of these, indicates a proportionate increase of danger, whereas a diminution of these appearances evinces a favourable issue, more particularly if the tongue becomes more moist and more clean, the fur and load disappearing from the point and sides, and progressively from the surface and base, the colour of the organ becoming, at the same time, more natural. If the coat or crust formed on the tongue be rapidly removed, the surface thereby exposed being glossy, smooth, or fissured, and dark-coloured, or having a raw appearance, the prognosis is not improved by the occurrence. This change often proceeds from self-contamination of the blood in the course of the disease, the tongue frequently becoming still more dark, contracted, dry, and even hard, towards a fatal issue.

113. With slight development of the filiform papillæ, the tongue sometimes presents patches which appear partially deprived either of papillæ or of the epithelium covering the upper surface, which, at the same time, is broad or flabby, the edges of the tongue being occasionally also indented by the teeth. This appearance is observed chiefly in protracted disorders of the digestive organs, and in hypochondriasis, hysteria, and diseases of the uterine organs. It is always an indication of protracted and intractable disorder.

114. *k. An aphthous state* of the tongue, affecting chiefly the point and edges, is often observed in the last or fatal stage of tubercular consumption, and of several other visceral diseases. It is always a serious indication in the diseases of adults, even when unconnected with phthisis, especially in diseases of the digestive and urinary organs. (See *arts. STOMATITIS, THRUSH, and TONGUE, diseases of.*)

115. *l. The temperature* of the tongue is seldom materially affected. It is somewhat increased in inflammatory fevers, and in the early stages of exanthematous and continued fevers. It is diminished in all diseases, or towards the fatal issue of all maladies in which the tongue presents a livid or dark hue. It is most diminished, becoming cool or cold as pestilential cholera proceeds to a fatal termination.

116. *C. THE SALIVARY SECRETION* is intimately connected with the state of the tongue and mouth in disease, and with the indications fur-

nished by the latter.—*a. Diminution* of the secretion, both of saliva and mucus, occurs at the commencement, and during the greater part of the progress of febrile and acute diseases; and with this diminution, which often amounts almost to suppression, these secretions become thick, viscid, or clammy, especially in continued, exanthematous, and low fevers, and in affections of the brain. They often assume a dark or dirty hue, thereby loading the tongue, and often collecting about the teeth, gums, and lips. The bloody or sanious appearance of the interior of the mouth observed in scurvy and hæmagastic pestilence, is not produced by the saliva and mucus, but by the admixture with these of the semi-dissolved blood, exuded from the surfaces of the tongue and gums. A return of the salivary and mucus secretions after their diminution or suppression is always a very favourable sign, the detachment of the fur and load on the tongue during incipient convalescence being thereby favoured.

117. *b. Increased salivary secretion—ptyalism*—may be produced by any stimulus taken or retained for a time in the mouth. It accompanies various affections of the gums and mouth, and the natural processes of teething in childhood. While it is a salutary indication of teething, the sudden interruption or suppression of it is a very serious occurrence, and is very often a sign of incipient or advanced disease of the brain and its membranes. Ptyalism is produced by the constitutional or local operation of mercurials, iodine and iodides, and various other metallic and poisonous substances. (See *art. Poisons, pluries.*) It attends, as a contingent or intercurrent phenomenon, several diseases, as gastric catarrhs, chronic dyspepsia, hypochondriasis, hysteria, diseases of the pancreas, and occasionally small-pox. In the confluent form of this last malady, it is often a favourable symptom; but if it cease suddenly or prematurely, it is generally a fatal indication.

118. *D. THE THROAT and fauces* present signs of disease, not merely of the digestive canal, but also of the constitution.—*a. Relaxation of the uvula* is a symptom of general debility, in connexion either with disorder of the stomach, or with catarrh, or with gastric catarrh, or that state of catarrhal irritation of the digestive and respiratory mucous surfaces which often appears in spring and autumn, in connexion with, or even constituting catarrhal fevers. The elongation of the uvula, the result of relaxation, is often a cause of irritation to the epiglottis, and occasions or aggravates cough. And this having been admitted to more than its full extent, it became a fashion to extirpate the uvula, without any regard to its functions, and without reference to the fact that the want of an uvula may be quite as injurious as an excess of it.\*

\* [Sir ASTLEY COOPER was strongly opposed to removing any more of the uvula than would reduce it to its natural proportions, for if the whole is removed, fluids cannot be taken without their passing into the nostrils, and without injuring, more or less, the articulation. Moreover, he did not believe that any permanent benefit attended the operation, as the uvula almost invariably acquired again its natural length. We believe the removal of the uvula is very rarely necessary, inasmuch as its enlargement is commonly owing to irritation of the alimentary canal, and will resume its normal proportions when that is quieted. It will sometimes become elongated to twice its usual length in the course of an hour, and, by its contact with the epiglottis, cause a constant hacking cough and sense of choking. In such cases, the patient should be advised to close the mouth and breathe through the nostrils, while the uvula and throat should be touched

119. *b.* The *tonsils* or *amygdalæ* are often enlarged, either by acute disease—*tonsillitis*—or by a chronic congestion. Sometimes they are enlarged in connexion with elongation of the uvula, and redness, or chronic inflammation, or irritation of the fauces and pharynx. Chronic enlargement of the tonsils is not so frequently a sign of disorder of the digestive organs as of a scrofulous diathesis, or of general derangement of health. In connexion with redness of the fauces, palate, and pharynx, enlargement or redness of the tonsils is an indication of disorder or disease of the digestive organs, of exanthematous and gastric or bilious fevers, and often also of continued and typhoid fevers. This redness of the several parts of the throat, with redness of the point and edges of the tongue, and development of the fungiform papillæ, is very remarkable in the early periods of scarlatina, and frequently also of measles and small-pox. (See also *arts. THROAT AND TONSILS.*)

[Whenever the tonsils are found to be enlarged and indurated, and especially when connected with follicular disease, they should be at once removed, and their excision followed in the course of a few days by a topical application to the throat of the solution of nitrate of silver, of the strength of from ℥j. to ʒj. of the salt to one ounce of water. It is now well established that if these organs, when diseased, are not removed, they will be likely to cause follicular disease of the throat by their presence, and if the latter already exists, then other treatment will prove unavailing, as the morbid secretion poured out by their disordered lacunæ will be sufficient to perpetuate the disease. (See "*A Treatise on Diseases of the Air-passages*," &c., by HORACE GREEN, M.D., New York, 1846.)]

120. *c.* The *secretions* of the throat are often materially affected. With increased redness they may be either diminished or augmented. *Dryness* of the throat attends the commencement or early stage of inflammation of the parts just mentioned (§ 119). And, in cases where an injudicious and officious treatment has removed either the uvula or the tonsils, dryness of the throat, and roughness or change of voice, have rewarded the confiding or credulous patient; the parts concerned in secreting and in distributing a lubricating mucus to the surface of the throat having been extirpated, as if nature had formed them for no purpose. During the more advanced stages of inflammatory irritation, the mucous secretion and watery exhalation from the throat are much increased; the same effect follows catarrh, catarrhal fevers, and influenza, in which, as well as contingently on several diseases, increased secretion and exhalation are prominent affections.

121. *E. DEGLUTITION* is often affected owing to disease either of the passages—of the throat, pharynx, and œsophagus—which convey substances into the stomach; or of the brain, or of the structures surrounding and protecting it, especially the base of the brain and medulla oblongata. The diseases of the passages leading to the stomach, and the attending symptoms of difficult and interrupted deglutition, are considered in the articles *ŒSOPHAGUS, THROAT, AND TONSILS. Dysphagia*, or difficult deglutition, and *Aphagia*, or impossibility of swallowing, are caused not only

by lesions of these parts, but also by diseases of the brain or medulla oblongata, or of their envelopes, and by structural changes implicating the nerves supplying the tongue, pharynx, and upper portion of the œsophagus. When swallowing is materially affected by these latter pathological conditions, then speech and voice are generally more or less disordered, or both deglutition and speech may be altogether lost. I saw a gentleman who had lost the faculties of deglutition, speech, and voice. He complained of no other symptoms referrible to the head or cervical region, and was otherwise in good health. Deglutition partially returned after a time, but the power of articulation was never restored. He died suddenly. The body was not allowed to be inspected. Impaired or lost power of swallowing, with or without loss of speech, but most commonly with partial or complete loss of this faculty, may either be the precursors of a more general attack of palsy or of apoplexy, or be the consequences of an attack of either or of both. But whether ushering in or following a cerebral attack, it is always a most dangerous symptom. When a fatal issue does not supervene, the power of swallowing generally returns, either partially or altogether, before speech or articulation is restored.

122. In all these cases deglutition is impaired or lost owing to paralysis of the muscles concerned in this function, but it may be difficult, painful, impaired, or impossible, in consequence of spasm of these muscles, or of some portion of the œsophagus, as in rabies canina or hydrophobia, and in hysteria, hypochondriasis, &c., in all which the difficulty of swallowing liquids is greater than that of taking more consistent substances. The dysphagia accompanying hysteria and other functional nervous affections is not farther unfavourable than that it indicates a greater severity of these affections. The aphagia of rabies is always a fatal sign, although it generally disappears before dissolution. Painful, difficult, or impaired deglutition is often a symptom of the presence of flatus in the œsophagus, and in these cases spasm of portions of the œsophagus often takes place. When swallowing is affected by this cause, flatulent eructations either precede, accompany, or follow the act, and the patient is generally subject to one or other of the forms of *indigestion*, or to *flatulence* during empty states of the stomach.

123. *ii. THE APPETITES FOR DRINK AND FOOD* are generally affected by disease.—*A. a. The desire for drink* is diminished in several diseases, and is in most of these a very unfavourable symptom, more especially when the tongue and mouth are dry, and other febrile symptoms are severe. In the advanced stages of fever, especially in continued and typhoid fevers, and in the advanced periods of inflammations, particularly of the brain or of its membranes, the absence of thirst, or of a desire for fluids or drinks of any kind, is a most dangerous, although not necessarily a fatal sign, especially in fever. In chronic diseases, the absence of a desire of drink is often present, and is merely an indication of the absence of febrile excitement; but in the last stages of acute diseases and fevers, it shows the existence of a state of sensibility which is either associated with delirium, or about to pass into it, or into unconsciousness or coma.

124. *b. Increased desire of drinks* is generally present in all diseases caused by irritation or inflammation—in febrile maladies during the earlier

twice a day with a strong solution of nitrate of silver. The inflammation will soon subside, and the uvula be reduced to its natural size.]



stages, and before sensibility or consciousness becomes impaired. The supervention of thirst or an increase of it, in the course of chronic disease, is an indication of intercurrent irritation or inflammatory action. Its continuance after critical evacuations is an unfavourable circumstance. Thirst, in its extreme state, is present in the most dangerous cases of choleric pestilence, and in inflammations of the stomach, &c. Thirst, with an inability of drinking, is characteristic of rabies, and sometimes occurs in hysteria, hypochondriasis, but in a much less marked, and in a different form. The sudden sensation of thirst, or absence of the desire of drink, after thirst had been urgent, precedes unconsciousness or coma.

125. *c.* An appetite for certain kinds of drink, in preference to others, is observed in several maladies; for iced water, or cold water, or for ice, in the stages of vascular excitement in fevers, inflammations, &c., especially in choleric pestilence and inflammations of the digestive canal; for demulcent and emollient drinks in affections of the respiratory organs; for acid or acetous fluids in chlorosis and disorders of the female sexual organs; for vinous and restorative drinks in diseases of debility, in nervous disorders, and during convalescence from fevers. The appetite for these several kinds of drink is an indication of the nature of the malady, and is, in many cases, in accordance with the intentions of cure which should be adopted. The desire for intoxicating drinks is of itself a malady, which, when not gratified, is attended by distressing symptoms of exhaustion and nervousness.

126. *B. Desire of food*, when moderate or natural, is a favourable symptom in chronic affections.—*a.* A diminution or entire loss of this desire is present in most acute, and in many chronic diseases. With increased desire of drink, diminished or lost desire for food is evinced. *Anorexia*, or loss of appetite, is often an indication of the impropriety of taking food, inasmuch as it occurs either in fevers, or in inflammations, or in other diseases of the stomach and digestive organs, in all which food would either be thrown off, or not digested, or be a cause of increased disorder. A diminution merely of the appetite is often caused by want of exercise, especially in the open air, and in aged or paralyzed persons, for whom the demands of nutrition are neither great nor urgent. It is also observed in chronic affections, often, however, with a return of the desire, or with cravings after intervals. The loss of appetite is always complete at the commencement and early stages of fevers and acute diseases. If it continue during convalescence, a relapse, or some important sequela, or structural change, should be inferred.

127. *b. Increased appetite* is, in its various degrees, not only a symptom of disease, but often also a sign of approaching disease. Extremely increased appetite—*Bulimia*—*fames canina*—has been treated of in the article APPETITE. These states only of increase which are observed as a symptom of disease will be noticed at this place. Increased appetite is most frequently a consequence, 1st, of an increased demand for support and nutrition, as occurs during pregnancy, and in convalescence from acute or exhausting maladies; 2d, or of a state of erythrim, or irritation of the stomach and digestive organs; 3d, or of irritation or disease of the nervous centres of animal life. Increased appetite in the early stages of

fever, or of other acute diseases, is unfavourable, but if it occur in connexion with other signs of improvement, it is a favourable indication. If it be present without other signs of improvement, after anorexia has existed, a dangerous sequela is indicated. Increased appetite is frequent in all verminous diseases, owing to the irritation they produce, and the consumption of nutritious elements; and it is often caused by the use of stimulants—of wine, spices, hot sauces, &c. A great increase of appetite—or a keen, or ravenous, or craving appetite—often ushers in, or precedes for a short period, an attack of apoplexy, or of epilepsy, or palsy, or mania, or phrenitis. Increased appetite very generally attends epilepsy in the intervals between the fits, and is the greatest before a severe paroxysm. It often also accompanies hemiplegia, and it indicates either an attack of apoplexy or an exasperation of the paralytic seizure, at no very distant period. A craving for particular kinds or articles of food is observed in the course of both acute and chronic diseases, and is often suggested to the imagination of the patient by recollections of the past, or by the attendants; but whether these cravings convey a favourable or unfavourable import, depends upon the effects they produce when the patient is allowed food. A craving for unnatural or improper kinds of food—*Pica*—or for articles that are not commonly used for food, sometimes occurs during pregnancy, in chlorosis, and in the course of several disorders of the female sexual organs. (See *art.* APPETITE, VITIATED.)

128. If increased appetite become changed to loss of appetite, or to loathing of food upon taking a small portion only, chronic gastritis or structural change in the stomach may be inferred. A desire for animal food early in febrile diseases, or previously to convalescence, is an unfavourable sign. A keen appetite is generally produced by exercise in the open air; but it is also often the result of habit, and of want of occupation, either mental or physical, especially when indulged. Excessive use of animal food is often progressive, the use of certain kinds creating an increased desire for them, especially of pork. Persons who have thus indulged their appetite generally die prematurely, or seldom live beyond middle age, and are either carried off by apoplexy, by a mixed epileptic and apoplectic seizure, or become hemiplegic. If attacked by continued fever, or by small-pox or scarlet fever, they seldom recover, the malady assuming either a comatose or a putro-adyynamic form.

129. *c. Loathing of food*, and *nausea* excited by certain kinds of food, are generally observed in the premonitory period of fevers and acute diseases, also in affections of the stomach. A dislike of flesh meats is very remarkable in these cases. A loathing of certain kinds of food is frequent in delicate, nervous, hysterical, and hypochondriacal persons. When it depends upon disorder of the digestive organs, nausea, horripilations, and even vomitings or retchings, often supervene. Prolonged loathing of food in chronic diseases augurs the presence of organic lesions. The occurrence of loathing in convalescence indicates either a relapse, or the supervention of visceral change.

130. *d. Nausea* may proceed either from the state of the digestive organs, especially of the stomach, or from the nervous systems of organic and animal life. The digestive organs sympa-

thize, through the medium chiefly of the organic nerves, with all the other abdominal and pelvic viscera, the stomach evincing this sympathy more particularly by nausea or vomiting. The nausea sometimes observed in hysteria, in pregnancy, and in hypochondriasis, is generally also sympathetic of irritation transmitted through the medium of the ganglionic nerves to the stomach. Nausea on the invasion, or at an early stage, of continued and exanthematous fevers, is only an indication of the marked participation in the disorder of the whole economy which the stomach generally evinces. Nausea, often attended by vomiting, accompanies epileptic seizures and diseases of the brain; and in these it is always a very serious, or even a most dangerous symptom. Nausea may be produced by a disgusting sight, or even by the recollection of such; and in these cases the impression is conveyed from the brain, as in cases of organic lesions of the brain, by the communicating nerves to the organic nerves or ganglia supplying the stomach. The nausea and sickness produced by sea-voyages have been attributed to affection of the brain sympathetically conveyed to the stomach, but they appear to be more directly owing to an affection of the semilunar and other ganglia, than to the state of the brain, which seldom betrays much disorder in cases of sea-sickness. Vomiting consequent upon fæcal obstruction is a most dangerous symptom, and is always fatal when the vomited matters have a fæcal odour. (See art. VOMITING.)

131. *c. Various other symptomatic affections of the stomach occur, and furnish important information as to the nature, seat, and issue of disease.* These affections are eructations, heartburning, retchings, and rumination, and are described, with their various relations, in the articles FLATULENCE, INDIGESTION, PYROSIS, RUMINATION, and VOMITING. To these I must refer the reader, and only adduce at this place a few remarks respecting flatulent and other eructations as a symptom of disease. *Eructations* either are flatulent, or consist of fluids or of semi-digested articles, which may be sour or acid, or saltish, or alkaline, but very rarely the latter. Flatulent eructations occur not only in most affections of the stomach, but also congestions and torpor of the liver, and in obstructions to the functions of this organ. They frequently depend upon a gouty diathesis, and attend, but more generally precede, an attack of this disease. They are common also in hysteria and hypochondriasis; the flatulence often rising in the œsophagus, and remaining for a time confined there by spasm, increasing disorder by pressing upon the heart and large vessels. Even when flatulence and flatulent eructations depend upon the diseases now mentioned, and especially when connected with biliary obstruction, it is more or less associated with acidity of the prima via. Fluid eructations often proceed from overloading the stomach, and from organic lesions of the stomach, or liver, or spleen, or pancreas; and in these diseases they may be either tasteless, or sour, or saltish. These may also precede an attack of gout, or accompany calculous affections; but when they are of long continuance, or are not materially influenced by treatment, they should be then referred to organic lesions either of the stomach or of one of the colatitious organs. It should, however, not be overlooked that the most dangerous diseases of these may occur without these eructations appearing in

a very prominent form. As to the signs furnished by appearances of matters thrown off the stomach, see the article VOMITING.

132. *iii. INTESTINAL FLATULENCE*, as well as gastric flatulence, should not be imputed to decomposition of the ingesta, or of the contents of the canal, owing to their retention, but rather to irritation of the mucous surface, in connexion with impaired tone of the muscular coat, and with general debility. Although certain ingesta may favour the generation of flatulence, or even furnish a portion of the gases producing it, especially in cases of intestinal flatulence, yet it cannot be disputed that the gases which accumulate in the digestive canal are chiefly an exhalation from the villous surface. In some cases, especially at an advanced stage of diseases of the digestive tube, the accumulation of gas occasions a tense and tympanitic state of the abdomen, and generally increases the severity of the disease and the sufferings of the patient. Gaseous collections in the stomach or bowels, or in both, are apt to occur in many diseases, as a contingent and intercurrent phenomenon; but in other maladies they are more distinctive symptoms, and should receive due attention, as evincing not merely the nature, but also the issue of the disease. These collections are most frequently formed in very young and in aged subjects; in persons of sedentary habits; in catarrhal irritation of the stomach and bowels; in the several affections and maladies of these viscera, and of the associated and connected organs; in the gouty diathesis and in the atonic forms of gout; in hysteria and hypochondriasis; in puerperal and adynamic fevers; and in obstructions of the intestines by any mechanical or other cause. These symptoms are aggravated by certain kinds of ingesta, especially by raw or bulky vegetables, and by peas, beans, or any preparations of these, also by hot spices, or by irritating and indigestible substances.

133. When the gaseous exhalation is attended by rumbling noises—by *borborygmi*—as in hysteria, a spasmodic or an irregular action of the muscular coats of the canal is present, propelling the distending flatus in various directions. *Borborygmi* in the course of low fevers sometimes precede a favourable crisis. The discharge of flatus by eructation is often of service in the more severe diseases in which gastric or intestinal flatulence are prominent symptoms; but the escape of it *per anum* is much more favourable, especially in ileus, in colicky affections, and in obstructions of the bowels. Intestinal, as well as gastric flatulence, is generally connected with acidity of the bowels, and often also with obstructed or morbid states of the biliary and intestinal secretions and excretions, and not only with these, but often also with a self-contaminated state of the circulating fluids, especially in the portal vessels. These states are more particularly manifested in the atonic forms of gout, in adynamic fevers, and occasionally in calculous or gravelly affections. In these diseases, and contingently in many cases of other complaints, the deficiency of a healthy bile not merely renders the villous surface more prone to exhale a gaseous fluid, but also favours morbid changes in the intestinal contents, the fæcal excretions being morbid in colour, consistence, and smell, the odour being sour and offensive.

134. *iv. THE INTESTINAL EVACUATIONS* should receive the most attentive examinations in all dis-



cases, but particularly in those which are severe or obstinate; and these examinations should be made in respect of the successive evacuations passed from the period of the previous visit. An inspection of the tongue, mouth, and throat, and an examination of the several regions of the abdomen, by pressure and percussion, should also be made, either immediately after or before, generally after, the stools have been examined, inasmuch as the state of these may suggest modifications in the examination of the abdomen.

135. The intestinal evacuations may be either too few or too frequent—after protracted intervals, or at unusually short intervals. They may be variously disordered or unhealthy, and the discharge of them may be preceded and attended by much and diversified disorder. These severally as well as in connexion will direct the diagnosis and prognosis of the physician. The derangements of defæcation—the disorders in which either the retention, or the frequent discharge of the fæces, depends chiefly upon the state of the digestive canal, have been fully described in the articles COSTIVENESS and CONSTIPATION, COLIC, ILEUS, CONCRETIONS in the intestines, &c., and in those on DIARRHŒA, CHOLERA, and DYSENTERY. These diseases being considered in connexion with the more important complications they present in practice, and with the states of the intestinal evacuations, comparatively little remains to be noticed at this place.

136. *A. Retention or delayed evacuation* of the intestinal contents is observed in various diseases as an important symptom, independently of being itself a distressing disorder. 1st. It is often a symptom of serious diseases of the digestive canal, of the liver, spleen, kidneys, and sexual organs; 2d. It is frequently caused by mechanical obstructions furnished either by the parietes of some portion of the canal, or by substances retained in, or obstructing the passage through, the canal; 3d. It may be entirely symptomatic of disease of the brain, spinal cord, and thin membranes, of hysteria, melancholy, mania, &c.—(a) The remarks offered when treating of COSTIVENESS and CONSTIPATION, of COLIC and of diseases of the CÆCUM and of the COLON, sufficiently elucidate many of the most important topics connected with constipation from disorders of the bowels themselves; and in gastritis, enteritis, hepatitis, and in other diseases of the abdominal viscera, costiveness and the appearance of the evacuations claim strict attention; the spontaneous return, or the easy production of intestinal evacuations, and a more natural or healthy appearance of them furnishing a most favourable indication; while a more obstinate retention, either with increase of painful symptoms, or with painful but abortive efforts at evacuation, evinces an increase of danger. In enteritis, the fæcal retention is occasioned chiefly by loss of the muscular or peristaltic action of the inflamed portion of bowel, and by the consequent distention of that and adjoining portions by flatus. The occurrence of evacuations indicates the removal, either partially or altogether, of these and other pathological conditions which caused the retention, and the subsidence of the inflammation, of which these conditions were the consequences.

137. (b) The mechanical impediments furnished by portions of the parietes of the digestive canal are either *spasmodic* or *structural*. *Spasm* of portions of the canal interrupting the passage

of the fæcal contents towards the anus is very frequently observed in the course of DYSENTERY, COLIC, LEAD COLIC, HYSERIA, GOUT, HYPOCHONDRIASIS, &c., and sometimes contingently on other maladies. In many of these cases, the fæcal discharges are hard, lumpy, scybalous, &c., and are evacuated with antecedent or coetaneous pain or gripings, and often also with flatus. In these complaints, free and copious evacuations and a more natural state of the discharges are favourable circumstances. In most of these, the obstruction to evacuation is not only in the spasmodic state of portions of the bowels, but also partially in the inactive condition of other portions, or in the distention of these portions by flatus. *Structural changes* often take place in the parietes of the intestinal tube, and interrupt the passage of the fæces along the canal, by contracting or stricturing the intestine. Various lesions, external to the bowel, by pressing upon or strangulating a portion of it, produce a similar, or even more rapidly dangerous results. These alterations are severally described in the articles COLON, DIGESTIVE CANAL and DUODENUM, and when treating of COLIC, ILEUS, CONSTIPATION, DYSENTERY, &c.

138. Various substances, either formed in the digestive organs or passed into the stomach or bowels, and even intus-susceptions of portions of the intestines themselves, occasion fæcal obstruction, and always dangerous, and very often fatal consequences, as fully shown in the places just referred to, and when treating of CONCRETIONS, BILIARY and INTESTINAL. Several indigestible substances may be swallowed, owing to a vitiated appetite, and be formed into masses more or less concrete or consistent, causing dangerous or even fatal results. A lady was in the habit of chewing and swallowing sealing-wax, and persisted in the practice for many months. Another, to whom I was also called, swallowed wax in every form, but chiefly as it existed in candles. Three young ladies came under my care who had long been in the habit of chewing and eating paper of various kinds. In all these, at first costiveness, and afterward constipation, with colicky symptoms, and severe suffering, supervened. The perverted appetite was suspected and admitted. The means used to remove the obstruction were successful in all these cases, and brought away large and concrete masses of the substances thus unnaturally taken, mixed with mucus and fæcal accumulations. It is chiefly when intestinal obstructions are produced by one or other of the causes now mentioned, and in much rarer instances, by intestinal worms, collected in large balls in hardened fæces and mucus, that the most dangerous consequences are to be dreaded from them.

139. (c) In all inflammatory and organic diseases of the brain, spinal cord, or their membranes, constipation is a common symptom; but the danger does not depend upon the obstruction to fæcal evacuations in these cases, although it may be increased thereby. In these diseases the obstruction is generally overcome by medicine, but returns if the means for procuring evacuation be not frequently repeated. When vomiting accompanies constipation in these, the danger is increased, yet not in consequence of the latter being more obstinate or irremovable, but of a greater severity of the disease of which this is merely a symptom.

140. When obstruction to fæcal evacuation is followed by vomitings, the prognosis is unfavourable, especially if the obstruction have continued long. The danger increases in these cases if distention and tension of the abdomen, if pain or tenderness, or increased frequency of pulse, great debility or exhaustion, &c., supervene. It is still greater, the result being nearly always fatal, if the vomited matters have a fæcal smell; if flatulent distention be great and be attended by borborygmi, and if hiccough or flatulent eructations be frequent or distressing. If the obstruction be suddenly removed, and evacuations more or less abundant be passed, pain or debility, or irritability of stomach still continuing, the prognosis is very unfavourable. If the pain and intestinal obstruction be suddenly removed, the vomitings, or hiccough, or abdominal distention still continuing, a fatal result will soon follow, and the sooner, the weaker and more rapid and irregular the pulse, and the colder the extremities.

141. If constipation be attended by frequent abortive efforts to evacuate, or by tenesmus or straining, obstruction is generally present in the rectum, and often is produced by internal hæmorrhoids, or by stricture of the rectum, or by an enlarged ovarium or uterus, or by displacement of the uterus, or by enlarged prostate. Costiveness, in tubercular consumption, is more favourable than diarrhœa. An alternation of constipation and diarrhœa indicates serious chronic or structural disease of the digestive organs; and, in children, that the mesenteric glands are affected, chiefly enlarged. If constipation follow the sudden cessation of diarrhœa, and become obstinate, the prognosis is unfavourable; more especially if pain, tenderness, tension or distention of the abdomen be also present, and the tongue become dry or parched.

142. *B. Frequency of the intestinal evacuations* depends much on the age and habits of individuals. Infants evacuate the bowels twice or thrice daily, adults generally once only, sometimes twice, old persons even less frequently, and sedentary persons, who eat little, only once in two, three, or even in several days. Great frequency of evacuation, or purging, is always occasioned by disease of the digestive canal—most frequently by irritation and hyperæmia of the digestive villous surface. The purging, when continuing for some time, constitutes diarrhœa, but when it ceases spontaneously after the bowels are unloaded, or after a short time, from the operation of medicine, it hardly amounts to the latter. Purging or diarrhœa is frequently owing to teething in children, and is a common complication in exanthematous fevers, and in gastro-enteric catarrh. In these cases, it is also pathologically characterized by irritation with hyperæmia of the digestive villous surface. When it follows ingurgitation of food or intoxicating liquors to excess, or fæcal accumulations, or the irruption of accumulated bile into the bowels, it is thus similarly characterized, and generally subsides spontaneously, especially if due abstinence be adopted; but when it occurs as a complication of exanthematous or gastro-enteric fevers, or in child-bed fevers, the spontaneous cessation of it should not be trusted to, means to moderate or to arrest the inordinate action being then required.

143. When diarrhœa occurs in the course of adynamic or putro-adynamic fevers, asthenic inflammation of the intestinal villous surface and of

Peyer's glands should be dreaded, and indeed it may have far advanced, especially if the stools present an ochrey appearance. In such cases the danger is very great—very considerable if the diarrhœa have been of some duration, and extremely great if the stools have this appearance, or are intimately mixed with blood. Diarrhœa is also a most dangerous symptom when it supervenes upon chronic disease of the lungs, or of the liver or spleen, and when it is connected with diseased mesenteric glands. Whenever the state of the evacuations shows either a protracted absence of bile or an intermixture of blood, the prognosis should be unfavourable, and at a far advanced period of chronic or of hectic diseases the danger should be considered as very great or extreme. When stools are passed immediately after substances have been received into the stomach, and more particularly if they have passed but little changed from the state in which they were taken, a fatal result may be expected in the great majority of instances, and disease of the mesenteric glands, and often also of other collatitious viscera, may be inferred.

144. Diarrhœa following vomiting often subsides spontaneously, especially when the cause consists of irritating ingesta or overloading of the stomach. The same prognosis may be entertained if the diarrhœa follow constipation. If diarrhœa and vomiting, with or without spasms, be of considerable duration; if they occasion sinking, &c., or if they be produced by poisons of an irritant and depressing nature, danger should be inferred, especially if spasms be present and continue. (See *art. CHOLERA and CHOLERIC FEVER OF INFANTS.*) In most instances of diarrhœa, the previous history of the case, the diseases of which it is a consequence, or a complication; the existence and character of nervous symptoms; the amount of nervous or vital depression accompanying it; the nature and character of the prevailing diseases and of the dominant epidemic constitution, especially in connexion with the exanthematous and continued fevers of which diarrhœa is so frequent a complication, should severally receive due consideration before we form conclusions either as to the result or as to the indications of cure.

145. If diarrhœa be attended by pains following the course of the colon, or by tormina, then the colon may be considered as the chief seat of the affection. (See *art. COLON and DYSENTERY.*) If the pains extend down the sacrum, or between the sacrum and pubis to the anus, or if they be accompanied by dysuria or ischuria and by tenesmus, the rectum is also affected. If diarrhœa or dysentery be attended by spasm of the sphincter ani, inflammation often with abrasion of the mucous surface in the vicinity may be inferred. If, in these diseases, the sphincter ani become relaxed or paralyzed, an unfavourable opinion of the result may be entertained, and more especially if this occur in the course of diarrhœa complicating exanthematous, or typhoid, or adynamic fevers.

146. If purging or diarrhœa, occurring in the course of visceral congestions, especially those of the liver or spleen, or in dropsical effusions, or in hypochondriacal affections, or as a sequela of agues, appear to give relief; or be followed by greater animation or increased strength and activity; and if either occur in the course of fevers and other acute diseases, as a critical evacuation,



being moderate in frequency and continuance, and the evacuation of a more natural and healthy character, a very favourable issue may be expected. (See *art. CRISIS.*)

147. *C.* The ALVINE EVACUATIONS furnish important information as to the nature, complications, and issue of both acute and chronic maladies. The fæces are altered by disease, in form, in consistence, in colour, in odour, in quantity, in the nature of their constituent elements or materials, and in the substances they contain, or that are mixed with them.—(a) *The form and consistence of the evacuations vary with the age of the subject.* The fæces in infants are pulpy and generally viscid form. In adults, they are usually formed and more consistent, and in aged persons they either continue so, or become much harder and less bulky. At all ages, however, after infancy, they present every grade of consistence, from fluid to solid, according to the states or affections of the digestive organs. In cases of spasmodic or permanent stricture of the rectum or anus, or of internal hæmorrhoids, the evacuation is of small calibre, and often presents the appearance as if the fecal accumulation were pressed through a diminished aperture, in continuous or broken, but considerable lengths, and of the same nature. If there be enlargement of the prostate, or displacement of the womb, the evacuation is generally more or less flattened. The discharge may be lumpy, may resemble pigeons' eggs in form, be hard or very consistent, or scybalous. It is generally of these shapes in dysentery, colic, hysteria, sometimes in hypochondriasis, and in several other diseases. In dysentery, these lumps or bills are accompanied either with a serous fluid, or with mucus mixed with blood, or with both, proceeding from the inflammatory irritation of the mucous membrane, accompanying the spasm of the muscular coats and the flatus, which chiefly occasion this form of the fæces in these complaints. Indeed, whenever the stools present this lumpy or scybalous form, a spasmodic and flutulent state of the bowels, especially of the colon, may be inferred; and costiveness is generally present.

148. In some cases, especially in chronic dyspepsia, with impaired action of the liver, the stools are tenacious, figured, and consistent, resembling putty in tenacity and sometimes also in colour; for these stomachic or chologogue purgatives are generally required. In aged and sedentary persons, especially females, and often also when the liver is torpid or obstructed, fecal matters accumulate in the sigmoid flexure of the colon, and in the rectum, distend the bowel, sometimes beyond the power of reaction or propulsion, and become hard and dry, owing to the absorption of their more fluid constituents. In this state, the lower bowel, especially the rectum, may be closely plugged up, the natural efforts to overcome the obstruction being accompanied with tormina, and continuing abortive until the concrete fæces are removed from the over-distended and obstructed rectum by mechanical means.

149. (b) *The colour of the stools is very materially affected by the ingesta.* In children, the fæces, in health, are generally yellowish; in adults, brown; in old persons, dark brown. They are rendered much darker by port-wine or claret; by extract of liquorice, and by most of the dark fruits; and still darker, or nearly black, by all the preparations of iron, and by all articles of diet

containing blood, as black puddings. They present a greenish hue, more or less dark or deep, after green vegetables, especially spinach. After rhubarb, they are often yellow, and after magnesia, or sulphur, or both, they are often paler than natural. The preparations of mercury often cause the fæces to assume a greenish hue, probably in consequence of the state of the biliary and intestinal secretions, and of acidity of the prima via. The compound decoction of aloes often imparts a darker hue to the stools.

150. (c) *The odour of the evacuations seldom continues the same as in health, in either acute or chronic diseases, and, when they return to their natural odour and colour, the circumstance is favourable.* The more offensive the odour of the stools, the disorder of the intestinal secretions and excretions, the accumulations of them in the prima via, and the depression of vital power, may, either severally or conjoined, be inferred to have been also the more remarkable, unless, indeed, some preparation of sulphur have been taken and given the discharges the odour of sulphuretted hydrogen. If the stools have an earthy smell, and more especially if they have the odour of raw flesh or of putrid meat, a most unfavourable prognosis should be given, especially in gastric or intestinal fevers, in dysentery, or in other diseases implicating the bowels. When the stools have a sour smell, then diarrhœa, or obstructed biliary discharge, or both, are generally present, and acidity of the intestinal contents clearly exists. This symptom is frequent in the diarrhœa of infants and children, and previously to or during an attack of gout or rheumatism. The stools in pestilential and infectious maladies have a most offensive odour, which is peculiar to each malady, as in choleric pestilence, small-pox, &c.

151. (d) *The colour of the stools is variously changed in disease.* It is pale, grayish, clay-like, or nearly white, in all cases of biliary obstruction, whether accompanied with jaundice or not. In the more chronic biliary obstructions, and in the darker shades of jaundice, the colouring and other ingredients of the bile are altogether wanting, the stools are nearly white, unless when partially coloured by the ingesta, and the slightest indications of the presence of bile in the stools are to be viewed as a favourable occurrence. A greenish hue of the stools occurs in several disorders of the digestive organs, and in scrofulous or other organic diseases of the brain. A deep brown or greenish-brown colour of the stools is generally owing to the passage of bile, which had been accumulated for some time in the gall-bladder and hepatic ducts, into the bowels; and a yellowish or bright yellow tint may be imputed to the passage of recently-formed bile into the intestines. Black stools are generally produced by the presence of blood, which may have passed into the stomach either from the nose, gums, or mouth, or from the pharynx, or may have exuded from the internal surface of the stomach or small intestines. When blood is partially digested and intimately mixed with the contents of the bowels, the uniformly black hue presented by the fæces has been ascribed to black bile, which had been long retained in the biliary apparatus; others, admitting that this colour is produced by blood, have believed that the blood has escaped from the secreting structure of the liver along the ducts. In favour of this latter opinion we have no satisfactory evidence. The source of the colour in these

doubtful cases may be determined by diluting the stools, when they will assume a more determinate red or green, according as the colour is owing to blood or to bile. An ochrey colour of the stools is generally produced by numerous ulcers seated in the glands of the villous surface, the blood exuded in small quantities from these being intimately mixed with the contents of the intestines, which are usually in these cases more or less fluid.

152. When blood is exuded in small quantity in any portion of the digestive canal above the valve of the cæcum, it is generally mixed intimately with the fæces. But, even when poured out in the small intestines, it may be passed by stool almost pure, although often grumous and uncoagulable, when the quantity is considerable or large, or the bowels irritable. Blood, imperfectly mixed with fecal matters, dark coloured and uncoagulated, may have come from either the small or large intestines. When it proceeds from the latter, it is often pure, red, and uncoagulable, and generally precedes or accompanies the evacuation. When it follows the passage of fæces, it commonly proceeds from the rectum, and is a consequence of internal piles. The blood thus discharged per anum, either alone or mixed with fæces, may be an exudation from an irritated portion of the villous surface, or a discharge from an ulcer or ulcers, or from a diseased vein, or an exudation occasioned by the association of irritation with a semi-dissolved condition of the blood itself. Bloody stools, either ochrey, black, red, reddish-brown, &c., occur in adynamic or typhoid fevers, in scurvy, in purpura, in organic diseases of the liver or spleen, in dysentery, in cancer implicating the digestive canal, in vicarious menstruation, hæmorrhoids, and contingently on several other maladies. Although the quantity of blood extravasated in these diseases may be barely sufficient to colour the stool, yet it may be so great in other cases as to excite fears of speedy dissolution, especially in fevers and in organic lesions of the liver or spleen. These excessive hæmorrhages are always dangerous, especially in the more advanced stages of adynamic fevers. Nevertheless, recovery sometimes takes place even in persons considerably advanced in life. I lately saw, within a short period of each other, two cases of this kind, with my friends Messrs. Houlston, senior and junior; and in these, although the loss of blood was remarkably great, recovery took place in both. The quantity of blood may be very small, or may merely streak the mucus, or discolour the serum in which it is passed, and yet the danger may be extreme, as in ileus, volvulus, or intus-susceptions, in enteritis, in dysentery, the attendant symptoms more prominently evincing the danger. A raw, carthy, or putrid odour of the stools, in these cases, is the most unfavourable sign which can accompany the presence of blood in the stools, whatever may be its quantity.

153. The discharge of blood by stool in moderate quantity may produce relief in several diseases, especially in those of the liver or spleen, and in hæmorrhoids. But the relief may be only temporary, inasmuch as the disease or lesion which occasioned it may not be removed by it, and may proceed after a period of relief, this discharge recurring, or some other results being produced. In all cases of this kind the prognosis should depend upon the effects produced by the loss, by the existence or non-existence of anæ-

mia or of vital sinking; but when such discharge occurs in adynamic levers, whatever may be the quantity—even no more than may be sufficient to impart an ochrey appearance to the stools, then great danger is present.

154. (e) *Bile* may be present in the evacuations in every conceivable quantity. The stools may even consist almost entirely of bile, or they may not contain a particle of it, as in choleric pestilence and in obstructive diseases of the biliary organs. A brown or gingerbread-colour of the stools indicates a due proportion of both cystic and hepatic bile; a bright but deep orange hue evinces a preponderance of hepatic bile, and, when the stools consist chiefly of a fluid of this tint, becoming darker after it is passed, then they may be viewed as bilious, or consisting in a great measure of bile mixed with more or less fecal matters. Superabundance of bile in the stools is generally caused by chologogue purgatives prescribed at a time when the biliary ducts and gall-bladder have been loaded with this secretion, or by excitement of the liver in connexion with the influence of high ranges of temperature, or with passion or intemperance, or by any cause productive of irritation of the duodenum or of the common bile-duct.

155. The stools may present various forms and grades of consistence, both when well coloured and abounding with bile, and when deficient in colour and in bile. When thus deficient, they may be watery or serous, as in diarrhœa and pestilential cholera, or pulaceous or thin, as in jaundice, or in torpor and various states of obstruction of the liver, or costive or hard in rarer cases of biliary obstruction, either with or without jaundice. Deficiency of bile, the stools presenting either of the characters just mentioned, but most frequently a thin or pulaceous consistence, is a symptom of torpor of the liver, as in many persons who have resided long in an intertropical climate, of obstruction of the ducts from constriction or contraction consequent upon inflammation, or from the impaction of a biliary calculus, and of the several organic changes described in the articles JAUNDICE, GALL-BLADDER AND DUCTS, LIVER, &c.

156. (f) The stools may contain more or less serum, as in the serous diarrhœa, which proceeds chiefly from inflammatory irritation of the mucous surface of the intestines, and which presents a brownish or dark brown hue in the more chronic cases, and when the liver or spleen is implicated; or they may consist almost entirely of serum, containing small albuminous flocculi, and present a pale and turbid appearance, or resemble rice-water, as in the diarrhœa of choleric pestilence, in which they are frequent and most abundant, and constitute the most dangerous symptoms of the malady. The continuance of pale, turbid, or serous evacuations without any appearance of bile, is always a dangerous circumstance, especially after rational means have been used to arrest them, and to procure a secretion of bile, or when they are very forcibly discharged or squirted from the anus. In pale, watery, or serous stools, insufficiently coloured with bile, especially when passed frequently, and the affection having been of some considerable duration, substances which had been recently taken into the stomach are often passed either but little or not at all changed from the state in which they had been swallowed. This *Lienteric form* of diarrhœa is always most unfavourable, especially in infants and children,



after weaning, or during dentition, or that have been deprived of their nurses' milk. (See *art. DIARRHŒA*, § 12.) The occurrence of serous diarrhœa with vomiting in infants and children, in warm summers and autumns, indicates serious and often very dangerous disease, especially when attended by fever. (See *art. CHOLERIC FEVER OF INFANTS*.)

157. Various substances, foreign to a natural state of the evacuations, are sometimes found in them, besides serum and blood. These are chiefly mucus, pus, fibro-albuminous exudations, fatty substances, cholestrine, biliary calculi, various kinds of intestinal concretion, worms either dead or living, portions of the mucous coat detached from the subjacent tissues, and even portions of intestine thrown off, in consequence of intussusception and the consequent changes. These severally require but little remark.—*a. Mucus* occurs in *dysentery* and *diarrhœa*, and is often mixed with serum and pellets or lumps of feces. In the mucous state of the stools, the follicular apparatus, with the villous surface, is chiefly inflamed; but this appearance may pass into a watery or serous condition, or even into a mixed state, in which the evacuations are more or less streaked with blood as in *dysentery*. If ulceration supervene, the evacuations contain sanious matters, or blood in larger quantities.—*b. Puriform* stools, or an admixture of *pus*, with fecal matters, may follow mucous evacuations, as in chronic diarrhœa or chronic dysentery, especially when the puriform matter is much diluted or mixed with mucus; but when it is present alone, or in large quantity and unmixed, or but little mixed with feces, then the rupture of an abscess, seated either in the liver, or in the spleen, or in the vicinity of the spinal column, into some part of the intestines, may be inferred. A change of mucous to serous, or to muco-puriform, or to sero-sanguineous, or to sanious, or to puriform stools, or to intestinal hæmorrhage, indicates a progressive advance of disease—generally of structural change; inflammatory irritation advancing to suppuration or ulceration, with the several changes described when treating of *DIARRHŒA*, *DYSENTERY*, and *FEVER*.—*c. The passage of fatty substances* in the stools occurs in rare instances, and has been observed chiefly in malignant and chronic visceral diseases, as in those of the liver, pancreas, duodenum, and lungs. The other substances sometimes passed from the bowels, of which no notice need be taken at this place, are described in the article *CONCRETIONS*, *intestinal*, and in the other articles on diseases of the *INTESTINES*, &c.—on *WORMS*, &c.

158. (*g*) In all cases in which it is necessary to examine the state of the intestinal evacuations, and indeed in almost every case which comes before the physician, the several regions, not only of the chest, but also of the abdomen, should be carefully examined by percussion, and by pressure, directed according to the peculiarities of individual cases; and the sensations of the patient, as well as the sounds emitted, should be carefully considered. When pain is experienced either previously to, or during, or after evacuations, its character and connexion with defæcation ought to be ascertained. In addition to these points, the strength, nutrition, and vital manifestations of the patient, as well as the performance of the several excreting functions, should receive attention. (See *art. ABDOMEN*.)

159. IV. SYMPTOMS AND SIGNS CONNECTED WITH THE CIRCULATING SYSTEMS.—When treating of *AUSCULTATION*, of the *AORTA*, of the *ARTERIES*, of the *BLOOD*, of the *HEART*, of the *LYMPHATIC* and *LACTEAL SYSTEM* and *GLANDS*, of the *PULSE*, and of the *VEINS*, the *SEMEIOLOGY of the Circulating Systems* was fully considered, especially as respects diseases of these systems. It therefore only remains for me, at this place, to notice only those topics which have either been omitted or insufficiently discussed under these heads.

160. i. In the articles on *AUSCULTATION* and *HEART* and *PERICARDIUM*, I have described the physical signs of the heart and its capsule. The healthy and morbid sounds of the heart were topics of discussion when these were written, and they still are by no means satisfactorily determined. The interruptions, obstructions, or difficulties to the passage of the blood through the several cavities and orifices of the heart, besides being accompanied by certain physical signs, described under these heads, give rise to several physiological or functional symptoms which ought also to receive due attention. The chief of these are: 1st. Short or difficult breathing, varying from a scarcely appreciable disturbance to dyspnoea or to orthopnoea; and often at first overlooked, or hardly complained of unless when ascending stairs or a height. 2d. Attacks of faintness or of syncope, followed or not by palpitations, &c. 3d. Paroxysms of difficulty of breathing, or startings from sleep, especially about one of the earliest hours in the morning. 4th. A sensation of sinking, or of suffocation, or of dissolution, upon walking quickly, or against the wind, or upon any physical exertion. 5th. Congestion of the brain, owing to obstructed return of blood, occasioning vertigo, headache, or apoplexy, palsy, &c., if not prevented by epistaxis. 6th. Congestions of the lungs, often causing hæmoptysis, pulmonary apoplexy, œdema of the lungs, or serous effusions into the thoracic cavities. 7th. (Edema of the lower and upper extremities, and often also of the face, in the morning; or asphyxia by accumulations of mucus in the bronchi. 8th. Lividity of the lips, tongue, gums, fingers, and nails. These cannot, individually, be assigned to certain or determinate organic lesions, but may severally accompany or supervene upon one or more of these lesions. Certain of them may even be present without any structural change of the organ, as shortness or difficulty of breathing may be a symptom of anæmia, or of chlorosis. Faintness or syncope, with or without a feeling of dissolution, is most frequent in passive dilatations of the cavities, or in cases of fatty softening of the parietes, of the heart, with or without ossification of the coronary arteries.

161. *Palpitations*, as well as irregularities, and intermissions of the heart's contractions, &c., attend several organic lesions of the organ, and they may occur independently of any of these, and merely as a consequence of weakness or other disorder of the digestive organs, or of irritation of some viscus with which the heart sympathizes. When palpitations follow mental emotions or sudden shocks they soon subside, or are followed by depression or faintness; or when they are consequent upon hysteria, or irritation or excitement of the sexual organs, the heart's action returns to its normal state. But in cases

of chronic debility, of exhaustion from prolonged discharges, or from over-exertion, or from inanition, or from prolonged anxiety, even independently of any manifest organic lesion, palpitations may frequently return, be alternated with faintness, or with irregularity of action, or even be characterized by such irregularity. In these latter circumstances, organic nervous power is more or less impaired, as respects the heart, especially in cases of faintness with or without any of these states of irregularity; or this power is irregularly distributed or determined, as in cases of nervous palpitation, in most cases of which it is also considerably weakened; the impaired tone of the muscular coats of the digestive canal, also generally present in these cases, admitting of flatulent distentions and fecal accumulations, and thereby increasing the cardiac disorder. Indeed, the parietes of the heart very often participate in the impaired vigour or tone of the coats of the stomach and bowels, flatulent distention of these impeding or interrupting the return of the blood to the auricles, and thus preventing either the filling or the dilatation of the cavities of the heart. When palpitations, attacks of faintness, or irregularity or intermission of the heart's action take place without being attended by any auscultatory sign, impaired influence or energy of the organic nervous system—constitutional or organic nervous debility is then generally present, although some change of structure, not indicated by the impulse or sounds of the heart, may also be present, as in case of fatty softening, or of impaired nutrition of the parietes of the organ, or of disease of the coronary arteries. When treating of diseases of the HEART, in 1836, I directed attention to fatty degeneration of the substance of the organ (see that *art.* § 224, *et seq.*); but, although this change may be admitted to be a consequence of impaired or morbid nutrition of the organ, often in consequence of ossific or other deposits in the coats of the coronary arteries, yet both softening and impaired nutrition of the muscular structure of the heart may take place without fatty degeneration in any very manifest degree being present. In all such cases, however, faintness, remarkable shortness of breathing, a sense of dissolution on walking fast, or on exertion, are generally observed.

162. ii. CONGESTION OF THE CAVITIES OF THE HEART may occur, either from general vascular plethora, or from a greater or more rapid return of blood to the right side of the heart than can be sent onward by the ventricle, or from weakness, or dilatation of the parietes of the organ, or from obstruction to the circulation by material or mechanical causes. Either of these pathological conditions may produce this effect, or any two or all of them may exist in the same case, and may even, without any farther appreciable change, either terminate life or place it in imminent jeopardy, the distention of the cavities having been too great to be removed by the impaired or exhausted power of their parietes, or the material obstruction being too great or prolonged to be overcome by the weakened action of these parietes. In cases of this kind the patient experiences, whichever of these pathological states obtain, extreme oppression and a feeling of distention in the cardiac region, with great alarm, choking, dyspnoea, or orthopnoea, and often also with a sense of impending dissolution. The congestion is not limited to the cavities of the heart,

but extends to the large vessels, especially to the veins, and the action of the organ is either weak, or irregular, or tumultuous and inefficient. The congestion is evidently connected with over-distention of the cavities, as shown by the increased sphere of dulness on percussion, by pain in the left shoulder or under the shoulder-blade, often extending to the arm. Death may ensue if the congestion be not removed, partially or altogether, either by stimulating or re-enforcing the power and action of the heart, or by diminishing the distending mass of blood by depletion, or by the combination of both. When this event takes place, it may be imputed to some other pathological state than this, as to spasm of the heart, especially when the orifices, valves, and parietes of the heart present no very manifest lesion, the post-mortem changes, or even the last struggles of existence removing the congestion, either wholly or in part, by which life had been extinguished. The slighter states of congestion of the heart are frequently present in *Hysteria*. (See *arts.* CONGESTION AND HEART, *plurics.*)

163. iii. THE SYMPTOMS AND SIGNS FURNISHED BY THE ARTERIAL AND VENOUS SYSTEMS.—Little remains to be added to what has already been advanced on this subject in the articles AORTA, ARTERIES, PULSE, and VEINS, to which the reader may be referred. When treating of the *Pulse*, I have pointed out the SEMEIOLOGY, comprising both the *diagnosis* and *prognosis*, of arterial action. There is generally heard, by means of the stethoscope, a dull weak sound in the tract of the larger arteries, and this sound is variously modified, according to the state of the blood and the thickness and tone of the arterial parietes. If the blood be thin, or watery, or poor in hæmatoglobulin, or if the arteries be thin, and the blood deficient as respects the capacity of the vessels, the sound of the arteries at every systole of the ventricles is clearer and approaches nearer to a bellows or blowing sound. This sound is single, and ceases with the systole of the ventricles. Pressure on the artery develops this sound, which is imputed to the friction of the blood-current or wave against the coats of the artery at each contraction of the ventricle.

164. A. *Morbid arterial sounds* are either *simple* or *single* or *double*.—a. The *simple* or *intermitting* bellows-sound is observed when tumours press on arteries, in aneurisms, in cartilaginous and ossific deposits in the coats of arteries, and when the circulation is accelerated, especially in chlorotic or anæmied persons, and after large losses of blood. It is generally sibillous in tone or character, varies in strength and loudness, and is isochronous with the termination of the systole of the ventricles.—b. The *double* or *continuous* bellows-sounds are heard chiefly in the carotid and subclavian arteries, but seldom with equal strength in both. Of these two or double sounds, the first is the stronger; and when they are loud or high, they become whizzing, buzzing, rumbling, or piping, or sibillous; but pressure on the artery, the position of the head, &c., produce various modifications of these sounds, which, however, are generally loudest with the systole of the ventricles.

165. B. *The Capillary vessels* of various parts of the surface, especially in febrile, exanthematous and cachectic diseases, furnish indications of some importance as respects vascular action and vital power. Pressure, in cases characterized by



redness or discoloration of parts of the external surface, often, indeed generally, shows the cause, whether this be capillary injection or congestion, or extravasation. If the last, pressure does not materially affect the discoloration. In the first and second of these causes, pressure momentarily removes the discoloration; and the rapidity of the return of blood into the emptied capillaries is an indication of the rapidity of the circulation. When the colour is florid, the circulation is active, and vital power is not very manifestly impaired, but when it is dark red, purplish, or livid, the capillary congestion is the consequence of impaired vital power, and the circulation through the capillaries is sluggish or impeded. The capillaries become impaired more and more in vital tone with the advance of age, and are subject to the same structural changes as are described when treating of these changes in the coats of the ARTERIES (§ 38, *et seq.*). When treating of these changes (in 1831), I described the *atheromatous* matter deposited in the walls of the arteries as "a suety substance which is greasy to the touch;" and, although much more recently stated to consist of fat, or to be fatty, yet I believe that the description I have there given (see ARTERIES, § 59) to be the more correct, as with fat other chemical constituents and animal products are conjoined.

166. C. The *veins* furnish indications of pathological states by their size and distention, by their varicose conditions, by the rapidity of their distention when pressure is applied in their course to the heart, and by their pulsations. The veins in the temples, face, and neck are distended in cases of congestion of, and vascular determination to, the brain; and when this state is viewed in connexion with other symptoms, the distention not being caused by attendant convulsions, then vascular depletion is generally required. A distended or varicose state of the veins in any of the extremities evinces obstruction of the venous trunk or large branches, owing either to obliteration, pressure, or other changes described in the article VEINS. The rapidity with which the veins refill, after having been emptied by friction, followed by pressure in their courses, as well as their size and fulness, serves to show the degree of fulness, or of deficiency, of blood in the system. The veins are small in youth and in corpulent persons; they are large in the aged and in the emaciated, this state admitting and showing fulness or enlargement of the veins, especially of the extremities. In the aged the veins lose their tonicity, and are more prone to congestion, and to retarded or obstructed circulation, especially when the circulation has to overcome the gravity of the column of blood in the veins.

167. A venous pulse is sometimes seen. It occasionally results from the continuation of the heart's action through the capillaries to the veins, when this action is inordinately excited, and is owing in some respects to the reaction of the capillaries upon the distention caused by the contraction of the ventricle, impelling the blood-wave onward. The pulsation in other cases may be caused by an artery lying under or near a vein; and in some instances the pulsation is retrograde, as in the jugular veins, and in these it is a most important sign of cardiac disease, and is produced by contraction of the right ventricle, and regurgitation of blood, owing to dilatation of

the right ventriculo-auricular orifice, or to imperfection of its valve.

168. D. The blood itself furnishes most important signs of the nature and probable issue of disease. Of the signs which this fluid—vital in its relation with the several viscera, but more especially with the ganglia and ganglionic nerves which supply the vascular systems—presents in disease, particular notice has been taken when treating of the several forms and complications of disease, in the articles specially devoted to them, as well as in the comprehensive article on *the changes observed in the blood in disease*. (See *art. BLOOD*.) To these, but more especially to this last, I must refer the reader, as nothing of any interest or of the least importance has been added to our knowledge beyond what may be found under those heads, and more particularly the last. *Spontaneous discharges* of blood, and the sources and appearances of the blood thus discharged, furnish very important pathological and prognostic indications, but these are fully considered in the article on HÆMORRHAGE.

169. iv. THE LYMPHATIC SYSTEM—*Vessels and Glands*.—This system furnishes but few signs of disease beyond those which appertain to the maladies occasionally seated in them; and these signs are described in the articles on the LYMPHATICS and GLANDS, SCROFULA and PESTILENCE, GLANDULAR. Enlargements, inflammations, &c., of the lymphatic glands, and inflammation of the lymphatics themselves, are generally produced by some irritation, sore, or puncture, or by the inoculation of some poison in a situation near to, or beyond the seats of these affections. Enlargement of the glands near the base of the cranium, or in the upper region of the neck, is often observed in cases of serofulous or tubercular meningitis and softening of the brain, in young subjects, either with or without effusion of serum in the ventricles, or between the membranes; and similar affections of the glands, either near the sternum, the clavicles, or armpits, not unfrequently precede or accompany the development of tubercles in the lungs. Enlargement, inflammation, suppuration, &c., of the glands, and even inflammation of the lymphatics, followed by disease of the glands, are very frequently occasioned by the application or inoculation of some virus or poison, or by sores or irritation, as often shown by the introduction of the syphilitic poison into the frame, and by poisoned wounds or punctures. But independently of these causes and sources of contamination, the lymphatic glands are sometimes enlarged or congested in weak and delicate subjects, and they are occasionally asthenically inflamed and disorganized in the course of pestilential and malignant fever; but most frequently and especially in the plague, in which pestilence the affection of these glands constitutes a distinguishing feature.

170. V. SYMPTOMS AND SIGNS OF THE RESPIRATORY FUNCTION.—These symptoms are of the greatest importance in respect not only of the diseases seated in the organs of respiration, but also of all other maladies to which the frame is liable. More or less disturbance of the respiratory function very often attends diseases of the heart and large vessels, and the advanced stages especially of diseases of the abdominal viscera, of febrile and constitutional maladies, and of affections of the brain. When treating of AUSCULTATION, of the CHEST, of the BRONCHI, LAR-

YNX, and LUNGS, the signs and symptoms of the function of respiration, were described with reference chiefly to diseases implicating that function. Besides the signs furnished by auscultation, percussion, and inspection and admeasurement of the chest, several other means have been recently suggested of furnishing signs of pulmonary disease, and these have reference chiefly to the determination of the quantity of air received and discharged from the lungs at each inspiration and expiration, and of the power with which these respiratory acts are performed. For this purpose, Dr. HUTCHINSON has invented an apparatus which he has termed a *spirometer*; and in order to show the movements of the chest in health and disease, Dr. SIBSON has furnished an instrument, which is called a *chest measurer*. My limits prevent me from describing these, and their application to the diagnosis of pulmonary maladies, and oblige me to refer the reader for all that should be known respecting them to the *Transactions of the Medical and Chirurgical Society* (vols. xxix., p. 137, and xxxi., p. 353). These means of diagnosis are of more or less service, especially in doubtful or difficult cases; but they should not be confided in farther than that they are useful aids to the means previously employed, and to the rational symptoms furnished by the maladies of the respiratory organs. In all diseases, whether of these or of other organs, the *voice and breathing* of the patient demand the strictest attention. The *Voice* is especially considered in a separate article; the *respiration* or breathing will be briefly noticed at this place.

171. i. RESPIRATION is influenced or modified by age, by sex, by temperament, by the habit of body, by mental emotions, by the states of the atmosphere, by the positions of the body, and by the sleeping and waking states, and most remarkably by disease. Of certain of these little need be said. Temperament influences the respiration chiefly in connexion with the conditions of the atmosphere, and with mental emotions, the nervous, susceptible, and irritable temperaments experiencing a greater frequency of respiration during warm and humid states of the air, and when the mental emotions are more or less excited. Persons of a full habit of body, and the subjects of obesity, respire more frequently, and receive less air into the lungs at each inspiration, than the thin or the more slenderly formed; and the short in stature have a somewhat less capacity of the lungs than the tall. Much, however, depends upon the breadth or width of the chest. A person when standing or sitting breathes more fully and freely than when lying down or reclining upon either side. Hence, in bronchitis, in pneumonia of both lungs, and in cases of effusion into both pleural cavities, the patient cannot lie upon either side, for this position in some measure extinguishes the motions of the side of the chest upon which he lies, and increases the difficulty of respiration. Respiration during sleep depends very much upon the position and upon the habit of body, and upon the state of the stomach.

172. *Respiration during disease* should be examined, 1st. By observing the motions of the chest, and the phenomena attending inspiration and expiration; 2d. By auscultation, or by listening to the sounds produced by respiration in the several regions of the thorax. The *second* of

these modes is considered under the head *Auscultation*, it furnishes chiefly signs of disease of the respiratory organs, or rather those changes of respiration which diseases of these organs produce. The first not merely evinces diseases of the respiratory organs, but also gives more or less information as to the states of the vascular system, of the abdominal viscera, and of the brain. To this *first mode* of examination a brief notice is to be directed. Attention should be paid, 1st. To the frequency and quickness of the respirations; 2d. To the motions and degrees of expansion in the several regions; 3d. To the states of the nostrils and mouth during respiration; 4th. To the uniformity, the ease, or the exertion of respiration; and the relations, in frequency and exertion, of the individual respirations to each other; 5th. The states of expiration in relation to inspiration; 6th. The sensations experienced by the patient during the acts of inspiration and expiration; 7th. The states of the expired air, chiefly in respect to temperature and odour.

173. a. The *frequency and quickness* of breathing may each exist independently of the other. Respiration is more *frequent* than in health, when a portion of the lungs can no longer perform its functions, as in pneumonia, tubercular consumption, &c., or when the lungs are more generally affected, as in bronchitis, or prevented from expanding by pleural effusions, by incurvations of the spine, or by the invasion of the thorax by abdominal or other tumours, or effusions, &c. It is also more frequent when the circulation is more rapid than in health, and passes more rapidly, or in larger quantity, through the lungs, as in febrile maladies, and when the lungs are congested by impeded circulation through the heart. The prognosis of increased frequency of breathing depends upon these causes—upon the nature of the one producing it. In febrile diseases, the less frequent the respiration relatively to the amount of fever, the more favourable is the prognosis. The breathing, even in the most unfavourable circumstances, rarely amounts to sixty in a minute. Respiration may be more *rare* or *less frequent* than in health, as when the heart's action is impeded or rendered slow, or when the brain is congested, or the basilar parts of the brain, or medulla oblongata, or cervical portion of the spinal cord, is congested or pressed upon, or in syncope, catalepsy, structural changes of the substance of the heart; in sopor, ecma, or apoplexy, or in certain states of paralysis; and during the extreme exhaustion preceding dissolution.

174. *Quickness* of respiration, especially of inspiration, arises from a more rapid action of the muscles of respiration occasioned by either weakness or fatigue of those muscles consequent on paroxysms of cough, as in pneumonia, bronchitis, pertussis, or on great muscular exertions, or on pleural effusions; and in many of these cases, as in pleuritis, in pleuro-pneumonia, in pericarditis, &c., the breathing may be quick and yet less frequent than natural, especially when respiration is attended by pain. Quickness increases the danger of frequency of respiration, especially in pneumonia, pleurisy, tubercular, and other organic maladies. *Slowness* of breathing is very often an attendant of diminished frequency, especially in those maladies with which this latter is mentioned in connexion. When it occurs in



cases of extreme exhaustion, or at a far advanced stage of acute or chronic disease, with a small, weak, or irregular pulse, sinking of the features, cold or clammy extremities, &c., it indicates approaching dissolution. But it may also occur, although not as a consequence of serious disease, as in these circumstances, in cases of nervous debility, during attacks of faintness, or it may usher in hysterical syncope or catalepsy, and be unattended by any danger.

175. *b. The motions and degree of expansion of the chest* vary much in different individuals in the same disease. The *motions* of the chest, in the several thoracic regions, should be observed when the clothes are removed; and any difference in the degree or extent, or quickness of motion in either side, ought to be noted. Uniformity of the motions of both sides of the chest is an indication of more or less uniformity of the states of the parts contained in each. But if this uniformity is only partial, if it be absent in any region, pleuro-pneumonia, tubercular formations, pleuritic effusions or adhesions, or other structural lesions, may be inferred to exist in the region where the motion is impaired or deficient, and the prognosis is unfavourable, or should be given with much caution.

176. According to the degree of expansion of the chest, respiration is *large*, or *full*, or *small*, or very small or shallow. If the breathing be full or large, the chest expanding freely and naturally, the rhythm being equal or normal, a favourable opinion may so far be entertained; but if this state of respiration be also rare or slow, or if the rhythm be unequal, oppression or congestion of the brain, as in nervous fevers, or sopor or coma, or apoplexy should be apprehended, if not actually present; or the accession of convulsions may be expected, especially in children. Respiration may be very great or large, and yet the quantity of air received into the lungs may be very small, the lungs being obstructed by disease of the bronchi or of their substance, or by emphysema or pleural effusions. A *small* or shallow respiration accompanies pleuritis, pleuro-pneumonia, pericarditis, hepatitis, and diaphragmitis, also peritonitis, gastritis and enteritis, owing to the increased pain or uneasiness occasioned by a fuller or larger expansion of the chest; and is an unfavourable sign especially when it is attended by much debility or a sense of sinking, or by some degree of quickness, or by a sudden stop.

177. If the rhythm, or intervals between the respirations, be irregular or of unequal duration, an unfavourable opinion may be entertained, in those diseases affecting the thoracic organs and brain, and in the far advanced period of other severe diseases, more especially if, with irregularity of rhythm, there also be inequality of the fulness, greatness, and quickness of the respiration, a great respiration following, or alternating with a small one. When the respirations are affected by spasms or by sighing, they are exceptions to this rule. A quick respiration, or a small one suddenly cut short, or interrupted by pain, or by the increase of it, is characteristic of pleuritis, pleuro-pneumonia, diaphragmitis, peritonitis, gastritis, &c.

178. *c. The states of the nostrils and mouth* during respiration often indicate the issue at far advanced stages of the disease. The expansion of the nostrils or *alæ nasi* at each inspiration indi-

cates a great want of pure air in the lungs, and evinces great danger in all diseases of the pulmonary apparatus. The patient often breathes entirely by the mouth in diseases of debility or exhaustion, or at an advanced stage of acute maladies, especially in dangerous diseases of the brain, and the low or typhoid forms of fever, the tongue and mouth becoming more parched by the passage of air. During respiration various morbid sounds are produced, chiefly by the posterior nares, and by the larynx and pharynx, which possess some prognostic significance. *Snoring* occurs during the sleep of plethoric, or other persons even in health, when the mouth is partially open, and occasionally in disease, especially in apoplexy. A *stertorous* breathing is always morbid, and is of much more importance than snoring, which is generally produced by inspiration, stertor chiefly by expiration through the nose, and is a dangerous symptom in apoplexy. Expiration entirely by the mouth, with a puffing or blowing sound, is still more dangerous in this malady.

179. *d. The Ease, Uniformity, and Degree of Exertion required in Respiration.*—Respiration, as respects the exertion made in its performance, may be easy, weak, strong, difficult, or strangulating.—(a) An *easy, quiet*, and regular or uniform respiration, without sighing or cough, is always a favourable sign, especially in febrile affections, and always renders other symptoms, which might otherwise be considered severe, less unfavourable, especially quickness of pulse and heat of skin.—(b) A *weak* respiration is characterized by the slowness of the motion of the respiratory apparatus, and by the diminished action of the respiratory muscles. It is a fatal symptom in pulmonary maladies, and in low or nervous fevers. It is chiefly in syncope or faintness, and in catalepsy, in which it is commonly the most remarkable, that it is of the least prognostic importance.—(c) A *full* respiration is generally present in healthy persons during exercise, or in excited states of nervous power and of the circulation. It is present, in varying grades, in all febrile and inflammatory affections, or in disorders of excitement unattended by diseases of the respiratory organs, and it does not indicate danger, when it is uniform, easy, and without pain or difficulty.—(d) A *strong* respiration is a higher grade of the last, and always is attended by some degree of exertion. It occurs in affections of the trachea and bronchi, in congestive pneumonia, in several diseases of the heart, and in the more sthenic states of fever.

180. *e. Difficult respiration—Dyspnœa*—is attended by much more muscular exertion than the former, and is present in asthma, in bronchitis and pneumonia of both lungs, in effusion into the pleural cavities, in obstructive and congestive diseases of the heart and large vessels, in emphysema of the lungs, &c. In this state of breathing, certain modifications may be remarked depending upon the seat and severity of the malady. 1st. The respiration may be *abdominal*, owing to increased action of the diaphragm, and to the consequent motions of the abdomen. This is observed in apoplexy, in certain states and forms of fever, attended by cerebral congestion and exhaustion, in pleuritis, fracture of the ribs. 2d. The breathing may be *thoracic*, the abdomen presenting but little motion; as in inflammation of the liver, or stomach, or bowels, or of the peritoneum—of the last especially; or in ascites, or en-

largement of the spleen or liver; or other changes impeding or preventing the free action of the diaphragm may be present. If the breathing be both thoracic and abdominal, great difficulty of, or obstruction to, respiration manifestly exists in the organs contained in the thorax, or in the respiratory passages. 3d. According as certain muscles are called into action during breathing, the degree of difficulty may be determined and the severity and danger of the malady inferred.

181. The more that the action of the upper ribs co-operates in enlarging the thorax—the more high the thoracic movements are observed—the *respiratio sublimis*—the more difficult is the breathing, and the more dangerous is the malady, as in hydrothorax, the advanced states of diseases of the heart and pericardium, in bronchitis of both lungs with mucous accumulations, in congestive pneumonia, in tracheitis, &c. In the more extreme cases of this kind, but chiefly in croup, laryngitis, œdema of the glottis, &c., the muscles of the neck are also brought into action, and the muscles also of the face are often also sympathetically affected. In the maladies just now mentioned, the motions of the thyroid cartilage upward and downward with each forced expiration and inspiration are extensive and remarkable. When the motions extend to the mouth and nostrils in difficult respiration, the danger is extreme. The act of inspiration is most difficult, from its commencement, in the several states of croup, laryngitis, inflammation of the epiglottis, in laryngismus stridulus, and in all affections of the glottis: it is most difficult towards the termination when the disease is seated within the thoracic cavity. In some cases of difficult respiration, the patient can take a deep and full inspiration, and yet he breathes with difficulty and frequently. In these the heart or brain, or some other organ, but not the lungs, is affected. In bronchitis, in tubercular consumption, in asthma, and in emphysema of the lungs, expiration is often more difficult than inspiration.

182. In the acute diseases of the thoracic organs, the degree of dyspnoea is not always proportionate to the severity of the attack, or to the amount of organic change. But in all acute cases, a laboured respiration is always unfavourable, especially when it is continued. And in chronic affections of these organs, a gradually increasing dyspnoea, without remission, is even still more unfavourable. Dyspnoea is always greatest when both lungs are affected; and when it is consequent upon the retrocession or disappearance of acute eruptions, especially in the exanthemata, it is always a dangerous sign. If the dyspnoea be attended by profound debility, or lividity of the lips, or gums, fingers, &c., death is near.

183. *f. The sensations experienced during respiration* are most important. These are chiefly pain, anxiety, a sense of strangulation or suffocation, and a feeling of impending dissolution. Pain is felt, chiefly during inspiration and towards the close of the act, in pneumonia, in pleuro-pneumonia, in pleuritis, &c., and at the commencement of the act in pleurodynia, acute pleurisy, peritonitis, &c. If it be experienced only when taking a full respiration, adhesions of the lungs to the costal pleura are probably present; but inflammatory action may, in those cases, exist in the lungs, or even in other organs, according to the seat of pain, when thus excited.

In bronchitis, bronchial catarrhs, and influenza, the pain is often felt most, at the advanced stage, or towards the termination, of the act of expiration. Pain in one or other of the regions of the chest may be constant, but more or less aggravated during respiration, or it may be experienced only during this act, or not be felt unless the inspiration or expiration be full and deep. Pains about or below the collar-bones, shoulders, shoulder-blades, in the back, or between the shoulders, are frequent in tubercular consumption, and may exist independently of inspiration, although often increased by it. When thus increased and experienced towards either side of the sternum or towards the angles of the ribs, or even in the back, chronic adhesions exist, or are being formed, between a portion of lung and the ribs. Pain in the sternum, not aggravated by full respiration, is often syphilitic; if aggravated or caused by respiration, especially expiration, it is produced by bronchitis, or inflammation of the mediastinum. Pain in the cardiac region, if it be continued, but aggravated by breathing fully, or if it extends to the left shoulder and arm, may depend upon carditis, pericarditis, or endocarditis, more especially if rheumatism of some joint or part have preceded it, or accompany it. If the pain continue in the same part, it indicates acute or chronic inflammation of the subjacent structures. If the pain shift about, it may be owing to hepatic congestion, or to some other biliary disorder, or to rheumatism or pleurodynia. Pain in the right shoulder, and under the right shoulder-blade, is generally caused by disease of the liver. When pain is increased by pressure, it may be attributed to pleurodynia, or pleuritis, or to pericarditis. The motions of the arm and chest increase the pain of pleurodynia. A dull pain, a feeling of weight or oppression, or tension, attends pneumonia, congestion of the lungs or heart, dropsy of the thoracic cavities, and enlargements of the liver or spleen, especially when great, and in certain positions of the body. Intensity of pain is seldom proportionate to the severity of the disease of the thoracic viscera. It is generally greatest or most acute when the attack is sudden, extensive, and seated chiefly in the serous tissues. In most cases, when the pain is increased, or is induced, by full respiration, there is more or less anxiety.

184. *g. Anxious respiration* is most frequent during congestive states of the lungs, heart, large blood-vessels, and brain; but more especially in diaphragmitis, pleuritis, in disease of the valves or orifices of the heart, in fatty softening of the substance of this organ, and towards the fatal termination of inflammations of the lungs, bronchi or pleura, and of thoracic dropsy. It is always an unfavourable symptom. A *strangling* or suffocative respiration occurs chiefly in croup, laryngitis, and other affections of the larynx or trachea. Respiration may be attended by a feeling of impending dissolution, especially when it is frequent, short, and difficult, especially in angina pectoris, in the organic lesions of the heart, &c., in some cases of spinal paralysis, in all of which it is a very unfavourable symptom. If the feeling be caused by the accession of syncope, the prognosis is very different, unless the syncope proceed from disease of the heart.

185. *h. Other phenomena* are presented by the breathing that deserve notice. When the respiration is healthy, it is not attended by any sound which can be heard by the ear when removed



from the chest; but in cases of difficulty, especially in the states now described, various modifications of sound may be heard. The sounds of inspirations and expirations become audible, and even somewhat loud, during or after physical exertion, especially ascending eminences, and at the same time frequent, strong, and deep. Respiration is *suppirious* or sighing, during states of mental anxiety and depression, of pulmonary, and of cardiac congestion, in cases of nervous depression or exhaustion, in hysteria and in hypochondriasis, and in hepatic or biliary congestion. Recovery from faintings, syncope, hysterical paroxysms, and from catalepsy, is attended by *suppirious* breathing. *A panting or gasping* respiration is observed chiefly in the most extreme or dangerous cases of thoracic disease, and in the same circumstances as have been noticed in connexion with the most difficult states of respiration, of which this is the most fatal. It often terminates life in cases of pneumonia or of bronchitis, or of congestion of both lungs, in the advanced states of organic disease of the heart, of hydrothorax and hydro-pericarditis, and in diseases of the larynx and trachea. In these last, in asthma, in edema of the glottis, and in hysterical affections of the throat and neck, the breathing is often also suffocative or strangulating, and attended by a *sibilous* or *hissing* sound. In the spasmodic states of the larynx, as in laryngismus stridulus and whooping-cough, the sound is *crowing*, *loud*, and *stridulous* at each inspiration, ultimately ceasing in a short time, or becoming strangulating and suffocative, and terminating life with the usual phenomena of asphyxia. As to the sounds of respiration in the several regions of the chest, on *Auscultation*, I must refer the reader to that head.

186. *i* *States of the expired Air in respect of Temperature and Odour.*—*A.* The temperature of the expired air is always more or less above natural in sthenic inflammations of the lungs, bronchi, and pleura, during inflammatory fevers, and in the state of vascular excitement in continued and periodic fevers. It is slightly lower than in health in states of vital depression, especially in congestive affections of the thoracic organs, and in disorders of debility: and it is much lower in the last or the advanced periods of fevers, particularly the adynamic, the typhoid, and the malignant, and in the asthenic forms of the exanthemata. It is lower still, being almost cold and raw, in the choleric pestilence, and in the extreme or fatal states of congestion, when the changes produced by the air on the blood cease, or nearly cease to take place.

187. *B.* The odour of the breath varies much. In perfect health it is sweet or pleasant; but during disorders of the digestive organs, it is foul, loaded, or unpleasant. It is more or less unpleasant, in cases of dyspepsia, during flatulence and costiveness, and during the catamenia, when the odour is peculiar. It may be rendered very unpleasant by several articles even during health, as by eating onions, leeks, asafetida, garlic, &c. The odour of the breath of those attacked by continued, exanthematous, malignant, and pestilential fevers is most unpleasant and infectious, especially to the predisposed. In those the odour is particularly disagreeable, and the humidity of the expired air is often unusually great, and loaded with animal matter, especially at an advanced period of these maladies, as shown by

breathing on a mirror or on any cold polished surface.

188. A disagreeable odour of the breath is present also in scurvy; in cancerous diseases of the stomach, mouth, uterus, &c.; in malignant sore throat; in gangrene of the lungs; in constipation of the bowels, and frequently in diarrhœa, especially in the diarrhœa precursory of pestilential cholera, and in asthenic dysentery. In this last and in chronic diarrhœa, an earthy or cadaverous odour of the breath is a most dangerous sign. In verminous complaints and in chlorosis the odour is sweetish, or resembles that of new milk. There are several other topics connected with respiration, but certain of them have received a special notice under their respective heads, as *Cough*, *Hiccough*, *Voice* and *Speech*, and to those the reader is referred. It therefore only remains to consider at this place the *expectoration* and the *signs connected with expectorating*.

189. *ii.* THE EXPECTORATION furnishes much information as to the nature, seat, and issue of disease, especially of pulmonary diseases. It may consist, 1st, of morbid mucus; 2d, of purulent mucus; 3d, of purulent mucus containing portions of tubercular matter; 4th, of pus or ichorous matter; 5th, of blood, or blood conjoined with either of the preceding; 6th, of fibrinous substances moulded in the bronchi; and, 7th, of calcareous matter, or hard concretions formed in, or the remains of tubercular deposits. In order to form a correct idea of the various matters thrown off the respiratory passages, the appearance and composition of healthy mucus from these passages should be noticed. There is, however, much difficulty in obtaining healthy mucus from these sources, as it is more or less altered from the normal state when excreted in such quantity as admits of its examination, and it is so mixed with the secretion of the bronchial glands, and so changed by the air, and the states of the air in certain localities, as to modify its condition very remarkably. The mucus of the bronchi is propelled along these canals by the ciliary motion on the surface of the mucous membrane, and by the respiratory functions. The mucus excreted is a viscid, tough, and tenacious or stringy matter, which is often clear or colourless, but more frequently it is turbid, of a grayish, or faint yellowish white tint, and of semi-fluid consistence. According to SIMON, it consists, chemically, of a varying proportion of water and of the following constituents—namely, mucus-corpuscles, epithelium-cells, mucin, small quantities of extractive matters and fat, chlorides of potassium and sodium, alkaline lactates, a little carbonate of soda and phosphate of lime, and sometimes a minute quantity of albumen.

190. *A.* *Morbid mucus* is produced chiefly by catarrh, bronchorrhœa, and by bronchitis; and in these especially, as well as in several other diseases, it is often produced in great quantity, and in various states. The quantity, as well as the appearances, of the pulmonary sputa depends much upon the quantity of water or serum, and of albumen, with the other ingredients just mentioned. The sputa are most watery or serous in bronchorrhœa, and in congestive and oedematous affections of the lungs; they are most viscid and albuminous in the inflammatory states of the bronchi. In these states the sputa are whitish, or of a pale yellow colour, and float in water. They possess a certain degree of consistency, and

feel slimy in consequence of the mucin connecting the mucus-corpuscles.

191. *B. Purulent mucus* from the lungs contains much less mucin than normal and morbid mucus; and consequently, the sputa have not the toughness, lubricity, and consistence of mucus unmixed with pus, and have a decided tendency to dissolve. In bronchitis and other affections of the lungs, the transition from morbid mucus to purulent mucus is so slight, that it is hardly possible to detect the first traces of pus mingled with the mucus—or to determine the presence of a little pus in mucus, or of a little mucus in pus. Purulent mucus sinks more quickly in water than the healthy secretion, owing partly to its containing less air, and partly owing to the greater quantity of albumen and of chlorides and higher specific gravity. Equal proportions of mucus and pus readily sink in water. A small amount of pus separates from the mucus when placed in water. Phthisical sputa, which commonly consist of purulent mucus, deposit a whitish granular sediment at the bottom of the vessel, while masses of mucus are still floating on the surface of the water.

192. *C. Purulent mucus with softened tubercular matter* is observed in the second and third stages of phthisis. Most of the expectoration in the malady proceeds from the chronic bronchitis which accompanies it. When the sputa are placed in a glass vessel containing water, then minute portions of softened tubercle, or much larger fragments, may be detected either adhering to the mucus or sunk to the bottom of the vessel, with the granular sediment consisting chiefly of the purulent portion of the excretion. These fragments of softened tubercle consist either of whitish streaks, or yellowish white masses, resembling portions of boiled rice, or of greenish white matters, of irregular shapes. (See *art. TUBERCULAR CONSUMPTION*.)

193. *D. Pus and Ichorous Matter.*—*a.* Pus may proceed from three sources: 1st, from violent inflammatory irritation of the bronchi; 2d, from inflammation of the parenchyma of the lungs; or, 3d, from a vonica or abscess opening into the bronchi. This last is comparatively rare, and pure pus is very seldom produced by the first and second sources. Violent irritation of the respiratory passages may cause the formation of pus in place of the mucous secretion. Hence the production of pus is owing to a greater intensity of the same morbid action which, in progressive grades, produced morbid mucus and purulent mucus; but it may be assumed that even in this highest grade a small proportion of mucus may still be present. Genuine pus is a somewhat thick fluid, viscid, but capable of separating in drops, like cream, of a whitish yellow, yellow, or greenish yellow colour, and of a faint animal odour. It may be slightly acid, or slightly alkaline, or even neutral. When mixed with water it soon sinks to the bottom, and on stirring it forms an emulsive fluid from which a sediment of pus-corpuscles is soon deposited. When examined under the microscope, pus appears, like mucus, to consist of a clear fluid in which small, round, and occasionally oval corpuscles are swimming, the quantity of which is in a ratio with the thickness of the pus. Pus and mucus corpuscles closely resemble each other in form and chemical relations. Their sizes are nearly the same; but the nuclei of the former become more distinct

than those of the latter when the corpuscles are treated with acetic acid.

194. The *liquor puris*, or fluid in which the corpuscles are contained, is transparent, and usually of a pale yellow colour. It contains so large an amount of albumen, that on the application of heat it becomes white, and very flocculent. The large amount of albumen, and of the chlorides, especially the chloride of sodium, associated with a small quantity of fat, distinguishes the fluid portion of pus from the consistent and adhesive fluid of mucus, and indicates the affinity between the liquor puris and lymph. The fat is chiefly contained in the pus-corpuscles, the nuclei probably containing a large proportion of it. In the liquor puris the fat is combined with alkalies.

195. It appears from the researches of GRUBB, SIMON, and others, that pus consists of two distinct portions: 1st. A fluid, or liquor puris; 2d. And of corpuscles swimming in this fluid, and insoluble in it. The corpuscles are surrounded by a capsule which becomes tumid in water, is soluble in free potash, and is reduced by ammonia to a thick viscid jelly, dissolves on prolonged gentle digestion, and is doubtless composed of mucin. Of the nature of the contents of the corpuscles lying between the nucleus and the capsule nothing is known. The nucleus probably consists of albuminous matter and fat. The liquor puris contains much albumen, some fat, pyin or dissolved mucin, extractive matter and salts. In pneumonia, as the chlorides, especially the chloride of sodium, are increased in the sputa, they are diminished, or disappear in the urine.

196. An *ichorous matter* is sometimes expectorated when gangrene of a portion of the lung takes place, and in malignant growths in the lungs. It may either proceed from a decay or other change of pus, or be secreted from the gangrenous or malignant part. This matter is thin, discoloured, of a brownish or reddish tint, and emits a fetid odour. It often either contains no pus globules, or very few, and those are broken down. Although ichor is of a reddish colour, it may not contain blood-corpuscles, these corpuscles having been dissolved in the morbid fluid, and having thereby imparted this colour to it. Mucus, or muco-puriform matter, may be expectorated with it in greater or less proportion, owing to the irritation of the bronchial membrane over which it passes during the process of its excretion. The presence of this matter is always indicative of great danger. Recovery may, however, take place when it proceeds from gangrene of a small or isolated portion of the lung.

197. *E. BLOOD* may be present in any of the states of the sputa already described. It may form, in a pure and unmixed state, the whole or the chief amount of the expectorated matter, or accompany more or less of either of the preceding kinds. It may merely streak or dot the sputum, or be so intimately mixed with it as to give it a pinkish, reddish, rusty, or brownish hue. When the blood is at all considerable, it proceeds from one or other of the sources described when treating of HÆMORRHAGE from the respiratory organs: it may be caused by interrupted circulation through the heart, or by congestion of this organ, or by congestion of the lungs and bronchi, with or without congestion of the heart, or by the irritation or congestion produced by tubercles, or by inflammatory action, or by the ulceration or erosion of vessels in tubercular cavities, or by



disease of the coats of the capillaries or arterial ramifications. It was the fashion, formerly, to ascribe all hæmorrhages from mucous or villous surfaces to an exudation from the capillaries of these surfaces; but this, although a common source, especially when congestion or inflammatory irritation exists, does not always or even generally obtain, for ulceration or erosion of vessels, and disease of their coats, especially sucty or atheromatous deposits in them, favouring their rupture when congested, are not infrequent sources of hæmorrhage, especially when the discharge of blood is large or very considerable. When the bloody expectoration is small in quantity, it commonly proceeds from exudation, owing either to congestion and relaxation of the capillaries, and then it is rusty or dark-coloured, as in congestive or asthenic pneumonia, or to inflammatory irritation of the bronchi adjoining the inflamed portion of lung, and then the blood is of a more florid red, in very small quantities, and mixed with a muco-purulent matter, as in sthenic pneumonia and in tubercular consumption.

198. When blood has been expectorated in either large or small quantities, it often continues to colour the sputa for several days afterward, the colour generally passing from a dark red to a brown, or rusty, to an ochrey and greenish hue, as the quantity of colouring globules diminishes or becomes altered in the containing fluid. Extravasated blood always occasions more or less irritation in the mucous surfaces over which it passes, and hence a more copious expectoration of morbid mucus or of muco-purulent matter follows the hæmorrhage, and continues for a longer or shorter period, according to the nature of the primary and consecutive changes. When blood is present in the expectoration in a quantity merely sufficient to colour the expectoration, and is intimately mixed with it, pneumonia is certainly present, the variation of the tint from red to brown, or from a reddish brown to that of prune juice, indicating the failure of vital power. If the blood merely appears in minute streaks or spots, severe catarrh or bronchitis may only exist; but if it occur in larger spots or patches, pneumonia or phthisis is commonly present. When the spots of blood are found in a copious turbid or muco-purulent expectoration, then phthisis or very severe bronchitis exists. When they are seen in thick yellowish or greenish-yellow and rounded sputa, then pneumonia may be inferred: in these cases the prognosis is very unfavourable. A frothy, fluid, and bright red blood is usually an exudation from the bronchial membrane in phthisis. Dark-coloured blood, without froth, and without muco-purulent expectoration, and in large or considerable quantity, proceeds generally from congestion, or from erosion of vessels in a tubercular cavity, or from pulmonary apoplexy. Clear fluid blood, without froth, and in large quantity, comes either from aneurisms, or from eroded or diseased vessels.

199. The bleeding may proceed from the pharynx, or even from the posterior nares, and, owing to the irritation produced by it in the glottis or epiglottis, occasion a hawking cough; but in these cases, redness is generally observed in the throat. The bleeding may be vicarious of menstruation or of hæmorrhoids, or be consequent upon the suppression of either; and if in these cases there have been no antecedent symptoms of phthisis, the blood may proceed chiefly from

the bronchial surface; but even in these it is often followed by, or connected with, either bronchitis or tubercular deposits. When the bloody sputa occur in fevers, and in the course of cardiac disease, the prognosis should be very unfavourable: it may be less so when bloody sputa are observed in scurvy and purpura. In all these cases numerous concomitant and antecedent circumstances should be taken into consideration.

200. *P. FIBRINOUS EXUDATIONS* take place, in rare cases, in chronic and in sub-acute states of bronchitis, and are moulded in the ramifications of the bronchi. They are generally expectorated in the form of the bronchial tubes, and present various extents of ramification and degrees of firmness and tenacity. These ramifications are very rarely hollow: they are commonly either filled with a softer matter, or are firmer in the more external layer. They resemble the false membranes or fibrinous exudations formed in the larynx and trachea in croup; and which are frequently thrown off in that disease accompanied with more or less gelatinous or glutinous mucus. (See *art. BRONCHI*, § 49, and *CROUP*, § 33.)

201. *G. EARTHY OR CALCAREOUS CONCRETIONS* are sometimes expectorated by persons who have had phthisical symptoms and recovered, or who are still suffering them in a chronic form, or have suffered in various grades for several years. I have seen many of these cases. These concretions vary in size from that of a head of a pin to that of a small bean. Their surfaces are generally unequal, irregular, and ragged. The expectoration of them may or may not be attended by much sputa, which may or may not be coloured with blood: most frequently the sputa are scanty, and are only minutely streaked or dotted with blood. A medical man called upon me, complaining that on each inspiration and expiration, but during the latter especially, there was a loud whistle, which could be heard at any distance in the room from him. He had neither cough nor expectoration, and he stated that he had not experienced either for several years. He was a fluent and eloquent speaker and lecturer, and never experienced any inconvenience from speaking for a long time; but many years ago, he had had some pulmonary symptoms. I told him that one of these concretions, of considerable size, was making its way through the parietes of one of the large bronchi, and that he would expectorate it in the course of a few days. He did so, the concretion being the size of a large pea. He is quite well at this time. A relative of my own has expectorated many of them, at different periods, the largest being the size of a small bean. She has been the subject of chronic phthisis for many years, but is now able to be about and go out of doors.

202. *H. THE EXPECTORATION IN THE SEVERAL FORMS OF DISEASE OF THE RESPIRATORY ORGANS* has been fully described under the separate heads of CATARRH, COUGH, BRONCHI, THE DISEASES OF, HÆMORRHAGE from the respiratory organs, LUNGS, THE DISEASES OF, PLEURA, TUBERCULAR CONSUMPTION, &c.; but it will, nevertheless, be useful to give at this place a brief *resumé* of the appearances of the sputum in those maladies in which it is present in increased quantity or altered quality.—(a) In *dry catarrh* the sputa are scanty, and consist of small pellets of tough, grayish, or greyish-yellow mucus, which are expectorated

after severe fits of cough.—(b) In *pituitous catarrh*, the sputa are much more abundant, and thin or watery, consisting of a serous mucus, containing albumen and mucin. This expectoration varies much in quantity and appearances, with the severity of attack, the congested state of the lungs, and with its complication with rheumatic or cardiac affections.—(c) In *bronchorrhœa* the expectoration is watery or serous, most abundant, and sometimes extremely so when complicated with pulmonary congestion or cardiac disease.—(d) In *acute bronchitis*, little or no expectoration occurs at first; but a liquid, slightly saltish sputum is soon formed, which gradually increases with the progress of inflammation. It is at first transparent, nearly colourless, moderately viscid, retains many small air bubbles, and is frothy on the surface, especially when expectorated after much coughing. When expectorated in the same vessel, the sputa coalesce, and may be drawn into aropy stream. The viscosity of the sputa is in proportion to the severity of the inflammation, of the fever, and of the dyspnoea. As the disease declines, the sputa become pearly, opaque, or of a yellowish or greenish white, and more consistent and glutinous. If a relapse or exacerbation takes place, the expectoration becomes thinner, more transparent, glairy, and frothy. As amendment advances, the sputa are more readily coughed up, and in more distinct pellets, which do not so readily unite into one mass as before. They gradually diminish in quantity.—(e) In *chronic bronchitis* the sputa vary much in different cases, and in the same case at different periods. They are frequently similar to the sputa at an advanced period of the acute form. They are often opaque, yellowish or greenish-white, owing to an admixture of a muco-purulent matter of this hue with mucus, and a watery or serous fluid. Sometimes the thick, opaque matter floats in the pituitous or serous fluid expectorated with it. In other cases, the mucus is inspissated, fibrinous, and moulded into the shape of the bronchial ramifications (§ 200).

203. (f) In *pneumonia*, the sputa, after the first two days, consist of a viscid, transparent fluid, tinged with an orange or rusty hue. At first they resemble the sputa of acute bronchitis, and they may be poured from one vessel into another in the form of viscid strings. At a more advanced stage, the sputa become so glutinous and viscid as not to leave the vessel even when inverted. They are also more streaked with blood, or red, or rusty. As the disease declines, the sputa assume the first or bronchitic appearance. In unfavourable cases, the expectoration becomes more viscous, more rusty, brown, opaque, or purulent. In some still more unfavourable cases it is altogether suppressed, owing to its viscous nature, and the want of power to throw it off; suffocation taking place, with lividity of the prolabia and extremities. In other unfavourable cases, the expectoration assumes the form of a deep, reddish-brown and slightly viscid liquid, like the juice of preserved prunes or liquorice water. This appearance indicates the existence of suppuration, or of a cachectic state of inflammation which has gone on to softening or purulent infiltration. The characteristic sputa of pneumonia, or pleuro-pneumonia, are orange, greenish-yellow, reddish, bright-red, or streaked or dotted with red, or rust-coloured, according to the amount of red globules contained in them.—(g) In *pleu-*

*risy*, the expectoration is scanty, mucous, or muco-serous, or resembles that in the different forms of catarrh.

204. (h) In *phthisis*, the expectoration is varied according to the stages of the disease, and is chiefly from the bronchi during the whole course of the malady, and altogether from them during the first and second stages. In some states of phthisis, little or no expectoration takes place throughout, or not until shortly before death. In the first stage there is either no expectoration, the cough being dry, or it is of a simple catarrhal or bronchitic character, or sero-mucous, and more or less abundant, especially when the lungs are thickly studded with tubercles, a mucous rhonchus being generally heard on auscultation. In the second stage, the expectoration continues as in the first, or assumes a more bronchitic character, or passes into the muco-purulent form of chronic bronchitis, until the softening and evacuation of the tubercular deposits. When the softened tubercles make their way into the bronchi, the irritation of these canals is increased, the mucous or muco-purulent expectoration is augmented, and contains whitish streaks, or whitish-yellow fragments, consisting of the softened tubercles. As the softening and formation of a cavity proceeds, the sputa assume farther changes, which have been already noticed above (§ 192), or fully described in the article on TUBERCULAR CONSUMPTION.

205. (i) The sputa are *evacuated* or *expectorated* with various degrees of ease or of difficulty, according to the nature and stage of the disease, the state of the sputa, the age and the strength of the patient. They may be hawked up with much ease, in some cases, or coughed up with more or less difficulty in others. They may be expectorated and swallowed, as in children, and sometimes in adults, when they are not very abundant. The rapid, violent, and loud expiration, by which expectoration is generally effected and cough produced, is caused by irritation existing in, or sympathetically propagated to, the larynx. Cough may thus be occasioned either by the irritation of sputa, when they reach the larynx, or sympathetically by disease in any part of the respiratory apparatus, or by disorders of the stomach, œsophagus, or pharynx and fauces. In the former case, expectoration follows the cough; in the latter, there is no sputum, or very little. (See *art. COUGH*.) The more viscous the sputum, the more difficult is the cough, especially in bronchitis; the cough often becoming suffocating or even strangulating as the sputum passes the larynx, as in croup, and the bronchitis of old persons, especially at a far-advanced stage. As the strength of the patient sinks, the morbid secretion accumulates, is expectorated with greater difficulty, sometimes becomes more viscous, and hence still more difficult of discharge, the functions of the lungs are impeded, and ultimately arrested.

206. iii. YAWNING and SIGHING are nearly related phenomena, both consisting of prolonged inspirations, and both indicating nervous weariness or exhaustion; or the depression depending upon mental longings, fatigue, or approaching sleep. They are often present during the more slight states of congestion of the lungs, or heart, or large vessels; and they are generally of service in relieving these states, by accelerating the circulation, and by more fully dilating and supplying



the air-cells with fresh air. They are frequently observed during the premonitory and invading stages of acute or febrile diseases, and in states of nervous exhaustion and general debility. While yawning is most frequently a sign of *ennui*, or of mental vacuity and fatigue, sighing is most commonly a sign of mental depression, melancholia, or hysteria.

207. iv. SNEEZING is a reflex, spasmodic action of the respiratory muscles, consequent upon irritation or titillation of the Schneiderian membrane. It consists of a deep inspiration followed by a sudden and violent expiration, by which the air is driven out through the nose and mouth with much force and an audible noise. It is most commonly occasioned by an incipient catarrh; but it may occur from various causes of irritation implicating the nasal and respiratory passages, and as a sympathetic phenomenon in hysteria and in verminous disorders. It sometimes, when frequently repeated, precedes or ushers in an attack of apoplexy or palsy.

208. Of *laughing* and *weeping*, it is unnecessary to remark farther, at this place, than that they are chiefly manifestations of certain opposite states of mental emotion; that they occur chiefly in susceptible, and often weak minds; and that they are characteristic phenomena of the hysterical paroxysm. They are sometimes of use, the latter especially, in moderating the emotions; laughing, by its mechanical stimulus, or its succussions, transmitted to the biliary apparatus; weeping, by proving a serviceable derivation from a congested brain, or an overloaded or congested heart and large vessels.

209. VI. SYMPTOMS AND SIGNS CONNECTED WITH THE URINARY AND SEXUAL ORGANS.—The signs furnished by the urinary and sexual functions and organs are of the greatest importance, as respects not only the diseases of these and of related organs, but also numerous maladies of distant parts and of the whole frame. Those signs which more immediately belong to diseases of these organs are described in the articles upon these diseases, especially in those treating of the KIDNEY, of LEUCORRHEA, of the OVARIA, of the URINE, URINARY BLADDER AND PASSAGES, of the UTERUS and VAGINA, and of the VULVA.

210. i. THE SIGNS FURNISHED BY THE URINARY EXCRETION.—The signs connected with the urinary functions divide themselves into, 1st, those which are connected with the chemical and physical states of the *urine* itself, and, 2d, those which depend upon the modes of *excreting* the urine. The first of these are discussed in the article URINE, and several of both the first and second are directly dependent on diseases of the URINARY ORGANS. Both orders of signs may appertain either to diseases of these organs, or to diseases of the brain or spinal cord, or to maladies implicating the whole frame, as pestilential, malignant, or exanthematous fevers; or to disorders of the digestive, assimilative, the excreting, and the sexual organs. The great interest which thus necessarily attaches itself to states of the urine, and of the excretion of it, will become at once apparent, from the connexions just enumerated. Reserving, however, the chief topics connected with these subjects for the articles just mentioned, I shall merely glance, at this place, to a few of those which are of less importance, and which are signs merely of disorders of distant organs, or of constitutional maladies. Of the states, changes, and

chemical conditions of the urine, I have treated at another place (see art URINE): I now notice merely changes in the function of excreting it.

211. A. *The excretion of the urine* may become difficult, painful, changed, or arrested; and the *secretion* of it may be scanty, or altogether suppressed, the excretion being similarly affected. Difficult excretion of urine may amount to what has been termed *dysuria*, in a lesser grade, and to *stranguria* in its higher grade: the former requiring much effort to empty the bladder, the latter strong efforts to discharge the urine, and chiefly by drops or small quantities. *Ischuria* has been used to express the suppression or the retention of urine—*ischuria renalis*, when none is secreted, and *ischuria ureterica*, or *vesicalis*, or *urethralis*, according to the seat of obstruction.—a. *Dysuria* and *strangury* may proceed, 1st, from diseases of the urinary organs and passages; 2d, from the conditions of the urine itself, or from the presence of a calculus or calculi in the bladder or urinary passages; and, 3d, from disease of either adjoining or distant viscera, as in cases of dysentery, of hepatic or splenic disease, or of uterine or ovarian lesions. Neither dysuria nor strangury should be viewed as devoid of risk, whenever observed. If either occur in aged persons, or in those who have previously experienced disease of the urinary organs or passages, a most minute examination should be instituted to ascertain the nature and seat of lesion, from which alone the amount of risk or danger should be inferred.

212. b. *Ischuria* may more correctly be divided into that of *suppression* and that of *retention*. The *suppression* or non-secretion of urine is caused, 1st, by inflammation or structural changes of the kidneys themselves; 2d, by congestions, inflammations, or other alterations occurring in the course of exanthematous or other fevers, or pestilences; 3d, by organic or other maladies of the brain, spinal marrow, or their membranes. In all these circumstances, the ischuria is a most dangerous sign, inasmuch as it consists of the suppression of a function by which the principal part of the injurious, effete, and irritating materials accumulating in the blood is eliminated and discharged; the arrest of the function being necessarily followed by very manifest alterations of the blood, by an uncommon excrementitious plethora, and by effusions in shut cavities and cellular parts, by coma and death, unless restoration of the excretion take place before these results have reached an irremediable extent. The *ischuria suppressionis*, in the three classes of disease in which it occurs, is nearly equally dangerous; as respects the general results, it is least so in inflammation or congestion of the kidneys; it is most dangerous, or commonly fatal, in diseases of the brain and spinal cord, and it is not much less dangerous when it occurs as a complication of exanthematous or other fevers or pestilences. In scarlet fever, the kidneys are often asthenically inflamed or congested to an extent incompatible with the performance of their functions, the excrementitious matters and fluid which should be excreted by them thereby accumulating in the blood. In pestilential cholera, the ischuria is a consequence of the excrementitious fluid of the blood being all discharged by the digestive canal and skin, none being left that can be removed by the kidneys; other excrementitious matters, however, accumulating in the blood, owing to the suppression of the renal function, and consecutive-

ly inducing secondary fever and fatal complications.

213. *c. Ischuria retentionis*—the ischuria of retention, or of obstruction—may take place either in consequence of an obstruction at the outlet of the pelvis of one or both kidneys, or in the course of the ureter, by a calculus, tumour, or any other lesion, or by inflammation, suppuration, &c., implicating either or both these. In all these cases the urine may be secreted, may accumulate in the pelvis of the kidneys or ureters above the seat of obstruction, and none may reach the bladder. But the *ischuria of retention* most frequently occurs in consequence, 1st, of *paralysis* of the coats of the bladder, consequent upon disease or injury of the brain, spinal cord, or their membranes; or of congestion of the nervous centres and paralysis of the bladder, in the course of typhus or low fevers; and, 2d, of *obstruction* to the discharge of urine from the bladder, sometimes caused by spasm, but more frequently by disease near to, or in the neck of, the bladder or urethra, as diseased prostate, impermeable stricture, the impaction of a calculus, &c. In all these circumstances ischuria is attended by more or less danger, but the amount of danger altogether depends upon the exact nature and seat of lesion, in respect of the urinary passages, upon the age and sex of the patient, and the progress and duration of the pathological lesion by which the ischuria is caused.

214. *d. Ischuria* may occur, however, in hysterical females—*Ischuria Hysterica*—and may depend upon either congestion of the spinal cord, and paralysis of the bladder, or upon spasm of the cervix vesicæ; most probably upon the former. Several cases of this form of ischuria have come under my notice, in which the urine required to be drawn off twice or thrice daily, yet complete recovery has ultimately taken place. It is generally caused by masturbation, and is sometimes feigned.

215. *B. Inability to retain the urine*—*Incontinentia Urinæ*—*Enuresis*, occurs in various forms. It may follow ischuria, or may take place even in connexion with over-distention of the bladder; the coats of this viscus having been so over-distended as to have lost the power of contraction and of evacuation. In this case, there is a constant dribbling of the urine. In such cases the prognosis is unfavourable, and especially in aged persons. The incontinence may proceed from the state of the urine itself, especially when, owing to disease of the kidneys, it contains either blood or albumen; but this form consists rather of frequent calls to pass urine, the quantity being small, than of absolute incontinence. Very frequent calls to micturate occur in most inflammatory diseases of the urinary organs, and more especially in those affecting the bladder. In such cases, these calls take place as soon as a spoonful accumulates in this receptacle. This incontinence may also proceed from ulceration of the inner surface of the bladder, or from disease of the neck of the viscus, or from calculi, or clots of blood, or from foreign bodies, in the bladder, or from paralysis of the neck of the bladder. The paralytic state is most frequent in aged persons, in those who have previously suffered diseases of the urinary organs, as a consequence of stranguity or ischuria, or of disease of the spinal cord or its membranes, and as a complication of typhus or of low fevers; in all which circumstances it is a very dangerous symptom.

216. *C. Frequent calls* to pass urine, more or less being passed on each occasion, sometimes occur in nervous persons, especially during states of mental anxiety or expectation; and in hysterical females. In many instances, the quantity of pale urine passed on one, or on several occasions, in connexion with hysteria, is often surprising. In these, this symptom need not create much anxiety; but in all cases of frequent calls to micturate, especially during night, the urine ought to be tested, in order to ascertain the presence of albumen, or other substances in it. Whenever this complaint occurs, the state of the urinary organs and the habits require attention, and should be ascertained in connexion with the physical state, the quantity, and the chemical condition of the urine itself, and with the functions of the digestive and circulating organs.

217. *D. An external examination of the abdomen* should always follow the recognition of the symptoms and signs connected with the urinary organs and urine. Percussion will aid in ascertaining the existence of enlargement of the kidney, or of distention of the bladder. Increased size of the kidney, or the accumulation of fluid in the pelvis of the organ, may be inferred, when, with marked dullness on percussion, there is also a fulness or tumour felt, while the region between the lower ribs and margin of the ilium is pressed forward, the thumb being gently moved or pressed anteriorly. But the bowels ought to have been freely evacuated before this examination can be confided in. The *sensibility* of the region of the kidney, during this, or any other examination, affords information of great importance in determining the existence of disease of the kidney, especially inflammation and the existence of calculi in the ducts or pelvis of the organ. The ureter may be so distended in ischuria ureterica, or when a calculus is impacted in its lower extremity, as to be felt like a rope in, or closely above the inguinal region.

218. A dull sound on percussion, immediately over the pubis, indicates fulness of the bladder. Pain in this situation is a sign of over-distention; and pain behind or below the pubis is a symptom of inflammation or ulceration of the bladder, or of its cervix, and of stone in the bladder. Disease of the prostate is best ascertained by examination per anum. The existence of stricture, or stone in the bladder, &c., should be ascertained by the sound, by the catheter, bougies, &c. (*See also the articles* DIABETES, KIDNEYS—*diseases of*, PROSTATE, URINE, and URINARY BLADDER.)

219. ii. SIGNS AND SYMPTOMS OF THE SEXUAL ORGANS.—*A. These symptoms in the male* have not generally received that amount of attention which they require, as respects the states of the constitution, the diseases of particular organs, and especially those of the brain and spinal cord. The lesions to which male organs are primarily and locally liable have been ably discussed by modern surgical and medical writers: it is chiefly as to the manner in which these organs are affected, sympathetically, in the course of other maladies, that a brief notice will be taken of them at this place. In health, the testes and penis are well developed, and the scrotum is more or less contracted; the cremaster muscles evincing sufficient tone to draw the testes close to the penis. In rare instances, one or even both testes may not have descended into the scrotum, and may have



been arrested in some part of their course from the abdomen to the scrotum.

220. In *diseases* of vital depression or exhaustion, especially in fevers, in diseases of the digestive organs, and particularly of the stomach and intestines, the dartos and scrotum are no longer corrugated, the cremasters are incapable of contraction, and the testes hang down unusually low. In nephritis, and in calculus or other diseases of the kidney, the cremaster of the same side as that in which the kidney is affected is contracted, the testis drawn up close to the penis, or even to the external abdominal ring, and a darting or aching pain often is felt in the testis of that side, or extends along the cord. In those diseases in which the cremaster and scrotum are so remarkably relaxed, as just stated, the venereal desire is for the time extinguished; but with convalescence from them, especially from fevers, a restoration of the contraction of these parts, and of the sexual desire, is one of the most certain signs of recovery, as evincing a return of nervous power in both the organic and spinal nervous system.

221. Inordinate relaxation of the cremasters and scrotum, often with more or less wasting of the testes, and sometimes with both softness and wasting, takes place in those who have prematurely or inordinately exercised their genital organs or been guilty of self-pollution. By these persons the venereal congress can no longer be either satisfactorily or fruitfully exercised. The seminal fluid is neither sufficiently nor healthily secreted, the organs being rendered incapable of discharging their functions. Hence IMPOTENCY, and one of the causes of STERILITY. (*See those articles.*) Persons who have thus destroyed their sexual functions, or who have greatly weakened them, and those who have been accustomed to sexual intercourse and who have relinquished such intercourse, are often subject to involuntary discharges during sleep, and are thereby more or less exhausted. When these involuntary pollutions are complained of, it may generally be inferred that the individual had prematurely or inordinately addicted himself to sexual excesses or to self-pollutions, and that having become aware of the injury they had produced, and abstained from them, the debility and morbid irritability thereby occasioned still persisting, the sympathetic excitement of a venereal dream proved sufficient to produce a seminal discharge. (*See art. POLLUTION.*)

222. The sexual organs having been so exhausted by premature, or excessive, or unnatural use, as to give rise to impotency, and the feeling of incompetence having taken possession of an individual's mind, so as to prevent him from entering upon the married state, or from exercising these organs, the disuse actually increases the wasting, softening, or decay of these organs, and, with such decay, constitutional vigour, or vital energy, becomes impaired. A very large proportion of bachelors are actually impotent after 30 or 35 years of age, and, being conscious of their prematurely exhausted powers, prudently abstain from sacrificing the happiness of the opposite sex. All are not, however, so prudent, for some marry from various motives, although capable only of exciting a desire which they cannot gratify. Owing to the cause now noticed, the duration of life among bachelors is considerably less than among married men.

223. Loss or increase of sexual desire depend-

ing thus, 1st, upon the states of the organs concerned in the performance of the sexual functions; 2d, upon the activity or excitement of those sources of nervous energy actuating these organs; and, 3d, upon the general condition of the body, it follows that either loss or increase of this desire becomes a symptom of disease in one or other of these quarters. It has just now been shown that the organs destined to the performance of the sexual function may be exhausted, or altogether worn out, or disorganized, by premature or excessive use, or subsequent disease. Nevertheless, the desire may exist, although performance is most imperfect, or even impossible. When this is the case, excitement is present in the sources of nervous power actuating these organs, either in the nervous centres at the origins of the nerves supplying these organs, or in the mind acting upon these centres, although these organs themselves may be incapable of discharging their offices. The excitement may be mental only—a mere passing or temporary feeling—but it may be more permanent, or even remarkable and uncontrollable; and, in this case, there is always reason to infer the existence of irritation or inflammatory action in those parts of the nervous centres—ganglial, cerebral, or spinal—most intimately related to the nerves supplying these organs. Diseases implicating the whole frame, as fevers, &c., are rarely attended by increased sexual desire, unless during convalescence from them. On the contrary, this desire is altogether abolished during their duration, while at the same time the sexual organs are collapsed, the testes dependent, and the scrotum flaccid and disposed to erythematous inflammation and excoriations. In acute, inflammatory, and febrile diseases, the sexual functions and desires are either impaired or abolished at their commencement, and during their continuance. In diabetes, in severe influenza, general debility, in some diseases of the brain, and in all acute maladies of the digestive canal, the sexual desire is lost.

224. The sexual desires and powers are seldom very remarkably impaired in chronic diseases of the lungs and heart, especially in tubercular consumption, and particularly in the more chronic and non-febrile states of this malady, in which they even may continue almost to the last. The same may be said of diseases of the ovaria and uterus, and, in a less degree, of chronic affections of the liver, spleen, and kidneys. Too frequent erections without sufficient cause, and seminal discharges at the commencement of, or too early in, an erection, is a sign of general debility, or of susceptibility and morbid irritability of the sexual organs consequent upon masturbation or sexual abuses, or upon irritation of the urethra, at the caput gallinaginis, or of stone in the bladder, or of ascarides in the rectum. But discharges from the prostate gland should be distinguished from seminal emissions, the former being much more frequent than the latter. Continued erection—*priapism*—is sometimes occasioned by calculi in the kidneys or bladder, by gonorrhœa, by epilepsy, &c.

225. *B. Signs connected with the sexual Organs of the Female.*—Retardation of the development of the female organs is occasioned chiefly by deficiency or atrophy of the ovaria. Want of sexual desire may proceed from the same cause, or from extreme debility, or from the same diseases as have produced this state in the male (§ 220).

Excessive sexual desire is a symptom of irritation or inflammatory action of the ovaria, or of active congestion or vascular determination to the uterus; or of masturbation, which had commenced early and been long continued. (*See farther, in illustration of this subject, the articles on IMPOTENCE and STERILITY, on LEUCORRHEA, MENSTRUATION, on SELF-POLLUTION, on the diseases of the OVARIA, of the UTERUS, VAGINA, &c.*)

[The following *Synopsis* or *Contents* of the preceding article, with the number of the paragraph commencing each topic, may be useful by facilitating reference.

PRELIMINARY REMARKS respecting SYMPTOMATOLOGY or SEMEIOLOGY, comprising GENERAL DIAGNOSIS and PROGNOSIS. . . . . § 1-3

I. SYMPTOMS AND SIGNS APPERTAINING TO THE ATTITUDE AND APPEARANCES OF THE BODY, AND OF THE ANIMAL FUNCTIONS. . . . . § 4

- i. *The Attitude and general Appearance of the Body* . . . . . § 4
- ii. *The Expression of the Face and State of the Features* . . . . . § 7
- iii. *The States of the General Surface of the Body* . . . . . § 16
- iv. *The Perspiratory Functions* . . . . . § 25
- v. *The State of Nutrition of the Body* . . . . . § 36
- vi. *The Functions and Organs of Voluntary Motion* . . . . . § 41

II. THE SYMPTOMS AND SIGNS FURNISHED BY THE SENSES AND NERVOUS SYSTEM OF ANIMAL LIFE . . . . . § 55

- i. *The Signs presented by the Eye* . . . . . § 57
- ii. *The Signs furnished by the Sense of Hearing* . . . . . § 74
- iii. *By the Sense of Smell* . . . . . § 76
- iv. *By the Sense of Taste* . . . . . § 78
- v. *By the Sense of Touch* . . . . . § 80
- vi. *The Signs furnished by Sensation or Sensibility* . . . . . § 81
  - A. Diminished and Exalted Sensation. . . . . § 81
  - B. Perverted Sensibility . . . . . § 84
  - C. Pain and its various Modifications. . . . . § 88
- vii. *The Signs furnished by the Mental Manifestations, &c.* . . . . § 95

III. THE SYMPTOMS AND SIGNS OF THE DIGESTIVE FUNCTIONS AND ORGANS . . . . . § 96

- i. *The Mouth, Teeth, and Gums* . . . . . § 97
- ii. *The Signs furnished by the Tongue* . . . . . § 101
- iii. *By the Salivary Secrecion* . . . . . § 116
- iv. *By the Throat and Fauces* . . . . . § 118
- v. *By Deglutition* . . . . . § 121
- vi. *By the Appetites for Food and Drink* . . . . . § 123
- vii. *The various Symptoms connected with the Stomach* . . . . . § 129
- viii. *By the Intestinal Functions and Evacu-ations* . . . . . § 132
- ix. *By the State and Appearances of the Alvine Evacuation* . . . . . § 147

IV. THE SYMPTOMS AND SIGNS CONNECTED WITH THE CIRCULATING SYSTEM . . . . . § 159

- i. *The Physical Signs and Symptoms related to the Heart* . . . . . § 160
- ii. *Congestion of the Cavities of the Heart* . . . . . § 162
- iii. *Symptoms and Signs connected with the Arterial and Venous Systems* . . . . . § 163
- iv. *Symptoms connected with the Lymphatic System* . . . . . § 169

V. SYMPTOMS AND SIGNS OF THE RESPIRATORY FUNCTION . . . . . § 170

- i. *Of Respiration* . . . . . § 171
- ii. *The Signs furnished by the Expectora-tion* . . . . . § 189

- A. Mucus, Muco-purulent Matter; Pus and Ichorous Matter, &c. . . . . § 190-196
- B. Blood, &c. . . . . § 197
- C. Fibrinous Exudations . . . . . § 200
- D. Earthy or Calcareous Concretions . . . . . § 201
- E. The Expectoration in Special Dis-eases . . . . . § 202
- F. The Act of Expectoring . . . . . § 205
- G. Yawning, Sighing, Sneezing . . . . . § 206

VI. SYMPTOMS AND SIGNS CONNECTED WITH THE URINARY AND SEXUAL ORGANS . . . . . § 208

- i. *Signs furnished by the Urinary Excre-tion* . . . . . § 210
- ii. *The Signs furnished by the Sexual Or-gans* . . . . . § 218

BIBLIOG. AND REFER. — *Hippocrates*, *Prænotiones*, *Prognosticon*, *Aphorismi*, &c., &c., in Op. ed. Fœsli, Geneva, 1657; et ed. Vander Linden. Lugd. Bat., 1665.—*Cælius Aurelianus*, *De Morbis Acutis et Chron.*, lib. viii., ed. Amstelod., 1755.—*Aræta*, *Opera Omnia*, ed. Kühn. Lips., 1828.—*Galenus*, *Opera*. Basil., 1538, *pluries*.—*U. Binder*, *Epiphania Medicorum*, &c. 1506.—*Galenus*, *De Symptomatum Differentiis*, lib. i., Thoma Linaere interprete, 4to. London, 1523.—*N. Bertruccius*, *Methodus Cognoscendorum Morborum*, 4to. Mongunt., 1534.—*J. Sylvius*, *De Signis Omnibus Medicis*, &c. Par., 1539.—*J. Huygel*, *De Semeiotica Medicina Parte*, fol. Basil., 1560.—*J. B. Pettegrini*, *De Ratione Cognoscendi Signa et Causas Morborum*, 4to. Bonon., 1563.—*A. Planer*, *Methodus Investigandi Locos Affectus*, 4to. Tub., 1579.—*N. Piso*, *De Cognoscendis et Curandis Morbis*, fol. Franckf., 1580.—*F. Dupont*, *De Signis Morborum*, lib. iv. (edit. Schomburg, 4to. London, 1765), 4to. Paris, 1554.—*D. Liddel*, *De Symptomatibus et Symptomatum Differentiis*, 4to. Helmst., 1595.—*J. Aubertus*, *Σημειωτική*, *Sive Ratio Dignoscendarum Sedum male Adfectarum et Affectionum*, 8vo. Genev., 1596.—*P. Alpinus*, *De Præ-sagienda Vita et Morte Ægrotantium*, lib. viij., 4to. Venet., 1601.—*J. Jesenius*, *Σημειωτική*, *Seu Nova Cognoscendi Morbos Methodus*, 8vo. Vittemb., 1601.—*G. Horstius*, *De Doctrina Signorum in Genere*, 4to. Vittemb., 1607.—*J. Wolfii*, *Exercitæ*, *Semeiotie in Cl. Galeni de Loc. Affect.*, lib. vij. Helmst., 1620.—*J. Varandé*, *Tractatus de Diagnosi Medica*, 8vo. Monspel., 1620.—*P. Forestus*, *De Incerto Urinarum Judicio*. Franckf., 1610.—*P. Savona*, *Decisiones Medicinales quoad Diagnosin et Prognosin*, fol. Panorm., 1624.—*A. Constantinus*, *Op. Medicæ Prognoseos*. Lugd., 1613.—*P. Casulanus*, *De Lingua, quæ Maximum est Morborum Acutorum Signum*, 12mo. Colon., 1626.—*R. Fludd*, *De Pulsuum Scientia*. Oxon., 1649.—*J. Sylvius*, *De Signis Omnibus Medicis*, fol. Paris, 1639.—*P. Finella*, *De Quatuor Signis quæ apparent in Unguibus*, 12mo. Neap., 1649.—*J. B. Van Helmont*, *De Morbis Introductio Diagnostica* (Opp.), fol. Venet., 1651.—*C. Bennet*, *Exercitationes Diagnosticae, cum Historiis Demonstrativis*, 8vo. Lond., 1654.—*J. Prævotius*, *Semeiotica*, *sive de Signis Medicis Enchiridion*, 24mo. Venet., 1651.—*E. Martinez*, *Tractatus de Modo Cognoscendi Morbum*, &c., fol. Complut., 1657.—*T. Fienus*, *Semeiotica*, *sive de Signis Medicis Tractatus*, 4to. Lugd. Bat., 1664.—*J. C. Hænn*, *Quo quis rectius cognoscit Morbum, eo rectius sanat*, Oratio, 4to. Altd., 1675.—*G. W. Wedel*, *Exercitationes Semeiotico-pathologicae*, 4to. Jenæ, 1700.—*J. P. Eysel*, *Compendium Semeiologicum, Modernorum Dogmatibus Accommodatum*, 8vo. Erford., 1701.—*J. H. Furstenau*, *Dissertatio quæ Desiderata circa Morbos eorumque Signa exponit*, 12mo. Amst., 1712.—*F. Hoffmann*, *De Morbis recte Distinguendis*, 4to. Hal., 1718.—*C. Vater*, *Semeiotica Medica, Succinetis Aphorismis Comprehensa*, 4to. Vittemb., 1722.—*H. Cope*, *Demonstratio Medico-Præctica Prognosticorum Hippocratis*. Dubl., 1736.—*J. Juncker*, *Conspectus Pathologiae et Semeiologiae in Forma Tabularum*, 4to. Halæ, 1736.—*G. Detharding*, *Fundamenta Semeiologiae Medicae*, 8vo. Har-niae, 1740.—*S. Rudd*, *A certain Method to know Diseases*, &c., 4to. Lond., 1742.—*S. Schaarsmidt*, *Semeiotik*; herausgegeben von C. A. Nicolai. 8vo. Berl., 1756.—*J. G. Klein*, *Interpr. Clinicus*, &c. Franckf., 1759.—*G. F. Hamberger*, *Semeiotische Vorlesungen ueber Lommen's Wahr-nemungen*, 8vo. Lemgov., 1767.—*J. L. L. Læsecke*, *Semeiotik, oder Lehre von der Zeichen der Krankheiten*, 8vo. Dresd., 1768.—*Matrin*, *Les Présages de la Santé et des Maladies, ou Hist. Univers. des Signes Prognostics*. Paris, 1770.—*M. Helian*, *Dictionnaire du Diagnostic, ou l'Art de Connaitre les Maladies*, 12mo. Paris, 1771.—*C. G. Gruner*, *Semeiotie in usu prælectorum*, 8vo. Hal., 1775.—*J. Berkenhout*, *Symptomatology*, 8vo. Lond., 1784.—*J. D. Metzger*, *Grundriss der allgemeinen Semeiotik und Therapie*, 8vo. Königsb., 1785.—*F. A. Weber*, *De Signis et Causis Morborum*, 2 vols., 8vo. Heidelb., 1786.—*N.*



*F. Rougnon*, Considerationes Pathologico-Semeiotice de Omnibus Corporis Functionibus, 2 vols., 4to. Vesunt., 1737.—*T. Bayer*, Grundriss der Allgemeinen Semeiotik, svo. Prag., 1787.—*J. C. T. Schlegel*, Thesaurus Semeiotices Pathologicae, 2 vols., svo. Steid., 1787.—*J. P. Frank*, Oratio de Signis Morborum e Corporis Situ Partiumque Positione Petendis, svo. Pap., 1788.—*J. C. Hoffbauer*, Tentamina Semeiotica, svo. Gorliz., 1879.—*D. F. Büttner*, Critices Semeioticae Medicinalis Fundamenta, svo. Bost., 1791.—*P. P. Price*, A Treatise on the Diagnosis and Prognosis of Diseases (part i.), svo. Lond., 1791.—*M. Stoll*, Allgemeine Anleitung Kranke zu examiniren, svo. Warb., 1792 (?).—*J. C. G. Ackermann*, Bemerkungen ueber die Kenntniss und Kur einigen Krankheiten, svo. Nürnberg, 1794.—*S. G. Vogel*, Kranken-examen, svo. Stendal., 1796.—*J. L. V. Broussonnet*, Tableau Élémentaire de la Semeiotique, svo. Montp., 1798.—*Anon.*, A Table of Symptoms, pointing out such as distinguish one Disease from another, &c., svo. Lond., 1799.—*C. G. Gruner*, Physiologische und Pathologische Zeichenlehre, svo. Jena, 1800.—*F. G. Kornatowsky*, Kunst Krankheiten genau und gründlich zu untersuchen, svo. Leips., 1800.—*F. Cabuchet*, Essai sur l'Expression de la Face dans les Maladies, svo. Par., 1801.—*K. Sprengel*, Handbuch der Semeiotik, svo. Halle, 1801.—*J. E. Wichmann*, Ideen zur Diagnostik; beobachtenden Aerzten mitgetheilt, 3 vols., svo. Hannover, 1802.—*W. F. Dreyssig*, Handbuch der Medicinischen Diagnostik, 2 vols., svo. Erfurt, 1803.—*L. Laforge*, De la Semeiotique Buccale, svo. Par., 1806.—*L. M. A. Caldani*, Institutiones Semeiotice, svo. Patav., 1808.—*J. F. Hernandez*, Mémoire sur les Questions, quels sont les Signes Diagnostiques et Prognostiques fournis de l'Etat de la Langue, &c. (?), svo. Toulon, 1808.—*Anon.*, Recueil Alphanétique des Prognostics Dangereux et Mortels, &c., svo. Paris, 1808.—*C. G. Schmalz*, Versuch einer Medicinisch-Chirurgischen Diagnostik in Tabellen, fol. Dresd., 1808.—*A. N. Guion*, Considér. Séméiologiques appliquées à l'Art d'observer les Maladies, Paris, 1809.—*K. Wolfahrt*, Ueber die Bedeutung der Zeichenlehre in der Heilkunde, svo. Berl., 1810.—*F. Dauz*, Allgemeine Zeichenlehre, svo. Leipz., 1812.—*Renavudin*, Dict. des Sc. Méd. (art. *Diagnostic*), t. ix. Par., 1814.—*A. J. Landré-Beauvais*, Semeiotique, ou Traité des Signes des Maladies, svo. Par., 1815.—*M. Hall*, On Diagnosis, in four parts, svo. Lond., 1817.—*F. J. Double*, Semeiotique Générale, ou Traité des Signes, &c., 3 toms. svo. Par., 1811–17.—*C. W. Hufeland*, Conspectus Morborum: Adjectis Characteribus Specificis Diagnostici, svo. Berl., 1819.—*Serrurier*, Dict. des Sc. Méd. (art. *Semeiotique*), fol. Par., 1820.—*A. P. Buchan*, Symptomatology, or the Art of Detecting Diseases, svo. Lond., 1821.—*M. Hall*, An Essay on the Symptoms and History of Diseases, svo. Lond., 1822.—*Chomel*, Dict. de Méd. (art. *Diagnostic*), t. vi. Par., 1823.—*M. Hasper*, Novus Thesaurus Semeiotices Pathologicae, svo. Lips., 1824.—*L. Martinet*, Manuel de Clinique, ou des Methodes d'Exploration en Médecine, svo. Par., 1824.—*M. E. A. Naumann*, Handbuch der Allgemeinen Semeiotik, Berl., 1826.—*J. B. Friedreich*, Handbuch der Pathologischen Zeichenlehre, svo. Wurtz, 1825.—*J. Voëmaer*, Institutiones Semeiotice, edit. a G. J. Mulder. Lugd. Bat., 1828.—*F. Nasse*, Leichenöffnungen zur Diagnostik, &c., svo. Bonn, 1828.—*Piorry*, In Journ. Hebdom. de Méd., t. i., p. 412.—*L. Rostan*, Cours de Médecine Clinique, ou Traité de Diagnostique, &c., 3 vols., svo. Par., 1830.—*Jolly*, Dict. de Méd. Prat. (art. *Diagnostic*), t. vi. Par., 1831.—*J. F. H. Albers*, Lehrbuch der Semeiotik für Vorlesungen, Leipz., 1834.—*M. Hall*, The Principles of Diagnosis, 2 vols. Lond., 1834; and Cyc. of Pract. Med. (art. *Symptomatology*), vol. iv. Lond., 1834.—*Dance*, Guide pour l'Etude de la Clinique Médicale, ou Précis de Semeiotique. Paris, 1834.—*P. M. Latham*, Lectures on Subjects connected with Clinical Medicine, svo. Lond., 1836.—*Knotz*, Institutiones Medicæ Hygienæ et Semeiotices Generalis Usui Academico Accommodatæ. Vienna, 1835.—*Schill*, Outlines of Pathological Semeiology, Transl. from the German, by D. Spillan. Lond., 1839.—*G. B. Wood*, A Treatise on the Practise of Medicine, 2d edit.; *Symptomatology*, vol. i., p. 159. Philadelphia, 1849.

[AM. BIBL.—*S. H. Dickson*, Elements of Medicine, svo. Phil., 1855.—*R. Dunglison*, The Practise of Med., 3d ed. Philadelphia, 1855.—*B. Rush*, Med. En., and Observations, &c.—*J. Eberle*, A Treatise on the Theory and Pract. of Med., 2 vols.]

SYNCOPE.—See FAINTING AND SWOONING.

SYPHILIS.—See VENEREAL DISEASE.

TABES.—SYNON.—*Marasmus*; *Atrophia*; *Phthisis*; *Macies*, Auct. These terms, as well as *tabes*, are usually employed, generically, to express emaciation of the whole body with languor, and generally with some degree of hectic fever; but to these terms are usually added

certain specific appellations, according to the cause and nature of the emaciation, atrophy or tabidity, in particular cases, as the *Tabes* or *Atrophia Infantum* or *infantis*.—*T. Mesenterica*, *glandularis*, *scrofulosa*, &c.—*T. Diabetica*.—*T. Lactantium* (of Nurses).—*T. or P. pulmonalis*, *Marasmus sculis*.—*T. or M. dorsalis* or *dorsualis*.—*T. coxaria*; *Tabidity*, *Atrophy*, *Emaciation*, *Decline*.

CLASSIF.—IV. CLASS, III. ORDER (Author in Preface).

1. DEFIN.—*Chronic emaciation of the body, with weakness and aching of the back and loins, languor, debility, and impotency.*

2. *Tabes*, *Marasmus*, or *Atrophy*, is considered at sufficient length in the article treating of the diseases, chiefly organic, on which this state, however named, actually depends. According as it proceeds from obstruction of the mesenteric glands, so it is described in the article on diseases of the MESENTERY; and as arising from tubercles in the lungs or other viscera, it is treated of under the heads TUBERCULAR CONSUMPTION, and SCROFULA and TUBERCLES. The other pathological conditions, of which extreme emaciation is a contingent or an occasional result merely, are so very numerous, that even an enumeration of them at this place is unnecessary, especially as they have been noticed in connexion with this effect under their respective heads. But there is one form of *tabes* to which attention may be farther directed than it has been, when treating of one of its most common causes, as well as of its usual consequences, namely, *self-pollution*, and *impotence* and *sterility*.

3. *TABES DORSALIS*, in its various forms and with its several concomitants, is of much greater importance to the individual himself, as well as to those connected with him, than has usually been considered; and, although imputed solely to the male sex, the same affection, produced chiefly by similar causes and characterized by nearly similar symptoms, is not infrequently also observed in the female. In the former sex it is generally caused by premature or excessive sexual excitement, or by consequent involuntary pollutions; in the latter it is also occasioned by the same causes, and by prolonged leucorrhœa commonly consequent upon self-pollution.

4. i. *The symptoms* in both sexes are chiefly extreme emaciation, a weak and bent state of the spinal column; the lumbar region of the spine having lost its posterior concavity, and having become either straight or convex, owing to the softened yielding or atrophied state of the intervertebral substance. The gait is unsteady and vacillating, the knees bend under the weight of the body, and all the muscular movements and mental manifestations evince debility, exhaustion, impaired powers of exertion, application and attention. The genitals are often flaccid, wasted, or soft and small in the male, and are subject to leucorrhœa in the female; the eyes are sunk, and the whole body is emaciated. If the causes are continued, various functional and organic lesions supervene, especially nervous affections, varying in character with the peculiarities and circumstances of individual cases, hysteria, hypochondriasis, mental depression or delusion, tremours, extreme susceptibility, anæmia, and ultimately epilepsy, incomplete or complete, partial or general paralysis, insanity, and the several other consecutive maladies mentioned when

treating of voluntary and involuntary POLLUTIONS.

5. ii. *The Prognosis* in tabes dorsalis entirely depends upon the changes which the spinal cord has undergone, and upon the secondary affections which have appeared. The nature of the changes, however, which may have taken place in the cord can be inferred with but a slight degree of certainty; for the cord may be partially softened, or it may be atrophied, or indurated, or both wasted and indurated; and the fluid existing between the spinal membranes may be increased, or the venous sinuses of the spine may be remarkably congested. The prognosis will greatly depend, not only upon the progress of the disease, but also upon the continuance of its principal cause; for too frequently the vice in which it has originated is persisted in, notwithstanding the conviction of the miseries which result. Although the disease may not be cured, or even much relieved, life may be prolonged for a considerable period.

6. iii. *Treatment*.—The means which have been recommended for DEBILITY, IMPOTENCY, and for POLLUTIONS, voluntary and involuntary, are altogether appropriate to this complaint, which commonly, as just stated, proceeds from the same causes as these. But unless the causes be relinquished, the means of cure may be most judiciously resorted to without avail. Of these means, chalybeate mineral waters and preparations, change of air, and residence in a dry and temperate air, frictions and stimulating embrocations along the spine; the iodide of iron taken in the sirup of sarza; the preparations of cinchona, of gentian, of valerian, of sunbul, &c., are the most beneficial, aided by suitable diet, exercise, and regimen.

BIBLIOG. AND REFER.—*Hippocrates*, Opera, Ed. Fœsius, p. 479, et p. 539.—*Avicenna*, Canon. l. iii. Fen. 20, Tract. ii., cap. 11.—*Tulpius*, l. iii., cap. 24.—*Crause*, De Nutritionis Impedimentis ab immatura vel nimia Venere. Jenæ, 1588.—*Morton*, Plithisiologia, p. 8.—*Willis*, Pharmac. Rat., p. ii., s. i., cap. 5.—*Brendel*, De Tabæ Dorsali. Goett., 1749.—Opera, t. ii., p. 179.—*Anon.*, Pract. Essay on the Tabes Dorsalis. Lond., 1748.—*Anon.*, Tabes Dorsalis, the Cause of Consumption in Young Men. Lond., 1752.—*J. E. Wichmann*, De Pollutione Diurna frequentiori, sed rarius observata Tabescentie Causa. Goett., 1782.—*Percy*, Dissert. on the Lues Venerea, Gonorrhœa and Tabes Dorsalis. Lond., 1787.—*W. Plouquet*, Exemplum Singularis Morbi Paralytici. Tub., 1806. (*Atrophy of the Spinal Cord*).—*Kortum*, In Hufeland, Journ. dcr Pract. Heilk., B. xx., st. 2, p. 12. (*Recommends Quassia*).—*J. P. Frank*, De Cur. Hom. Morbis, l. v., p. 261.—*Sontag*, In Franck's Select. Opusc. Med. German., vol. vii., p. 299.—*Schneider*, Journ. des Progrès des Sciences Médicales, t. viii., p. 258. (*Erectio nulla sed Pollutiones noct. cum Tabæ Dorsali*).—*F. Lallemand*, Des Pertes Seminales Involontaires, 3 t., 8vo. Paris, 1839-41.—*M. H. Romberg*, A Manual of Nervous Diseases of Man, transl. by E. H. Sieveking. Lond., 1853. 8vo. vol. ii., p. 395. (See also the BIBLIOG. AND REFERENCES to the Articles DEBILITY, IMPOTENCY, and STERILITY, and to POLLUTIONS, VOLUNTARY AND INVOLUNTARY.)

TETANUS AND TRISMUS.—SYNON.—Τέτανος (from τείνω, I stretch), Auct. Græc. Tetanus, Pliny, Vogel, Swediaur, Sauvages, Cullen, &c. Tonos Trismus, Parr. Entoma rigida, Young. Entesia Tetanus, Good. Catochus, Auct. Tetanos, Fr. Todtenkrampf, Starrkrampf, Germ. Tetano, Ital. Tetanos Erectus, vel T. Proprius; Tetanus, Tetany. Tonic or Entonic Spasm.

TETANUS EMPROSTHOTOS — ἐμπροσθότονος, from ἐμπροσθεν, forward, and τείνω, I stretch—when the body is bent forward. Tetanus Anticus. Good. Tetanic Procurvature.

TETANUS OPISTHOTOS — ὀπισθότονος—from

ὀπίσθεν, backward, &c., when the body is bent backward. Tetanus Dorsalis, Good. Tetanic Recurvature.

PLEUROSTHOTOS, from πλευροσθεν, side-ward, πλευρὸν, the side, &c., when the body is bent laterally. Tetanus lateralis, Sauvages.

TRISMUS—τρίσμος, from τρίω, I gnash—when the muscles of the jaws are chiefly or solely affected. Entasia Trismus, Good. Locked-jaw.

CLASSIF.—4th Class, Nervous Diseases. 3d Order, Spasmodic Affections (Cullen).—iv. Class, Diseases of the Nervous Function. iii. Order, Affecting the Muscles (Good).—II. CLASS, III. ORDER (Author in Preface).

1. DEFINIT.—A tonic state of Spasm, or entonic Spasm, extending to many or to most of the muscles of animal life or voluntary motion—with exacerbations, and usually without any period of complete relaxation until the subsidence of the malady, its progress being generally acute or sub-acute, and often most rapid, and then terminating life by asphyxia.

2. The Pathology and Treatment of Tetanus and Trismus have been subjects of discussion with both medical and surgical writers during many years, and even the most experienced and the ablest writers have confessed their inability to furnish satisfactory information respecting them. As tetanus is most frequently a consequence of surgical operations and of external injuries in temperate climates, physicians are not often called to its treatment. Nevertheless, it behooves them, as much as surgeons, to be acquainted with all that is known of both the nature and the treatment of this malady. Although it, as well as trismus, is most frequently symptomatic, yet it occasionally appears primarily or idiopathically; rarely in this climate, but not infrequently in hot climates, especially in the dark races.

3. According to its severity and duration, tetanus has been divided into acute and chronic; but in neither point of view can it be considered to be, in any case, a chronic disease. If any such division be adopted, the acute and sub-acute states may be assigned to it; but this division is altogether arbitrary, as no line of demarcation can be drawn between them. Primary or idiopathic tetanus is either acute or sub-acute, is often less violent than the symptomatic, and is less dangerous, especially in temperate climates. The symptomatic or traumatic tetanus is commonly acute, and is a most dangerous malady. Besides the divisions now noticed, certain forms have been described which are characterized by peculiar symptoms, which are merely manifestations of the disease in greater severity, or to a more limited extent in some muscles than in others. The partial state of the disease, trismus, is that in which the more general forms commence—the forms usually recognised being trismus, pleurosthotonos, emprosthotonos, opisthotonos, and tetanus cretus; but two or more of those forms may appear in the progress of the same case, according as the morbid action of the muscles extends or predominates in one set of muscles over the others.

4. I. DESCRIPTION.—The symptoms of tetanus in all their forms are very readily recognised, but not until those characteristic of the malady appear. Those which are premonitory of the attack, or which occur in the period which elapses between the cause and the declared disease, have



not been satisfactorily observed. It cannot be supposed that this period is without any premonition of the impending malady. I have remarked uneasiness or pain at the epigastrium and about the throat; much lassitude, with restlessness and depression of spirits; chilliness or cold chills, especially in the idiopathic; uneasiness and anxiety at the præcordia; twitchings of the muscles of the injured limb, in some cases of the traumatic form; and obstinate constipation in every form of the disease. These symptoms may be of short duration, or they may be experienced for a considerable time: they are followed by pain under or below the sternum, often extending backward to the spine, by more or less difficulty of swallowing, by pain and stiffness of the neck, &c. To these are generally soon added all the other symptoms which characterize the more partial or limited form of the disease, namely, rigidity, pain or contraction of the muscles of the lower jaw.

5. *a. Trismus* may be viewed as the commencement of all the forms of tetanus. With or following the pain under the sternum and difficulty of swallowing, the patient complains of uneasiness or stiffness of the muscles of the jaws, neck, and throat, and pain in the course of the cervical region of the spine. To these succeed a difficulty in opening the jaws, in masticating or swallowing food, and in rotating or even in moving the head. The muscles which raise the lower jaw assume a state of contraction or tonic spasm, so that the teeth are kept in constant contact (*locked-jaw*). This symptom is first indicated when the patient is desired to show his tongue, and soon is followed by more or less spasm of all the muscles of the face. The angles of the mouth are retracted, the *alæ nasi* are elevated, and the nostrils expanded; the eyes are fixed and prominent, the brows and forehead drawn and wrinkled, the countenance presenting an anxious or distressed expression. In children, or rather in young infants, the disease may not proceed farther, as respects the tetanic affection of the muscles, and yet it may terminate fatally, more or less rapidly, either in convulsions or in asphyxia. This limitation and this course of the malady are very rare in adults, the state of trismus generally advancing quickly to those about to be mentioned.

6. *b. Pleurosthotonos*, or *tetanus lateralis*, is a predominant spasm of the muscles of one side, drawing the body to that side. This form very seldom occurs. It commences with trismus, or with the affection of the muscles of the face and neck, and often passes into one or other of the forms about to be noticed. The lateral curvature is not always considerable, for it is produced rather by a greater severity of the spasms in one side than by any limitation of them to that side. I have observed the form in a child, in an idiopathic form, death occurring during a violent convulsion from asphyxia.

7. *c. Emprosthotonos* is the predominant contraction of the muscles of the anterior aspect of the trunk, by which the body is bent forward and the head is drawn to the sternum. This state is rarely observed during the whole course of the malady. It may occur for a short time, and be followed by either opisthotonos or tetanus erectus. It, as well as the other forms of the disease, commences with trismus, which in it, as in the others, continues throughout.

8. *d. Opisthotonos* is the bending backward of the trunk by the excessive action of the muscles of the posterior parts of the neck, back, and loins. This is the most frequent form of the disease. The numerous strong extensor muscles of the spine overcome the action of the flexor muscles of the abdomen, and produce a rigid curvature, or posterior concavity, the body resting during the exacerbations upon the occiput and heels only, the jaws being also forcibly closed, and the abdominal muscles contracted. This form may be followed by, or may alternate with the next, the *tetanus proprius*.

9. *e. Tetanus*, although designating any of the forms of the disease attended by general spasm, and being the generic appellation, is often intended to convey the idea of a state of the disease in which the body is stretched out by the spasms without being very manifestly bent in any direction—*tetanus erectus*, not *tetanus proprius*. It may follow, in the progress of the malady, either of the states already noticed, presenting at intervals the form of opisthotonos, the posture assumed by the trunk depending upon a momentary or temporary predominance of action of certain muscles or series of muscles; or it may appear in this form consecutively upon the premonitory symptoms, and the partial affection of the face and neck, and preserve it throughout.

10. *A. ACUTE TETANUS*.—This common form of the disease may be either symptomatic or idiopathic. It may result from propagated irritation, and present no satisfactory evidence of inflammation of the membranes or substance of the spinal medulla; or irritation may superinduce inflammatory action, with the usual symptoms, or even be attended by such symptoms from the commencement, especially in the idiopathic form. (See *PATHOLOGICAL INFERENCES*, &c., § 61, *et seq.*)—*a.* After a more or less evident manifestation of premonitory symptoms (§ 4, 5), contractions, generally persistent, commence in the muscles of the face and neck—the stage of *trismus*. These contractions extend downward to the muscles of the back and trunk, and often also to those of the limbs; and the disease assumes either of the forms now stated, but most frequently the two last specified. The jaws generally continue finfully closed, and, although the contraction of the muscles of voluntary motion—of both trunk and limbs—or the rigidity of these muscles, remains uninterrupted, violent paroxysms or exacerbations of the contraction recur after short intervals, or after from five to fifteen minutes, and are attended by extreme pain and distress. As the disease advances, the exacerbations become more violent or prolonged; the body is bathed in a warm perspiration; the pain at the præcordium is increased; respiration is laboured, embarrassed, or hurried; and the pulse becomes very rapid and often irregular. The exacerbations are induced by the slightest causes—by a current of air, by attempts to move or to swallow, or by unpleasant sounds, or by a strong glare of light.

11. As the disease continues, the voice becomes altered, harsh, and disagreeable, the larynx is raised upward, and the tongue is often forced against the teeth during the exacerbations and lacerated. The shoulders are drawn forward, and the body is either extended or forced into the other positions already noticed, according as the action of one set of muscles predominates over their antagonists. The sense of tightness and

the pain under the sternum and ensiform cartilage continue to extend to the spine, and are attended by a laboured, quick, and difficult respiration, and by an agonizing feeling of suffocation. The muscles of the face are strongly contracted, while the countenance is pale or livid, and bathed in perspiration. The patient expresses the most distressing sufferings, both from pain and from the difficult respiration, particularly during the exacerbations, which are more frequent, prolonged, and violent as the malady advances, the respiratory muscles, and even the diaphragm, ultimately becoming more or less affected. Owing to this extension of the spasm the patient is carried off by asphyxia, especially in the more acute or rapid traumatic cases; but in the more sub-acute and idiopathic cases, when the disease has been of much longer duration, the severity of the symptoms often abates previously to death, and the patient sinks apparently from exhaustion, but even in these a recurrence or an extension of spasm to the respiratory muscles sometimes terminates life.

12. *b.* Such is the usual course of this malady, but each case presents certain modifications of the symptoms during its progress. The earliest or the most constant precursory symptom is obstinate constipation, and this generally continues throughout the disease. The pain at the epigastrium, and anxiety under the sternum and at the præcordium, are the next, and these are very prominent, equally persistent, and generally extend to the spine. Inability to swallow is owing to spasmodic action of the muscles of the tongue and pharynx, and probably also of the œsophagus, often implicating also the glottis, attempts to swallow liquids being often followed by their forcible rejection through the nose and mouth. This state of spasm is such as prevents the introduction of a flexible tube down the œsophagus from one of the nostrils. The difficulty of defæcation, owing to the spasm of the sphincter ani, increases the constipation, and a similar difficulty attends micturition, the urine being sometimes retained, or forcibly ejected by the spasm of the abdominal muscles. The spasms of the muscles of the face occasion remarkable distortion of the features, young persons often presenting the appearance of age. Respiration is chiefly affected during the exacerbations. It is then catching, difficult, and painful, the pain extending from the ensiform cartilage and præcordium to the spine, or darting in the direction of the diaphragm, and being most probably occasioned by spasm of this muscle. The pain in this situation, at an advanced period of the disease, is different from that experienced under the sternum at the commencement. The spasmodic contraction of the muscles is attended by more or less suffering; but this is said not always to be the case. The exceptions are certainly rare, for I have never seen an instance to the contrary, although the distress has been much less in some cases than in others, and experienced only during the paroxysms.

13. The greatest diversity is presented by the extent and severity of the spasms, and by the state of the pulse in different cases. While in some the muscles of the face and neck, and particularly the muscles closing the jaws, are chiefly or solely attacked (*Trismus*), those of the trunk and limbs being but slightly or not at all contracted; in others the muscles of the face are

much less affected, while those of the trunk and limbs are severely attacked. Mr. CURLING, in his excellent work, remarks, that the muscles of the eye are sometimes, but not generally, affected. When this occurs, the eyeball is fixed and drawn slightly inward, the patient being unable to direct it towards particular objects. Most frequently, however, these muscles are free, the eyelids being half closed, the contractions of the orbicularis palpebrarum, in this case, being unopposed by spasm of the levator palpebre. The pupil of the eye has been said to be contracted in tetanus, by some writers, and to be dilated by others. I believe it to be generally contracted, but that it may become dilated with the supervention of the cerebral congestion connected with incipient asphyxia. The muscles of the extremities are less frequently or less severely affected than those of the face, neck, and trunk, the forearms and hands being generally the least affected; but much depends upon the seat and nature of the injury of which the disease is the effect, for the spasms sometimes commence or are most violent in the injured limb. When the disease has followed amputation, the spasms of the muscles of the stump and limb are often most distressing. The spasms being thus more or less general and severe, as respects the voluntary muscles, and ultimately extending to the sphincters, and to the respiratory muscles in the more acute cases, the violent and continued spasms of these latter muscles generally terminating life in these cases, it may be inquired, 1st, whether or no the spasms extend also to involuntary muscles; and, 2d, whether sleep has any influence in relaxing them.

14. 1st. It has been supposed by CURRIE, PARRY, HOWSHIP, TRAVERS, and others, that death, in tetanus, is caused by the extension of spasm to the heart; but, with Mr. CURLING, I doubt the existence of spasm of this organ, even as a termination of the disease. There can be no doubt that the inordinate actions of the voluntary muscles occasion a quick return of blood to the right side of the heart at the accession of the paroxysms, and rapidly as well as irregularity of the action of this organ; but any degree of spasm of it would be incompatible with the continuance of life. But although spasm of the heart is not present in the course of the malady, it may occur and terminate life; and Mr. HOWSHIP has adduced a case in which he believed, from the state of the heart observed after death, that spasm of this organ was the cause of death. The examination, in this instance, was made eleven hours after death, at which time the body is generally still warm, and the heart firmly contracted. In two most acute traumatic cases, which I examined after death, the heart did not present any appearances different from those observed in cases of sudden or rapid death from other causes. Both these cases terminated in asphyxia. Mr. CURLING refers to a case for which amputation was performed by Mr. LISTON, and in which the vessels contracted so much that there was no hæmorrhage, and ligatures on the mouths of the divided vessels became unnecessary. I am not acquainted with any similar case. The contraction certainly could not have existed to any considerable extent previously to death, otherwise the circulation could not have gone on, the phenomenon being produced by the increased irritability of the coats of the arteries and by their constriction on exposure to the air. It was supposed by Dr.



CULLEN and others that the constipation always observed previously to the accession and during the course of the disease is owing to spasm of the muscular coats of the digestive canal; but there is no pain or other symptom referrible to this quarter suggestive of spasm, obstinate constipation generally attending all severe maladies of the nervous centres of animal life, as shown when treating of diseases of the BRAIN and SPINAL CORD.

15. 2d. Sleep rarely occurs in acute traumatic tetanus, and only during a few minutes, or in the intervals between the exacerbations, or when the continued contractions in these intervals are not attended by much pain. In the sub-acute cases, however, sleep is more frequent, and a more complete relaxation of the muscular contraction takes place, but, upon being awakened, the full tension of the muscles returns. This circumstance shows the influence of loss of consciousness upon the morbid irritability of these cases, and throws some light upon the pathology of the disease (see § 61, *et seq.*). During recovery, and in the less severe cases, and when the intervals between the paroxysms are considerable, sleep may ensue, and the spasms be relaxed, especially as then the effects of the narcotics, so frequently prescribed for the disease, begin to be manifested.

16. c. The pulse in tetanus has been variously described by different authors. This has been owing chiefly to the different states of the heart's action in the several stages or states of the disease, and the varying grades of frequency in the acute and sub-acute cases, as well as in the idiopathic and symptomatic forms of the malady. Dr. MORRISON, HENNEN, MACGREGOR, and others have remarked that the pulse is seldom much affected; but the greater number of writers have stated the pulse to be very much accelerated, and most remarkably so in acute cases. This is the result of my own observation in the numerous cases which I have had an opportunity of observing in France and Germany, in 1815 and 1816, and subsequently in warm climates. In an acute case which I attended in 1820, the pulse was 120 in the minute in the first day of the developed attack. The patient died on the third day. The pulse is generally much less frequent during the intervals than in the paroxysms, but the degree of frequency varies in different cases, as well as in the course of the disease. The treatment adopted has often a considerable influence in quickening the pulse, and towards a fatal issue this is especially the case. The changes taking place in the spinal cord, medulla, &c., and their membranes, according to their nature and amount, also influence the pulse. As the powers of life sink, or are depressed by sedative agents, as by tobacco injections, &c., the pulse becomes remarkably quick, and often feeble. Both the pulse and the respiration are greatly accelerated by the spasms, and hence are varied in character and in quickness with their severity and frequency of accession. During their continuance, especially towards the close of the malady, the pulse is often so frequent, weak, and irregular as not to admit of being accurately counted, while the respiration is laboured or gasping.

17. d. The surface of the body is much warmer than natural, is bathed in perspiration, and is often morbidly sensitive to external agents. The amount of animal heat necessarily varies in different cases—probably from 100° to 106° of Fahr.

M. PRÉVOST, of Geneva, has stated it to have been much higher (110°) in a case under his care. Dr. BRIGHT says that it was 105° on the third day of the disease. I observed it 105½ in the axilla on the second day of a case which terminated fatally on the fourth day, and 106° in another which died on the third day. The perspiration is most copious during the exacerbations, and generally has a pungent and peculiar smell. LARREY supposed it to be critical, but Mr. CURLING justly considers this not to be the case. I have seen it the most abundant in the most rapidly fatal cases. A miliary eruption sometimes accompanies excessive perspiration and heat of the skin. The cutaneous sensibility is unusually great, especially to the slighter causes of sensation, as to a light touch, to cold air, &c., and in this the disease resembles the sensitiveness of the surface in RABIES, and in inflammation of the spinal membranes (see SPINAL CORD, § 135).

18. e. The urine is generally in small quantity in tetanus, as may be supposed from the excessive perspiration, and it is usually high-coloured. It is more abundant in the sub-acute form of the malady. The bowels are always constipated, and are moved with great difficulty; the stools, however, present no very remarkable disorder beyond what is usual from retention. The tongue is commonly white and moist at the commencement, but it is often dry, with the papillæ erect as the disease advances, and thirst becomes urgent. When tetanus or trismus is fully developed, the tongue can seldom be satisfactorily shown.

19. f. The senses are acute during the course of the disease, especially sight, hearing, and touch, and are remarkably susceptible of their respective stimuli. The functions of the mind are unimpaired, even during the most distressing exacerbations, and any degree of delirium is rarely observed until shortly before dissolution, and then it may sometimes have been occasioned by the narcotics which had been prescribed.

20. g. The state of the blood has not been satisfactorily observed, either in the idiopathic or symptomatic form of the disease. I have seen it without any particular change in one case, and both cupped and buffed in another, and slightly cupped only in two; but one of these cases was only once accidentally seen by me. The question is, whether or no this state of the blood is connected with, or a manifestation of, inflammatory action in the animal nervous centres, or merely the consequence of the inordinate muscular action; but this involves the consideration of the pathology of the disease. Admitting that there is inflammatory action of these centres, or at least of their envelopes, in some cases, as there undoubtedly is in the idiopathic states of the malady, there must necessarily be some degree of fever, and this state of the frame is said not to exist in traumatic tetanus. Mr. CURLING observes that this form of the malady "is generally unattended by fever; and Dr. CULLEN, Dr. CLEPHANE, and Dr. CHALMERS, and many other authors, have remarked that the blood very rarely possesses an inflammatory character." Mr. O'BERNE states that he witnessed about two hundred cases of tetanus, but he never saw one accompanied with fever. It may certainly be admitted that, in the traumatic form of the disease, fever is not often observed at its commencement, and that the feb-

rile symptoms enumerated above, especially the quick pulse and respiration, the hot skin, the copious perspiration, thirst, and excited papillæ of the tongue are chiefly the consequences of the violence of the muscular contractions; yet in many cases these symptoms (if not febrile, what are they!) are partly to be imputed to increased vascular action—an action excited by the irritation propagated to the spinal cord and medulla oblongata, and thence reflected upon the voluntary muscles, the inordinate action of these muscles developing increased vascular determination to the origins of the spinal nerves and to the spinal cord; this determination, advancing to morbid action, perpetuating the muscular contractions, extending their spheres, and ultimately terminating, in very many instances, by implicating the respiratory muscles, even the muscles of the glottis as well as those of the pharynx.

21. *B. SUB-ACUTE AND OTHER STATES OF TETANUS.*—When an attack of either idiopathic or symptomatic tetanus is less severe than that described above, especially during the second and third days, or when its severity is partially subdued, it may continue in a sub-acute or milder form for several days, or even for three, four, or five weeks. This state of the disease has been usually termed *chronic*, but it hardly can be called so as respects either the character or duration of the disease. In this less acute or milder form the symptoms are nearly the same as in the acute, especially at an early period, but they either are or become less severe. The intervals between the paroxysms are longer, and the paroxysms are shorter, or the spasms are milder. The pulse, also, is either less frequent or but little accelerated during the intervals, and the contractions are less general or continued than in the acute form. The symptoms thus gradually subside, and the natural functions assume their healthy states; but the muscles continue for some time stiff or sore, and they are liable to a return of stiffness or contraction after exposures to either cold, wet, or miasmatic exhalations.

22. *The sub-acute or mild form of tetanus* may present an intermittent character, especially when it is idiopathic, owing to the concurring influence of malaria with wet and cold in causing the attack; but this modification of the disease is only met with in warm climates and in miasmatic localities. In females, trismus or sub-acute tetanus may assume an *hysterical character*, or hysterical symptoms may be associated with the tetanic, the disease being really tetanus, and occasioned by an injury. Of this association I had a very remarkable instance, many years ago, in a cook in my own family. This state of the disease should be distinguished from hysteria, when the latter assumes a tetanic form, owing to the violence of the spasms during the hysteric paroxysm (see DIAGNOSIS, § 35).

23. But tetanic symptoms may be produced in females by the usual causes of tetanus, especially during the catamenia, or after an abortion, or after parturition, especially if any portion of the ovum, or membranes, or placenta be retained. In these there is sometimes much of the hysterical character, but the tetanie may so predominate as to place the patient's life in jeopardy. Of this I saw a case to which I was called in consultation some years ago. I was convinced of the retention of a portion of the ovum. A decoction of secale cornutum with the bichlorate of soda was

prescribed, terebinthinate enemata were administered, and terebinthinate embrocations applied along the spine. The cause of irritation was discharged from the uterus, and the patient recovered.

24. *C. TERMINATIONS.*—A *fatal issue* is most commonly occasioned as now stated. In this case the paroxysms become more severe and prolonged, and the pulse most frequent, feeble, and irregular. Respiration is difficult, hurried, laborious, and unequal. The motions of the chest and of the diaphragm are impeded, and the lips, face, and surface become first pallid and then livid. The lungs are congested, and air ceases to be either inhaled or expelled. It has been supposed that, during the paroxysm, asphyxia may be occasioned by spasmodic closure of the glottis, the spasms extending to this quarter chiefly or only, and that death is thus suddenly produced during the exacerbation; and it has also been inferred that spasmodic closure of the glottis is superadded to spasm of the muscles of the chest and diaphragm. Whether either mode takes place solely, or both co-operate in occasioning the fatal result, is a matter not easily determined; but it is of some importance that it should be ascertained, as indicating an extreme measure of treatment in imminent circumstances. While death is thus generally occasioned in the acute cases, it is imputed chiefly to exhaustion in the sub-acute, or chronic, as commonly termed—the prolonged disease, the inability to receive nutriment, the return of spasms, and the consequent exhaustion and inanition terminating life. But even in these spasm may affect the muscles of respiration, or even the glottis, and produce death. When exhaustion or inanition occasions this termination, the paroxysms become weaker and less frequent, the pulse small, weak, irregular or intermittent; the muscles relax, the features sink, the eyes are dim, or are covered by a slight film, and respiration is gasping, slow or laboured, or it gradually and almost insensibly ceases.

25. Recovery from tetanus is commonly gradual. In a table where Mr. CURLING has arranged 128 cases of traumatic tetanus, fifty-eight terminated successfully, eight being cured in the course of a week, three in ten days, four in a fortnight, four at the end of three weeks, fifteen at the end of a month, four after five weeks, eight after six weeks, three at the end of eight weeks, three after two months, and two after three months. The muscles often continue stiff for some weeks after the spasms have subsided, owing to the injury received by them during the attack. Even months may elapse before they regain their healthy tone and action. In a case recorded by Dr. CURRIE, the patient's features retained "the indelible impression of the disease." And in a case by Mr. CURLING, the patient complained of stiffness about the jaws when exposed to cold, although nine months had elapsed from the attack; and in another case, rigidity of the muscles of the lower jaws continued for six months after recovery. A few days before this was written I was consulted by a gentleman, whose jaws had continued so firmly locked, after an attack of idiopathic trismus, that some of the front teeth had been extracted to enable him to receive food into his mouth. This contraction of the muscles of the jaws had continued nine years without any change. He had become accustomed to it, and he now consulted me for a different ailment. The



treatment of these effects of tetanus is a matter of importance, as will appear in the sequel.

26. *The duration of tetanus* varies very remarkably, both in the idiopathic and symptomatic forms. This is well shown, as respects the latter form, by the table compiled by Mr. CURLING. Professor ROBINSON has stated that a negro, having scratched his thumb with a broken piece of china, was seized with tetanus, and died in a quarter of an hour. In one case the patient died in twelve hours; in another, recorded by Mr. DICKINSON, death took place in twenty-two hours; and in a case contained in Mr. CURLING's table, in twenty hours. In another, fully detailed by this excellent writer, death occurred sixteen hours after the first appearance of tetanic symptoms, and six days after the injury. This termination is frequent at various periods from twenty-four to forty-eight hours. In the table just mentioned, fifty-three cases were fatal within eight days after the appearance of symptoms: eleven on the following day, fifteen on the second day, eight on the third, seven on the fourth, three on the fifth, four on the sixth, three on the seventh, and two on the eighth day after the commencement of the disease, but very few after a longer period. MORGAGNI mentions a case which was fatal after twenty days. Dr. LIONEL CHALMERS, in his account of acute idiopathic tetanus in South Carolina, assigns the duration of this form of the disease nearly to that of the traumatic form now quoted from Mr. CURLING. Dr. L. CHALMERS states that patients generally die in twenty-four, thirty-six, or forty-eight hours, and very rarely survive the third day; but when the disease is less acute, that few are lost after the ninth or eleventh day.

27. *D. APPEARANCES IN FATAL CASES.*—Different changes have been observed in different cases, and those which have been found in some have been absent in others. Certain changes are, however, more constant, and are rarely altogether absent.—*a.* The *body* generally is unusually rigid after death; and the *muscles* are not only firm or contracted, but they also present, in many places, rupture of their fibres and ecchymoses.\* The *blood* is always uncoagulated, and hence it gravitates to the more depending parts, and gives those parts externally a livid or dark mottled hue. The combination of rigidity of the muscles with fluidity of the blood shows that the *rigor mortis* is not the result of the coagulation of the blood in the structures; this state of the muscles being evidently owing to the morbidly increased irritability before dissolution, the remains of which still continue in their fibres for some time after death.

28. *b.* The *nerves* immediately connected with the seat of injury are stated by some writers to have been injured, inflamed, or otherwise changed; and by others to have been in no ways affected.

\* Mr. BOWMAN (*Philos. Transact.*, 1841, p. 69) has found some muscles in tetanus apparently healthy, while others presented a pale appearance in many parts, like the muscles of fish, owing probably to the blood having been squeezed out of the vessels. In other parts they had almost lost their fine filamentous structure, and presented a soft spotted mass which was easily torn. Extensive ecchymoses were frequent, and contrasted with the pallor of other parts. Under the microscope, the primitive fasciculi exhibited here and there the characteristic signs of extreme contraction, fusiform swelling, and a closer approximation of the transverse striae than usual. In other parts, these fasciculi were reduced in size, and the striae were either far apart or had disappeared entirely. In many parts they had burst with the sheath.

Even when presenting manifest appearances of inflammation, they have been viewed as merely participating in a similar state of the surrounding parts. In some cases, however, the inflammatory changes have not been confined to the portions of the nerves in the seat of injury, but have been traced in different parts of their course as far as their origins. Many recent observers have traced these changes along the nerves to the pia mater, the arachnoid, and the substance of the spinal cord, which have usually also presented evidence of inflammatory action. Some instances have occurred to these and other observers (see BIBLIOG. and REFER.), in which injury of the nerve has existed, or causes of irritation have been in contact with the nerve, without signs of inflammatory action. As respects the nerves, therefore, the proofs of change, although evident in many instances, are wanting in others; but it is by no means certain that, although changes perceptible to the unaided senses have been wanting, no change has existed, or that irritation of a most violent kind may not have been propagated along the nerves without developing inflammation, or changes usually termed inflammatory, sufficiently great or manifest to remain many hours after death.

[We have, in several instances, found tumefaction and reddening of the nerve, extending from the wound to the spinal cord, after death from tetanus, which we have never observed in cases where no tetanic symptoms had occurred. M. PELLETIER has also published several cases (*Revue Medicale*, 1827, vol. iv., p. 183) where he observed the inflammation propagated along the injured nerve in this disease. FROEIER has noticed the same phenomenon in seven cases of tetanus, and regards it as a uniform and characteristic lesion. There is certainly no uniformity in the post-mortem appearances in the central organs of the nervous system in tetanus, and there is no uniform lesion, unless it be that of the nerve above mentioned. In examining for this lesion, it must be recollected that the neurilemmatous sheath is the part mainly affected in inflammation, presenting an increase of redness, more or less intense; the infusion of serum inducing a fulness and swelling of the nerve, causing the nerve-tubules themselves to become separated, and, as it were, unraveled. This is often followed by exudation of fibro-plastic matter, and compression of the fasciculi, thus causing their obliteration.]

29. *c.* The *ganglia and sympathetic nerves* were suggested by me, in a paper published in the *London Medical Repository* for May, 1822, to be the seat or pathological cause of tetanus, and especially of the idiopathic form of the malady. I then contended that the ganglial, or the organic nervous system, is the source of irritability in contractile tissues; and when this property is inordinately excited without the control of the will, that changes should be looked for in this system. Some years subsequently, Mr. SWAN directed attention to the sympathetic system in tetanus, and stated that the ganglia were preternaturally injected in this disease; and appearances said to support this statement were observed by ANDRAL, ARONSOHN, and DUPUY; while MEYER, VETTER, [BRIGHT], and others have adduced instances of tetanus consequent upon ossific deposits irritating branches of ganglial nerves. It should not, however, be overlooked, that the ganglia are often

very vascular, even in health; that they are not always, or even generally, unusually or excessively vascular, and much less manifestly inflamed in tetanus; and, even granting them to be excessively injected or inflamed, it cannot be shown that their inflammation could be more productive of tetanus than a state of irritation or of vascular erythism, this latter condition being manifestly more compatible with excessive discharge of function than a state of inflammation.

30. *d. The Spinal Cord, Medulla Oblongata, Brain, and their Membranes*, have frequently presented changes, more or less decidedly morbid, in tetanus and trismus. I believe that these changes are rarely altogether absent, especially as respects the spinal cord, medulla oblongata, the pons Varolii, and their membranes, when the inspection is made within twenty-four hours after death, and when these parts are carefully examined. Something, however, should be imputed, as respects both the presence and the absence of change, to the fluidity of the blood after death, and to the position of the body. In no inspection which I have witnessed have inflammatory appearances in one or other of these parts been altogether wanting. These appearances have been viewed as the pathological cause of tetanus by the FRANKS, LARREY, MAGENDIE, BERRA, RECAMIER, REID, KENNEDY, OLLIVIER, CASTLEY, and many others, whose writings are referred to in the BIBLIOGRAPHY; and when tetanus or trismus has been present, and these changes have been slight or absent, the circumstance may be explained without inferring that these parts were either unaffected or unchanged, even in their vascular conditions during life (see § 63, *et seq.*). The changes more commonly observed are, vascular injection of the pia mater, sometimes with exudations of lymph on its free surface; hardening or softening of one or more of the columns of the cord or of the medulla oblongata, softening being more frequently observed when the inspection has been long delayed; opacity of the arachnoid, or deposits of small plates of bone or of cartilage in the free arachnoid, the surface of these plates being rough on the sides next to the pia mater; generally increased vascularity, sometimes with recent adhesions, and congestion of the veins and venous sinuses of the spine. These changes may extend more or less generally along the cord and medulla oblongata, often also to the pons Varolii, and even to parts in the vicinity of the latter, and surrounding the fourth ventricle. They were thus observed, with several ossific plates in the arachnoid, in an acute case of tetanus which was under my care in 1820, and of these appearances I made a coloured drawing, which is still in my possession.

[We find that in tetanus the equilibrium of the forces, whose balance is necessary to the due performance of the functions of the nervous system, is destroyed, and it is quite compatible with our knowledge of pathology and physiology that this should occur without any primary change in the circulating organs, while, on the other hand, we are equally justified in assuming that a state of congestion and inflammation may react upon the nervous system in such a manner as to entirely alter its normal relations—so that we may view the morbid appearances in the vascular system, either as the cause or the result of the changes in the nervous system.]

31. In addition to these, the substance of the cord and medulla is somewhat reddened or injected, and exhibits numerous red points when divided. In some cases the membranes are more decidedly inflamed and thickened. Generally the spinal fluid is abundant and somewhat altered or turbid. In rarer instances, a puriform exudation is found between the membranes, and the softening of a portion of the cord presents a puriform infiltration with capillary injection. In still rarer cases, the serous exudation is of a rose colour, or even more deeply tinged, or even blood is extravasated and extended along a considerable part of the cord. These are the chief changes which are observed in the spinal medulla in fatal cases of tetanus; but nearly all the appearances described when treating of *inflammation of the membranes and substance of the SPINAL CORD and MEDULLA OBLONGATA* are sometimes found in cases of tetanus and trismus, especially in the idiopathic form; while in some cases, more particularly of the traumatic form, no changes in the spinal cord, medulla oblongata, or their membranes, or in the ganglionic nerves, or even in any other part, have been detected; but whether the examination in these instances has been sufficiently minute or not, may be viewed, in the present state of our knowledge, as somewhat doubtful.

[It should be recollected that position is more likely to affect the spinal cord than the brain, owing to its being less excluded from atmospheric agency; and also that the relation of the envelopes of the cord differs from that existing between the investments of the brain and their contents in various material points. Mr. CURLING has called attention to this circumstance, and relates a case of tetanus where, on examining the body *post mortem*, which had been placed on its face immediately after death, he found that part of the pia mater covering the anterior columns of the spinal cord remarkably vascular, while in three other instances of the same disease he found the vessels in the posterior parts only turgid. From several similar observations, Dr. C. infers that the vascular condition of the spinal cord in tetanus is chiefly a post-mortem phenomenon.]

32. The morbid appearances which have been constant in the cases which I have inspected, chiefly, however, many years ago, were, injection of the membranes and substance of the more central parts of the base of the brain—the medulla oblongata, the pons Varolii, and parietes of the fourth ventricle. Numerous cases illustrative of the pathology of tetanus have been detailed by Mr. CURLING; and to his work, as well as to others, and to many interesting papers referred to in the BIBLIOGRAPHY, I refer the reader.

33. The changes which have been found in these parts of the animal nervous system admit of more than one interpretation, and manifestly supervene in two ways: 1st. They may be induced primarily, especially in idiopathic tetanus, the seat and extent of the inflammatory action along the medulla oblongata and cord, occasioning the extended and the continued contractions, and the spasmodic exacerbations. 2d. They may be merely consequences of the irritation conveyed to the spinal medulla and membranes, or to the medulla oblongata, or parts in its vicinity, by nerves proceeding from the periphery of the frame, or by communicating nerves from internal ganglia or viscera; the irritation thus extended



and reflected by motory nerves on the voluntary muscles, excites increased vascular action; and this increased action in many instances advances to inflammation, or to the production of changes, either resembling or identical with those said to be inflammatory. (See *Pathological Inferences*, &c., § 61, *et seq.*)

34. *e.* In addition to the above, changes have been found in other parts of the body. The *lungs* are usually congested, and the blood in the vessels is dark and fluid, owing to the immediate cause of death—the state of asphyxia. Increased vascularity or inflammatory injection of the digestive *mucous surface* has also been seen by M<sup>r</sup>ARTHUR, SWAN, ANDRAL, and others; but this change may also have resulted from the asphyxia, or from the medicines prescribed. Injection of the *ganglia* has been remarked by SWAN, myself, and others; but this, if it at all exceed the natural state, may be only the result of propagated or transmitted irritation. The existence of *worms* in the intestines and stomach in a very large proportion of cases, of both the idiopathic and symptomatic malady, especially the former, is interesting, at least as a predisposing cause; and instances of this fact have been recorded by MUR-SINNA, O'BIERNE, LARREY, LAURENT, DAZILLE, THOMPSON, MORGAGNI, STOLL, and many others; and great importance has been attached to them as a cause of tetanus by these writers. “The *papillæ maximæ* at the root of the tongue are sometimes found hypertrophied, and the mucous lining of the *larynx* highly injected, and containing a quantity of frothy mucus.”—(CURLING.) The *pharynx* and upper portion of the *œsophagus* are much contracted, and their internal surface is red and inflamed, and often covered with a viscid reddish mucus. Similar appearances are also found in cases of RABIES (see § 22). In both maladies the spasms of the pharynx explain the changes of these parts.

35. II. DIAGNOSIS.—Tetanus can hardly be mistaken for any other malady.—*a.* The continued contraction of the muscles of the jaws and face, the peculiar pain under the sternum, and the exacerbations of the continued muscular contractions, viewed in connexion with the cause, when this is known, sufficiently indicate the malady.—*b.* It may, however, when superficially viewed, be mistaken for *rabies* (or hydrophobia, as that malady has improperly been termed), owing to the difficulty of swallowing fluids, to the accession of spasms of the muscles of the face and neck upon attempts to swallow, and to the increased sensibility. But the entire absence of muscular contraction during the intervals between the paroxysms, and the morbid impulse and ferocity characterizing the rabid paroxysms, distinctly mark that disease, and distinguish it most satisfactorily from tetanus.

[In some cases of tetanus, guttural spasms occur on attempting to drink, and there is the same dread of fluids, and their rejection, as in hydrophobia. But in tetanus there is rarely a discharge of saliva, which is so common in hydrophobia; and thirst is as rare in the former as it is common in the latter. In tetanus, also, the mind is generally clear to the last, while hydrophobia is marked by more or less mental aberration. There is also a marked contrast in the expression of the countenance in the two diseases, and tetanus scarcely ever presents the laborious, panting respiration, the tremour of all the mus-

cles, and the great sensibility of the surface and organs of sense which occur in hydrophobia.]

36. *c.* Tetanus can hardly be distinguished from inflammation of the *membranes of the spinal cord and medulla oblongata*, especially idiopathic tetanus. Indeed this latter, and even the symptomatic, may be viewed as often being very acute forms of inflammation attacking almost simultaneously the arachnoid and pia mater of the cord and medulla oblongata, and occurring either primarily or consecutively of irritation propagated to these parts (§ 33), the extent of the morbid action occasioning a co-ordinate extent of muscular contraction. When treating of meningitis of the cord, and of myelitis (see SPINAL CORD, § 127–157), I described the symptoms, as respects the voluntary muscles, as being identical with tetanus or trismus, according to the seat and extent of disease of the spinal membranes. Inflammation attacking either these membranes, or the cord, or the medulla oblongata, or extending to them all, will necessarily be followed by effects, as respects the muscles especially, varying with the changes produced in these structures by the inflammatory irritation or action, of which they are either successively or coetaneously the seats. For, if the morbid vascular action in these tissues be not followed by either effusion of lymph, or softening of the cord so as to occasion abolition of function (paralysis), it must necessarily follow that the increased muscular action, produced by the vascular action in the membranes of the cord, will be continued either until the vascular action subsides or is subdued by treatment, or until it extends to the membranes or substance of the medulla oblongata and central parts of the base of the brain, and occasions spasm of the respiratory muscles and asphyxia. In many cases the inflammatory action in the membranes or substance of the spinal cord is limited to a portion only of either, or of both, and the consequent changes are such as occasion paralysis, the tetanic contractions described, in the article referred to, being partial and co-ordinate with the extent of disease in the cord, and either preceding the paralysis or coexisting with paralysis, but in a different series of muscles. Instead, therefore, of viewing tetanus and trismus, especially in their idiopathic forms, as totally different diseases from inflammation of the membranes of the spinal cord and medulla oblongata, I consider them very closely allied, although not identical maladies, the chief differences arising from the extent to which these membranes are affected, from the development of muscular irritability being greater in the one disease than in the other, and from the changes consequent upon the irritation or inflammatory action of which they are the seats.

37. *d.* It ought not to be overlooked that *Hysteria*, especially in its more paroxysmal and spasmodic form, may very closely simulate one or other of the forms of tetanus. Of this I have observed several very remarkable cases, the closeness of resemblance being such as would have induced a physician, who had seen the case for the first time, to believe that the patient was actually the subject of tetanus. Generally, however, these hysterical tetanic seizures are preceded and attended by so many hysterical phenomena that the difficulty of diagnosis is slight. But this is not always the case; for the trismus, or the more general tetanic contractions, may be so protracted, and the symptoms of either opis-

thotonos or emprosthotonos be so complete as to lead to the conclusion, which the observation of some cases has confirmed, that the irritation of the sexual nerves has so excited the spinal cord or membranes, or the origins of the spinal nerves, as to develop a tetanic state, owing to the reflexion of this irritation from the cord and origins of the voluntary nerves upon the muscles of voluntary motion. The nature of these hysterotetanic seizures, even when prolonged, may be inferred from the sex and age of the patient, from the history of the case, from coexisting hysterical symptoms, and from the rapid effect produced by influences acting strongly on the mind, or powerfully exciting volition, as preparations to apply the actual cautery or the cold affusion. It may farther be mentioned, that cases may occur (I have seen three undoubted instances) of simulated trismus or tetanus in hysterical females, especially in those who addicted themselves to self-pollution. The test just mentioned will often aid in the detection of these cases, and often present the recurrence of the hysterical form of trismus or tetanus. The trismus, or more fully developed tetanus, occurring in rare instances after parturition or abortion, is often attended by hysterical symptoms, and hence requires close attention to distinguish it from some states of hysteria, the alliance in such cases being close. Although *epilepsy* is attended both by trismus and tetanic spasms, yet the characteristic unconsciousness of the former sufficiently distinguishes it from the latter.

[Prof. SIMPSON, of Edinburgh, maintains that traumatic tetanus sometimes supervenes as a secondary obstetrical disease; regarding the interior of the uterus, after abortion and parturition, as in a state of lesion similar to that of a wound on the external parts of the body. The reason why the separation of the *decidua* does not more frequently give rise to tetanus, he believes to be found in the fact that the uterus is chiefly supplied by nerves from the sympathetic system, whereas tetanus, being chiefly a disease of the true spinal system, is produced by irritation of nerves immediately connected with that system. As Dr. SIMPSON holds that *eclampsia*, or puerperal convulsions, is generally produced by the existence of a morbid poison in the blood, so he deems it probable that the generation of a special blood-poison, at the site of the wound or elsewhere, may give rise to surgical or obstetrical tetanus, just as the presence of strychnia in the blood gives rise to tetanic spasm. Out of 24 cases of obstetrical tetanus recorded by Prof. SIMPSON, only three recovered, and these under opposite modes of management. Indeed, there are but very few cases on record of recovery from this rare affection. The principles of treatment applicable to it are the same which regulate the management of other forms of the same disease. Dr. D. H. STOKER, of Boston, has recorded a fatal case of tetanus following a retained placenta (*N. Y. Lancet*, vol. i., p. 62), and other similar cases have been reported.

Dr. COLLES, of Dublin, thinks that two distinct diseases have been confounded together under the name of tetanus. That which is often mistaken for it comes on after injuries, and especially fractures. We have seen two cases, in hysterical females, from pricking the finger with a needle. The spasms which so often occur in the muscles of a fractured limb, from the irritation caused by the sharp spiculae of bone, or the want of support,

or of points of resistance to muscular action, and which come on immediately after the receipt of the injury, are never a formidable affection, and seldom continue beyond the second or third day. But another and frequently fatal form of spasmodic disease occurs about the third or fourth day after the injury, generally terminating in death by exhaustion between the second and sixth day from its invasion. The spasms, commencing in the injured limb, and recurring at irregular, but increasingly frequent intervals, at length extend to the muscles of the body (at first confined to the injured side), then gradually involve all the muscles of the body, which are distorted in a fearful manner. It is distinguished from true tetanus, according to Dr. COLLES, by its occurring in three or four days after the accident, while the latter seldom appears before the second or third week. It begins by spasm in the limb injured; true tetanus by stiffness of the throat. In the intervals between the spasms in the former, the muscles are quite relaxed, and the patient can swallow and move with comparative ease; while in tetanus there is constant rigidity, almost preventing swallowing or motion of any description, and giving the peculiar expression of countenance. In the former the pain is chiefly in the wound, and is most severe during spasm; in the latter there is no pain in the wound, but a pain, not very severe, at the scrobiculus cordis. It also runs its course in three or four days, while tetanus may continue (says Dr. COLLES) for as many weeks. In it amputation holds out the only prospect of relief; while in tetanus amputation is perfectly useless, if not injurious. Such, according to COLLES, are the essential differences between these two forms of spasmodic affection, and which are so generally confounded.]

38. III. TETANUS INFANTUM.—SYNON.—*Tetanus vel Trismus Nascentium; Tet. vel Tris. Neonatorum; Tet. or Tris. of new-born Infants.*—The Tetanus or Trismus of recently-born infants is essentially the same disease as that already described. It generally commences in the first seven or nine days after birth, and rarely later than the fourteenth day. The muscles of the lower jaw are first affected, hence it has been frequently named trismus; but the spasms are rarely limited to these, but commonly extend to the other muscles of the face, and to those of the neck, trunk, and also of the limbs. Even when the spasms are apparently confined to the muscles of the jaws, a paroxysm of more general spasm suddenly occurs and terminates life by asphyxia. The tetanus of infants usually presents two forms, as in the tetanus of adults, but is even more rapid in its progress than the latter—the *acute*, which commonly terminates life in ten or thirty hours, or within forty-eight hours; the *sub-acute*, which may be prolonged to eight or nine days, but more frequently terminates from the third to the fourth or fifth. Recovery from either of its forms is very rare.

39. This malady is now very rarely observed in temperate climates, and formerly not frequently, unless in Lying-in-Hospitals, in which it has appeared as a most fatal endemic. According to Dr. JOSEPH CLARKE, it proved fatal to many of the infants born in the Dublin Lying-in-Hospital. At the conclusion of 1782, of 17,650 born alive in that institution, 2944, or about 17 per cent., had died of it within the first fortnight from birth. But it is chiefly among the dark races, and the



negro slaves especially, that it is most frequently met with. Mr. MAXWELL, Dr. HANCOCK, Dr. MORRISON, and others state that it is a chief cause of depopulation in the negro races in the West India Isles, and in the colonies of Demerara and Essequibo, the deaths of new-born infants from this malady being about cent. per cent. of all that are born. According also to RUSH, FOURCROY, VALENTIN, DAZILLE, CAMPET, and others, it is also a frequent, and always a fatal, disease in the Southern or Slave States of the United States, but that it is rarely seen in white infants. According to Dr. HOLLAND and Sir GEO. MACKENZIE, it is destructive to all the infants born in the island of Haimacy, on the south coast of Iceland, and it exists in St. Kilda, the most remote of the western islands of Scotland; this prevalence being imputed chiefly to the food given to infants.

40. *The causes of this disease of infants have been very differently assigned by writers.* By some it has been imputed to the division of the umbilical cord, and to the subsequent treatment, and hence it has been viewed as traumatic tetanus in the infant; by others it has been considered as idiopathic, and caused chiefly by a vitiated atmosphere, from crowding and deficient ventilation; and by many it is said to be owing to the retained meconium, and to morbid secretions in the prima via; while not a few impute its frequent occurrence in the West Indies to the excessive use of irritating purgatives soon after birth. All these causes have been disputed, and exposure to cold, or currents of air, has been assigned as its chief agent. That more causes than one are concerned in producing it seems most probable, and, in connexion with the division of the umbilical cord, an impure air, currents of cold air, unwholesome and inappropriate nutriment, and irritation of the digestive canal either by morbid secretions and excretions, or by unsuitable purgatives, may concur in developing the malady, in those constitutionally predisposed to it, as negro infants appear to be, especially in some localities. That a contaminated atmosphere is concerned in causing the malady in white infants, is shown by the fact that the very remarkable fatality occasioned by it in the Dublin Lying-in Hospital, and noticed above (§ 39), was reduced, after the date there stated, from seventeen per cent. to five per cent., by a better ventilation of the institution.\*

41. *The appearances in fatal cases* have been very differently described. But although nearly every case has been fatal, and numerous opportunities of inspection have been furnished, still the changes produced by the malady have been very imperfectly observed. Until early in the

present century the spinal cord and parts in the vicinity of the fourth ventricle were rarely or never examined, even in this and other forms of tetanus; and as various concomitant or contingent changes were remarked by writers in different tissues and organs, so these changes severally received the credit of directly or pathologically producing the disease. Various changes of an inflammatory kind have been observed in parts in the vicinity of the umbilicus; while several of these changes have been considered such as necessarily follow the division of the cord. Dr. GOMELIS, of Vienna, was among the first to examine with attention, although preceded by the FRANKS, the spinal cord and medulla oblongata, in the cases which occurred in the foundling hospital of that city; and he, as well as others subsequently, has always observed increased vascularity of the membranes and substance of those parts of the animal nervous centres. Indeed, according to my own observations in a few instances, and to those of other writers who have always inspected these parts, not only in cases of trismus and tetanus, but also in fatal cases of epilepsy and convulsions, morbid appearances, either congestive or inflammatory, and often also their usual consequences, have been observed in these situations, and in the more central parts of the base of the brain, and hence we have no reason to infer that the pathology of the tetanus of new-born infants is in any material respect different from that of the tetanus of adults, the only difference being in the greater severity, acuteness, and fatality of the former; and, as far as my own observation has extended, in the more marked inflammatory appearances, or the extremely increased capillary injection of the nervous centres of both organic and animal life.

42. IV. RELATIONS AND ALLIANCES OF TETANUS AND TRISMUS TO OTHER DISEASES.—i. Certain of these *relations* have been already noticed when noticing the *Diagnosis* of tetanus and trismus, but there are others which should not be overlooked, especially as they serve to throw light on the nature and treatment of this malady. When treating of inflammation of the membranes of the BRAIN and of the SPINAL CORD, I stated that spasm, more or less constant or persistent, is present in the muscles supplied with nerves, the origins of which are more immediately connected with the inflamed part, and that the spasm continues until pressure or disorganization, at the origins of these nerves, destroys their functions. When irritation is propagated from remote or distant parts to the membranes of the cerebro-spinal system the effect produced may be longer persistent, than when inflammation is primarily developed in these membranes; for, in the former case, the irritation may continue long before inflammation is developed, while in the latter the primary existence of inflammation may be more rapidly followed by exudation, thickening, and other inflammatory changes calculated to impair or destroy the functions of their seats and of adjoining parts. Hence in most cases of spasm, convulsive disease, and tetanus, the nature and rapidity of the fatal result depend either upon the extension of the irritation to parts intimately connected with the origins of nerves supplying vital parts, or to the inflammation and consequent changes at or near the origins of these nerves.

43. A. In *cerebral or spinal Meningitis* there is generally spasm of muscles supplied by nerves,

\* [In the West India Islands and our Southern States, a large proportion of new-born infants die during the first fortnight. This mortality is ascribed to a variety of causes, such as want of cleanliness and ventilation, and sudden and frequent changes of temperature, &c. In the northern parts of Europe the same affection is common, especially among Jewish children, and is attributed to the same causes. The disease is also very prevalent among the western isles of Scotland and on the southern coast of Iceland, where fish and the eggs of sea-fowl constitute the sole food of the inhabitants. There can be no doubt that constitutional and hereditary causes may also be influential in predisposing to the disease, as well as that of locality. It must be acknowledged, however, that we are not as yet well acquainted with all the causes which predispose to or excite this fatal malady. Messrs. COLLES, BUSCH, and LEVY attribute trismus in the new-born infant to inflammation of the umbilical arteries, while Dr. WOOLLEN and others ascribe it to irritation in the umbilical cord, from bad management.]

the origins of which are allied to the irritated or inflamed portion of membrane; and, when the membranes of the basilar parts of the brain are affected, the spasms are the more general and severe or fatal. In the convulsive or spasmodic affections of infants or children, the great difficulty often is to determine whether the attack proceeds from disease existing primarily in the brain or its membranes, or from irritation and consecutive morbid action propagated thither from distant or remote parts; and even when the latter is most evidently the case, it is not the less difficult to decide how far the propagated irritation may have affected the membranes or substance of those parts of the cerebro-spinal centre to which it had extended. The spasmodic attacks of infants and children, whether tetanic or convulsive—whether persistent or momentary—generally depend upon certain pathological conditions, which are usually simple, or unassociated at their commencement, but which are not unfrequently complicated in their advanced progress. These conditions may be—1st. Irritation or vascular erythism in, or implicating, the more central parts of the base of the brain, or of the membranes. 2d. A similar state affecting some portion of the spinal medulla. 3d. Inflammatory action, at an early period of its progress, or before the consequent organic changes have abolished the functions of the nerves proceeding from the seat of morbid action in either the brain, or spinal cord, or their membranes. 4th. Irritation primarily affecting some portion of the digestive canal, and propagated thence to either the cord, or brain, or their membranes. 5th. Irritation existing in the gums, or in other parts more or less remote and similarly propagated. 6th. Morbid states of the blood, arising either from the absorption of morbid matters, or of poisonous articles, or from self-contamination, consequent upon the failure or arrest of some depurating function, and affecting the substance or membranes of the cerebro-spinal centre.

44. It will follow, from a due consideration of the usual procession of morbid action, that the disorder, whether denominated irritation, erythism, morbidly exalted nervous function, &c., commencing originally in either the *fourth* or *fifth seats*—in either the digestive canal or other parts—will frequently, and after various periods, superinduce either the *first, second, or third* of these pathological conditions, or all of them in succession; and while they, severally or singly, are attended by spasm, more or less persistent or momentary—tetanic or convulsive, continued or paroxysmal—the great difficulty which the physician will have to contend with, is to decide respecting the origin and seat of disorder and the progress it has made, conformably with the procession of morbid actions now demonstrated. To ascertain these points with due precision, also, the remote causes, the more immediate effects of these causes, and the whole history and progress of each case, require accurate examination; and the functions of parts deriving nerves from the several sources already indicated should be duly investigated. The accession, the progress, and termination of each attack—paroxysmal or more or less persistent—ought to be carefully and closely observed, in respect, 1st. Of the functions of ingestion, digestion, and defæcation. 2d. Of respiration, circulation, and vascular action. 3d. Of the functions of sense, and of al-

tered sensibility. 4th. Of cerebral manifestations and consciousness.

45. When there is, in connexion with spasmodic or tetanic action, increased sensibility of the surface of the body, the membranes of the spinal medulla are obviously implicated. If with these symptoms there be also a morbid exaltation of the senses of hearing, seeing, &c., the extension of irritation or of inflammatory action to the basilar parts of the brain may be suspected. If the spasm be accompanied with anæsthesia of the surface, either consecutively upon increased sensibility, or primarily, or with impairment or loss of the functions of sense, the presence or super-vention of congestion, or of effusion, or of softening, in those parts of the nervous centres, upon states of irritation, erythism, or inflammatory action, may be inferred; the extent and seat of spasm, and of impaired or lost sensation, indicating the seat and extent of the pathological condition. If in connexion with, or consecutively upon, spasmodic contractions, there be loss of all consciousness—of all the functions of sense, and all the manifestations of mind—as in epilepsy, and in puerperal and some other forms of convulsion, &c., it may be inferred that the irritation, whether cerebral, spinal, or in parts remote from these centres, so affects the medulla oblongata or the central parts of the base of the brain as to occasion spasm of the respiratory muscles, especially of the glottis and diaphragm, or to paralyze or arrest their functions, either for a time or fatally; if for a time only, the cerebral congestion attending the paroxysm and the imperfectly oxydized blood serve to dissolve the spasm by paralyzing for a brief period the previously irritated nerves, a return of the normal state of the functions ultimately resulting; if fatally, the protracted spasm and the consequent congestion and asphyxia terminate existence.

46. The views now stated explain the alliance of tetanus or trismus with the spasms or convulsions of infants and children, as well as of adults; for, as long as the parts of the base of the brain, which are more intimately connected with conscious sensibility, are not implicated in such a manner as to abolish their functions either for a time or forever, the attack is simply spasmodic or convulsive, consciousness and mental manifestation being unimpaired. When, however, the powers of mind and consciousness are affected, the extension of disease to the brain, or the primary affection of some part of this organ, is made manifest, and the attack is either epileptic or apoplectic, according to its mode of accession or to the phenomena attending and following it.

47. B. In *Epilepsy* and in the *epileptic convulsions of the puerperal states*, there are present not only the spasms of the muscles of the neck and face, but also most of the other phenomena of tetanus, in either of the forms already defined, often modified, but sometimes almost identical with them, although generally of a short or paroxysmal duration. The chief distinction, however, is in the sudden accession of unconsciousness which is generally contemporaneous with, or somewhat antecedent to, the spasm. In all cases of spasm or convulsion, accompanied with unconsciousness, the muscles of respiration are early affected, and cerebral congestion and imperfect oxygenation of the blood result, these conditions tending to dissolve the spasms, and thereby to admit of the return of a normal state of respi-



ration, if they are not so excessive or persistent as to destroy life.

48. *C.* In *Apoplexy*, and more especially in that form which was first described by me under the name of *convulsive apoplexy*, tetanic rigidity of muscles, more particularly of those of the neck or limbs, with various convulsive movements, is more or less manifest. Although in these cases the vessels of the brain are very frequently diseased, and the substance of the brain consecutively altered, with hæmorrhagic clots, yet the spasms, tetanic contractions, and convulsive movements are not to be imputed so much to these and other allied alterations in the substance of the brain, as to changes in the membranes, especially in those parts which cover the central and basilar parts of the cerebrum.

49. *D.* The tetanic spasms and convulsions observed in the more violent *paroxysms of hysteria* are seldom accompanied by unconsciousness; or, if they be so attended, the loss of sensation is incomplete, and supervenes gradually, whereas it is instantaneous and complete in the fully-developed fit of epilepsy; and it comes on gradually or suddenly, or is incomplete or complete in convulsive apoplexy, the contractions of the muscles being either very extended or limited in either malady. The chief differences in the spasmodic or muscular contractions, characterizing these diseases and the several forms of trismus and tetanus, are that they are either subordinate phenomena, or of comparatively short duration in the former, while they constitute the characteristic feature, the most dangerous symptom, and the cause of death, in the latter.

50. *E.* In the tetanic contractions characterizing the *convulsions of infants and children*, especially the form termed *eclampsia*, there is generally more or less affection, primary or propagated, of the cerebro-spinal centres, or of their membranes. If the brain be unaffected, the functions of sense and consciousness are not materially disturbed during the attack; but if these functions be manifestly impaired or lost, the mischief is in the brain or its membranes, or is propagated thither either along the spinal cord or its membranes, or directly from the seat of irritation, by means of the ganglionic or sympathetic nerves. In young children and infants, when the irritation is in the stomach, or in the bowels, or in the gums, it is often difficult to determine whether the muscular contractions are attended by loss of consciousness or insensibility. In many cases they are not thus associated, as evinced by the senses of sight and hearing, by the sensibility of the surface, and by the free and unembarrassed cry; this last more especially indicating that the function of respiration is unaffected. In other cases, even when the irritation is seated in one or other of these parts, the cerebro-spinal centres may not be implicated at first, but they may become affected sooner or later, and be the chief seat of disease, as commonly observed in other convulsive maladies attacking either children or adults. (See *arts. CONVULSIONS*, § 22, *et seq.*, and *SPASM*.)

51. *ii.* THE EFFECTS OF MUSCULAR CONTRACTIONS ON THE CIRCULATION have not received sufficient attention from pathologists. It is manifest that the changes produced on the circulation by muscular contraction, inordinate either in degree or in continuance, will vary with these conditions, and with the muscles affected. The provisions so wisely made as to the return of blood from the

brain and spinal cord: the sinus within the cranium, and the venous sinuses of the spinal column are so arranged, as very greatly to diminish or to counteract the ill effects of arrest of the return of blood from these organs; nevertheless more or less obstruction to the return of blood from them is produced by violent or protracted spasm, chiefly by pressing upon venous trunks, or by interrupting the passage of air into the lungs, or by preventing the relaxation, or by continuing the contractions, of those muscles, upon the alternate relaxation and contractions of which respiration depends. In these cases, the right auricle of the heart becomes over-distended, the return of blood from the brain impeded, the liver becomes congested, and the circulation through the lungs insufficient for the oxygenation of the blood; asphyxia and cerebral congestion being the ultimate results.

52. *iii.* THE INFLUENCE OF THE BLOOD ON MUSCULAR CONTRACTION is even greater than that of muscular action on the circulation. According to the states of the blood circulating through muscular parts, the contractions of these structures may be exalted, spasmodically excited, or weakened, or even altogether abolished. Much of these states is doubtless owing to the influence of the blood upon the nervous centres, from which the affected muscles derive their nerves; but it is not unreasonable to infer that a highly oxygenated state of the blood will impart tone directly to the muscular fibre, that an opposite state of the blood will impair the tone of this fibre, and that the accumulation of acid, acrid or irritating elements or materials in the blood, occasioned by interrupted excretion or otherwise, will sometimes cause not only exalted or morbid contractions of muscular parts, but also irritation and vascular excitement of the substance and membranes of the nervous centres. If the vascular excitement go on to the usual condition and consequences of inflammatory action, these changes will rarely be limited, although more manifest in one part than in another, for the exciting pathological cause is general, being present in the blood, and implicates both the nervous structures and their membranes; whereas the more common exciting causes of inflammation chiefly act locally, and affect a portion only of these structures, although often extending more or less to adjoining parts.

53. *V. CAUSES.*—*A. Predisposing Causes.*—The several forms of tetanus are more frequent and more fatal in the male, than in the female sex. This is partly owing to greater exposure of the former to the exciting causes, especially to injuries, accidents, and wounds. Of the influence of temperament in favouring the occurrence of the disease, we have no certain knowledge; but probably the nervous and irritable temperaments are most prone to it. There is no doubt of the much greater liability of the negro race to every form of tetanus or trismus, than of the white race. Climate and locality have a marked influence in predisposing the frame to a tetanic seizure. This is evinced by the much greater frequency of the malady in hot, than in temperate climates, and in humid and malarious localities, than in dry situations. Disorders of the digestive organs, especially the retention of morbid secretions and excretions in the digestive canal, the existence of intestinal worms, the failure or arrest of the depurating functions, and the consequent contamination of the circulating fluids, are among the

most frequent causes of predisposition. Bodily fatigue, harassing duties and occupations, excessive muscular exertions, and irregularities of diet or unwholesome food, are also causes of predisposition. The catamenial period, parturition, and abortions also favour the occurrence of the disease in females.

54. *B. The exciting causes*, in temperate climates, are chiefly injuries and surgical operations. Punctures and lacerations of fascia, tendons, and nerves; lacerations and ligatures of nerves; and injuries of the extremities, especially of the hands and feet, are the most frequent causes; but wounds in any situation or part of the body, and of every kind and grade, from the sting of a bee or wasp, or the abrasion of the cuticle, to the amputation of a limb, may produce tetanus. A cleanly incised wound is much less likely to occasion this disease than a puncture or laceration. But although these injuries are chief causes of the attack, the influences of the predisposing causes, and of those which are mainly concerned in producing the idiopathic form of the disease, in concurring to develop the malady, should not be overlooked. The causes which thus give rise to the idiopathic state of the malady, and which so often concur with injuries in developing the symptomatic form, are, vicissitudes of temperature, exposure to the heat of the sun, more particularly to the sun's rays, and soon afterward to the chills, dews, and cold of night; sleeping on the ground, especially when exposed to the night dews or moon's rays; exposure to currents of air, or to cold and wet in any way; drinking cold water, or other cold beverages, when the body is perspiring; imprudent cold bathing; sleeping in confined and ill-ventilated apartments; breathing a contaminated or a miasmatic atmosphere; and such laborious occupations as making trenches, digging clayey soils, &c. While these concur with, or aid injuries or wounds, in giving rise to tetanus, they frequently of themselves occasion the disease, especially in hot climates, and in the dark races, more particularly the negro race, by arresting the eliminating processes, and by favouring the accumulation of morbid materials in the blood, which enter into new combinations, and irritate the nervous centres and membranes, and the muscular structures themselves, both directly and indirectly, by means of the nerves. Owing to a stricter attention in preventing these predisposing and concurring causes, and to the adoption of a more wholesome diet and regimen, the several forms of tetanus are now much less frequent than they were many years ago, more especially the traumatic or symptomatic form. Tetanus may be produced by some poisons, particularly by nuxvomica, and its preparations. (See *art. Poisons* § 364-381, *et pluries*.)

[LARRY thinks that tetanus has often been produced by including a nerve in taking up an artery, especially in climates favourable to the production of the disease. He thinks that mischief more certainly arises when the ligature does not compress the nerve very powerfully, and therefore advises, in such cases as do not permit of the omission of the ligature, that it should be drawn very tightly, so as to compress the nerve very strongly.]

55. As I shall have to show hereafter, certain of the exciting causes seem to act more directly on the spinal medulla than others, while many of these causes occasion a state of the most distress-

ing irritation, transmitted through the medium of the ganglial system, or of the sentient nerves, or even through the media of both, to the cerebro-spinal centres, and thence reflected on the muscles of voluntary motion. Thus worms in the digestive canal not only predispose to attacks of traumatic tetanus, but also directly occasion the idiopathic form of the malady. That these parasites are no infrequent cause of tetanus has been insisted upon by AVICENNA, SCHENCK, HILLARY, BISSET, RUSH, CHALMERS, MICHAËLIS, RAHN, ZULATTI, and DE HAEN; and not by worms only may the disease be thus occasioned, but also by whatever inordinately irritates the intestinal canal, as the retention of the meconium, or the use of drastic purgatives, in infants. I have seen it caused by internal strangulation of the bowels, the primary lesion being accurately ascertained only after death. A temporary state of tetanus has even been produced by the passage of gall-stones, as was shown by a case which lately came under my care, emprosthotonos, of many hours' duration, having been thereby occasioned, with the slowness of the pulse which usually attends this form of biliary obstruction, the attack having been not only severe, but also protracted. TULIUS has recorded an instance of the disease having been occasioned by calculi in the kidneys; and I have observed the sufferings produced by the passage of calculi along the ureters, accompanied by spasms so general, so continued, and so severe, as closely to approach the tetanic state.

[Dr. EBERLE has related a case where he supposed tetanus was caused by a dead fœtus *in utero*, but Dr. DEWEES regards this and similar cases as instances of *post hoc, ergo propter hoc* reasoning, as it is very common for children to perish *in utero*, whereas this is almost the only instance on record where tetanus has been attributed to this cause. FOURNIER relates a case somewhat analogous, and thinks that during a violent and inefficacious labour, from extreme irritation of the uterus and neighbouring viscera, tetanus may be produced, which will subside on the delivery of the patient. Spasms undoubtedly not unfrequently occur during labour, in which every muscle of the body may be affected with tetanic contraction, coincident with contraction of the uterus, and rendering the latter wholly inefficient; but these are not cases of genuine tetanus, as the symptoms cease as soon as delivery is accomplished, and may be produced, as DEWEES has suggested, by a peculiar distribution of the sacral nerves, on which the head of the child is made to impinge by the contractions of the uterus.]

56. Several of the causes are very rarely productive of the malady, as caries of the vertebræ; while others which had more frequently occasioned it, are fortunately not so often observed now as in former days. Tetanus not seldom followed a recourse to torture, as torture was practised either by civil authorities or by pseudo-religious inquisitions, or by military and naval commanders; but whether the wretched result proceeded from the excessive pain thereby produced, or by the irritation excited in the tissues—the integuments, the nerves, the muscular or the tendinous fibres—of the parts which sustained the injury, cannot be readily determined. HARDER says, that he has seen it follow pain only; but it may justly be admitted, that excessive pain may have predisposed the system to be affected by the irritation more permanently devel-



oped in the seat of torture. That the disease may follow either burns or scalds has been admitted by many writers, and has been shown by SMITH, FIZEAU, and others; and that it may be caused by fright or terror has been proved by RIEDLIN, PIDERET, HANSA, BIERLING, and LATOUR. DE HAEN says that he has seen it produced by retrocedent gout; and probably the *materies morbi* of gout in the blood had so excited the spinal medulla and membranes as to develop a state of morbid or continued contraction of the muscles, amounting to idiopathic tetanus.\* WRIGHT and other writers have insisted much upon the influence of insolation in warm climates, or in warm seasons in temperate climates, in occasioning tetanus, and with much justice, as intertropical physicians will admit; and no less just and important is the fact shown by AVICENNA, and adverted to by many since the days of the celebrated Arab, that sleeping on the ground, especially after exposure to the sun's rays, or while exposed to the night dews or to the moon's beams, is a most influential cause of idiopathic tetanus, and of the development of the malady after injuries, wounds, &c.

57. C. The *Formative period* of tetanus, or the time which elapses from exposure to the causes until the commencement of the attack, is a matter of some importance, as respects the elucidation of the manner in which the causes act, and the employment of measures calculated to prevent the development of their effects. The duration of this interval is most various—from an hour or two to fourteen days—most frequently, in cases of injury, from the fourth to the fourteenth day. In the returns furnished by Sir J. MACGRIGOR, the interval never exceeded three weeks. Sir G. BLANE mentions four weeks as the longest period. Sir B. BRODIE observed the disease to commence generally in the second week. Mr. CURLING refers to an instance recorded by Mr. WARD, of the occurrence of the malady ten weeks after a burn in the axilla. May not some other cause or causes have occurred in this interval?

58. It has been noticed by Mr. CURLING and others, that the longer the interval between the receipt of the injury and the appearance of the symptoms, the less acute and dangerous is the disease. In thirteen cases the symptoms did not commence until three weeks after the wounds,

and only four of these were fatal; and of seven cases in which the symptoms did not appear until a later period, or about four weeks, only two terminated fatally. The more rapidly the disease follows its exciting cause, the more acute and fatal does it prove, in both the idiopathic and the symptomatic form.

59. D. The *state of the injury* or wound at the commencement of the disease is a subject of interest. Dr. RUSS remarked, that there is an absence of inflammation or free suppuration from the wounds causing tetanus. This generally appears to be the case. The injury either seems to be healing, or is quite healed, and even forgotten, when the disease commences. In some instances a feeling of irritation is referred to the injury or cicatrix; and in others a cause of irritation, of a material or palpable nature, is detected in one or the other, or is found to affect a branch or filament of nerve. In others no such feeling or cause apparently exists. If a healthy suppuration have existed in the wound, it is usually suspended, and is followed by an ichorous, or scanty sanious discharge, just before the accession of the spasms of the muscles of the jaws and neck and the difficulty of deglutition, or contemporaneously with the accession of the premonitory symptoms mentioned above (§ 4).

60. VI. THE PROGNOSIS.—The *issue* of tetanus varies with the causes, and with the form which the disease assumes. A fatal result is most frequent in the traumatic form. It is less frequent in the idiopathic form, and much less frequent in the sub-acute, whether idiopathic or symptomatic, or when the malady is prolonged beyond the ninth or tenth day. Much, however, depends not only upon the exciting or efficient cause, but also upon the influence of concurring causes, as exposure to cold and wet, to malaria, or to an impure or often respired air, and the presence of intestinal worms, either, or all, of these tending remarkably to increase the mortality of the traumatic form. The concurrence of malaria or other impurities of the air, with exposure to cold, also greatly increases the fatality of the idiopathic states of the malady. Recovery very rarely takes place if the pulse rise above 110, in the intervals between the exacerbations on the third day, especially in the traumatic form; still more rarely, if it reach 120 on that day; and no hopes may be entertained, if the pulse in that form reaches this latter frequency on the second day, or at an earlier period. Dr. PARRY thought that, if the pulse of an adult be under 110 on the fourth day, the prognosis is favourable; and if 120 or upward, unfavourable; but cases frequently terminate fatally on the third, fourth, or fifth day, and yet the pulse, in the intervals between the paroxysms, has not risen above 100 or 110, or even, according to some writers, above 80 or 90, although this latter state of the pulse, in acutely fatal cases, does not quite agree with my observation. Dr. Druitt has very truly and ably stated that, "as a general rule, the prognosis is favourable, if the complaint is partial—if it does not affect the muscles of the glottis—if it has lasted some days, without materially increasing in severity—if it is sensibly mitigated by the remedies employed—if the pulse is not much accelerated—if the patient sleeps—and if he has been subject to it before, in an intermittent form. On the other hand, the prospect will be unfavourable, if the spasms continue to increase in severity, and especially if they affect the

\* (Dr. TODD ("Phys. of the Nervous System," 1847) maintains the humoral origin of tetanus—producing a peculiar excitability or "exalted polarity" of the spinal cord: originating, in traumatic tetanus, at the distal extremity of the nerve, while its extension and implication of the spinal cord are due to the existence of some special poison in the blood, the introduction of which is dependent either upon some general depravation of the nutritive processes, or possibly, in traumatic cases, on some morbid action taking place in the wound. What lend support to this view, he thinks, are the absence of pathological changes in the cord, in death by strychnine, the occasional endemic prevalence of tetanus, the known dependence of trismus nascentium and of laryngismus stridulus on a disordered state of the nutrition, imperfect ventilation, and other influences tending to deprave the blood, &c. "The much greater facility," he remarks, "of inducing this polar state of the spinal cord by the introduction of certain substances into the blood, even in almost infinitesimal quantity, than by mere mechanical irritation of the nerves, strongly points to and favours the conclusion, that a change in the natural condition of the blood may greatly promote, if not wholly cause, the development of the tetanic state; and this change in the blood may be caused either by the introduction into it of some new material from without, or by the generation within it of some new matter possessing highly poisonous qualities.")

muscles of the glottis;" and I would add, or if they extend to the diaphragm and other muscles of respiration; and if the disease be very acute and the pulse very frequent on the second day.

61. VII. PATHOLOGICAL INFERENCES AND REMARKS.—*a.* That a predisposition, original or acquired, exists in some constitutions to be affected by tetanus, when the exciting causes, by their nature or their concurrence, are brought into operation; that this predisposition is most evident in its original state, in the negro race, and in the darker races; and that males appear to be more susceptible of this malady than females.

62. *b.* That depressed states of organic nervous power, connected with nervous susceptibility and with increased irritability, seem to favour the occurrence of an attack of tetanus; and that, still more especially, the presence of worms in the digestive canal, disorders of the digestive and intestinal functions, intertropical or warm and miasmatic localities, or otherwise contaminated states of air, and the arrest of the excreting processes, farther tend to favour the appearance of the malady, by accumulating excrementitious materials in the blood, and aid the operation of the exciting causes enumerated above (§ 54, *et seq.*).

63. *c.* That the lesions of the nervous centres of animal life, on which tetanus has generally been supposed to depend, may be, 1st. That of erythism, or of irritation, in which vascular injection and organic lesion are either not seen, or not manifested to any considerable amount, or so as to be admitted as inflammatory; 2dly. Or that of increased vascularity and the changes generally viewed as constituting inflammation, or consequent upon it; 3dly. Or, any change intermediate between the extremes of these states—the minima of the former, and the maxima of the latter—may be inferred to exist in cases of the several forms of this disease.

64. *d.* That similar lesions, in their nature and amount, to those just stated may exist in the sentient or centripetal nerves, or in the ganglionic nerves, which are the media by which the irritation is transmitted from its primary seat to the spinal medulla and central parts of the base of the brain, although lesions in these communicating nerves are not easily ascertained, traced or rendered apparent after death; or they may be such as are compatible only with the living state, and disappear soon after dissolution.

65. *e.* That any irritation at the periphery of the nervous sphere may be propagated by sentient nerves to that part of the nervous centres with which the part irritated is most intimately connected or related, and be reflected thence upon muscular parts, through the motor nerves which are most intimately connected with those portions of the nervous centres to which the irritation is transmitted.\*

66. *f.* That the irritation of the muscular structures themselves, directly produced by the accumulation of morbid and irritating materials—acid or saline—in the blood, may induce a more or less continued state of spasm of the muscles, and the existence of these materials in the blood, may perpetuate this state and superinduce farther changes in the nervous centres and in their mem-

branes, this state of the blood being produced as above noticed (§ 52).

67. *g.* That the irritation thus excited may be perpetuated or continued to the extinction of life by asphyxia or by vital exhaustion, without the changes actually constituting inflammation having been developed—at least to an amount admitting of their permanent manifestation or undoubted existence after death.

68. *h.* That, although this (§ 67) may be the case, especially in the traumatic form of tetanus, and more especially when the ganglionic system, which is so intimately connected with the existence of irritability in all animals, is brought within the sphere of morbid action, yet inflammation and its usual consequences actually does sometimes take place, but not so frequently and evidently in the traumatic as in the idiopathic malady.

69. *i.* That the inflammatory changes observed particularly in the idiopathic form, as when occasioned by insolation and by subsequent exposure to cold or the night dews, or by sleeping on the ground, &c., may be early produced, the tetanic phenomena being merely the manifestation of the early inflammatory state and changes in the membranes or substance, or in both, of the spinal medulla, extending often to, if not originating in, the medulla oblongata and the central parts of the base of the brain; and that the changes, whether inflammatory or merely irritative and incapable of demonstration, which first take place in the nervous centres of animal life, should be looked for in the parts most intimately connected with the origins of the nerves supplying the muscles of the pharynx, lower jaw, throat, and neck; these changes, as they extend along the membranes of the medulla oblongata and cord, extending the sphere and the severity of the malady.

70. *k.* That in these cases (§ 69), according to my observation, the pain which is commonly felt in the occiput, and in the cervical and dorsal regions of the spine, with the throwing backward of the head, &c., in addition to the symptoms pathognomonic of tetanus, early declare the seat and nature of the disease—irritation or inflammation of the parts now mentioned (§ 69).

71. *l.* That in cases which arise from irritation in some distant part, transmitted to nervous centres and reflected thence upon contractile structures, and in which inflammatory action is either absent, or its existence is problematical at an early period of the malady at least, we can now infer, agreeably with what we know to take place in the animal economy, that inordinate or continued contraction of muscles can exist, without an increased demand being made upon the circulation supplying the nervous centres which actuate these muscles; and hence we may conclude that increased vascularity, or even the earlier states of inflammation, of these centres and of these membranes may be the necessary consequences of the continued and inordinate muscular action constituting the disease; the augmented determination of blood thus directed to these nervous centres tending to the perpetuation and the extension of the muscular contractions, and thereby to the more or less rapid extinction of life.

72. *m.* That, notwithstanding this condition of the nervous centres of animal life, whether primary or superinduced, it is most probable that the contractions would not become so persistent, or the spasms so severe and frequent, if the gan-

\* This view is identical with that stated with reference to the pathology of CHOLERA, CHOREA, and CONVULSIONS, articles which were written more than three years, and published in 1832, or about two years before Dr. M. HALL'S earliest writings on the reflex function.



glial system preserved a normal state of function, or was free from irritation or vascular excitement.

73. *n.* Inferring, as stated above (§ 63, *et seq.*), that tetanus may depend upon, or be connected with, one or other of three pathological states of the nervous centres of animal life, namely, 1st. Upon inflammatory action of these centres or of their membranes, especially in the idiopathic form of tetanus; 2d. Upon inflammatory action superinduced upon irritation transmitted from the periphery of the sentient nerves to these centres, or from ganglionic nerves to these centres, and thence reflected on contractile structures; and, 3d. Upon irritation thus transmitted and thus reflected, without sufficient proof of inflammation. It should become an object to ascertain with all possible accuracy to which of these pathological states the case belongs to which we are called to administer relief; for, upon the inferred pathological condition, the indications and the plans of cure should be based.

74. *o.* Many of the changes which are presented by the lungs, the heart, the blood, and even by the liver and digestive mucous surface, are manifestly results of the mode of death. Those seen in the pharynx and glottis are evidently caused by spasms of those parts, consequent on the irritation or inflammation, or both, existing in the medulla oblongata and its vicinity, and upper portions of the spinal medulla, or their membranes. Yet other morbid appearances may exist in different portions of the digestive canal, or in one or other of the urinary or genital organs, which cannot be viewed as the results either of the malady or of the mode of death; but which may be considered as being either sources of irritation, or as concurring aids to irritation, or merely as accidental and unimportant changes: if they be viewed in the former light, it becomes important to ascertain how far they can be connected with the early or premonitory symptoms, and to determine the manner in which the functions of the organs in which they were seated had been discharged.

75. *p.* That, when tetanus follows irritation or injury in some peripheral part of the nervous system, the division of nerves or parts between the seat or cause of irritation and the nervous centres most frequently fails of arresting the disease; such failures evincing the superinduction and extension of the irritation, or other morbid condition constituting the malady, to the nervous centres of animal life, and probably also to the organic or ganglionic system, to which I imputed irritability in its normal manifestations very many years ago, and more recently in this work. (See *arts. IRRITABILITY AND IRRITATION.*)

76. VIII. TREATMENT.—A slight experience of the different modifications of tetanus, more especially of the idiopathic, symptomatic, and infantile forms, is sufficient to show the justice of the distinctions which I have endeavoured to establish between what may be considered as the inflammatory and the irritative states of the malady. But as either state does not exist simply or unassociated—as one condition is accompanied with more or less of the other—as the irritative often sooner or later becomes inflammatory, or the former state frequently induces the latter, the difficulty of determining in practice how far the one state may exist independently of the other is remarkably great. Unfortunately, a simply inflammatory state either of the membranes, or the

substance of the central parts of the base of the brain and medulla, or of both the membranes and substance of these parts, is seldom so manifested as to admit of a distinct recognition, the very phenomena which it sympathetically produces either masking its presence, or throwing doubts on its existence. Besides, irritation is so nearly allied to inflammation, even when it exists simply, and so often excites the inflammatory state, by eliciting vascular determination and injection—"ubi irritatio, ibi fluxus"—that we can hope only to reach an amount of accuracy which may not altogether be deserving of being considered erroneous. If the difficulty of ascertaining pathological conditions, upon which all rational indications of cure should be based, be so great in this malady as not to have hitherto been overcome, can it be a matter of surprise that the means which have been resorted to, both by physicians and by surgeons, in its treatment, have been most opposite in their effects, the most different in their natures, and in every respect most empirical and uncertain? In this state of our knowledge it would be better to leave Nature to her unaided efforts, to observe closely and accurately what is the true procession of changes and of their manifestations, and to ascertain the seats and the extent of lesion as soon after death as may be attempted with propriety.

77. I have contended above, more strenuously perhaps than any previous writer, for the inflammatory character of this malady, especially in the idiopathic form. But admitting the existence of this character, as manifested by the changes observed after death, the following questions remain to be determined, namely, Is the inflammatory state necessarily or always evident to the close observer during the life of the patient when it actually exists? and, if it be evident, Is it most successfully treated by the usual means resorted to, when combating the sthenic form of inflammatory action? 1st. As respects the former question, it may be said that inflammation of either the substance or the membranes of the spinal medulla, or of the medulla oblongata, or parts in the vicinity, is often ascertained with great difficulty. This is apparent from what I have said when treating of spinal inflammations (see *art. SPINAL CORD, &c.*, § 137, *et pluries*); and there I have viewed them as they are usually presented to both physicians and surgeons in the course of practice—as commonly limited to a portion only of either the membranes or substance of the cord, or as advancing along them gradually, and attacking successively adjoining portions. But, when the inflammatory action of these parts extends rapidly, or takes place almost coetaneously, the effects upon contractile structures are quickly and extensively manifested. Whether, therefore, it be irritation or inflammation which is produced in the spinal medulla and its membranes, or irritation quickly inducing a certain amount of vascular injection or inflammation, or merely an exalted polarity of the spinal cord, as contended for by K. SPRENGEL, there is reason to infer that the morbid condition is at first limited in extent, although advancing rapidly, and that it commences in the more immediate vicinity of the origins of the nerves supplying the muscles of the pharynx, lower jaw, and neck. When pain is felt in the cervical region of the cord, extending either upward to the occiput or downward to the dorsal and lumbar regions, when the sensibility of the

surfaces, whose nerves are connected with those parts of the nervous centres, is unusually increased, or when any stimulus acts upon the muscles connected with these parts, so as to occasion spasm or distress, as when attempting to swallow, it may then be inferred that a morbid action, usually termed inflammatory, is really present in the membranes or structures of these parts, although pain and other symptoms may not be exasperated by pressure on that portion of the spine where inflammation of the cord or its membranes is indicated; pressure no farther influencing the pain than it would if it were made upon some part of the cranium when the brain is similarly affected.

78. 2d. Admitting the presence of inflammation in the spinal medulla, or central parts of the base of the brain, or their membranes, in many, if not in the great majority of cases of tetanus, either at an early or in an advanced stage, or consecutively upon transmitted irritation, the success of such means as are usually employed against inflammation still remains questionable. We know that the term inflammation has been applied to very different states of vascular injection, as I have shown when treating of inflammation, and that these states differ as to the current through the capillaries, as to the power or tone which these vessels manifest, as to the products or fluids which are exuded from them during these states, and as to the extension of the morbid action or condition to continuous or contiguous tissues. Hence, even when the first question is admitted in the affirmative, we must have recourse to the results of an enlightened experience for our answers to the second; and these answers only can be given, so as to be satisfactory, by referring to the effects of such means as are most successful in removing changes commonly considered as, and denominated inflammatory. But it should not be overlooked, that it has been most satisfactorily shown that these changes are so different in their local characters, in their constitutional relations, and in their tendencies and results, as to require for their successful issues very different and often opposite means of cure; the differences being occasioned chiefly by the varying grades of organic nervous power, and by the presence of irritating or injurious excrementitious materials in the blood (§52). These facts have been fully illustrated when treating of the several forms, varieties, and modifications of *Inflammation* in the different organs and tissues; and what has been proved and admitted of inflammation generically, and of the special manifestations of it in these organs and tissues, may be extended to inflammation in those parts of the substance and membranes of the nervous centres to which the disease has been now chiefly referred.

79. But it should not be overlooked that while the fully-developed malady may be attributed to an inflammatory state of these parts, induced by transmitted irritation, the primary morbid condition, especially in the traumatic or symptomatic form of the malady—the irritation existing, whether manifested or not, in the seat of injury, propagating itself to the nervous centres, there developing morbid action, and perpetuating reflex muscular contraction—should be attempted to be removed or counteracted by the most efficient and appropriate means. While the local or primary irritation exists, or its transmission along

centripetal nerves is not interrupted or prevented, the procession of irritation to inflammatory action, and the extension of this action along the membranes, with the reflected muscular contractions, are thereby promoted, and the morbid consequences—the tetanic contractions and spasms—necessarily aggravated. Therefore, at all periods of the malady, but as early in the treatment as possible, means should be employed, in the *traumatic form* of the malady, to *arrest the transmission of irritation from the seat of injury to the nervous centres, or to allay irritation in this seat.*

80. A. THE LOCAL TREATMENT of traumatic tetanus should therefore be as early as possible determined upon; the means being such as are most suitable to the nature of the injury. To obtain the end now stated, 1st. Amputation or excision of the wounded part; 2d. Division of the nerves proceeding from the seat of injury; 3d. The application of agents calculated to procure a healthy action or a free suppuration in the injured parts; and, 4th. A recourse to soothing or anodyne applications to these parts, and in the course of the nerves proceeding from them, have been severally recommended, and have been found of service in some cases, and inefficacious in others. It is obvious that, when the symptoms of tetanus, and even when those of its first stage, trismus, have appeared, the pathological changes in the nervous centres and their membranes have already commenced, although they may not be fully developed; and that the removal of the remote irritation which produced these changes may not then be influential in subduing them. Nevertheless, the removal of the cause may render the effects either more mild or more controllable by treatment—may prevent the effects from reaching that amount which the continuance of the cause might develop.

81. a. Instances of recovery from acute traumatic tetanus, after amputation had been employed in order to arrest the attack, have been recorded by LARREY, VALENTIN, WHITE, HOWSHIP, and others; but recourse to it has also failed with many. Mr. CURLING states that it was performed in eleven of the cases in the table which he has given, and of these seven were cured. In most of these, however, the operation was resorted to before the symptoms were fully developed, at which time only should hopes of success from it be entertained.\* It is inadmissible in sub-acute tetanus, unless the condition of the injury be such as demands the operation independently of the spasms; for most of the cases of this form recover, often notwithstanding the treatment which has been adopted. Mr. CURLING very justly remarks that amputation is justifiable only after a severe injury of the extremities, immediately that there is the slightest indication of spasm; for, if delayed until the disease is more advanced, instead of proving beneficial, it will rather aggravate the symptoms and render the constitution less able to sustain the exhausting effects of the spasms.

82. b. *Division of the nerves*, in order to arrest the transmission of the irritation from the injured part, and even of the *tendons and aponeuroses*, when these are lacerated or injured, has been ad-

\* [We apprehend that no physician would be justified in resorting to amputation "before the symptoms of the disease were fully developed," as tetanus is a rare affection, and there is no certainty of its occurrence, even after spasmodic symptoms have appeared.]



vised and practised in some cases with marked success by SCHMUCKER, HICKS, DELAROCHE, MURRAY, FOURNIER, STÜTZ, LARREY, [HALL,] and some others. When this operation can be performed so completely as to comprise all or the chief nerves proceeding from an injured part, it should not be neglected, nor delayed until the disease is fully evolved. It is in every respect to be preferred to amputation. Dr. PENNOCK has advised the application of ligatures or cupping-glasses, in order to paralyze the nerves, when a complete division of them cannot be effected, as previously recommended for poisoned wounds. In cases of cutaneous or superficial injuries, &c., these means may be resorted to.

[Dr. MARSHALL HALL states that "the first indication of treatment in traumatic tetanus is to divide the injured nerves;" and the second, "to subdue the spasmodic affection by such remedies as the hydrocyanic acid." We have never known division of the nerves produce more than temporary benefit in this disease. Perhaps, had it been resorted to at an earlier period, the effects would have been more salutary. Though local in its origin, tetanus soon becomes a profound constitutional affection.]

83. *c. Incisions made into the seat of injury, and applications which may excite a free suppuration in it, have been recommended by RUSH, VALENTIN, MERCIER, CAMPET, LARREY, PARANT, and many others. The actual or the potential cautery has been advised by some with this intention; and a free opening into the seat of injury, or reopening of the cicatrix, or incisions into it, and the application of various substances, with the view of exciting healthy action, have been recommended by others. In one case, I directed the injured part to be freely incised, soon after the occurrence of spasms of the muscles of the wounded limb, and the incision to be filled with lint soaked in equal parts of tincture of opium and spirits of turpentine, the same substances being also applied as an embrocation, on flannel, in the course of the nerves proceeding from the part; but, as the treatment about to be noticed was employed at the same time, the share which these means had in the recovery of the patient is not very manifest; the local symptoms, however, appeared to be much alleviated by them.\**

84. *d. Soothing, emollient, and anodyne applications were advised by HIPPOCRATES, CELSUS, CÆLIUS AURELIANUS, and by many of the moderns, to the injured part; they may be employed either immediately or after the division of nerves or the incisions already noticed. These means have not been restricted to the part, but have likewise been applied in the course of the nerves proceeding from it. The agents which have been thus employed by the more recent writers consist chiefly of moist heat, anodyne poultices, fomentations, or embrocations; applications containing either opiates, or conium, or belladonna. &c. It has also been recommended by CERIOLE, LEMBERT, and others, to remove the cuticle from the parts in the vicinity of, or above the seat of injury, and to apply either of the preparations of morphia to the denuded surface. It is obvious that these or similar means can be of use only early in the disease, and as aids to other rational measures.*

85. *e. While these local means are more or less appropriate to traumatic or symptomatic tetanus, and chiefly to the acute form at a very early stage of the attack, and are useful aids to the treatment which the pathology of the disease will suggest, the measures about to be passed under review are equally suitable to all the forms of the malady, duly adapting them, however, in respect of amount, combination, and succession to the severity and peculiar features of individual cases. It should not be supposed that all cases which recover, especially those which I have denominated as sub-acute, and more particularly such as are symptomatic of, or associated with, other diseases, as with hysteria, or with epilepsy, or even with the effects of malaria, as insisted upon above (§ 22), are really cured by the means which have been employed. Nature in many of these cases asserts her own prerogative, and carries it above the many and incongruous agents too often irrationally, empirically, and injuriously resorted to. If we consider the diverse and even opposite nature of the measures which have been prescribed for this malady, their apparent success in some instances and their failure in others, and their employment in different states of the disease, with little regard to the modes of their operation in relation to pathological conditions, we necessarily must infer that recovery has sometimes taken place, notwithstanding their use, and not by their aid.*

86. *B. THE EXTERNAL MEANS recommended by writers are almost as numerous as those prescribed internally, and while they have been used as adjuvants by some, they have been more entirely confided in by others.—a. Not the least important of these are the affusion of cold water and the cold bath. The former was prescribed by HIPPOCRATES, but he directed the patient to be afterward wrapped in warm coverings. The cold affusion was also adopted by AVICENNA, SCENCK, KITE, RUSH, WRIGHT, TALLMANN, and CURRIE, for this disease; and the cold bath by COCHRANE, HARRIS, MOSELY, and the writers now mentioned. CELSUS considered the cold bath to be injurious. FISCHER advised it, opium having been given internally. In the cases in which opium has been taken in large or frequent doses, the cold bath, and more especially the cold affusion on the head and cervical spine, are much less hazardous, if not beneficial, in this disease than when they are resorted to under other circumstances. Both the cold affusion and the cold bath are not without some degree of risk, if the shock produced by either be too sudden or too severe for the amount of vital power. But when judiciously employed, and the effects carefully watched, and aided by appropriate internal remedies, they may, especially the cold affusions, prove most influential means of cure, more particularly in the idiopathic form of the malady. Many instances have been recorded of recovery from acute tetanus, by means of cold applied in either of these modes, or in some other way. The changes found on dissection after fatal poisoning by *nux vomica* and *strychnine* are the same, as respects the spinal medulla, the central parts of the base of the brain, the cerebellum, and their membranes, as those observed in fatal cases of tetanus; and the treatment found most successful in poisoning by these substances is generally appropriate in acute tetanus. (See art. POISONS, § 364–381.) M. GUÉRIN DE MAMERS states that the cold affusion arrests the tetanic*

\* [Dr. DEWEES states that this practice of stimulating the wound was resorted to by himself and Dr. PHYSICK, but without the slightest use.—*Pract. of Med.*]

paroxysms produced in animals by *nux vomica*. The application of cold lotions, or of pounded ice, to the occiput and nape of the neck, whenever or as long as the temperature of these parts is above the natural standard, has not hitherto received the attention it deserves as appropriate means in this disease.

87. *b. Warm Baths and Vapour Baths.*—The former were recommended by MARCARD and BEHN. Sir J. MACGRIGOR found them to produce momentary relief only. HILLARY and DE HAEN have stated that instantaneous death has sometimes followed their use. This result may have arisen from their temperature having been too high, especially when the patient was first immersed. Warm baths are the safest, if not the most beneficial, when their temperature is at first from 85° to 90°, and gradually raised to 96° or 98°. They have little influence on the acute form of the malady, but they are often of service in the sub-acute and during convalescence. BEHREND, MURINNA, STÜTZ, and MARCUS prescribed warm baths, containing alkalies and aromatics; and ANDERSON recommended tobacco to be infused in the bath, and after the operation of purgatives, wine to be freely exhibited. Warm baths have been employed chiefly in connexion with the internal use of stimulants, tonics, and anti-spasmodics. Dr. MARSH has recorded three cases in which *vapour baths*, at a low temperature, were employed for many hours in succession. Two of the three cases recovered; but they were of the sub-acute form. These baths have been also prescribed by several Continental physicians, but with no advantage in the acute form of tetanus.

88. *c. Emollient applications over the spine* in this disease were noticed by HIPPOCRATES, CELSUS, CÆLIUS AURELIANUS, and others; and these applications either consisted of vegetable oils, or were aided by *oleaginous frictions* over the general surface of the body. That they may have appeared of some service in sub-acute cases may be admitted; but that they were in any way of service in the acute admits of doubt. *Frictions* along the spine were advised by CELSUS and many others.

89. *d. Rubefacient and oleaginous Liniments and Embrocations*, applied over the spine, were employed in tetanus by ARÆTÆUS, AVICENNA, RULAND, DE HAEN, and STÜTZ; but the benefit to be derived from them in the acute form was doubtful, although they may have proved of service in the sub-acute. I have prescribed certain of the *Liniments* contained in the Appendix (*see Form.* 295–297, 307, 311) with apparent advantage, or equal parts of the turpentine and of the compound camphor liniments of the London Pharmacopœia, with a little Cajuput oil, when applied constantly along the spine in the form of an embrocation, by means of flannel or spongio-piline. *Sinapisms* and *blisters* over the spine were recommended by RUSH, HUNTER, and LATOUR; but CHALMERS contends that they produce an injurious effect. The application of the *actual cautery* to the neck is mentioned by CELSUS, but it has not received the sanction of modern writers.

[Dr. JOSEPH HARTSHORNE, of Philadelphia, recommends applying over the spine, from the occiput to the sacrum, a solution of caustic potassa (3ij. to ʒiv. of water), by means of a sponge, till the skin is much reddened, and signs of caustic action are displayed. Dr. WOOD states that this

treatment has been employed with much success in a number of cases, in connexion with moderate doses of opium and purging.

Prof. WOOD recommends the removal or correction of obvious sources of irritation; active purgation, bleeding when the pulse is strong and symptoms of inflammation exist; opiates, hemp, tobacco, or aconite, the cautious use of the cold bath, caustic potassa along the spine; the free use of alcoholic stimulants, and nutritious food when symptoms of debility appear. (*See "A Treatise on the Pract. of Med.,"* vol. ii., p. 763.)]

#### 90. C. CONSTITUTIONAL AND INTERNAL MEANS.

—*a. Antiphlogistic measures* have been advised by many writers, and more or less censured by others, in this disease. But the selection of these measures, the extent to which they may be carried, and their adaptation to the peculiarities of individual cases, are of the utmost importance, rendering them either beneficial or the reverse.—(a) Of these means the most dangerous, and yet often the most beneficial, is *blood-letting*. For, if prescribed in cases where debility and irritability are very manifest, where the disease is far advanced, where the pulse is very rapid between the paroxysms, and where the disease follows an injury, bleeding, especially from a vein or to any considerable amount, is more frequently injurious than beneficial. The evidence in its favour is extremely contradictory. It has been recommended by ARÆTÆUS, CELSUS, PAULUS ÆGINETA, FORESTUS, HILLARY, PUJOL, BISSET, and many others; and its repetition, even oftener than once, has been resorted to by COXE, GARDANE, GUTHRIE, EARLE, &c.; but the results have not always been satisfactory. FLAJANINI states that he has seen death immediately follow blood-letting; while LISFRANC says that it has been carried to an enormous extent and been followed by recovery. Mr. CURLING is not in favour of its adoption, unless early in the disease, and when the attack is decidedly inflammatory. In this, as well as in other maladies, the physician will be guided by a variety of circumstances. The appearances on dissection seem to favour the adoption of blood-letting, yet these appearances, if not produced, may be heightened by the disease; and, even admitting them to have existed from the commencement, experience has shown that inflammations of the spinal medulla, or of its membranes, are not so successfully attacked by blood-letting as many other inflammations. When the disease is idiopathic; the patient young, robust, and plethoric; the pulse full, strong, and not very frequent or much above 100 between the paroxysms; and the disease is not far advanced, and especially if pain is complained of in the occiput and cervical region; then bleeding by a number of *leeches* applied in these situations, or *cupping* as advised by CELSUS and PAULUS ÆGINETA, appears to be indicated. In the circumstances, also, just mentioned, not only leeches or cupping along the spine, but also venesection, may be practised, and even repeated, according to the effects produced. In more doubtful states, *dry cupping* along the spine may be tried. *Arteriotomy* has been recommended by VOGEL; and several writers have considered, with much justice, that, when blood-letting is indicated, it should be carried to a full extent at once, and not repeated to a small amount at intervals. There can be no doubt that, in all spasmodic and con-



vulsive maladies, however inflammatory the appearances may appear after death, or however accelerated or excited the circulation may seem during life, blood-letting, especially venesection, is a hazardous remedy; and, although sometimes required in a decided manner, particularly in the circumstances and in the way just stated, it requires the utmost caution and discrimination. When it is clearly indicated, the action of other suitable remedies is promoted by it.

91. (*b*) *Purgatives* are essentially requisite in tetanus and trismus; but, in order to obtain satisfactory results from them, they should be given early and decidedly, and selected judiciously. Calomel with the compound extract of colocynth, or with jalap, or scammony, or gamboge, may be prescribed in such doses as will produce, as advised by FORESTUS and HAMILTON, copious evacuations. MOSELEY directed the cathartics to be conjoined with cinchona or other tonics. These, especially the more bitter tonics, generally render the operation of purgatives more certain. In the few cases I have seen, I have prescribed, at first, full doses of calomel with camphor; and, some hours afterward, the spirits of turpentine with castor oil, the action of these having been promoted by enemata containing these oils and some common salt. The frequency of worms in the digestive canal of patients attacked with either idiopathic or traumatic tetanus, has induced me to prefer these means, and to give them in large or repeated doses early and according to the circumstances of the case. The oil of turpentine, when judiciously prescribed in this disease, is not only an energetic anthelmintic and purgative, but also the most certain antiphlogistic and antispasmodic remedy we possess. After the bowels have been freely evacuated by its aid, or by a combination of it with other cathartics, it may be given internally at various intervals, either on the surface of an aromatic water, or in the form of an electuary made with honey and powdered liquorice-root, and may be administered in enemata, or applied along the spine in the form of embrocation (§ 89).

92. Where there is reason to infer that the disease is favoured, or in any degree occasioned by the presence of uneliminated acid, acid, or excrementitious materials in the blood, the action of the excreting viscera should be excited by means of these and other purgatives, by diuretics conjoined with or alternated with these, or by combining cathartics and diuretics with large doses of the alkaline carbonates, or of the chlorate of potash, or with magnesia and sulphur in full and repeated doses, so as not only to excite the several excretories, but to change the state of the blood, and to counteract the injurious action of the morbid materials by combining with them and neutralizing their influence and effects.

93. (*c*) *Mercurials*, internally and externally, have been very frequently prescribed in all the forms of tetanus, as purgatives, as alteratives, and as antiphlogistics, and have received the sanction of MANGET, DONALD MONRO, MEASE, KITE, CLARK, ECKER, and others; and calomel, the bichloride of mercury, and the oxides, have been severally employed in order to produce these effects. Calomel, given in full doses, alone or with other medicines, early in the disease, and as a colagogue purgative, is generally of use. But no confidence can be placed in it, or in any other mercurial, as a remedy for tetanus, especially the

traumatic form. Mercurials were formerly much employed in the West Indies as purgatives and alteratives for the cure of idiopathic tetanus, but even when ptyalism has been produced by them, no alleviation of the disease has resulted, as shown by MACGRIGOR, WELLS, THOMSON, CARLISLE, and CURLING, tetanus even having occurred in persons during mercurial salivation, and the malady appearing to have been aggravated in other cases by the production of this effect. Of twelve cases related by Mr. HOWSHIP, of tetanus consequent upon injuries, in which mercury was freely exhibited, two only recovered, and in both it was conjoined with opium.\*

94. (*d*) *Antimonials* are uncertain in their operation in trismus and tetanus, and are liable to the same objections as have been urged against blood-letting, but they also possess the advantages sometimes to be procured from the latter. The preparations which are most deserving a trial in this disease are tartar emetic and James's powder. In a case of sub-acute tetanus treated by Mr. LISTON, the former was given in doses of one grain every hour, and the patient was put into a warm bath thrice in the day, the bath containing in solution half an ounce of tartarized antimony (*Lancet*, 1834 and 1835, p. 581). The pulse after the baths was generally accelerated, but became much softer as soon as the copious sweating by which it was followed appeared. Mr. WOODWARD (*Dublin Journal of Med. Science*, July, 1835) exhibited tartarized antimony in a case of idiopathic tetanus, with the effect of depressing the pulse and diminishing the muscular rigidity. The patient was soon able to swallow, and, by persisting in this remedy, gradually recovered. Dr. ELLIS administered this substance in enemata; but no sufficient experience of the results of this practice has hitherto been furnished.

95. *b. Sedatives* of various kinds have been often prescribed for all the forms of tetanus. Certain of the means already mentioned are more strictly sedative than antiphlogistic, although generally prescribed with the latter intention, especially the cold affusion and antimonials.—(*a*) *Colchicum* has been recommended for tetanus by M. DUFRESNOY. Dr. W. G. SMITH has employed it largely in the West Indies, and, in his opinion, with great benefit. But as he employed several other means at the same time, the amount of benefit which was really due to this powerful medicine remains doubtful (*see* § 114).

96. (*b*) *Tobacco* has been much employed in cases of tetanus. Mr. CURLING remarks that "the earlier writers applied the *oleum tabacci* externally to the back and neck." In a work by Dr. GARDNER, at the beginning of the 16th century, entitled the *Triall of Tobacco*, it is stated that "the suffumigation of tobacco, being taken, is a good remedy for the stakeness or stiffness of the neck called tetanus." CAMPET, who practiced in the French West India Islands in the last century, prescribed tobacco injections and wine by the mouth, and detailed several cases proving the success of the practice. The use of tobacco injections in this disease has subsequently been recommended by O'BEIRNE, ANDERSON, EARLE, TRAVERS, and CURLING. In most of the cases the infusion, or decoction, or smoke of tobacco was administered as enemata, twice or thrice dai-

\* [Dr. RUSH records a case of tetanus cured by mercury, aided by bark and wine.]

ly; and wine or other stimuli were given by the mouth, to counteract the distressing poisonous action of the tobacco (see *art. Poisons*, § 523, *ct seq.*). This substance is one of the most powerful agents which can be employed against tetanus. Its effects are, however, seldom lasting, and it tends very remarkably, when given late in the disease, or when the dose is strong, to depress the powers of life beyond the powers of reaction. I have perused most of what has been written in its praise, and I can truly state that it has often proved injurious, owing to its having been resorted to at a too advanced period of the malady, and in a too powerful form or dose; and, even in the cases where it has appeared to have been of service, its effects appeared very equivocal. In two acute cases which I attended many years ago, the infusion of tobacco was administered as an enema, contrary to my advice, by the other medical men who were also in attendance, and both cases terminated fatally, with all the symptoms of poisoning by tobacco, a few minutes after the administration of the second injection. The bodies were examined after death, and displayed the appearances described above (§ 27, *ct seq.*). The decoction or infusion has been also employed in impregnating a warm bath, into which the patients have been immersed twice or thrice in the day.

97. The use of *tobacco* in tetanus requires the utmost caution. The sensations produced by it, when the dose is too powerful, are most distressing, and, when prescribed late in the disease, are such as often fatally prostrate the powers of life. Even when less injurious, patients have expressed the sensations occasioned by it to have been so distressing, that they would rather have endured the convulsions, painful as they were; and that they would hardly be induced to submit to a repetition of the medicine. Mr. CURLING, who is much more in favour of its use than I am, states that, of nineteen cases in the table, in which tobacco was employed, nine recovered. There can be no doubt that this medicine was injudiciously prescribed as to form, dose, and period of the disease, and as to other means resorted to, in some of the fatal cases; but there is as little doubt that, in some of the cases which recovered, the result was not due to this substance. When the use of it is determined upon, in an acute or traumatic case, a scruple of the leaf should be the largest quantity for an adult, infused in twelve ounces or a pint of water, and administered as an injection. The dose ought not to be larger at first, although it may afterward be increased according to its effects. If employed at all, it should be early in the disease; and it may then be so conjoined with other agents as to promote the operation of purgatives given by the mouth. During a recourse to it, the powers of life should be supported by tonics, stimulants, and nutrients, especially by wine, ammonia, and other means about to be noticed.

[*Tobacco* has generally been considered the most certain relaxer of muscular fibre, but the extreme and alarming depression produced by it, together with its distressing effects, are great objections to its use. These objections do not apply to *chloroform*. It not only wholly annihilates pain, but also causes complete muscular relaxation; and it is now sufficiently established that patients may be kept under its influence continuously for many hours, and, with due care,

without danger or subsequent ill effects. Several cases of tetanus and trismus have been recorded within the last few years, where it has proved effectual in controlling the disease. It is well known, however, that, though the tetanic spasms will be very certainly overcome by it, yet they will often return, unless the system be kept, to some extent at least, under its influence. At the same time, it is very important that the strength be supported by concentrated nourishment, as essence of beef, &c. Many patients, labouring under this disease, have been relieved by chloroform, but allowed to die from subsequent exhaustion. Where chloroform does not save life, it affords great relief, by subduing the pain, or rendering the patient insensible to it. It also enables the patient to take sustenance, when otherwise he would be wholly unable to swallow. As, for the most part, the spasms are reflex and excited by peripheral irritants, it might be beneficial to surround the patient with an atmosphere of chloroform or ether vapour, which may easily be done by placing a sponge saturated with it under the bed-clothes, the head being of course left out, and the clothes well tucked in around the neck. Of 43 cases of tetanus reported in the *Lond. Med. Times* (June 17, 1854), 11 recovered under the use of *chloroform*, two under that of *belladonna*, two were unsuccessfully treated by *tracheotomy*, and one recovered under the use of *sesquioxide of iron* and *Dover's powder*. In several cases *Indian hemp* seemed useful. In one, *nicotine* controlled the spasm, and repressed constitutional disturbance. In one case of *trismus* we succeeded in relaxing the jaws, and saving the patient by the continuous and persevering use of *electro-magnetism*, applied directly to the muscles of the jaw. This was a traumatic case, and brought on by the extraction of a tooth. While we are by no means of opinion that *chloroform* is to prove a *specific* for tetanus or any other constitutional form of disease, we do claim for it, in most cases of general spasms, great importance as a palliative, and for its power in subduing pain, allaying spasm, calming the general agitation, and producing sleep, besides enabling the unhappy sufferer to take suitable nourishment and other medicines, if thought necessary. The late Dr. HOSACK, of New York, trusted chiefly to *alcoholic stimulants* in the treatment of tetanus, and especially *wine*; and cases of cures by this method are recorded by him in the appendix to his edition of "*Thomas's Practice of Med.*" ]

98. (c) *Hydrocyanic acid* was recommended by Mr. H. WARD, of Gloucester, and given in a case detailed by him, at first every half hour in cinnamon-water; and after three hours, the spasms having then been considerably relieved, it was continued every four hours, and was taken in wine. The patient ultimately recovered. Mr. CURLING states that this medicine was employed, in small doses, in three cases, all of which were fatal. It is obvious that, in small doses, but little advantage can be expected from it, and, in large doses, it requires great caution and a close observation of its effects.

99. (d) *Ethers* have been prescribed in various combinations, in the several forms of tetanus. The compound spirit of sulphuric ether, and the hydrochloric ether, were recommended, in conjunction with other sedatives and antispasmodics; but little benefit appeared to have resulted



from them in the acute cases, and in the sub-acute their effects were doubtful. Recently, frictions with the sulphuric or the hydrochloric ethers, or with chloroform, have been prescribed; and probably much of the benefit supposed to have been derived from this mode of using these substances has been produced by the inhalation of a portion of the vapour diffused in the air, during the use of them in large quantities in this manner.\* M. MORISSEAU, in a case of traumatic tetanus, ordered the surface of the body to be assiduously rubbed with chloroform three times in the day. This treatment was continued during five days, and was attended by a copious perspiration. On the sixth day the patient complained only of general languor and debility (*Union Médicale*, 21st June, Paris, 1851).

100. The ethers and chloroform have been employed, especially by inhalation, with apparent success, both in this country and abroad, in tetanus and trismus. Nevertheless, they severally require a much more extensive and satisfactory trial in this disease than has as yet been given them; and this trial should be made with greater precision, and ought not to be limited to one or two modes of using them, but extended to the exhibition of them by the mouth, to the inhalation of them with the atmosphere, to frictions of the general surface with them, and to the administration of them in enemata. Even although they may not be the means which should be mainly confided in, they will generally prove excellent adjuncts, and will palliate the most urgent symptoms.

101. *c. Narcotics* have been very generally employed in the treatment of tetanus, especially of the traumatic form.—(a) Of this class of medicines, the preparations of *opium* and of its ingredient *morphia*, have been most frequently prescribed. Opinions respecting the use of opium in this disease are not only different, but even opposite. This drug is recommended in various forms of combination, by many writers: by LARREY, conjoined with camphor and nitre; by STÜTZ, with the fixed alkalies in large doses; by LATHAM, combined with ipecacuanha in the form of the pulvis ipecacuanhæ compositus; and by MARCUS in frequent and increased doses. It has been prescribed by the mouth, in enemata, and in embrocations and liniments applied externally. It has also been used conjoined with other substances, as with alkalies in warm baths; and certain of its preparations, as the aqueous solution, have been injected into the veins of persons afflicted with this malady. *Morphia* and its salts have likewise been prescribed, both internally and externally, in the several forms of tetanus, and not infrequently to a blistered surface, after the removal of its cuticle.

\* The following case of inflammatory idiopathic tetanus by Dr. TIBALDI, will show the treatment employed for this form of the disease in the north of Italy: A labourer, aged 25 years, was attacked with tetanus two days after lying on the damp ground while in a state of perspiration. In pursuance of the plan generally adopted in that country for this disease, he was bled eight times during five days, sometimes to as much as twenty ounces; and above a hundred leeches were applied to the painful parts. On the sixth day, the state of the patient being still severe, Dr. TIBALDI had the loins rubbed twice with sulphuric ether; the patient was bled a ninth time, and took half a grain of acetate of morphia. The frictions with ether allayed the spasms. The next day (the seventh) he was again bled, and an ounce of ether was rubbed over the back and neck. On the following day the patient could sit up, and was soon afterward convalescent.

102. It is difficult, if not impossible, to form a correct or a precise opinion as to the effects of these preparations, or of the best modes of combining and administering them in this malady. While several authors are favourable to the use of them, others of great experience, as Sir G. MACGRIGOR and Mr. TRAVERS, consider them, if not objectionable, at least inefficient; and some writers have given opium, either in solution or in a solid state, in so enormous doses in this disease, without any very marked effect, as to induce a belief, either that the drug has not been swallowed, or that the system is insusceptible of its action during the malady. The truth, however, is, that the opium, by the excess of the dose, paralyzes the vital actions of the stomach, and it is retained in this organ without change.\* Moreover, there is no doubt that it has often been given both improperly and injuriously, as respects the quantity, the modes of administration, and the previous treatment. None of its preparations should be prescribed until the secretions, excretions, or fecal accumulations have been freely evacuated. Either of them which are most congruous with the other medicines prescribed may then be tried, in decided and frequent doses, by the mouth or in enemata, in conjunction with antispasmodics, aromatics, stimulants, or tonics, or with camphor or ammonia, or the fixed alkalies, oxide of zinc, oxide of bismuth, or with castor, musk, &c., or even with wine or brandy, according to circumstances, or when the evidence of morbid irritation predominates above that of inflammatory action in the nervous centres and their membranes. In this state or form of the malady, the endermic application of morphia may be prescribed, while other medicines, as stimulants, antispasmodics, or tonics, are liberally taken; or the fluid preparations of opium may be administered in enemata with camphor, asafetida, spirits of turpentine, &c.

103. MM. PERCY and LAURENT (*Journ. des Progrès des Sc. Méd.*, tom. iii., p. 257, 2d sér.) injected a watery solution of opium into the veins, in three successive cases of tetanus, with success. This practice was adopted in eight instances, and recovery took place in five. MM. DELPECH and DUBREUIL had recourse to the injection of a scruple of the watery extract of opium dissolved in two ounces of water into the veins of a lady, aged 50, attacked with tetanus consequent upon the application of a caustic to an ulcerated os uteri. This solution was injected after three intervals of about twenty minutes each. The patient fell asleep; the pulse became full, and 70 in a minute from being 120, and the muscles were relaxed. Upon waking from her sleep, the tetanic contractions returned, about eight hours after the injection. The operation was repeated, and was followed by the same results. The patient, however, sunk on the third day. MM. PERCY and LAURENT farther state, that they have injected twenty grains of the extract of stramonium, dissolved in half an ounce of water, into the veins of several persons attacked with tetanus, and with success. They have also injected a strong decoction of this plant with similar results; but

\* [Mr. PAGE has reported a case of tetanus cured by the *Tincture of Aconite*, given to the extent of 19 minims in 8 hours the first day; on the second day, 32 minims in 14 hours; the third day, 25 minims in 7 hours; and the fourth day, 20 minims in 2 hours. The tincture was prepared according to the formula of Dr. FLEMING. (*Aconit. rad. sicc.*, ʒxxvi.; *Alcohol*, f. ʒxxiv.)]

the details of these cases are not furnished in the work in which this statement is made, nor is any notice taken of instances of failure. The injection of a solution of acetate of morphia into the veins of two horses affected with tetanus was tried at the Veterinary School at Alfort, but the result was unfavourable. Mr. SEWELL, of the Veterinary College, also tried this practice in a horse and in an ass affected with idiopathic tetanus. The tetanic symptoms were removed, but the animals subsequently died from other causes, but not from a return of tetanus. (CURLING, *Opus cit.*, p. 202.)

[Dr. J. W. FELL, of New York, has published (*New York Journ. Med.*, vol. 7, p. 371) the history of seven cases of traumatic tetanus treated successfully by *strychnia*. In every case, as soon as the specific twitching was produced, the tetanic spasms abated, and convalescence was rapid. He recommends it in doses first of an eighth or tenth of a grain, and then in two hours a sixteenth, reducing the dose just sufficient to produce its specific effect after each one: the great object being to produce the twitching as soon as possible, and maintain it by as small doses as possible. It is, however, proper to state that in some of the cases reported by Dr. FELL other remedies were used; as wine, opium, mercury, antimony to the spine, &c.; and that in other cases, treated by others, it has failed. *Strychnia* has been recommended by Drs. WATSON and SYMONDS in this disease, on theoretical grounds; not that it may relieve by acting on the homœopathic principle, but because it acts on the part which is evidently the seat of the disease, as the oil of turpentine often proves beneficial in the treatment of hæmaturia, though in overdoses it sometimes produces bloody urine.]

It is perhaps impossible, in the present state of our knowledge, to decide whether the great tolerance of opium in this disease, as well as in child-bed fever, delirium tremens, &c., be owing to "paralysis of the vital actions of the stomach," as suggested by our author, or to the state of the nervous system—the condition of innervation—as is more generally supposed. We think it, however, by no means improbable that the function of absorption in the stomach and intestines is suspended by the paralyzing influence of immense doses of opium, though there is in this disease also an extraordinary insusceptibility to the action of the drug, as proved by injecting it into the veins. How otherwise can we account for the fact stated by Prof. WOOD, that in one instance half a gallon of laudanum and half a pound of opium were given in the space of ten days, and with impunity? But in all diseases where such tolerance is present, it should be remembered that the opium may, though it remain unabsorbed and inert in the stomach for a time, act powerfully when the insusceptibility, or the obstacle to absorption, shall cease. But it is generally useless to persevere, if the symptoms do not yield to less than poisonous doses; the cases of recovery, under enormous quantities of the drug, are too small to warrant persistence in this mode of management.]

104. Other narcotics have received, comparatively, but slight attention in the treatment of tetanus. *Stramonium* was considered of service by Dr. BEGGIE (*Trans. of Med. and Chirurg. Soc. of Edinb.*, v. i., p. 285); and *belladonna* was recommended chiefly as a prophylactic by M. SAU-

TER. The *Canabis Indica* was suggested, but I am not acquainted with any instances in which recovery from tetanus has resulted from its use; at least farther experience of its effects in this disease is required.

[Dr. O'SHAUGHNESSY, of India, states that he gave the resinous extract of Indian hemp in several cases of the traumatic form of this disease, at first in doses of 2 grs. every third hour, and afterward of 3 grs. every second hour, until the usual intoxicating effects were produced; when the spasms were in some cases mitigated, and in others wholly removed (see DUNGLISON'S *New Remedies*, 4th ed., p. 135).]

105. *d. Alteratives* of various kinds have been tried for this malady, and several medicines, already noticed, have been prescribed in alterative doses, especially the bichloride and other preparations of *mercury*. When the disease is attended by morbid states of the blood, more especially by acid and other excrementitious materials accumulated in the circulation (§ 52), large doses of the *fixed alkalies*, as advised by STÜTZ, or of *magnesia*, or of *ammonia*, as recommended by BLANKARD, after the bowels have been freely evacuated, will prove of service; but these should not be trusted to alone; they should be employed as will hereafter be recommended (§ 112). The preference in such cases is due to *magnesia*, inasmuch as it both corrects this state of the blood and opens the bowels. FOWLER'S solution of *arsenic* was prescribed by HULL, JENKINSON, HOLCOMBE, TAYLOR, and MILLER, in large and frequently repeated doses, in conjunction with opium and stimulants. The last-named physician gave ten drops of this solution every hour, with as much tincture of opium in a spoonful of brandy, in four cases of traumatic tetanus, which terminated favourably (*New Engl. Journ. of Med.*, &c., Boston, 1818). The administration of alkalies internally, in large doses with opium, and the employment, at the same time, of alkaline warm baths, although praised by STÜTZ, BEHREND'S, WILD, ELSE, and others, were denounced as inefficacious by MARCUS and FICKER.

106. *c. Antispasmodics and stimulants* have been very generally prescribed in the several forms of tetanus. Of these, the most frequently resorted to are, *musk*, *camphor*, *asafoetida*, *amber*, *castor*, *spirits of turpentine*,\* the *ethers*, and *ammonia*, variously conjoined with each other, or with opium, alteratives, and other stimulants. AINSLIE, HUCK, ZANETTI, and others were favourable to the use of musk. CHESELDEN gave it with the tincture of opium, in moderate doses, and at short intervals. CHAPP and VOET prescribed the same medicines, but in larger doses; and FOURNIER recommended the musk to be given with camphor. The following is nearly the same preparation as that prescribed by him:

No. 347. R. Moschi, Camphoræ, sacchari albi, aa, ʒj.; Terebinth. Muellag. Acacie, ʒvj.; olei adde Spirit. Ammon. Arom., ʒij.; Infusi Arnice, ʒv. Misc. Caplat Cochl., j. amplius singulis horis.

*Asafoetida* and *castor* were favourably noticed by CELSUS, ARETÆUS, and SCHULTZ, and many others; but in modern times they have been given in tetanus chiefly in conjunction with the other

\* [Dr. VALENTINE MOTT has related a case of traumatic tetanus cured by *Spirits of Turpentine* after it had resisted all the usual means. He gave a teaspoonful every 15 minutes for 2 hours, when the spasms ceased: after which it was given at more distant periods, till 123 doses were given in 36 hours.]



medicines just mentioned, or with opium, either by the mouth or in enmata. FOURNIER and PESLAY consider *ammoniacum* one of the most certain remedies for tetanus, but that it should be given in frequent doses, carried as far as half an ounce in the twenty-four hours. A successful recourse to spirits of *turpentine* has been had by PHILLIPS, HUTCHINSON, PEACOCK, and GIBBON, who prescribed this medicine by the mouth or in enmata. In either mode, as well as externally applied, it is generally of service (§ 89, *et seq.*). The *balsam of Peru* has also been administered, both internally and externally, in tetanus. Dr. KOLLOCK states, in HARLESS's Annals, that he gave as much as  $\frac{3}{4}$  ij. of this balsam in the twenty-four hours, in a case which terminated favourably.

107. *f. Tonics* of various kinds, and conjoined with stimulants, or with alteratives, or with narcotics, have been frequently prescribed in tetanus, often, however, too indiscriminately, and without due reference to the form, state, or stage of the malady. RUSH considered this disease as essentially one of debility, and therefore prescribed for it cinchona, ammonia, wine, brandy, cordials, &c.; but, in addition, he directed the wound to be early opened or enlarged, and to be filled with lint soaked in spirits of turpentine, in the traumatic form of the disease. *Tonics, stimulants, and aromatics* of various kinds, and in different combinations, had been recommended by CELSUS, ARETÆUS, and others among the ancients; the most energetic in their operation was advised for tetanus by HARKNESS, PARKINSON, and BISSET. Dr. BRIGHT prescribed the sulphate of *Quina*, with other stimulants; Dr. ELLIOTSON, the *carbonate of iron*, in large doses; Dr. SMITH, the *sulphate of zinc*; RUSH, MOSELEY, PLENK, and FISCHER, the *cinchona* in powder, or in decoction. The free use of *wine* was advised by HIPPOCRATES, HILLARY, RUSH, CURRIE, and HOSACK. I can only add that these, as well as antispasmodics, or stimulants, or alteratives, or narcotics, are beneficial chiefly when prescribed with strict reference to existing pathological conditions. If the morbid irritability be characterized by debility, or by morbid states of the blood; if these states predominate over inferred inflammatory action in the membranes or substance of the spinal cord; if this action be not clearly indicated, or if it have been actively attacked by antiphlogistic measures; if the disease be traumatic or symptomatic; and if the secretions and excretions have been freely promoted and evacuated, then either of these classes of medicines, or various combinations of certain individual substances belonging to two or more of these, will be more likely to be efficacious than when otherwise employed. In these circumstances of the disease, tonics may be conjoined with antispasmodics, with alteratives, and with narcotics or sedatives, and be given every hour, or every two or three hours, according to their doses or to their effects. The following may illustrate such combinations:

No. 348. R. Potasse Hydriodatis.  $\mathcal{O}$ j.; Potasse Bicarbon.,  $\mathcal{O}$ iv.; Tinct. Camphoræ Comp.,  $\mathcal{E}$ j.; Tinct. Cinchonæ Comp.,  $\mathcal{Z}$ ss.; Tinct. Capsici,  $\mathcal{Z}$ ss.; Decocti Cinchonæ,  $\mathcal{V}$ jss. Misce. Capiat Cochli.  $\mathcal{I}$ j. larga, 2dis, vel 3tis, horis, cum aquæ pauxillo.

No. 349. R. Moschi et Camphoræ,  $\mathcal{A}$ ñ,  $\mathcal{Z}$ j.; Extr. Belladonnæ, gr. vj. (vel Extr. Canabis Indicæ purif., gr. xii., vel Extr. Conii, gr. xviii.). Tere cum Mucilag. Acaciæ,  $\mathcal{Z}$ ss., et adde Ammonię Hydrochloratis,  $\mathcal{O}$ j.; Hydarg. Bichloridi, gr.  $\mathcal{I}$ j.; Tinct. Serpentariæ,  $\mathcal{Z}$ j.; Tinct. Cinchonæ Comp.,  $\mathcal{E}$ j.; Decocti Cinchonæ (vel Infusi Valeri-

anæ),  $\mathcal{Z}$ v. Misce. Capiatur Cochleare unum Iargum omni horâ, vel omni bihorio, in aquæ destillatæ pauxillo.

108. *g. Diuretics*, especially the *tincture of cantharides*, the spirits of *turpentine*, the spirits or oil of *juniper*, are said to have proved successful in cases of this disease by GARDINER, BROWN, and MEASE. The good effects of these are, however, most manifest when they have been given in such frequent or large doses as to irritate the urinary passages, or to occasion bloody urine. It has been said that the South Sea islanders, among whom traumatic tetanus is a frequent disease, endeavour to cure it by producing mechanical irritation of the urethra.

109. *D. SUCCESSIVE AND COMBINED MEASURES.*—The *Treatment* of tetanus should not consist of an empirical employment of one or more medicines, the efficacy of which has been vaunted by some writers, doubted by others, and altogether denied by not a few. It is chiefly by a *succession and combination of means*, carefully considered and selected, and appropriately applied to the pathological conditions of each case, as far as these may be rationally inferred from the antecedents, and from existing phenomena. Much will necessarily depend upon the stage at which the case comes under treatment, upon the cause or causes which have produced the attack, upon the circumstances connected with the patient, and the means which have been already employed. The success of treatment will mainly, also, depend upon a right interpretation of the state of the pulse, especially between the exacerbations—upon the existing vascular action generally, and locally, as far as this may be inferred, from a close investigation of symptoms, especially from the state of deglutition, from the seat and extent of the spasms, and from whatever appears to excite or to allay them.\*

110. In the treatment of tetanus and of several other diseases, certain misconceptions often mislead the inexperienced physician, not the least injurious of which are the following: 1st. That bleeding will generally cure, and that it is necessary to the cure of inflammatory action; 2d. That there are no other means than this upon which any dependence can be placed capable of effecting this purpose; 3d. That all tonics, antispasmodics, stimulants, narcotics, &c., are contraindicated, or necessarily injurious, or at least inefficacious, where inflammation is present or blood-letting is required. It should therefore be recollected that, even when inflammation most unequivocally exists, blood-letting, when alone confided in, may be carried so far as to endanger life, without removing this state, especially when, owing to its seat, it occasions spasms or convulsions, or when its seat is the centre, or intimately connected with the centre, to which all impressions are conveyed and rendered objects of conscious sensation or perception, as is the case with the seat of tetanus and trismus. We accordingly find that blood-letting, when confided in alone, may be carried to the utmost, by repe-

\* [Physicians have too often lost sight of this consideration in the treatment of tetanus, seeking for some *specific*, to the neglect of that combination of means which is indicated by the pathology of each case. And where the case has terminated favourably, the recovery is too often attributed to some one remedy, rather than the combination of means employed. The pathological conditions must all be regarded, if we wish to control this affection; and he will be most successful in its management who keeps this truth constantly in view, and adapts his remedies accordingly.]

tion or otherwise, in the treatment of this disease, whether idiopathic or traumatic, and yet the desired result is not attained. Nevertheless, blood-letting, largely or repeatedly, may be required and prove most beneficial, when judiciously timed and directed, especially in the idiopathic form. But it generally requires several aids to the development of its efficacy, and, in tetanus more particularly, it is serviceable chiefly by favouring the operation of other means, although these means may seem calculated to produce effects very different from, or even opposite to, those expected from blood-letting. None of these means is more beneficial in this malady than purgatives such as have been mentioned above, aided, as occasion will suggest, by croton oil or other active cathartics, and by such other of the remedies noticed above as the circumstances of the case may warrant or require, especially by terebinthines, internally and externally, by mercurials and by antimonials.

111. *a.* The *Symptomatic* or traumatic form of tetanus is not so manifestly benefited by vascular depletions as the idiopathic, unless the patient be young, robust, or plethoric; and unless pain be experienced in the occiput, cervical or dorsal regions of the spine, or other signs of the superintention of inflammatory action, upon irritation propagated to these regions of the nervous centres, be present; and in these circumstances blood-letting, general or local, or both, should be prescribed, according to the peculiarities of individual cases, and to the effects produced. Brisk cathartics, more particularly those already recommended, followed by antispasmodics, conjoined with sedatives or narcotics; or by tonics and stimulants, selected with judgment and prescribed with decision, are generally requisite, the period of exhibiting them, and the mode of combining them depending upon the acumen and experience of the physician. In this form of the malady, the *local* and *external means* mentioned above (§ 80-89) ought to be resorted to without the least delay; and be followed by active cathartics, and the other means which the progress and state of the disease will suggest. In this, as well as in the idiopathic form of tetanus, *worms* often are present in the digestive canal, and either predispose to or aggravate the disease, more especially in warm climates, and in certain localities. Therefore the purgatives should have an anthelmintic operation, or *anthelmintic* medicines should precede the exhibition of cathartics, those already noticed being preferred, and administered by the mouth and in enemata.

112. In the symptomatic form of tetanus, where the indications of inflammatory action in the nervous centres or their membranes are hardly manifest, or are equivocal—where violent spasmodic action and continued contraction are the chief and dominant symptoms—the free evacuation of the bowels by chologogue, anthelmintic, and drastic purgatives, as already advised, ought to be the first *intention*, in connexion with the local and external measures directed above. The next should be to support vital power and resistance, and to correct morbid states of the circulation, by administering the more powerful tonics, antispasmodics, and stimulants, in such combinations with each other, or with sedatives or narcotics, or with alkalies, as the circumstances of each case may suggest. If it be inferred that the irritation has been excited, extended, or perpetu-

ated by morbid or excrementitious materials in the blood, the free action of the excreting organs—of the bowels, kidneys, skin, &c.—should be promoted by the exhibition, either alone, or with tonics, stimulants, or aromatics, of diuretics, diaphoretics, and alteratives; of alkalies, the nitrate or chlorate of potash, the citrate of magnesia, or precipitated sulphur with magnesia, camphor, turpentine, the balsams, &c.

113. *b.* The *sub-acute* states of tetanus require similar means to those already mentioned, prescribed appropriately to the features characterizing individual cases. In these, as well as in the acute, the symptoms or signs of inflammatory action in the nervous centres or their membranes should be assiduously looked for; and if they be observed, the treatment ought to be directed accordingly. In this form of the malady, as well as in others, the most powerful agents are not always or even generally the most efficacious in arresting or controlling its course. Mild remedies, when appropriate in their operation to existing pathological conditions, especially when they are absorbed into the circulation and correct morbid states of the blood, or when conjoined with either of the several sedatives or narcotics noticed above (§ 95, *et seq.*), are often more beneficial than the most heroic, more particularly in the milder forms of tetanus, in which it is often doubtful whether these latter are more injurious than serviceable.

114. It should always be recollected that a judicious succession, as well as combination, of means is required for the cure of a disease which is so violent, so distressing, and so rapid in its course as the acute forms of tetanus are; and we accordingly find in the histories of cases furnished by writers that such a succession and combination have proved the most successful. GILMORE had recourse to blood-letting, and administered calomel with camphor, soda, and brisk cathartics, followed by tonics and narcotics. WOODFORD prescribed blood-letting, calomel, Dover's powder, blisters, terebinthinate enemata, and the solution of tartarized antimony in frequent doses until it produced nausea, fetid and black evacuations having been procured by means of the antimony and the turpentine injections, relief was then obtained. Several writers have observed the beneficial effects of large doses of the alkalies with opiates or other narcotics, after bleeding, purgatives, and other suitable means have been used. Dr. SMITH, after the operation of purgatives, applied from fifty to sixty leeches along the spine and behind the ears; and as soon as the leeches fell off, he kept constantly applied, over the whole length of the spine, cloths wet with a strong solution of the muriate of ammonia. At the same time he administered the wine of the seeds of colchicum, commencing with half a drachm, and increasing the dose every half hour or hour, until it produced vomiting, when it was no longer given. Other authors have shown that, after a due recourse to blood-letting and purgatives, in this malady, very different means of cure may be of service, in different cases, as blisters along the spine, followed by poultices moistened by an infusion of tobacco, wine, and opium being taken at intervals; or the cold affusion on the occiput and spine, followed by warm coverings, hot wine, spices, and opiates, the affusion being continued until approaching syncope, and these measures being repeated upon a return of the



spasms; or the extract of opium conjoined with camphor and nitre, or with tartarized antimony; or the injection of a solution of a watery extract of opium into the blood, in addition to medicines otherwise administered; or the injection of a solution of tartarized antimony into the veins; or the administration, *per anum*, either of this solution, or of the infusion of tobacco, or of tobacco-smoke. A recourse to several of these more energetic means, more particularly the injection of powerful agents into the blood, and the administration of tobacco or tartarized antimony, always require the utmost caution. The effects of these should be carefully observed during a considerable time after they have been employed, in order to ascertain the propriety of repeating them, and that no time may be lost in having recourse to measures to counteract any injurious effects which may appear from them.

[In the treatment of tetanus, it is very important to bear in mind that death takes place in this disease by the exhaustion consequent on the frequent renewal of the paroxysms of tetanic convulsion, rather than from disorganization of any of the vital organs; and hence that it is essential to support the strength of the patient as much as possible by *tonics, stimulants*, and an ample supply of *easily digested food*, as *essence of beef*; while, at the same time, we remove all possible sources of irritation or depravation of the blood, as vitiated secretions, bad diet, impure air, and reduce the "exalted polarity" of the nervous centres to their normal condition, by means which will not greatly prostrate the powers of the patient. The secretions from the bowels, skin, and kidneys should be promoted by agents best calculated to produce this effect without exhaustion. *Opium* is not adapted to the disease; *belladonna*, *conium*, and *tobacco*, though they exert a more direct influence on the cord, are neither safe nor manageable remedies, and not unfrequently hasten a fatal termination. *Cold*, locally applied over the cord, but not so as to depress materially the heart's action, together with *chloroform* and *sulph. ether*, taken internally, promise the most success. The latter is not so powerfully depressing, and may be found, eventually, best adapted to the successful management of this obstinate affection. We cannot boast of any great success in the treatment of this disease, most cases having terminated fatally in our hands; nor have we any great confidence in the success of any of the plans above recommended. "As regards our own experience," says our judicious countryman, Dr. DEWEES, "we freely confess that we never succeeded but once in curing tetanus; and this was effected by keeping up a slight intoxication by means of hot rum punch for several days consecutively; but this remedy failed utterly in the very next case in which it was employed.]"

115. *E. THE PREVENTION OF TETANUS OR TRISMUS* can rarely be entertained by the physician, as the circumstances indicating the contingent occurrence of the malady in its idiopathic form are seldom sufficiently marked, and still seldomer come under his cognizance. But it is a very important consideration to the surgeon. Much of what I have advanced when discussing the treatment of SHOCK (see that art., § 19-28) applies to the prevention of this malady after severe injuries. But the chief means of prevention consist in promoting the excreting functions of the skin, bowels, and urinary organs, and in sup-

porting the constitutional powers when these appear to languish, or are inordinately depressed by the shock, or by other causes. A dry and temperate state of the air, due ventilation, and the removal of the patient from unhealthy or miasmatic localities, or from crowded dwellings and narrow and insufficiently drained streets, are of the greatest importance in preventing the occurrence of the traumatic forms of tetanus.

116. *F. CONVALESCENCE* from tetanus or trismus requires much care as respects the regimen and medical management of the patient. The secreting and excreting functions ought to be duly regulated and promoted whenever they become torpid. The functions of the skin should be facilitated by occasional warm baths, by frictions, and by regulated exercise in an open and healthy atmosphere. The digestive organs always remain long weak and irritable, and require the use of mild tonics, with soothing or sedative medicines, as the bitter infusions with hydrocyanic acid, &c., and a light diet. As the digestive functions become restored, the more energetic tonics, or chalybeate preparations, and mineral waters, may be given, and a more generous diet be allowed.

BIBLIOG. AND REF.—*Hippocrates*, Περὶ Νοσῶν, iii., p. 491, et Περὶ τῶν ἐνδὸς Πλασῶν, p. 561.—*Arctavius*, Morb. Acut. i. i., c. 6.—*Celsus*, l. iv., cap. 3.—*Oribasius*, Synops. i. viii., cap. 17.—*Paulus Ægineta*, l. iii., cap. 20.—*Azicenna*, Canon, l. iii., fac. 2; Tract. i., cap. 8.—*Pontius*, De Medicina Indorum, cap. 3, ob. 247.—*Boerhaave*, Praelect. de Morb. Nerv., t. i., p. 70.—*L. Chalmers*, Medical Observations and Inquiries, vol. i.—*I. Clephane*, in Ibid., vol. i.—*G. Macaulay*, in Ibid., vol. i.—*C. White*, in Ibid., vol. ii.—*R. Huick*, in Ibid., vol. iii.—*W. Farr*, in Ibid., vol. iv.—*W. Wright*, in Ibid., vol. vi., art. 13.—*I. Lind*, On Preserving the Health of Seamen in the Royal Navy, Svo. Edin., 1757.—*W. Hillary*, Observations on the Epidemical Dis. of Barbadoes, Svo. Lond., 1759.—*C. L. Hilfinger*, De Tetano Liber Singularis, 4to. London, 1763.—*W. Watson*, in Philosophical Transact. London, 1763. (On Electricity in Tet.).—*R. Ferrius*, Traité des Mal. fréquentes à Surinam, Mass., Svo. 1764.—*L. Chalmers*, On the Weather and Dis. of South Carolina, p. 23.—*I. B. Morgagni*, De Causis et Sed. Morb. Epist., &c. Ep. x., art. 2; Ep. Liv. 49.—*Desportes*, Hist. des Malad. de St. Dominique, 3 vols., Svo. Par., 1771, vol. ii., p. 171.—*D. Monro*, in Phys. and Literary Essays, vol. iii. (On the use of Mercury in Tet.).—*Van Swieten*, Comment., ad § 112.—*Wilkinson*, Med. Facts and Observations, vol. iii.—*T. Cochrane*, in Edin. Med. Comment., vol. iii., p. 183. (On Cold Bathing in Tet.).—*Bisset*, Medical Essays and Observations, art. 8.—*W. Irunka de Kerzowitz*, Commentarius de Tetano, Svo. Vindob., 1777. (A standard Work).—*Bang*, in Acta Reg. Soc. Med. Haun., t. iii., p. 126. (Extravasated Blood in the Brain).—*I. C. Starke*, De Tetano, ejusque Speciebus Præcipuis. Jena, 1778.—*G. Cleghorn*, Observat. on the Epidem. Dis. in Minorca, 4th ed., Svo. Lond., 1779.—*Akermann*, in Edin. Med. Comment., vol. vi.—*M. Stoll*, lat. Med., &c. i., p. 298. (Dis. of the Spin. Cord.).—*De Haen*, Rat. Med., &c., Pars. x., cap. 3, 4.—*G. Blane*, On the Diseases Incident to Seamen, Svo. Lond., 1785.—*Tallmann*, in Trans. of Philos. Soc. of Philad., vol. i., p. i., n. 21.—*B. Rush*, Philosoph. Transact. of Philadelph. Philad., 1786, and in Mem. of Med. Soc. of London, vol. i.—*Dazille*, Observat. sur le Tétanos, Svo. Paris, 1788.—*W. Cullen*, First Lines of the Practice of Physic, vol. iii., p. 378, Svo. Ed. 1789.—*N. Heurteloup*, Précis sur le Tétanos des Adultes, Svo. Paris, 1789.—*J. Clarke*, Transact. of Royal Irish Academy, vol. iii., 4to. Dublin, 1790. (The Tet. of New-born Inf. as it occurred in the Lying-in Hosp.).—*Coze*, in Philadelphia Medical Museum, vol. i., p. 57. (Inflamm. of the Larynx).—*R. Worthington*, A Treat. on the Dorsal Spasm, Svo. Lond., 1792.—*N. B. Nottbeck*, Dissert. de Tetano recens Notarum, Svo. Goet., 1793.—*J. Currie*, in Mem. of Med. Soc. of Lond., vol. iii., p. 147.—*T. Dallas*, in Annals of Med., vol. iii. Edin., 1798.—*J. A. Laurent*, Mémoire Clinique sur le Tétanos chez les Hommes, Svo. Strasb., 1798.—*Smith*, in Mem. of the Med. Soc. of London, vol. vi., art. 8.—*D. Hosack*, in New York Medical Repository for 1800.—*Portal*, Cours d'Anatomie Médicale, t. iv., p. 267.—*Ehrmann*, Nouv. Méthode de traiter le Tet. qui survient aux Plaies, Svo. Mayence, 1801.—*J. Currie*, Medical Reports, &c., vol. i., p. 155. (On Cold Bathing in Tet.).—

- P. Fournier, Du Tétanos Traumatique, Svo. Brux., 1803.  
 —B. Mosely, A Treatise on Tropical Diseases, Svo. Lond., 1803.—C. L. Mursinna, in Edin. Med. and Surg. Journ., vol. ii., p. 255.—D. Arnoldi, in Ibid., vol. iv., p. 45. (A case successfully treated by Cold Affusion).—H. Briggs, in Ibid., vol. v., p. 149. (A case cured by Purgatives).—T. Christie, in Ibid., vol. viii., p. 415. (Opium and Warm Bath).—M. Ward, The Efficacy of Opiate Frictions; also concerning Hydrophobia and Tetanus, Svo. Manch., 1809.—W. A. Stütz, Abhandlung über den Windstarrkrampf, Svo. Stuttg., 1804.—J. Harkness, in Transact. of Lond. Med. and Chirurg. Society, vol. ii., p. 286.—J. Parkinson, in Ibid., vol. ii., p. 293.—E. Phillips, vol. vi., p. 65. (Treated by Oil Terebinthine).—J. Schneider, Abhandlung über den Kiunbekenkrampf oder Kinder, &c., Svo. Herb., 1805.—J. Howship, in Lond. Med. and Phys. Journ., vol. xxii., p. 186.—L. Valentin, Coup d'Œil sur les Différentes Modes de traiter le Tétanos en Amérique, Svo. Paris, 1811.—H. Holland, Of the Dis. of the Icelanders, in Travels in Iceland, by Sir J. S. Mackenzie, 4to. Edin., 1811.—W. C. Wells, in Trans. of Soc. for Improv. Med. and Chirurg. Knowledge, vol. iii.—D. J. Larrey, Mém. de Chirurg. Milit. et Campagnes, 4 tomes, Svo. Paris, 1812-17; vol. iii., p. 289.—Marcus, in Magazin für Therapie und Klinik, b. i., p. 26.—J. Laatham, in Med. Transact. of Roy. Coll. of Phys., vol. i. London.—R. Reid, On the Nature and Treatment of Tetanus and Hydrophobia, Svo. Dublin, 1817.—C. H. Parry, Cases of Tetanus and Rabies Contagiosa, p. 18. Bath, 1814.—N. Dickenson, in Lond. Med. Repository, vol. i.—D. Pring, A View of the Relations of the Nervous System in Health and in Disease. Lond., 1815.—J. Macgrigor, in Transac. of Med. and Chirurg. Society of London, vol. vi., p. 449.—D. Dickson, in Ibid., vol. vii., p. 447.—D. M'Arthur, in Ibid., vol. vii., p. 461.—J. Elatoln, in Ibid., vol. xv., p. 161. (On Sub-Carb. of Iron in Tet.).—H. Earle, in Ibid., vol. vi., p. 93.—M. A. Burmester, in Ibid., vol. xi., p. 384.—W. Budd, in Ibid., vol. xxii., p. 188. (Remarks on the Pathology of Tet.).—R. Bright, in Ibid., vol. xxii., p. 4.—C. Grimston, Edin. Med. and Surg. Journ., vol. vii., p. 14; and vol. xi., p. 419.—T. Duncan, in Ibid., vol. xi., p. 199. (Recovery from Inject. of Tobacco-smoke).—J. Hall, in Ibid., vol. xv., p. 184.—S. B. Labatt, in Ibid., vol. xv., p. 216.—J. Sanders, in Ibid., vol. xvi., p. 474.—J. Hayte, in Ibid., vol. xvii., p. 394.—J. Thompson, in Ibid., vol. xviii., p. 44.—W. W. Manifold, in Ibid., vol. xxiv.—W. Briggs, in Ibid., vol. xxv.—P. C. Gibson, in Ibid., vol. xxvi.—Chapp, in Harless Neues Journ. der Ausl. Med. Liter., t. v. Erlang., 1806.—J. Hull, Edin. Med. and Surg. Journ., vol. iv., p. 245.—Phillips, Trans. of Med. and Chirurg. Society, vol. vi., p. 65.—Gardiner, Americ. Med. and Philos. Register. New York, 1814.—Fournier, Dict. des Scienc. Méd., t. iv., p. 31.—Chapman, Elements of Therapeutics. Philad., 1824.—Miller, The New Engl. Journ. of Med. and Surg. Boston, 1818.—Hutchinson, in Lond. Med. and Phys. Journ. Feb., 1823.—Chapman, in Philad. Journ. of Med. and Phys. Sciences, May, 1823.—Larrey, Dict. de Méd. et de Chirurg. Pract., t. xv., p. 303.—Lembert, in Archives Génér. de Méd., &c. Jul., 1828.—Berton, Jour. Hebdom. de Méd., &c. Oct., 1829.—Gibbon, Lond. Med. Gazette. Jan., 1831.—Baldwin, in Americ. Journ. of Med. Sciences, 1833.—Smith, in Ibid. Nov., 1836.—Ogden, in Lond. Med. and Surg. Journ. 1836.—Woodworth, in Dublin Journ. of Med. Sciences, July, 1835.—Gilmore, Journ. des Conn. Méd. Avril, 1836.—J. Morrison, A Treatise on Tetanus, Svo. Newry, 1816.—J. W. Heustis, in New York Medical Repository, vol. iii.—Cross, in Lond. Med. and Phys. Journ., vol. xxxvii.—A. Colles, in Dublin Hospital Reports, vol. i. (On Trismus Nascensium).—G. Bergamaschi, Sulla Mi litide Stenica c sul Tetano, loro Identita, Metodo de Cura, e Malattie Secondarie che ne derivano, 12mo. Pavia, 1820.—Bryme, in Lond. Med. Repository, vol. xv., p. 1.—J. Kenned, in Ibid., vol. xvii., p. 381.—J. Copland, in Ibid., vol. xvii., p. 375.—Mercier et Parant, Lond. Med. and Phys. Journ., vol. xli., p. 658. (To open the wounded part, procure Suppuration, Antiphlogistics and Purgings).—J. O'Beirne, in Dubl. Hosp. Reports, vol. iii., p. 343, 378.—H. Marsh, in Dubl. Hospital Rep., vol. iv., p. 567. (Vapour Bathing).—R. Carmichael, Trans. of King's and Queen's Coll. of Phys., Dubl., vol. iv., p. 273.—E. W. Roberts, in Amer. Med. Recorder, July, 1828. (Calomel and the act. Caustery).—J. Swan, An Essay on Tetanus, Svo. Lond., 1825.—H. Ward, Observat. on Tetanus. Glouc., 1825.—Anderson, in Transact. of Med. and Chirurg. Society of Edin., vol. i., p. 184, et vol. ii., p. 365. (Of Tobacco in Tet.).—A. Le Pelletier, Mém. sur la Nature et le Traitement de Tétanos Traumatique, in Rev. Médicale, t. iv. Paris, 1827.—Carron, in Journ. des Progrès des Sciences Méd., t. iii., p. 271. (Injection of the Ganglia).—Rochoux, in Diction. de Médecine, t. xx., art. Tétanus.—B. C. Brodie, in London Medical Gazette, vol. ii., p. 345.—J. Murray, in Ibid., vol. xii. (On the Division of Nerves, &c.).—Le Pelletier, in Journ. des Progrès des Sciences Médicales, t. vii., p. 23, et p. 262. (Inflam. of the Arachnoid and Pia Mater of the Spinal Medulla).—Ibid., p. 263. (Case produced by the Sting of a Bee).—Ibid., t. ix., p. 279. (Mielitis et alt. Rad. Anter. Nerv.).—Ibid., t. xii., p. 94.—Lambert, Ibid., t. viii., p. 277. (Endermic. Applicat. of Acet. of Morph.).—W. J. Holcombe, in Ibid., t. xi., p. 260. (Arsenic).—Guines, Archives Génér. de Méd. Mars, 1829. (Affection of the Epigastric Centre).—Ibid., t. xvi., p. 279. (Opium and large doses of fixed Alkali).—Wendt, in Ibid., t. xvii., p. 441.—Cruveilhier, in Revue Médicale, t. ii., p. 83. 1824.—Guse, in Ibid., t. ii., p. 82. 1824. (Phosphorus).—G. Cerioli, Annali Universali di Med. Milano. Maggio, 1829. (Morph. Acet. Enderm.).—Van Deekere, Mém. de la Soc. Méd. d'Emulation, t. ix., p. 477.—Poggi, in Archives Génér. de Méd., t. xviii., p. 406. (Lesion of the Anterior Columns of the Med. Spin.).—Fritz, in Ibid., t. xix., p. 435.—Lafranc, in Ibid., t. xx., p. 130. (Excessive Blood-letting).—Pearcock, in Lancet, p. 640. Jan. 28, 1837. (Cured by Oil Terebinth.).—Cavenne, in Brit. and For. Med. Rev., p. 223. July, 1837.—In Ibid., p. 226. Jan., 1838.—Hamerton, Med. and Chirurg. Rev., p. 48. July, 1837. (Treated by Sub-Carb. of Iron); and Ibid., p. 227; and Ibid., p. 159. July, 1838. (Treated by Colchicum).—E. Leah, in Edin. Med. and Surg. Journ., vol. xxx.—J. Furlonge, Cases of Tetanus Nascensium successfully treated, in Ibid. 1830.—J. Hancock, in Ibid., vol. xxxv., Olivier, J. Hennen, Principles of Military Surgery, 3d ed., Svo. p. 244. Lond., 1829.—S. Cooper, Surgical Dictionary, 6th ed., art. Tetanus.—J. Sym, Cases of Traumatic Tetanus, in Glasgow Med. Journ., vol. iii., Svo. Glasg., 1830.—T. Adams, On Tetanus with Cases, in Ibid., vol. iii., p. 141.—B. Smart, in American Journ. of the Med. Sciences, Svo. Philad., 1830.—Castley, in Lond. Med. and Phys. Journ., vol. liv., p. 197. (Of the Dis. in Horses).—R. Bright, Reports of the Medical Cases, &c., vol. ii., p. 564, 4to. Lond., 1831.—Poggi, in Annali Univers. di Medicina, &c. Feb. e Marzo, 1828; and in Archives Génér. de Méd., vol. xviii., p. 406.—J. Morgan, A Lecture on Tetanus, Svo. Lond., 1833.—F. O. Douet, in Lancette Française, Jan., 1832. (Cases treated by cold Affusion).—J. Murray, in Transact. of Med. and Phys. Society of Calcutta, vol. vi., p. 410.—J. Grant, in Ibid., vol. v., 212.—A. Gilmore, in Ibid., vol. v., p. 208.—P. Roe, in Ibid., vol. viii., p. i.—J. Maxwell, On Traum. Tet. and Trismus Nascensium, in Jamaica Phys. Jour., Svo. Jam., 1834.—J. Swan, On Dis. and Injuries of Nerves, Svo. p. 343. Lond., 1834.—Dunphyren, Leçons Orales de Clinique Chirurgicale, t. ii., Svo. Paris, 1834.—J. A. Symonds, in Cyclop. of Pract. Med., vol. iv., p. 669.—B. Travers, A farther Inquiry concerning Constitutional Irritation, Svo. p. 293. Lond., 1835.—R. Liston, Lecture by, on Tetanus, in Lancet. Lond., 1835.—Wallace, in Ibid., 1836.—R. Bright, in Guy's Hosp. Reports, vol. i., p. 111, 8vo. Lond., 1836.—C. A. Key, in Ibid., vol. i.—T. B. Curling, A Treatise on Tetanus, &c., Svo. Lond., 1836.—R. Druitt, The Surgeon's Vade Mecum, 5th ed., p. 14.
- [AM. BIBLIOG. AND REFER.—E. H. Clarke, Case of Traumatic Tetanus, cured by uninterrupted inhalation of chloroform for 24 hours; no other medicine used. Wounded with a saw Feb. 28th. Attacked March 5th. Discharged cured March 12th. Am. Jour. Med. Sciences. 1849.—S. P. Hildreth, Case of Spasms and Trismus from prick of needle in a female, assuming the form of hysteria, accompanied with excessive irritability, severe pains in various parts, simulating a variety of diseases, and continuing for a year or more. Ohio Med. and Surg. Jour., vol. i., p. 208.—D. P. Phillips, Tetanic Symptoms from the use of iodide of Potassium. Phil. Med. Examiner, 1853.—Wm. O. Baldrin, On Trismus or Tetanus Nascensium, and on its Identity with Traumatic Tetanus in the Adult, in Am. Jour. Med. Sci., p. 353, Oct., 1846; and in the Western Jour. Med. and Surg. for 1845. Dr. B. shows the identity of the pathological appearances in this disease and traumatic tetanus, and ascribes it to irritation seated in the umbilical cord at the incised part, caused by mismanagement, neglect, and improper dressings. The treatment recommended by Dr. B. is mainly prophylactic, consisting in the application of clean, soft, and unirritating dressings to the umbilicus, renewed every 24 hours, with great attention to cleanliness, ventilation, and the avoidance of atmospheric vicissitudes. In the commencement of the disease, free incisions are to be made in the umbilicus, and followed by the liberal application of nitrate of silver and bland poultices, using such remedies at the same time as are calculated to restore or correct deranged secretions.—J. Marton Sims, On Trismus Nascensium, in Am. Jour. Med. Sci., p. 365: 1846. Dr. S. attributes the disease to imperfect ossification of the cranial bones of the foetus, and mechanical pressure on the os occipitis,



produced by decubitus on the back for a length of time on a hard mattress or folded blanket, with a piece of an old quilt or some old clothes wadded up and placed under the occiput, thus interrupting the flow of blood from the spinal veins, and causing congestion and ultimate extravasation within the dura mater of the cord.—*E. Rush*, in Trans. Amer. Phil. Soc., vol. ii. Dr. Rush maintains that there is *invariably* an absence of inflammation in the wound causing the disease, and advises the free use of alcoholic stimulants.—*M. A. McDowell*, Observations on Tetanus, in New Orleans Med. and Surg. Jour. March, 1846. Dr. McD. relates numerous cases where the wound had *completely* healed before symptoms of tetanus were manifested, and contends that the smallest portion of any foreign matter fixed in the substance of, or lodged in contact with, the sensitive structures, may suffice to produce the malady. Dr. McD. relates several cases of traumatic tetanus in the adult cured by free incisions into the wound or cicatrix, with free use of nitrate of silver or actual cautery, followed by bland poultices.—*Robert Libby*, Report of four Cases of Traumatic Tetanus, treated by Mercurial Salivation. (Three of the cases recovered.) Ohio Med. and Surg. Jour., p. 543. July, 1850.—*Paul F. Eve*, Case of Tetanus in which Sulphuric Ether was used by Inhalation, in South. Med. and Surg. Journal. 1849. (The patient died while under its influence).—*N. W. Worthington*, in Am. Med. Recorder, p. 55. 1820.—*N. H. Allen*, in Bost. Med. and Surg. Journ., vol. xx., p. 165.—*C. W. Capers*, On Trismus Nascentium, in Carolina Jour. of Med. Sci. and Agriculture. January, 1825.—*W. G. Ramsay*, in Am. Jour. Med. Sci., vol. iii., N. S., p. 498.—*D. H. Storer*, Case of Tetanus following a retained Placenta, in Ibid., vol. iii., N. S., p. 97. A similar case reported in Ibid. for 1832.—*T. M. Markee*, Tetanus from Burns from Caustic Potash, cured by large doses of Asafetida, in Ibid., vol. ii., N. S., p. 344.—*Wm. G. Smith*, On Tetanus in Hayti, in Ibid., vol. vi.—*John W. Malone*, Case of Tetanus cured by Sulph. Quinine, in Ibid., vol. vi., p. 376.—*D. Francis Condie*, Review of Curling on Tetanus, in Ibid., vol. xx., O. S., p. 142.—*H. Dorsey*, Case of Tetanus cured by large doses of Laudanum and extensive irritation over the spine, in Ibid., vol. xviii.—*Skinner*, in Phil. Jour. Med. and Phys. Sci. 1827.—*T. G. Priolletau*, On Cold Affusion in Tetanus and Convulsive Affections, in Am. Med. and Phil. Register, vol. iii., p. 8.—*Wm. J. Holcombe*, Case of Tetanus successfully treated by Arsenic, in Am. Jour. Med. Sci., vol. I., O. S., p. 477.—*N. Chapman*, Elements of Therapeutics, vol. xi., ed. v., p. 477. Cases of Tetanus cured by Arsenic, and Review of Bird on Tetanus and Hydrophobia, in Am. Jour. Med. Sci., vol. iii., p. 123. 376.—*A. Poultke*, Case of Traumatic Tetanus cured by Calomel and Stimulants, in Am. Jour. Med. Sci., vol. ix., p. 100.—*W. H. Valk*, On Pathology of Tetanus, Ibid., vol. ix., O. S., p. 540.—*B. Smart*, Case of Tetanus cured by Tobacco-injections, Ibid., vol. vi., p. 337.—*G. W. Stedman*, Ibid., vol. iii., p. 244. 247.—*John Bellinger*, Case of Trismus Nascentium, in which Tracheotomy was successfully performed, Ibid., vol. vii., p. 138.—*A. C. Baldwin*, Case successfully treated by Opium, Antimony, and Tobacco-poultices, Ibid., vol. xii., p. 263.—*T. S. Kirkbride*, Ibid., vol. xvi., p. 331.—*A. Sidney Doane*, Notes to "Good's Study of Medicine," art. *Pentasia Tetanus*.—*Daniel Ayres*, On Tetanus, in N. Y. Jour. Med. and Coll. Sci., vol. viii., No. 1, p. 75. N. S. 1852.—*E. P. Bennett*, Ibid., vol. vi., N. S., p. 159.—*Moses Sweet*, Cases of Tetanus cured by the division of the injured nerve, Ibid., vol. vi., No. 2, N. S., p. 194.—*Samuel Tyler*, Ibid., vol. iv., N. S., p. 204.—*John O'Reilly*, in Ibid., vol. iv., N. S., p. 295.—*D. E. Bishop*, Case of Tetanus cured by large doses of Quinine, Morphia, Wine, Beef-tea, Porter, &c., in Ibid., vol. ix., p. 201.—*H. D. Bulkley*, Traumatic Tetanus, following a simple fracture of both bones of forearm, in which amputation did not prevent a fatal result, in Ibid., vol. iv., p. 45; also vol. vi., p. 14.—*J. W. Fell*, History of seven cases of Traumatic Tetanus successfully treated by Strychnia, in Ibid., vol. vii., p. 371.—*J. B. Zabriskie*, Case of Tetanus, arising from intestinal irritation, cured by large doses of Opium, in Ibid., vol. vii., p. 169.—*S. Jackson*, Observations and Facts on the use of Tobacco in Tetanus, &c., in Am. Med. Recorder, vol. x., p. 315.—*D. M. Reese*, Case of Tetanus from a gun-shot wound, controlled by caustic issue applied to the spine, in Ibid., vol. viii., p. 548.—*B. E. Bowen*, Tetanus successfully treated by tobacco enemata, in Bost. Med. and Surg. Jour., vol. xxiv., p. 85.—*Editorial*, On Division of the Nerve in Tetanus, in Boston Med. and Surg. Jour., vol. ix., p. 96.—*M. B. Brown*, in N. Y. Jour. of Med. and Collateral Sciences, vol. ix., p. 125.—*Richard Hazeltine*, in N. Y. Med. Repository, vol. vi., p. 252.—*Frederick Dallas*, A case of Tetanus unsuccessfully treated by Tinct. Cantharides, in Ibid., vol. ix., p. 1.—*James Archer*, A case of Tetanus successfully treated by the Cold Bath, Bark, Wine, Opium, Stramonium, and

Tinct. of Cantharides, in Ibid., vol. ix., p. 258.—*P. Traey*, A case of Tetanus successfully treated by large doses of Wine and Laudanum, with mercurial unguent, pushed to the extent of causing salivation, in Ibid., vol. ix., p. 368.—*Jeremiah Barker*, A case of Traumatic Tetanus cured by Amputation and the free use of Opium and Alcohol, in Ibid., vol. ix., p. 237.—*David Hosack*, Case of Tetanus cured by Wine, Ibid., vol. iii., p. 21. (In this case three gallons of wine were taken in five days, and with the happiest effects).—*Jabez W. Heustis*, Observations on Tetanus, and a case of the disease successfully treated with Laudanum, in Ibid., vol. iii., p. 122. 229. A very elaborate, learned, and judicious essay.—*Joshua Fisher*, in Transactions of Mass. Med. Soc., No. 11, Part i., and Med. Repos., vol. xii., p. 276. Dr. F. recommends large doses of opium in the treatment of Tetanus, and mentions one case of a young female affected with the disease who took nearly 11 drachms of solid opium in 3 days, taking 12 grs. every 10 minutes till she had taken 72 grs., "which removed the spasms, produced comatose insensibility, slow stertorous breathing, and a slow full pulse. After an interval of 8 hours the spasms began to return, and the remedy was given as before, and with similar result." The patient recovered.—*William Harris*, A case of Tetanus cured by the Cold Bath, in N. Y. Med. Repository, vol. iv., p. 76.—*Samuel Perry*, Case of Trismus cured by Electricity, Ibid., vol. iv., p. 77.—*Richard Hazeltine*, A case of Trismus cured by Laudanum, Ibid., p. 386.—*Clark Wright*, Cases of Tetanus with Remarks, in N. Y. Jour. of Med. and Surgery, vol. ii., p. 260. In 6 cases, 3 were cured by large doses of Calomel and Opium, with Ol. Terebinth. and Brandy internally.—*Gurdon Bueh*, Hospital Reports, in N. Y. Jour. of Med. and Surg., vol. iii., p. 372. 373. In 2 cases the disease yielded to the use of Asafetida, Brandy, and Tinct. of Rhuibarh, in 3 it proved unsuccessful.—*Benj. J. Raphael*, Hospital Cases, in N. Y. Jour. Med. and Surg., vol. iv., p. 109.—*J. C. Skinner*, Case of Traumatic Tetanus cured by tobacco enema (3ss. to Oj.), in Phil. Jour. Med. May, 1827.]

## THERAPEUTICS, GENERAL PRINCIPLES

### OF—PHYSIC, PRACTICAL PRINCIPLES OF—THERAPEIA GENERALIS.

1. In the article *DISEASE* I have discussed—1st. *The causation of disease, or Ætiology*; 2d. *The general doctrine of disease, or Pathogeny—the several states of Morbid Action*; 3d. *Diseases of the fluids, and more solid structures, generally originating in altered conditions of life, especially in those previously discussed*; 4th. *The connexion of Morbid Actions and of organic lesions with Morbid states of the Blood*; 5th. *The Progression of Morbid Phenomena*; 6th. *The Terminations of Disease*; 7th. *The Relations, Alliances, Successions, and Complications of Disease*; 8th. *The Mutations and Metastases of Disease*; and 9th, and lastly, I have noticed, very briefly, the *Circumstances modifying the Form, Complications, Durations, and Terminations of Disease*. This article, in connexion with those on the BLOOD, on ABSORPTION (all written and published in 1831, '32, and '33), on ENDEMIC and EPIDEMIC INFLUENCES, on INFECTION, on INFLAMMATION, and on SYMPATHY, constitutes a system of GENERAL PATHOLOGY to which, although many years before the profession, there is even now (1853) little of any importance to add, and in which I can find as little either to change or suppress. During this period, however, I have seen many of my ideas reproduced by others; and although I have been flattered, even by this mode of adopting them, yet I have not had the honour of their paternity assigned to me. Of this I have reasonable cause to complain.

2. Having, under the above and other heads, considered the *Causes and Doctrines* of diseased actions, and the *Successions of Changes* following the predisposing, exciting, and accessory causes of disease, until either recovery or structural changes, and even death, ensue; and having, in the articles AUSCULTATION and SYMPTOMATOLOGY,

gy, and in others on the symptoms and signs of disease, discussed the phenomena and manifestations of general and special morbid action, it legitimately follows that the *Principles* which should guide us in attempting the removal or alleviation of disease should be as fully developed and illustrated as the scope and limits of my work will permit.

3. In the articles on ENDEMIC and EPIDEMIC INFLUENCE, on INFECTION, on PROTECTION FROM PESTILENTIAL AND OTHER MALADIES, and in several other places, the most important and practical parts of PUBLIC and PRIVATE HYGIENE have been fully treated of. Although the *prevention of disease* does not strictly fall within the scope of *therapeutical doctrine*, yet it is so closely allied to it as to warrant a reference to those places, where it is most appropriately considered, in connexion both with the causes which require prevention and counteraction, and with the effects which result when such precautions are not taken.

4. I. CIRCUMSTANCES RETARDING OUR ARRIVAL AT JUST PRINCIPLES IN THERAPEUTICS.—A. *Erroneous, limited, or one-sided views of the causes, seats, nature, and procession of disease—of medical doctrine*—are among the most influential means of retarding, and even of arresting, our progress in therapeutical knowledge, and in attaining to principles which may enable us to methodize that knowledge, and to advance its progress. The empirics and dogmatists of antiquity, the humoralists of much later times, the solidists and nervous pathologists of the last century, the doctrines of BROWN, the less philosophical and more limited views of BROUSSAIS, and other partial hypotheses, which never reached the dignity of being accounted theories, have set principles at defiance, and left reason out of consideration. Doctrines have been based on postulates, and what, in other hypotheses, may have been true of a species or variety, has been unjustly imputed to the genus or order. Inferences have been drawn from a few incorrectly observed facts, while assertions have been received as truths, and credulity has reposed upon them; worthless authority thus usurping the place of close observation and calm deduction.

5. B. *The neglect into which the vital endowment of the frame has fallen*, among modern pathologists, and the disposition to impute more to chemical and material changes than truly belongs to them, are also no mean causes of the retardation of the progress of sound therapeutical principles. The *vis vita*, the operations of Nature, constitutional power, vital resistance, &c., are terms which have been used synonymously with vital endowment; but whatever may be the name by which *vitality* should be recognised as a principle of our being—as the chief essence or principle of existence—it should always receive the first and chief consideration. Although partially or altogether neglected by many, and although results are imputed to other agents and causes which more especially belong to it, yet it on many occasions asserts its own rights, evinces its rule throughout its domain, and, whatever agents we may employ, and often even in opposition to injurious agents, it accomplishes those salutary purposes for which it is destined, and removes diseases which can be removed only by its influences. Whatever may be the object or intention with which medicines are administered, whatever the mode of prescribing them, the vital

manifestations of the organ to which they are applied, or of the body generally, are more or less affected by them.

6. C. *Specious or novel plans or views, to which much greater importance is attached than they deserve*.—Novelties, specious appliances, attempts at precision which cannot be reached, and various methods recommended by cunning persons to serve their peculiar purposes, and quickly caught up in order to serve the same ends, or to show extended information, severally tend to retard, and even to mislead, the march of therapeutical knowledge. The recent vaunting of the importance of medical statistics, and of numerical methods of proving the seat or nature of particular maladies, or the efficacy of particular remedies or plans of cure; undue values put upon therapeutical agents, plans, or systems; the vain parade of imported articles of medical belief, even although they may rank no higher than specious absurdities, are all impediments in the way of truth. A physician who has obtained by accident, by connexion, or by talent of some kind, a position in his profession, asserts that a disease, or class of diseases, exists in certain numerical proportion, or presents numerically certain pathological changes or phenomena; and that the success of particular remedies or plans of cure may also be valued numerically as respects that or other diseases. The assertion, although so fallacious as to be almost absurd, yet being made by a physician of reputation or position, is believed, paraded as an astonishing novelty, and as an undisputed truth. Yet no hypothesis connected with medicine is more erroneous, inasmuch as there is not one disease which is always the same in all its features, in all places, or seasons, or times, or which is identical as to its precise seat, nature, or vital and material relations and associations. As there is not a single disease in the various and ever-varying states of climate, of causes, of duration, of endemic or epidemic influences, of constitutional peculiarity, &c., that is identically the same, attempts at a numerical precision must necessarily be fraught with error, and be productive of most injurious results; the specious appearance of a precision which the nature of the subjects to which it relates cannot reach, or even approach, misleading those who prefer authority to deep thought, and a striking novelty to close observation.\* This is

\* There cannot be a more absurd belief than that confined in by some recent writers, who have adopted the numerical method not only of describing the causes and symptoms of any particular disease, but also of treating such disease. Thus our Continental brethren, and our domestic imitators, having assumed that the disease is pneumonia, or pleuritis, or peritonitis, or any other specific form, without noting the influences of climate, season, age, constitution, endemic or epidemic conditions, duration, complications, &c., are not content with informing us that so many in the hundred presented a certain symptom, or proceeded from a particular cause, and that another number in this hundred furnished different results; but they go even farther, and, endeavouring to enlighten us still more, tell us that a certain number per cent. of a certain disease was cured by one medicine, another certain number was cured by another medicine, the one which cured the most being the remedy for that disease; as thus most irrefragably proved by this most admirable statistical or numerical therapeutical method! Let me take a recent illustration of this most admirable method, as furnished by a most distinguished medical *savant*, somewhere between this and the Black Sea. He takes a large number of cases of a disease which he has assumed to be, or is pleased to call, *pneumonia*, but of the truth of which we have no evidence, and none whatever of the causes, of the characters, of the duration, of the morbid associations or com-



only one of the several specious plans or novelties which the love of notoriety, or the desire of distinction, has thrown out to the credulity of the multitude, each one having its own crowd of believers until another supersedes its supremacy for a time, until it, in its turn, sinks under the influence of a successor, the revolving wheel of time at last turning up anew the theories, the plans, and the beliefs of past ages.

7. *D. Wrong estimates of the efficacy of particular medicines and agents* are as influential in retarding the progress of therapeutical principles, as the adoption of erroneous doctrines of the causes, seats, or nature of disease. Therapeutics is based equally on sound pathological principles, and on a knowledge of the operation and efficacy of medicine—of the instruments which we employ for the removal of morbid conditions. It requires not the lapse of many years to show the experienced physician the perishable reputation of many of the agents which have been employed against disease. Worthless agents have often been adopted; means which possess little influence have been over-estimated; and others, which are efficacious when judiciously used, have sunk below their true value, or even fallen into disuse. Fashion, undue estimates, improper and irrational employment, have contributed their respective shares in retarding our knowledge of therapeutical agents, and in preventing us from accomplishing therapeutical intentions. The same revolutions which have taken place in respect of medical doctrines during many centuries have likewise taken place as to therapeutical agents; the vanity of some, the cupidity of others, and the sanguine or enthusiastic views of a few, leading those into error who trust to authority, and who are deprived of the means or the powers of original research and profound observation.

8. *E. The license allowed by the laws to charlatans, impostors, and systems of imposture*, and the credit which these obtain with the public,

plications, &c.; no proof whatever whether or not they were cases of sthenic, or of asthenic or congestive pneumonia, or of broncho-pneumonia, or of peripneumonia. He represents these numerous cases as pneumonia, although it is well known that pneumonia presents very different and even opposite features, and conformably with such features requires very different and even opposite means of cure—means varied and appropriate to each case and to each state and stage of the malady. But the enlightened and illustrious therapist makes short work of his numerous cases. True to his faith in numbers—to his infallible “numerical method,” he divides his devoted, although numerous cases, into three equal parts. These three equal numbers—these three forlorn hopes, which thus are led to storm the stronghold of scientific and rational medical practice—are each very differently treated: one devoted third is treated by blood-letting alone; another devoted third, by tartar emetic only; and a somewhat more fortunate third, is left entirely to the unaided efforts of Nature. Can there be any doubt of the result, when we know well that many cases of pneumonia, instead of blood-letting, or tartar emetic, in which cases these means are certain destruction, require camphor, ammonia, and other remedies very different from those he has experimented on? What this empirical admirer of the “numerical method” inferred, when he found that Nature was the best doctor, may not be manifest. But she is undoubtedly very greatly to be preferred to the *soi-disant* physician, who treats disease according to the name he chooses, often irrationally, to give it; and without adapting or combining his agents in such modes as an enlightened physician would employ and direct them to the removal, the counteraction, or to the relief of such existing morbid actions as pathological science would enable him to detect and estimate with due accuracy.

owing to the confidence of their assertions and the false testimonies they produce in support of their delusions, are injurious to the progress and reputation of scientific medical practice. The cure of disease being essentially a most important and high profession, all who pretend to it receive from the public an amount of notice great in proportion to the parade, rather than to the justice of their pretensions. Hence the high standard of medical profession is lowered, and every pretender, while he detracts from this standard, derives to himself a reputation with the credulous public which is altogether opposite to his deserts. These impostors, by assuming characters which do not belong to them, and which the negligence of the Legislature, and the worse than negligence of the expositors of a most imperfect legislation, not only permit, but even encourage, by thereby lowering the prestige of medical science, and by diminishing the amount of encouragement held out to learning and science, actually retard the progress of scientific research, of professional learning and observation, and consequently of practical medicine.

9. *F. But the most remarkable cause of the slow progress of therapeutical science is to be found in the highest and most legitimate ranks of the medical profession—in physicians themselves.*—Public institutions for the cure of disease, in very few instances in this country, and even these only in recent times, have furnished the amount of knowledge to the profession which they are calculated to furnish; and many of those who have been engaged for the greater part of their lives in treating the diseases received into the wards of these hospitals, have gone to their graves either without having thrown any light upon the obscurities of pathology and of therapeutics, or, if any such light had broken in upon the darkness of their mental vision, it had never been reflected to others, or enlivened the gloom in which they had shrouded their ignorance. Other physicians have enjoyed the patronage not only of the public but also of their profession, and must have had their minds stored—if, indeed, capable of obtaining and retaining such stores—with pathological and therapeutical knowledge, and have sunk into the tomb without furnishing a single fact, precept, or opinion by which their names could be rescued a single day from their deserved oblivion. Thus the springs of therapeutical science have either been dried at their very sources, or have been absorbed by the barren and sandy soils through which they had most unfortunately passed. Others, with a more determined selfishness, reserve to themselves, and to their own uses, and for their prospective gains, the results of the experience they may have reached, and of the researches they may have made; and, without reflecting that the attainment of knowledge imposes the duty of imparting that knowledge to others, as a grateful return for the kind Providence of attaining it, do all in their power to turn it to their own advantage, and to prevent it from coming before the profession or the public. This last cause, however, of the retardation of therapeutical knowledge is much less remarkable than formerly, and is rarely to be observed at the present day.

[The above remarks are specially applicable to many of the practitioners in our own country, who are connected with hospitals and other public institutions where valuable experience may be

acquired. A vast majority of such rarely, if ever, publish to the world the results of their experience, and the only persons who profit by their advantages are themselves. Such physicians should bear in mind that those institutions are not only designed to aid the sick and suffering poor, but also to aid in the accumulation of medical experience, in order to the advancement of medical science. Such practitioners should not expect to enjoy the patronage of the profession unless they share with them the facts and the knowledge acquired by their greater advantages.]

10. *G. The want of correct ideas as to the physiological action of remedies* is one of the most powerful causes of the retardation of therapeutical knowledge. It is obvious that, even when the causes and nature of a disease are clearly indicated and recognized, if the physiological action, the *modus operandi* of the agents prescribed be not accurately known, the indications of cure cannot be successfully fulfilled, unless, indeed, the vital resistance of the frame be such as overcomes the injurious or wrong-directed means. Hence the propriety, as will be shown in the sequel, of ascertaining with precision the true action of the means employed—of using aright the instruments of cure.

11. *H. The prejudices, also, of those who are submitted to medical treatment, and the neglect of others*, although chiefly preventing the success of treatment, likewise retard the advance of this department of medical science. Many persons submit to treatment to satisfy their friends, without belief in its efficacy, or at least with a conviction that medical care cannot avert their fates, or change the decrees of Providence, not knowing, or not believing, that the means are required to be used by us before the blessing of the Almighty can be accorded to them; and that those are most certainly aided by Divine power who use every endeavour to aid themselves, while those who mistrust their own, and other human efforts, most frequently reap the fruits of distrust and unbelief. The neglect of patients themselves, although confiding more or less in medicine, to follow out with care the injunctions of the physician as to its use, and as to diet, air, exercise, and regimen, often mislead him as to the operation and the success of the means which he has prescribed, and induces him to attribute either too little or too much to their influence.

12. *I. Medical jealousies and contentions; opposing systems, plans, or means of cure; jarring views as to the efficacy or operation of certain medicines; opposite opinions in courts of justice, or otherwise appearing in public; the publicity given to medical discussions*, especially when different views are warmly espoused, have severally and collectively an unfavourable influence on the public, especially at the present day, and prevent many from trusting to medical treatment, at least for such a period as is requisite for their cure. These circumstances induce many to have recourse to charlatans, whose confidence and assurances impart a similar sentiment in them. The impatience, also, of those who ought to be patient; the frequent changes of their medical advisers, and the consequent discordance of their views and of their means of cure; the recourse to new plans or agents before those previously employed had received due trial, or their effects observed, together with various other circumstances depending upon both physician and pa-

tient, and with the too frequent incongruity of the means prescribed, not merely retard or prevent the recovery of the patient, but also exert a similar influence on the progress of therapeutical science.

13. II. THE PRINCIPLES OF THERAPEUTICS.—My limits prevent me from noting the earliest attempts to develop the principles of therapeutics, or the more recent efforts at a satisfactory arrangement of these principles. The reader who is desirous of satisfying himself as to these matters may do so by referring to the works enumerated in the BIBLIOGRAPHY. Without adopting, or in any way following, the methods of others, I shall draw upon my own resources, and state what extensive observation and prolonged experience have induced me to believe. Although on this, as on many other occasions, I furnish the references for those who choose to have recourse to them, yet the opinions or doctrines which may be there found, and those which will be here enunciated, if they agree at all, or in as far as they agree, may be viewed as accidents or coincidences, and as evidences of their truth, rather than that I have been indebted for them to any of the sources there indicated.

14. i. FUNDAMENTAL PRINCIPLES OF THERAPEUTICS—THE ESSENTIAL BASIS OF THERAPEUTICS.—*A. To endeavour to interpret aright the operations of Nature, and not to interfere with them when their process is conducive to the removal of morbid states, or to a return to health, but to aid and to develop them when aid is required.*—This precept is evident to all observing and experienced minds; but it is not always adopted by the inexperienced. When a person is seized with epistaxis, or with vomiting, or with diarrhoea, or with a hæmorrhoidal discharge, inexperience may attempt to arrest it, and thus to change a salutary evacuation to a dangerous malady. If these were duly watched, the effects carefully observed, and allowed to proceed, either until they subsided spontaneously, or until it became obviously requisite to arrest them, cerebral congestions and determinations, hepatic obstructions or congestions, or other serious affections, which often follow upon their premature arrest, might be averted. It not infrequently occurs that either of these discharges, especially when scanty, or insufficient to produce a salutary effect, points the path which should be taken. Where Nature directs, we should follow; and, although her steps may not be exactly those in which we should always tread, the principles she inculcates ought to be adopted, and carried as far as an enlightened experience or a reasoning observation will warrant.

15. *B. We should next endeavour to ascertain the causes, the mode of accession, the duration, and the extrinsic and intrinsic circumstances influencing the progress of the disease.*—*a.* It is obvious that the nature of the cause will always most materially influence the state, course, and termination of the malady. The cause often becomes identified with, and forms, as it were, a portion of the constitution of the disease. A poisonous seminum, emanated from an infected person, impregnates the frame of another, imparts a specific character to the resulting malady, in all its successive and spreading disseminations. Malaria invades the frame, and produces effects commensurate with the concentration or dose of the poison and the susceptibility of the individual.



The inflammations resulting from the more usual causes of suppressed perspiration, or of interrupted eliminating processes, manifest different features from those which result from special animal emanations or other poisons: while the former are more or less sthenic or limited, the latter are spreading, erysipelatous, contaminating, or infectious. (See *arts. ENDEMIC AND EPIDEMIC INFLUENCES, ERYSIPELAS, INFECTIONS, POISONS, &c.*)

16. *b. The mode of accession* is often an index to the future character and course of the malady. If the accession is clearly connected with the cause, and such as the cause usually produces, both the nature and the treatment of the disease are often clearly indicated. Thus, if a person experiences chills or rigours, but complains of no remarkable pain or other affection of an organ lodged in any of the cavities, although there be pains in the head, back, and limbs, and if he can trace his disease to exposure to any of the usual sources of malaria, either intermittent or remittent fever may be considered as having commenced; and if, after such rigours and such exposure, heat of skin, vascular reaction, and the other usual symptoms of febrile excitement be present, the nature of the malady becomes still more manifest, although a farther time, probably only a very few hours, may be required to demonstrate the type of the malady. In such cases, an emetic, followed by a chologogue purgative, and by free evacuations, and these, at the due period, by a powerful dose or doses of quina or of cinchona, &c., will make a salutary impression on the frame, will break the chain of morbid actions, and prevent the succession of febrile paroxysms. This connexion of the cause with the accession of the disease it produces is still more remarkable in respect of specific and infectious maladies, and often not less so as regards endemic and epidemic diseases, and often furnishes a sufficient basis for therapeutical intentions.

17. *c. The duration of the disease*, when the physician is first called, and the previous history of the case, obtained with all possible precision, are essential to a proper treatment of it. The stage at which it has arrived; the existing pathological conditions, as far as they may be traced; the probable degree of vital power or resistance; the evidence as to the state of the blood and of the depurating organs and functions; and the means which have been already employed, and the effects produced by them, should be severally estimated with all the accuracy in our power. It is obvious that, as disease is generally a succession of morbid actions, leading either to the restoration of health, or to exhaustion of vital power and deterioration of the fluids and structures, so should the progress in either direction be carefully considered, and the indications and means of cure directed accordingly.

18. *d. There are numerous intrinsic and extrinsic circumstances influencing the character and tendency of a disease* which ought to be duly considered by the physician, inasmuch as a recognition of these, and a careful estimate of them very often, should direct or modify both the indications and means to be adopted. I can merely enumerate these circumstances at this place, as a more full consideration has been given them under different heads. The several *epochs of life*, from infancy to extreme old age, not merely have diseases which are especially incidental to them, but

also very remarkably modify the features and tendencies of those which are common to all ages (see *art. AGE*). The *temperament and habit of body*, particularly as respects vascular fulness and inanition, or anæmia, are of great importance, as I have shown in the article *BLOOD* (§ 13-77).

*Varieties of the human species and differences of race* very remarkably influence not only the predisposition to, but also the treatment of, many diseases, especially those of a febrile, inflammatory, and epidemic nature; and when individuals of any variety or race have migrated from a climate in which they were indigenous, to one more or less different in the several physical elements and circumstances which constitute *climate*. The pathology and treatment of diseases, with reference to difference of race or variety, was for the first time duly considered in this work. The *occupation* of the individual not only induces many diseases, but also modifies others. (See *ARTS and EMPLOYMENTS, &c.*) The *habits and mode of living* usually adopted by the patient both modify the character of many of the diseases to which he is liable, and require modified indications, means of cure, and regimen. They are even productive of several others, as fully shown in the article on *DISEASE* (§ 18, *et seq.*). In addition to these, certain *DIATHESES* and hereditary diseases should not be overlooked, and, of the former, the *SCROFULOUS*, the *GOUTY*, and the *RHEUMATIC* are the most important.

19. *Mental impressions, emotions, &c.*, have a powerful influence in modifying, as well as in predisposing to disease; and this influence is very generally exerted during the whole course of the malady, favouring, and sometimes even occasioning, an unfavourable or a favourable issue, according to the nature of such impressions or emotions. These affections of mind ought always to be duly considered by the physician before he forms his indications or selects his means of cure. In severe, dangerous, and infectious maladies, the patient often entertains anticipations of the result, which occasion their own fulfilment. When these anticipations are unfavourable, and especially when they amount to convictions in the patient's mind, then they should be combated not only morally but physically. They should even direct the indications and the means of cure, the most powerful remedies being then required to rouse the vital powers and resistance, to arrest exhausting discharges, when these are present, and to restore the depressed energy of the organic and cerebro-spinal nervous systems. Several slighter and more chronic maladies either are rendered more severe, or are prolonged, by mental disquietude or anxiety—by some cause depressing or irritating the sentiments, emotions, and passions. The mental condition and circumstances of the patient should, therefore, be ascertained, when the state of disorder indicates any disturbance in this direction, and ought to be directed accordingly.

20. *Several extrinsic influences* modify the character, nature, type, and terminations of disease, not merely in as far as they are the occasion of it, but chiefly by the impression they make on the frame during the course of the malady. *Climate* remarkably affects the prevalence and nature of many diseases, and requires that the indications and the means of cure should be directed and modified accordingly; and with reference not merely to those persons who are indigenous

and acclimated, but also to those who have recently undergone a change of CLIMATE. (*See that article.*) ENDEMIC and EPIDEMIC INFLUENCES (*see these heads*), confinement in an infected atmosphere, or in crowded or ill ventilated apartments and localities, emanations from burying-grounds, sewers, drains, cess-pools, or water-closets, and the numerous sources of atmospheric contamination described when treating of the causes of PESTILENCE and of the means of preventing it, severally not only produce disease, but aggravate its character when the patient continues to be subjected, during its progress, to any of these causes.

21. *States of weather and season* have also great influence upon the course of diseases, certain ranges of temperature favouring the occurrence of some diseases, or even being necessary to the diffusion or to the infection of others, especially of infectious, pestilential, and epidemic maladies. The influence of season, weather, winds, and, more especially, of ranges of temperature, not merely on the diffusion of disease, but also upon its general character, is so well known that it is unnecessary to furnish any illustrations of the fact at this place, as they are fully adduced, under their respective heads, when treating of the maladies chiefly influenced by these causes, and in the articles DISEASE, INFECTION, &c., and in those just referred to.

22. Among other influencing extrinsic causes, the *prevailing epidemic constitutions*, as well as those just mentioned, and generally in connexion with them, require strict attention when forming the indications, or selecting means of cure. These epidemic constitutions often continue many years, and the prevailing diseases present either a high range of sthenic diathesis, or a general asthenia, or depression of vital resistance to the progress of morbid changes. In the former the character of diseased actions is sthenic, inflammatory, and recuperative; in the latter it is adynamic or deficient in vital power. The sources of these prevailing constitutions have not been satisfactorily shown. They have been imputed to a prevailing character of the seasons, to the annual amount of rain fallen during a series of years, and to the states of terrestrial and atmospheric electricity—to either or all of which they may be referred, although the proofs respecting them are not quite conclusive; and are not sufficient to exclude the influence of other, or even of unknown agencies.

23. *C. To determine the pathogeny of disease—to ascertain existing pathological conditions, and the morbid tendencies characterizing them*, is the chief basis on which indications of cure should be founded. This is the great axiom in rational therapeutics, and, unless due regard be paid to it, medical treatment is worse than empirical—it is often destructive of life—it entirely subverts its own intentions. This being the case, the utmost care should be taken to arrive at accuracy respecting these conditions, and as to their several tendencies and consequences if they be not arrested or controlled. Due consideration ought likewise to be given to those topics which have been already discussed. The existing pathological states having been rationally inferred from every fact and circumstance connected with the disease, and from its causes and modifying or accessory influences, the indications and means of cure should be appropriately directed to re-

move, or to control, or counteract them, according to their natures and tendencies, as shown in the more *special principles of therapeutics* (§ 36, *et seq.*), and fully illustrated in the consideration of the specific forms of disease, under their several heads.

24. *D. To remove all predisposing, exciting, and concurring or accessory causes, as far as may be in our power*, is obviously necessary to the removal of the effects resulting from these causes. The causes of disease, especially those which are exciting or most influential, are often so obvious, and their connexions with their effects are so demonstrative, that the existence of the former leads us to infer the latter; and a due manifestation of the latter is indicative of the former. This is especially the case in respect of specific, infectious, contagious, febrile, endemic, and epidemic maladies. But there are other diseases which are the effects not of one or even of two causes merely, but of several. There are numerous circumstances which influence, by predisposing or by counteracting, the susceptibility of the individual to the invasion of the exciting or efficient causes of disease; while there are many more which concur or reinforce these causes, either at the time of, or subsequently to, their morbid impression and action. Some of these may escape detection or due estimation, while others may have an undue importance assigned to them. Still it should be our strenuous endeavours to ascertain their existence and influence with due precision, in order that they may be removed or counteracted.

25. ii. GENERAL THERAPEUTICAL PRINCIPLES AND PRECEPTS.—*A. Of indications and contra-indications in the treatment of disease.*—Indications or intentions of treatment or cure are those objects or ends which we propose to attain, in order to remove altogether, or to alleviate disease when removal is no longer attainable, owing to its nature or progress. Contra-indications are such intentions or means which would, reasoning from existing phenomena and pathological states, either not remove or benefit these states, or would aggravate them, and thereby risk the life of the patient. Indications of cure are to be accomplished or fulfilled appropriately and successively, by a careful and accurate deduction from existing morbid conditions and tendencies, and with a strict reference to the fundamental principles noticed above, to facts, and to the considerations and reasonings which accurately observed facts suggest. Having observed with care and acumen, and drawn rational indications from a close and comprehensive view of both the intrinsic and extrinsic circumstances of the case, the next object is—

26. *B. To employ agents or means—remedies or medicines—for the fulfilment of those indications or intentions that are the best calculated to this end.*—But to attain an object, to accomplish an intention, it is most requisite to entertain accurate views as to the mode of action, the proper methods of employing, and the efficiency of, the agents, instruments, or means which we may recommend. The physiological action of medicines, in different doses or quantities, ought to be known, and the operation of the same medicines and doses be ascertained, in different diseases, by a careful experience and close observation. Having previously known the modes in which agents or means become remedial or in-



strumental against disease, those agents or medicines should be employed with strict reference to the removal of existing morbid states, as far as they may be ascertained, and with the intention of preventing progressive disorder, a strict regard being always had to the physiological and pathological operations of these medicines or agents.

27. *C. To closely observe the states of vital power and resistance, and the grades and character of vascular action, in connexion with the condition of the circulating fluids and of the several secreting and excreting functions.*—Our means should always have regard to the vital manifestations, recollecting that agents become remedies only when acting on vital states, and appropriately to a correct interpretation of these states—when they calm or lower vital excitement or morbidly increased vascular action, if either of, or both these pathological conditions are present, and when they restore vital power or impaired vascular action, if either of or both these states require restoration. But it is not only necessary to attend to the grades and character of vital power and of vascular action and reaction; the conditions of the circulating fluids, and of the secreting and excreting organs, should be ascertained with all possible accuracy. The condition of the circulating fluids, especially of the blood, can often be inferred only from the activity, from the torpor, or from the suppression of one or more of the eliminating or depurating functions, and from the appearances of the skin, extremities, and the outlets of mucous canals; it may be farther inferred, on many occasions, from the states of the heart's action, and of the pulse, in connexion sometimes with the appearances and the changes of the blood itself, when taken from a vein. Whatever may be the changes, the signs, or the phenomena which may guide our inferences as to vital power, or to vascular action, or as to normal or abnormal conditions of the fluids or solids, these inferences having been rationally drawn, the indications of cure conclusively follow, and are to be fulfilled by medicines selected conformably with their known operations.

28. *D. To take into consideration not merely the states of vital power, of vascular action, and of the excreting and depurating functions, but also the diathesis, the general aspect, the complexion, the posture, the nutrition, and the physical power of the patient.*—In addition to these, the circumstances in which the patient is placed, and by which he is influenced, whether mental or physical—whether intrinsic or extrinsic—should be duly estimated conformably with the influence they may severally or collectively exert in favouring, or in counteracting the indications and the means of cure; and these means should be selected with due reference both to these indications, and to these moral and physical circumstances which are never present without influencing, more or less, the present condition, and the course and the terminations of the disease; and, moreover, without modifying the effects of remedies.

29. *E. To select the means of cure with strict reference to what is known of their modes of action, and, conformably with this knowledge, to employ them appropriately to inferred pathological conditions.*—Medical agents are remedial only as they are rationally or appropriately prescribed. In order that they may be so employed, it is requisite

to bear in mind the following propositions: 1st. That medicines should be given in forms which may best produce their desired effects; 2d. That the vehicles in which they are given should also possess this property; 3d. That the substances with which they are associated ought to be such as either will develop their effects or will concur in producing the same effects; 4th. That substances which act upon more than one function, surface, or viscus ought to be cautiously prescribed, and with especial reference to the function or viscus on which their operations are desired; 5th. That when medicines are likely to occasion nausea, pain, or distress, these effects should be avoided by combining them with substances which may prevent or correct such discomforts; 6th. That when it is desired to influence more than one organ or system, agents whose actions have been shown to be thus complex may then be selected with these intentions, or several may be conjoined with these views, provided that they are chemically compatible, suitable to the ends proposed, and altogether congruous with each other; 7th. That the combination of medicine producing different effects often occasions additional effects, different from those produced by either, and frequently without materially disturbing the action proper to each. These propositions, although almost self-evident, require a few remarks for their elucidation. My limits, however, require that these remarks should be very brief.

30. *a.* The form best suited for the production of the effects of a remedy, is that which conveys either all, or the greatest amount, of the properties characterizing the remedy, and which presents these properties in the most suitable state for their immediate or for their more protracted operation, as either may be required. Thus the more immediate and full operation of medicines is most frequently obtained by infusion or decoction, by dilution, or in the state of tincture or essence, according to the nature of the substance; or by trituration or minute division, if the substance be more or less solid. In the states of solid and extract, or in the form of pill, many substances either may long remain in the stomach without being acted upon, or may pass the pylorus, and either occasion a very delayed or a very imperfect effect; and when pills are gilded or silvered, their operation may be still longer delayed, or they may pass off without being dissolved. When the operation of medicines upon the lower bowels or uterus is desired, then the form of substance, extract or pill, may be preferred.

31. *b.* The vehicles best suited for the administration of active medicines should be congruous with the operation of these medicines, and such as may prevent the stomach from being disturbed by them, and at the same time promote their operation. Thus the action of the disulphate of quina is promoted by taking it in the compound infusion of roses; the tinctures of cinchona, in the infusion or decoction, or in an aromatic water; the several tonic tinctures, in bitter and aromatic infusions; and the purgative tinctures or salts, in laxative or purgative infusions; neutral salts, in states of much dilution; powders, in aromatic infusions or waters; and the active ingredients for enemata, in vehicles which will admit of their administration in due or equal admixture.

32. *c.* That several substances whose effects are congruous, or calculated to develop their mutual actions, are often most beneficially prescribed together, cannot be controverted, especially in cases requiring a decided operation on the secreting and excreting organs, and a due development of the several vital manifestations. Thus various purgative or cathartic substances are combined with advantage; several stimulants, with antispasmodics; tonics, with stimulants and aromatics, &c. Quina, or the disulphate of quina, is advantageously given with camphor, in many cases requiring the former; or cinchona with ammonia, or with serpentaria, or with both; or myrrh with asafœtida, galbanum, or ammoniacum; or infusion of valerian, with tincture of sumbul, or with ammonia, or the ethers; the preparations of iron with those of quina, or with those of calumba or quassia; the preparations of scoparium, with those of taraxacum, juniper, &c., or these with the salts of potash, &c., or with diuretic spirits or tinctures, &c.

33. *d.* It is often desirable to have recourse to substances which affect more than one function, or to combine medicines which affect different organs, due regard being had to the function requiring to be chiefly acted on. Certain medicines, particularly those which are alterative, and more or less specific in their operations, produce, according to their doses, the frequency of their repetition, and the nature of the disease, changes in more than one organ or function. Mercurials, antimonials, iodine, and the iodides, sulphur, magnesia, and the alkalies, &c., may be adduced in illustration of this position. While sulphur acts on the bowels, it is partially absorbed into the blood, and acts also upon the skin, increasing both the cutaneous exhalation and the follicular secretions. Magnesia opens the bowels, is partially absorbed, and neutralizes and counteracts excrementitious materials in the circulation. Alkalies and the iodides combined with the alkalies, affect the blood, and through it the several emunctories and solids. Camphor passes into the circulation, affects the nervous system, and promotes exhalation from the lungs and expectoration; the terebinthines also are absorbed, and act upon the capillary circulation and on the kidneys, &c. Many of the neutral salts act upon the bowels, and being absorbed, especially when taken in doses which are not purgative, excite the kidneys to increased action, and sometimes also the skin, &c.

34. *e.* The action of medicines may cause discomfort or painful symptoms, which should be prevented or counteracted by adding substances which will correct these unpleasant effects. Purgatives, especially those which are cold, saline, or nauseous, and substances which in large doses occasion vomiting, frequently are rendered both more pleasant and more active, by conjoining them with aromatics, or with spices, or with bitters, or with both, and sometimes also with anodynes or narcotics; or by giving them in finer divisions, or in more diluted states, either similarly combined, or in smaller and more divided doses.

35. *f.* Medicines possessed of different properties may be conjoined, when it is desirable to affect more than one function, organ, or system; provided that the action of the one substance does not counteract that of the other, and that they are chemically and vitally compatible with

each other. Thus the alkalies, the combination of them with boracic acid, or common borax, the nitrate of potash, magnesia, and the citrate of magnesia, severally change the states of the blood, especially when uric acid or the urates and fibrin are in excess in the blood, or when this fluid is loaded with excrementitious materials. They neutralize these materials, and promote their removal by means of the emunctories; and, when they are conjoined with tonics, or with febrifuges, or with bitter infusions, they promote the salutary effects of those, especially in periodic and low fevers, more particularly when they are given in the decoction of cinchona with serpentaria, or with camphor, arnica, &c. Those deobstruent and alterative substances, or the iodide of potassium, with the solution or the carbonate of potash, and with the tonics now mentioned, are also most beneficial in several states of rheumatism and gout, in some diseases caused by malaria, and in several other maladies, chiefly owing to the combination of means and to their conjoint actions.

36. *g.* The combination of medicines possessed of different properties often gives rise to different or to additional effects, those characterizing each either still appearing, or being masked by the effects resulting from the combination. Sometimes the effects are a combination of those produced by each ingredient, as when tonics are combined with aperients or purgatives. The true Dover's powder, or the association of ipecacuanha and opium with the nitrate of potash, produces an effect beyond those which characterize these constituents; yet their individual properties are more or less manifested. Disulphate of quina, conjoined with one tenth of the quantity of aloes which is usually required to open the bowels gently, produces a cathartic operation. Small doses of opium tend to determine the action of medicines, which are apt to disorder the stomach or bowels, to the skin or to the kidneys, as when they are conjoined with antimonials, or with ipecacuanha, or with colchicum, or with the common diuretics.

37. III. SPECIAL THERAPEUTICAL PRINCIPLES.—The special consideration of therapeutical principles has been partly discussed under other heads; but it may not be without advantage to bring the whole subject, in a full and connected manner, before the reader, referring him to those places in which certain topics are as fully considered and illustrated as the scope and limits of this work will permit, in order that repetitions may be prevented both in this and in other places.

38. I. THE RESTORATION OF NERVOUS AND VITAL POWER, WHEN PRIMARILY DEPRESSED, is very often necessary; and the physician is called upon to accomplish this intention in a great variety of circumstances: in cases of mental and physical SHOCK (*see that article*); after the impression or action of numerous sedative, poisonous, or noxious causes; upon the invasion of any of the several infectious and pestilential maladies; in the cold stage of periodic fevers; and in the several forms of local or general DEBILITY (§ 5, *et pluries*). In these, and even in other circumstances of disease, either the organic nervous energy, or the vital power generally is more or less depressed; but this may not be the only morbid condition. It may be associated with others in various grades, equally requiring attention and removal; but when it constitutes the prom-



inent or chief affection, the others may arise from and depend on it, and the vital depression then imperatively requires removal. When the depression is a primary effect of known, specific, or poisonous causes, the continuance of it may then be followed by one or other of three results: 1st. It may become more and more urgent, or may increase until the vital manifestations entirely cease; 2d. It may be followed by imperfect or abortive efforts at reaction, life at last sinking in the struggle; 3d. When the vital energies are not subdued in either of these modes, reaction of a tumultuous or excessive kind may supervene, and endanger the integrity of the structures or organs most predisposed to organic alteration. These results are the more likely to occur when specific, infectious, or poisonous causes occasion the primary vital depression; inasmuch as the functions of the secreting and excreting organs are then early impaired or interrupted, or entirely suppressed, and the blood and other circulating fluids are more or less altered, contaminated, or poisoned. In this, as well as in other states of disease, the INDICATIONS are, 1st. *To ascertain and to prevent the farther action of the causes occasioning vital depression*; 2d. *To remove the effects already produced*; and, 3d. *To prevent or counteract contingent or consecutive results.*

39. *A.* The first of these, although not always possible, may often be accomplished. A contaminating air may be corrected by ventilation, or by removing either the sources of contamination or the patient from their influence. But a specific infection or contagion, having once made its morbid impression, cannot be prevented from producing the succession of changes which characterize its effects, although these changes may be aggravated and vital power depressed by a humid, impure, or contaminated atmosphere; the second and third intentions are, therefore, to be attempted. Malaria, in any of its states, may have made its impression on the frame; and, although removed, the effects will take place in the form of vital depression, chills, rigours, &c., followed by vascular reaction, perspiration, &c. But if the patient were to remain during the progress of the disease subjected to the continued influence of this cause, the disease would be more severe, more difficult to remove, and more prone to occasion structural changes in predisposed organs, and might even assume a more continued and dangerous type. There are numerous external or physical agents which depress the organic nervous energy, and through this system lower the vital manifestations; and there are many mental, and intrinsic, and even structural conditions which produce similar effects, without being clearly evinced or ascertained. In these circumstances, although the causes, and the changes which they have induced, may be loosely inferred; yet their removal or prevention may not be within our power, and the next indication is to be at once attempted.

40. *B. Secondly.* To remove the depression already produced, is an intention which should be fulfilled by means, as respects their powers and natures, appropriate to the grade of depression and the phenomena characterizing it. But these means should have more or less reference, not only to the state of depression, but also to its causes—whether mental, physical, specific, infectious, &c. They ought to be sufficient for the end proposed; but not excessive in their opera-

tion, or such as are likely to occasion inordinate excitement or reaction, or irritation, or inflammation of the organs to which they are directed. In the more extreme cases, or when vital power is remarkably depressed by the invasion of infectious maladies, the more powerful stimulants are then required, aided by external measures, in order to determine the flow of blood to the external surface, and to relieve the internal organs from the congestion and vascular distention which oppress them, and which, without such means, the vital powers might not be sufficient to overcome. The invasion of several maladies produced either by malaria, or by infectious emanations, or by moral or physical shocks, is often attended by vital depression, characterized by a sense of sinking and of coldness; by tremours, rigours, or shiverings; by failure of the pulse, as respects either strength or frequency, or both; by a shrunk, cold, and bloodless state of the external surface; and by a feeling of oppression or of anxiety at the epigastrium and præcordium. These phenomena, when they are caused by malaria, are in most cases soon followed by vascular and vital reaction, unless in those circumstances and cases which are fully described in their proper places (*see* FEVER, INTERMITTENT, &c., § 33–35). In the more severe and congestive of such cases, retching or vomiting is generally added to the above characteristics of vital depression; and when the invasion of infectious and pestilential maladies, of exanthematous and other fevers, produced by their specific poisons, is attended by signs of vital depression, such as, or similar to, those now stated, there are generally also super-added retchings or vomitings, or both, evincing the more serious nature of the vital depression, and showing the efforts of Nature, not only to throw off the morbid cause, but also to resist the impression it has made, and to overcome the congestion produced by it in the large vessels and vital organs. In such dangerous circumstances, Nature points the way to the fulfilment of the indication under consideration, and therefore it should be followed by promoting it by appropriate means, such as by warm, stimulant, and demulcent draughts; by external warmth and warm baths, containing salt, mustard, &c., and by stimulating and aperient enemata, in order to remove fecal accumulations and depressing morbid excretions. The great question is, In these circumstances how far should the vomitings be promoted or allowed to proceed! This can be decided only by the effects produced, and by the quantity and appearances of the matters ejected; but generally, if the retchings or vomitings continue beyond the time apparently sufficient for producing a salutary effect, if the matters thrown off be scanty, serous, or sero-mucous, and if the vomiting be attended by an internal sense of heat at the epigastrium, and tenderness or heat over the region of the stomach, and by other gastritic or gastro-enteric symptoms, then, instead of promoting the vomiting, or of exhibiting stimuli, &c., the gastric irritability should be allayed by refrigerant or cooling demulcents, conjoined with sedatives; by external derivatives, and other suitable means. (*See art. GASTRO-ENTERIC DISEASE, and STOMACH, DISEASES OF.*) Nervous depression and sinking require for their removal the more diffusive stimuli, often conjoined with antispasmodics or with tonics, according to circumstances, and as shown in the article DEBIL-

ITY (§ 43, *et seq.*). The same symptoms which indicate the propriety of restraining retchings and vomitings, should also forbid the exhibition, by the mouth, of stimulants or tonics, which in other circumstances of vital depression would be required, often liberally and frequently, but with due circumspection and regard to the effects produced, and to the peculiarities of the case; these medicines also being selected judiciously, and according to an enlightened experience.

41. *C. Thirdly.* During our efforts to remove primary vital depression by suitable agents, due regard ought to be paid to the prevention of contingent or consecutive results of an unpleasant or serious nature; and when these cannot be prevented, they should be counteracted as far as possible. The internal congestions, which frequently occur during the vital depression directly produced by sedative infections and poisonous causes, frequently continue after efforts at reaction have been made; or, although partially removed, give rise to more or less disorder, especially when secreting or excreting organs have been thus affected. Not infrequently the viscera which experienced congestion during the primary depression, become, during the consequent reaction, the seats of a congestive inflammation or irritation. Hence the propriety of preventing or anticipating these results in the treatment employed to remove the primary morbid condition—of prescribing those means which are least likely to convert congestion into inflammation, and which, while they remove the depression, restore the vital manifestations in the several secreting and excreting organs, and promote the functions of these organs, especially of the skin, kidneys, and bowels. The contingent evils upon vital depression depend very much upon the depressing causes; and where these causes are specific, the effects are generally such as may be expected, yet they cannot be entirely prevented, or even always allayed or controlled. If the causes are concentrated, the susceptibility great, and the consequent depression extreme, the contingent congestion and consequent effects, although expected, may soon destroy life, however judicious the means which may be used. Numerous proofs of this are furnished us by the histories of the more malignant cases of remittent, continued, exanthematous, and pestilential fevers. In these the causes characterize the effects, and all the manifestations of these effects throughout the frame; but, although these effects necessarily result, well-directed means may often allay or control them when they are excessive or dangerous. These means will necessarily depend upon the effects in the several forms of these maladies, and are such, as well as the particular effects they are employed to control, as can be discussed only under their specific heads, to which I must refer the reader.

42. ii. THE PROMOTION OF THE SEVERAL SECRETING AND EXCRETING FUNCTIONS—OF THE DEPURATING PROCESSES, WHENEVER THEY ARE TORPID OR IMPAIRED, has been just stated, as generally requisite to the prevention of many contingent evils, during states of vital depression by whatever cause produced; but it has a still more general application, for in all circumstances, and in all dynamic or other states of vital manifestation—in states of excitement and increased vascular action, as well as in those of depression—these functions are very often either torpid or

impaired, or even interrupted, and require restoration; otherwise additional, or more severe and dangerous changes result, and the blood, loaded with excrementitious materials, occasions the most deleterious effects in vital organs. But the functions of depurating or excreting surfaces or organs are not confined to the mere elimination of injurious elements or materials. In connexion with this depuration, the organic nervous fibrils, by means of the capillary vessels, affect more or less the state of the blood circulating in the capillaries, and impart to it a more complete organization as well as vital properties. The blood, in different parts of the capillary circulation—in the skin, in the respiratory mucous surface, in the digestive villous surface, in the structures of the several glands—by the influence exerted on it by the organic or ganglionic nerves, through the media of the capillaries, thus varies, in vital properties and in sensible qualities, with the modified vital manifestations of the ganglia and their nerves; the functions of organs or parts owing not only their differences and specific characters to these modifications, but also the amount of their performance.

43. Next to the sedative or depressing effects produced by the causes of disease, the impairment or arrest of depurating functions closely follows, the latter being very frequently the consequence of the former. These functions are often, in these circumstances, restored by the same means as are employed to remove the primary morbid impression, especially by a judicious selection of emetics, and of diffusive stimuli, and by warm, hot, or medicated baths. In all cases, 1st. *The Causes which impaired or interrupted these functions should be ascertained and removed*; 2dly. *The Means which the states of the several secreting and excreting functions require for their due promotion should be prescribed, and generally with marked reference to the causes on the one hand, and to associated and contingent pathological conditions on the other.*

44. A. Suppression of the depurating function of the skin illustrates the importance of these intentions, while it shows the several pathological effects which may result from it. The great diversity of these effects, upon different persons, depend upon, 1st. The existing susceptibility of the individual; 2d. The amount and duration of the cause; 3d. The predisposition of certain organs or tissues to be affected; 4th. The vicarious increase of other excreting functions, diminishing or modifying the effects produced by the cutaneous suppression; 5th. The concurrence of other causes with those which suppressed the action of the skin. The suppression of excreting function being referred to its cause with all possible precision, the exact nature and amount of the pathological effects should be ascertained. If the function of the skin be farther considered in connexion with this subject, we find that its suppression may be followed, especially if the kidneys do not perform a vicariously-increased function, by catarrh, or by rheumatism, or by inflammation of the lungs or pleura, or by diarrhoea, or by dysentery, or by enteritis, or by other maladies, according as the predisposition of parts may determine the morbid action. The cause or causes, whether exposure to cold or to influences depressing vital power, occasion, first, interruption of the depurating function of the skin, and, next, more or less fulness or congestion of, or



vascular determination to internal viscera or parts; and, in addition to this latter effect, and as a consequence of the suppression of the cutaneous function, the blood is loaded with these excrementitious elements which the healthy action of the skin eliminates. The conditions of the blood and of the circulation resulting from the changes and circumstances just enumerated, are such in many cases as kindle disease, either those now mentioned, or others of a slighter or severer nature. The practical importance of tracing the causes and the succession of effects is farther illustrated by the beneficial results which follow, when these causes are duly recognised, and the means of cure judiciously directed to the removal of the causes and the effects produced by them, and especially to the restoration of the impaired or suppressed function.

45. Still farther, the treatment of any of the diseases mentioned above (§ 43), when occasioned entirely or chiefly by suppressed cutaneous function, is legitimately based on the principle of restoring this function, and by its aid of removing injurious excrementitious elements from the blood, of soliciting the circulation to the external surface, and of diminishing the vascular determination to the seats of disease. The importance of attending to the depurating function of the skin is too frequently overlooked in the treatment of diseases, and in health, by all classes of the community. In the cases to which allusion has been here made, the means commonly resorted to, viz., warm and medicated baths and diaphoretics, suited to the nature of the disease and to the existing states of vital power and vascular action, are those usually indicated. But the appropriate use of these is to be acquired only by close observation and by an enlightened experience.

46. Not merely the restoration, but also the due preservation, of all the functions are most essential both to the removal of disease and to the continuance of health—more especially of the excreting functions; and those performed by the skin are not the lowest in the scale of importance. There are several practices connected with this function, in health and in disease, that have been too much neglected in modern times, although adopted among the ancients, and even by uncivilized communities at the present day; these are, anointing the surface of the body with oil; oleaginous frictions of the skin, especially after bathing; and the use of woollen or cotton coverings for several diseases, and while having recourse to diaphoretics. Frictions of the external surface with oil—with olive, palm, or other vegetable oils—promote the excreting functions of the skin, protect the surface from the injurious impression of physical, infectious, and morbid causes, and tend to preserve a due supply and distribution of blood to the extremities and external parts; and these effects are the more manifest the more constantly they are resorted to, in connexion with due ablution and bathing. The advantages also which result from lying in blankets or other woollen coverings, during the exhibition of diaphoretics, or when the depurating functions of the skin are being promoted, have been too generally overlooked in modern times, and deserve adoption in many diseases requiring an increase of these functions.

47. *B.* What has been said respecting the promotion of the *functions of the skin* applies like-

wise to the *other secreting and excreting functions*. Impairment or interruption of these, caused either by depressed vital manifestation, by lost or paralyzed power, or by mechanical obstruction, requires the same indications of cure as have been stated above (§ 39, *et seq.*), due regard being had, in the selection of our means, to the remote and the more immediate causes, and to existing and contingent pathological states. Of all the excreting or depurating functions, those performed by the *kidneys* are the most important, and most rapidly fatal when impaired, interrupted, or suppressed. But it is not merely impairment of this function as to the quantity of the excretion, but disorder of it as to the natural quality that also requires attention. Both conditions demand close observation, and furnish important indications for the treatment of disease, these indications being always derived from pathological states of most serious import, whether existing at the invasion, or in the progress, or towards the termination of disease. Mere deficiency of this excretion may require the use of means—of *diuretics*—suited to the vital conditions and to the states of vascular action; but the quality or chemical constitution of the urine, either independently of quantity, or in connexion with the abundance of the excretion, excites the most serious considerations, both as to the vital powers, and as to the states of the blood and circulation, and urgently requires powerful alternative or constitutional remedies, appropriate to existing pathological changes. Illustrations of the importance of recognising alterations not only in the quantity, but also in the constitution of the urinary excretion, and of founding rational intentions of cure on these alterations, are furnished in the articles on the BLOOD, on DISEASE, on DIABETES, on DROPSY, on the exanthematous and continued FEVERS, on diseases of the KIDNEYS, on the URINE, &c., to which I must refer the reader for the intentions and means of cure, when the functions of the kidneys are impaired, disordered, or interrupted, as to either the quantity or the quality of the excretion, and for the pathological causes and the consequences of such disorders of this excretion.

48. *C.* Impaired and interrupted excreting functions of the *intestines* and *liver* are next in importance to those of the kidneys. Many diseases originate in, or are characterized by, at an early stage of their progress, defective excreting action of the liver and bowels—in neglecting to promote these depurating functions. It is believed by many that the regular and daily evacuation of the bowels is quite sufficient; but this may not always be the case, as to either the fecal discharge, or the biliary secretion, or even as to both; and, although the former may appear frequent and abundant, the latter may be deficient, or altogether wanting. Hence the importance of observing accurately the appearances of the intestinal excretions, both in health and in disease, and of having recourse to such means as those appearances, the frequency of evacuation, and the associated states of disease will suggest. The several substances arranged as *purgatives* and *cathartics* should be suited to the peculiarities of each case, and be conjoined with others of the same class, or with such as may either correct or promote their operation. The general effect of purgatives is to leave the bowels more or less torpid after their operation has ceased. This will

often be prevented by conjoining a bitter tonic with the purgative, as a preparation of gentian, or of cinchona, with that of senna, or the sulphate of quina with aloe, the digestive canal being thereby strengthened as well as excited to increased action. These and similar combinations are often slow in operating, but they generally procure full and feculent evacuations, whether given in these simple states of combination, or with various alkaline or saline and stomachic additions. The various topics connected with torpor or inaction of the bowels, and with similar conditions of the liver—with impaired excreting functions of the liver and intestines—are fully discussed under the heads CÆCUM, COLIC and ILEUS, COLON, CONSTIPATION, INTESTINES, JAUNDICE, LIVER, RECTUM, &c., to which my limits oblige me to refer.

49. iii. To EQUALIZE THE VITAL AND VASCULAR ACTIONS THROUGHOUT THE FRAME is a practical object, desired in all diseases in which vital manifestation or vascular action is inordinately expressed in, or determined to, any particular structure or organ; or in which vital organs are congested or oppressed. The entire accomplishment of the two preceding objects generally also attains this. Yet states of disease sometimes present themselves, or circumstances occur, which induce the physician to prefer such means as more directly act in this way—which equalize the vital and vascular actions. Indeed, most of those means act also upon the secretions and excretions, more especially on those of the skin, as when warm baths, warm diaphoretics, pediluvia, &c., are prescribed; and the very agents which are given to restore vital power (§ 37, *et seq.*) have often the effect of equalizing the circulation and promoting the secretions. The means just now mentioned generally produce these complex effects, and others are often equally efficacious when employed in suitable forms and appropriately to pathological conditions. The acetate and other preparations of ammonia, the spirits of nitric ether, sulphur, warm or imperfectly conducting bed-clothes, warm diluents containing diffusive stimuli, &c., have similar effects. In cases where local determination, or increased flow of blood, occasions either oppression, or augmented function, or causes defect of function in parts from which the vital or vascular action is derived, not only those means, but others of a more strictly *revulsive* or *derivative* kind, are often required, especially local depletions, dry-cupping, blisters, rubefacients, and other agents, whose operation is more permanent or continued, as setons, issues, and similar modes of producing *counter-irritation*, or even suppuration and vascular discharges. (See *arts.* CONGESTION, and BLOOD, *local plethora* and *determinations* of, § 23, *et seq.*)

50. iv. To MODERATE EXCESSIVE SECRETION AND EXCRETION, OR TO RESTRAIN EXCESSIVE DISCHARGES, is an intention requiring much acumen in the physician to carry into safe execution. For the secretion or discharge may not be safely restrained or stopped. It may be a safety-valve opened by nature; and, when this is the case, it should not be closed without another having been substituted. When an attentive and a discriminating examination of the case shows that the discharge is productive of injurious effects, and requires either to be moderated or arrested; and when it is associated with other disorder, equally requiring to be removed, then such means as will

have this effect, consistently with the nature of the secretion or discharge and with the existing state of vascular action, should be employed. Whenever an excessive or unnatural discharge is attended by increased vascular action, attempts to moderate, and far less to arrest it, should not be prematurely or hastily made, or, if made, they ought to be directed chiefly to the states of vital and vascular action. A nasal or hæmorrhoidal discharge of blood may prevent an attack of apoplexy or palsy, or of congestion of the liver or lungs. Any chronic or prolonged discharge, if abruptly arrested, may be followed by congestion or inflammation of the affected organ, or of an adjoining part, or by effusion into a shut cavity. Thus I have seen the sudden arrest of a copious leucorrhœa followed in different cases by congestion of the uterus, by inflammation of this organ, or by peritonitis, followed by copious effusion of serum. The same effects may also follow sudden arrest of a too abundant catamenial discharge. Whatever merely suppresses the morbid effect while the pathological cause or condition is allowed to exist, may be productive of bad or even fatal results. A chronic diarrhœa, if suddenly suppressed, without due attention having been paid to the appearances of the evacuations, to existing pathological states, and to the excretions from the skin and kidneys, or without either establishing a free derivation from the bowels, or determining the circulation to the surface, &c., may be followed by enteritis or peritonitis, with or without serous effusion into the peritoneal cavity. Epistaxis, if prematurely arrested, especially in persons of middle or advanced ages, or full habit of body, may be followed by an apoplectic, paralytic, or epileptic seizure.

51. In all cases of excessive or prolonged discharge, the nature of the discharge, and the changes from which it proceeds, require attentive examination; and these particulars having been ascertained, the treatment should be directed chiefly to the changes producing it. Many inordinate discharges, especially when acute or severe, or of sudden occurrence, cure themselves. As soon as the irritating secretion or accumulated excretions are fully evacuated, the disorder ceases, as in many cases of autumnal cholera or diarrhœa, and there remains only a slight irritation, occasioned by the morbid secretions, which either subsides, or is soon removed by promoting the functions of the skin, or by correcting morbid tendencies in the blood and digestive functions, or by other suitable means. Recourse is often had, in cases of excessive discharge, to the more powerful *astringents* or *tonics*, without due regard to the circumstances just mentioned, or to others of equal importance connected with the source of mischief; and in consequence of the use of these, the disease is arrested, and the patient thinks himself cured. But, after a short time, a different disease is manifested, one often more serious than its antecedent, and proceeds without the cause of its occurrence being sometimes suspected. Hæmorrhoidal discharges, or fistula in ano, especially when chronic, have been followed at some period, more or less remote from their cure by these or other means, by congestion of the liver or lungs, by hepatitis or pneumonia, or by ascites, or by increase of pre-existing pulmonary disease, as is most frequently the case.

52. v. To MODERATE OR ALLAY EXISTING NERV-



ous EXCITEMENT, OR UNNATURAL FUNCTION, OR IRREGULAR ACTION, is an intention which the physician is often called upon to accomplish, in the present state of society. The successful attainment of this end depends greatly upon a due recognition of the remote causes, both mental and physical,—both moral and corporeal,—and of pre-existing and existing changes. The removal of the causes should always be preliminary to attempts to allay the excitement, whether nervous or vascular. When the former is associated with the latter, it should always be ascertained whether the nervous disorder is occasioned by increased vascular determination and action, or whether this latter results from the former. The nature of the exciting causes will often render the progression of morbid phenomena more or less manifest, and at the same time suggest the indications and means of cure. When the causes are of a mental or moral nature, when they have acted chiefly on the susceptibility and sensibility of the individual, and when they have produced suffering, pain, spasm, or irregular muscular actions, then those means which are classed as *sedatives*, or *anodynes*, or as *anæsthetics*, are usually required; but in many of such cases, *stimulants*, or *antispasmodics*, or even *tonics*, may also be necessary in conjunction with these, particularly when debility or exhaustion is present. If, however, the nervous excitement be attended by increased vascular action, or local determination, and more especially if this excitement be a consequence of the vascular disorder, those means which will allay this latter disorder should precede a recourse to those which act chiefly on the nervous system. In such cases, the *antiphlogistic* and other measures usually required are often aided by a judicious recourse to sedatives or anodynes, or even to anæsthetics or narcotics, especially when want of sleep, or excessive pain, or restlessness, or disordered muscular actions, characterize the affection. If the nervous excitement or disordered actions be traced to vascular determination to, or inflammatory action in, any portion of the cerebro-spinal centres or their membranes, or to a similar affection of the sexual organs, or to other inflammatory or febrile conditions, then the same indications and means of cure as are noticed in the following section (§ 52, 53) are necessary; and when they have been judiciously employed, they may then be followed by such of the medicines belonging to the above classes as are most appropriate to the existing states of nervous disorder.

53. vi. TO ALLAY OR MODERATE INCREASED VASCULAR ACTION, OR TO REMOVE VASCULAR DISORDER, is obviously required, especially when excessive; for we cannot with propriety leave this disorder to the unaided efforts of nature, unless it be slight, and the constitution and age of the patient be such as warrant confidence in the result. In order to allay increased vascular or febrile action, the physician should investigate its causes, its manifestations, the states of the secretions and excretions, the indications of vital power, and the conditions of the circulating fluids, as far as they are indicated by the pulse and by the hue of the surface, of the lips and tongue, and of the extremities. The diathesis of the malady—*sthenic* or *asthenic*, *dynamic* or *adynamic*—and other changes having been inferred from these sources, the *indications* and means of cure must be based upon them. If the vascular or

febrile excitement be *sthenic*—if it be characterized by a salutary reaction indicating neither impairment of organic nervous or vital power, nor contamination of the fluids—it should be allayed by the means classed as *antiphlogistic* and *febrifuge*, comprising blood-letting when the nature of the case requires it, in any form. In addition to these, substances which promote the secretions and excretions, which equalize the circulation when it is inordinately determined to particular organs, and which derive it from the affected organ to the external surface, are generally beneficial.

54. When the vascular or febrile excitement is *asthenic*—when vital power is exhausted or depressed, and the circulating fluids are contaminated or poisoned by infectious or injurious elements, or materials which irritate or excite the vascular system—then the *indications* of cure are: 1st. To support the vital energies; 2d. To promote the secreting and depurating functions; 3d. To correct or counteract the morbid states of the blood, by such medicines as may be absorbed into the circulation and produce these effects. The importance of this last indication is so great as to require for itself a distinct consideration (§ 54–56). Sufficient illustrations of this therapeutical principle are to be found in the articles Erysipelas, Fevers, Inflammations, and Pestilences, as well as under other heads, where a more special consideration is devoted to the several topics embraced by it.

55. vii. MORBID STATES OF THE BLOOD ARE TO BE CORRECTED OR COUNTERACTED BY MEANS WHICH OBSERVATION, SCIENCE, AND EXPERIENCE HAVE SHOWN TO BE SUITABLE TO THIS END.—Morbidity of conditions of the blood are so various as respects their causes, associations, and consequences, and are so little known, especially as regards their intimate natures and the slighter and subtler alterations, as frequently to render the *intentions* of cure imperfect, their accomplishment unsatisfactory, and the choice and operation of means doubtful. We know that the blood and the secretions and excretions are more or less contaminated in many maladies, and owing to many causes, 1st. That the contamination may take place slowly and insidiously, until, upon the action of some exciting or concurring cause, active disease is developed in the form of gout or rheumatism, or of scurvy, or of cutaneous affections; 2d. That it may result more rapidly and much more dangerously, owing to the absorption of morbid secretions or injurious materials into the blood, as in cases of purulent or sanious infection; and, 3d. That it may take place in a more rapid and specific manner, from a poisonous infection, producing its peculiar seminum, and propagating itself among all who are susceptible of its operation, even although in many cases the changes of the blood are neither considerable nor manifest. Morbid states of the blood are often the most evident and productive of the most dangerous results in the advanced stages of continued, remittent, exanthematous, and pestilential fevers; and these states, whether proceeding from foul, contaminating emanations, or other causes, or from a seminum of a specific nature, generating its like, affect both the secreted fluids and the solids, as shown when treating of the maladies produced by these causes. In the earlier stages and slighter cases of these diseases the changes of the blood are either very slight or not very

manifest; yet they nevertheless may be inferred to exist, inasmuch as the odour of the blood has been found different, and the same species of disease has been propagated by it.

56. Alterations of the blood are owing, as shown above and more fully in the articles BLOOD and DISEASE, and in those on the maladies in which these alterations are the greatest, to pre-existing morbid states, as in *scurvy*, *purpura*, *gout*, *rheumatism*, &c., or to the poisonous operation of infectious miasms emanating from a person similarly affected, as in the *pestilences*, the *exanthemata* and *malignant fevers*. We know that diseases which are most malignant and dangerous proceed from causes which remarkably depress the powers of life, and either suppress or disorder the depurating functions. Hence it may be inferred that, although the specific cause produces effects which are constant and specific, the resulting changes on the blood, especially when heightened by vital depression and impaired excretion, increase the malignancy of the malady, and often either occasion or hasten death. Now, to counteract these changes it becomes necessary, 1st. To support, promote, or restore vital power, as far as may be possible; 2d. To promote or restore the several excreting or depurating functions; and, 3d. To endeavour to correct or neutralize the morbid materials or elements formed or accumulated in the blood in the progress of, or antecedent to the full development of the malady. The *first* and the *second* of these intentions should be energetically carried out by the same or similar means to those adverted to above (§ 37-47)—by powerful *restoratives*, *tonics*, *stimulants*, &c.; and by stomachic, warm, and stimulating *emetics*, *diaphoretics*, *diuretics*, and *purgatives*, as may be most appropriate to the nature and state of the malady.

57. The *third indication* is that which more especially concerns the present subject. In certain diseases, in which the blood is very manifestly altered, the crasis or coagulating power of this fluid is increased, as in rheumatism and gout; while in others it is more or less impaired, as in scurvy, and in the malignant maladies alluded to above. In the former, *alteratives*, as the alkalies and the alkaline earths, especially magnesia, are required to neutralize the acids formed in the digestive canal, and even also in the blood; in the latter, the most powerful *stimulants*, *tonics*, and *antiseptics*, are necessary to the restoration of vital power, of the irritability of the contractile fibre, and of the crasis of the blood, and to the counteraction of the tendency to dissolution manifested by both fluids and solids—to the putridity contended for by the older writers. Of the several tonics and stimulants often required to fulfil the present indication, it is unnecessary to make mention at this place, as their use is fully shown under the diseases in which they are most appropriate. Of those which manifestly prevent or counteract a septic tendency, it may be remarked that, whatever supports or restores vital tone, has indirectly this tendency, but that there are substances which possess this property in a more direct manner—that are more strictly *antiseptic*—as hydrochloric acid, the chlorides and hydrochlorides, chlorinated waters or fluids, the chlorate of potash, the nitrate of potash, and several other alkaline salts, the terebinthines, balsams and camphor, creasote and tar, the cinchona and cascarilla barks, and the barks of several trees,

as the oak bark, willow bark, cedar bark, &c. In the more urgent or malignant cases, two or several of these may be conjoined or given with stimulants or tonics, as the decoctions or infusions of cinchona, or of serpentaria, or of arnica, with nitrate of potash, the carbonates of the alkalies, or the chlorate of potash, &c.

58. viii. TO ALLAY MORBID IRRITATION BY MEANS SUITED TO THE SEVERAL MANIFESTATIONS OF THIS CONDITION is often of urgent importance, and always is attended by great difficulty, inasmuch as the successful accomplishment of this object requires an accurate interpretation of the cause and essence of the morbid conditions or changes on which the irritation depends. The source of irritation may exist *locally* in any structure or tissue, or in a nervous ramification; or generally, in the blood and in the secreted and excreted fluids; or both *locally* and *generally*. When it is *local*, it may, according as it may affect the nerves or the blood-vessels at its source, either occasion spasm, convulsion, or severe or neuralgic pain, or produce alterations of structure, acute or chronic inflammation, and their several consequences. When it is *general*, febrile action, more or less violent or acute—more or less rapid in its course, and dangerous in its issue—is always present; the morbid, contaminating, or poisonous materials present in the blood and other fluids inordinately exciting vascular action, and at the same time depressing nervous or vital power. When the irritation commences locally and becomes general, then the secretions and nutrition of the part have been changed, and the morbid products have been absorbed into the circulation; and while the local irritation continues, the general irritation is superadded, occasioning an amount of febrile or general disturbance, varying with the nature and the amount of the materials absorbed, with the state of predisposition or diathesis, with the accumulation of these morbid matters in the blood, or with the rapidity of their elimination by the emunctories. Thus we have presented to our observation sources of local irritation and change, followed more or less rapidly by every grade of hectic or irritative fever; and not inereby these, but also by destructive changes consecutively produced in various organs, and more especially in those concerned in the elimination of the morbid matters from the blood. It is unnecessary to prosecute this subject any farther, as it is fully considered in the articles ABSCESS, ABSORPTION, HECTIC FEVER, and more fully and in its several relations, both pathologically and therapeutically in the article IRRITATION.

59. ix. TO ALTER, OR MORE COMPLETELY TO CHANGE MORBID STATES OF INDIVIDUAL TISSUES, OR OF THE STRUCTURES GENERALLY, may be considered an intention, the fulfilment of which is beyond our powers. I have shown, when treating of typhoid, adynamic, putro-adynamic, and malignant fevers, and *exanthematous* and *pestilential* maladies, and of *scurvy*, *syphilis*, &c., that we have every proof of alterations having taken place, in the advanced course of these diseases, not only in the fluids, but also in the vital cohesion and intimate organization of the more solid structures, and yet the vital powers may arrest these alterations, and gradually restore the healthy conditions. This great end can be attained only by the restorative efforts of nature—by the development of vital resistance to farther changes.



The constitutional powers often, by resisting farther alterations, accomplish this object without assistance, or merely by the aid of freer ventilation, of a purer air, or by the removal of injurious influences. But these powers are often assisted or developed by art—by means which restore or promote nervous or vital energy (§ 37, *et seq.*), and which moderate, correct, or remove morbid states of vascular action and alterations of the blood (52–56). The indications, as well as the means, are fully discussed in the treatment of the maladies just referred to, and of several chronic and cachectic diseases, especially *scrofula*, *rickets*, *scurvy*, *venereal diseases*, &c., to which I must refer the reader.

60. x. TO PREVENT OR REMOVE EXHAUSTION IN ITS VARIOUS FORMS is often required of the physician; but the nature of the previous excitement of which exhaustion is the consequence, should be ascertained, as the issue in many cases depends upon such excitement and its causes—whether mental or physical, moral or corporeal. The *indications* and the *agents* required to fulfil them are usually the same as have been already mentioned when treating of primary depression of nervous or vital power (§ 37). In this latter state of vital depression, although its cause may be more energetic and dangerous, yet the frame is more generally free from structural change of its tissues or organs, and reaction is more readily produced, than in the secondary vital depression, or exhaustion consequent upon mental, nervous, or vascular excitement. Whereas in the exhaustion thus produced, and more especially when following vascular disorder, alterations of the fluids, and even of the structures, are more likely to be present, and to complicate the vital depression, the structural change and the vital condition mutually increasing each other, often opposing the influence of the most judicious means of cure, and generally requiring the most energetic and the best-directed agents for their removal. The observations which I have offered on this subject when treating of *consecutive and complicated DEBILITY* (see *art. DEBILITY*, § 43, *et seq.*) will farther elucidate this subject.

61. xi. TO REMOVE CONGESTIONS OF BLOOD, ACCORDING TO THEIR SEATS, is one of the most important ends for which medical aid is required. To accomplish this end the most energetic agents are often necessary, especially when congestion is complicated with marked depression of organic nervous or vital power, or with oppression or suppression of the functions of the congested organ. In these circumstances the indications are, 1st. To *derive* the circulation from the seat of congestion to other external parts, by suitable *revulsants*, *rubefacients*, &c.; 2d. To equalize the distribution of blood throughout the frame, as advised above (§ 48); 3d. To support nervous or vital power, especially when inordinately depressed, by appropriate restoratives and stimulants; and, 4th. To restore the function of the congested organ. This subject is fully elucidated in the articles *CONGESTION* and *Blood* (§ 23–33).

62. xii. TO ENABLE ORGANIC NERVOUS OR VITAL POWER TO RESIST THE SLOW EXTENSION OF DISEASE, OR TO OVERCOME ITS MORE RAPID ADVANCES, AND TO THROW OFF PARASITICAL AND OTHER FORMATIONS, are ends which should be much more frequently proposed for successful attainment in practice, than they usually are. In many diseases, the efforts of nature are insuffi-

cient for these purposes, unless they be aided by suitable means. In malignant and pestilential maladies, these efforts are inadequate in the most severe cases, and should be reinforced by the most energetic means, especially by tonics, stimulants, antiseptics, and others already noticed. In diseases of a slower course, as *scrofula*, *scurvy*, and morbid formations of various kinds, tonics, conjoined with alteratives, are generally indicated; but very much depends upon the choice which is made of these means, which should be appropriate to the nature of individual cases. In most of the diseases which require the development of vital resistance, restorative agents ought to be directed both to the organic nervous system and to the blood—the energy of the former must be excited, and the crasis and purity of the latter must be preserved, or restored when deficient. In acute malignant maladies, the means which we possess are not always equal to the attainment of these ends. The vital energy may be too far depressed to be excited by medical agents, however well selected or directed; or, if it be excited, the reaction evinces features equally morbid and dangerous with those of the previous depression; for the states of the fluids, especially of the blood, conduce to structural changes as rapidly and certainly during vascular reaction as during vital depression. Hence it is generally insufficient merely to rouse the organic nervous, or vital power, unless we also procure a free elimination of morbid materials or elements from the blood by the emunctories, and, at the same time, prevent or correct alterations of this fluid by means appropriate to the inferred alteration, as advised above (§ 54–56).

63. In chronic, malignant, or structural maladies, the constitutional or vital power is impaired, and the blood is altered more or less, although not always visibly or demonstratively altered. As these maladies advance, especially cancer, tubercle, rickets, &c., the alteration of the blood becomes more and more evident, this fluid being thinner, poorer, or deficient in red globules. Hence the necessity of supporting the powers of life by means which will neither excite nor irritate them, and of preserving the healthy state of the blood by conjoining with those means such as will correct or prevent alterations of this fluid, and will, at the same time, promote the conversion of the colourless or chylous globules of the blood into red globules—will promote the processes of sanguification and nutrition—as chalybeates and cod-liver oil.

64. The same indications and means which are most successful in resisting the slow extension of organic or malignant maladies are also most advantageously employed in throwing off *parasitical animals* and *productions*, and in preventing their generation or formation. Although the expulsion of parasitical animals from the digestive canal requires a recourse to a class of remedies which act chiefly either on the canal itself, or on the *entozoa*, or on both, and are usually classed as *anthelmintics*; yet the reproduction of these animals is to be prevented only by means which develop organic nervous power, which improve the states of the blood, and of the secretions and excretions, which promote the digestive functions, and which insure a healthy nutrition. Of these means nutritious food, and pure air and pure water, are among the most important.

65. xiii. TO RESTORE, AS FAR AS MAY BE RE-

STORED, IMPAIRED OR LOST FUNCTION is to remove a very large proportion of the ailments to which our frames are liable. This being a great end of medical treatment, the course which may be pursued in attaining it should be duly considered, and with a strict reference in practice to the nature of individual cases. The means used for attaining this object should be directed either, 1st, to the sources of function; 2d, or to the organ itself, whose function is impaired or lost; 3d, or to the promotion of the general health and constitutional powers; and, 4th, or even to these conjointly, coætaneously, or consecutively. The great importance of attaining this object has been insisted upon when noticing the consequences of impairment of the excreting or depurating functions (§ 41, *et seq.*); but there are other functions than those of elimination which may be impaired, and the issue may be more or less serious. Most of the disorders comprised under the *first class*, in the arrangement which I have followed in this work, consist of impaired function or defective action; and in all these the indications now stated may be severally adopted.

66. The means of cure, when not acting directly on the surface or organ to which they are applied, and frequently even when directly affecting such surface or organ, act also, 1st, on the nervous systems, especially the organic; 2d, on the vascular system and on the blood, and, through either or both these channels, indirectly or consecutively on the organs or surfaces whose functions are defective. The deficient function may thus be restored by stimulating the nervous endowment of its appropriate organ at or near the origins of the nerves, or by exhibiting medicines which are inhibited or absorbed into the circulation, and either alter the constitution of the blood or excite the organ or surface whose functions are impaired by their presence in this fluid. The actions of the kidneys, for instance, may be increased by stimulating applications over the loins, or by various substances (*diuretics*), which, having passed into the circulation, and being carried by the blood to these organs, excite them to increased action, either while these substances are being eliminated by them, or while circulating through them before they are eliminated by some other emunctory. The secreting and excreting functions of the liver, of the digestive mucous surface, of the bronchial mucous surface, of the skin, &c., are augmented in similar ways by the several classes of medicines, which, owing to these respective predominant modes of action, according to their doses and combinations, have been called *chologogues*, *aperients* or *purgatives*, *expectorants*, *diaphoretics*, &c.

67. xiv. TO PALLIATE URGENT OR DISTRESSING SYMPTOMS, EITHER WHEN THEY CANNOT BE REMOVED, OR IN ORDER TO OBTAIN TIME TO ASCERTAIN THEIR SOURCES AND FOR THE REMOVAL OF THESE SOURCES, OR PATHOLOGICAL CAUSES, is an intention which the physician may propose to himself either at the outset or invasion of disease, or at its ultimate or fatal close, even in cases of little or no danger, and in those of the greatest danger. It is obvious that the means, in these very different circumstances, should have strict reference to the nature and tendency of the phenomenon or symptom by which the patient is distressed. If it be alarming sinking, stimulants and restoratives are required; if violent or painful spasm, antispasmodics, anodynes, sedatives,

&c., according to the seat, antecedents and concomitants of the *spasm*; if it be extreme pain, sedatives, narcotics, and other means advised under the head of *neuralgic affections*; if to remove alarm or mental perturbation, the combination of restoratives or stimulants with sedatives or narcotics; making always such selection of means as experience, derived from enlightened and close observation, will suggest and will point out as appropriate to the features and complications of particular cases. A judicious application and combination of means, in the most extreme cases, and when no hopes of prolonging life can be entertained, will, in conjunction with the solace of religion, render dissolution as calm and peaceful as the accession of the natural sleep.

68. xv. TO EXCITE AND DIRECT THE MENTAL EMOTIONS, SO AS TO PREVENT THE EXTENSION OR AGGRAVATION OF DISEASE AND TO INSURE OR HASTEN RECOVERY, is one of the highest aims of medical science, and is often conducive both to the prevention and to the removal of disease. *Fear*, *anxiety*, and all the *depressing emotions* not only predispose the frame to the invasion of disease, but also impart to disease an asthenic or low character, and conduce to unfavourable results; whereas, *confidence*, *hope*, and all the elevating emotions support the powers of life, reinforce the vital resistance, and impart a great share of the efficacy exerted by the means of cure. Not only ought all mental and moral circumstances which either have caused or have influenced the progress of disease, to be removed as far as possible, but the mind of the patient should be inspired with hopeful sentiments, and by the confident bearing and expression of the physician. There are numerous circumstances, also, directly affecting the mind, and indirectly influencing it through the media of the senses, which aid the treatment of disease, especially of diseases which are chronic, or which impair the mental energies. The chief of these are, agreeable mental occupations; the solaces resulting from the performance of duties and from conferring benefits on the deserving; the contemplation of the numerous wonders and beauties of nature; the enjoyment of musical and harmonious sounds, of the appeals of reason and eloquence, and of instructive and interesting society; the affectionate regards of relations and friends, and rational amusements and relaxation. In addition to these, changes of scene, of air and locality, or more complete change of climate, and travelling, with all the circumstances which render travelling mentally and bodily healthful, should not be overlooked.

69. Having thus endeavoured to point out, for the instruction of the inexperienced, and as suggestions to others who wish to review the stores of information with which observation may have enriched their minds, what I consider to be, 1st. *The fundamental principles of medical practice or Therapeutics*; 2d. *The more general principles*; and, 3d. *The special principles of Therapeutics*, I shall conclude with an ARRANGEMENT of the modes of employing, and of the operation of medicines. When treating of Poisons, I gave a full exposition of the modes of exhibiting, the channels of operation, and the physiological and pathological effects of poisons. It is obvious that, as many poisons are employed, although in very different states and doses, as very important means of cure, the classification of these will necessarily approach to that of *Therapeutic Agents*; and



hence several resemblances will be observed between the arrangement given in that article and the classification which I am now about to submit to my readers.

#### THERAPEUTICAL AGENTS, CLASSIFICATION OF, ACCORDING TO THEIR MODES OF ACTION AND EFFECTS.

The classification of medical agents is a matter of great difficulty, and hence numerous excellent attempts have been made to overcome the difficulty by many of the more recent writers on Therapeutics. My limits will not admit of my noticing these in the manner which they deserve; but the reader who is desirous of becoming acquainted with them, will find them in the works of their respective authors enumerated in the BIBLIOGRAPHY. The arrangement I am now about to adopt may not be superior to several of those which have been already published; but, as it is in accordance with the views exhibited in this work, more especially in this article and in that on POISONS, I have adduced it at this place.

#### I. PSYCHICAL OR MENTAL REMEDIAL INFLUENCES.

##### i. THOSE FURNISHED THROUGH THE MEDIA OF THE SENSES.—*The sensual affections of mind—External affections of mind.*

A. Affections of mind induced by pleasant odours and tastes.

B. States of mind induced by Vision—by the sight of the beautiful in nature and art, of endeared objects, especially after absence or dangers, &c.

C. Sounds and Noises, of various kinds, especially such as are monotonous, often favour the occurrence of sleep. Appeals of reason and eloquence. Musical and harmonious sounds, vocal and instrumental, in due variety or combination. The society of relations and friends. Rational amusements, &c.

D. The Sense of Touch.—Frictions—Rubbing—Shampooing—Flagellation, &c.

##### ii. THE INTELLECTUAL AFFECTIONS OF MIND.

A. A due and moderate exercise of the powers of perception—conception—memory—or powers of consciousness.

B. A well-directed exertion of imagination—of reason and judgment—and of other active intellectual states.

C. A due exercise of the powers of reflection—of right and wrong—of causation and truth—of duty—immortality, &c.—of rational incentives to duty.

##### iii. THE MORAL AFFECTIONS OF MIND.

A. Instinctive or simple moral Affections.—Hope—Confidence—Anticipation of pleasures and happiness—Love—Desire of approbation, of knowledge, of power, &c.

B. Rational Emotions of Mind.—The duties which the individual owes himself and those connected with him—Religious obligations—Agreeable mental pursuits—Useful occupations—Rational amusements, &c.

#### II. HYGIENIC AGENTS AND INFLUENCES.

##### i. FOOD AND DRINK.

A. Food.—a. Vegetable and farinaceous aliments.—b. Animal food.—c. Mixed food.—d. Regulated diet or dietetic regimen during and after disease.

B. Drinks.—a. Distilled and spring waters.—b. Mineral waters.—c. Beverages, wines and liquors.—d. Prescribed forms or combinations of these.

C. Condiments.—Spices, Sauces, &c.

##### ii. AIR AND LOCALITY.

A. Purity of Air, in connexion with locality with the soil and with its productions.

B. Light and Sunshine.

a. Influence of light.

b. Effect of the sun's rays—the chemical—the electrical or magnetic—the colouring, &c.

c. Of the absence of either or all these.

C. The temperature, dryness, or humidity of the Air.—Dependence of these on latitude, on altitude, on the soil, on the productions of the soil, on position or locality.

##### iii. OF EXERCISE.

A. In-door Exercise.—a. Occupations and employments.

B. Exercise in the open Air.—a. Walking.—b. Riding.—c. Active and athletic exercises.

##### iv. CLIMATE AND CHANGE OF CLIMATE (see art. CLIMATE).

A. Climate of Great Britain and Ireland.

B. Foreign Climate.—a. European.—b. Asiatic.—c. African.—d. American.—e. Australasian and Polynesian.

C. Changes of Climates.

a. Effects of change on different races or colours.

b. Effects of change on disease.

D. Travelling and Voyaging.

a. Travelling by railroads or otherwise.

b. In sailing or in steam vessels.

c. The several effects of these modes.

#### III. MEDICINAL AGENTS—MEDICINES APPLIED TO THE FRAME.

##### i. MODES IN WHICH MEDICINES ARE EMPLOYED OR EXHIBITED.

A. To the respiratory Organs.—Inhaled or inspired.

B. Taken into the Stomach.—In various forms and combinations, without or with the food.

C. Injected or introduced into the Bowels.—Enemata and suppositories.

D. Introduced or injected into the sexual and urinary Organs.

a. Into the vagina.

b. Into the urethra and urinary bladder, &c.

E. Applied externally.

a. To the general surface, or part of the surface.

b. To a part of the surface after the removal of the cuticle.—Endermic medication.

F. Injected into the Blood-vessels.

##### ii. THE ACTION OF MEDICINES.

A. Locally and Primarily.—On the tissues to which they are applied.

B. Remotely and Consecutively.—Sympathetically, and by the blood.

C. Both Locally and Remotely.

D. Chemically.—By altering the chemical constitution of fluids and solids.

E. Mechanically and Surgically.

F. Vitally.—By altering the states of function or vital manifestation.

G. Organically.—By affecting the structure or the intimate organization of parts.

##### iii. THE MODES IN WHICH, AND THE CHANNELS THROUGH WHICH MEDICINES ACT.

A. Primarily and Locally.

a. On the nerves of the part.

b. On the capillaries of the part, and on the contained fluids.

c. On the irritability of the tissues.

d. On the organization and structures of the part.

B. *Sympathetically or through the media of the organic and the animal systems of nerves.*

C. *By imbibition, or endosmose and absorption.*—Through the medium of the circulating fluids, especially the blood.

#### iv. THE GENERAL EFFECTS OF MEDICINES.

A. *Depressing nervous influence and vascular action.*—Lowering vital power—Sedatives or depressants.

B. *Stimulating nervous influence, either organic or animal.*—Stimulants.

C. *Exciting vascular action.*—Phlogistics.

D. *Exciting both nervous influence and vascular action.*—Excitants.

E. *Exhausting nervous influence or vital energy.*—Exhaustants.

F. *Altering, otherwise than dynamically, nervous influence and vital power.*—Alterants.

G. *Changing the sensible appearances and the constitution of the blood.*—Hæmapharmaca.—Blood-remedies.

H. *Producing a succession of two or more of these effects.*

CLASSIFICATION OF MEDICINES ACCORDING TO THEIR SPECIAL OPERATION.—THE PHYSIOLOGICAL ACTION OF MEDICINES.—*Remedial Agents according to their special effects.*

CLASS I. ABSTRACTING THE ANIMAL HEAT, OR DEPRESSING THE CALORIFIC PROCESS IN A PART OR THROUGHOUT THE BODY.—REFRIGERANTS.

i. *External Refrigerants.*—Thin Clothing—Cool or cold Air—Cold Baths—Cold affusions or Douche—Cold sponging—Shower-baths—Cold or evaporating Lotions—Ice applied externally—Cold Solutions.

ii. *Internal Refrigerants.*

a. *Dietetic Refrigerants.*—Lemons, Oranges, Mulberries, Strawberries, Pomegranates, confectioned Ices, Tamarinds, common Sorrel, Lettuce, Whey, Buttermilk, &c.

b. *Medicinal Refrigerants.*—Cold fluids—Ice and iced waters—Solutions of Hydrochlorate of Ammonia—of Nitrate of Potash—of Nitrate of Soda—of most of the alkaline neutral salts—Citric Acid and the citrates—Tartaric Acid and the tartrates—Acetic Acid—Acetate of Ammonia, &c.

CLASS II. DEPRESSING, SUPPRESSING, OR BENUMBING SENSIBILITY, OR PARALYZING INVOLUNTARY AND VOLUNTARY MOTIONS.—SEDATIVES.

i. *Mental Sedatives.*—Grief, Anxiety, Fear, Terror, Regret, Sadness, Disappointment, Loss of fortune, reputation, friends, &c., Home-sickness, &c.

ii. *Physical or Medicinal Sedatives.*—Humid states of the atmosphere, and whatever favours the transfer or eduction of electricity from the frame. The preceding agents (CLASS I.) when long or largely employed, relatively to the state of vital power or resistance, the preparations of Lead and Saturnine Solutions, Hydrocyanic Acid, Laurel water, volatile oil of Bitter Almonds, Cyanide of Potassium; Tobacco and its several preparations, especially the oil; the infusion, decoction, and smoke of Tobacco, Nicotina, Sulphuretted Hydrogen gas, Carburetted Hydrogen gas, Carbonic Acid gas, Chloroform and Ethers, especially when inhaled; excessive blood-letting, or vascular depletion causing syncope.

CLASS III. SOFTENING, LIQUEFYING, OR DISSOLVING ONE OR MORE OF THE TISSUES OR TEXTURES.—DISSOLVANTS.

The Alkalies and alkaline sub-carbonates—Antimonial Salts—The Oxalates and Oxalic Acid—Boracic Acid—Borate of Soda—Putrid animal matters, &c.

CLASS IV. ASTRINGING THE TISSUES, AND INCREASING THE TONE OR VITAL COHESION OF STRUCTURES.—ASTRINGENTS AND TONICS.—ANTISEPTICS.

i. *Vegetable Astringents.*—Oak bark, Nutgalls, Catechu, Kino, Uva-Ursi, Rhatany—Tornentilla, Pomegranate bark or rind, Logwood, Bistort, Matico.

ii. *Bitter Tonics.*—Quassia, Simarouba, Gentian, Calumba, Cheirayta, Common Centaury, [Gold Thread,] Buckbean, &c.

iii. *Astringent and Bitter Tonics.*—The Cinchona barks, Spigelia\*—Elm bark, Willow bark.

iv. *Aromatic Tonics.*—Cascarilla bark, Wormwood, Elecampane, Canella bark, Angustura bark, Hops, Cedar bark, [Chamomile.]

v. *Acid Tonics.*—a. *Mineral Acids:* Sulphuric, Nitric, and Hydrochloric Acids; Alum.—b. *Vegetable Acids:* Formic Acid, Gallic Acid, Catechuic Acid.

vi. *Alkaloid Tonics.*—Quina, Cinchonia, Salicine, Quassine, [Strychnia.]

vii. *Metallic Tonics.*—The salts, oxides, and carbonates of Iron, of Silver, Zinc, [Copper. Bismuth, Arsenic, &c.] The bichloride of Mercury in minute doses.

CLASS V. IRRITATING TISSUES, STRUCTURES, AND ORGANS.—IRRITANTS.—CORRODANTS.

i. *The mineral salts*, in large doses or in quantities above those producing a tonic or astringent action. The chlorides and chlorates of the alkalies. The metallic salts, as the sulphates and chlorides of Zinc, Copper, &c. The Nitrate of Silver, salts of Antimony, &c. Lime unslacked.

ii. *Euphorbia*, *Croton Tiglium*, *Savine*, *Rhus Toxicodendron*, *Mezercon*, *Pyrethrum*, and numerous acid or irritant *vegetable productions* and vegetable oils. (See art. *Poisons*, § 234–248.)

iii. *Animal Irritants*, as *Phosphorus*, *Cantharides*, and the scales of many insects—Morbid Animal secretions and poisons.

iv. *Physical and Mechanical Irritants.*—Urtication, Heated Air, Hot Water, Heated Metal. The Actual Caution, Setons, Issues, &c.

CLASS VI. RELAXING THE TISSUES, OR LOWERING THE IRRITABILITY OF STRUCTURES.—EMOLLIENTS—DEMULCENTS.

i. *Aqueous Emollients.*—Water at ranges of temperature between 65° and 170°—Aqueous Vapour, Medicated Aqueous Vapours.

ii. *Mucilaginous Emollients*—*Demulcents.*—Prepared from Gum Arabic, Tragacanth, Mallows, Marsh-mallows, Colt's-foot, Linseed, Sweet Almonds, &c.

iii. *Amylaceous Emollients.*—Farinaceous and starchy substances—Flour, Oatmeal, Barley, Sago, Arrow-root, Starch, Tapioca, &c.

iv. *Saccharine Emollients.*—Honey, Liquorice, Sugar of Milk, Beet-root.

v. *Albuminous Emollients.*—White and yolk of Eggs, Milk, Saliva.

vi. *Gelatinous Emollients.*—Gelatin in its pure

\* [Spigelia can hardly be ranked among tonics.—ED.]



or other forms, or as obtained from Isinglass, Hartshorn shavings, Tendons, Bones.

- vii. *Oleaginous Emollients*.—Animal fats, Butter, Spermaceti, Vegetable oils, especially Palm, Olive, Almond, Linseed, and other oils.

CLASS VII. STIMULATING, OR EXCITING THE VITAL MANIFESTATION OF A TISSUE OR ORGAN.—STIMULANTS—EXCITANTS.

*Stimulants* are related, on the one hand, with *Tonics* and *Irritants*, especially when the latter are given in small doses; and with *Sudorifics*, *Evacuants*, and *Diuretics*, on the other. They act primarily on the organic nervous, and on the Cerebro-spinal nervous Systems, according to the manner of using them.

- i. *Condimental and Aromatic Stimulants*.—Garlic, Leeks, Onions, Mustard, Horseradish, Scurvy-grass, Water-cresses, and other anti-scorbutic plants. The hot or warm spices—Ginger, Pepper, Capsicum, Cloves, Cinnamon, Canella, Ginseng, &c.

- ii. *Resinous and Balsamic Stimulants*.—Guaia-cum, Mastic, Elemi, the Turpentine, Copaiva, Opobalsum, Benzoin, Styrax, Tolu, Peruvian Balsam.

- iii. *Gum Resins*.—Asafetida, Ammoniacum, Galbanum, Sagapenum, Opoponax, Myrrh, Olibanum.

- iv. *Camphoraceous Stimulants*.—Camphor, Arnica, Serpentina, Contrajerva, Valerian, Cajuputi Oil.

- v. *Ammoniacal and other Stimulants*.—The preparations and salts of Ammonia. The empyreumatic oils, Phosphorus, Musk, Sumbul, Castor.

- vi. *Alcoholic Stimulants*.—The several alcoholic liquors. Wine, Alcohol, the Ethers. Malt and fermented liquors.

- vii. *Calorific and Electrical Stimulants*.—A temperature exceeding 60°. The sun's rays, especially as imparting light, heat, and electrical influence. Dry heat above 60° and not exceeding 120°. The electro-motive or the electro-magnetic current.

CLASS VIII. AUGMENTING THE SECRETIONS AND EXCRETIONS.—EVACUANTS—DEPURANTS.

Substances which produce this effect, generally first excite the organic nerves, supplying the parts on which they act, and consecutively attain the end which chiefly characterizes them. In larger doses, they not only stimulate the functions to which they are directed, but often also irritate more or less remarkably the tissues to which they are applied. They are thus closely related to *Stimulants*, and to *Irritants* and *Alterants*.

- i. *Increasing the Secretions from the Schneiderian membrane*.—*Errhines*.

- a. *Aromatic Errhines*.—Lavender, Marjoram, Sage, Spices, &c., reduced to powder.

- b. *Acro-sedative Errhines*.—Tobacco, Euphorbium, Veratrum, Asarum, &c.

- ii. *Augmenting the salivary Secretion*.—*Sialogogues*.

- a. *Local Sialogogues*.—*Masticatories*.—Mezereon, Pellitory of Spain, Horseradish, Ginger, Betel Nuts, Betel Leaf, Mustard, Tobacco, &c.

- b. *Remote or contingent Sialogogues*.—Acting through the medium of the circulation—preparations of Mercury, of Iodine, of Gold. Foxglove, Hydrocyanic Acid, Nitric Acid, &c., in rare instances.

- iii. *Provoking the discharge of the contents of the Stomach, and increasing the secretions from its villous surface*.—*Emetics*.—*Vomits*.—The biliary and pancreatic secretions are also frequently increased by the operation of emetics.

- a. *Vegetable Emetics*.—Ipecacuanha, Tobacco, Mustard, and other vegetable irritants, taken in large doses.

- b. *Mineral Emetics*.—Emetic Tartar, Sulphate of Zinc, Sulphate of Copper.

Of these Tobacco and Emetic Tartar are the most depressing: often so depressing as to be injurious or even poisonous. They ought never to be given in states of vital exhaustion or Narcotism.

- iv. *Producing Alvine Evacuations*.—*Purgatives*.—*Cathartics*.

- a. *Laxatives or Lenitives, Mild Aperients*.—Manna, Cassia pulp, Tamarinds, Prunes, Almond and Olive Oils, Magnesia, Bitartrate of Potash.

- b. *Cooling Antiphlogistic or Saline Purgatives*.—The Sulphates of Soda, Potash and Magnesia, Citrate of Magnesia, Tartrate of Potash.

- c. *The milder Purgatives*.—Sulphur, Senna, Rhubarb, Aloes, Castor Oil.

- d. *Cholagogue Purgatives, Alterative or Mercurial Purgatives*.—Calomel and other preparations of Mercury. Bitartrate of Potash in large doses.

- e. *Drastic or Acid Purgatives*.—*Hydragogue Cathartics*.—Jalap, Scammony, Gamboge, Black Hellebore, Colocynthis, Sulphate of Potash, Elaterium, Croton Oil.

- v. *Promoting the Excretion of Urine*.—*Diuretics*.—Acting chiefly through the medium of the Blood.

- a. *Acid and Saline Diuretics*.—The dilute Mineral and Vegetable Acids, the Carbonates of the Alkalies, the Vegetable Salts of the Alkalies, especially the Bitartrate and the Acetate of Potash, the Citrates of Soda, Potash, and Magnesia, the Nitrates of Potash and Soda.

- b. *Irritant Diuretics*.—Squills, Common Broom, Cantharides, Juniper, Turpentine, and Balsams.

- c. *Sedative or Depressing Diuretics*.—Digitalis, Colchicum, Tobacco.

- d. *Alcoholic and Etherial or Stimulant Diuretics*.—Dilute Spirit, Gin, Ale, the Nitric and other Ethers.

- vi. *Promoting Cutaneous Transpiration*.—*Diaphoretics*.

- a. *Diluent or Aqueous Diaphoretics*.—Warm fluids, Whey, Tea, Gruel, Broths, &c.

- b. *Saline, Antimonial or Cooling Diaphoretics*.—Acetate, Citrate, and Carbonate of Ammonia; Alkaline Citrates and Tartrates, Nitrate of Potash, Sulphur, Sal Ammoniac, the preparations of Antimony, weak solutions of Camphor.

- c. *Opiate Diaphoretics*.—Opium, Morphia, and their preparations, conjoined chiefly with Ipecacuanha, or with one or more of the foregoing, or with the Ethers.

- d. *Warm or Stimulating Diaphoretics*.—The preparations of Ammonia, Sassafras, Mezereon, Guaiacum, Camphor in full doses, Spirits or Alcoholic fluids, the Etherial preparations, Coffee.

vii. *Promoting the discharge from the Bronchi and Trachea.*—*Expectorants.*

a. *Vapours inhaled into the Lungs.*—The dilute vapour of Turpentine, or of Tar, or of Creasote, or of Camphor, or of Iodine, or of Benzoic or Acetic Acid; the smoke of Stramonium, or of Tobacco.

b. *Stimulating Expectorants, acting chiefly by the Organic Nervous System and the Blood.*—Camphor, the Gums and Gums-resins, [Olco-resins], the Balsams, Ammoniacum, Squills, Senega, Garlic, Onions, Sulphur.

c. *Nauseating or Emetic Expectorants.*—*Depressing Expectorants.*—Preparations of Antimony, of Ipecacuanha, Lobelia inflata, Tobacco, [Alum, Turpeth Mineral].

viii. *Exciting the Catamenial Discharge.*—*Emmenagogues.*

a. *Purgative Emmenagogues.*—Acting chiefly on the lower Bowels. Aloes, Gamboge, Colocynth, Calomel, Black Hellebore.

b. *Diuretic and Stimulating Emmenagogues.*—Savine, Juniper, Ruc, Cantharides, the fetid Gums, Castor, the preparations of Iron, Myrrh, &c.

c. *Acting more directly on the Uterus.*—More frequently restraining hæmorrhage from the uterus by exciting contractions of its parietes, than favouring a discharge from it. Ergot of Rye, Biborate of Soda, Oil of Turpentine, [Black Cohosh].

CLASS IX. EXCITING THE CEREBRO-SPINAL NERVOUS SYSTEM.—NERVOUS AND MUSCULAR EXCITANTS.—Nux Vomica and Strychnia, and plants containing Strychnia, Brucia Antidysenterica, Cocculus Indicus, [Rhus toxicodendron], Coriaria Myrtifolia, &c., &c.

CLASS X. IRRITATING AND DEPRESSING MEDICINES—IRRITATING AND PARALYZING.—ACRO-SEDATIVES.—Substances which irritate the tissues, and depress organic nervous or vital power.

i. *Mineral Acro-Sedatives.*—Arsenic and its compounds. Tartar Emetic and Antimonial preparations. Cupreous substances: Baryta and its Salts; Sulphate of Potash in large doses, Oxalate of Potash, Chromate of Potash, the Sulphurets, Tartaric Acid.

ii. *Vegetable Acro-Sedatives.*—Aconite and its preparations. Colchicum autumnale, Hellebore and its species, Digitalis, Indian and Virginian Tobacco, Castor Seeds, Jatropha Manihot, Veratria, &c.

CLASS XI. IRRITATING AND ALTERATIVE—ACRO-ALTERANT MEDICINES.

i. *Mineral Acro-Alterants.*—Chlorine and the Chlorides. Chlorate of Potash; the Hypochlorides. Iodine and its compounds, Iodide of Iron, of Mercury, of Arsenic, Bromine, Mercury and its preparations, Arsenic, &c. The Alkalies.

ii. *Vegetable Acro-Alterants.*—Iodine, Bromine, the Thorn-apple, Conium, Belladonna, Benzoin, Camphor, Turpentine and the Terebinthines and Balsams, Tar, and Tar Water.

CLASS XII. ALTERING VITAL ACTIONS.—ALTERANTS—DEOBSTRUENTS.—Changing the state of the secretions, and of the nutrition of certain textures and organs, according to the substance employed and the mode of employment.

i. *Mineral and Metallic Alterants.*—Sulphur, Magnesia, the Carbonates of the Alkalies, the

preparations of Iron, of Mercury, of Iodine, of Arsenic, &c.

ii. *Vegetable Alterants.*—Taraxacum, Carbon, Sarsaparilla, Sassafras, Citric Acid, and Citrates; the preparations of Iodine, especially the Iodides.

iii. *Animal Alterants.*—Cod and Torsk Liver Oil. Ox-gall.

CLASS XIII. STUPEFYING OR NARCOTIZING THE NERVOUS SYSTEMS.—NARCOTICS.—HYPNOTICS.—ANÆSTHETICS.

i. *Gases and Vapours, especially when inhaled.*—Carbonic Acid Gas, Carburetted Hydrogen Gas, Sulphuretted Hydrogen. The vapour of Chloroform, or of the Ethers, or of Alcohol.

ii. *Vegetable Narcotics.*—Opium, Morphia, and their preparations. The smoke of Opium, Henbane, Cicuta virosa, Poppy, Hops, Hemlock-dropwort, Lollium temulentum, Cannabis Indica (an uncertain narcotic).

CLASS XIV. AFFECTING THE STATES OF THE BLOOD AND CAPILLARY BLOOD-VESSELS.—HÆMATO-CATHARTICA.—HÆMOPHARMACA.

i. *Altering the Appearance and Condition of the Blood.*—*Blood-medicines.*—The Alkaline Carbonates, Magnesia and its Citrate, the Nitrate, Citrate, and Chloride of Potash; the Chlorate of Potash; the Nitrate, Citrate, and Chloride of Soda; Chloride of Sodium; Alkaline Solutions, Sulphur, weak or dilute Acids, Chlorine and Chlorinated solutions and waters, Nitrohydrochloric acids, Citric Acid. The preparations of Iron; Chalybeate and Mineral springs and artificial Mineral waters.

ii. *Constringing the Capillary Blood-vessels, and altering the state of the Blood circulating in them.*—The Mineral acids, the diacetate of Lead, the Spirits of Turpentine, the Ergot of Rye, the Gallic and Tannic Acids, Matico, Creasote.

[It is now admitted that many medicinal substances enter the blood, and produce important changes in its physical and vital condition, upon the tissues generally, and especially the excreting organs. Of the changes effected in the blood itself we are as yet mainly ignorant, yet we may not doubt that physical, chemical, and vital effects are produced in the corpuscles, or that the composition of the plasma is influenced in an important manner. The action of medicines and poisons is the same. Some moderate the course of the blood by more or less coagulating the serum, as nitric acid, alcohol, creasote, the metallic salts, &c. Some liquefy the blood and accelerate its course, as the acetate of ammonia, nitrate and probably all the salts of potash, the iodides, bromides, &c. Some modify the chemical reactions which take place in this liquid, as by seizing its oxygen, thus preventing hæmotosis, and producing chlorosis, anæmia, &c., as sulphuretted hydrogen and hydrocyanic acid; while, lastly, some produce abnormal chemical reactions in it, as the poison of rabid animals, serpents, &c. (*Mialhe*.) *Diluents* lower the specific gravity of the plasma, by increasing the proportion of its fluid parts. *Insipissants* produce the opposite effect. *Spanæmies* are agents, which, by long-continued use, impoverish the blood, as iodine, bromine, most of the metals (iron excepted), acids, alkalies, and earthy salts. Mercury and antimony possess this property, perhaps, in the greatest degree, acting as resolvers and liquefacients. *Arsenic* (which, from veterinary practice, has recently begun to



be used by American females to improve their skin and complexion, and impart a healthy look) would seem to act like iron, as a general alterative and tonic. *Hæmatinics* augment the amount of *hæmatin* in the blood, as *iron*.—See *Pereira*, vol. i., p. 226.]

CLASS XV. INDUCING CONTRACTIONS OF THE UTERUS.—PARTURIFIANTS.—PARTURIENTS.

—Ergot of Rye, Biborate of Soda, Spirits of Turpentine, in full doses or in enemata.

CLASS XVI. EXPELLING WORMS AND PREVENTING THE FORMATION OF WORMS.—ANTHELMINTICS.

- i. *Mechanical Anthelmintics*.—Filings of Iron, Granular Tin, Cowage, &c., followed by drastic purgatives.
- ii. *True Anthelmintics*.—Substances poisonous to parasitic animals.—Oil of Turpentine, Tar and Tar-water, Creasote, Animal oil or Dippe's oil; Chenopodium or Worm-seed, or its oil; Spigelia or Pink-root, Male fern, bark of Pomegranate root, bark of the root of Azedarac, Fucus helminthocorton, Corsican Wormweed, Tanacetum vulgare, common Salt, Kousoo.
- iii. *Purgative Anthelmintics*.—Calomel, Jalap, Scammony, Castor oil, Aloes, Hellebore.—Most efficacious when following the exhibition of the preceding.
- iv. *Medicines preventing the formation of Worms*.—Asafœtida, Myrrh, the preparations of Iron, Tar-water, Charcoal; Quassia, and bitter tonics.

CLASS XVII. PREVENTING OR CORRECTING A TENDENCY TO A DISSOLUTION OF THE TISSUES, OR TO A SOLUTION OF THE VITAL COHESION OF TEXTURES.—ANTISEPTICS.

The substances classed as *Astringents* and *Tonics* (Class IV.) are also more or less *Antiseptic*.

- i. *Mineral Antiseptics*.—The Chlorides of the alkalies, the Hypo-chlorides, Chlorine and Chlorinated fluids, the Chlorides of the metals and of the metalloids, the Tincture of the Hydrochloride of Iron, the Chloride of Zinc, the Mineral acids.
- ii. *Vegetable Antiseptics*.—Tar, Turpentine, Tar-water, Creasote, Charcoal, Camphor, the astringent and tonic Barks, Quina, Beeberrine, Tannin, Gallic, and Gallie Acids.

CLASS XVIII. NEUTRALIZING ACIDITY, REMOVING OR PREVENTING ANTACIDS.—SORBEFACIENTS.

- i. *Direct Antacids*.—The Alkalies and Alkaline Carbonates, the Carbonates of Iron, of Zinc, of Bismuth, Magnesia, Lime, and their Carbonates, Lime-water.
- ii. *Indirect Antacids*.—The Mineral acids, Tonic and Bitter infusions, Tonic Mineral salts, Sulphate of Quina, &c.

CLASS XIX. DESTROYING, OR REMOVING, OR COUNTERACTING AN INFECTIOUS SEMINUM OR Miasmata.—DISINFECTANTS.

- i. *Destructives*.—Heated air from 180° to 254°.—This is the only real disinfectant.\* All oth-

er substances which have been extolled as disinfectants act merely by removing offensive odours, or by fortifying persons exposed to infection against its invasion. The medicines enumerated in CLASSES IV., VII., and XVII., by increasing the vital tone and cohesion of the tissues, enable the body to present a greater or less resistance to the impressions made by infectious miasmas, and in this they are aided by mental excitement and confidence, and by the several stimulants and tonics, when these are so employed as not to be productive of consecutive exhaustion.

- ii. *Deodorizers*.—Charcoal absorbs all putrescent effluvia. Lime absorbs carbonic acid, sulphuretted hydrogen, &c. Nitrous fumes destroy many putrescent odours, and decompose, by their oxidizing power, several of the gases evolved by putrefying animal matters. Several metallic salts are deodorizers, and perhaps disinfectants, as they react on sulphuretted hydrogen and the hydrosulphurets, forming insoluble, inodorous, metallic sulphurets, and also unite with animal matters and check putrefaction. Such are the nitrate of lead (*Ledoyen's disinfecting fluid*), in the proportion of ʒj. to ʒj. of water; also the acetate of lead, chloride of zinc (*Burnett's disinfecting liquid*), the persalts of iron, and sulphate of copper.]

In the above attempt at classifying Therapeutical Agents, I have departed far from previous arrangements. Certain *Classes* or *Orders* have been created, while others have been omitted. Of the former there is little to be remarked, and that little will be seen by the reader who is acquainted with the subject. I have omitted the *Class Antispasmodics*, because there is really no class of medicines which possesses the property of directly arresting spasm; substances which have acquired this appellation possessing their only claims to it by their contingent action on the morbid conditions productive of spasm. Some writers have created a class of *Recrellants*, or *Counter-irritants*; but revulsion, or counter-irritation, is merely the employment of means comprised in CLASSES V., VII., and VIII., in such a manner as to induce irritation and consecutive vascular determination to parts at a distance from the seat of morbid action, or to sollicit an increased flow of blood to viscera or organs, by promoting or exciting their functions. It will be perceived that I have arranged several substances under more than one class. This necessarily follows the varying and even different action of the same substance, according to its dose and modes of exhibition or combination. For very enlightened views as to the operation and classification of Therapeutical Agents, I may refer the reader to the more recent works on Therapeutics and *Materia Medica* enumerated in the BIBLIOGRAPHY.\*

\* [As chlorine has the property, from its strong affinity for chlorine, with which it unites, forming hydrochloric acid, of decomposing sulphuretted hydrogen, ammonia, hydro-sulphuretted ammonia, phosphuretted hydrogen, and other fetid and offensive vapours, it is generally considered to be a true disinfectant, although, from its irritating and corrosive properties, it is often objectionable when employed in the sick-room. The hypochlorites have the same power (as the hypochlorite of soda), which are employed in solution, and to which the same objections do not apply. It remains, however, to be proved that chlorine and its compounds decompose all miasmata.]

\* [The more the above essay on Therapeutics is examined, the more convinced will the reader be that it is one of the most comprehensive and philosophical ever given to the public on this subject. It embraces all the facts hitherto established in regard to the indications for the cure of disease, and the means by which they are to be fulfilled. Unbiased by theory, the author has embraced in his view all the considerations flowing from legitimate solidism and modern humoralism, and while doing justice to both, he has reconciled conflicting statements and doctrines, in such a manner as will satisfy the adherent of either system. Whoever candidly studies this essay, will not only feel a just pride in the

BIBLIOG. AND REFER.—*Hippocrates*, Περὶ τῶν τῶν κατ' ἀνδρῶν, p. 417.—*Aristotle*, De Animalibus Hist., l. x., 4 tom., Svo. Lips., 1811; et Philosoph. Medicorūque problemata, 12mo. Lond., 1583.—*Theophrastus*, Opera, &c.—*Dioscorides*, Opera quæ extant omnia, fol. Franc., 1538.—*Celsus*, De Medicina, pluries.—*Scribonius Largus*, De Compositione Medicamentorum, fol. Ed. Princ., 1519; et 12mo. Basil., 1529; et Compositiones Medicæ. *J. Rhodius*, recensuit, notis illustravit, Lexicon Scriboniarum adject., 4to. Patav., 1655. (The first Pharmacopœia; but very difficult to be understood, without the notes and lexicon of Rhodius.)—*C. Plinius secundus*, Naturæ Historiarum, Libri xxxiii., fol. Hag., 1518; et eum Notis Variorum, Edit. Valpy, 8vo; tom. xii., Svo. Lond., 1826.—*Galenus*, Opera, pluries.—*Cælius Aurelianus*, Method. Medicorum dirigens Omnia, &c., Op., p. 275, et pluries.—*Oribasius*, Medic. Collect., l. vii., passim.—*Paulus Ægineta*, Opus de Re Medicæ, fol. Colon., 1534. The Seven Books of *P. Æ.*, transl. from the Greek, with a Commentary embracing a complete view of the Knowledge possessed by the Greeks, Romans, and Arabians on all Subjects connected with Medicine and Surgery, by *E. Adams*, 3 vols., for Sydenham Society, Svo. Lond., 1844.—*Ætius*, Tetrabiblos, passim.—*Alexander Tralianus*, De Morbis et Febribus, fol. Basil., 154.—*Actuarius*, Method. Med., l. iii., et Opera de Act. et Spirit. Animal. Paris, 1556, passim.—*Mesue*, De Morbis Internis Curandis, Svo. Lugd., 1551.—*Avicenna*, Canones, 4to. Venet., 1700.—*I. M.*, Regimen Sanitatis Salernitana. *A. Croke*, Ed., Svo. &c.—*I. de Gaddesden*, Rosita Anglica, seu Practica Medicinæ, fol. Pavia, 1492.—*Gilbertus Anglicus*, Compendium Medicinæ, 4to. Lion., 1510. Schola Salernitana, sive de Conservanda Valetudine Præcepta Metrica, A. l. de Mediolano, 12mo. Rot., 1667.—*Arnoldus de Villa Nova*, Opera, p. 36, fol. 118, et Regimen Sanitatis, 4to. Paris, 1505.—*Gavasetti*, De Indicationibus Curativis. Venet., 1586.—*J. Werner*, Therapeutica, h. e., Sanitatis restituendæ Ratio Artificialis, l. ii., Svo, 1596.—*Fernelius*, in Method. Med., l. i.—viii.—*I. Fontanus*, Method. Generis cognoscendi et curandi Morbos, Svo. Aven., 1601.—*J. Renealmi*, Ex Curatationibus Observationibus, quibus videre est, Morbos cito, tuto et jucunde posse debellari, si Galenicis Præceptis Chymica remedia veniant subsidio, Svo. Paris, 1616.—*J. Sporisch*, Libri vi., de Ratione curandi in agris Illorum Corporibus Morbosque horum per Dietam, Svo. Lips., 1617.—*Santa Cruz*, De Impedimentis magnorum Auxiliorum in Morborum Curatione, l. iii., 12mo. Patav., 1652.—*H. Cortes*, Summa medendi Methodus, 4to. Venet., 1658.—*T. Willis*, Pharmac. Ration., p. i., Svo. 1674.—*J. G. Sartorius*, Compend. medendi Methodus, 4to. Alt., 1682.—*J. Floyer*, Φάρμακο-Βάσις; or, the Touchstone of Medicine, 2 vols. Svo. 1687.—*G. Bate*, Pharmacopœia Bateana, by Fuller, 12mo. 1691.—*S. Dale*, Pharmacopœia: seu Manuductio ad Mat. Med., Svo. 1693.—*J. Quincy*, Pharmacop. Officialis et extemporanea, &c. 1718.—*F. Hoffman*, Opera et Suppl., pluries. Stahl, Opera, Halle, passim.—*Burggrav*, De Methodo medendi pro Climatum Diversitate varia instituenda. Lugd. Bat., 1724.—*R. Bradley*, A Course of Lectures on the Mat. Med., &c., Svo. 1730.—*Alberti*, De Therapia Morborum Morali, Halle, 1714; De Cura per Expectationem, Hal., 1718; De Therapia Imaginaria, 1721; De Abstinentia a Medicamentis et Medicis Morbos et Mortem Interdum averte, 1722; De Morum et Remediorum Nexu, 1728; De sanatione dytium Difficili, 1731; De Curatione per contraria, 1732; De Curatione per Similia, 1734; De Egriss Medicinæ Abstemis Dieteticæ Curandis, 1744. (These and other Dissertations of *Alberti* are well deserving perusal.)—*R. James*, Pharmacop. Universal, or a New English Dispensatory, Svo. 1747.—*W. Lewis*, The New Dispensatory, Svo. 1754. (Edited after his death by several Physicians, and ultimately became the Edinburgh New Dispensatory.)—*J. Juncker*, Therapia Generalis, 4to. Halle, 1736.—*Otto*, Historia Generalis quomodo cito, tuto et jucunde Medendum. Lips., 1746.—*G. Cheyne*, The Natural Method of curing the Diseases of the Body and the Disorders of the Mind depending on the Body, Svo. Lond., 1752.—*B. Robinson*, Observations on the Virtues and Operations of Medicines, Svo. Lond., 1752.—*B. Swalloe*, Therapia Generalis, 12mo. Amst., 1757.—*S. Scharschmidt*, Therapia Generalis, oder Abhandlung von den üblichen Arzneien, Svo. Berlin, 1755.—*J. Barker*, Essay on the Agreement between Ancient and Modern Physicians; or, a Comparison between the Practice of Hippocrates, Galen, Sydenham, and Boerhaave in acute Diseases, Svo. Lond., 1747.—*A. Scharschmidt*, Begriff der allgemeinen Kurmethode in der practischen Medi-

cin. Berlin, 1770.—*J. Whittors*, Observations on the Abuse of Medicines, Svo. London, 1775.—*J. Brown*, Elementa Medicinæ, Svo. 1780.—*F. Home*, Methodus Mat. Med., 12mo. Edin., 1781—et Clinical Experiment, Hist. and Dissert., Svo. Edin., 1783.—*C. G. Bahne*, Unriss der allgemeinen Heilungskunde. Berlin, 1785.—*J. D. Mezger*, Grundsätze der allgemeinen Semiotik und Therapie. Königsb., 1785.—*J. Beyer*, Grundriss der allgemeinen Hygiene und Therapeutik. Prag, 1788.—*J. Gregory*, Conspectus Medicinæ Theoreticæ, Svo. Edin., 1782. (Many Editions subsequently.)—*R. Home*, The Efficacy and Innocence of solvents candidly examined, &c., Svo. Lond., 1785.—*G. F. Plouquet*, Fundamenta Therapiæ Catholicæ, Svo. Tübing., 1785.—*J. C. Juncker*, Versueh einer allgemeinen Heilkunde. Hal., 1788.—*W. Cullen*, Treatise of the Materia Medica, 2 vols. 4to. Edin., 1789. (Believed that Medicines acted by means of the nervous system.)—*Z. G. Baldinger*, Literatura Universa Materiæ Medicæ, Alimentariæ, Toxicologicæ, Pharmacicæ et Therapiæ Generalis, &c., Svo. Marb., 1793.—*B. Carmichaeli*, Hygiene, Therapeutice et Mat. Med., 4 vols. Svo. Pavia, 1791–95.—*J. C. Tode*, Die allgemeine Heilkunde oder die Lehre von den Heilungsanzeigen, Svo. Kopenhagen, 1797.—*J. S. Vaume*, Traité de Méd. Pratique et sur les Remèdes Généraux, &c. Paris, 1798.—*J. C. G. Ackermann*, Institutiones Therapiæ Generalis. Norimb., Svo. 1794.—*C. W. Hufeland*, System der practischen Heilkunde. Jena, 1800.—*A. F. Hecker*, Therapia Generalis, Svo. Berlin, 1789—et Kurzer Abriss der Therapie, Svo. Berlin, 1807.—*Von Hoven*, Grundsätze der Heilkunde. Rotherb., 1807.—*W. P. C. Barton*, Vegetable Mat. Med. of the United States, 2 vols. 4to, fig., 1817–18.—*J. Bigelow*, American Med. Botany, 2 vols. Svo. Boston.—*J. Eberle*, Treatise on Mat. Med. and Therapeutics, 2 vols. Svo. 2d ed. 1824.—*A. P. De Candolle*, Essai sur les Prop. Méd. des Plantes, Svo. Paris, 1804; 2d edit., 1816.—*J. L. Alibert*, Nouv. Elémens de Thérapéutic, 3 t., Svo. Paris, 1804; 5me ed., 1826.—*J. B. G. Barbier*, Princip. Génér. de Pharmacol. Traité Elém. de Mat. Med., Svo. Paris, 1805; 2de edit., 3 vols. Svo. Paris, 1824.—*F. L. Alibert*, Nouveaux Elémens de Thérapéutic et de Mat. Méd., &c., Svo. Paris, 1804.—*J. Murray*, System of Mat. Med. and Pharmacy, 2 vols. Svo. 1804; 5th edit., 1828.—*A. F. ad Hecker*, Kurzer Abriss der Therapie, Svo. Berlin, 1807.—*J. L. Augustin*, Handbuch der medicinischen Therapie, Svo. Berlin, 1806.—*Kell u. Hoffbauer*, Beiträge zur Beförderung einer Kurmethode auf Psychischen Wege. Halle, 1807.—*K. G. Neumann*, Allgemeine Therapie. Leipz., 1808.—*A. T. Thomson*, Conspectus of the Pharmacopœias. 1510; 13th ed., 1841. London Dispensatory, Svo. 1811; 9th edit., 1837.—*F. Berard*, Plan d'une Médecine Naturelle, ou la Nature considérée comme Médecine, &c. Montp., 1810.—*J. W. H. Conradi*, Grundriss der Pathologie und Therapie, Svo. Marb., 1811.—*Friedlander*, De Methodi Stimulantis Abusu, crebra Exitus funesti in Morbis acutis Causa. Giesse, 1810.—*P. J. Hirsch*, Handbuch der allgemeinen Therapie, Svo. Würzb., 1811.—*J. P. Frank*, De Curand. Hom. Morbis, l. v.—*J. A. Paris*, Pharmacologia, Svo. 1812; 9th ed., 1838. (A very Classical work.)—*K. H. Burdach*, Die Literatur der Heilwissenschaft, 3 b., Svo. Gotha, 1810–21.—*S. F. Gray*, Supplement to the Pharmacopœias, Svo. 1815; 6th edit., 1836.—*J. D. Reuss*, Repertorium, &c. t. xvi., 4to., Götting., t. xi., Therap. et Mat. Méd.—*C. Sprengel*, Institutiones Medicæ, vi. Tomi, Svo., tom. vi., pars prima. Therapia Generalis. Lips., 1816.—*N. Chapman*, Elements of Therapeutics and Materia Medica, 2 vols. Svo. Philad., 1821. Rev. in Med. Chirurg. Rev., vol. iv., p. 61.—*W. Ainslie*, Materia Medica of Hindostan, 2 vols. Svo. 1826.—*J. Rouques*, Pytographie Médicale, 2 vols. 4to. Paris, 1821. (Plates beautifully coloured.)—*J. Bégin*, Traité de Therap., Svo. 2 vols. Paris, 1825.—*A. Chevalier*, *A. Richard*, et *J. A. Guillemin*, Diction. des Drogues, &c., Svo. 5 vols. Paris, 1827–29.—*A. J. L. Jourdan*, Pharmacopœie Universelle, 2 vols. Svo. 1828; 2d ed., 1840.—*L. Martinet*, Manuel de Thérapéutic et de Mat. Méd., Svo. 1828.—*J. Stephenson* and *J. M. Churchill*, Medical Botany, 4 vols., fig. Svo. Lond., 1831.—*J. Pereira*, Lectures on the Mat. Medica and Therapeutics, in London Medical Gazette, for 1835–37. The Elements of Materia Medica and Therapeutics, 2 vols. Svo. Lond., 1839–40; 2d edit., 1842.—*R. Christison*, A Dispensatory or Commentary on the Pharmacopœias of Great Britain, Svo. Edin., 1842.—*Simon*, in Journ. des Progres des Sciences Méd., t. x., p. 104.—*M. C. Petit*, in Ibid., t. xvii., p. 178.—*Moreau de Jonnés*, in Mém. de la Soc. Méd. d'Emulation, t. viii., p. 175.—*Hecker*, in Medio-Chirurg. Rev. July, 1838, p. 265.—*J. H. Royle*, in Journ. of the Asiatic Society of Bengal, 1832.—*G. G. Sigmond*, Lectures on the Mat. Med. and Therapeutics, in Lancet for 1836–38.—*A. Ure*, Pract. Compend. of Mat. Med. for Infancy and Childhood. 1838.—*J. H. Lane*, Compend. of Mat. Med. and Pharmacy, Svo. 1840.—*A. L. J. Bayle*, Bibliothec.

vast resources of scientific medicine, but will be effectually guarded against all inclination to the plausible system of quackery and delusion so lamentably prevalent in our country.]



de Therapeut., 4 tom. Paris, Svo, 1828-37.—*F. V. Merat et A. J. de Lens*, Dict. Univers. de Mat. Méd., 6 vols. Svo. Paris, 1829-34.—*C. P. Galtier*, Traité de Mat. Méd. et des Indications Therapeutiques, &c., Svo. Paris, 1839.—*H. M. Edwards* and *P. Vavasour*, Manuel de Mat. Méd., Svo. Paris, 1826. Translated by *J. Davies*. London, 1827.—*G. Giacomini*, Trattato filosofico sperimentale di i soccorsi Therapeutici, 4 vols. Svo. Padova, 1833.—*G. B. Wood* and *F. Baehle*, The Dispensatory of the United States, Svo, 3d ed. 1836.—*W. B. O'Shaughnessy*, The Bengal Dispensatory and Pharmacopœia, &c., Svo. Calcutta, 1841.—*E. Ballard* and *A. B. Garrod*, Elements of Mat. Med. and Therapeutics, Svo. Lond., 1845.—*A. Bouchardat*, Annuaire de Therapeutique, de Mat. Méd., &c., 12mo. Paris, 1846-50.—*J. Carson*, Illustrations of Medical Botany, consisting of col. fig. of Plants affording important Art. of Mat. Med., &c., 4to. Philad., 1847.—*C. G. Mitscherlich*, Lehrbuch der Arzneimittellehre, Svo. Berlin, 1847.—*F. Oesterlen*, Handbuch der Heilmittellehre, Svo. Tübingen, 1845.—*A. Richard*, Eléments d'Hist. Nat. Méd., &c., 4to. Paris, 1849. (Many Plates).—*J. F. Royle*, Mat. Med. and Therapeutics, including the Preparations of the Pharmacopœias of London, Edinburgh, and Dublin, with many new Medicines, 12mo. Lond., 1846. Edition, also, with the Pharmacopœia of the United States, by *J. Carson*, Svo. Philad., 1847.—*A. Trouseau* and *H. Pidoux*, Traité de Therapeutique et de Mat. Méd., 3mo edit., Svo. Paris, 1847.—*R. Dunglison*, General Therapeutics and Materia Medica adapted for a Medical Text-book, with numerous Illustrations, 2 vols., 4th ed., Svo. Philad., 1850.—*F. W. Headland*, An Essay on the Action of Medicines on the System, &c., Svo. Lond., 1852.

[AM. BIBL. AND REF.—*John P. Harrison*, Elements of Materia Medica, 2 vols. Philad., 1845.—*Martyn Paine*, The Institutes of Medicine. New York, 1847, p. 826; and Therapeutical Arrangement of the Materia Medica, 12mo. New York.—*J. Carson*, Am. ed. Pereira's Elements of Materia Medica, 3d Am. ed., and Synopsis of Lectures on Materia Medica, Svo, p. 208. 1855.—*Alfred Stillé*, Principles of General and Special Ther., Svo. Phil., 1856.—*Edward Parish*, A Pract. Introduction to Pharmacy, Svo. Phil., 1856.—*D. M. Reese*, Am. ed. of *J. M. Neigan's* Medicines, their Uses and Mode of Administration, &c., Svo. New York, 1850.—*W. Leo Wolf*, Remarks on the Abreacadabra of the 19th century, Svo. New York, 1840.—*Asa Gray*, Botan. Text-book, 12mo. New York.—*J. Tognio* and *E. Durand*, Am. edit. of *H. M. Edwards* and *P. Vavasour's* Manual of Mat. Medica and Phar., Svo.—*B. Smith Barton*, Am. ed. of Cullen's Mat. Med., 2 vols. Svo. Phil.—*J. Thacher*, The American New Dispensatory.—*H. Coley*, A Treat. on Poisons, &c., Svo. New York.—*J. Torrey* and *A. Gray*, A Flora of North America, &c., Svo.—*C. Tieknor*, A Treatise on Medical Philosophy, 12mo. New York.—*J. Stewart*, A Practical Treatise on Diseases of Children.—*G. W. Carpenter*, Essays on the more important articles of the Mat. Medica, &c., Svo.—*E. J. Coze*, A Practical Treatise on Med. Inhalations, &c., 18mo.—*A. Eaton* and *J. Wright*, North Am. Botany, &c., Svo.—Eclectic and General Dispensatory, comprehending a System of Pharm., Mat. Med., &c. By an American Physician, Svo. New York.—*J. A. Gallup*, Outlines of the Institutes of Medicine, 2 vols. Svo.—*Geo. B. Wood* and *Franklin Baehle*, The Dispensatory of the United States.—*R. E. Griffith*, Medical Botany and Universal Formulary. Phil., 1855. Am. ed. Christison's Dispens., 2d ed. 1855.—*B. Ellis*, The Medical Formulary, 10th edit. Phil., 1855.—*Robley Dunglison*, Gen. Ther. and Mat. Med., 5th edit., 2 vols. Svo, 1855; and New Remedies, with Formule for their Administration, 6th ed., Svo. Phil., 1855.—*Jacob Bigelow*, Am. Med. Botany, 2 vols. Svo. Boston. (60 coloured Plates.) Flora Bostoniensis, and Sequel to U. S. Pharm. 1822.—*Wm. P. C. Barton*, Veg. Mat. Med. of the United States, 2 vols. 4to., fig. 1817-18; and Outlines of Lectures on Materia Medica and Botany, 2 vols. 12mo. Phil.—*J. Eberle*, A Treatise on the Mat. Med. and Therapeutics, Svo, 2d edit. 1821.—*W. Chapman*, Elements of Ther. and Mat. Med., 2 vols. Svo. Phil., 1821.—*Chas. A. Lee*, Am. edition of Thomson's Conspectus, 18mo, and of Paris's Pharmacologia, 9th edit. New York, 1844. Catalogue of Medicinal Plants, indigenous and exotic, growing in the State of New York, Svo.—*John Bell*, A Practical Diet. of Mat. Med., Svo. Phil.—*Lewis C. Beck*, Adulterations of various substances used in Medicine and the Arts, &c., 12mo. New York, 1850.—*J. J. Reese*, The Amer. Med. Formulary, based upon the United States and British Phar., &c., 12mo. Phil.—*Win. Proctor, Jr.*, Am. edition of Mohr and Redwood's Practical Pharmacy, Svo. 506 Engravings. Phil.—*T. D. Mitchell*, Materia Med. and Therapeutics, Svo. Phil.—*J. B. Beck*, Essays on Infant Therapeutics, &c., 12mo. New York, 1851.—Lectures on Materia Med. and Ther., Svo. New York.—*J. C. Warren*, Etherization with Special Remarks, Svo. Boston.—*W. Channing*, On

Etherization, Svo. Boston, 1852.—*O. W. Holmes*, Homœopathy and its kindred Delusions, 12mo. Boston.—*C. S. Rafinesque*, Medical Flora, or Manual of the Med. Botany of the United States, 100 Plates. 2 vols. 12mo.—*A. Wood*, A Class-book of Botany, with a Flora of the Northern States, 38 Engravings. 12mo.—*J. Darby*, A Manual of Botany, adapted to the Productions of the Southern States. 145 Engravings. 12mo.—*J. R. Coze*, The American Dispensatory, containing the Natural, Chemical, Pharmaceutical, and Medical History of the different substances employed in Medicine, &c., &c., Svo.—*William Tully*, Materia Medica and Therapeutics. Springfield. 9 Nos. published, 64 pages in each No.; to be continued: a very learned work.—Am. Edit. of Cullen's Mat. Med. New York, 1802; and B. S. Barton's ed. Philadelphia, 1812.—*Joes's* ed. of *J. Murray's* Mat. Medie. New York, 1844; and Chapman's edit. of same, New York, 1821.—*John Warren*, On Mercurial Practice, Boston.—*P. S. Physiek* and *Leybter* (Experiments on the absorption of Medicines), Med. Repository, New York, vol. v.—*Hodges* (Inaugural Thesis on the absorption of Medicines, 1801).—*Wm. P. Dewees* (On modus operandi of Med.), Amer. Jour. Med. Sci., new Series, 1825, p. 150.—New York Formulae Selectæ. 1818.—*A. W. Treas's* Am. edit. of Paris's Pharmacologia. New York, 1824.—*Elliott*, Botany of South Carolina and Georgia.—*Edwards* and *Vavasour's* Man. Mat. Med., translated by Tognio and Durand. Phil., 1829.—United States Pharmacopœia, edition 1550.]

## THROAT, DISEASES OF—COMPRISING THE TONSILS AND PHARYNX.

1. The parts of which the throat may be said to consist—the *velum* or soft palate and *uvula*, the *tonsils* and pillars of the palate, the *pharynx*, and the *root* of the tongue and *epiglottis*—may individually, or severally, or even altogether, be the seat of disease, especially of the various forms and states of inflammation, or of ulceration, or of sympathetic functional disorder. Whether they be individually or conjointly affected, the disease may be either *primary* or *consecutive*—*idiopathic* or *symptomatic*—*simple* or *complicated*—*local*, or *constitutional*, or *specific*; and, as respects the state of vital power, *sthenic*, or *asthenic*, or *phagedenic*, or *gangrenous*. This last or malignant form is generally a manifestation of a general or specific contamination of the circulating fluids, in connexion with reduced or perverted organic nervous power or vital action. It is comparatively seldom that one only of the parts comprised by the generic term, *Throat*, is affected, the others remaining healthy. Most commonly adjoining parts are more or less implicated; and, not infrequently in consequence either of previous disorder of the digestive functions, or of impaired vital power, or of interrupted excretion and morbid states of the blood, the disease extends to all these parts, and even still farther, as to the œsophagus, or to the larynx and trachea—to both the digestive and the respiratory passages, especially during wet and unhealthy seasons and epidemic influences, and in low, humid, and malarious localities. Under the head *PALATE* and *UVULA* I have treated of *Relaxations* and *Inflammations* of these parts. I have now to consider the *inflammatory* and *structural changes* of the *Tonsils* and *Pharynx*, and the *diseases* of the *throat*, which are not limited to one or other of these, but which often extend also to the palate, and even also to the epiglottis and larynx in one direction, and to the œsophagus in another.

I. INFLAMMATION OF THE TONSILS.—*SYN.*—*Tonsillitis*, from *Tonsilla*, the *Tonsils*.—*Synanche vel Cyananche Tonsillarisis*; *Angina Tonsillarisis*, Auct. *Angina cum tumore*; *Amygdalitis*, Fr. [*Kehlsucht*, Germ. *Esquinancie*, Fr. Quincy, Engl.]

CLASSIF.—III. CLASS, I. ORDER (Author).

2. DEFINIT.—*Pain* or *uneasiness in the seats*

of the Tonsils, with redness, enlargement, and often with difficulty of swallowing and fever, terminating in resolution, abscess, or chronic enlargement.

3. The Tonsils may be inflamed alone or chiefly, or in connexion with other parts of the throat, most frequently with the fauces or pharynx, or both, especially where affections of the throat are epidemic, or complicate febrile and exanthematous maladies. Both tonsils are generally affected either contemporaneously or in succession. One only is rarely attacked—not more than one in 15 or 20 cases.

4. *A. The causes of Tonsillitis* are nearly the same as those occasioning inflammation of other parts of the throat. The disease is not frequent in young children; it is rare during the period of lactation; but it becomes more and more frequent from five to ten years, and still more so from ten till about 20. From the latter age, or from 25 to 30, its frequency diminishes, until it is rarely seen at ages upward of 50. It is nearly equally prevalent in both sexes; but the male sex generally furnish the greater number of cases, probably from a more frequent exposure to the exciting causes. Seasons of the year, states of weather and locality, favour its prevalence, so much so as to render it epidemic or endemic. Epidemic visitations of the malady have mostly occurred in spring or autumn; and although the disease appears at all seasons, it is most frequent when the weather is cold, wet, or changeable. Cold and humid situations, wooded and miasmatic places, and clay or absorbent soils, favour its prevalence. It affects most frequently persons of a fair complexion and those of the scrofulous diathesis; and it often recurs in the same individual, from exposure to cold or currents of air, especially when overheated or perspiring, or when the digestive functions are disordered.

[When abscess in the tonsils has once occurred, it is very apt to occur again whenever inflammation attacks the organ, and so suddenly does it take place, that remedial measures are seldom effectual in preventing it. Its progress is attended with very great suffering and inconvenience, if not danger, and which are suddenly relieved on the bursting of the abscess. In some individuals, generally of a plethoric habit, attacks of Tonsillitis would seem to be periodical, occurring at certain regular periods, as the spring of the year, or the beginning of winter. Early precautionary measures will, however, in many of these instances, ward off an attack.]

5. *B. The symptoms of Tonsillitis* sometimes commence without any very manifest previous disorder. In other cases they are preceded by slight derangement of the digestive functions; and occasionally by most of the phenomena which usher in other inflammations, especially by chills or shivering, followed by heat of skin, excited pulse, thirst, and headache; or merely by general uneasiness, by want of appetite, and pains or soreness of the limbs. Rapidly following, or even coetaneously with these, more or less difficulty of deglutition, and a sensation as if a foreign body were present in the throat, are experienced; and in a few hours, or in one or two hours, a continued pain, at first moderate, sometimes severe or acute, a sense of heat, and a constant desire to swallow, are complained of. Deglutition becomes so difficult and painful as to occasion, in some cases, contorsions or convulsions; and in others it is impossible. A guttural cough, a frequent

desire of expuition, or of rejecting the saliva and the increased secretion from the throat; a hoarse and difficult respiration; and obscured, confused, or whispering and guttural articulation, or a voice entirely suppressed or lost, are generally present in the more severe cases. In some instances, when the tumefaction of the tonsils is very great, and the discharge of the secretions from the throat and mouth is difficult, paroxysms of dyspnoea, or of threatened suffocation, occur at intervals and heighten the distress and alarm of the patient.

6. When the patient's mouth is opened and the base of his tongue depressed, the tonsils are seen more or less swollen, protruding from between the pillars of the palate, and nearly approaching or even touching each other. The membrane covering them partakes in the inflammation, and is at first red and dry; but it afterward is partially covered by whitish exudations, or by specks or patches of mucus or of lymph, or even by a membranous coating of these. In some instances, however, the tonsils continue more or less free from exudations, and present a deeper and darker red as the disease proceeds. In most cases the inflammatory appearances are not confined to the tonsils, but extend also to the soft palate and uvula, [sometimes to the larynx and trachea;] and there is every reason to infer, from the extension of pain to the interior of the ear, the crepitations which are heard, and the deafness complained of, that inflammatory changes then extend to the Eustachian tube at least, and even in a slight grade to the interior of the ear. When one only of the tonsils is attacked, the enlargement may be so great as to pass the mesian line and to push the uvula to the sound side. The patient in such cases inclines his head from this side, in order that deglutition may be less painful. When both tonsils are affected, as is most commonly the case, and the swelling is great, the uvula is either thrown backward and is concealed behind them, or it is wedged between and above them and contracted. Frequently the enlargement of the tonsils is so great and so painful as to render it difficult to open the jaws so far as to see the state of the parts; but generally this may be ascertained by the introduction of the finger.

7. In addition to those more strictly local symptoms, others of a more sympathetic nature are often present. These are chiefly flushing of the face, headache, thirst, loss of appetite or nausea, heat and dryness of the skin, scanty high-coloured urine, costiveness. In some cases the patient cannot swallow even fluid food, and a few attempts at deglutition are followed by the forcible rejection of the substances taken, through the nostrils. When this occurs, it may be inferred that the pharynx is also inflamed. The character of the *symptomatic fever* varies remarkably. In persons previously healthy, and in open and high localities, the febrile diathesis is generally *sthenic* or *phlogistic*; but in the delicate or cachectic, and in the inhabitants of large towns, or of low, close, or humid places, the attending fever is of a lower or more *asthenic* character, and the local symptoms are more extended to parts in the vicinity. In a few cases, and these the most robust, the febrile action is very slight, although deglutition may be altogether prevented by the swelling. In such cases the patients complain of hunger from this deprivation.

8. *C. The course and duration of Tonsillitis* is



usually acute, and generally extends from seven to fourteen days. The disease may *terminate* in five or six, and it is rarely prolonged to twenty-one days. The symptoms commonly become more and more severe during the first third or half of their duration; they then continue stationary for a time, and subside afterward with greater or less rapidity. When the disease is slight or moderate, or when the case is early and judiciously treated, then resolution takes place and the swelling gradually and quickly subsides. But in the more severe attacks suppuration commonly supervenes in one or both tonsils; and is indicated by a change in the nature of the pain, which passes from an acute and pulsating, to a dull or heavy character; and sometimes by chills or chilliness, slight rigours, and a general perspiration. The difficulty of swallowing continues or increases; and, upon introducing the finger, a softness, or even fluctuation of one or both tonsils may be felt. When the parts can be brought into view, the part to which the matter points may sometimes be seen. The spontaneous rupture of the abscess, when it is not opened immediately upon ascertaining the presence of matter, occurs either when retching or vomiting, or when coughing or speaking, or when attempting to swallow or to throw out the secretions from the throat. But the abscess may break during sleep, the matter having been insensibly swallowed, and the patient feeling greatly relieved when awakened. If the abscess thus breaks spontaneously, the matter is usually fetid and offensive from its retention, the fetor sometimes being the only indication of the rupture, when the quantity of matter is small and mixed with the secretions from the throat and mouth. Instances are rare in which the matter makes its way externally, or at the lateral and upper region of the neck; but it has thus made its way either in one or in both sides, especially when a diffusive inflammation of the adjoining cellular tissue has occurred in connexion with the suppuration of the tonsils, particularly in the more malignant exanthematous complications of the disease; and in still rarer cases, the matter has found its way along the vessels of the neck, into the chest.

[It is doubtful whether *melanosis* ever attacks this organ, as Prof. GROSS states that there is not a single instance of it on record.

Dr. WARREN, of Boston, regards true *scirrhus* of the tonsils as not infrequent (*on Tumours*, p. 356), although most pathologists regard it as of extremely rare occurrence, and believe that it is confounded with mere *induration*. Such is most probably the case.

DUPUYTREN describes a case where he met with an *accephalocyst* in an excised tonsil, the pouch being of a white opaline tint, elastic, and occupied with a limpid, serous fluid, without, however, the ordinary globular hydatid. The tonsil was greatly enlarged. It has been suggested that, as this appearance has not been observed by others, it may have been owing to obstruction and consequent dilatation of one or more of the follicles.

We sometimes observe *concretions* of a purely *animal* character, blocking up the lacunæ of the tonsils and distending them, of a whitish, grayish, or yellowish tint, unctuous or greasy to the touch, very fetid, and varying in size. They are composed apparently of fibrin, in union with mucus.]

9. Inflammation of both tonsils sometimes terminates differently as respects each; one terminating by resolution, the other by suppuration. Gangrene takes place rarely, and only in the malignant and complicated states of the malady. The termination of tonsillitis in *chronic enlargement* of the parts is not infrequent in scrofulous and cachectic subjects, and after repeated or periodic attacks. These returns of the disease may be more or less frequent, or at certain seasons, or at uncertain times. They may recur, and leave the tonsils either in a healthy state, or more or less enlarged, the enlargement increasing and becoming more permanent after each attack. This is frequently the case after a recurrence of the complaint, the previous affection, or an existing enlargement predisposing to subsequent attacks, so that the disease assumes the character of a remittent chronic tonsillitis. This is most apt to occur in the scrofulous diathesis, and in young persons of delicate constitution and weak digestive functions. In these more especially the enlargement may become permanent and more or less embarrass deglutition, and affect the voice and speech.\*

10. *D. Enlargement of the tonsils* commonly proceeds from changes which are purely inflammatory or the consequences of inflammation, although *other* changes also produce it in rarer instances, as is shown by the examination of cases, in which a fatal result has followed some other intercurrent or complicating disease. The appearances which proceed more strictly from inflammation, are thickening and injection of the membrane enveloping the tonsils; infiltration of a gelatinous and yellowish serum giving rise to thickening, enlargement, and induration in the cellular tissue situated between the follicles which constitute these organs, and purulent infiltrations or collections in the same situation. The parietes of the follicles are also sometimes thickened and indurated or softened. In those cases which are still more chronic and appear independently of inflammation, or in which inflammatory action is either doubtful or has long subsided, concrete friable matter, very closely resembling tubercular matter, is found in one or several of the lacunæ of the tonsils. When it is found in one cavity, the collection may be more or less considerable, and may have formed either in a single lacuna or in several, the partitions between them becoming absorbed, and a single cavity being thus formed.

[*Hypertrophy of the tonsils* is the usual result of chronic inflammation, inducing an enlargement of the organs in all directions, which are of a firm, almost fibro-cartilaginous consistence, while the surface is of a pale reddish or cineritious hue, and the mucous follicles often five or six times the natural size. The orifices of these follicles may be closed with inspissated mucus, earthy concretions, fibrinous plugs, or tubercular matter. The tonsils, however, may be remarkably friable and distinctly lobulated, instead of being

\* [Dr. STOKES maintains that tonsillitis is not only a frequent cause of persistent cough in children, but also of *posterior spinal curvature*. The continued cough tends to draw up the shoulders and throw the head forward, thus causing a strain upon the walls of the chest which extend to the spine. The patient becomes round-shouldered, stoops, and after a while posterior curvature of the dorsal vertebra takes place. Hence the importance of attending to chronic tonsillary enlargement, especially in children of a lymphatic temperament; and not only local means must be employed, but such, also, as are calculated to strengthen the general system.]

tough and indurated, and of a red, brownish, or violet colour. When the hypertrophy is great, the speech, hearing, and respiration are apt to be affected, while, at the same time, the chest is rounded and arched behind, contracted in front, and flattened at the sides, while the neck is bent forward, and the patient habitually stoops. The breathing is more or less embarrassed—during sleep greatly so—the head being thrown back so as to bring the mouth on a line with the larynx, and the surface bathed in perspiration, from the increased effort of the respiratory muscles to introduce air into the lungs. In one instance, a boy of ten years of age, where the uvula as well as tonsils were enormously enlarged, violent paroxysms of suffocation would frequently occur during the night, owing to the enlarged and elongated uvula falling into the rima glottidis, thus completely preventing the entrance of air into the lungs. The patient was anæmied and greatly emaciated, but on excising the enlarged organs no more paroxysms occurred, and in a short time he was restored to his usual health. We are inclined to believe that this disease rarely, if ever, occurs except in persons of a scrofulous constitution.

ROKITANSKY says, "In scrofulous subjects the tonsils are often affected, in addition to hypertrophy and habitual hyperæmia, with a peculiar blenorrhœa, and the purulent secretion not infrequently becomes inspissated, so as to form tubercular cheesy plugs, or even chalky concretions. These, in their turn, keep up a perpetual state of irritation in the tonsils." And this affection, we may remark, is often not amenable to local treatment, as the nitrate of silver, but only yields to excision of the diseased follicles.

On examining with a microscope the structure of enlarged tonsils which have been removed, we find it identical, in most cases, with that of the healthy gland, constituting a true hypertrophy. It is to be recollected that the tonsils are made up of a number of duplicatures and involutions of the mucous membrane; a vertical section showing the thin surface-layer of scaly epithelium with a thick underlying stratum, consisting of nuclear, or very slightly developed celloid particles; this layer, being traversed by vessels which are dilated in hypertrophied specimens, running up to the basement-membrane, which supports the layer of scaly epithelium. When there is any habitual hyperæmia, and consequent exudation, this low sub-mucous celloid growth readily assimilates the effused plasma into similar substance, and so the hypertrophy continually goes on. The induration which takes place, and which is often mistaken for scirrhus, is doubtless owing to a fibroid development of the exudation.

*Gangrene* of the tonsils sometimes occurs as the result of acute tonsillitis, and is readily ascertained by the livid colour of the parts, the fetid breath, and the dark, sanious discharge. After death, the tonsils are found pulpy and disorganized, and of a deep ash or mahogany hue. In scarlatina maligna, or putrid sore throat, as this form of disease is often called, deep ulceration, gangrene, and sloughing of these organs is a common phenomenon. The changes which the tonsils undergo in *syphilitic* affections will be found particularly described under the articles *SYPHILIS* and *VENEREAL AFFECTIONS*.

These organs may be the seat of some of the *heterologous* formations, as the *tubercular*, which

is by no means rare, the matter being of a pale yellowish colour, semi-concrete, and in small isolated particles, or masses of a considerable size. This matter may undergo softening or be changed into chalky concretions, and is often associated with tubercular deposits in other structures.

*Encephaloid* of the tonsils has been observed by VELPEAU, VIDAL, CARSWELL, though it is very rare. It may occur as an infiltration, or a tumour, or in disseminated masses, and indicates a similar deposit in other organs.]

11. II. INFLAMMATION OF THE PHARYNX.—SYN.—*Pharyngitis* (from φάρυγξ, the posterior part of the throat); *Cynanche Pharyngæa*; *Angina Pharyngæa*; *Dysphagia Inflammatoria*, Auct. *Angine Pharyngée*, Fr. *Schlundentzündung*, Germ.

CLASSIF.—III. CLASS, I. ORDER (*Author*).

12. DEFINIT.—*Soreness or pain referred chiefly to the posterior portion of the throat, with increased pain and difficulty when swallowing, the substances taken being sometimes forcibly ejected through the nostrils; constitutional disturbance often slight, but oftener very severe or dangerous.*

13. *Pharyngitis* occurs in a great variety of forms, circumstances, and complication. It may be *mild, slight, catarrhal, primary, consecutive; and associated* with other disorders or maladies. It may exist *singly* or *simply*, or be *associated* with inflammatory action more or less manifest or pronounced, in either the soft palate or fauces, or in the tonsils, or even in the œsophagus, or in the larynx and epiglottis. The simple or unassociated state of the disease is much less frequent than the associations now mentioned, and of these the most common are those in which the soft palate and tonsils are more or less prominently affected. *Pharyngitis* in its simpler states is often symptomatic of disorder of the digestive functions, especially of severe or protracted indigestion; or of the more acute states of dyspepsia following an excessive indulgence in rich food and vinous or spirituous liquors; the eructations of irritating gases and fluids from the stomach in these cases inducing irritation and inflammation of the pharynx. *Pharyngitis* in its associated states presents every grade of severity, and all the forms or characters which are observed in diseases usually denominated inflammatory. It may be thus *sthenic* or *phlogistic*, either when simple, or when associated with tonsillitis or palatitis; or *asthenic* or *malignant*, when it occurs in the course of low fevers, during disorders of the digestive functions, during morbid states of the blood or general cachexia, and more especially in connexion with scarlet fevers or with any of the other exanthemata. When thus *asthenic* or associated the inflammatory action always is extended to the adjoining parts of the throat, not infrequently to both the œsophagus and larynx, and even along the Eustachian tubes to the ears.

14. i. *Causæ*.—*Pharyngitis*, in its simple and primary form, is rarely observed; but associated as now stated, or even appearing as the more prominent part of an inflammation extending to adjoining portions of the throat, or even farther, it is of frequent occurrence; and owing to the functions of these parts, and even of others in the vicinity, it is of much greater importance than has hitherto been attached to it. The most common manifestation of the disease is the *catarrhal*; and although it may be the chief affection, it is when thus characterized generally associated in



the manner just stated. When pharyngitis is *mild* or *catarrhal*, it usually proceeds from exposure to cold in some form or manner (§ 4). When more or less limited, it is frequently consecutive of acute attacks of indigestion, caused by the ingurgitation of too much food or fermented liquors; or it is more directly produced by swallowing acrid, corrosive, or irritating substances, [or smoking tobacco.] Thus it may be caused by hot water; by acrid poisons, taken intentionally or by mistake; by mustard, given as an emetic in cases of narcotic poisoning; and by hot spices, or irritant medicines exhibited in excessive doses. In those circumstances, although the pharynx may be chiefly affected, the soft palate and œsophagus may be more or less implicated with other adjoining parts. *Catarrhal* pharyngitis generally proceeds from the same causes as those which produce tonsillitis, especially from currents of cold air passing over or near the neck or throat, from wet feet or damp clothes, from cold and wet seasons, and from changeable weather, especially about the equinoxes, when it is often epidemic. The more severe and dangerous forms of pharyngitis are those in which this local affection is merely a prominent manifestation of a constitutional or febrile malady, as in scarlet fever, small-pox, measles, scurvy, erysipelas, and other diseases in which the circulating fluids become more or less contaminated. In these circumstances the pharyngitis is asthenic, often characterized by pellicular exudations, but frequently not so characterized; always spreading, and generally, when thus symptomatic, occurring from infection, and often as an epidemic.

15. ii. *Description*.—Pharyngitis may be an extension of a catarrhal or mild inflammation from the fauces or tonsils, or from both; or it may be coeval as well as coextensive with these; or it may be associated with *œsophagitis* (see art. *ÆSOPHAGUS*), either as the primary or the secondary affection. The catarrhal form usually commences with coryza and all the symptoms of a common cold or catarrh, or with those mentioned above in connexion with *tonsillitis* (§ 5).—*A*. The more acute or phlogistic form, especially when occurring in the sanguine temperament and in young robust persons, is commonly attended by symptomatic inflammatory fever ushered in by chills or rigours. With these a sense of heat, dryness, and soreness is felt at the posterior part of the throat and posterior nares, and the surface of the pharynx is seen, when the tongue is depressed, red, and injected, sometimes shining. Soreness and pain are increased by attempts at deglutition, or as soon as the pharyngeal muscles are called into action. As the affection proceeds, the pain and difficulty of swallowing increase, and substances, especially fluids, are often forcibly rejected by the nostrils. When the inflammation is severe, the pain is often referred chiefly to the neck or the anterior aspect of the upper cervical vertebræ. The heat and pain in this situation are somewhat abated as soon as the red and inflamed surface becomes covered in parts with a thick tenacious mucous exudation. This exudation often increases, or is more and more abundant, but still viscid or ropy, and is discharged after a hacking, or hawking, or guttural cough; yet the disease may continue several days, or even proceed to its termination, without this secretion being very manifest or considera-

ble. If the inflammation extends to the epiglottis and larynx, the cough is more severe, paroxysmal, or strangulating than when it is confined to the posterior part of the pharynx.

16. When the *lower portion* of the pharynx is chiefly affected, then the soreness and pain are referred chiefly to the superior part of the throat, behind the cartilages, and the increased pain on swallowing, and the difficulty of accomplishing this act, are experienced after substances have been seized by the pharyngeal muscles and are about to pass into the œsophagus, at the top of which they are felt to be arrested or to pass with difficulty. In these cases the inflammatory action often extends more or less down the œsophagus; the soreness and pain being increased upon pressing the lateral parts of the neck and throat. In these cases the posterior part of the pharynx may not present a very marked state of inflammation, even when the root of the tongue is pressed downward; the inflammation being often either lower down than this, or affecting chiefly the anterior parietes of the pharynx. The voice is generally but little, or not at all affected; and the cough varies in severity and in character with the degree in which the epiglottis and larynx are implicated.

Whatever may be the exact seat and extent of the pharyngeal affection, the constitutional disturbance is very various, being in some inflammatory or sthenic, in others asthenic, and in many slight or very mild. The severity of the accompanying fever depends much upon temperament, diathesis, habit of body, and the age of the patient. It is more generally asthenic or adynamic in the spreading and other states of the disease about to be noticed, in cachectic conditions of the frame, and when the affection is a prominent complication of other febrile and exanthematous maladies. Pharyngitis presents certain characters or forms which deserve notice.

17. *B*. The *catarrhal* is generally erythematic or superficial, and extends more or less, with an abundant secretion, to the posterior nares, the fauces, and the tonsils. It often commences with coryza, and presents a marked tendency to extend to the larynx and trachea, and to be followed by pulmonary catarrh, or by bronchitis—especially during cold and wet seasons, and in changeable weather, or during easterly winds. In rare instances pharyngitis presents a distinctly *gouty* or a *rheumatic* character. Of these two forms the *gouty* is the more frequent, and is generally consequent upon attacks of indigestion, often connected with exposures to cold or wet, occurring in the gouty diathesis. The *rheumatic* is seldom observed, unless in connexion with rheumatism of the face or neck, and with biliary accumulations and disorder of the digestive organs. The association of pharyngitis with *erysipelas* is much more frequent than is supposed; but this, with other states and complications of the disease, will be more fully considered in the sequel.

18. *C*. The *terminations* of pharyngitis are chiefly by *resolution*, by *suppuration*, and by *gangrene*.—*a*. *Resolution* is the common issue in the catarrhal form, the superficial nature of the affection, and the abundance of the secretion from the surface, favouring this termination, which usually occurs in a few days, and is rarely prolonged beyond the fourteenth day. In most cases the inflammation is superficial, or erythematous; but in others the sub-mucous cellular tissue is also af-

feet, and the symptoms assume a greater degree of severity, the surface remaining longer red and dry, or subsequently becoming covered by a viscid secretion, which is detached only after great efforts and paroxysms of cough, sometimes attended by retchings.—*b. Suppuration* occurs in rare cases of pharyngitis, owing to the extension of inflammation to a portion of the cellular tissue connecting the pharynx to adjoining parts. This termination is usually announced by irregular chills or rigours, by a pulsating pain or sensation in the part chiefly affected, and sometimes by sweats. The matter is most frequently formed at the posterior portion of the pharynx, or at the sides, or even anteriorly. In all cases the abscess renders deglutition difficult or almost impossible; and in the latter situations it embarrasses respiration, and affects the voice and speech. The abscess may break spontaneously; but if it be not opened early, or when it cannot be reached, the matter may accumulate to a fatal extent, owing to its pressure on the larynx, or it may become offensive and contaminating, or it may find its way externally at the side of the neck, or it may break into the trachea, especially when it forms in the anterior or lateral parts of the pharynx.—*c. Post-pharyngeal-abscess* is a rare result of pharyngitis; and although it generally opens into the pharynx, it may follow the course just now stated; and it may, moreover, produce disease—inflammation, caries, &c., of one or more of the cervical vertebrae. This issue is most likely to occur in the complicated pharyngitis of exanthematous fevers, especially scarlatina, in which I have met with two instances.—*Gangrene* very rarely occurs in simple pharyngitis; but it is not an infrequent termination of the severe and complicated forms about to be noticed.

[The pharynx may be the seat of *scirrhus*, *tubercle*, or *encephaloid*. The latter is not unfrequently met with, and may cause death by mechanical obstructions. MAYO records such a case, where a scirrhus tumour was attached to the laryngeal surface of the pharynx, which gradually filled the passage, and destroyed the patient by inanition. A similar case has been recorded by Dr. JOHN WATSON, of N. Y. (*Am. Journ. Med. Sci.*). Occasionally *polypous* growths have been observed in this situation, as in a case described by Professor MONRO, of Edinburgh, where the polypus adhered to the fore part of the pharynx by a narrow root, and was of such a length as to be thrown forward against the incisor teeth whenever the patient retched. We have known one instance where the pharynx became *sacculated* at its junction with the œsophagus, forming a blind pouch. A sac has been found in this situation large enough to hold several ounces, and entrapping articles of food in their descent to the stomach.]

19. *D. Chronic Pharyngitis*.—The mild or slight state of the disease, as well as that which is more severe, although generally terminating in resolution in a few days, sometimes becomes *chronic*, or relapses so frequently, or returns after intervals, and thus assumes first a remittent or intermittent form, and then ultimately becomes more continued and chronic. In this state of the disease, difficulty of swallowing, uneasiness, soreness, slight pain in the posterior part of the throat, relaxation of the uvula, sometimes hoarseness of voice and speech, hacking cough, and either dryness of the throat or increased secretion from the pharynx, or an alternation of dryness and aug-

mented secretion, are the usual symptoms; and these commonly continue for a long period, with remissions and exacerbations, especially in persons suffering from, or subject to chronic inflammatory dyspepsia, or chronic bronchitis, or tubercular consumption. In some such cases, the chronic affection is readily excited to an *acute* or *sub-acute* form, by errors in diet, by cold or damp feet, by currents of air, or by any of the usual exciting causes.

20. III. INFLAMMATION OF THE THROAT WITH PLASTIC EXUDATION.—SYNON.—*Plastic Inflammation of the Throat; Pseudo-membraneous Inflammation of the Throat; Angina Membranacea; Diphtheritis*, Bretonneau. *Angina Plastica; Angine Diphthérique*; A. Couenneuse; A. Pseudo-Membraneuse, Auct. Gall. *Angina with pellicular exudation*.

CLASSIF.—As above.

21. DEFINIT.—*Soreness, pain and heat in the throat, often increased on deglutition; redness with an exudation of a buff or grey-coloured lymph in spots or patches, at an early stage; commencing in either the fauces, or the tonsils, or pharynx, and quickly extending to these, and often also to the larynx and œsophagus; the exudation becoming more continuous and firm, accompanied with fever, and appearing generally either epidemically or endemically*.

22. This disease has been confounded with *Croup*, on the one hand; with malignant angina or putrid sore throat, or *Cynanche maligna*, on the other. It is rarely seen sporadically, or in isolated instances; but chiefly in an endemic or epidemic form, owing to locality, season, weather, and exposure; and, even in these circumstances, the usual causes of inflammations of the throat have been concerned in producing it; more especially vicissitudes of weather, changes of season, cold and humid states of the air; low, miasmatic, and wet localities. It is most prevalent in children after weaning, and up to puberty; and it becomes less and less frequent with the progress of age. As this form of inflammation of the throat occurs endemically or epidemically, it has been viewed by some writers as infectious. The prevalence of it may, however, be assigned to local or more general causes, especially those just now mentioned. But as it is attended by much fetor of the breath, the emanations from the affected surface occasioning this fetor may infect the throats of young and susceptible subjects, especially when sleeping with, or inhaling the breath of those already attacked. It may thus extend to all or the great number of the children in a family, when one is affected.

23. i. *Description*.—The symptoms of plastic inflammation of the throat vary much at their commencement; in some cases beginning and advancing insidiously, in others more manifestly and severely. In many it occurs with all or most of the symptoms of a common catarrh or sore throat, either with or without chills or rigours. Generally slight soreness and pain are first experienced, with a sense of increased heat, and are increased on swallowing. Redness, of different grades, is seen in the soft palate, or its pillars or tonsils, and the uvula is relaxed. The inflammation sometimes commences in the posterior nares and extends to the pharynx, tonsils, &c.; but it more frequently begins in the tonsils and isthmus faucium, and extends to the pharynx, larynx, &c. Thus far the local symptoms are not different from



those of common sore throat; but the constitutional disturbance is frequently more severe; nausea, vomiting, heat of skin, thirst, loss of appetite, and great acceleration of pulse being most frequently observed.

24. *A.* The special characters of the disease now supervene with greater or less rapidity. The tonsils, the velum palati, the pharynx, either successively or at the same time, present irregular patches of a yellowish, buff, or grayish-coloured exudation on the inflamed surface. These patches enlarge, coalesce, and extend to the nasal fossæ, or to the larynx with the usual symptoms of primary croup (see that *art.*, § 32, *et seq.*), and often also to the œsophagus. In adults, the disease often commences in the nasal fossæ and extends to the pharynx. At the commencement of the fibrinous exudation, stiffness, soreness, and pain are experienced in the neck and throat. The face is pallid, sometimes red and swollen; the tonsils and the cervical and sub-maxillary glands are enlarged; and the neck is often also somewhat tumified. Deglutition becomes more difficult as the morbid exudation advances; and substances are frequently forcibly ejected through the mouth and nostrils, when attempting to swallow. On some occasions, when the disease has been epidemic, the parotid as well as sub-maxillary glands have been enlarged; and the membranous exudation has in a few hours extended over all parts of the throat, and occasionally over the cheeks and tongue. In some cases the morbid exudation has even appeared on the lips, in the nostrils, and behind the ears. With the development of the exudation the mucous surface, at its margin, is red and swollen. The patches become elevated, or partially detached in parts; and minute exudations of blood take place, which mix with a more or less abundant salivary discharge. The secretion in the mouth and throat is sometimes thick, viscid, frothy, and of a grayish or yellowish gray tint. In these cases it is often scanty and discharged with considerable difficulty. But in other instances, especially when the disease is very prevalent, the secretion from the throat is much more abundant, frequently serous, sanious, or sanguinolent, and always nauseous and fetid. In the more severe and asthenic cases these characters are very marked; and a similar discharge escapes from the nostrils, epistaxis sometimes also taking place. As the disease advances, the pellicular exudation becomes detached in parts, and is discharged with the saliva and morbid secretion. Very frequently the exudation is formed anew, on the surface from which a portion had been detached; and this reproduction of it may take place in the course of a few hours, and even for the third time, each successive exudation being more scanty or thin. The disease may continue in this state from eight to twelve days, the exfoliation of the pellicular exudation going on the greater part of the time. But sometimes the exudation softens, or breaks down, in the course of three or four days, or even in a shorter time mingles with the more fluid discharge from the inflamed surface, and is thus discharged, without presenting a continuous or membranous form. M. GUERSENT states that, when the exudation is only slight or partial, it is sometimes absorbed as the disease subsides, and is not thrown off. With the resolution of the affection of the throat, the swelling of the neck and of the glands and the painful symptoms subside.

25. *B.* The constitutional symptoms vary much with the vital energy of the patient, with the predisposing, endemic, and exciting causes, and with the character of the prevailing epidemic. In some cases, the disease presents a *sthenic*, or phlogistic, or sthenically inflammatory condition; in others, it is *asthenic*, or putro-adyamic, or intermediate between these extremes. The former occurs most commonly in sporadic cases, in strong or robust subjects, and in the well-fed, plethoric, and sanguine. In these the attending fever is inflammatory; the face is red or flushed; the pulse frequent, full, and strong; and the skin dry and hot. There are thirst, scanty urine, and costive bowels. The local symptoms are generally severe, and the membranous exudation is firm and continuous, and rapidly and largely developed. The latter appears chiefly in cachectic, weak, or delicate or ill-fed subjects; in low, close, and miasmatic localities; in over-crowded or ill-ventilated apartments, &c., and in epidemic visitations of the malady. In these circumstances the face is tumid, or bloated, or pale; the neck is swollen; the flesh soft or flabby; the pulse is quick, soft, small, or weak; the skin hot; and the excretions offensive, scanty, or irregular. The discharge from the mouth is serous or sanious, and extremely offensive; a similar discharge often taking place from the nostrils. In these the exudation is much less consistent, sometimes pulsatious, more readily breaks down and mingles with a more offensive and a more abundant discharge from the throat, than is observed in the sthenic forms of the malady.

26. *C.* A less acute, or a sub-acute variety—is a milder form of the disease—is sometimes seen, in which the local and constitutional symptoms are less severe, less rapid in their development, and more insidious at their invasion and in their early progress, than in the forms just described. In this the affection of the throat is either more confined to one part, or is attended by much less exudation and fluid secretion. The pain and difficulty of swallowing are not considerable, and the swelling of the neck and glands not very remarkable. The febrile symptoms are often slight, although the debility is frequently great. The symptoms of the disease, both local and constitutional, thus vary remarkably, according to the extrinsic and intrinsic circumstances of individual cases, and to the intensity of the causes, from the most mild to the most acutely and rapidly phlogistic, on the one hand, to the most putro-adyamic on the other.

27. *D. Termination and Prognosis.*—The pellicular forms of inflammation of the throat are all more or less dangerous. But the danger arises chiefly from the frequency of the extension of the inflammation to the larynx; a contingency which may occur in the most severe cases, even in a few hours, after the full manifestation of the malady, and which is more frequent in some epidemics and seasons, than in others. In many instances, the extension of the disease to the larynx, as described in the *art.* Croup (see § 12, *et seq.*), is the earliest indication of the nature and danger of the affection; the antecedent symptoms having been overlooked, owing to their mildness, or the very early age of the patient. The disease is most frequently fatal in these cases; and when it attacks delicate or badly nourished children, or those weakened by previous diseases. It is less dangerous in adults, unless the constitution has

become cachectic or debilitated, or injured by dissipation, or the blood contaminated by neglect of the depurating functions. In these cases, the morbid process may advance not only to the larynx, but also to the trachea and bronchi, and even to the pharynx and œsophagus. The intense state of the disease may *terminate* in twenty-four hours, when the larynx is implicated, but more frequently from the 3d to the 7th day. The less violent attacks may be prolonged until the 14th, or even the 21st day; but seldom beyond the latter period. The disease very rarely assumes a chronic form.

23. The termination of the disease by *resolution* is attended by detachment of the pellicular exudation, either spontaneously or by the aid of treatment. It most frequently occurs from the 7th to the 21st day; but it is often hastened even before the former period by local treatment. The grayish or brownish flakes of exudation, when detached, leave the mucous surface of the guttural fossa of a uniform red or rose colour, and covered in parts by a puriform mucus. The tonsils are often enlarged, or sometimes contain a small collection of matter. In some places, erosions appear, especially where the exudation was longest and most firmly attached; but these are either very superficial or illusory.

29. When the affection implicates the *larynx*, the patient is seized with a short, dry, sibillous, or wheezing cough, which recurs frequently in short paroxysms; and is soon followed by aphonia, and a sense of impending suffocation (see *arts. Croup*, § 12, *et seq.*, and *LARYNX*, § 55, *et seq.*). In children and infants, asphyxia with convulsions may rapidly terminate life; but, in adults, the disease more frequently is either arrested, or it extends along the trachea, the exudation becoming more fluid or less consistent, and assuming the appearance at first of a viscid mucus. It thus often advances to the bronchi on both sides, and sometimes terminates in *bronchitis* or *broncho-pneumonia*.

30. *E. The appearances after death* vary with the period of the disease at which dissolution occurred, and the states of vital power and of vascular contamination. If death have occurred at an early period, owing to the extension of the pellicular exudation to the larynx, the mucous surface and sub-mucous cellular tissue are more or less injected, the epithelium of the former being covered by a membranous exudation in more or less extensive patches. With the extension and *sthenic* character of the inflammation, the exudation is generally continuous, and is either firmly attached or partially detached, according to the duration of the disease. In the more *asthenic* cases, the exudation is more soft, pulpy, or broken down or mingled with a sanious or dirty mucus; the mucous and sub-mucous tissues being dark, livid, congested, sometimes ecchymosed or infiltrated with serum or blood, or with both, and often as if excoriated; the mucous surface being in numerous parts or spots deprived of epithelium, and eroded. These tissues are sometimes brown, livid, or of a dark gray colour, softened or friable, and emit a fetid odour. The cervical and sub-maxillary glands are much enlarged, of a brownish or violet red hue, softened, especially in their centres, and sometimes reduced to a pulpy or semi-fluid state, or to a sanious appearance nearly resembling wine-lees. The changes in this class of cases are very nearly the same as

those observed in the more malignant cases of the scarlatinous cynanche, and described in the article on SCARLET FEVER (see § 20, *et seq.*). The lesions found in the *larynx* and *bronchi* are similar to those described when treating of inflammation of these passages, and in the *Croup*.

#### 31. IV. DIFFUSIVE INFLAMMATION OF THE THROAT.

—*SYN.*—*Erysipelatous Cynanche. Diffusive Angina. Asthenic Angina. Simple and complicated Cynanche. Cynanche vel Angina simplex et associata.* [*Putrid, ulcerated, or gangrenous Sore Throat: Angina maligna.*]

*CLASSIF.*—As above.

*DEFINIT.*—*Soreness or pain, with redness of the throat, increased on deglutition, accompanied with fever, and often with a diffused swelling, more or less evinced internally and externally: the constitutional affection presenting more of the asthenic than of sthenic characters.*

32. *A. Causes.*—This form of *angina* or *cynanche* is often general, or diffused, when it comes under the observation of the physician; or it may commence in the arch or pillars of the palate, or in the posterior nares, or in the tonsils, or in the pharynx, and rapidly extend from either part to the others. It may be strictly *erysipelatous*, or be consecutive of *erysipelas* of the face; and I have seen instances of its occurrence from the inhalation of the breath of patients dangerously affected with *erysipelas* and *puerperal fever*. I have most frequently met with it in persons who have been previously attacked with scarlatinous sore throat in a very severe form, or who have been exposed to cold in some way while the digestive organs have been disordered, or the depurating functions impeded or interrupted; or who are living in low and close or ill-ventilated apartments, in over-crowded sleeping-rooms, or in houses the air of which is contaminated by foul privies, drains, or cess-pools, in which latter circumstances especially it often attacks several, or many persons, particularly the younger, in the same family, the delicate, ill-fed, or convalescent from other diseases, or others similarly predisposed. In these circumstances, it may be viewed as a primary or simple malady; but although it may appear as a primary, it is not a simple affection, but rather the more prominent manifestation of what is really a constitutional malady, organic nervous power and the vascular system and blood being more or less impressed and disordered. When thus apparently simple or primary, it may be either mild, or severe, or malignant, as well as when it is consecutive of *erysipelas*, or of *scarlatina*, or of small-pox, &c. In these latter or associated states, the *cynanche* may be said to be specific; and the specific forms may not be limited to the several *exanthematous fevers*, but extended to the *mercurial*, in which the tongue, gums, and salivary apparatus are particularly implicated, as described when treating of the *mercurial poisons* (see § 568, *et seq.*), and to the *syphilitic*, as shown in the article on *VENEREAL DISEASES*.

33. The infectious nature of the diffusive form of *cynanche*, as well as of that next to be noticed, has been affirmed by some writers, and disputed by others. This difference of opinion is chiefly owing to the circumstances under which both the one form and the other generally appear. The local causes most frequently originating diffusive *cynanche* independently of the scarlatinous infection are such as often affect a greater or less



number in one house or family; but instances have occurred of a person having transmitted the disease to others differently circumstanced as respects these causes; although it has rarely proceeded to a third series of subjects, unless the predisposing and existing causes were present, due ventilation and dilution of the contaminating emanation preventing infection. This form of cynanche, moreover, is very frequently a form merely of scarlet fever, the cutaneous affection being either wanting or overlooked; the spread of the disease being attributable rather to the fever than to the state of the throat. But when, in simple diffusive cynanche, the disease is severe or malignant, or is attended by any degree of fetor, the risk of infection should be dreaded, and the unaffected ought to avoid the inhalation of the breath of the affected; for I have seen this form of cynanche thus communicated when there was not the least evidence of a scarlatinous origin having been connected with it. This form of angina, moreover, may be caused by suppression of the catamenia; and it is not unfrequently favoured by, and complicated with, the gouty diathesis, and by biliary disorder.

34. *B. Symptoms.*—These vary with the causes, with their intensity or concentration, with the season, weather, and endemic or epidemic influences, with the predisposition and with pre-existing disorder. This affection may be slight, as in most cases of the catarrhal form. It is generally more severe in the morbillous or variolous states; and it is often most severe or even malignant or gangrenous in the scarlatinous and erysipelatous. Diffusive cynanche may be either mild or severe—also in the simple or uncomplicated states, or when it occurs independently of exanthematous infection, and is produced sporadically or endemically from the contaminating or poisonous causes already mentioned (§ 32, 33). It is, however, in the more complicated states, especially in the erysipelatous and scarlatinous, that the adjoining cellular tissues and glands are most liable to be infiltrated, contaminated, and softened; the organic nervous power to be depressed, and the circulating fluids to be altered. Generally in proportion to the severity of the local affection—to the diffusion of the inflammation—to the swelling, lividity, pain, heat, and difficulty of swallowing, and to the fetor of the breath, are the febrile symptoms developed; the pulse being quick or rapid, the heat of surface increased, and the secretions and excretions impaired, suppressed, or interrupted. But the defect of organic nervous or vital power is more especially manifested by the softness, openness, smallness, and the great rapidity, or the unusual slowness of the pulse; these varying states of pulse depending upon the quantity and quality of the blood, as well as upon deficient organic nervous power. With the lividity of the inflamed throat, with its diffusion to the pharynx and œsophagus, or even to the respiratory passages, on the one hand, and to the mouth and cheeks, Eustachian tube and internal ears, on the other, and with the swelling of the more external parts, the febrile symptoms generally present more and more of an asthenic character; and the blood more of an impure, imperfectly oxygenated, contaminated, or poisoned condition—a condition varying according to the nature and concentration of the exciting causes, and to the extent of impaired or interrupted depuration. In this advanced stage and low form

of the malady, the excretions become fetid, especially those from the bowels; the fetor of the breath is remarkable, and the urine scanty, high-coloured, and turbid. Sometimes diarrhœa supervenes and becomes critical, recovery either afterward taking place, or fatal exhaustion being produced by it, accordingly as it is treated, or as the constitutional powers resist its effects.

35. *C. The Duration* of this general diffusive form of cynanche is very various. If the respiratory passages become early affected, or if the disease assumes a very severe form, a fatal result may occur in the course of two or three days from the commencement of the attack; but this seldom takes place before the 5th or 6th day; and occasionally it occurs at even a much later period, owing either to vital exhaustion, to contamination of the blood as stated above (§ 34), to lesion of the respiratory passages and organs, or to changes in the nervous centres and their membranes. Recovery generally occurs from the 7th to the 14th day, but sometimes much later. *Relapses, or repeated attacks*, of the disease may take place; the intervals between them varying with the circumstances or causes producing them; and the malady may even, from these and other causes, thus assume somewhat of a *remittent* or *intermittent* form, or even become *chronic*, recovery or a more acute attack supervening after an indefinite period.

36. *D. Terminations and Prognosis.*—*Recovery* often follows early and decided treatment; the inflammation of the throat presenting a less livid hue, the swelling subsiding, and deglutition becoming more easy. When these changes are attended by an improvement in the states of the pulse and skin, and in the several secretions and excretions, then this result may be expected with certainty. More unfavourable symptoms even than those already mentioned sometimes appear, and indicate irritation of the nervous centres, either by the contaminating operation of the miasms causing the disease, or by the interruption of the depurating functions; the blood in either case being affected, and vital power depressed. These symptoms are convulsions in children; delirium and restlessness in young persons and adults; followed by stupor, coma, pickings of the bed-clothes, &c. These generally follow rapidly upon the extension of the inflammation, or rather of the local morbid action to the œsophagus, to the larynx, and trachea, or to the Eustachian tubes and internal cavities of the ears. The severity of the local symptoms, the diffused swelling produced by the infiltration of the sub-mucous cellular tissue, as well as by capillary injection and congestion, and the viscid exudation from the diseased surface, increase all the symptoms connected with deglutition and respiration, and often threaten, and sometimes occasion, death by asphyxia, especially in children and young subjects, convulsions often also accompanying this event. The danger is generally great in proportion to the difficulty of respiration, to the dark hue and swelling of the throat, to the fetor of the breath, to the tumefaction of the sub-maxillary regions and neck, and to the weakness, smallness, and frequency of the pulse. Lividity of the face, lips, and tongue; a dirty, dark hue of the general surface, and blueness of the fingers and nails, are commonly fatal signs. Suppression of urine, and involuntary or unconscious intestinal evacuations, are also indications of impending

dissolution, especially when they are preceded or attended by the foregoing symptoms.

37. The dark colour of the throat, the sanious discharge from the mouth, and the gangrenous or fetid odour of the breath, have induced a belief, especially among some writers of the last century, that *gangrene* or sphacelation of one or more of the parts affected supervenes and occasions death. But actual sphacelation of any of these parts rarely occurs during the life of the patient; although the swelling, sanious or sero-sanious infiltration, and softening of the parts, are sometimes initiative of this alteration, and approach it more or less soon after dissolution. In the rare cases in which sphacelation of a portion of the inflamed surface takes place, a slough usually sufficiently apparent is formed, and, if the treatment be active and judicious, it is thrown off, leaving an ulcerated cavity or loss of substance more or less manifest according to the amount of the disease. In these cases, the danger may be less (recovery sometimes occurring) than when the morbid action is more diffused; the constitutional symptoms, or those connected with the nervous and vascular systems, and with the state of the blood and of the excretions, evincing by their severity a greater amount of risk than is denoted by the local sphacelation. This alteration, instead of constituting a distinct variety of cyananche, is merely an accident, or result seldom supervening, and is as likely to occur in one form of the disease as in another, although it is consequent upon the severity of the local affection, whether that affection be simple, or complicated with scarlatina or scurvy, or any other constitutional malady. The *phagedenic* or gangrenous stomatitis, affecting in rare instances infants and young children (see *art. STOMATITIS*, § 24, *et seq.*), sometimes extends to the fauces and throat, if it be not quickly arrested, and the poisonous action of mercurials, particularly in this class of subjects, and in adults who are susceptible of this action, is occasionally exerted in the throat and mouth in this destructive manner.

38. *E. The associations or complications of inflammatory affections of the throat*, in their partial or more general forms, are very numerous. They are commonly at first *symptomatic* manifestations of a more general or of a febrile nature; and they not unfrequently become most troublesome and even dangerous complications, not merely from their severity, but also from their extension, as shown above (§ 36), to one or more of the passages leading from the throat to other organs, and even to those organs themselves. In the exanthematous order of fevers, and sometimes also in the more simple continued fevers, these affections are often most serious complications. They are still more particularly so in scarlet fever, and sometimes in erysipelas of the head and face. They are often present in scurvy and other forms of cachexia; and they are frequently associated with the inflammatory states of dyspepsia, and in gastro-enteric disorders, both acute and chronic. In many organic maladies seated in the abdominal and respiratory organs, chronic affections of the throat, and sometimes also of the mouth and tongue, often supervene, especially at a far-advanced stage of these organic maladies, and indicate depressed organic nervous power, and change of the circulating fluids; thus evincing an unfavourable and generally a fatal issue. The affections of the throat and

mouth, in the advanced course of these maladies, especially of tubercular diseases of the lungs, often assume an apthous appearance, and increase the distress of the patient.

[M. BILLARD (*A Treatise on the Diseases of Infants*, translated by JAMES STEWART) has called attention to the fact that the veil of the palate and the isthmus of the fauces, in young children, are generally red and injected, and that the whole pharynx is in a high state of congestion, its degree being in proportion to nearness to birth. In 200 children, aged from one to ten days, that had died from various diseases, he found the isthmus of the fauces injected in 190—the injection being generally uniform, but sometimes in the form of ramifications. The tonsils also partake of this congestion, showing the intimate connexion between the vascular system of the skin and that of the mucous membrane of the mouth, throat, and probably the whole intestinal canal.

Though it be sometimes difficult to recognise inflammation of these parts in young infants, for the reason just stated, yet it may be safely inferred, when the redness continues beyond the ordinary time of the disappearance of the congestion in young infants, viz., ten or twelve days; or when it occupies several points, instead of being spread uniformly over every part of the throat; or, lastly, when some of the other symptoms of cyananche exist at the same time with the redness, and it occurs at a time when the parts are not naturally congested.

If either this or the following form of inflammation occurs in infants, unless it be very slight, there will be difficult deglutition, regurgitations, or vomiting, with an expression of pain on attempting to swallow; tumefaction of the tonsils, with pain and tenderness of the neck on pressure, and an alteration of the cry and the physiognomy.

Inflammatory affections of the throat and fauces derive much of their importance from the fact that the same affections of the air-passages have their origin generally in the former, the inflammation extending by continuity to the respiratory tubes.

In disease, the mucous membrane lining the throat and air-passages becomes changed from the pale rose colour of health to a dark scarlet, purple, or violet colour, according to the form and insensibility of the inflammation; if acute, the red or violet colour is nearly equally diffused over the whole surface, while in the chronic forms it appears in irregular circumscribed patches, presenting highly coloured centres, which become paler towards their circumference. In some cases we find the membrane lining the throat and fauces swollen and of a bright red colour, pouring out mucus or pus upon its surface. In another, the membrane appears tense and much injected, and, instead of pouring out a mucous secretion, is dry and glossy. In a third form, the investing membrane is pale, relaxed, and cedematous, while serous infiltrations distend the sub-mucous cellular tissue. In another, there is plastic exudation, forming a dense adventitious membrane, as above described by our author. In most of these latter cases, there will be observed at a very early period white or ash-coloured patches of albuminous exudation spread over the fauces and pharynx, while the membrane not covered by them is of a deep scarlet or Modena red colour. They are not unfrequently mistaken for



superficial sloughs, and, when cautiously removed, the membrane will be found divested of its epithelial coat. • M. BRETONNEAU has recorded several cases where this false membrane extended down to the cardiac orifice of the stomach; while in other instances it lined the trachea and larger bronchial tubes.

There is still another form of disease of the throat, unnoticed by our author, which may be characterized as *follicular disease of the pharyngeal mucous membrane*, or *Follicular Pharyngitis*. This is *one*, and only *one*, of the forms of the disease which has been called *clergyman's sore throat*, to which we first called attention in an article entitled "An Enquiry into some of the Causes of Disease among the Clergy," and published in the "*Lit. and Theol. Review*," Sept., 1836. This affection has doubtless always prevailed to a greater or less extent, although from some unknown causes it has been far more prevalent since about the year 1830, when this country was visited by the influenza in an epidemic form. At first it appeared to be confined chiefly to public speakers, especially the clergy; but probably this was only apparent, inasmuch as this class would be more likely to apply for medical relief, in consequence of the inconvenience it occasioned in the discharge of their duties. Particular attention has been called to this disease of late, in consequence of its very general prevalence. Dr. HORACE GREEN has described it under the name of *follicular disease of the pharyngo-laryngeal membrane*, and *tubercular sore throat*, while Dr. POKEN has named it *Tubercles of the Larynx and Fauces*.

This disease consists essentially in inflammation of the mucous follicles, generally sub-acute, and terminating in hypertrophy, ulceration, or induration of these glandulæ, or infiltration of tuberculous matter into their substance. Whatever parts may be involved in the disease, it nearly always commences in the fauces and pharynx. *Follicular pharyngitis* is usually very insidious in its approach, and may exist for some time without causing particular inconvenience; at length, however, the voice grows husky, there is an uneasy sensation in the throat accompanied with frequent hawking and inclination to swallow, while there is a very copious secretion of viscid, opaque mucus poured out by the diseased follicles. There is rarely any cough, although there is more or less soreness about the region of the larynx. If we examine the throat at this stage of the disease, we shall find the mucous follicles hypertrophied, and the membrane injected, while the epithelial coat will have been more or less destroyed. If the disease have long existed, the follicles may be greatly enlarged, indurated, or filled with a yellowish substance resembling tubercular matter, while the membrane will be extensively covered with a layer of muco-purulent secretion. The disease may extend down the larynx, invading the vocal cords, when the voice becomes weak, hoarse, or husky, and may be wholly lost, or speaking is followed by a sensation of pain and soreness in the larynx, and there is more or less general as well as local debility. The absence of cough is a characteristic feature of this form of disease.]

39. V. TREATMENT.—i. OF TONSILLITIS.—The treatment of tonsillitis is nearly the same as that of other forms of angina.—A. At the commencement of the complaint *acidulous* and *demulcent*,

or *emollient fluids*, may be used; and the open mouth may be frequently held over a basin containing about half a scruple or scruple of camphor and an ounce of vinegar, on which about a pint of boiling water is poured, the patient directing the *fumes* from these towards the throat by placing half a sheet of paper before and above his open mouth, and under his nostrils, so as to allow respiration to be free. If the *vapour* from these excite cough (which it will not occasion if the paper be adjusted over the upper lip, so as not to allow the fumes to be respired by the nostrils) either the quantity of water may be increased, or that of the other ingredients diminished. A sufficiently active aperient and alterative pill ought to be given at bed-time, and a *purgative draught* in the morning; and the feet and legs should be plunged in warm water, containing salt and mustard, the *pediluvium* being repeated according to circumstances. In mild cases, or in delicate persons, these means, aided by *diaphoretics*, and by *embrocations* to the throat and neck, will generally be sufficient to remove the complaint; but in strong, robust, and sanguine habits of body, or when the febrile action is considerable, is sthenic or phlogistic, *venesection*, or *leeches* applied behind the ears, or both modes of depletion may be practised.\* In large towns, and in persons living in low, close localities, and in the insufficiently nourished, *blood-letting* is as often injurious as beneficial. For males, *cupping* on the nape of the neck—the quantity of blood taken by it having due reference to the state of the patient—should be preferred; but for females, neither this mode of depletion, nor the application of leeches to the neck, is eligible, on account of the marks which are left by them. For these latter, therefore, *bleeding* from the feet while they are plunged in warm water, or the application of a few leeches below the groins, especially if the catamenia be delayed, suppressed, or difficult, or scanty, should be preferred. I have never seen much benefit derived from the application of leeches to the neck in tonsillitis; and the recommendation of some writers to apply them to the inflamed tonsils is generally repugnant to the patient, and is seldom advantageous.

40. B. *Fomentations* and *poultices*, of an irritant nature by some, and of an emollient kind by others, have been advised; either of these may be of service, and either of these may be quite useless.† I have generally prescribed *terebinthinate epithems* and *embrocations* to be applied around the neck, two or three folds of flannel being moistened by the substances prescribed, and covered by a napkin or handkerchief. These substances, conjoined with the turpentine, have been varied according to the features of the case, as directed in various parts of this work, and in the APPENDIX (see *Form. 311*); and are beneficial in all the forms of angina. They may be so prescribed as

\* [We have found large doses of *Dover's Powder*, aided by a dilute warm solution of the *nitrate*, or *acetate of potash*, freely taken, very successful in arresting this disease. If inflammatory action runs high, a little *antimony* should be added. Free purging is indispensable, carefully avoiding all mercurials. If necessary, we apply leeches under the jaws and cups behind the ears. In many cases the treatment must be very active to prevent the formation of an abscess.—*Ed.*]

† [Dr. WATSON says, "The only gargle which is admissible, in the commencement of the malady, is one of warm milk and water." Dr. SOUTH recommends the steam of hot water, taken through an inhaler.—*Ed.*]

to produce erubescence of the external surface, or as not to occasion this effect, according to the intention of the physician. In addition to the use of laxatives and aperients, or purgatives, and of diaphoretics, it has been usual to prescribe *gargles* to the throat. I have seldom seen them of much service. But refrigerant and emollient fluids, in the severe and *sthenically* inflammatory cases, as the nitrate of potass, solution of the acetate of ammonia or muriate of ammonia and mucilage, in camphor mixture, may be taken frequently, and held in the throat for some time, while the head is thrown back, before they are swallowed, or before they are thrown out.

41. C. The more *asthenic forms* of tonsillitis occurring in weak, ill-fed, or cachectic persons, or in those weakened by a foul atmosphere, or by previous disease, ought not to be treated by local or by general blood-letting. After the excretions and fecal accumulations have been duly evacuated, organic nervous power and the depurating functions should be promoted by suitable means; and the local extension of the morbid action ought to be prevented by the applications which have been found most successful in attaining these ends. The action of the excreting organs should be increased by conjoining *tonics* with *aperients*, and these with the *alkaline carbonates*. These medicines may be taken at night or early in the morning, or at both periods; while the decoction of *cinchona*, with the compound tincture of cinchona and the solution of *acetate of ammonia*, may be given during the day. In many cases, the dilute *hydrochloric acid*, or the nitro-hydrochloric acids, or the pyroligneous acids, may be substituted for the acetate of ammonia; and each dose of such mixture may be held for some time in the throat, as just advised, before it is swallowed; or the same mixture may be used very frequently as a *wash* for the throat while the head is thrown back, and be afterward ejected. I have in these cases also prescribed the sulphate of quina with compound infusion of roses, dilute sulphuric acid, &c.; but I have had reason for preferring the medicines now advised, to this last. In the more *asthenic*—in the gangrenous, putro-dynamic, or malignant, as they have been termed—still more *astringent* and *antiseptic gargles* or *washes* for the throat may be prescribed, especially those with *krameria*, *capsicum*, sulphate of zinc, &c.; or those with the chlorides, or with chlorinated water or solutions; or others with decoctions of bark and pyroligneous acid or creasote. I have used with much advantage in those cases gargles and washes with strong *tar water*; and when this last is not too strong to swallow, then a portion of it will generally be taken into the stomach with manifest benefit. In these cases, also, the *fumes* arising from hot water poured over camphor, with myrrh, vinegar, or pyroligneous acid, and a little creasote, may be inhaled or passed into the throat, as directed above (§ 39), or the weak fumes of tar may be similarly used—or the vapour of hot water poured on tar.

[In this form of the disease, a strong solution of nitrate of silver (40 grs. to the ℥j.) will often prove useful, and there is reason to believe that in the first form an early application of the same would probably arrest its progress.]

42. Several other measures, besides those now mentioned, have been prescribed for tonsillitis. Dr. MONGE has advised the tonsils to be *scarified*; and in the more chronic and indurated states of

the disease this may be of service. M. RANQUE prescribed the *pyroligneous acid* to the inflamed tonsils; M. LAENNEC, of Nantes, the insufflation of *powdered alum*; M. BENNATI, *gargles*, with a strong solution of alum; and M. GUYTON-MORVEAU, powdered *carbonate of lime*. These, as well as other applications about to be noticed, are more beneficial in the chronic enlargement of the tonsils than in the acute or early inflammations of those organs. *Gargles* of various kinds have been advised by numerous writers since the days of HIPPOCRATES and of AVICENNA—cooling and emollient gargles in the more *sthenic* or *phlogistic* cases; warm, stimulating, and antiseptic gargles in the *asthenic* or *malignant*; and astringent gargles when the disease is attended by relaxation. *Dry-cupping* on the neck has been recommended by HIPPOCRATES, ARÆTEUS, PAULUS ÆGINETUS, KORTUM, and others; but to be useful it should be often repeated. *Emetics* were much used by the older writers in all inflammatory affections of the throat. They are most beneficial when such affections are complicated with torpor of the liver, or with biliary accumulations in the gall-bladder and ducts. When exhibited after the formation of matter in the tonsils, they generally occasion rupture of the abscess and immediate relief. *Blood-letting* has been very generally employed for the *sthenic forms* of guttural disease. HIPPOCRATES, CELSUS, ARÆTEUS, CÆLIUS AURELIANUS, ALEXANDER TRALLIANUS, AVICENNA, and many writers of the 16th and 17th centuries, advised the blood to be drawn from the sublingual veins; but the practice has fallen into so complete disuse, that no one at the present day is able to give an opinion as to its merits. Bleeding from the feet was likewise advised by many writers, but not so generally as bleeding from the nasal veins.

[We have frequently resorted to free scarification of the tonsils, in acute inflammation of the glands, with the best effects, and have seen no case made worse by this treatment. The scarifications should be shallow, and may be made with a palate-lancet, or a common bistoury, the edge of which is guarded nearly to the point. This operation, however, is not unattended with danger. WATSON mentions one case of fatal bleeding from a wound of the internal carotid, and another where very serious hæmorrhage occurred from this simple operation. LAWRENCE mentions a similar case from premature puncturing of the tonsil, to evacuate matter. Sir B. BRODIE relates two cases, where death from bleeding ensued from puncturing a tonsillar abscess. PORTAL, ALLAN BURNS, and TYRRELL, all mention similar cases. The incision or puncture, in these cases, should be made directly backward, or from without, inward and backward, to avoid puncturing the internal carotid artery. Accidents of this kind, however, are extremely rare, and will never happen if the above directions be followed. In most cases of tonsillar abscess, the effort of vomiting, excited by emetics, is sufficient to burst the walls and discharge the pus; but this is attended with so much suffering, that it is far better to open the abscess. After the matter has been discharged, soothing gargles, with honey, should be frequently used, and commonly they produce a speedy cure. Astringent gargles are best suited to cases where the swelling still continues, although the inflammation has subsided. The internal use of powdered *guaiac*, in doses of ʒss. ev-



ery six hours, has been recommended as a specific in the cure of tonsillitis.]

43. *D.* When the disease has passed on to suppuration or to *abscess of the tonsils* (§ 8, *et seq.*), as it generally does if the above means fail to arrest it in a few days, then the distention attending this state almost threatens suffocation, and the cough, difficulty of breathing, or the occurrence of retchings, &c., tend to rupture the abscess, and relief is obtained. But before the distressing symptoms occur, and as soon as fluctuation is felt on applying the finger, an incision should be made for the escape of the contents. Frequently the abscess bursts before the symptoms become urgent, and the disorder soon subsides. If this should not be the case, the local and constitutional means already advised should be persevered in; and, if a chronic remittent or intermittent state of the disease follow, the means about to be noticed will generally succeed in restoring the parts to a healthy condition.

44. *ii.* THE TREATMENT OF PELLICULAR OR PLASTIC INFLAMMATION OF THE THROAT has been the subject of much discussion both in this country and on the continent.—*a.* *Blood-letting*, general or local, or both, should be early employed, when the habit of body, age, and strength of the patient, and the sthenic character of the local affection and of the attending fever, indicate the propriety of the practice. But I have never seen much advantage obtained from too copious or too frequently repeated depletions in this malady. It should be recollected that the disease occurs chiefly in an epidemic form, and epidemics seldom require large depletions, even although vascular action may appear greatly excited. In these maladies the excitement greatly exceeds the amount of vital power. *Emetics* are more generally appropriate, and when blood-letting is proper, they should soon follow this measure, the terebinthinate *embrocations* already mentioned (§ 40) being applied around the neck and throat. *Purgatives* are of use, but of much less use than in the other forms of guttural inflammation. The bowels, however, should be kept in an open state throughout the disease by medicines taken by the mouth or administered in enemata, and all the depurating functions ought to be promoted.

45. *b.* The *local treatment* of plastic angina is of the greatest importance, and especially for the severe and rapidly spreading cases. For these the dilute *hydro-chloric* or *nitric acids*—the dilution being less in the most severe, and proportionably greater in the milder cases—should be applied by means of a piece of sponge firmly tied on the end of a piece of whalebone. Either of these acids, or a strong solution of the *nitrate of silver*\* [or *creasote*,] ought to be thus applied over

and around the parts covered by the pellicular exudation, and the application repeated according to its effects and the urgency of the case. It should be carried sufficiently down into the pharynx, and over the base of the tongue and epiglottis, to prevent the extension of the exudation to the larynx.\* In the milder cases, the *chloride of mercury*, or the *biborate of soda*, mixed in fresh butter or in honey, in the proportion of from one to two drachms of the former to an ounce of the latter, will prove quite as efficacious as the mineral acid or the nitrate. Having arrested the disease by these means, or having so employed them as to change the morbid action in the affected parts and to prevent its extension, the treatment about to be recommended for the next variety—the simple and complicated forms of diffused *cynanche*—may be pursued, appropriately to the features of individual cases. In most instances, the *fumigations* and *embrocations* advised above (§ 39, 40) will be sufficient to restore the local affection to health, when aided by the means requisite to promote the secretions and excretions, to allay febrile action when it is materially excited, and to support vital power when it is deficient. For these purposes the measures already mentioned and those about to be noticed are quite appropriate. MM. BRITONNEAU and GILLON at first advised the *insufflation* of a powder into the throat consisting of either the dried sulphate of alumina or chloride of mercury, mixed with powdered gum acacia; but it was found that the frequent passage of a portion of the powder into the larynx and trachea often occasioned unpleasant and even dangerous effects. The acids or the nitrate just mentioned—the former slightly diluted, the latter in strong solution, in the more severe epidemic cases—were therefore preferred by them and by others in this form of *cynanche*.

[Powdered *alum*, made into a paste with water and honey, and applied to the throat by means of a camel's-hair pencil or sponge probang, is often very beneficial. Great advantage will often arise from the use of a gargle made of salt, vinegar, and capsicum. A solution of chloride of soda or lime has been found useful. If the disease, however, be constitutional, little dependence can be placed on local measures only.]

46. *iii.* TREATMENT OF DIFFUSED CYNANCHE, SIMPLE AND COMPLICATED.—*A.* This form of the disease is so frequently dependent upon disorder of the stomach, or of the biliary functions, or of the bowels, or of all these, that it is very often necessary to commence the treatment with an *ipæacuanha emetic*, promoting its action by drinking a warm infusion of chamomile flowers. *Blood-letting*, in this state of the disease, is seldom required, unless in persons of a gross, plethoric habit of body, when it may be advantageously employed, the quantity and mode of depletion being adapted to the peculiarities of the case. After the operation of the emetic, a full dose of calomel should be given, either alone, or conjoined with other *purgatives* and aromatics or spices, or with camphor, and according to the character of the febrile symptoms, and be followed in a few

\* [In the application of the *nitrate of silver* in the follicular and other forms of pharyngeal inflammation, a solution of the crystals should be employed, the strength varying, according to the kind and degree of the inflammation, from one to four drachms to the ounce of distilled water. Where the follicles are enlarged and the disease has become chronic, the solution should be applied by the probang and sponge, at first every other day, for two or three weeks, afterward about twice a week, till the granular and vascular mucous surface assumes a healthy appearance. Where the diseased follicles are confluent, presenting a tuberculated form, they should be touched occasionally with the solid nitrate. Sometimes the mucous crypte in the posterior nares become diseased, causing a morbid and offensive secretion, which, falling down, keeps up an irritation in the posterior fauces. In such cases the disease may be reached by the curved syringe, using a solution of the nitrate of silver, of the same strength as before; or a piece of whalebone, bent to a right angle at a

distance of one inch and a half from the end, and armed with a small piece of soft sponge, may be carried back of the velum, so as to come in contact with the affected parts. The syringe, however, is the most effectual. If the *uvula* be permanently hypertrophied, both thickened and elongated, excision will be advisable.]

\* [In order to bring the pharynx fully into view, the spatula, bent to a right angle, should be employed.—*Ed.*]

hours by a stomachic purgative draught, and by a cathartic enema, if the operation on the bowels be insufficient. The *terebinthinate embrocations* and the *fumigations* mentioned above (§ 39, 40) should not be omitted, and the febrile or general disturbance ought to be treated conformably with the character which it may assume. In most cases I have found that, after the due operation of the above means, the decoction of cinchona, liquor ammoniæ acetatis, the sesqui-carbonate of ammonia, and compound tincture of cinchona, or the decoction with hydrochloric acid, &c., have soon removed all disorder. In most cases the *washes* and *gargles* of the throat already advised have also been of use.

47. *B. The Guttural Inflammations* which occur as *complications* of either local, general, or specific diseases, are of an asthenic or diffusive nature, and usually require the *tonic or restorative*, conjoined with the *alterative*, means already recommended. At the same time, the treatment appropriate to these ought to be enforced; and most commonly the measures which are the best suited to the primary disease are most beneficial for the guttural affection. In these complications, the *fumigations* of the throat, with stimulant and antiseptic substances, and *washes* or *gargles*, with similar or with astringent medicines (see § 41, 42), and *embrocations* applied externally as advised above (§ 40), are generally indicated and beneficial. The functions of the skin, kidneys, and bowels, ought to be duly promoted by conjoining such depurating medicines as the states of these functions may require, with tonics and alteratives; the best alteratives being those which depurate the blood, and at the same time neutralize or remove, or counteract morbid materials or elements which may accumulate in the blood, either previously to, or in the course of, developed forms of disease. Of these sufficient notice has been taken above, and in the article on the principles of THERAPEUTICS.

48. *C. The Diet and Regimen* for inflammatory affections of the throat differ very much in different cases. In the more *asthenically* inflammatory the regimen should be strictly antiphlogistic, and the drinks or beverages allowed ought to be refrigerant, demulcent, or emollient, either of these properties predominating according to the states of the skin and urine. When the guttural affection is *asthenic* or diffusive, the beverages or drinks may be more restorative; and when the affection is severe or malignant, or is attended by an offensive or putrid odour of the breath, then *vinum*, more or less diluted, may be given in the intervals between the exhibition of the *tonic and antiseptic medicines* mentioned above. The *diet and regimen*—or, rather, a successful adaptation of both to the intimate nature of the case—must be directed mainly by a correct interpretation of the states of the pulse and of the circulating fluids; and this interpretation can be attained only after close observation, profound thought, and diversified as well as extensive experience. The physician, thus enlightened, will adapt the means to the end, and will direct such diet and regimen as will be congruous not only with the state of the patient, but also with the internal and external remedies which are prescribed. Of the regimen, the most important part is the removal of the patient, from the operation of such miasms or exhalations as may have either caused or aggravated the complaint, to a pure or temperate and

dry air. In all cases, also, however slight, moderation in the use of animal food, or even a temporary abstention from this food, as well as from malt or other fermented liquors, should be enforced, unless when wine or other beverages or drinks of a restorative kind are allowed medicinally. Wine ought to be restricted chiefly to the asthenic, diffusive, and complicated cases of the malady. During *convalescence*, the diet should be abstemious, and chiefly farinaceous. As strength is obtained, particularly after the more severe and complicated attacks, the food should be generous but digestible; and change of air, tonics, and tonic and alterative mineral waters, ought to be prescribed. Travelling, voyaging, and exercise in the open air, will also prove extremely beneficial.

#### 49. VI. STRUCTURAL CHANGES OF THE THROAT AND TONSILS.

CLASSIF.—IV. CLASS, I. ORDER (*Author in Preface*).

*Structural Lesions* of the Throat and Tonsils are generally produced, 1st, by inflammation; 2d, by the syphilitic infection; 3d, by mercurial action; 4th, by the scrofulous diathesis and tubercular disease; 5th, by prolonged disorder of the digestive organs; and, 6th, by mechanical injury. These lesions may be confined to the tonsils, or to the pharynx, or to two or more of the parts forming the fauces and throat. Certain of them are noticed under the heads PALATE and UVULA, LARYNX, &c., and others are comprised under VENEREAL DISEASES, the *Mercurial Poisons*, and SCROFULA, owing to their being very important manifestations of these constitutional afflictions. In the brief view which will be here taken of structural lesions of the throat and tonsils, attention will be chiefly directed to those which are produced by inflammation, by disorders of the digestive organs, and by a cachectic or morbid diathesis, the exact nature and causes of which are often imperfectly ascertained. The *syphilitic* and *mercurial* sources of lesions of the throat are fully considered under the heads just referred to.

50. Organic lesions of the throat are most frequently the consequences of some form of inflammation—sthenic or asthenic, common or specific—the character, severity, or the duration of which is productive of alterations in the structure of one or more of the parts in which the inflammatory action has been chiefly manifested. These consequences are, suppuration or abscess; ulceration; œdema, or serous or sanious infiltration; ecchymosis; varicose state of the venous capillaries and congestion of vessels; exudations on the mucous surface of either an aphthous, pulpy, or membranous nature, with or without superficial ulceration or excretion; softening, tumefaction, pulpy degeneration and discoloration of the mucous and sub-mucous tissues; vesicular and pustular formations and ulcerations; phagedenic ulceration; sloughy or gangrenous disorganization, or sphacelation. These changes take place independently of either the *syphilitic infection* or the *mercurial poison*; although, in addition to the forms of ulceration and other structural changes peculiar to these poisons, certain of the alterations now enumerated sometimes acknowledge the same origin.

51. I. STRUCTURAL LESIONS OF THE TONSILS AND FAUCES have been partly considered above (§ 10, 24, *et seq.*). Superficial ulceration, relaxation of the fauces, elongation and œdema of the uvula, tumefaction and induration of the tonsils,



congestion or hyperæmia of the guttural surface, extending to the Eustachian tubes and to the glottis and rima glottidis, and increased mucous discharges from the affected surfaces, are the most frequent and the least serious changes which these parts undergo, and are generally the consequences of catarrhal inflammation, or of those less dangerous states of inflammation which depend upon disorders of the digestive organs, or which complicate exanthematous fevers, especially when the former of these become chronic, or frequently recur.—*A. Abscess* or suppuration has been already noticed (§ 8) as a frequent consequence of tonsillitis. It may also, although rarely, appear in the velum palati or the upper part of the fauces. *Edema* and *serous* or *sanious infiltration*, ecchymosis, and softening of the fauces and tonsils, are most commonly the effect of the more asthenic or adynamic states of inflammation, as remarked in the guttural inflammations attending scarlatina, erysipelas, &c., or are consequent upon stomatitis, especially when occasioned by the mercurial poison. In these circumstances, the affected surface may be covered by grayish, shaggy or pulpy, dirty or sanious exudations. The plastic exudation which characterizes the pellicular form of cynanche (§ 21, *et seq.*), and the changes consequent upon affections of the throat in scarlet fever, are described under their respective heads.

52. *B. Vesicular and pustular formations* are rarely seen, and only in the severer forms of small-pox. In these cases the mucous tissue is softened, tumefied, and often covered by a plastic mucous secretion. *Excoriations* and *exfoliations* of portions of the epithelium of the fauces occur in the course of many of the affections of the throat, and are often connected with the several states of exudation noticed at this and other places. *Ulceration* of the tonsils and fauces sometimes follows the detachment of these exudations, but not so frequently as is commonly supposed; nor is phagedenic ulceration, or superficial sphacelation often seen, unless after the poisonous action of mercury, and in the complicated and malignant states of cynanche, as already shown (§ 36–38). The rapidly-destructive ulceration which characterizes *noma* or phagedenic stomatitis sometimes extends from the gums and cheeks to the fauces. The more chronic forms of ulceration are chiefly consequences of scrofula, syphilis, and mercurial action, and are noticed in other places.

53. *C.* In addition to *enlargement* and *induration* of the *TONSILS*, these bodies may contain, in their lacunæ or in their structure, substances varying in appearance and hardness from that of tubercle, to that of indurated calcareous formations—or small calculi. They consist of concentric layers in some instances, and of agglomerated grains in others; are of a yellowish white or grayish hue; the more soft and friable resembling tubercular matter; the harder containing phosphate and carbonate of lime. They vary in size from that of a millet-seed to that of a pea, and are often spontaneously detached from the tonsil. They are probably the more permanent or saline remains of small collections of pus, or of small chronic abscesses in the tonsils. Some of these contain, with the ingredients just named, a little fatty matter and a coagulated albumen. *Cysts* and *acephalocysts* are very rarely seen in the tonsils; and *cancer*, in its several forms, is as

rarely found primarily in the tonsils, although it not unfrequently attacks parts in the immediate vicinity, and then often involves these organs. The tonsils and portions of the fauces may be destroyed by the ulceration produced by phagedenic stomatitis, or by syphilis, or by mercurial action, and be followed by cicatrization—the *cicatrices* ultimately contracting so remarkably the aperture of the fauces as not to allow the passage of the more solid kinds of food; but these occurrences are very rare. Fibrous *polypi* sometimes occur in the fauces, but much less frequently than in the posterior nares; and vary in form, as well as in firmness or softness. Their investing mucous membrane is generally spongy, is often ulcerated and disposed to bleed.

54. ii. ORGANIC LESIONS OF THE PHARYNX.—These consist chiefly of *alterations of calibre*, of the changes consequent upon inflammation—especially *exudation*, *softening*, *abscess*, and *ulceration*—and of *fibrous* and *malignant formations*.—(a) *Dilatations* of the pharynx may be general as respects the parietes of the tube, and extend to the upper portion of the œsophagus, the parts thus presenting a *funnel-like shape*; or they may be partial, one side or part of the pharynx having become so much dilated as to form a *pouch* attached to the pharynx. In this latter case the muscular fibres are stretched, ruptured, or wasted, so that the pouch consists chiefly of mucous and cellular tissues; but these tissues may have been pushed out between the muscular fibres, thus forming, in the first instance, a *diverticulum* from the pharynx that has ultimately become dilated into a pouch. The funnel-like dilatations are often the consequence of constrictions of some kind in the œsophagus. *Constriction* of the pharynx is generally a consequence of malignant disease, or of tumours pressing upon the pharynx and upper portions of the œsophagus, or of the cicatrization following ulceration.

55. (b) *Inflammatory changes* are most frequently seen in the pharynx. These consist chiefly of *croupy* or *plastic exudations*, as described above (§ 20) and in the *art. CROUP*; of *aphthous exudations* in cases of thrush; and of *pustular formations* in very rare instances, in variola or after tartar emetic has been given in excessive doses. *Exudations of blood* from the throat sometimes occur during catarrhal or other inflammation of the pharynx or fauces, especially when these are attended by much irritation of the glottis and severe cough. The blood generally is seen in streaks in the viscid mucous expectoration. When the lower portion of the pharynx is affected, and when there are retchings as well as cough, the discharge of blood is occasionally more considerable; and it is then difficult to determine whether it proceed from the pharynx, or the œsophagus, or the stomach, or even from the bronchi or lungs; and whether it is merely an inflammatory exudation or a consequence of ulceration. These points can be determined only by the history of the case, by a careful examination of the sputa, and by a due consideration of all the phenomena. *Softening* of the internal coats of the pharynx, and especially of the mucous and sub-mucous tissues, is seen in typhoid, exanthematous, and malignant fevers, and in scurvy and after the ingestion of caustic, alkaline or septic, or other poisons. *Abscess* or suppuration of the pharynx has been already noticed when treating of inflammation (§ 18). It may give rise to ul-

eration, and to still more extensive and dangerous alterations of parts in the vicinity, as shown above; but *ulceration* is much more frequently produced by syphilitic infection (*see* *VENEREAL DISEASES*). Ulceration generally takes place in the posterior portion of the pharynx, although it has, in rare instances, attacked the anterior or latter portions, and extended into the larynx or trachea.

56. (c) *Fibrous tumours* or *polypi* have been found in the pharynx, or implicating the upper region of it and the posterior nares; but they very rarely arise primarily from this portion of the alimentary tube. *Cancerous* or *carcinomatous* or *medullary formations* sometimes affect this part, but not so frequently as the œsophagus. In the cases of carcinoma of the pharynx which I have seen, the base of the tongue and the pillars of the fauces became implicated, and the canal or passage into the œsophagus narrowed, and ultimately so remarkably reduced as to render the conveyance of nourishment into the stomach most difficult or nearly impossible. The carcinomatous ulceration has in some instances been followed by fatal hæmorrhage before this change has supervened.

57. (d) *Foreign bodies* of various kinds, and especially the bones of fish or of other animals, may be fixed in the pharynx, or penetrate, partially or altogether, the parietes of the canal, and give rise to inflammation, abscess, &c. Foreign bodies of every possible kind may be swallowed or be attempted to be swallowed, and produce either immediate or more or less remote effects of a serious or dangerous nature, for which surgical as well as medical aid may be required—the former immediately, the latter subsequently. Of wounds of the pharynx it is not my province to speak.

58. iii. *Treatment of Organic lesions of the Throat.*—a. *Enlargement and Induration* of the tonsils are generally the consequences of neglect of the slighter forms of tonsillitis, of repeated returns of the disease, or of the chronic remitting forms already mentioned (§ 9, 10), especially when occurring in the scrofulous diathesis, and in delicate persons. For these states of disease numerous methods of cure have been employed. The scarifications and local means already noticed (§ 39, *et seq.*) may be first tried; and if these fail, the measures about to be advised may be employed, and modified according to circumstances, while the general health should be promoted by change of air, and by a suitable diet. But, with the promotion of health and strength, the several depurating functions must be regulated and severally increased. Tonic infusions or decoctions with hydrochloric or nitro-hydrochloric acid, or with pyroligneous acid, or, instead of acids, the alkalies and the iodide of potassium, or the chlorate of potass, may be severally prescribed. The local application, by means of a hair brush, of a weak tincture of iodine, or of a strong solution of the nitrate of silver, or of dilute nitric, or hydrochloric, or pyroligneous acid, has often been found of the greatest service, especially while the iodine ointment or terebinthinate embrocations have been applied externally.

59. b. *The removal* of enlarged and indurated tonsils has been advised since the days of CÆLUS down to the present time. Some surgeons have employed ligatures to the enlarged tonsil, others have had recourse to excision. Unless the enlargement have resisted scarifications and the

means already recommended, after a sufficient trial has been given, and unless the enlargement greatly impedes the voice, speech, and deglutition, I would not advise either of these operations to be performed; for, knowing that the functions of the tonsils are to secrete a lubricating fluid, for the superior orifice of the glottis, and for the epiglottis and pharynx, it necessarily follows that the extirpation of these organs deprives these parts of what is essentially requisite to the healthy discharge of their offices. Hence the throat becomes unpleasantly dry and husky. Voice and speech are thereby remarkably injured, and are incapable of being exerted for any considerable time. These effects I have observed to follow in numerous cases where the officious interference of surgeons has removed these organs. I have not known an instance of a female who had had a good voice who did not entirely lose it after the extirpation of the tonsils; and a similar result has often followed the excision of the uvula close to the velum palati.\*

[Where the tonsils are permanently enlarged and indurated, we have uniformly found local applications unsuccessful in reducing their size, and have resorted to excision as the only certain remedy. We have not often found it necessary to remove the entire gland; nor, when this only is done, is there any reason to fear that change in the voice, speech, and deglutition referred to by our author. In regard to the effects of the entire removal of the uvula, Mr. YEARSLEY states that the utmost pains have been taken to ascertain the results of the loss of the uvula, but in no one case can he find that the slightest inconvenience has arisen from its removal. Dr. H. GREEN also remarks, "In a large number of cases where I have found it necessary to amputate the uvula, I have not been made aware, in any instance, of the occurrence of inconvenience, either from its partial or entire removal. Ordinarily, however, I have not considered it advisable, in the operation, to

\* [Dr. F. H. Hamilton, of Buffalo, has published a history of fifty-two cases of enlarged tonsils, which he has extirpated (*Buff. Med. Jour.*, vol. iii., p. 189). In all the cases the glands were simply enlarged and slightly indurated, except in six or eight instances, where a few small tubercular deposits were found in them. Dr. H. has never seen them scirrhous or affected with any other malignant disease. In ten the enlargement was attributed to scarlatina, in seven to whooping-cough, in three to croup, and in eighteen to hereditary predisposition. Many of the patients had a scrofulous look, and some had enlargement of the cervical glands. The tonsillar enlargement was generally noticed between the fourth and seventh year of life. When left to themselves, Dr. H. thinks, enlarged tonsils will usually disappear before the twentieth year; but, as they predispose to tonsillitis, bronchial diseases, and croup, impair the general health, speech, and hearing, and cause dulness of intellect and petulance of feelings, &c., he advises their removal by excision. He has seen little benefit from other local means or general treatment. Excision should not be performed, however, when the tonsils are inflamed, unless the patient is threatened with suffocation, nor if the patient has a hæmorrhagic diathesis, nor if no other reason can be assigned than that they are enlarged. The operation may be performed at almost any age. Three operations were made on children two years of age. To check the bleeding a gargle of cold water will usually suffice, and if this does not succeed, apply snow or pounded ice or cold wet cloths about the neck, and especially opposite the seat of the tonsil. Dr. H. recommends the removal of the entire gland, as less likely to be followed by copious hæmorrhage. If one half only is removed, the enlargement, he thinks, is apt to go on. Neither the speech nor hearing is apt to be improved until after the lapse of months after the operation is made. Dr. H. has never known the speech or voice to be injuriously affected by the removal of the tonsils or uvula, nor any other inconvenience result from the operation.—*Loc. cit.*]



practice total excision, but have generally found it necessary, and quite sufficient, to remove the greater part of this organ."—*A Treatise on Diseases of the Air Passages, &c.*, New York, 1846, p. 209. This writer also states that he has not met with a single case where any serious inconvenience resulted from the subsequent hæmorrhage. One such case, however, was communicated to us recently by Prof. T. CHILDS, of Pittsfield, Massachusetts, where death was the consequence. Sir ASTLEY COOPER advises to remove only so much of the uvula as to reduce it to its proper proportions, believing that if the whole were removed, fluids could not be taken without their passing into the nostrils, and the articulation would be injured. Dr. SOUTH remarks that he does not advise it, because he knows it to be unnecessary; that "it is commonly sympathetic with irritations of the alimentary canal, and when that is quieted, the uvula resumes its ordinary length."—*Chelius's Surg.*, vol. i., p. 167. It often becomes very red, elongated, and swollen in the course of an hour, and by dropping on the epiglottis, excites a constant hacking cough, and frequently a sense of choking, which may be partially relieved by closing the mouth and breathing through the nostrils.

Dr. PARISU, of Philadelphia, has recorded two cases where the voice underwent a peculiar change from the excision of the tonsils. Here the voice was rendered shrill and whistling, and we have observed the same modification in other cases from the same cause.—*Trans. of the Coll. of Phys. of Phil.*, Nov. and Dec., 1841, and Jan., 1842.]

60. c. The treatment of organic lesions of the throat and tonsils consists chiefly of the early opening of abscesses or small collections of matter when these form, as stated above (§ 42, 43); of the employment of the local and constitutional means already advised when the tonsils remain enlarged and indurated; of the fumigations and washes, astringent, tonic, and antiseptic, when ulceration, softening, &c., affect any portion of the throat; and of the several means above directed, and the diet and regimen recommended for the asthenic and chronic forms, and for the usual consequences of guttural inflammations. In all cases, support of the constitutional powers, attention to the state of the bowels and kidneys, to the digestive functions generally, and to diet and change of air, are most important. Air, food, and water, are influential both in producing and in removing affections of the throat, whether functional or structural; and upon a judicious attention to, and avoidance or selection of these, appropriately to the nature of each affection, the success of treatment will mainly depend.

BIBLIOG. AND REFER.—*Hippocrates*, *Περὶ Νοσῶν*, Op. 464.—*Celsus*, lib. iv., cap. 4.—*Aræteus*, De Caus. et Sig. Acut. et Diut. Morb., lib. iv., cap. 9.—*Cælius Aurelianus*, Acut. et Chron. Pass. libri quinque, lib. iii., cap. 2.—*Amenæna*, Canon, lib. iii., fen. 9, tr. 1, cap. 8.—*J. A. Foglia*, De Faucium Uleeribus, 4to. Neap., 1563.—*J. Weir*, Med. observat. Rariar., lib. i., De Pestilentiali Angina, 4to. Basil, 1567.—*F. Nola*, De Epidem. Phegmone Anginosâ, grassante Neapoli, 4to. Venise, 1610.—*J. de Villareal*, De Signis, Causis, et Curatione Morbi Sudocautis, lib. ii., 4to, 1611.—*F. P. Cascales*, De Morbo Garrotillo Appellato, 4to. Madrid, 1611.—*P. Forestus*, Observat. et Curat. Medicin., lib. vi. et xv.—*J. A. de Fontecha*, De Angina et Garrotillo Puerorum, 4to. Alcalá, 1611.—*Mercato*, Consult. Morbi Complicati et Gravis. Frankfurt., 1620.—*J. A. Sgambati*, De Pestilenti Faucium adfectu Neapoli Sæviente, &c., 4to. Neap., 1620.—*J. B. Carnale*, De Morbo Strangulatorio Affectu. Neap., 1620.—*F. Nola*, De Epidemia Phegmâ Anginosâ Gr-

santi. Neap., 1620.—*A. Tamayo*, De Morbo Garrotillo. Madrid, 1622.—*L. Nunnez*, De Gutturis Uleeribus Anginosis, 4to. Seville, 1615.—*C. P. de Herrera*, De Scientia, Causis, Præsigio, et Curatione Faucium et Gutturum Anginosorum, 4to. Madrid, 1615.—*J. A. Foglia*, De Anginosâ Passione, 4to. Neap., 1620.—*T. Brancholt*, De Populâ, horribili ac pestilenti Gutturis et annexarum Partium Affectione. Naples, 1622.—*M. A. Severino*, De Pestilenti ac Præfocanti Pueros Abscessu, &c. Neap., 1641.—*Zacutus Lusitanus*, Opera Omnia. Lyon, 1642.—*J. D. Prosimi*, De Faucium et Gutturis Anginosis et Pestiferis Uleeribus, 4to. Messina, 1633.—*C. Sigerini*, De Morbo Strangulatorio, 4to. Rom., 1636.—*Riverius*, Observat., Commun., &c., p. 353. (*Calculi in Tonsil.*)—*M. A. Alaymo*, Discorso intorno alla Preservazione del Morbo Contagioso e Mortale che regna al presente in Palermo, 4to. Palerm., 1625.—*J. B. Cortesius*, Miscellan. Medicor. Decades duæ, lib. ix. De Pestilenti Angina, fol. Mess., 1625.—*G. G. de Pina*, Tratado del Garrotillo, 12mo. Zaragoza, 1636.—*T. Bartholinus*, Exercitationes de Angina Puerorum Campaniæ Siciliæque Epidemia, 12mo. Paris, 1646.—*Dodonæus*, Observat., cap. 8, 15. (*Abscess of the Tonsils breaking externally.*)—*Zacutus Lusitanus*, De Med. Princ. Hist., lib. i., Hist. 77. (*Caused by suppression of the Catamenia.*)—*J. H. Stark*, De Angina Alba seu Prunella, vulgo Weissæ bräune. 4 Reg., 1690.—*Bonnet*, Sepulchret., lib. ii., sec. xxiii. (*Assoc. with dis. of Liver.*)—*Malouin*, Histoire des Maladies Epidemiques Observées à Paris, in the Mem. de l'Academ. des Sc. de Paris, 1746, p. 151; 1747, p. 553; 1748, p. 531; 1749, p. 113; et Mem. de l'Academ. de Chirurg., t. v., pp. 423, 461.—*Garnier*, An Anginæ Gangrenosæ emeticum, &c., 4to. Paris, 1750.—*Boucher*, Lettre sur des Maux de Gorge Gang. epidemiques, in Recueil Périod. d'Observat. de Med., t. viii., p. 557.—*Raulin*, Des Maladies Occasionées par les Variations de l'Air, 12mo, p. 261. Paris, 1752.—*Astruc*, Lettre sur l'Espèce de Mal de Gorge Gangreneux qui a regné parmi les enfans l'année 1748, 4to. Paris, 1748. (*This and other histories of epidemic cynanche, prevailing throughout various parts of Europe during the middle of the eighteenth century, were strictly those of epidemic Scarlet Fever.*)—*J. Fothergill*, An Account of the Sore Throat, attended with Ulcers; a disease which hath of late years appeared in this city and in several parts, &c., 2d edit., 8vo. Lond. 1748.—*J. Wall*, An Account of a successful Method of Cure in the Ulcerated Sore Throat. Lond., 1751. (*Vapour of hot water with the fumes of vinegar, myrrh, &c., inhaled through the throat.*)—*M. Ghisi*, Lettère sopra le Angine epidemiche degli anni 1747, 1748. Cremona, 1749.—*Starr*, in Philosoph. Trans., 1750.—*J. Huxham*, A Dissertation on the Malignant, Ulcerous Sore Throat, 3d edit., 8vo. Lond., 1759. (*Advised chiefly tonic restoratives; preparations of Cinchona, and his Tinct.*, the *Tinct. Cinchona comp.*)—*M. Chomel*, Dissert. Historique sur l'Espèce de Mal de Gorge Gangreneux, &c., 12mo. Paris, 1749.—*J. S. Zapp*, Synop. Observat. Med. cum Hist. et Cur. Anginæ, 1746-176. 8vo. Lugd. Bat., 1751.—*N. Torriano*, A Histor. Dissertat. on a part. Species of Sore Throat among Children, 12mo. Lond., 1753.—*C. Colden*, Letter concerning the Throat Distemper, in Med. Observ. and Inquiries, vol. i., 8vo. Lond., 1755.—*Anon.*, Letter from a Bath Physician to Dr. Heberden on the Malignant Sore Throat, 8vo. Lond., 1758.—*J. Chandler*, Of the Dis. called a Cold; also of the Nature and Seat of the Putrid Sore Throat, 8vo. Lond., 1761.—*J. Johnstone*, A Treatise on the Malignant Angina, or Putrid and Ulcerous Sore Throat, &c., 8vo. Worcester, 1770.—*Morgagni*, De Sed. et Caus. Morb. cp., xlv., art. 3; lxiii., art. 16.—*P. Penrose*, Dissert. on the Inflammatory, Gangrenous, and Putrid Sore Throat, 8vo. Lond., 1766.—*P. A. Marteau de Granvilliers*, Descrip. des Maux de Gorge Epidemiques et Gangreneux, 8vo. Paris, 1768.—*S. Bard*, Researches on the Nature, Causes, &c., of Sore Throat, 8vo. New York, 1771.—*W. Fordyce*, A new Inquiry into the Causes, &c., of Putrid Fevers, with an Appendix on the Malignant or Ulcerated Sore throat, 8vo. Lond., 1773.—*W. Grant*, Account of a Fever and Sore Throat in London, 1776, 8vo. Lond., 1777.—*Read*, Hist. de l'Équinancie Gangrénense de Moivron, 8vo. Paris, 1777.—*G. Levison*, An Account of the Epidemical Sore Throat, 8vo. Lond., 1778.—*W. Saunders*, Observat. on Sore Throat and Fever, 8vo. Lond., 1778.—*R. Saunders*, Observat. on the Sore Throat in the North of Scotland in 1777, 8vo. Lond., 1778.—*Meza*, in Acta Regia Soc. Reg. Med. Haun., vol. ii., p. 326.—*Musgrave*, De Arthritide Anomala, cap. 13. (*In the Gouty diathesis and complicated with Gout.*)—*Weiss*, De Angina Juvenum ex tarda et difficili Eruptione Dentium Sapientia, 8vo. Leip., 1776.—*T. Skeete*, Experiments on Bark, with remarks on Putrid Sore Throat, 8vo. Lond., 1786.—*W. L. Perkins*, An Essay for a Nosological and Comparative View of the Cynanche Maligna, 8vo. Lond., 1787.—*W. Rowley*, Essay on the Malign. Ulcerated Sore Throat, 8vo. Lond., 1788.—*T. Reeve*, An Essay on the Erysipelatous Sore Throat, 8vo. London, 1789.—*J.*

Clark, Observat. on Fevers, &c., and on Ulcerated Sore Throat, svo. Lond., 1792.—*T. Johnson*, Dissert. on the Putrid Ulcerated Sore Throat, svo. Philadelphia, 1793.—*Goesche*, de Ang. Inflamm. et Catarrh. ab Menstruorum Suppressionis Nata. Jenæ, 1798.—*E. Peart*, Practical Informant, on the Malignant Sore Throat, svo. Lond., 1802.—*Renaudin*, Dict. des Sc. Méd., t. ii., art. *Angine*.—*Guerent*, Dict. de Méd., t. ii., art. *Angine*.—*P. Bretonneau*, Des Inflamm. Spéciales du Tissu Muqueux, &c., svo. Paris, 1823.—*Sackse*, Encyclop. Wörterb., b. ii., art. *Angina*.—*Roche*, Dict. de Méd. Prat., vol. ii., art. *Angine*.—*Conenense*.—*Tweedie*, Cyclop. of Pract. Med., vol. iv., p. 175.—*E. Gendron*, in Journ. Complément. des Sc. Méd., t. xxiii., p. 346, et t. xxx., p. 269. (*On Pellicular or Plastic Angina*).—*Deslandes*, in Journ. des Progrès des Scien. Méd., t. i., p. 152. Paris, 1827.—*Billard*, in Archives Génér. de Méd., t. x., p. 491. (*On the use of Calomel in Pellicular Angina*).—*Lessine*, in Ibid., t. xlii., p. 519.—*Emargard*, Mem. sur l'Angine Epidémique ou Diphtérie, svo. Paris, 1829.—*Brunet*, in Ibid., t. iii., p. 536. (*Contagious*).—*Schmidtman*, Observ. Medicæ, t. ii., p. 1. (*Simple and complicated Angina*).—*Mayer*, in Dublin Journ. of the Med. Scien., Sept. 1837, p. 126. (*Cases of Plastic Angina*).

[AM. BIBL. AND REF.—*Horace H. Hayden*, On Diseased Tonsils, in N. Y. Med. Repository, vol. i., New Series, p. 128, 231, 323.—*Horace Green*, A Treatise on Diseases of the Air Passages, &c. N. Y., 1846, p. 270.—*James Stewart*, A Practical Treatise on the Diseases of Children, 3d ed., svo. N. Y., 1845, and translation of Billard.—*S. D. Gross*, Elements of Path. Anatomy, svo. Phil., 1845.—*D. F. Condit*, Am. ed. of Watson's Lectures on the Prin. and Prac. of Phys., 3d ed. Phil., 1850, p. 491. (Dr. C. speaks very favourably of the frequent application of the Iodide of Zinc to enlarged tonsils to promote their rapid absorption. See *Trans. Coll. Phys. of Phila.*, No. vii., p. 191.)—*John Bell*, Lect. on the Theory and Prac. of Physic, 2 vols. Phil., 1848. (Dr. B. has given a very full and able account of this disease under the names of *Angina Membranacea* and *An. Mem. Maligena*, to which the reader is referred for further information.)—*G. B. Wood*, A Treatise on the Practice of Medicine, 2 vols. svo. Phil., 1847.—*Ira Warren*, in Bost. Med. and Surg. Jour., 1852.—*Joseph A. Galup*, Sketches of Epidemic Diseases in the State of Vermont, svo. Boston, 1815. (Dr. G. describes the "*Scarlatina*," "*Malignant Sore Throat*," or "*anker Rash*" as very prevalent in New England from 1783 down to his own times. It was very fatal between 1787 and 1790, and went by the name of *Throat Distemper*.) See N. Y. Med. Repository for notices of this disease, and N. Eng. Jour. Med., also Bost. Med. and Surg. Jour., and Am. Jour. Med. Sci.—*F. H. Hamilton*, Buffalo Med. Jour., vol. iii., p. 189.]

THRUSH.—*SYNON.*—*Aphthæ* or *Aphtha*, Ἀφθαί, Hipp., Gal. (from ἄπτω, I inflame). *Pustule Oris*, Hal. Abbas. *Ulcuscula Oris*, Auct. *Stomacaceæ*, Ploucquet. *Alphtha*, Sauvages. *A. Infantilis*, Plenck. *Aphtha*, Vogel. *Aphtæ*, Pincl. *A. Lactantium*, Bateman. *Cystisma Aphthosum*, Typhus Aphthoides, Young. *Emplysis Aphtha*, Good. *Aphthes*, Muguet, Fr. *Schwämmchen*, *Mundschwämmchen*, *Mehlhund*, Germ. *Afte*, Ital. *Thrush*.

CLASSIF. — III. CLASS, I. ORDER (Author in Preface).

1. DEFIN.—Numerous white curd-like specks or exudations on the tongue and insides of the lips, gradually spreading to the interior of the cheeks and fauces; preceded and attended by fever or constitutional disturbance, and very often symptomatic of disorder of the digestive organs, or of structural disease.

2. *Thrush*, or *Aphthæ*, was divided by Dr. M. Good into three varieties: 1. *Aphtha Infantum*; 2. *A. Maligna*; 3. *A. Chronica*. The first and second differ chiefly in the degree of vital depression by which each is attended. The third variety is always symptomatic, generally of structural disease. The first has been considered as a primary or idiopathic affection by some writers, but this may be viewed as somewhat doubtful, for it is very generally preceded by disorder of the digestive functions, and by more or less constitutional disturbance; and hence it may be viewed as contingent upon, or as a peculiar manifestation

of, such disorder. It has been often mistaken for, or confounded with, the erythematic, the pseudo-membranaceous, and the ulcerated forms of STOMA-TITIS (see that article), from which it is quite distinct. In the true thrush there is neither pustulation nor ulceration, but an exudation, at numerous points, of a white, curd-like matter, enlarging and spreading more or less along the buccal, pharyngeal, and œsophageal mucous surface.

3. i. CAUSES.—This disease may attack all ages, but with a very different degree of frequency. It is most common in infants, especially those at the breast or only a few months of age. In these, particularly in the two first months of existence, it has been viewed as an idiopathic affection. However, this view is merely conventional, and may be entertained in respect of this affection with a considerable share of justice. M. VERON believed that this disorder may even affect the fœtus. I am not, however, aware whether or no it has been seen in any case at the time of birth. It is rarely observed in adults, and still more rarely in aged persons. When it occurs at a more advanced period than that of early childhood, it is generally symptomatic of, or at least complicated with, some visceral disease. It occurs most frequently in children of a feeble constitution and in those who breathe an impure air. The seasons have no very manifest influence in causing it. M. VALLEIX, however, considers it to be most prevalent in hot seasons. VAN SWIETEN says that it is rarely met with in very cold and very warm climates, but apparently from insufficient evidence. M. GUERSENT remarks, that in temperate countries it is somewhat more frequent in cold and wet seasons, and when catarrhal affections are most prevalent. This seemed to be the correct opinion; but the crowded or ill-ventilated wards of lying-in, or children's hospitals, and even such wards, however well aired; low, humid, and close apartments and localities; insufficient, unwholesome, and inappropriate nourishment; and whatever impairs the vital powers, are the chief causes of this affection, especially in children. Hence it is frequently observed in those who are attempted to be brought up by hand, or who have sickly nurses with poor or unhealthy milk; in the children of ill-fed or drunken mothers, and in those who are suckled by nurses with inflamed and irritable nipples. BOERHAAVE attributed the affection to protracted suckling in many cases, and to the prematurity or improper use of purgatives. It does not appear to be infectious or propagated from one child to another, although it may be produced in more than one by the unhealthy state of the nurse's breast or milk.

4. ii. SYMPTOMS.—According to M. VALLEIX, the thrush is very often preceded by erythema of the groins and the posterior and upper parts of the thighs, which may have existed several days before the affection of the mouth appears. This is certainly the case in many instances, and is an indication of irritation, or a disordered state, of the digestive mucous surface, the circulating fluids being also imperfectly elaborated, or containing excrementitious elements. At the commencement of the complaint, redness, dryness, and heat are perceived in the mouth, and the infant evinces pain, fretfulness, or restlessness, or even disinclination to seize the nipple when applied to the breast of the nurse. At this time, dryness of the skin, frequency of pulse, and various other febrile phenomena are present. This may be called the



first or erythematic period of the disease, and is almost identical with erythematic stomatitis—*Stomatitis erythematica*. (See STOMATITIS, § 3, *et seq.*)

5. *A. The characteristic features of the disease, the eruptive or second stage*, is shown by whitish points or minute white specks in the surface of the inflamed membrane. These specks first appear on the point of the tongue and on the insides of the lips and cheeks. They soon increase in number, enlarge, the nearest uniting and forming irregular but thin small patches, which remain separate or distinct, are after a time detached, and again renewed. As long as these minute albuminous exudations continue distinct—*aphtha discreta*—the complaint is comparatively mild; but they are successively thrown off in thin flakes, the inflammation subsiding at periods varying from seven days to three or four weeks. In severer cases, however, the patches of albuminous exudation increase in size and thickness, unite or run into each other, forming one continuous coating; and extend over the tongue, fauces, and pharynx—*aphtha confluens*. In these cases, the cream-like albuminous exudation covers the greater part of the mouth and fauces, becomes daily thicker or deeper; and, when it is thrown off, the mucous surface, deprived of its epithelium, reproduces a new exudation, softer and more curd or cream-like than the former. The colour of this is at first white, but it becomes yellowish in the course of a few days, the child being more and more enfeebled and emaciated. The pulse is now quick, weak, and small, the stomach irritable, the bowels disordered, and emaciation increased. Subsequently vomitings occur, the matters ejected being mucous, curdy, and of a yellowish or greenish tint; and the substances taken into the stomach being hardly changed. Diarrhœa often supervenes, with extreme prostration; but death sometimes takes place before diarrhœa becomes apparent or at least urgent, owing to the severity of the gastric symptoms, to the impossibility of deglutition, and the rapidly progressive exhaustion. In these cases the surface of the œsophagus, stomach, and duodenum presents a similar appearance to that of the mouth and throat, the villous coat being covered by numerous dirty, grayish, or yellowish elevated specks or patches of exudation; and the villous and sub-villous cellular tissue being injected, tumid, softened, and most readily torn or detached from the muscular coats. When diarrhœa takes place and becomes urgent, and especially if termina, straining, or dysenteric symptoms occur, the aphthæ disappear, almost or altogether from the mouth, the vomitings frequently cease, and food is sometimes even taken and retained. But the evacuations are frequent, painful, mucous, or curdy, sometimes streaked with blood, or contain shreds of lymph or exudation, and are often offensive or emit an acid odour. Excoriations appear at the anus, the sphincter being irritable and constricted, and miliary pustules occasionally break out in different parts of the body. Although in these the duration of the disease is protracted, the ultimate result is not much more favourable than in the former class of cases.

6. *B. After death* the small and large intestines present the most marked indications of change; the appearances of these viscera, as well as the symptoms during life, showing that the disease which had originated in the mouth had traversed

the œsophagus, stomach, and the whole intestinal canal, the upper portions of this canal having been more or less restored to a healthy state after the lower portions had become affected. The bowels are covered interiorly by a pulpy exudation, more marked in some places than in others, and of a yellowish gray or brown tint. The villous and sub-villous tissues are tumid, softened, and very lacerable, the epithelium being thickened and opaque. Whether the morbid exudation be external to, or beneath, the epithelium has been a subject of discussion. According to my own observation, it appears to take place beneath this covering in some situations, especially in the mouth and at the anus, where the epithelium is more fully developed, and above or externally to it in other situations, and to be attended by a thickening or a detachment of the epithelium in most places.

7. *C. The nature of Aphthæ* has been discussed by several recent writers referred to hereafter. Aphthæ is so very closely allied to the plastic forms of stomatitis and cynanche, as to warrant the opinion that it is merely a modification of these, resulting from the age, constitution, strength, habit of body, &c., of the patient, in connexion with the extrinsic causes and influences producing it. According to the ages, habit of body, states of the circulating fluids, and to various external influences, aphthæ, the allied affection, named muguet or blanchet by French pathologists, plastic stomatitis, pseudo-membraneous cynanche or quinsy (the diphtherite of BRETONNEAU), and croup, are merely varieties of one disease marked by different grades of acuteness, by the sensible qualities of the morbid exudation which chiefly characterize them, and by the parts on which this exudation appears, and to which they severally are most prone to extend. While aphthæ, muguet, and plastic stomatitis, on the one hand, most frequently occur in infants at the breast, oftenest arise from intrinsic causes, and most frequently extend to the alimentary canal; pseudo-membraneous cynanche and croup, on the other hand, more frequently affect older infants and children, oftenest proceed from extrinsic causes and influences, and most frequently extend to the respiratory passages.

8. *Muguet or Blanchet*, which several writers have considered as a distinct affection from aphthæ, and from plastic stomatitis and cynanche, is merely a modification of these; or it holds an intermediate place, approaching very closely to aphthæ in its sensible characters, and in its marked disposition to extend along the alimentary canal; and presenting appearances allied to the plastic or pseudo-membraneous forms of stomatitis and cynanche, especially as respects the morbid exudation, as seen in the mouth, or in other parts of the digestive tube. Thus the variety of these affections, termed *Muguet* by French pathologists, may be placed between aphthæ and plastic stomatitis, with which, as well as with pseudo-membraneous cynanche and with croup, it presents very intimate relations.

9. All the affections now named are to be viewed not merely as simple inflammations of the mucous surface or membrane in which they are seated or to which they extend, but also as special or peculiar in their states or characters, particularly in the superficial nature of the inflammatory action; in the plastic condition of the morbid exudation, varying, however, in consist-

ence, cohesion, colour, &c., in each affection; in the manner in which the epithelium of the affected surface is involved in the exudation; and in the marked disposition they all possess to extend along the mucous surfaces, without materially affecting subjacent tissues. These characteristics, especially the disposition to extend continuously, and the states of the morbid exudation, may be ascribed to impaired, or originally deficient vital power, allowing the extension of the morbid action; to an imperfect power of limitation or vital resistance; and to the condition of the circulating fluids, these fluids abounding most probably in albuminous and imperfectly assimilated elements and materials, and being deficient in hæmotosine or duly developed blood-globules.\*

10. *D.* Recent microscopic observers have detected in the cream-like exudations of aphtha, especially in the advanced and most unfavourable states of the malady, when vital power is most depressed, *parasitic vegetable productions* of the most minute and lowest forms. These parasitic formations appear during life in these states of the disease, or immediately after death; and when they form during life they multiply remarkably after dissolution. They can be viewed only as the evolution of the lowest grades of organization in the morbid secretions which take place from surfaces during the most depressed conditions of vitality, and upon the departure of the vital manifestations from the several textures of the body; their multiplication taking place with remarkable rapidity, especially on the more exposed surfaces. They belong to the class *Cryptogamia*, and are low forms of *algæ* and *fungi*. These, which appear on the mucous surface of the mouth and digestive canal, are chiefly the following: 1st. *Oidium albicans* (BERG, VOGEL, ROBIN); *Aphthophyte* (GRUBBY); the *cryptogamia* of aphtha and diphtheritis. 2dly. *Sarcina ventriculi* of GOODSIR; the *Merismopædia ventriculi* of ROBIN. 3dly. The *Leptothrix buccalis* of ROBIN; *algæ* of the mouth. 4thly. The *Cryptococcus cerevisiæ*, KUTZING; the *Torula cerevisiæ* of authors; the yeast-plant. Of the opinions lately entertained as to the formation of these and other parasites some notice will be taken when those which form in *TINEA* are mentioned.

11. II. TREATMENT.—The means commonly resorted to by the ancients for this disease were in many respects the same as those employed in the present day.—*A.* CELSUS advised alum in honey as a local application for aphtha; and AVICENNA subsequently, and LINDT and STOLL in modern times, recommended the same. Honey, myrrh, crocus, and various detergents were prescribed by PAULUS ÆGINETA; and aromatic tinctures with honey, by RIEDLIN. Borax and other detergents were employed, in mucilage, by ACKERMANN, in honey by GOOCH, with cinchona, in hon-

ey by LOEFLER, and in sirup of roses by STARKE. Camphor was used locally in honey by AVICENNA, and the sirup of mulberries by RIEDLIN. The pomegranate fruit and bark were also employed locally by ACTUARIUS; the sulphate of zinc was similarly prescribed by REIL and HERZ. Emetics were recommended by HUFELAND; and when the sulphate of zinc is used locally with honey or sirup of roses, a portion of it is sometimes swallowed and acts as an emetic. Absorbents were mainly relied on by HARRIS and CHALMERS; and the mineral acids, chiefly the hydrochloric, by GRANT and many others.

12. *B.* The treatment of aphtha should be *hygienic and medicinal*—local as well as constitutional or general. Unless *hygienic* measures be judiciously prescribed, the local and general medicinal treatment will generally be inefficacious. The *causes* which have produced the complaint ought to be removed as completely as possible, and the patient placed in a dry, temperate, and open situation in a well-aired apartment. Change of air is in most cases more or less beneficial. The nourishment should be prescribed with care; and if the child be still suckling, the milk and health of the nurse ought to be objects of particular attention. The age of the milk, the habits and functions of the nurse, and the state of her nipples, require examination. If the nurse have suckled long, or if she be intemperate, delicate, unhealthy, or cachectic; if the catamenia have been present, or if the nipples are sore, another nurse should be obtained. If the child is being or about to be weaned, it may be necessary to defer the weaning for some time, if the nurse be healthy; but if the complaint be then or at any other time attributable to the state of the milk, another nurse must be immediately sought for. If this intention cannot be accomplished, or if the child have been weaned, the disease having been occasioned by the change of nourishment, or by improper food, ass-milk or goat's milk, warm from the animal, should be given in quantity or states of dilution, which the peculiarities of the case, or the effects produced, will suggest.

13. *C.* The medicinal treatment, local and constitutional, must depend chiefly on the causes of the affection, on the age, strength, and circumstances of the patient, and on the history and complications of the case. In most instances of this disease, local as well as constitutional remedies are required, the former to correct or remove the local affection, the latter to improve the strength and the digestive and nutritive functions. Washes and lotions for the mouth, to be used by means of a piece of sponge firmly attached to a stick or whalebone, when the child is too young to rinse the mouth with them, are generally required; but the selection of these should depend much on the peculiarities of the case. The biborate of soda conjoined with honey is most commonly used. When the biborate is freely employed it readily cleans the mouth, separates the morbid exudation, and destroys the parasitic production that often appears; but if much of it be swallowed, it irritates the stomach and bowels. If these be already in a state of irritation, the local means which are least likely to increase that irritation or most likely to remove it ought to be prescribed. In such cases weak solutions of chloride of lime, or chlorinated soda, or chloride of zinc, may be used as now advised; or a solution of the nitrate of silver, applied by a pencil

\* [The *Aphtha adutorum* of BATEMAN is a distinct disease from the above, being vesicular, and usually appearing on some of the same parts as the thrush of infants, particularly the edges of the tongue and fauces. If the vesicles be observed before the cuticle is ruptured, the fluid they contain is generally found more or less coloured with sanguineous discharge from the denuded cutis; but when they become broken, the collapsed cuticle exhibits a whitened appearance and adheres to the affected surface, thus exhibiting some resemblance to thrush. The diseased surface is very irritable and tender, and superficial sloughs, to which the cuticle becomes attached, are formed, which do not readily separate. A viscid, offensive discharge takes place, and often excites considerable nausea or vomiting.]



or sponge, as already recommended; or mucilage, or honey, or sirup of roses containing diluted sulphurous or muriatic acid, may be employed in a similar manner. The chief objection to these latter is, that when they are swallowed in any considerable quantity they often occasion severe griping pains, or increase existing disorder of the bowels. Dilute pyroligneous acid with minute doses of creasote may be tried in the same way as the preceding, or lemon juice may be substituted for the acid. Dr. JENNER has recently recommended the solution of a drachm of the sulphite of soda in an ounce of water, as a wash for the mouth when the parasitic formations are developed. Many years ago I generally directed at the Infirmary for children a confection composed of powdered liquorice root, honey, and a small proportion (about  $\frac{1}{2}$  to  $\frac{3}{4}$ ) of spirits of turpentine; and my experience has convinced me of its superiority over other means in the larger number of cases.

14. Various other washes or gargles for the mouth have been advised and are very commonly used, especially solutions of borax with tincture of myrrh, honey, or sirup of roses; or the solution of alum in the infusion of roses, with tincture of krameria or catechu and a small quantity of tincture of opium. If the bowels become much relaxed, the cretaceous mixtures, with the compound tincture of camphor and the tincture of krameria or catechu, and aromatic confection; the warm bath or semicupium, salt or mustard being added to the water, are commonly of service. If the powers of life are much depressed, warm stimulants should be added to whatever other means may be required. Of these the most beneficial are the carbonate and aromatic spirit of ammonia, camphor, capsicum, tincture of cinnamon, or of arnica, or of cascarrilla, &c.; and one or more of these may be selected. If the bowels be constipated, magnesia and sulphur, rendered palatable with ginger and liquorice powder, may be prescribed, either with or without rhubarb, according to circumstances.

15. In all cases of thrush, the *hygienic* treatment ought to receive especial attention. The food of the child should be selected with care, and the effects of each particular article of diet carefully observed, in respect of the functions of digestion and defecation. The other means already noticed under this head (§ 12) should receive no less attention; for the use of detergent, astringent, or antiseptic applications, as above advised, ought never to supersede hygienic measures, the restorative, tonic, and febrifuge remedies, and even the more active stimulants, which are often indicated in both the more simple and the complicated forms of this disease.

[*Aphthæ* should be regarded as one of the varieties of *stomatitis*, which assumes various forms, according to the nature, degree, and seat of the inflammatory action; as *erythematic with altered secretion* (*muguet*), *follicular* (*aphthæ*), *ulcerous*, *gangrenous* (*cancrem oris*).

The *erythematic* variety to which new-born infants are so liable, from the naturally congested state of the buccal mucous membrane, is characterized by redness, heat, and sometimes dryness of the mouth and tongue. It is the first degree, or primary symptom, of the other varieties of *stomatitis*; varying much in intensity and duration; often accompanying inflammation of the stomach

and bowels, rarely giving rise to any febrile derangement in very young infants. The inflammation may be confined to one part of the mouth, or occupy the entire cavity, sometimes spreading to the lips, causing them to tumefy, excoriate, or become the seat of *herpes labialis*. It generally yields readily to emollient gargles, milk diet, and a little magnesia.

*Stomatitis*, with altered secretion, or *muguet*, is sometimes confounded with *aphthæ*, from which, however, it is quite distinct. True *muguet* is characterized by a concretion of mucus on the surface of inflamed mucous membranes, as in the mouth, œsophagus, stomach, and small or large intestines. It occurs under three forms: 1st, in the form of very small white points, dispersed over the tongue and sides of the mouth; 2d, of various-sized shreds; and, 3d, of a distinct membrane covering the tongue or sides of the mouth. In all these forms, the appearances are owing to an erythematic inflammation of the surface of the tongue, or buccal parietes, and the preceding varieties are owing to the degree of inflammatory action present. The slightest grade produces the small white points; as it increases in severity, these points coalesce, and form small laminæ either on the surface of the tongue, or of the lips and cheeks. These layers may thicken, exfoliate and detach themselves, leaving an inflamed surface, which soon secretes materials for a new concretion, which will be renewed as long as the inflammation lasts. This last form is called *confluent* or *malignant muguet*. The pointed variety usually occupies the extremity and edges of the tongue, the second appears on the internal surface of the lips and cheek; while the membraniform occurs at the base of the tongue and on the velum. This affection is almost confined to early infancy, and is extremely apt to occur wherever children are crowded together, in badly ventilated places, and nourished with unsuitable food. It is not confined to any particular season of the year, as proved by observations made by BILLARD at the Foundling-Hospital of Paris, where on an average more than one fourth of the children suffer an attack of it. There is no reason to suppose it contagious. It is attended with more or less heat and dryness of skin and thirst, though the pulse is rarely excited. It is sometimes complicated with other phlegmasiæ, as of the digestive organs, skin, lungs, and cerebro-spinal apparatus.

*Follicular stomatitis*, or *aphthæ*, consists essentially in an inflammation of the muciparous follicles of the mouth, which in the healthy state are invisible, but when inflamed assume the form of small white or red points, with sometimes a prominent coloured spot in the centre, and surrounded by a slight inflammatory circle. Like the former varieties, this disease exists in different grades of intensity, from slight enlargement of the follicles, which pour out a white puriform matter, to ulceration of the same. The follicle, when broken, presents a superficial ulcer, with circular elevated borders, and surrounded by a red inflammatory circle; and from it a white pultaceous matter is secreted, which may adhere in the form of a scab, or be detached and ejected with the saliva.

These *aphthæ* may be isolated, as on the internal surface of the lower lip, the frenum of the tongue, the internal surface of the cheeks, &c.; and if they are numerous, they coalesce, and the curdy matter which is poured out forms a con-

tinuous coat of greater or less extent and thickness. It is this appearance which has caused this form of disease to be confounded with *muguet*, in which there is no solution of continuity, and no development of the follicles. Sometimes a brown scab is formed by the secretion being mixed with a small quantity of blood, which is often mistaken for a gangrenous eschar, though the inflammation may rarely terminate in true gangrene; after cicatrization has taken place, scarcely any trace of the ulcer can be seen.

This disease is not, like *muguet*, peculiar to infants, but may occur at any period of life. It is generally, however, met with in feeble, pale, and leucophlegmatic children, and under the same circumstances as predispose to *muguet*—bad nutrition, vitiated air, crowding, &c. While the latter occurs among newly-born children, *aphthæ* are more frequently met with among those who are teething, and its chief exciting cause, no doubt, lies in the anatomical development and increased vital energy of the follicular apparatus at this period.

The constitutional symptoms are usually slight, the pulse is scarcely affected, and there is not much febrile excitement, unless in children a little advanced in age. If the disease, however, extends to the stomach, the child grows pale and thin, is affected with diarrhœa and frequent attacks of vomiting, or acid eructations, and regurgitations of the milk, while the child is wakeful and restless.

The treatment of this form of disease is very simple—a mixture of cream and the white of egg, or powdered gum arabic, placed in the mouth, or a piece of lint dipped in a decoction of flax-seed or slippery-elm, marsh-mallows, barley-water, or milk and water—always attending particularly to the best hygienic conditions.

The above measures, with suitable nourishment and gentle laxatives, will be all that is necessary in the mild form of the disease; but when the *aphthæ* become confluent, acidulated gargles or slightly stimulating applications may be substituted with advantage, as a mixture of barley-water sweetened with honey, to which a few drops of sulphuric acid have been added; equal parts of finely powdered borax or alum and white sugar; a wash of decoction of cinchona or oak-bark, and in severe cases chloride of soda in the proportion of ʒss. to ʒiij. of water.

The other forms of stomatitis are, 1st. *The Ulcerous*; 2d. *The Pustular*, and, 3d. *The Gangrenous*. The first, the result of ordinary inflammation, and occupying indifferently every part of the buccal cavity; the second developed only during the progress of small-pox; and the third being the termination of any of the preceding kinds of stomatitis already described, but which is more particularly treated of under that head.]

BIBLIOG. AND REFER.—*Celsus*, lib. vi., cap. 11.—*Pavus Ægineus*, lib. i., cap. 10; lib. iii., cap. 26.—*Ætius*, Tetrab. i., serm. iv., cap. 15; Tetrab. ii., ser. iv., cap. 39.—*Actuarius*, Method. Med., lib. ii., cap. 10; iv., cap. 14.—*Avicenna*, lib. iii., cent. vi., cap. 22.—*Ballonius*, Consil. i., p. 34; iii., p. 100.—*V. Ketelacr*, Comment. Medicus de Aphthis nostratibus, seu Belgarum *Sprouw*, 12mo. Lugd. Bat., 1672.—*Riverius*, Observat., &c., cent. ii., 43; cent. iii., 35.—*Amatus Lusitanus*, Curat., cent. i., No. 17.—*Sennert*, Pract., &c., lib. ii., cap. 18, p. 271.—*Riedlin*, Lin. Med. 1700, p. 249. (*Extending to the Stomach and Bowels*).—*Thilenius*, Med. und Chirurg. Bemerkungen, b. ii., p. 73. (*Sulphate of Zinc*).—*Boerhaave*, Aphorism. sect. 979, et seq.—*Van Swieten*, Comment. ad Boerhaave Aphor., t. iii., p. 197.—*Rosen*, Traité des Mal. des Ent., cap. ix.—*Sauvages*, Nosolog. Méth., t. i., p. 455.—*Colom-*

*bier*, in Hist. de la Soc. Roy. de Méd., 1779, p. 186.—*Auvity*, in Mém. &c., 1787 et 1788, p. 148. (*Infectious*).—*J. C. Stark*, Abhandlung von den Schwämmchen, 8vo. Jena, 1784.—*Alzra*, in Acta Haun., ii., p. 117.—*Lentin*, Beyträge, &c., 246. (*Contagious*).—*Auvity*, in Mém. de la Soc. Roy. de Médecine, 1787–88.—*Sidren*, in Nov. Act. Soc. Upsal., iii., p. 36. (*Esse papule non ulcera*).—*M. Stoll*, Prælect., i., p. 436, et Ratio Medendi, ii., p. 167.—*Harris*, De Morbis acutis Infantum, p. 29.—*J. F. S. Possewitz*, Semeiologia Aphtharum. Witteb., 1790.—*F. Double*, in Journ. Génér. de Méd., t. xviii., 1803, p. 13.—*Reil*, Memorab. Clinica, fasc. ii., p. 14.—*M. Bailhe*, Series of Engravings, &c., fasc. ii., tab. 2.—*J. Pison*, Dissertat. sur les Aphthes des Nouveaux-nés, 4to. Paris, 1806.—*Wolff*, in Hufeland u. Himley, Journ. der Prac. Heilk., 1810, p. 114.—*Veron*, Observat. sur les Mal. des Enfants, 8vo. Paris, 1825; Rev. Méd., t. iii., 1825, p. 318. Archives Génér. de Méd., t. ix., p. 291.—*Léclut*, in Ibid., t. xiii., p. 335, et in Répertoire d'Anat. Patholog., t. iii., p. 143.—*Guescent et Devillers*, in Dict. de Médecine, Articles *Aphthes* et *Muguet*.—*A. Henke*, Handb. zur Erkenntniss und Heilung der Kinderkrankheiten, 2 vols. 8vo. Francf., 1821.—*Heufelder*, Beobacht. ueber die Krankheiten der Neugeborenen, &c., 8vo. Leipzig, 1824; et in Encyclop. Wörterb., art. *Aphtha*, b. iii. Berl., 1829.—*Guyot*, in Nouv. Biblioth. Méd., Ann. 1829, t. iii., p. 53.—*C. Billard*, Traité des Maladies des Enfants Nouveaux-nés, 8vo. Paris, 1828.—*Godinat*, Du Muguet chez les Nouveaux-nés. Paris, 1834.—*Denis*, Rech. d'Anat. et de Physiol. Pathol. sur Mal. des Enfants, &c., 8vo. Paris, 1834.—*A. Robertson*, Cyclop. of Pract. Med., vol. i., art. *Aphthæ*. Lond., 1832.—*Valleir*, Clinique des Mal. des Enfants Nouveaux-nés, 8vo. Paris, 1838.—*Denis*, Recherches Patholog. sur plusieurs Maladies des Enfants Nouveaux-nés, 8vo. 1836, p. 106.—*C. Robin*, Histoire Naturelle de Végétaux Parasites qui croissent sur l'Homme, et sur les Animaux vivants, avec planches, &c., 8vo. Paris, 1853.—*Jenner*, in Med. Times and Gazette, 1853.

[AMER. BIBL. AND REFER.—*James Stewart*, A practical Treat. on the Dis. of Children, 8vo. N. Y., 1845; also Trans. of Billard of Dis. of Infants, 8vo. Phil., 1850.—*Coates*, in N. A. Med. and Phys. Jour., 1826.—*John Bell*, Am. ed. of Michael Underwood's Treat. on the Dis. of Children, 8vo; and Lectures on Prac. of Physic, 2 vols.—*D. F. Condie*, A Treatise on Dis. of Children, and Am. ed. of Evanson & Maunsell's Practical Treat. on the Dis. and Management of Children, 8vo. Phil.—*W. W. Gerhard*, Graves & Gerhard's Clinical Lectures, 8vo. Phil.—*C. D. Mcigs*, On Diseases of young Children, 8vo. Phil., 1850.—*Robley Dunglison*, The Pract. of Med., 2 vols. 8vo. Phil.—*J. Eberle*, A Treatise on the Dis. and Phys. Education of Children, 8vo.—*J. Bigelow* and *O. W. Holmes*, Amer. edit. of Marshall Hall's Principles of the Theo. and Prac. of Med., 8vo. Boston.—*J. Thacher*, Am. Med. Prac., 8vo.—*W. P. Deuces*, A Treat. on the Phys. and Med. Treat. of Children, 8vo. Phil.—*A. S. Doane*, Am. ed. of Good's Study of Med., 2 vols. N. Y.—*J. B. Beck*, Essays on Infant Therapeutics, 8vo. N. Y.]

TINEA.—SYNON.—*Tinea capitis*. Αχωρ, Græc. Favus, Lat. Porrigo, Celsus, Pliny, Willan. Tinea, Sennert, Sagar, Sauvages, Cullen. Phlysis porrigo, Young. Ecpycystis porrigo, Good. Crusta lactea, Impetigo, Auct. Klein klein-grind, Germ. Tcigne, Gourme, Fr. Tetter. Scall, Scalled-head, Ringworm.

CLASSIF.—See SKIN—Classification of its Diseases.

1. DEFINIT.—A specific chronic disease affecting chiefly the hair follicles, where specific parasitic plants are developed, and which are capable of communicating the disease to parts susceptible of the infection.

2. M. BOSQUILLON supposes that the term *Tinea*\* was used for the first time by ETIENNE, of

\* [The word *tinea*, according to LOVEY, is a barbarous term, introduced by the writers of the Middle Ages, and is supposed to be derived from the words *sahafate* and *alothathim* of the Arabians. Under these names AVICENNA described an ulcerating and crustaceous disease of the hairy scalp, of which he admitted two species, the one moist (*pseudo-tinea*) and the other dry (*favus*, of the moderns). From the Arabian words above alluded to, the commentators and Latin translators have, by abbreviation and corruption, been able to forge the terms *thius*, *thineum*, and *lineam*. MERCURIUS, however, states that the name *tinea* has been given to the malady in consequence of the ravages which it makes on the hairy scalp, similar to those which the insect bearing the same appellation, *tinea* (moth), produces in clothes.—Ed.]



Antioch, who, in 1127, translated the works of HALY HABBAS. It was afterward adopted by GUY DE CHAULIAC, and long subsequently employed by AMBROSE PARÉ. But from the earliest use of the term, the greatest diversity of opinion existed as to the varieties or forms which the disease presented. GUY DE CHAULIAC recognised five forms of Tinea, which term was used synonymously with *porrigo*; viz., *T. favosa*, *ficosa*, *amedosa*, *uberosa*, and *lupinosa*. AMBROSE PARÉ described three varieties; *T. porriginosa*, *ficosa*, and *corrodans*. Much more recently ALIBERT admitted five species of the disease; namely, the *mucous*, *furfuraceous*, *amiantaceous*, *granular*, and *favous*. WILLAN described six species under the genus *Porrigo*; *larvalis*, *furfuracea*, *lupinosa*, *scutulata*, *decalvans*, and *favosa*. It is obvious that those as well as other writers comprised under the generic term Tinea or Porrigo several eruptions of the scalp which actually were varieties of different diseases. Thus the *Porrigo larvalis* of WILLAN corresponds with the *Achor mucosus* of ALIBERT, a variety of *impetigo*. The *Porrigo favosa* is a true *impetigo* of the scalp, and is the same as the *granular tinea* of ALIBERT. The *Porrigo furfuracea* of WILLAN is the *Tinea furfuracea* of ALIBERT, and is merely *Pityriasis capitis*; the *Tinea amiantacea* of this latter writer being only a more chronic and severe form of the same affection. Thus several varieties of *Eczema*, *Impetigo*, and *Pityriasis* have been arranged under *Tinea*, or its synonym *Porrigo*.

3. It has been recently shown by BAZIN, and farther illustrated by Dr. JENNER, that several affections of the scalp are connected with the development of parasitic microscopic plants. These affections are obstinate, contagious, seated chiefly in the hair follicles, have a tendency to spread in circles, and hence have been popularly called ringworm. M. BAZIN and Dr. JENNER have included under the genus *Tinea* those affections which are attended, kept up, or produced by the development of minute parasitic plants or spores; namely, *Tinea favosa*, *T. tonsurans*, *T. decalvans*, and *T. sycosa*. Of these four species, three only will be considered at this place; the fourth, or *Tinea sycosa*—the *Mentagra* of WILLAN and BATEMAN, the *Sycosis* of numerous writers—has been described under this latter appellation. (See art. SYCOSIS).

4. i. DESCRIPTION.—*A. Tinea favosa*, *Porrigo favosa* of WILLAN and BATEMAN; *Favus* of Drs. A. T. THOMSON, SIMON, and others. This disease most frequently appears on the hairy scalp, but sometimes on other parts of the body. It is characterized by dry, thick yellow crusts, which are, when small, circular, depressed in their centres, and somewhat cup-shaped. A hair is generally seen passing through the centre of each crust. Some of the crusts are generally very small, while others have a diameter of one third of an inch, or even upward. The larger appear in many instances as if formed in concentric rings, alternately yellow and brown, and have an irregular shape or outline, still, however, indicating their origin from distinct centres. The large, irregularly-shaped crusts are pitted on the surface, and, from their resemblance—often, however, very slight—to the divided surface of a piece of honeycomb, the disease has been named *favus*. The margins of the larger crusts are considerably above the level of the surface; while the centres seem somewhat sunk into the substance of the

cutis. Upon carefully detaching the crusts from the surface a distinct layer of epithelium is found beneath them, while a careful examination of the smaller crusts shows a layer of epithelium covering them. The crusts of *Tinea favosa* are remarkable for their thickness, dryness, brittleness, and depressed centres. It is not a pustular disease, but it is sometimes consecutive upon eczema, impetigo, chronic lichen, and herpes circinatus; and pustules are occasionally or sometimes formed subsequently to *Tinea favosa*, owing to the irritation produced by the morbid exudation, and by scratching.

5. The hair, even at an early period of the disease, may be easily pulled out from the centre of each little crust. It subsequently falls out of the diseased parts, and permanent baldness of those parts results. When the disease is developed, or any considerable extent of surface is affected, a peculiar offensive odour, which has been variously described, is generally perceived. This was noticed by JOHN of GADDESDEN,\* in his *Rosa Anglicana*, where he gives the following definition of *Tinea*: "*Tinea est scabies capitis, eum squamis, crustis, pilorum evulsione, colore et odore fædo, et aspectu abominabili.*"

6. The parasitic plant, detected by the aid of the microscope, is different in species, and in the precise situation occupied by it in the several species of the disease. In *Tinea favosa*, as described by GRUBBY, BAZIN, ROBIN, and JENNER, the cryptogamic parasite is the *Achorion Schönleini*. "This plant has mycelium, sporule-bearing branches, and sporules. The sporules are round or oval, and their diameter varies, according to GRUBBY, from 0.003mm. to 0.01mm. The vegetable growth is first perceptible between the layers of epithelium, just at the orifice of the hair follicle; from this point it may spread downward between the hair and its capsule, and upward around and in the substance even of the hair."—JENNER.

7. *B. Tinea tonsurans*—*Porrigo scutulata* of WILLAN, BATEMAN, and A. T. THOMSON; *Herpes tonsurans* of CAZENAVE and *Trichinosis furfuracea* by WILSON—is often mistaken for *Herpes circinatus* of the scalp, with which, however, it is sometimes associated. It is characterized by pallor of the affected part, and by decolorization and brittleness of the hairs. Thin, white, powdery scales surround the bases of the hairs, and cover the skin between them. The affected hairs somewhat resemble "tow," and are remarkable for their bent and twisted shape, and resemblance to the fibres of hemp in colour and appearance. They are sometimes so brittle, that every hair in the affected spot is broken off close to the surface. The diseased patches are generally circular. Crusts form on the patches of *Tinea tonsurans* only when, from neglect, from scratching, or from the application of irritants, they become inflamed.

The parasite in this species of the disease is the *Tricophyton tonsurans*, "and is composed of spores only; the spores, however, are occasionally somewhat elongated and arranged in a linear series. They are round or oval, and their diameter varies from 0.003mm. to 0.01mm. The primary seat of this parasite is the root of the hair. Subsequently it extends up into the substance of

\* He admits the contagious nature of the disease, and supposes it to be caused by depraved humours and bad food, and by transmission from the parents or nurse.

the hair, and even outward, according to BAZIN, on to the skin between the hairs."—JENNER. The spores may be at first confined to the hair follicle. But BAZIN and ROBIN have described and delineated them between the fibres of the hair, which they had split up.

8. *C. Tinea decalvans*.—*Porrigio decalvens* of WILLAN and BATEMAN; *Vitiligo of the Scalp* of CAZENAVE—is characterized by the falling out of the hair rapidly, from one or more circular spots, leaving a smooth bald surface, without crusts, scales, or eruption of any kind. When the bald surface is large, it becomes more irregularly shaped, with scalloped edges, and a tendency to preserve the circular form. The disease may spread over the greater part or the whole of the scalp.

9. In *Tinea decalvans* the parasitic formation is the *Microsporon Audouini*. "This plant is formed of branched filaments, on which the spores are developed. The spores are very small, from 0.001mm. to 0.005mm. The seat of the growth is the outside of the hair, and it forms a sort of sheath around the hair, from the surface of the skin, upward, from 1mm. to 3mm. GRUBBY first described this plant, and its relation to *Tinea decalvans*; and ROBIN says he can confirm the accuracy of GRUBBY's description."—JENNER.

10. *D. For Tinea sycosa*, see *art. Sycosis*. These four species of *Tinea* are especially characterized as follows: *Tinea favosa* is remarkable for its crusts; *Tinea tonsurans* for the discoloration and brittleness of the hair; *Tinea decalvans* from baldness not preceded nor attended by an eruption; and *Tinea sycosa* from inflammation, tenderness, hardness, and suppuration of the hair follicles.

12. ii. CAUSES.—It has not been decidedly shown whether or no the parasitic formations detected in these species of *tinea* are the actual causes of them, or whether they are formed in the course of the disease. Those who espouse the former alternative believe that the spores of these parasitic plants are given off, float in the air, and infect those who are exposed to them. Still they admit that these spores require for their growth a peculiar nidus. Dr. JENNER contends that, as all persons who mix with children affected with *tinea* do not receive the disease, a soil favourable to the growth of the spores previously exists, so that when a spore is conveyed to that soil it is developed and forms other spores, and so spreads and propagates. REMAK applied the crusts of favus to his arm, and having removed them after a time, his skin appeared perfectly healthy; and it was not until a fortnight after that his arm had become diseased. Still this experiment does not prove that the spores contained in the crusts produced the infection, but that the morbid secretion forming the crusts infected the parts to which it was applied, and that the hair follicles, thus becoming diseased, furnished the secretion in which the parasites were developed; and hence the experiment of REMAK favours the latter alternative rather than the former; viz., that the morbid secretions of the crusts having infected the hair follicles, parasitic cryptogamic formations were developed in the secretion lodged between the layers of epithelium and between the hair follicles and the roots and fibres of the hair. Those who believe that the conveyance of the spores from the developed disease to a soil suited to their growth, admit that the soil

exists, and consists of an already morbid state of the hair follicles, caused by debility, scrofula, neglect of cleanliness; and that many persons, especially those thus predisposed, "have in their hair follicles a secretion suited to be the nidus of this plant." But this admission is in truth what I contend for; namely, that the disease, owing either to the strumous diathesis, to constitutional or local debility, to uncleanness, to the lodgment of foul matter, or to the contact of contagious secretions, supervenes in the hair follicles, and the morbid secretion in these follicles produces, according to its especial nature or character, a parasitic formation peculiar to each species of the disease. Thus the parasite is consecutive of disease of the follicle, and not the agent by which the disease is propagated. Dr. JENNER almost admits this while he contends for the agency of the spores, by remarking that "the patient suffering from *tinea* comes under our care for the perceptible disease, and will be well contented if we can cure him of that; but it would be better if we could also destroy the susceptibility to the disease—if we could bring the hair follicles into a state in which they no longer secrete a nidus in which the plant can grow." The truth appears to be, that in this disease, as well as in others, where a morbid secretion is produced in states of great general or local debility, and where these secretions remain long in contact with the surface producing it, and protected in these situations, parasitic formations of low grades of vitality and development take place, the morbid secretions forming the material of growth, and the vitality emanating from the diseased part, imparting to these materials the organization which they present.

13. iii. TREATMENT.—General and local debility, a scrofulous diathesis, and want of cleanliness predisposing to, if not of themselves producing, the disease, contagion being an efficient or exciting cause in many if not in all instances, the contagious agent being, moreover, either the spores of the parasitic plants noticed above, or the secretion of the affected parts, the indications of cure are quite apparent. These are, 1st, to strictly observe general and local cleanliness; 2d, to improve the state of the constitution; and, 3d, to remove the local affection. These intentions may be fulfilled contemporaneously. But in many cases, especially of the *second* and *third* species, none of the predisposing causes just mentioned may exist; there may be neither debility, nor the scrofulous diathesis, nor want of cleanliness, and yet the disease is present. Contagion or infection may be inferred without sufficient proof, even although the parasitic formations are detected by the aid of the microscope; for it may as reasonably be concluded that the disease has occurred sporadically, owing to debility or other morbid condition of the hair follicles, the secretion of these follicles giving origin to the parasitic formations in the manner above stated (§ 6, *et seq.*).—A. In most instances, especially where the conditions, often favouring the several species of the disease, are present, frequent ablutions and poultices, in order to remove the crusts; tonics and alteratives, aided by the usual hygienic measures, change of air, exercise, and suitable diet, are requisite. But, at the same time, *local means* are indispensable, especially such as may restore the hair follicles to a healthy state, and destroy the parasitic formations, to which more than due



importance has been imputed since their discovery by microscopic observers. These means are remarkably numerous, but most of them are only occasionally efficacious, comparatively few being even generally successful.

14. *a.* While constitutional treatment is being employed, the local means most to be relied upon should be strenuously continued. The hair ought to be cut close; the crusts of favus softened and removed by linseed or bread and water poultices, and by ablutions with strong soft soap, and the scalp covered by an oiled silk cap. These preliminary measures are always necessary. After these, the local remedies most to be confided in should be prescribed. But, before I notice the substances that have been more recently recommended, I shall enumerate those which had previously been prescribed, and more or less confided in. These latter have generally been employed in the form of *ointments*, of *lotions*, or *washes*, or *plasters*. The first of these, whatever may be the active ingredient, should be washed off by means of soap and water, or any alkaline or detergent lotion, after having been applied for some hours, and immediately afterward renewed; for ointments often become more or less rancid and irritant when they have been long applied. Most of the fluid applications or lotions, whether solutions, dilutions, decoctions, or infusions, require to be applied for some time to the affected part, by means of lint, especially if the crusts have not been entirely removed, and the hair of the diseased follicles is still remaining. *Washes* may be selected with the double intention of cleansing the surface and curing the disease; this latter object being attained either by destroying the parasitic plant or by removing the morbid condition producing the parasite, or by this combined action. *Plasters* may be employed, after the hair has been cut off close to the surface, with the object either of removing the diseased hair, or of curing the affection, or of fulfilling both intentions.

15. *b.* The *ointments* prescribed for this complaint after the crusts have been removed, have often failed. Those containing *mercury* in some form or other, although advised by very eminent physicians, have not only frequently failed, but have sometimes been injurious, especially when their effects have not been carefully watched. Ointments containing calomel are praised by HILDEBRANDT and others. Those with the white precipitate, or with the nitrate, have been employed by PURMANN, VOGEL, LENTIN, MURRAY, and RING. *Sulphur* ointment, or the balsam of sulphur, in the form of an ointment, has been recommended by RULAND, HAMILTON, BARTON, and ALIBERT. Ointments containing the *sulphate of copper* have been prescribed by THOMANN, DESAULT, DUNCAN, and STARKE; that with *muriate of barytes*, by HUFELAND; with *cantharides*, by WENDT; with common *soot*, by PELARGUS, THOMANN, and NIEMANN; with *conium*, by QUARIN, STORCK, MURRAY, STOEHLER, and HUFELAND; with *tar*, by VAN DER HAAR; and with *empyreumatic oil*, by ZACUTUS LUSITANUS and RUDOLPH. The *unguentum Jasseri*, which consists of the sulphate of zinc and sulphur, is praised by SCHACK. It was formerly in great repute in Germany for the cure of this affection. Ointments with the *balsam of Peru* and *tincture of Lytta*, have very often been prescribed by the author for the second and third species of the disease with success.

16. *c.* *Lotions* and *washes* have been as generally used in tinea as ointments. Dilutions of the *acids* have been advised by many—of the *nitric acid*, by COLLA and TOMASINI; of *muriatric acid*, by THILENIUS, PLENK, and BRINCKMANN; of *sulphuric acid*, by AGRICOLA and others; and the pyroligneous *acetic acid*, either alone or with creasote, by myself. Solutions of the *bichloride of mercury*, either in dilute alcohol, or in water with the muriate of ammonia, have been employed by ZACUTUS LUSITANUS, BELL, DUNCAN, and others, but they may be injurious. Solutions of *borax*, either in distilled water or in diluted acetic acid and tincture of myrrh, have been prescribed by the author. Besides the above, solutions of the *nitrate of silver*, of the sub-carbonates of the *alkalies*, of the sulphate of *copper*, of the sulphate of *zinc*, of the sulphate of *iron*, of the *sulphuret of potass*, and of the *arseniate of potass*, have been severally employed by numerous authorities; while decoctions, infusions, &c., of *tobacco* and of various narcotic plants, have been advised by many writers. The *Ledum palustre* was used by LINNÆUS, and the *Tussilago farfara* by MEYER and HUFELAND.

17. The use of *tar-water*, as either a lotion or wash, after the removal of the crusts of favus, is favourably mentioned by WEAVER. I have, in similar forms and circumstances, employed strong *tar-water* with complete success.

18. Other substances have been prescribed for this complaint, either in the form of ointment or in a fluid state, as a lotion or wash, as the peculiarities of the case suggested. Of these the most important are *arsenic* and *tobacco*. My own observation has proved that these may be most dangerous when applied to a large surface after the crusts of favus have been removed, especially when incautiously used in a fluid state, or when ointments containing either have been too long applied or too frequently renewed. IUSTANOND witnessed a case in which the use of a decoction of tobacco was fatal; and I have seen an instance in which arsenic applied to the scalp after the removal of the crusts of favus very nearly produced a fatal result. *Tartar emetic* has been advised by BLIZARD, and employed in the form of ointment and lotion; but it may be also injurious, if not carefully watched, and it is by no means of great service at any period of the disease.

19. *d.* *Plasters* of common *pitch*, or *Burgundy pitch*, have been employed with the object of removing the hair from the diseased follicles, and of restoring the follicles to a healthy state. *Ammoniacum*, made into a plaster with acetic acid, and applied after the crusts have been removed, has been prescribed with the same intentions as the pitch. Tar ointment, or tar mixed with melted suet, has been similarly used. Tar applied simply over the affected part, after the crusts and diseased hair have been detached, and covered by oiled silk, very seldom fails of success, especially if tar or pitch pills be given internally during the treatment.

20. More recently the preparations of *iodine* have been frequently prescribed, both in this disease and in several others of those which I have arranged under the order *Dermatitis contagiosa* (see art. SKIN, § 76). As early as 1825, Mr. MORSON prepared for me an *iodide of sulphur*, which I prescribed in the form of ointment (from ℥j. to ʒj. in ʒj.) in cases of tinea and psora, chiefly at the Infirmary for Children. About the

same time and subsequently, I frequently employed the tincture of iodine somewhat diluted, or the iodurated solution of the *iodide of potash*. These preparations were generally successful, especially if the preliminary part of the treatment was duly attended to (§ 13, 14). I have also employed various combinations of camphor, turpentine, and soap liniment after the removal of the incrustations; or the former of these with lime-water.

21. *B.* When favus is seated on the trunk or extremities, it may be easily cured by these means, or even by alkaline, or sulphurous baths, or by frequent ablation with strong soft soap after the incrustations are removed by poultices. But when it is seated in the scalp, then most of the means above noticed may fail, or at least require a protracted use, if the diseased hair be not removed. *Evulsion of the hair* was long ago directed by ASTRUC, ACREL, FISCHER, VAN DER HAAR, MORISON, LAMOTTE, SEDILLOT, and PLUMBE; and more recently by the Messrs. MAHON of Paris, who facilitated and accelerated this intention by a depilatory powder, the composition of which they kept secret. The method formerly employed of extirpating diseased hair was by applying straps of plaster, variously prepared with pitch, ammoniacum, or other gums, after the removal of the incrustations, and by removing these straps forcibly after a day or two. Dr. WILLIS has justly remarked that any plan of treatment which combines the removal of the hair by gentle means, or when it has been loosened at its roots, with undeviating attention to cleanliness for about two months, will be found to cure favus.

22. Very recently, the local treatment of tinea has very satisfactorily been illustrated by Dr. JENNER, and, in such a manner as to deserve particular notice and adoption. Professor GRAHAM had suggested the use of *sulphurous acid* and the *sulphate of soda* for the destruction of parasitic formations. Dr. JENNER adopted the suggestion in the treatment of Tinea favosa; and it may be inferred that the means he has employed will be serviceable also in the other species of tinea. A solution of sulphurous acid is prepared, by passing a stream of the gas through water until the latter is saturated. Of this solution two ounces may be added to six ounces, to make a lotion, which may be used by means of lint, and frequently applied and kept wet for the removal of the crusts, and subsequently applied to keep the surface clean. Afterward zine ointment may be prescribed to heal the surface left raw or sore by the previous application. I have seen great benefit obtained from washing the scalp occasionally, or frequently, with tar-water, or solutions of creasote, or with terebinthinate lotions. When the disease is seated on the trunk or extremities, the saturated solution of sulphurous acid may be abundantly added to a tepid bath, immersion being continued for about half an hour, and repeated after intervals of two or three days; a very few repetitions of the acid bath appears to remove the disease. This treatment deserves a trial in the second, third, and fourth species of tinea, as well as in several other chronic eruptions, and especially in all those which I have classed under the ORDER *Dermatites contagiosa* (see art. SKIN, § 76, et seq.).

23. *C.* Most of the means above noticed may be employed for the *second and third species of tinea*, due attention being paid to the states of the

hair and hair follicles; and the more stimulating applications, as the balsam of Peru, tincture of lytta, the essential oils, &c., being prescribed in pomades or ointments, after a due trial has been made of the sulphurous acid. After the acid has destroyed the parasite, these applications will be of service in restoring the functions of the hair follicles. (See art. HAIR.)

[We have generally found most cases of this disease curable by removing the incrustations with soap and water, then plucking out the hairs by the roots with a forceps. Apply a solution of *sulphate of copper*, carefully removing the pus by soap and water daily. In a short time the purulent secretion will cease, and the cutis, assuming a red and shining appearance, soon becomes covered with hair. If the copper does not succeed, we resort to the *unguentum hydrargyri nitrati*, diluted with an equal quantity of simple cerate; or the *sulphuric acid* ointment. The *calomel* ointment (3j. to ʒj. lard) we have also found very successful. In several obstinate cases we have succeeded in effecting a cure by first cleansing the head and removing the hair, as above, and then employing the *iodide of sulphur ointment*, made by mixing 16 grs. of sulphur with ʒj. of iodine, and slowly heating over a gentle fire until they are completely fused into one mass, and then made into an ointment in the proportion of 10 grs. to ʒj. of lard, using it night and morning, and gradually increasing its strength from ʒj. to ʒj. Anodyne applications are necessary when the inflammation is attended with much irritability or pain. Constitutional treatment is not to be neglected, and the *cod-liver oil* will be found an admirable remedy, used both internally and externally.]

BIBLIOG. AND REFER.—Pliny, l. xxviii., c. 14.—John of Gaddesden, Rosa Anglica, 2 vols. 4to. Ed., 1595.—Guy de Chauliac, Chirurgia, 4to. Lugd., 1585.—Ballonius, Consil. ii., 19; iii., 58.—Zacutus Lucitanus, Med. Pract. Hist., l. i., 3.—Bonet, Sepulchret., l. iv., sect. xii., 6.—Mercurialis, De Morb. Cutan., l. i., c. 10.—Astruc, De Tumoriis, p. i.—Ruland, Curat. Cent., v., 7.—Raymond, Des Mal. qu'il est dangereux de guérir. Avign., 1757.—Murray, in Doering Tract., t. i., p. 176.—Schack, in Mursinna Journ. für die Chirurgie, b. ii., p. 134.—Plenk, Beytraegen, ii., 5.—Thilenius, Medic. u. Chirurg. Bemerkungen, p. 293.—Agricola, Comment. in Poppium de Vitiola, p. 494.—Lentin, Beyträge, t. iv., p. 408.—Thomann, Annalen ad 1800, p. 134, et Annales Wurceburg., ii., 35.—Colla and Tommasini, in Giornale della Soc. Med. Chir. du Parma, t. i., p. 1.—Barton, in Journ. Gén. de Méd., t. xxvii., 237, et t. xxxv., p. 101.—Bourdin, in Ibid., t. xxxviii., p. 443.—Hecker, Annalen, 1810, p. 261.—Gallot, Recherches sur la Teigne, &c. Paris, 1802.—Péres, in Mém. de la Société Méd. d'Emulation, t. i., p. 230.—Wegelin, in Stark's Archives, b. vi., p. 271.—Morsion, in Duncan's Ann. of Medicine, vol. ii., No. 3.—Fischer, in Richter Chirurg. Bibl., b. viii., p. 75.—Sedillot, in Journ. Génér. de Méd., t. xvi., p. 270.—Blizard, in Lond. Med. and Phys. Journ., vol. viii.—Hufeland, Von der Skrofulenkrankheiten, p. 278.—Albert, Précis Theor. et Pract. de Mal. de la Peau, t. i., p. 3.—Albert and Plumbe, Rev. of, on Tinea, in Medico-Chirurg. Review, vol. ii., p. 534.—Crampton, in Transact. of Irish Coll. of Phys., vol. iv., p. 69.—F. W. Weaver, in London Med. Repos., vol. v., p. 292. (*Tan-water as a cure of.*)—Cooke, A Pract. Treatise on Tinea Capitis contagiosa, 12mo. Lond., 1810.—Lucmore, Observ. on the Nature and Treatment of Tinea Capitis, or Scald Head, 12mo. London, 1812.—Mahon, Recherches sur le Siècle et la Nature de Teignes, 8vo. Paris, 1829.—N. Baudeleque, Revue Médicale, t. iv., 1831.—Dick, Med. Gazette, 23 Decr., 1837, and Edin. Med. Journ., vol. iv., p. 536; Ibid., No. 118, p. 244.—Gruby, Mém. sur une Végétation qui constitue la vraie Teigne, dans Comptes rendus des Séances de l'Acad. des Sc., 1841, t. xiii., p. 72. Sur les Mycodermes qui constituent la Teigne favéuse, Ibid., p. 309.—A. Cazenave, dans Ann. des Mal. de la Peau et de la Syphilis, t. i., p. 37. Paris, 1843.—J. E. Erichsen, A Practical Treatise on the Diseases of the Scalp, 8vo (with Plates). Lond., 1842.—J. H. Bennett, On the Inoculability of Tinea Favosa, in



Northern Journ. of Medicine, Sept., 1845.—*F. Wilson*, On Ringworm, its Causes, Pathology, and Treatment, 8vo. Lond., 1847.—*W. Jenner*, in Med. Times and Gazette, 20th Aug., 1853. (See also BIBLIOG. and REFER. to arts. HAIR and SKIN.)

[AM. BIB. AND REF.—See the American works referred to under the art. THRUSH, and BULKLEY's edit. of CAZENAVE and SCHLEGEL.]

**TONGUE—DISEASES OF THE.**—(Γλῶσσα, γλῶττα. *Lingua*, Lat. *Langue*, Fr. *Zunge*, Ger. *Lingua*, Ital. *Lengua*, Sp.)

1. Those slighter affections of the tongue which are symptomatic of either constitutional or visceral diseases, and which furnish more or less important indications of the seat, nature, and issue of disease, have been passed in review when treating of the symptoms and signs furnished by this organ in the article SYMPTOMATOLOGY. (See § 101, *et seq.*)

2. I. NEURALGIA OF THE TONGUE.—SYNON.—*Glossalgia* (from γλῶσσα and ἀλγέω, I pain). *Tic Douloureux of the Tongue*.

CLASSIF.—See NEURALGIC AFFECTIONS.

3. A. Neuralgia of the tongue is not of frequent occurrence. I have seen only a few cases; and in these the pain was, without an exception, limited to one or other side of the organ. The pain presents nearly all the characteristics of neuralgia. It is sudden in its accession, most violent, often contracting the organ to the side affected, sometimes causing an abundant flow of saliva, and inducing sympathetically, more or less, contortion of the face. Its continuance may be momentary, its cessation being as sudden as its occurrence; or it may be more protracted, with more or less remission and violent exacerbation. The pain sometimes resembles the passage of a sharp instrument, or of a hot needle from the side of the base to the apex. The cases which I have seen were unattended by neuralgia of any other part, and I have viewed them as indicative of irritation either at the origin, or in the course of the nerves supplying the side of the tongue affected; and as a not improbable precursor either of paralysis of the tongue, or of hemiplegia, or of apoplexy.

4. B. The treatment should be based upon the inferred states of the general and cerebral circulation, as respects either congestion, capillary action, or inflammation. If the neuralgic pain recur frequently, or prove obstinate or protracted, notwithstanding a due recourse to local depletions, especially cupping on the nape of the neck or over the mastoid processes, when general or local plethora or increased action exists; to purgatives and deobstruents, or to tonics, stimulants, and antispasmodics, with or without anodynes, when neither congestion nor inflammatory action is inferred, it will often be of service to pass a seton into the nape of the neck, and to preserve a free discharge from it. In some cases, especially when increased action or congestion exists, the shower-bath or the cold effusion on the head, while the feet are kept warm, or plunged in hot water, ought to be cautiously employed. The treatment in all respects should be the same as recommended in the article on NEURALGIC AFFECTIONS. (See § 79, *et seq.*)

5. II. PARALYSIS OF THE TONGUE.—CLASSIF.—See art. PALSY.

6. i. Palsy of the Tongue is characterized by limited or impaired movements of the organ, and imperfect utterance, or entire loss of speech. The loss of the power of motion of the tongue is gen-

erally unattended by the loss of sensation. The sense of taste is often not affected (SCARPA and myself). Paralysis of motion when primarily affecting the tongue is rarely so complete as to entirely prevent articulation. But after a stroke of apoplexy, or in connexion with hemiplegia or other paralytic states, the motions of the tongue are often so constrained or impaired as to affect articulation, more or less. When articulated sounds are altogether prevented, then the nerves of the tongue are not alone affected, but those also of the pharynx are more or less implicated, deglutition being also impaired, or very difficult. Paralysis of the tongue is most commonly observed at an advanced period of paralysis of a more or less general form, or after repeated attacks, especially of apoplexy, and is a very unfavourable sign. When thus appearing or associated, it is always attended by impaired or lost articulation, and is followed by difficult or lost deglutition; the patient, however, being often carried off by an apoplectic attack before this latter symptom occurs. Palsy of the tongue, in a more or less complete form, rarely precedes apoplexy or hemiplegia; but when it thus appears primarily, or before the occurrence of an apoplectic or hemiplegic seizure, it is always a very dangerous symptom, and most rarely exists long without a severe or fatal attack supervening. When it thus occurs primarily, it may or may not be accompanied by impaired or altogether lost deglutition. I have seen several cases of primary paralysis of the tongue, with complete loss of articulation, the first and most complete of these with Mr. WINSTONE. In these no other sign of disease was observed, and in all I inferred that severe or fatal apoplexy would occur in a short time; this result took place, and was rapidly followed by dissolution. In a case recently attended by Dr. N. GRANT and myself, the paralysis of the tongue and pharynx disappeared upon an attack of gout in the feet. The slighter states of impaired movements of the tongue are, however, no infrequent precursors of apoplexy or palsy, and generally somewhat impair utterance or articulation.

7. ii. The treatment of palsy of the tongue is in many respects the same as described in the articles APOPLEXY and PARALYSIS, and depends entirely upon the inferred pathological conditions—1st, of parts near the origins, or in the course of the lingual and pharyngeal nerves; 2d, of the blood-vessels and blood; 3d, of the organic nervous system; and, 4th, of the excreting viscera. If a gouty diathesis be inferred; or if gout have been previously experienced, sinapisms should be applied to the lower extremities; *Masticatories* and *Errhines* have been much recommended by HAUTESIERCK and LANGE; a seton or open blisters on the neck, by HELWIG, &c., and active purgatives by RIEDLIN; but these are generally in use.

8. III. INFLAMMATION OF THE TONGUE.—SYN.—*Glossitis* (from γλῶσσα, the tongue).

CLASSIF.—III. CLASS, I. ORDER (see Author in Preface).

9. DEFINIT.—Pain, great swelling and redness of the tongue, more frequently towards its base, and sometimes confined to one side of the organ, with more or less febrile action, the character of which varies with the cause and nature of the local disease.

10. Idiopathic and sthenic glossitis is sometimes a very severe and even a dangerous disease. It is not, however, often met with in practice, al-

though the tongue is much exposed to the usual causes of inflammation. J. P. FRANK saw but one case during a practice of twenty-five years, and during forty-five years he treated only seven cases. I have seen only four cases of this form of glossitis in thirty-five years. Of these, two terminated in suppuration; one only having thus terminated in the seven cases seen by FRANK. The four which occurred in my practice either were limited to one side of the organ, or affected one side chiefly. The cases which were followed by abscess were limited to one side; and the inflammation in all the cases was chiefly seated in the thick part of the tongue. This immunity from the more usual sthenic form of inflammation may be ascribed partly to the muscular structure of, and partly to the abundant supply of nerves possessed by this organ.

11. i. ACUTE GLOSSITIS. — *Sthenically acute Glossitis*.—This disease is readily recognised, as it comes directly before the senses of the physician. *It is characterized by redness, swelling, hardness: an acrid, stinging sense of heat, or a burning pain of the tongue, with either great dryness of the mouth, or a profuse flow of saliva, and the usual symptoms of inflammatory fever.* In proportion to the swelling are the functions of the organ impaired, and the voice, speech, and deglutition affected; the two latter being generally either nearly or altogether abolished in the most severe cases. Sometimes the tongue is swollen to such a size as to press upon the glottis, or rather to prevent the rising of the epiglottis, and to fill up the isthmus faucium and mouth, and threaten suffocation. In other cases, the swollen and inflamed tongue is protruded from the mouth. This, however, is oftener the case in the sympathetic glossitis proceeding from cynanche (see THROAT, *Inflammation of*), and from the excessive use of mercury, when the simultaneous affection of the tonsils, parotids, and parts in the vicinity, and the consequent tumefaction of these, press the tongue outward.

[DR. SALTER has described one form of glossitis, which he calls *erectile*, in which the tongue becomes rapidly and enormously distended with blood, hard and stiff. The swelling is so great that respiration through the mouth is quite prevented, and can with difficulty be performed through the nostrils. Though the congestion becomes so intense that the organ is of a dark black colour, neither mortification nor abscess has been observed to occur. Free incisions give exit to the blood, and the patient recovers. Sometimes only one half of the tongue is affected. In most cases it occurs in persons who are in perfect health, and without any manifest exciting cause. —Ed.]

12. A. In some cases the attack is sudden; and in the most severe cases the tumefaction and the threatened suffocation are such as to place the patient's life in imminent danger. The surface of the tongue is generally covered by a thick mucous coating, or by an exudation of lymph. At the commencement of the disease the sense of taste is very acute, owing to the excited state of the nerves and increased vascularity of the papillæ; but, as the disease proceeds, taste is abolished, owing perhaps to the pressure experienced by the nervous fibrillæ from the turgid vessels, and fluid effused in the structure of the organ, and partly to the thick mucus or lymph covering the inflamed surface. To these are added unquen-

able thirst, great anxiety and restlessness, headache, turgescence of the countenance, swelling and tenderness about the throat, and beneath the maxilla, watering of the eyes; sometimes anxious, pale, or saddened expression of countenance, quickened circulation, costive bowels, and high-coloured urine.

13. The course and termination of the disease are the same as of other inflammations. The malady usually proceeds as above, in a more or less severe form, and generally increases until the third, fifth, or seventh day, when it either subsides gradually under treatment, or terminates in resolution with critical phenomena, particularly profuse perspiration, hypostatic urine, or a copious discharge of saliva, or bleeding from the nose, or accession of the catamenia. If a favourable change does not take place at these periods, the disease may terminate in suppuration or in sphacelation; or it may occasion suffocation or apoplexy, neither suppuration nor gangrene having taken place, but these unfavourable results very rarely occur, unless the disease has been neglected.

14. C. Abscess seldom follows glossitis, owing to the muscular structure of the organ. I have seen only two cases in my practice, in which abscess occurred; and after a free opening was made the parts readily healed. Cases are recorded by EBERMAJER, FRANK, and others of this termination of the disease. Owing to the exudation of lymph into the substance of the organ, considerable hardness and enlargement sometimes remain long after the acute state of disease has been subdued. HILDENBRAND supposes that this change may at last terminate in scirrhus or carcinoma; and in this opinion he appears to be supported by the observations of LOEFLE and ZEIGLER. I believe, however, that cancer very rarely or never supervenes upon sthenic forms of inflammation; malignant diseases of the tongue commencing in a slow and insidious form, and independently of antecedent acute disease. When acute glossitis goes on to suppuration, very serious consequences may result from neglect of this state. When the disease comes under treatment previously to the commencement of suppuration, this result may be prevented; or if it be inevitable, danger will be avoided, by a judicious and prompt method of cure; unless it take place in sympathetic glossitis, or in persons of a cachectic habit of body, or in cases caused by animal poisons taken into the mouth, or by the stings or bites of poisonous insects or reptiles.

15. ii. *Asthenic acute Glossitis*.—A. Inflammation of an acute asthenic character may take place either in a person whose constitution has been exhausted and his blood more or less altered, or in the advanced stage of a malignant febrile malady, as in exanthematous and pestilential diseases, or by the application of such animal poisons or deleterious matters as will be noticed in the sequel, to the tongue or mouth. This state of the disease, especially when occurring from these last-named causes, generally appears suddenly, and proceeds rapidly with great violence. The pain and tumefaction are very great, the inflamed parts being livid, or dark red, or brown, and the accompanying fever being characterized by vital depression, by a very quick weak or irritable pulse, and by signs of progressive contamination of the circulating fluids. Asthenic acute glossitis is seldom seen in a primary and uncomplicated form.



It is most frequently met with as a complication of scarlet fever, of small-pox, of erysipelas, and of pestilential maladies. When it occurs primarily, it may generally be inferred that some foul or poisonous substance has caused the attack. But whether appearing primarily or in the course of another malady, its diffusive nature is manifest. It often extends to the fauces, tonsils, pharynx, surrounding cellular tissue, and neck, more especially when it is caused by animal or other poisons, or by the sting of an insect.

16. *B. The course and termination* of this form of the disease are generally rapid and unfavourable, unless very prompt and judicious means be employed. When it is caused by the contact or inoculation of poisonous matters, the local changes vary with the cause. These changes may consist of tumefaction, owing to the exudation of a dirty lymph or serum, or the affected parts may be livid, or otherwise discoloured, and more or less softened; or they may nearly approach a gangrenous state. In some cases the inoculated poison may so affect the organic nervous and vascular systems, and the blood, as to occasion death in a short time, the changes found in the tongue and adjoining parts being insufficient to account for this result.

17. *iii. THE CAUSES* of acute idiopathic glossitis are chiefly poisonous, chemical, and mechanical agents. Animal poisons applied to the tongue, or animal matter in a state of disease or of decomposition, or the blood or the discharge from foul sores or malignant ulcers, the bites of insects, &c., produce the more severe and asthenic form of the disease. The incautions or accidental mastication of acrid and irritating substances, especially such as are poisonous, as briony or wild vine, the mandragora, the arum and other poisonous plants, have produced glossitis. I saw a case of the diffuse and asthenic form of the malady caused by monk's-hood accidentally masticated. Caustics, acids, and acrid chemical compounds, cauterics; hot and highly-seasoned articles of diet and stimulating drinks; mechanical injuries, as wounds, punctures, or bites during mastication or epileptic paroxysms, operations on the teeth, or for ranula; burns or scalds, the irritation produced by irregular or carious teeth, and the local action of irritating or stimulating substances introduced into the mouth during coma, have severally occasioned glossitis. I saw a case following the introduction of mustard into the mouth to produce vomiting in a case of poisoning by opium. The disease has sometimes been ascribed to the more common causes of inflammation, as exposure to cold in any form, draught of cold water or the use of ice, suppression of the perspiration or of accustomed discharges. SCHEIDEMANTEL states that he saw glossitis follow exposure to cold; STARCK from suppression of the menses, and hæmorrhoids; WENDT from suppressed perspiration of the feet; and DELATOUR from sudden suppression of epistaxis.

18. The above have been viewed as the chief *efficient causes* of this malady; but several of these may be considered as incapable of producing it, without the concurrence of others, either *favouring* or reinforcing them. The chief or most influential *pre-disposing* causes are, disorders of the prima via and digestive organs generally, especially those characterized by the accumulation of morbid secretions and mucous sordes; the gouty, rheumatic, and scrofulous diatheses;

and inflammatory affections of neighbouring parts. VON MERTENS, KEMME, LOEFLE, and others have too strongly insisted upon the occasional relations of these diseases to glossitis. In rare instances the disease has been said to have appeared immediately upon the subsidence of other inflammations. Thus FRANK observed it after an attack of hepatitis; Dr. ELLIOTSON saw it after bronchitis; but such occurrences may be viewed as hardly connected, or as mere contingencies.

19. *iv. SYMPTOMATIC AND COMPLICATED GLOSSITIS.*—Inflammation may attack the tongue consecutively upon inflammation of adjoining parts, as of the tonsils, fauces, gums, and pharynx. This form of the disease not infrequently occurs from excessive mercurial action of the salivary glands, which in some constitutions may be induced by a very small dose of any mercurial (see *art. Poisons*, § 568, *et seq.*). This unpleasant result is sometimes induced by exposure to cold, or to currents of cold air about the head and neck, during or soon after the use of mercurials, or from the suppression of the salivary discharge by these causes. When the tongue is affected from excessive mercurial action, or suppression of the salivary flux, there is generally much more tumefaction than actual inflammation of the organ; the inflammatory action even, when present, possessing much less of the true sthenic or phlogistic character than when the disease appears in an idiopathic form.

20. Glossitis also occurs symptomatically, and forms an important complication, in *scarlet fever* and in *small-pox*. REIL observed it in several cases of an epidemic fever which occurred in the north of Germany near the termination of the last century (*Fieberlehre*, ii., p. 370); and VAN SWIETEN, DELAMALLE, LOUIS, MARJOLIN, and myself, have seen it supervene in the progress of malignant fevers. When thus complicated, glossitis is generally asthenic, diffusive, or spreading, the parts adjoining being more or less implicated, and the danger of the disease thereby greatly increased. I have seen this complication also in ERYSIPELAS, and have adverted to it when treating of that disease.

21. *v. SUPERFICIAL AND PARTIAL GLOSSITIS.*—This is generally a more chronic form of the disease than any of the foregoing. It consists chiefly of an inflammatory state of the villous surface of the tongue, and is much more common than inflammation of the substance of the organ. This is very frequent in young children, consisting generally in an extension of inflammation either to or from the adjoining parts. It is thus very often met with in aphthous affections (see *THRUSH*), in inflammation of the mouth and gums (see *STOMATITIS*), and Cynanche maligna (see *SCARLET FEVER* and *THROAT*, &c.). In this partial and associated form of glossitis the edges of the tongue are chiefly affected, but the whole of its surface may also partake more or less of disease, and the organ may also be swollen. The inflammation may be, moreover, of a specific kind—not only of the kinds just mentioned, but *syphilitic*, with or without ulceration. This state of the disease is even occasionally met with in infants, and has been caused by the affected nipples of nurses. This partial form of glossitis may also proceed from mercurial action. It is attended in this case with more than ordinary loss of the vital cohesion of structure; the edges and sides of the tongue have an inflamed, swollen,

flabby, and unhealthy appearance, and retain the impressions of the teeth, against which they are forcibly pressed by the tumefaction of the organ. This state of partial glossitis sometimes gives rise to fungous excrescences of a soft, flabby, and vascular character, shooting between the teeth, and bleeding on the slightest irritation.

22. Partial or superficial glossitis is much more frequently seen in the course of scarlet fever, small-pox, continued fevers, &c., than the form of the disease noticed above (§ 20) as complicating these maladies in rare instances. It often occurs, also, in the inflammatory affections of the throat, as an extension of these affections (see *ARTS. STOMATITIS and THROAT*); and not unfrequently it is symptomatic of disorder of the *prima via*, particularly of the stomach and liver, arising from the accumulation of morbid secretions. Owing chiefly to this cause, it is sometimes also observed accompanying several acute cutaneous eruptions, as urticaria, &c.

23. vi. CHRONIC SUPERFICIAL GLOSSITIS.—This form may be confined chiefly to the sides or edges of the tongue, or may extend over the whole surface. In either case I have seen it as the chief lesion or affection, while it has been more frequently associated with a similar affection of the gums, fauces, and pharynx. It is a common complication in *scurvy*, and then it is generally removed in due time by the means recommended for that disease; but in other circumstances it is a most obstinate, and often serious, but a rare malady. In some cases, the redness and peculiar raw appearance of the tongue have apparently extended not only to the fauces and pharynx, but also to the œsophagus, and, in some degree, to the villous surface of the stomach. When the disease is confined chiefly to the sides or edges of the tongue, the irritation caused by carious or irregular teeth may have occasioned or prolonged it; but, when it is more general, the digestive viscera are in fault, and, owing to the nature of their disorder, the affection of the tongue varies in severity and duration. In a few cases of this disease which I have seen, the redness, pain, heat, and soreness of the tongue were very much complained of; and they had been of considerable or long duration before I saw them. The gums were also red, retracted from the teeth, and the fauces and pharynx were more or less affected. The surface of the tongue was deprived of its papillæ, was raw and inflamed throughout, acutely sensitive, but the organ was not much swollen, although it was the part more especially affected. Of five or six cases of this disease that I have treated, two went from under my observation after having been some time under treatment without much apparent benefit. The others were also obstinate, but recovery or relief followed the means about to be noticed (§ 36, *et seq.*). One of the cases was imputed to the use of iodide of potassium in large doses. In all, the extreme tenderness of the tongue and mouth, the difficulty of taking solid food, or of masticating any food, the pain on deglutition, the disorder of all the digestive functions, and the occasional irritability of the stomach and bowels, the torpor of the liver, the state of the urinary discharges, &c., had occasioned more or less emaciation, with other indications of cachexia, and shown the relations of the disease. This form of glossitis appeared to have been, in all the cases, symptomatic of prolonged or neglected disease of the di-

gestive organs, more especially of the villous surface of the digestive canal.

24. vii. THE PROGNOSIS of glossitis may be inferred from what has been stated respecting its forms and terminations.—*a.* When the disease has been produced by an animal poison; when the attack is sudden and violent, and the swelling is great; when the constitutional disturbance is very considerable, and the pulse is quick and weak, the disease is then attended by great, or even extreme danger. The risk is generally greater in the *asthenic* than in *sthenic* cases; but, even in the latter, when the tongue is greatly swollen, or much discoloured, and the suffocative symptoms urgent, the danger is then very considerable. In the milder idiopathic forms, especially when the treatment is judicious and prompt, the prognosis is favourable. When the disease is complicated with any of the forms of *cynanche*, or is attended by much swelling, pain, and tenderness about the throat and angles of the maxilla, the danger is considerable, as the extension of inflammation either from or to the tongue indicates both a severe form of disease, and a faulty state of the vital power and habit of body of the patient.

25. *b.* The termination in *abscess*, although an unpleasant occurrence, is not generally attended by danger; indeed, in persons not otherwise diseased, the constitutional symptoms not being very urgent, no risk may be apprehended, particularly if the abscess be limited in extent, or confined chiefly to one side of the tongue. If suppuration, however, take place in an unhealthy subject, and be attended by a very quick, irritable pulse, by depression of the vital energies, by delirium towards night, coma, followed by a fatal issue, should be expected. Sphacelus and gangrene rarely occur, but recovery never takes place when they appear in this organ as a termination of either primary or complicated glossitis.

26. *c.* Partial glossitis and chronic glossitis, especially when affecting aged persons, are often very obstinate diseases; the latter especially. When the partial glossitis is caused by carious or irregular teeth, or has often occurred, or has gone on to ulceration, it is very difficult of cure. The ulcerations may become indolent, or be followed by hardening, enlargement, or even by scirrhus and carcinoma. The tongue may thus present a very dangerous state, which, although at first local, may, in its advanced stages and malignant form, assume a constitutional and fatal character. Chronic glossitis is always a protracted and unfavourable form of disease. In all the cases I have seen, it formed only a part of very complicated states of disease, but a very distressing part, requiring both discrimination and perseverance in both the local and constitutional treatment.

27. viii. TREATMENT.—*A.* OF ACUTE GLOSSITIS.—The treatment of this disease should be modified according to the causes producing it. When it has arisen from causes the operation of which still continue, as the irritation occasioned by irregular or carious teeth, foreign bodies, &c., these should be removed as soon as possible. When it has originated in causes which are not depressing to the vital energies, the means of cure should be very different, or even opposite to those which are required when it is caused by poisonous agents. In the former circumstances the disease presents a *sthenic* character, in the latter an *asthenic* form, both locally and constitutionally.



28. (a) *Sthenic Glossitis*.—In this form the vital energies are not impaired, although vascular action be locally and generally excited. Hence vascular depletions are promptly required, with an activity proportionate to the severity of the disease. Authors, however, differ as to the situation from which the blood should be abstracted. Many recommend the application of a number of leeches,\* or scarifications and cupping, about the throat, angles of the jaws, and neck, after venesection in the arm; others advise blood-letting from the radial veins, or from the feet; while some prefer the application of leeches to the inflamed tongue.† The determination of this matter may be of some consequence, and it may be even next in importance to the amount of blood which should be taken away. In these matters the physician should be guided by the causes and the severity of the disease. But in acute sthenic glossitis, blood-letting, whether general or local, or both, will not of itself cure the disease, unless in its less severe forms; and in those which are severe, the radial vessels cannot generally be reached.

29. The very slight advantage derived from vascular depletion in this disease, as usually performed, has been long known to physicians, and has led them to the adoption of other measures of a decisive character, and productive of a locally depleting effect, namely, of *incisions* made into the substance of the inflamed organ. This practice seems to have been first resorted to by JON MECKREN in 1656, and it has been generally followed ever since. DELAMALLE, NAUMBERG, STÖLLER, J. P. FRANK, ARNEMANN, HILDENBRAND, SCHNEIDER, DELATOUR, VAN DEKEERE, MARJOLIN, and others, have prescribed it in many cases. LOUIS states that *incisions* have failed only in those cases where they have been too superficial, and he therefore advises that they should be deep, and consist of from two to four, made longitudinally near the edges of the organ—one or two on each side of the median line, from the base to near the point. A copious discharge of blood should be promoted from the incisions by emollient applications, by the steam of warm water or medicated vapours, by suitable gargles and washes, &c., which will, at the same time, favour the termination in resolution. In the cases which I have seen, incisions were successfully employed. In two cases, suppuration had advanced before I was consulted, but incisions were directed and were equally beneficial.‡

30. Other antiphlogistic means are also required in this form of the disease, especially cooling purgatives and diaphoretics. Drastic purgatives are often necessary at the commencement of the treatment, and although BROUSSAIS and his followers—the master and disciples of a now obsolete school—have inveighed against them, experience has demonstrated their utility. GALEN, VAN SWIETEN, and many others, have recommended them. Their operation should be assisted by active purgative injections. The excessive thirst accompanying the disease may be calmed

by a solution of cream of tartar, with a little nitre in tamarind water. If deglutition be prevented by the swollen state of the tongue, the urgency of this symptom may be moderated by tepid or warm bathing, by emollient lavements, and by cooling and emollient fomentations to the throat, and by applications to the tongue itself. Injections of a similar nature should be thrown into the mouth, which the patient ought to be directed to gargle or wash frequently with emollient infusions and decoctions. SPERANZA advises an infusion of digitalis for this purpose.—(*Annali Univ. de Med.*, Jan. 1829.) MARJOLIN recommends gargles and lotions with diluted vegetable acids. A solution of the bichlorate of soda and bitartrate of potash, or of the former alone, in the decoction of marsh-mallows, or in linseed tea, is one of the best gargles or washes in this disease. I have employed it with benefit in this form of glossitis, as well as in the other forms which I have designated partial and superficial. Linctuses, consisting of mucilages or honey, or sirup of roses, and containing either the muriate of ammonia or the nitrate of potash, are also of considerable benefit, both in these states of the disease and in the partial and superficial forms.

31. In addition to the above means, external and internal *derivatives* or *revulsants* have been resorted to, as *blisters* or terebinthinate *embrocations* applied beneath the lower jaw, or to the nape of the neck, and repeated; *sinapisms* to the lower extremities, stimulating pediluvia and manuluvia, drastic *purgatives*, and irritating *enemas*, &c. M. DUPONT advised, after incisions or scarifications of the tongue, an active *emetic*; and I believe the practice to be judicious. Among other means, substances calculated to excite the action of the salivary glands have been recommended by BLANCARD and MARCUS. Mercurial preparations may be prescribed for this purpose when the disease is not of mercurial origin, but their action is not sufficiently rapid nor certain. SPERANZA advised lotions of infusion of digitalis.

32. (b) *ASTHENIC GLOSSITIS*, especially when it becomes diffusive, or has been induced by the contact or inoculation of an animal or any other poison, often assumes a very violent and dangerous form, the lividity and swelling of the organ being great, the local and constitutional symptoms indicating a powerful sedative influence on the system. Consequently, a different treatment from that advised above is required, and that treatment should be promptly decided on and energetically carried out. Still the severity and the cause of the disease should decide the adoption and the selection of the means. Vascular depletions, as usually practised, are not required in this form of the disease, and are rarely productive of any benefit. Yet *incisions* into the tongue (§ 29) may even here be practised with advantage. The cases of STÖLLER prove their advantage in this state of the disease. Indeed, incisions may be more advantageous in this than in any other form of the disease, by allowing the discharge of the poisoned exuded fluids, causing the swelling and contamination of the organ. After they have been made, the tongue and mouth should be afterward often washed with a decoction of cinchona, with either of the mineral acids and camphor, or with a strong infusion of green tea, or of arnica, or with strong tar-water; or these ought to be injected into the mouth, when they cannot be otherwise taken into it; and full

\* [Professor WOOD says, "As many as one hundred American leeches may be applied at once, if the strength of the patient permit. They should be preceded by venesection."]†

† [Leeches are better when applied in the vicinity of an inflamed organ than immediately to it.]

‡ [If incisions and the other measures prove unsuccessful, and suffocation is threatened, laryngotomy or tracheotomy should be at once resorted to.—*Ed.*]

doses of the preparations of cinchona, of serpentaria, or of arnica with camphor, or with hydrochloric acid and hydrochloric ether, or with ammonia and its preparations, should be often administered, in such forms and vehicles and in such a manner as circumstances will suggest or require. If an animal poison has occasioned the disease, fluids containing the turpentine, or creasote, or the chlorides, &c., ought to be introduced into the mouth, and the tonics and stimulants assiduously administered, conjoined with alkalies, or with chlorides, or with other medicines already mentioned, both by the mouth and in enemata.

33. *C. Glossitis, symptomatic* of, or complicated with, eruptive or malignant fevers, is generally of an asthenic character. Blood-letting is injurious in these cases, beyond the local discharges proceeding from the incisions, which also may be necessary, and which should then be made, when the tumefaction and pain, or sensation of suffocation, are urgent. While the primary or the special disease ought to receive due attention, and be treated appropriately to its form and stage, the local complication, according as it may present more or less of the characters appertaining to either of the cases above described, should be treated conformably with the recommendations already offered.

34. When the disease has gone on to *suppuration*, then incisions into the adjoining parts, and a free opening into the part in which the matter is either forming or is collected, should not be neglected. If there be little or no swelling unless that produced by the collected matter, a free opening into it will generally suffice. But when the matter is formed in the asthenic form of the malady, or after inoculation or contact of a poison, incision or scarifications of parts adjoining may be required.

35. The severe states of glossitis caused by mercury have been likewise treated by incisions by PLENK, DELAMALLE, FRIESE, SCHNEIDER, and others. LOUIS advises blood-letting, and agrees with PLENK and others in the active administration of purgatives, drastic enemata, sudorifics, diuretics, astringent and cooling washes, and change to a dry and healthy atmosphere. Emetics have also been recommended, and I have prescribed washes with tar-water, with creasote, with the chlorides, and with several other substances, the affliction continuing notwithstanding for a considerable time in some cases. (See *art. Poisons*, § 590, *et seq.*, and *Stomatitis*, § 20, *et seq.*)

36. *B. Partial and Superficial Glossitis*.—Most of the local means already advised may be prescribed in this state of the disease; but in all cases due reference should be had to the predisposing and exciting causes, and to the states of the digestive, the assimilating, and of the depurating functions, and of the constitutional powers. The lotions, linctuses, &c., washes or gargles, mentioned above (§ 32), or those prescribed in the *art. Stomatitis* (§ 14, *et seq.*), or solutions of either of the mineral salts, as the sulphate of zinc, the nitrate of silver, &c., may be severally employed as circumstances will suggest. These last, or the dilute mineral acids in tonic or astringent decoctions, and used as washes or gargles, are most appropriate when ulceration is present. In most of the cases which come under the present category, the treatment and means advised under the heads *Stomatitis* and *Thrush* are quite appropriate.

37. *C. Chronic Glossitis*, whether it be limited to the sides or edges of the tongue, or whether it be more general and superficial, is always a most obstinate disease, and is often merely a severe local manifestation of a very general and serious malady, or at least of a protracted disease of the digestive organs. Hence, in addition to the local means already recommended—to the use of vegetable, of saline, and mineral astringents and refrigerants, of emollients and demulcents, &c.—general and constitutional remedies, directed especially to the restoration of the digestive, assimilative, and depurative functions, or to the removal of whatever lesion or disease which may be inferred to exist in any of the organs devoted to the discharge of these functions, should be prescribed, and their effects closely watched and aided by a suitable diet, regimen, and change of air. Cachectic symptoms should be combated; and when the diet, mode of living, air, water, or residence of the patient appear to have originated or concurred in producing the malady, these especially should all or severally be ameliorated, or altogether changed.

38. The principles now stated and developed above, as well as in other places in this work, must be guides to the inexperienced in the treatment of the diverse forms and complications of glossitis; for it is impossible to lay down rules, or to furnish illustrations or explanations of such rules, as will be altogether appropriate to the diverse cases which may occur in practice. In such cases, as in those of other diseases, the physician must think and decide for himself, and, by thus habituating himself, he will ultimately more certainly arrive at correct practical conclusions.

#### IV. ORGANIC LESIONS OF THE TONGUE.

##### CLASSIF.—IV. CLASS, I. ORDER (*Author in Preface*).

39. The structural alterations of the tongue are consequences either of inflammation, or of unhealthy or cachectic states of the constitution, or of chronic disorders of the digestive organs. Inflammations, either primarily or consecutively affecting the tongue, are rarely of any considerable duration, without changing more or less the structure of the organ; still they cannot be viewed in their earlier stages especially as falling within the category of structural lesions. Cachectic states of the constitution may variously alter the organization of a part or organ, independently of inflammatory action, by either impairing, increasing, or otherwise altering the nutrition of that part, or by changing its cohesion, consistence, bulk, &c.; and prolonged disorder of the digestive organs may sympathetically occasion similar effects on this part. Organic lesions of this organ may, moreover, be produced by specific poisons or infectants.

40. *i. ULCERATION OF THE TONGUE*.—This lesion is frequently a consequence of partial or chronic glossitis, especially when limited to the sides, edges, or point of the tongue. It is often also a result of *Stomatitis* and *Thrush*, and of exanthematous and continued *Fevers*, more especially of *Scarlet Fever* and *Small-pox*. It frequently complicates *Scurvy*; and is often caused by the prolonged irritation of irregular or carious teeth. These antecedents are sufficiently indicative of the nature and treatment of the lesion. But the ulceration may be of a *specific nature*, and, it may be, *primarily*, or *consecutively*, or *secondarily specific*: as such it falls within



the category of VENEREAL AFFECTIONS. Irrespective of these states of ulceration, there are others which not unfrequently are subjects of interest and concern to the physician—which cannot be imputed to these affections, and which require both a local and constitutional treatment.

When ulceration of the sides of the tongue is the result of prolonged irritation of irregular or various teeth, both the nature and the treatment of it is obvious. As a consequence of scarlet fever, small-pox, and fever, the ulceration generally heals with the progress of convalescence. In rare instances, however, it becomes obstinate and chronic, requiring the application of strong solutions of the nitrate of silver, or the bichloride of mercury, of the tincture of iodine, &c. These ulcerations are seldom on the dorsum or middle superior surface of the organ; but, when they are thus situated, the constitutional disorder is then chiefly the cause, unless some local disorder of the surrounding parts have complicated and increased the affection. One of the most difficult cases of ulceration in this situation occurred in a case of typhoid fever, and was manifestly caused by the patient having, in the course of his delirium, taken a tongue-scraper, and forcibly removed the long dark fur covering the tongue; this fur evidently tending to protect the surface of the organ during the advanced stages of the fever.

41. Ulceration of the tongue may, however, take place without very manifest antecedent inflammatory action—at least without any severe or prolonged state of this action, and without any evidence of the state of the opposite teeth being its cause. The conditions of the digestive organs, especially of the stomach and collatitious viscera, or of the system generally, are, in most of these cases, the chief assignable causes; especially when the ulceration does not present either specific or malignant features. In some instances, even when these features may be expected, or are about to be developed, they may not be clearly manifested; for the ulceration may be either indolent, chronic, and variously characterized; and yet it may be difficult to state with certainty its cause, nature, or probable issue—the antecedents, concomitants, or history of the case being the chief guides. An ulcer in the side of the tongue, when caused by the teeth, may be cured with difficulty, even after the cause is removed; and when it has followed protracted disorder of the digestive organs, or a scorbutic attack, it is not readily healed in many cases, after the disorder of these organs, or after a general cachexia, is either removed or greatly ameliorated, especially in aged persons. The dread of consecutive malignancy, or cancerous degeneration, always suggests itself; and, although such a result may not take place, we know that it often has occurred in such cases, or that the cancerous nature of the ulceration does not always distinctly declare itself at first.

42. II. CANCER OF THE TONGUE is not infrequent.—A. Dr. WALSH states that out of 8289 fatal cases of cancer reported in the Paris registers in 1836, it was primarily or mainly seated in this organ. Scirrhus is its usual form, passing into ulcerations; but fungous excrescences sometimes appear, or exhibit the encephaloid character. It may attack any part of the tongue, especially the sides. I have seen three cases where it affected one side chiefly of the thick part or

base of the tongue, extending to the isthmus of the fauces and even to the pharynx, occasioning remarkable dysphagia and its usual symptoms. It may commence as a small, somewhat knotty, and irregular tumour, generally seated in the anterior part of the organ, midway between the raphæ and the edge, or rarely extending beyond the middle line. It sometimes appears as a small excrescence. In very rare cases the cancerous matter is deposited in erectile tumours. Simple ulcers of a chronic or indolent nature may become cancerous; but instances of this occurrence are comparatively rare. In all cases, when the surface ulcerates, the glands become affected in the usual way. Distant organs are not frequently implicated. There is generally an aching sensation in the affected part and vicinity, with occasional sharp or darting pains towards the ear or throat. Pain and difficulty in speaking, masticating, and swallowing are always present, and increase with the progress of the disease, until these functions can no longer be performed. Incessant sputation is always present, and is most distressing. The cancerous cachexia and emaciation are always very remarkable. According to Mr. TRAVERS, strong males, upward of forty years of age, are the most frequent subjects; but the disease is not rarely observed in much younger persons and in females.

43. B. *The Diagnosis* of cancer linguæ is sometimes difficult. The history and antecedents of the case should be duly considered. Cancer may be mistaken for *simple induration* of a part or side of the tongue—an affection noticed by RUYSCH and PERCIVAL, and most frequently seated in the base of the organ. This induration may depend upon tubercular deposits, and be attended by ulceration; but it is not apparently malignant, although it may possibly become so. Mr. TRAVERS has described a *globular tumour* seated deeply in the tongue, which is characterized by an unyielding and uniform surface. Both these forms of lesion are best treated with tonics and alkalies conjoined with the iodide of potassium. The *fissured and dyspeptic ulcer* may bear a near resemblance to cancer, but it has not the hard basis of the latter, is often in the middle line, the rest of the tongue being often chapped or fissured. It is frequently complicated with psoriasis. *Syphilitic ulcers* are not easily distinguished from cancer linguæ. They are generally larger, have less marked and less circumscribed hardness of their margins: their discharge is less abundant, and they want the firm everted edge and sprouting edge of the latter. The history of the case should be strictly ascertained. "Dr. WARREN describes an *enlargement of mucous glands* occurring on the side of the tongue, with a red fungous appearance, but differing from cancer in being sensitive, not painful, and unattended by real ulceration or thickening of the organ. *Hypertrophy of the mucous membrane* sometimes gives rise to irregular fissured elevations on the surface." *Erectile tumours* are known by their pulsation; but they become seats of cancerous deposits.

44. C. *The Treatment* of cancer of the tongue is palliative only in most cases. As the disease often primarily attacks this organ, the removal of it by surgical operations may be attempted before the glands in the vicinity become affected. Successful cases of this kind have been published by Mr. J. M. ARNOT and others (*see the modern Works on Surgery*)

[The *diagnosis* of cancer of the tongue is, like that of other cancers, in many cases, difficult, if not impossible. Even after its extirpation, when we can examine it at our leisure, and with all the microscopic and other aids in our power, we cannot always decide with certainty as to its nature. Our diagnosis is to be based, 1st, on the peculiarity of the development of the tumour and the changes which take place in it; and, 2d, on the presence of true cancer-cells, *viz.*, the *irregular caudate*; the *large cells with many cytoblasts and young cells*; *cells with a thick wall*; and the *accumulations of cells in fibrous capsules*; all of which are readily distinguishable from pus-corporules, or the indefinite cellular structure of tubercle; and in proportion to their abundance, preponderance, and perfect condition, will be the certainty of our diagnosis. It is certain that, before the stage of softening, a correct diagnosis must be founded exclusively on the presence of cancer-cells; and the only successful treatment is the entire removal of the diseased mass by the knife or caustics. It is the nature of every true cancerous tumour to increase continuously; as nature has adopted no means, as in the case of tubercular and other tumours, of limiting its growth. Hence, as we know as yet of no *specifics* for the cure of cancer, the only proper mode of treatment is the *early use of the scalpel*. We need not dwell on the necessity of the entire radical extirpation of the diseased part, whether the knife or caustic be employed, as every one knows that, if any cancerous matter remains behind, it will grow much more rapidly than before, in consequence of the more abundant secretion of cytoblastema. But a radical cure is not to be expected if the surrounding parts are not in a healthy condition, or the original cancerous diathesis is not eradicated. As the diagnosis, then, of a cancerous tumour in the living body is uncertain, it is expedient, in all cases of chronic tumours of the tongue, to extirpate them immediately, and before ulceration takes place; as no harm will occur from the removal of an innocent tumour, while, should it prove cancerous, the worst consequences may result from leaving it till ulceration takes place.]

45. iii. HÆMORRHAGE FROM THE TONGUE rarely occurs unless from accidents or operations, or in the far-advanced stages of diseases especially affecting the crasis of the blood and the vital cohesion of the tissues. In these latter circumstances it is chiefly met with in some extreme cases of mercurial affection of the tongue, and not infrequently in yellow or hæmagastic pestilence, and in scurvy. In these maladies the blood often exudes from the surfaces of the tongue and gums more or less copiously. J. P. FRANK notices a case of the latter disease in which the hæmorrhage was so abundant from the tongue as to prove fatal. For these occurrences, as well as for others of a similar nature, the most appropriate *treatment* is the local application of spirits of turpentine, by means of lint or sponges, while the same medicine is taken by the mouth, in doses suited to the peculiarities and urgency of the case. The other means advised, when treating of *Passive* and other forms of HÆMORRHAGE (see § 40, *et seq.*), may be employed if this fail.

46. iv. INDURATION OF THE TONGUE is rarely met with unless in connexion with tumour (§ 43), or some degree of enlargement. It has, however, been noticed by RUYSCH and PERCIVAL. It is oc-

casionaly seen in some degree in cases of syphilitic contamination. For such, the *treatment* should consist of the means advised for VENEREAL CACHEXIA. In other circumstances the alkalies with iodide of potassium, or the iodide of mercury, or the bichloride of mercury, with conium, may be prescribed.

47. v. ENLARGEMENT OF THE TONGUE, often to a very remarkable degree.—*Hypertrophy and Elongation* have been described by several writers.—A. The enlargement has been generally so great as to cause the protrusion of the organ two or three, or even four, inches beyond the lips, the thickness and the breadth of the tongue being also greatly increased. I had frequent occasion to see a very remarkable case of this kind, many years ago, in a female. The instances of it adduced by ZACCHIAS, BARTHOLINUS, CAMPER, TRIOEN, POILREUX, ARNEMANN, SCALIGER, SANDIFORT, PORTAL, and others, and very recently by MESSRS. HUMPHRY, HODGSON, and TEALE, as well as those described by the writers about to be noticed, present a remarkable similarity as to the appearance and nature of the enlarged organ. This lesion is well illustrated (by plates) and described by Mr. HUMPHRY in the work referred to. The structure of the organ was not altered otherwise than hypertrophied. This disease is quite different from the tumefaction of the organ produced by inflammation or by excessive mercurial action; as it is permanent when not restrained by surgical treatment, and is not occasioned by the causes just mentioned. In the case which I saw the disease commenced in childhood, and had continued without change up to the period when I examined it, when the subject of it was upward of 40 years of age.\*

[*Hypertrophy* of the tongue may be limited to its muscular substance, its mucous covering, or its papillæ. The former variety may be congenital, and we know a family of several children, all of whom labour under it to a greater or less extent. In adults it may occur as the consequence of glossitis, or without any assignable cause. Of the former, Dr. HARRIS, of Philadelphia, has published a case, in a girl, twenty-four years of age, which progressed until the organ protruded four inches beyond the incisor teeth, measuring one inch and three fourths in thickness by six inches and three fourths in circumference; the projecting portion being dense, of a dark chocolate colour, and constantly covered with a thick, tenacious mucus. The part within the mouth was entirely free from disease, excepting the lenticular papillæ, which were about five times the natural size. In another case, reported by the same surgeon, the hypertrophy was congenital, and was attended with unusual shortness of the rami of the lower jaw, with great separation of the incisor teeth (*Am. Jour. Med. Sci.*, vol. vii., p. 17; *Ibid.*, vol. xx., p. 15).

Dr. WELLS, also, has described a case (*West Jour. Med. and Phys. Sci.*, July, 1832) in a girl six years of age, where the tongue, preternaturally dense and rigid, hung down two and a half inches beyond the teeth of the upper jaw, and was more than two inches in breadth. The patient had suffered much from inflammation and

\* [Dr. PAGET mentions two cases of *fatty tumour* of the tongue, one of them 1½ inch long, and another, which he removed, of a *fibro-cellular* nature, firm yet succulent, and forming an obscurely filamentous tissue, abundantly nucleated.—*Lect. on Surg. Path.* Phil., 1854.]



ulceration of the mucous membrane of the tongue. This lesion would seem to be more common in the female than the male, and is most frequently the result of inflammatory irritation. "Enlargements of this kind," says Dr. GROSS, "are sometimes remarkably vascular, being pervaded by plexuses of dilated vessels, and subject to temporary erections from the preternatural influx of blood. Dissection shows that the fleshy fibres of the tongue have lost their normal colour, and that they are converted into a dense, semi-cartilaginous substance, with scarcely a trace of the primitive structure. In some cases the enlargement of the organ would seem to be occasioned by the development of nœvous-like structure."—*Path. Anat.*

Hypertrophy of the mucous membrane of the tongue is usually limited to one or more points, or extends to the whole surface, varying in thickness from the twelfth to the third of an inch, and exhibiting a rough, grayish appearance, the prominence being sometimes divided by deep fissures. There is usually no pain attending it, but the sense of taste is much blunted or entirely destroyed. The papilla may also become hypertrophied from gastric derangement or local injury, and thus form tumours of the size of a pea or larger, of a deep florid colour, resembling cancerous excrescences, but distinguishable from them by the absence of pain and ulceration. In these cases it is the circumvallate papillæ that are enlarged. The epithelial caps of the conical or filiform papillæ may become extraordinarily elongated, so as to be half an inch long (*Salter*.) They are of a dark colour, and look like little brown hairs. Minor degrees of this condition are not uncommon. In some cases the papillæ become atrophied.

Atrophy of the tongue is a rare lesion, but is occasionally met with. It is sometimes associated with inflammatory irritation or paralysis, and may proceed to such an extent as to leave only a dense, whitish mass, with scarcely a vestige of muscular tissue.

The tongue is also liable to congenital malformations, as bifurcation, extreme smallness, nipple-shaped, double, or even it may be wanting. The frenum may be too long, too short, preternaturally thick, and of a dense, fibro-cartilaginous consistence.

Mr. EARLE, of London, has described a peculiar disease of the tongue, consisting in very minute, semi-transparent vesicles, occupying the muscular substance of the organ, elevating sometimes the mucous membrane in the form of little tumours. In one case they grew in clusters, and were so sensitive as to bleed profusely on the slightest injury. The clusters, in some places, were separated by deep clefts, which discharged a fetid, irritating sanies. *Polypoid growths*, which seem to be of the nature of fibrous tumours, or, in some cases, of enchondroma, are sometimes met with in the tongue; also *fatty tumours* and *simple cysts*. The *caneroid* tumours of the tongue, described by Dr. H. BENNETT, would seem to be true cancer.]

48. *B. The Treatment* of this lesion is entirely surgical, and has been successfully conducted by, 1st. Pressure; 2d. Ligature; 3d. Incisions; and, 4th. Amputation. The treatment by pressure has been employed successfully by LASSUS (in two cases), LOUIS, RUMBAUM, CLANNY, FRETEAU, CROSSE, and TEALE. *Ligatures* were employed

by INGLIS, BIERKIN, VAN DER HAAR, MIRALTY, SIEBOLD, EDHOLD, COOPER, WELLS, LISTON, and HODGSON. *Incisions* were practised by ZACUTUS LUSITANUS and SCHNEIDER. *Amputation* was resorted to by PAMARD, FICKER, KLEIN, PERCY, HARRIS (in two cases), NEVERMANN, LEBER, NEWMAN, MUSSEY, PIMPERNELL, SYME, and HUMPHRY. The result was fatal in SIEBOLD's, LISTON's, and SYME's cases. Pressure would therefore appear to be the least dangerous mode of treatment.

BIBLIOG. AND REFER.—*Dioscorides*, l. i., c. 231.—*Pliny*, *Ilist. Natur.*, l. vi., c. 30.—*Celsus*, l. vii., c. 12.—*Galen*, *De Locis Affect.*, l. iv., c. 2.—*Actius*, *Tetrat.* ii., serm. i., c. 118; serm. iv., c. 38.—*Avicenna*, *Canon*, l. iii., Fen. 6.—*Tract.* 2, c. 2.—*Riverius*, *Observ.*, cent. iv., n. 24.—*Zacchias*, *Quest.* Med. Leg., l. ii., 8, l. iii., 1. v., 5.—*Dienbröeck*, *De Peste Ilist.*, 36. (*Carbuncle*.)—*Forrestus*, l. xiv., obs. 24 (*Carcinoma*), observ. 28 (*Hypertrophy*).—*Zacutus Lusitanus*, *Med. Pract. Ilist.*, l. i., ii. 71, et p. 478.—*F. Hildanus*, *Cent.* iii., obs. 84; Cent. iv., obs. 20.—*Plater*, *Observat.*, l. i., p. 98.—*Borelius*, *Observ.*, cent. ii., n. 63.—*Schenck*, *Observ.*, l. i., No. 382.—*Mortimer*, in *Philosoph. Transac.*, No. 486.—*D. C. Valther*, *De Rarissima Affectu Glossagra*, 4to. Erf., 1701.—*Bonet*, *Sepulchret.*, l. i., sect. xxi., obs. 19, 20, 21.—*Trioen*, *Observat. Med. Chirurg.*, p. 142. (*Ling. Hypertroph. ex Febre*).—*Penada*, in *Mem. di Matem. e Fisica della Società Italiana*, t. viii., No. 2. (*Duplex*).—*Eschenbach*, *Observata*, p. 8.—*T. Bartholinus*, *Ilist. Anat.*, cent. ii., No. 22; cent. iii., 43.—*Hoffman*, *Consult.*, Cent. i., n. 58.—*Trincavelli*, *Consil.*, l. iii.—*Ficker*, *Beytrage*, n. 8. (*Ling. Enormis amputata*).—*Ruysch*, *Observat. Anat. Chirurg.*, No. 76.—*Cyrilli*, in *Haller's Biblioth. Chirurg.*, ii., p. 211.—*Morgagni*, *De Sed. et Caus. Morb.*, Ep. lxxviii., 10.—*Thilenius*, *Med. a. Chirurg. Bemerkungen*, i., p. 107.—*Sandiford*, *Observ. Anat. Pathol.*, l. iv., c. 9.—*Scaliger*, *Exercit.*, 199.—*Meckren*, *Observat. Med. Chirurg.*, cap. 23.—*De la Motte*, in *Mem. de l'Acad. de Chirurgie*, t. v., n. 16.—*Hayes*, in *Mem. of Med. Society of Lond.*, vol. ii., p. 189.—*Sherwen*, in *Ibid.*, vol. ii., No. 18.—*Vallisneri*, *Opera*, iii., p. 167, 552.—*Gilbert*, *Adversar. Pract.*, p. 21. (*Conium in Carcinoma Lingue*).—*Lassus*, in *Mem. de l'Institut National pour l'An.* iv., t. i.—*Louis*, in *Mem. de l'Acad. de Chirurg.*, t. v., No. 15. (*Enlarged*).—*I. P. Frank*, *Acta Instit. Clinica Vilmensis*, t. iii., p. 120. (*Enlargement after a Bite*); et *Interpret. Clin.*, t. i., p. 160. (*Inflammation, Suppuration*); et *Ibid.*, t. i., p. 178. (*Scorbatic Hemorrhage, Fatal*); et de *Curand. Hom. Morb.*, l. ii., p. 94.—*Bierken*, in *Hufeland u. Himley, Jour. der Pract. Heilk.* Inl., 1811, p. 118. (*Elongated and Hypertrophied removed by ligatures*).—*Sauvé*, *Essai sur l'Affect. de la Langue Prolapsus*, &c. Paris, 1812.—*Poironz*, in *Journ. Génér. de Méd.*, t. xxix., p. 388. (*Tumour, Fatal*).—*Scheffer*, in *Hufeland, Jour. der Pract. Heilk.* Dior., 1810, p. 20. (*Hypertrophy of*).—*Inglis*, in *Edinb. Med. and Chirurg. Journ.*, 1805.—*Oberteuffer*, in *Loder Journ. für Pract. Chirurg.*, b. iii., p. 398. (*Corrosive Sublim. for Carcin. Ling.*).—*Percival*, *Pract. Essays*, i., p. 37. (*Induratio Foliis Belladonnæ sanata*).—*Conradi*, in *Arneemann Magazin*, &c., b. i., p. 151. (*A Blister to the Throat for Glossitis*).—*Delatour*, in *Revue Méd.*, t. i., 1825, p. 452.—*Gottel*, in *Ibid.*, t. i., 1826, p. 128.—*Van Dekerel*, in *Archives Génér. de Méd.*, t. xviii., p. 94.—*Speranza*, in *Ibid.*, t. xix., p. 407.—*Piorry*, in *Ibid.*, t. xxi., p. 588.—*Portal*, *Cours de l'Anat. Méd.*, t. iv., p. 507. (*Ling. Magna intus streatomatosa*).—*Ebermajer*, in *Hufeland Journ. für Pract. Arzneyk.*, b. v., p. 278.—*Loeffler*, in *Ibid.*, b. iii., p. 695; et in *Loder's Journ.*, &c., b. i., p. 599. (*Incisions for Glossitis*).—*Reil*, *Fieberlehre*, ii., p. 370.—*Freteau*, in *Journ. Gén. de Méd.*, t. lvii., p. 286. (*Intumescence and Elongation of the Tongue*).—*British and Foreign Medico-chirurg. Review*, July, 1850, p. 54.—*C. T. Quintard*, in *Lond. Journ. of Medicine*, No. xxxiii., p. 845.—*Hufeland*, *Journ. der Pract. Heilk.*, b. xiv., p. 201. (*Paralysis Lingue Chenopodio Ambrosioidi Sanata*).—*Richter*, *Med. u. Chirurg. Bemerkungen*, p. 166.—*J. Mitchell*, *Case of Spasmodic Affection of the Tongue successfully treated*, in *Trans. of Roy. Med. and Chirurg. Society*, vol. iv., p. 25.—*C. Lane*, in *Ibid.*, vol. viii., p. 201. (*Ulcer of Tongue treated with Arsenic*).—*H. Earle*, in *Ibid.*, vol. xii., p. 283. (*Disease of Tongue caused by irritation, and resembling Cancer, treated by Embrane*).—*B. Travers*, *On Cancer of T.*, in *Ibid.*, vol. xv., p. 245; et *Ibid.*, vol. xv., p. 257. (*On Ulcers of the T.*).—*T. M. Arnott*, in *Ibid.*, vol. xxii., p. 20. (*Case of Malignant Disease of T.*).—*E. Williams*, *An Essay on the Tongue in Functional Derangements of the Stomach and Bowels*, 8vo. London, 1843.—*Percy et Laurent*, in *Dict. des Sciences Médicales*, t. xxvii., p. 243. (*Cases of Hypertrophy and Elongation of the Tongue*).—*Breschet et Pinot*, in *Ibid.*, t. xxvii., art. *Glossite*.—*Bégin*, *Dict. de Méd. et de Chirurg. Pract.*, art. *Glossite*, t. ix.—*Desormeaux*, in *Dict. de Méd.*, 2d

ed., art. *Langue*, Maladies de la.—*Ker*, in *Cyclopædia of Pract. Medicine*, vol. ii., art. *Glossitis*.—*G. M. Humphry*, *Hypertrophy and Prolapse of the Tongue*, in *Transact. of Roy. Med. and Chirurg. Society*, vol. xxxvi., p. 113.—*J. Hodgson*, *Hypertrophy of the Tongue*, &c., in *ibid.*, vol. xxxvi., p. 129.—*J. P. Teale*, *Hypertrophy of Tongue*, in *ibid.*, vol. xxxvi., p. 133.

**TREMOR.**—**SYNON.**—Τρομός, Greek; *Tremor*, Lat. *Synclonus Tremor*, Good. *Tromos*, Swediaur. *Zittern*, German. *Tremblement*, Fr.; *Trembling*.

**CLASSIFIC.**—4. Class, 3. Order (Good).—I. CLASS, III. ORDER (*Author in Preface*).

**DEFINIT.**—*An involuntary, rapid, and feeble oscillation or agitation of some part of the body, or of the whole body, appearing primarily and without fever.*

1. Tremor has attracted the attention of the oldest writers on medicine. It has been noticed by HIPPOCRATES, CELSUS, ARETÆUS, and GALEN. AËTIUS and PAULUS ÆGINETA have devoted chapters to the consideration and treatment of it; and many modern writers have taken a more comprehensive view of its morbid relations, its symptomatic forms, and of the means of cure.

2. I. DESCRIPTION.—Tremor is very frequently a sympathetic and symptomatic affection. It is, however, sometimes a primary or idiopathic disorder, or one which can be assigned only to the state of the nervous system, or of the nerves supplying the part affected, either at their origins or in their course. The character or form of tremor varies much in different cases, and with the causes which produce it. Thus it may be merely a *slight but quick oscillation*, or a more marked and *rapid movement*, or *to-and-fro motion*; or it may amount to a *violent agitation*. It may present either of these features, and be also a *rotatory* or a *vertical motion*, especially when the head, eyes, lower jaw, or limbs are affected, and according to the muscles which are acted upon. It may, moreover, be only *temporary*, or of short or uncertain duration; or it may be *remittent*, or *intermittent*, or continue a *very long time*, or the *whole of life*, without apparently shortening the length of life. It may, in any of these, be either *general* or *partial*, as respects the frame. It may be a manifest and an important disease, or part of disease; or the patient may not evince any other disorder. In the latter case it may be viewed as idiopathic, or as constituting the complaint; in the former it is generally only a symptom. Although, when symptomatic especially, it varies its character, not merely as stated above, but sometimes still more remarkably, yet the oscillatory form, or to-and-fro motion, is usually preserved. The jerking and tremulous movements, which occur in other diseases, are observed chiefly in CHOREA, in SHAKING PALSY, in ERGOTISM, in BARBIERS, and in HYSTERIA. In all these, however, the abnormal motion is a symptom merely, is often more irregular, agitative, or spasmodic, than in tremor. The motions in this disorder are very quick and very limited or slight in extent, but always passive and usually very chronic, while they are in those diseases more active and acute. But many varieties of tremor, or modifications, are observed, and are to be referred chiefly to the causes of this affection. Tremor is rarely observed when the patient is sleeping, although he often starts in his sleep, and when he moves, the tremor is commonly very manifest. It is also increased after muscular efforts, or even during these; and by mental excitement, especially during anger or any

feeling of temper. Depressing emotions of mind, the abstraction of accustomed stimuli, fatigue, inanition, &c., also increase the tremulous motions, or even extend their sphere in the frame liable to the affection.

3. II. CAUSES.—Tremor may arise from only one cause, or it may be the result of the concurrence of several. The causes which most frequently predispose to it are commonly such as depress or exhaust the nervous energy of a part, or of the whole frame. Of these the most remarkable are original and hereditary conformation, insufficient or improper nourishment during infancy and childhood, masturbation, premature or excessive sexual indulgences and other secret vices, unwholesome air, and the several depressing causes fully considered under the head DEBILITY (§ 6). While many of these causes, especially when their operation is prolonged or excessive, may singly occasion tremor, others more commonly excite it, after the nervous system has become predisposed and susceptible. Of this latter class the most common are fear, fright, or terror; various moral sentiments, as passion, anger, excessive sexual desire, joy, &c.; contusions or injuries, succussions, concussions of the brain, falls, fatigue; excessive or prolonged muscular exertions, blood-letting improperly prescribed, or excessive discharges of blood, or inordinate secretion; the local injuries of nerves, inanition, or the abstraction of accustomed stimuli; and the abduction of animal heat in any way, whether rapid or prolonged. Most of these causes produce merely a temporary state of this affection. Those which follow more frequently occasion more prolonged or even permanent effects, although variously characterized, as mentioned above, especially as respects remissions, intermissions, or exacerbations. Those more influential causes are, the abuse of spirituous and fermented liquors or of narcotics; the excessive use of coffee or green tea; the use of tobacco in any form, especially when carried to excess; the fumes of mercury, arsenic, or lead, or the actions of those poisons in any form or way; various vegetable poisons;\* sexual excesses, inordinate mental exertion, invagination, and the suppression of accustomed discharges, eruptions, &c. The most permanent states of tremor result from old age and the changes in parts, or in the whole of the nervous system from prolonged debauchery and dissipation, and from organic change in or near the origins or course of the nerves, or implicating the nerves of the affected parts. Many cases of tremor of the simplest and most permanent kind present no manifest cause, and can only be referred to the pathological causes just assigned, although many of the changes may be too minute or much beyond our senses to be detected.

4. Tremor has been divided into several varieties by some authors. Thus, J. FRANK has added the following: 1st. The Inflammatory; 2d. The Rheumatic and Arthritic; 3d. The Gastric; 4th. The Atonic; 5th. The Nervous; 6th. The Metallic, or that caused by metallic poisons. Among the other divisions which have been assigned by writers, the following appear the most deserving of notice: 1st. Tremor senilis; 2d.

\* I have at present an officer under my care who was poisoned in the north of India and recovered with difficulty. Although a large and strong-looking man, he has ever since been subject to tremor, which is much increased by and after excitement. The treatment about to be noticed has been employed with only moderate success.



T. *potatorum*; 3d. T. *mercurialis*; 4th. T. *febrilis*; and, 5th. T. *paralyticus*. The subject may be elucidated by a few remarks on these varieties.

5. (a) The *Inflammatory* of FRANK would have been more correctly named the Congestive; inasmuch as the contingent occurrence of tremor is more frequent in congestive than in inflammatory affections of the nervous centres, and is more likely to take place from general or local vascular plethora, and from morbid condition of the blood, than from inflammation.—(b) The *Arthritic* and *Rheumatic* variety of tremor is not of frequent occurrence, and is an occasional symptom, oftener observed, however, during the earlier periods of convalescence from these diseases than during their course, and especially when those diseases have been neglected, or injudiciously treated by colchicum and other depressing agents.—(c) The *Gastric* form of tremor, contended for by FRANK, is of rare occurrence; for although tremor may be often connected with gastric disorder, the former may no more depend upon the latter than the gastric disorder may depend upon the tremor—both states of disorder being merely concurrent manifestations of the condition of the nervous centres or nervous prolongations, either voluntary or involuntary.—(d) The *Atonic* and the *Nervous* varieties of this writer may be viewed as one and the same; for it matters little whether the efficient or immediate cause be debility, exhaustion, atony, or asthenia, general or local, since the effect is nearly the same, although the causes are generally very different or even opposite in their natures.—(e) The *Metallic* and the *Mercurial* forms of tremor are distinctions which may be admitted as serving both to point out the cause and to suggest the treatment; but these terms fulfil this purpose in a very limited and insufficient manner; for tremor may be caused not by mercury only, but also by lead and by arsenic; and even not merely by metallic substances, but also by several vegetable poisons, as by aconite, conium, stramonium, &c.—(f) The *Senile* form of tremor requires no remark. It is in no respect different from the atonic and nervous.—(g) The *Paralytic* is identical with *Paralysis agitans*, and is treated of in the article PARALYSIS. It often varies in character from the slightest tremor to a more violent agitation, as above stated (§ 2).—(h) The *Febrile* is observed chiefly in periodic, and in low or nervous fevers, and especially in the far-advanced stages of these and sometimes of other fevers, or during convalescence from them. In these the tremour is indicative of depressed or of exhausted nervous power, especially of depressed or exhausted organic nervous power, and of some degree of alteration of the blood.

6. Tremor sometimes pertinaciously follows attacks of fever, especially those of a periodic type; and in some instances continues for a long period, even for months, exasperated, however, by exhausting or debilitating causes. A case of this description recently came under my care in a gentleman long resident in India, and often attacked by periodic fever. The tremor had been of very long duration; it was then his only ailment; and it was much increased by exhausting and depressing causes. It was ultimately removed by quinine, and tincture of sumbul. These cases of tremour are oftener met with in persons who have freely lived.

7. (i) The most frequent form of tremor is that observed in *drunkards* and *smokers*, or in

those who indulge in any of the fermented or *intoxicating liquors*, or in *tobacco* or *opium* in any form. In those persons the tremors are most observable in the mornings, or during the intervals between the abuse of any of the substances indirectly causing them, and are chiefly manifested in the extremities, especially the upper. The tremor in such cases may be either simple or associated with illusions of the senses, or with delusions of the mind. In this latter case the disease is essentially that which has been usually denominated *Delirium tremens*, and which I have described as DELIRIUM WITH TREMOR. But in the former, or when the tremor is simple, the affection may vary in its severity and characters, as already stated (§ 2), especially in the intervals between the abuse of the intoxicating agents; for the tremor generally either altogether ceases or is mitigated, as well as the usually attendant feeling of depression, sinking and anxiety, or internal misery, by recourse to the intoxicating cause. Hence the affection is perpetuated or increased, until it terminates in paralysis, insanity, convulsions, or fatal exhaustion of nervous power, with more or less marked disturbance of the excreting organs.

8. (k) One of the most important forms of tremor, although hitherto not mentioned by writers, is that which may be termed the *Hysterical*. It is merely a modification of the atonic or nervous state of the disorder, which may affect equally either sex; while the hysterical occurs chiefly in the female sex, and is a most obstinate affection, owing to its cause, viz., manustupration—a vice which, when once indulged in, is seldom relinquished, until either the mind or body, or more commonly both, are completely broken down. Hysterical tremor is variously manifested, most frequently in the eyes and eyelids, sometimes in the hands or in the motions of the head or lower jaw, occasionally in the lower extremities; and in this last case it is often associated with incomplete hysterical paraplegia. A case of hysterical tremor of the head and another of the lower jaw came under my observation some time ago; the former having been treated by Dr. N. GRANT and myself. In both these the oscillations were horizontal.\*

9. (l) The last form of tremor which I shall notice is symptomatic of *intestinal worms*; and although this form is merely a symptom, and even a rare symptom, of invermination, yet it deserves mention, as respects not merely this cause of tremor, but also the states of the nervous system, which characterize both the primary disorder and the sympathetic affection. In verminous tremor the organic nervous power is both depressed and susceptible of irritation, which is propagated from the involuntary to the voluntary muscles, chiefly of the abdomen and trunk. The few cases of this form of tremor that I have seen, have been in persons from whom either tape-worm or the long round worm has been expelled.

10. III. THE NATURE OF TREMOR may be inferred from the causes and circumstances of its occurrence. Unless when it proceeds from con-

\* A remarkable case of tremor, resembling a pulsating motion, of the muscles of the throat, was some years ago attended by Mr. Liston and myself. The question was whether it was hysterical or aneurismal, as the movements were often synchronous with the contractions of the left ventricle. The hysterical nature of the case became more manifest; and the patient returned into the country, without having allowed us time to observe the farther progress of the case.

gestion at the origins of the nerves of the affected part, and even in such cases also, tremor must be viewed as an indication of impaired power of these nerves, owing either to some change of their most minute organization, or of those parts of the nervous centres in which they originate. That the state of the circulation in the capillary vessels of those parts, or even of the blood circulating in them, as well as change of the structures or tissues in the vicinity, may also occasion this affection, may be admitted, especially when we consider the circumstances in which it occasionally comes under our observation, especially in the last stages of nervous fevers, in various forms of delirium (as the delirium of drunkards), in some cases of poisoning by narcotics or intoxicating poisons, &c. In a few cases of hysteria, and in rare cases of intestinal worms, tremor is a prominent symptom; and in these a sympathetic affection reflected upon some external or voluntary part or parts from the internal seats of irritation—uterine and intestinal—through the medium of the sympathetic or ganglionic order of nerves.

11. IV. PROGNOSIS. — Tremor often furnishes important prognostic indications. When tremor occurs in old persons, it sometimes is the forerunner of paralysis; and when it affects parts already paralyzed, it occasionally precedes returning health. Its appearance in an early stage of fever, or after the cold stage and during the period of increment, is an indication of severe cerebral affection; and in these cases, as well as its occurrence during or after the delirium of fevers, tremor is a dangerous affection. When it occurs in cases of cerebral congestion, it is a serious symptom; but much depends upon the circumstances of the case. In *gouty* and *rheumatic attacks* it is less dangerous, as long as the extremities or voluntary organs are alone affected; but when either disease has retroceded or been misplaced—internal or vital organs being attacked—and tremor appears in these cases, then the danger is imminent. If this affection be slight; if it depend upon excessive exertion, or upon inaction; or if it be of recent occurrence, it may be generally removed with the causes which produced it; but if it occur in habitual drunkards, smokers, or opium-eaters, or in the aged, and especially if it be associated with delirium, or illusions, or with delusions in persons addicted to intemperance, it either is not permanently removed, or if it be alleviated, it usually returns. Tremor is seldom or never cured when it is associated with *paralysis*, or when it appears in the *insane*. Although it is not a dangerous affection when it occurs in *hysterical females*, yet it is most difficult to cure, especially if there be reason to infer that masturbation has occasioned it, or the associated hysterical disorder. It is less serious when it is symptomatic of *worms*. It generally admits of removal when it has been caused by mercury; but it is cured with much greater difficulty when it has been produced by lead or arsenic; and, in many of these latter cases, it is often attended by great danger. Tremor in nervous persons, and in a slight or limited form, may continue for many years, or even to an advanced or very old age, when it is unassociated with any other disorder, and when the functions, both mental and bodily, are not impaired, or even not materially impaired.

12. V. DIAGNOSIS. — Tremor may be mistaken for several complaints, which either nearly re-

semble, or are closely allied with it; or they may be confounded with it, more especially chorea, the cold stage of ague, the formative stage of continued or exanthematous fevers, shaking palsy, delirium tremens, the subsultus tendinum observed in the last stage of fevers, &c.—*a*. In *chorea*, and in some cases of *palsy*, caused by disease of the membranes of the spinal cord, the motions are very different from tremor. In the former disease, the motion is caused by an irregular and frequent jerk, or momentary contraction of muscles, now affecting one part, then another; while in the latter, there is no tremor when the patient does not exert any volition on the affected limb; but, as soon as he attempts to move that part, the movement is often tremulous, uncertain, and imperfect. — *b*. In *shaking palsy*, the tremor or shaking is constant, unless the patient is sleeping, when it is either absent or diminished, and the power of motion is impaired or lost, or nearly so. Sensation is generally but little affected. — *c*. In *delirium tremens* there is more or less tremor, generally of the hands, and often also of the lower extremities and tongue; but there are also illusions of the senses and delusions of the mind, and nervous excitement. But tremor is often caused by intoxicating fluids, without delirium being present; and in cases occasionally characterized by delirium, tremor is often experienced either before or after attacks of delirium, or it may continue during the intervals between those attacks. The cold stage of ague, or the invasion of continued fevers—the former especially—may resemble tremor. But in the cold stage there is a general feeling of cold, which is not present in tremor, while the motions of the former are more active, and more generally manifested in the frame than those of the latter, which are usually passive and limited to certain parts, or at least not so widely extended. — *d*. The *subsultus* of the last and most dangerous state of fevers cannot be mistaken for tremor, as the history of the case, and the nature and seat of the movement, are sufficient to distinguish between them. The tremor of the tongue, often observed in *low fevers* when this organ is protruded, as well as the tremor of the limbs on attempts at motion or progression, occurs only when volition is attempted, and is distinct from idiopathic tremor, which is always present; the former, or symptomatic, being a frequent attendant upon greatly impaired nervous power, and manifested only when voluntary motion is attempted.

13. VI. TREATMENT. — The means of cure should be selected with strict regard to the causes and pathological states occasioning this affection. When it is caused by mercury or other metallic poisons, the remedies advised when treating of these in the articles POISONS (*see* § 568, *et seq.*), and ARTS and EMPLOYMENTS producing disease, should be adopted.\* Under this latter head the

\* [In tremor caused by any of the metallic poisons, as lead, mercury, &c., the iodide of potassium will prove a very successful remedy, especially in connexion with warm sulphur baths, vapor baths, &c. The bath should be made by taking from ℥ij. to ℥iv. *sulphuret of potassium*, mixed with 20 to 30 gallons of water.]

A new method of eliminating metallic poisons from the system, by means of *galvanic electricity*, has lately been introduced into practice, and, it is said, attended with marked success. A metallic bath is insulated from every thing, and partially filled with acidulated water, to convey more readily the electric currents. The patient lies on a seat in the tub, insulated entirely from the tub. When gold, silver, or mercury is in the system, nitric or hydrochloric acid is employed; when lead is suspected, the acid



prophylactic measures that may be employed against the metallic poisons are fully noticed. Sulphur was strongly recommended for the tremors caused by mercury by Dr. LETTSON; and electricity by DE HAEN, MANDUYT, and SIGAUD LA FOND, not only for the mercurial tremor, but also for tremor caused by other mineral poisons. ZACUTUS LUSITANUS advised sulphurous and aromatic warm baths, not only for those cases, but also for tremors produced by other causes. The treatment recommended by most writers for tremor has generally been either empirical, or been based upon the presumed nervous character of the affection. Antispasmodics were prescribed by MARTINI; blisters by MUYS; musk by STARK and BANG; the oxide of zinc by FISCHER; opium by THOMANN; purgatives by RIEDLIN; cinchona and its preparations by BOUCHER and FILLEAU; and the *chenopodium ambrosioides* by J. FRANK.

14. When tremor is occasioned by congestion or plethora of any part of the nervous centres, then recourse may be had to scarifications and cupping, or to the application of leeches, according to the circumstances of the case. If it be connected with gout or rheumatism, the remedies advised for these diseases are appropriate, but those which lower nervous power ought not to be adopted when this affection is symptomatic of these diseases. If it be caused by intoxicating fluids, the preparations of ammonia are generally most efficacious. When it is occasioned by cold, the warm bath, followed by frictions and ammonia, are indicated; and if these fail, cinchona, serpentaria, the calamus aromaticus, arnica, camphor, guaiacum, &c., may be severally employed. If congestion of the brain have occurred from this cause and produced the tremor, the arm or arms are most frequently the seat of the affection, and in this case cupping, leeches, a blister to the nape of the neck, or behind the ears, or even venesection if the patient be plethoric, as advised by SOLBRIG, may be prescribed. Cases have been recorded by ANDRÉ and others, which have recovered by means of a prolonged course of tonics conjoined with purgatives. Tremor may occur in such various, different, or even opposite circumstances and pathological conditions, whether appearing idiopathically or symptomatically, that it becomes impossible to state the means most appropriate to each of these, at least within the limits to which I am confined. In respect of this affection, as well as of most others, the physician must observe closely and judge for himself, selecting and devising his means with a strict reference to ascertained causes, and to inferred changes.

BIBLIOG. AND REFER.—*Hippocrates*, Prognos., ii., 24, lib. ii., epid. sect. 4.—*Dioscorides*, Facile Parab., l. i., c. 233.—*Celsus*, l. iii., cap. 25.—*Galen*, De Tremore, Opp. Cl. iii.—*Paulus Aegineta*, l. iii., c. 21.—*Avicenna*, Canon., lib. iii., Fen. 2, Fr. i., cap. 11.—*Forestus*, lib. x., obs. 99. (*Tremor Manuum*).—*Tulpius*, l. i., c. 12. (*Tremor periodicus*).—*Zacutus Lusitanus*, Prax. Amedur., lib. i., 42.—*Fernicius*, Consil., No. 16, et seq.—*Camérarius*, Memorab., Cent. ii., n. 23; et De Tremore a cessanti Scabbie. Tub., 1688.—*Diemerbroeck*, De Trem. et Paralysi. Traj. ad Rh., 1652.—*Bellini*, De Morbis Capitis, p. 562.—*Hochstetler*, Dec. iv., obs. 100. (*Tremor Pedum*).—*Peepelin*,

used is sulphuric. The negative pole of a battery is put in connexion with the bath, while the positive pole is in the hands of the patient. The metal is conveyed from the system, it is said, and deposited on the sides of the bath. Establishments for this purpose have been recently opened in our principal cities. Dr. TODD also speaks highly of galvanism for the same purpose in his recent "Clinical Lectures on Diseases of the Nervous System." Philad., 1855.—*Ed.*

l. ii., obs. 32. (*T. Corporis Universalis*).—*Bonet*, Sepulcret., l. i., sec. xiv., observ. 7, 9, 10.—*Riedlin*, Lin. Med., 1695, p. 101.—*Leutin*, Beyträge, p. 104. (*Scabie suppressa*).—*Thomann*, Annales Wureeb., t. i., p. 46.—*Bang*, in Acta Reg. Soc. Med. Haun., vol. ii., p. 153, et p. 253.—*De Haen*, Rat. Med., P. iii., p. 202; et P. iv., p. 231.—*Van Swieten*, Comment., t. iii., p. 439.—*Bardin*, in Jour. Génér. de Médecine, t. xxxviii., p. 129. (*Caused by Mercurial Vapours*).—*Soebrig*, in Horn. N. Archiv., b. ii., p. 333.—*Fischer*, Bemerkungen über London, &c., p. 172.—*Abrahamson*, in Meckel. N. Archiv., b. i., st. iii., n. 38.—*Sawages*, Nosolog. Method., t. ii., p. ii., Class iv., Gen. 14, Sp. 4.—*Manduyt*, in Mém. de la Soc. Roy. de Méd. ad 1782 et 83, l. p. 160.—*Boucher*, in Jour. de Méd., t. xii., p. 23.—*Filleau*, in Jour. de Méd., t. xlix., p. 241.—*Mérot*, in Jour. de Méd. Contin., t. viii., p. 390; et Mém. sur le Tremblement auquel, sont sujettes les Personnes qui emploient le Mercure. Paris, 1804; et Dict. des Sciences Méd., t. iv., p. 517.—*J. Frank*, Praxeos. Med. Universae Præcepta, t. iii., p. 227, 8vo. Lips., 1821.—*Chomel*, Dict. de Méd., 2d edit., art. Tremblement.

## TUBERCULAR CONSUMPTION.\*—SYNON.

—*Phthisis* (φθισις, from φθω, I waste or decay), Hippocrates, Pliny, Iuncker, Vogel, Sauvages, Cullen, &c. *Tubcs*, Celsus. *Phthoe*, Hippocrates. *Phthisis pulmonaris*, *Phthisis pulmonalis*, *P. serofulosa*, Frank, Pinel, &c. *Ph. pulmonalis tuberculosa*, *P. serofulosa*, Auct. *Affectio Phthisica*, Hoffman. *Hectica Phthisis*, Young. *Marasmus Phthisis*, Good. *Exulceratio pulmonum*, *Consumptio pulmonum*; *Lungen-sucht*, *Schwindsucht*, *Lungenkrankheit*, Germ. *Phthisie pulmonaire*, Fr. *Tisi pulmonare*, Ital. *Tisica*, Sp. *A phthisic*, *consumption*, *decline*, *pulmonary consumption*, *Tuberculous Phthisis*.

CLASSIF.—1. Class, 4. Order (Cullen). 3.

Class, 4. Order (Good). IV. CLASS, II. ORDER (Author in Preface).

1. DEFINIT.—Unusually quick respiration on slight exertion, short cough, hectic fever, and emaciation: expectoration at first wanting or scanty, afterward varying with the progress of disease, sometimes streaked with blood, or attended by more marked hemoptysis: colliquative perspirations and diarrhœa, or both alternately, generally supervening or hastening dissolution: usually occurring in the serofulous diathesis.

2. PATHOL. DEFIN.—The infiltration of tubercular matter in parts of the lungs; the morbid deposit undergoing metamorphosis, most commonly softening and more complete solution, followed by erosion of the containing tissues, by ulcerating cavities, by successive changes in adjoining parts, especially by vascular congestion, sanguineous exudation or extravasation, or inflammatory action generally limited to the adjoining structure and to the bronchial canals communicating with the tubercular formations.

3. In addition to the above symptoms and lesions characterizing tubercular consumption, there are many others less commonly present, that can be comprised only in a more detailed description of the several forms and stages of the disease. Of these sufficient notice will be taken in the sequel. Some of the topics more fully considered in the articles SCROFULA and TUBERCLES will here receive a passing notice, in as far as they are more especially connected with pulmonary phthisis. The intimate connexion of scrofula and tubercular formation, in all cases, and their actual identity as respects especially their causes and constitutional relations, have been fully discussed under the heads just referred to (see SCROFULA and TUBERCLES, § 112–119, et pluries). It

\* [The additions to the present article will be chiefly found in the Appendix at the end, to which the reader is referred.—*Ed.*]

is therefore unnecessary to advert to these topics in connexion with tubercular phthisis, especially as they will be made apparent during the description of the causes and organic changes of this malady.\*

4. The *forms and states* of pulmonary consumption—of tubercular disease, affecting chiefly the lungs—and the numerous complications or morbid associations, either developed in the course of this malady, as contingent and intercurrent affections, or existing in the frame as latent or as manifest disorders from the commencement, severally require due recognition and diagnosis, and claim the especial investigation and study of the physician. The early aberrations from health which indicate the commencement of tubercular phthisis have been, during the greater part of the period of which my experience is cognizant, either imperfectly estimated or overlooked, while undue attention has been, and still is, directed alone to that which, although fully deserving a due portion of attention, should not receive an undivided investigation—to *physical diagnosis* in the several forms and methods, in which it has recently been paraded, over-estimated, and lauded. Owing to this one-sided study, to the fallacies inseparable from its nature and to those which arise from varying conditions of vital influence and action, from different states of secretion and excretion, from numerous disturbing causes appearing contingently, and from habits of dogmatizing with the view of exhibiting a precision of acquirement and knowledge beyond what has been previously reached, the cultivation, if not the advancement of physical diagnosis, to the neglect of the intimate observation of constitutional and physiological changes, has been generally attempted. Manipulations which strike the senses of the attendants, and more than one sense of the patient—examinations which may be seen, felt, and talked about, have a much more impressive and lasting influence upon both patient and spectators, than the close observation of symptoms and the pertinent inquiries of the profound and comprehensive thinker. The former are lights which the possessor places upon an eminence for his own advantages; the latter are lights intended entirely to benefit the person for whose safety they are employed. The one method strikes and impresses the patient and those around him, the

other is at best but imperfectly estimated, or even altogether unheeded.

5. Auscultation, which is of great service in the progress of phthisis, is much less advantageously employed at the commencement and even during the early stage of the malady. Too great dependence upon, and a too *ad captandum* parade of, this mode of diagnosis, sometimes even with the fussiness and the flourishes of vulgar craft, have tended to the neglect of those states of vital manifestation, of disordered functions, and of vascular action, which, while they indicate incipient or early pulmonary disease, also characterize its forms, and point to the changes in which these forms originate, and on which they continue more or less to depend. The presence or absence of certain sounds on percussion or auscultation, the states of development and of mobility of the several regions of the thorax, both individually and in relation to each other, are all of great importance in themselves, but this importance is heightened when they are viewed in connexion with their causes and with existing conditions of vital manifestation, of morbid function and of vascular action.\*

6. The usual modes of physical diagnosis in respect of tubercular consumption have been sufficiently described, illustrated, practised, discussed, praised, and confided in, since the days of LAENNEC to those of SKODA, which nearly mark the period comprised by my experience; but they have not always been received as immutable truths. What was confided in by the batoned followers of LAENNEC is now disputed by the skeptical followers of SKODA. Doctors proverbially differ; but professed adepts as certainly disagree, and that the disagreement may not be the less marked and continued, the one school misinterpret or misrepresent the dogmas of the other. As among the microscopists, so among many of those who pretend to the greatest powers of auscultation—who split hairs in auscultatory diagnosis—the greatest differences occur, in the early stages of phthisis especially. What is heard by one is often not heard at all, or heard differently by another; belief frequently rendering the sense of hearing more acute and the physical signs more distinct. Not infrequently the adepts—the *specialists* of this malady, the would-be the greatest authorities, the infallible in this department of *speciality*—find evidence of tubercles in the lungs on auscultation and percussion, where none exist, or have existed, or could be detected after death.†

\* [From the various analyses of tubercle given by different authors, it appears that it consists, 1st, of an animal matter mixed with certain earthy salts, the relative proportions of which vary in different specimens of tubercle, animal matter being more abundant in recent, and earthy salts in chronic tubercle; 2d, that the animal matter contains a large amount of albumen (*casein, fibrin, and fat* have also been detected in small but variable proportion as constituents of tubercle); 3d, the earthy salts are chiefly of the insoluble phosphate and carbonate of lime, with a small proportion of the soluble salts of soda; 4th, that very little difference in ultimate composition has yet been detected between recent tubercle and other so-called compounds of protein. VOGEL, however, states that the chemical composition of tubercle is at present unknown (*"Path. Anatomy of the Human Body."* Phil., 1847), and all that is positively known regarding it is, that it is a protein compound. During softening, the same writer states that chemical changes occur, the phosphorus and sulphur diminishing, till at last they wholly disappear. The experiments of SCHERER seem to show that tubercle in different cases presents a different composition, and is not always identical with protein.—(*Simon's Animal Chem.*, vol. ii., p. 478.) It is admitted by all that, in addition to the protein compounds, tubercle contains various salts, fat, extractive matters, and a substance resembling pepsin—the calcareous salts predominating when the tubercles become changed into concretions, leaving but about three per cent. animal matter.—(*Thenard.*)—Ed.]

\* [DR. CAMMANN, of New York, has invented a stethoscope which possesses many advantages over those in ordinary use. In cases of suspected tuberculosis, in which tuberculous deposits are either wanting or are small and disseminated, we are able, by means of this instrument, to make a closer comparison of the respiratory sounds than with the naked ear or the ordinary cylinder. "A disparity, therefore, on the one hand, is in some instances rendered appreciable which otherwise would not be discovered; and, on the other hand, the absence of a disparity and the completeness of the normal characters are more satisfactorily determined than is always practicable without this improved means of auscultatory exploration. It enables the auscultator to study the characters of the respiration in some cases in which it is so feeble as to be with difficulty appreciated by the ordinary cylinder or by immediate auscultation. Its usefulness, in cases in which it is desirable to make nice comparisons with respect to vocal phenomena, is not less than in examinations with reference to respiratory sounds. These advantages render the instrument particularly serviceable, both in a positive and negative point of view, in the diagnosis of pulmonary tuberculosis."—A. Flint.]

† [We fear that sarcasms in regard to the use of the



7. I. As to the ORIGIN OF TUBERCLES, I must refer the reader to that article (*see* SCROFULA and TUBERCLES); but I may here remark that much has been written upon this topic in former days, and at the present time it still remains a "*quæstio vexata*." At an early epoch of pathological speculation respecting it, the formation of tubercles was imputed to impaired vital influence, and afterward to depressed nervous energy. At a more recent period a morbid nutrition obtained credit for the mischief, although it might have been difficult to show how nutrition, however morbid, could have formed what was admitted to be neither organized nor organizable. Then it was attempted by ROKITANSKI and his admirers to describe tubercles as transitions from organized to non-organized formations. Still more recently the origin of this formidable malady was laid in the blood; and if the actual existence of the tubercular matter could not be detected in the circulation by the far-seeing—or rather near-seeing—microscopists, after the most minute search, the elements of this matter doubtless existed. Upon this latter inference they could safely count. Indeed, this part of the conclusion could hardly be denied; for, where vascular assimilation is deficient, the materials for morbid formations must necessarily abound; and the development of such formations will necessarily most readily take place in situations and structures most favourable to the morbid process, and most exposed to the influence of the causes which predispose to, or produce it. When organic nervous power is impaired, vascular assimilation and healthy nutrition must necessarily suffer; and those tissues and organs which are the most disposed by function and organization, and as respects their capillary circulation and their normal secretions, to experience the early effects of these changes, will be the first to manifest disease, and the most likely to experience disorganization.\*

8. Dismissing, however, the consideration of this topic, and referring to what I have advanced respecting it under its appropriate head, I shall now very briefly advert to the constitutional states in which the formation of tubercles in the lungs generally takes place, and with which they are

more or less intimately allied during the greater part or the whole of their progress. These states have been very imperfectly described and distinguished from each other, both in health and in disease; the great difficulty of assigning distinctions, arising from their mixed characters, the manner in which they pass into one another, and the association of temperament, diathesis, and habit of body being often such as to obscure the subject, and to render precise and accurate observation almost impossible. Nevertheless, these states have a more or less intimate relation to the forms or varieties of tubercular phthisis, and should hardly be separated from a due consideration of the influence and *modus operandi* of the predisposing and exciting causes. Certain of these, especially the scrofulous diathesis, and very probably this only, have a most intimate connexion with the pulmonary disease, while others are much more doubtfully, or even are in no ways, related to it. They should, notwithstanding, be viewed in connexion with the causes, the courses, the morbid associations, and the inter-current affections of tubercular phthisis. The imperfect attention which has hitherto been directed to this part of the subject must be my apology for the insufficient discussion of it at this place, my object being rather to indicate than to supply the deficiency: to this latter end precise observation and patient research are altogether wanting.

9. i. *The scrofulous diathesis or taint* is the most common constitutional condition in which phthisis occurs. It is that intimate organization of frame which results from those predisposing causes, referable to the parent and to the infancy of the offspring, and which, with these causes, I have described when treating of SCROFULA and TUBERCLES (*see* § 3, *et seq.*). But although it is most frequently the basis of the tubercular formations in the lungs, whether latent or developed—the soil in which they grow—yet these formations may appear in other conditions of the frame than this, when the predisposing and exciting causes are in energetic or concurrent operation. In this condition, however, the tubercular formations in the lungs are most prone to pursue their usual course, especially after the age of puberty, and before the period of middle age. They may also assume the acute form, especially in the plethoric, and when their causes are more than usually active.

10. ii. *The lymphatic temperament* has been supposed, especially by French pathologists, to predispose to phthisis more frequently than any other temperament or diathesis, excepting the scrofulous. This may be the case, for I am not prepared to dispute it; but if the question be put as to what constitutes the lymphatic temperament, and as to what signs this temperament may be recognised, but few will agree in the answer, or be prepared to answer it at all. This much may be said respecting it, that it is very closely allied to the scrofulous taint or diathesis; that the lymphatic system is prominently developed in persons possessing it; and that the lymphatic glands and serous membranes in those persons are very prone to become the seats of tubercular deposits, whatever may be their complexions or races.

11. iii. *The melancholic, phlegmatic, and bilious temperaments* do not predispose to phthisis. When this malady occurs in either of these constitutional conditions, it is generally caused by

microscope, instead of serving any useful purpose, will only serve to excuse indolence and depreciate the value of physical diagnosis among practitioners. It is in the highest degree important that medical men should be able, if possible, to detect the existence of this disease in its early stages, when, by proper hygienic means, it is often within our control, and no means of diagnosis which furnish any aid towards that object are to be neglected.—*Ed.*

\* [SIR JAMES CLARK, DR. BENNETT, of Edinburgh, and many other writers on this disease, have called attention to the fact that it is usually ushered in or preceded by derangement of the digestive organs, indicated by furred tongue, capricious appetite, acidity and anorexia, constipation alternating with diarrhœa, and that the same symptoms, in a majority of cases, accompany phthisis throughout its progress, becoming more and more violent towards its termination. It is therefore reasonable to believe that, as the nutritive properties of the blood are entirely dependent on a proper assimilation of food, and as this assimilation is interfered with in the morbid conditions of the alimentary canal, the continuance of such conditions necessarily induces an impoverished state of that fluid, and imperfect growth of the tissues. When, under such circumstances, exudations of the liquor sanguinis occur, they are very liable to assume the form of tubercles, and if they are poured into the lungs, there are then produced those changes and that condition called pulmonary tuberculosis. *See a Treatise on the Pathology and Treatment of Pulmonary Tuberculosis, and on the Local Indication of Pharyngeal and Laryngeal Diseases frequently mistaken for or associated with Phthisis*, by J. H. BENNETT, 8vo. p. 130. Phil., 1854.—*Ed.*]

several concurrent influences, and it frequently assumes a very protracted form, or it remains long latent before it is openly and fully manifested. It may then be far advanced, and either assume in this state a chronic form, or proceed rapidly to the usual termination. It is often, however, very difficult to determine the diathesis and temperament of persons labouring under phthisis, especially in its advanced stage; and the comparative tendencies of either temperaments, diathesis, or habits of body, to this disease, have not been ascertained with a sufficient precision to enable me to state any thing with confidence on this topic.

12. iv. *The nervous, the irritable, and choleric temperaments* present no very marked predisposition to phthisis, although this malady may appear in either of these temperaments when the causes are energetic. In these the disease is prone to assume an acute, rapid, and febrile character, or to be associated with bronchitis or laryngitis; and, in the nervous temperament especially, it may, in its early course, present many of the characters of nervous fever, or, in children, of remittent fever. In either of these constitutional states various complications may occur in the progress of the disease, affecting either the lungs or other organs. Although hæmoptysis may take place in either of these, it is not so frequent in them as it is in the sanguineous temperament, or in the scrofulous diathesis.

13. v. *The sanguineous temperament* is probably more disposed to phthisis than those last noticed (§ 11, 12); but it is more especially so disposed when it is associated with the scrofulous diathesis. It is then apt to favour an acute or febrile form of the malady, which is frequently complicated with hæmoptysis, with pneumonia, and various other lesions of the lungs and pleura. As respects this temperament, as well as the others, a more precise observation of phenomena from the commencement to the termination of phthisis, in a wider field of observation than I have possessed, is required to illustrate this part of my subject, and to render it available to practical purposes.

14. II. DESCRIPTION OF TUBERCULAR CONSUMPTION.—In describing tubercular consumption, or phthisis pulmonalis, I confine myself to the phenomena produced by the formation of tubercles in the lungs, although I do not overlook the fact that tubercles often exist in other organs when they are formed in the lungs, especially in young subjects. Of this circumstance notice will be taken in the sequel. Pulmonary phthisis may be viewed as a vital blight, which in the animal kingdom as in the vegetable, affects the circulating fluids by attacking the organs of assimilation and respiration. Numerous vital and physical causes, severally or concurrently, produce this result; while many influences, occasioning either excessive waste or imperfect supply of assimilating or nutritious elements, exert a similar effect.

15. *Phthisis* may present numerous variations in its course. M. Louis states that he has seen it prove fatal within a period varying from three months to twenty years; and the tendency of the disease to cause a simultaneous or successive formation of tubercles in different parts of the system is one of the chief reasons of these variations. I have met with cases, the duration of which has been even much longer than just now

mentioned, and I will make a more particular reference to them in the sequel. The very different or varied occurrences and lesions, which may take place in the early course or advanced progress of phthisis, independently of the influence of *diathesis* and *temperament*, are such as to vary most remarkably the character of this disease. The development of tubercles in different tissues and organs; the progress of tubercular deposit, and the form of tubercles; their softening, and the excretion or absorption of the tubercular and morbid matters; intercurrent inflammations, bronchial irritations, or pleuritic attacks; the occurrence of hæmoptysis, its frequency or amount; attacks of laryngitis, tracheitis, or ulceration either in those situations or in the bowels, with many other contingencies, either severally or in combination, impart a marked diversity in the characters, course, and duration of this malady. In order, therefore, that these variations, with their most frequent sources and contingencies, may receive sufficient attention, I shall notice, 1st. *The more usual form of tubercular phthisis*; 2d. *The latent form of phthisis*; 3d. *The primarily acute form of phthisis*; 4th. *The consecutively acute form*; 5th. *The protracted form of phthisis*; 6th. *Of phthisis in infancy and childhood*; and, 7th. *Of phthisis in the dark races*.

16. Having considered the *forms* or *variations* of the disease as fully as my limits permit, I shall afterward take a brief view of the complications and intercurrent lesions which may appear in the course of these forms, more especially of, 1st. *Bronchial irritation and inflammation*; 2d. *Hæmoptysis in its several states*; 3d. *Inflammation, ulceration, œdema, &c., of the larynx, trachea, &c.*; 4th. *Inflammations or congestion of the lungs, or of the parts surrounding tubercular deposits, &c.*; 5th. *Inflammations of, effusion from, and adhesions of the pleura*; 6th. *Perforation of the pleura, pneumothorax, and hydro-pneumothorax*; 7th. *Diseases, especially ulceration of the intestines*; 8th. *Fistula in ano*; 9th. *Disorders of the uterine functions and organs*; 10th. *Diseases of the kidneys and urinary organs generally, and their consequences*; 11th. *Diseases of the heart and pericardium*; 12th. *Abnormal states of the blood and blood-vessels, at the commencement and at the successive stages of phthisis*.

17. i. OF THE MORE USUAL FORM OF TUBERCULAR OR PULMONARY PHTHISIS.—At its commencement phthisis may be manifest to the close observer, or it may be inferred with uncertainty, or detected with the greatest difficulty. But, as it advances, it generally becomes evident to the most careless observer. The diagnosis, however, should have reference not merely to the existence of this disease, but also to the progress it has made, as shown by the nature and combination of the symptoms and signs during its course. The division of its course, therefore, into *periods* or *stages*, according to the progress and extent of the pulmonary and associated lesions and to the nature of the symptoms, is of much importance, not only as imparting a greater precision of description, but as suggesting more appropriate indications and means of treatment.

18. A. FIRST STAGE.—a. In some cases before the respiratory functions indicate any disorder, but in others either contemporaneously with, or soon after such disorder, the habit and appearance of the body evince more or less of falling off



from the healthy condition. Cough and shortness of breathing, slight at first, and hardly observed, are early experienced. The cough is at first short, slight, occurring only in the morning when leaving the bed, consisting only of a slight hack, and afterward recurring only occasionally or more and more frequently in the course of the day, or upon exertion. It is at first dry, or attended by a slight, ropy or saliva-like fluid. The respiration, either previously, subsequently, or about the same time, is quick or hurried on the slightest exertion, and becomes more remarkably short as the cough continues or becomes frequent. At this period, or even previously to either cough or shortness of breathing being experienced, the patient's spirits, in some cases, are much depressed, and the pulse is weak and slow. This is more particularly remarked when the disease is produced or determined by exhausting or depressing causes, as masturbation or depressing mental emotions. In many cases, the pupil of the eye is much dilated, and the conjunctiva pale or pearl-like. Pallor of the countenance and a deficiency of the carnation tint of the general surface are also often observed, while the flesh is softer than natural, and somewhat emaciated. There are a general indication of languor, and a want of the elasticity of mental and bodily health.

19. These symptoms may continue for some time, without making much progress, or they may become more marked, but they are, after a longer or shorter time, according to the states of season, weather, climate, and numerous other influences, followed by greater and more general disturbance. The pulse becomes quicker than usual, especially towards evening or after meals. A chilliness, or sense of coldness, going down the spine, is experienced early in the day and again towards evening, followed by an increased heat of skin, the evening chill and heat being most complained of. The febrile paroxysm at noon may be slight, and thus overlooked, but that in the evening is attended by greater heat of skin, particularly of the palms of the hands and soles of the feet, which continues during the night, perspiration occurring towards morning. Owing to this febrile condition the patient is restless, and sleep is less sound and refreshing; cough often occurring during the night, when turning in bed, and as the disease advances. The patient readily flushes on any excitement, or after a full meal; and a tightness or oppression of the chest, or transitory pains, especially near the collar bones, are often experienced. The bowels are not much disordered, or are somewhat confined; the urine is not materially affected. The female discharges are at this stage not necessarily deranged; but they may be either excessive in quantity or frequency, or they may be scanty, difficult, or suppressed, or replaced by leucorrhœa; these disorders often accelerating, the last affection sometimes delaying, the progress of the malady.

20. Climate and weather, aided by various circumstances, very remarkably influence the progress of this stage, especially when aided by judicious treatment. With the advance of spring and summer, in this and temperate countries, the malady often appears arrested, and the general health improved. The patient sometimes gains flesh and strength; but cough and shortness of breathing seldom entirely disappear; and as autumn advances and winter returns, they become exasperated upon the slightest exposure, or even

without any known exposure, and the other symptoms also are aggravated, periods of exacerbation and of relief sometimes taking place irregularly, and tending to retard the progress of this stage, or even to carry it on to the following spring and summer, if the second stage have not previously supervened.

21. *b. This first stage of tuberculous phthisis corresponds with the first stage of tubercular development.* The lungs at this period contain a greater or less amount of tubercular deposit in what has commonly been denominated a state of crudity. The tubercles are generally of two kinds, as described in the article SCROFULA AND TUBERCLES (§ 71, *et seq.*); the one more or less firm, grayish, and somewhat transparent; the other of a pale yellowish colour and opaque. At this stage, the adjoining pulmonary tissue and bronchial membrane may not have undergone any perceptible alteration, or both may present more or less redness or vascular congestion. If *hæmoptysis* have occurred in this stage, which is very frequently the case, and which I shall notice more particularly hereafter, these changes are generally present in a more or less marked degree. The symptoms thus indicating the first stage of tuberculous phthisis chiefly are, slight cough, shortness of breathing, languor, loss of the healthy colour of the surface, commencing emaciation and flabbiness of the flesh, slight hectic fever, and the state of the eyes already mentioned.

22. *c. The physical signs in this stage are very often obscure.* This, however, depends much upon the form in which the tubercular deposit exists in the lungs—whether or no in that of isolated granules or as a continuous mass infiltrated through the parenchyma. Isolated tubercles may be so minute as almost to escape observation; or they may render portions of the lung impermeable to air, either by enlarging and approaching each other, or by the formation of more recent tubercles between them. While the solitary tubercles are separated from each other by healthy tissue, physical signs may be absent or obscure; but when portions of the lung are impermeable to air by infiltration of tubercular matter, or by the development of solitary tubercles, these signs are rendered more or less manifest, especially in proportion to the greater or less extent and rapidity of the respiratory movements. The quantity and quality of the secretions formed in the bronchial tubes have, however, great influence on the nature of the physical phenomena.

23. *d. Solitary tubercles do not, of themselves, produce the slightest change in the percussion sound of the lungs, even although they be scattered throughout the organ in considerable number.* Any change of this sound depends upon an altered state of the portions of lung between these tubercles: the sound is tympanitic when the intervening tissue has lost its contractility; but the infiltration of blood, serum, &c., into the tissue, whereby the air is expelled from it, renders the sound dull. As long as the intervening tissue continues normal the sound continues normal; but it is less sonorous, if the tissue be more dense and hypertrophied than natural. SKODA disputes the statement of Dr. STOKES that solitary tubercles, when very abundant, produce a somewhat dull percussion sound. When they do so, the intervening tissue is then most probably congested or infiltrated.

24. *e. On Auscultation the signs of solitary tu-*

*bercles* are often indefinite, owing to their number, development, and the state of the bronchial mucous membrane. The inspiratory murmur may be distinctly or loudly vesicular, or it may be indistinct or altogether inaudible, though unaccompanied by râles, or whistling, or sonorous sounds. Râles of every kind, as well as whistling and sonorous sounds, may be mixed with the vesicular or indeterminate inspiratory murmur, or râles or whistling sounds alone be heard. The expiratory murmur may be altogether inaudible, or as loud and strong as that of inspiration, and, like this, be associated with râles, and whistling, and sonorous sounds.—SKODA.

25. As the deposit of tubercular matter increases, "and in many cases even at its first deposition, swelling of the bronchial mucous membrane, accompanied or not by secretion, takes place, and then the same auscultatory signs appear as those described under the head of catarrh. The slow development of tubercles almost invariably takes place in the upper parts of the lungs, and hence, in such cases, we frequently find the auscultatory signs of catarrh permanent there, the respiratory murmur being elsewhere healthy. Rapidly developed tubercles, however, do not manifest themselves in the first instance at the apices of the lungs, but are frequently scattered equally throughout the whole of a lung, or of one lobe."\* SKODA considers that there are no distinct signs by which the existence of acute miliary tubercles can be diagnosed. Dr. STOKES states that "if in a case presenting the signs and symptoms of severe bronchitis, or in which we observe a crepitating râle continuing without intermission, we find incomplete dullness over a considerable extent of the surface of the thorax, unaccompanied with bronchial respiration; and if the stethoscope shows that the lung is almost every where permeable to air, and obstructed only at certain places, or if the crepitation be too feeble to account for the dull percussion sound, we may diagnose the acute inflammatory development of tubercle." According, however, to the experience of SKODA, most cases of acute tuberculosis are unaccompanied by any of those signs, and every one of them may be present without the disease being tubercular.

26. *f. Tubercles in Masses and tubercular Infiltration.*—a. In by far the greater number of cases of tubercular disease of the lungs, of some duration, the *percussion sound*, under one or both clavicles, is duller and emptier than natural, or is completely dull, while over the other parts of the thorax the sound is normal, or louder, or duller than ordinary. This is owing to the conglomeration of tubercles in the upper parts of the lungs, where they are slowly developed, increase in size, and, coming in contact with each other, form considerable masses. Tubercular infiltration also occurs in the form of a slow process of development in the upper parts of the lungs, and then gives rise to this change of sound under the clavicles. Generally, when the sound under the clavicles is duller than natural, it is abnormally loud in the natural regions of the thorax, the lower part of the lung being more than usually distended, owing to respiration being impeded above. Acute tubercular infiltration takes place most frequent-

ly in the upper lobes of the lungs. It produces the same percussion sound as hepatization.

[Dr. H. J. BOWDITCH, of Boston, has reported eight cases where the tubercular deposit commenced near the base of the lung and extended upward; and he estimates that these exceptional instances are liable to occur in a ratio of 1 to 150 or 200 cases. The instances observed by him were characterized by a well-marked crepitant râle behind, over the lower lobe, persisting for weeks or months, followed by the physical signs of solidification, the disease finally extending to the upper lobe, affecting both sides, and advancing to the formation of cavities, as in the ordinary form of tuberculosis. The symptomatic phenomena in these cases did not present any material variation from those usually observed in phthisis. The diagnosis involves discrimination from pneumonia. The physical signs are common to the two affections, but with this essential difference: in the tuberculous affection the crepitant râle persisted for weeks and months, solidification being slowly induced. Moreover, the history and symptoms of the case differ essentially in the two diseases. Exploration for phthisis should, therefore, not be limited to the upper part of the chest.]

27. *g. Auscultatory Signs.*—As long as the tubercular mass, or the tubercular infiltration, is of such limited extent as not to contain within it at least one large bronchial tube, it will not give rise either to bronchophony, or to bronchial breathing, or to any consonating sound. "Vesicular respiration may continue audible beneath the clavicles even when tolerably large masses of tubercles are present in the upper lobes of the lungs, provided there be sufficient healthy tissue to produce it, and the bronchial mucous membrane be not swollen nor covered by secretion. But this is not generally the case, for we almost invariably hear an indeterminate inspiratory murmur, of different degrees of strength, often, indeed, very strong, and in most cases attended by moist râles, or by hissing, whistling, and sonorous sounds; the expiratory murmur is nearly as loud, or even louder, than the inspiratory, and is likewise combined with different kinds of râles, and whistling and hissing sounds."—*Op. cit.*, p. 302.

28. If the tubercular masses or infiltration be of such extent as to embrace bronchial tubes, in which the voice or the respiratory murmur can consonate, bronchophony and bronchial breathing will be heard beneath the clavicles, provided the tubes are not filled by fluid or solid exudations, and should there be any râles, or whistling or sonorous sounds in the trachea, or in a large bronchial tube, consonating râles, or whistling or sonorous sounds, will also be heard. But if the bronchial tubes in question be obliterated, neither bronchophony, nor bronchial breathing, nor any consonating râles, will be audible, these being replaced either by indeterminate respiratory murmurs, with or without dull râles, or no murmur whatever. It is often observed, owing to the bronchial tubes being at one time filled or obstructed by mucus, and at another freed from it by coughing or expectoration, that in the course of a few minutes bronchophony is heard alternating with a dull resonance of the voice, bronchial respiration with indistinct breathing, and a clear acute with a deep dull râle, &c. Consonating and non-consonating sounds may be also heard at the same time.—SKODA.

\* *A Treatise on Auscultation and Percussion by Dr. JOSEPH SKODA; translated from the fourth Edition, by W. O. MARKHAM, M.D., p. 300.*—The best authority on Auscultation.



29. Should the tubercular masses or infiltration not be developed in the upper lobes, the respiration beneath the clavicles may be quite natural, auscultatory signs being presented over those parts of the chest which correspond with the affected portions of lung. The parts which are healthy, or which contain only solitary tubercles, yield either a weak or loud vesicular or indeterminate respiratory murmur; or every variety of râle and whistling and sonorous sounds may be audible, according as the bronchial tubes are or are not free from catarrhal affection. "There are no auscultatory signs pathognomonic of tubercular disease of the lungs; and there are none which will enable us to determine that no tubercle is present in a lung, or in any part of it."—SKODA.

30. *h.* Of the *physical signs* in this stage, it may be said that, unless there is an obvious difference between the sounds emitted in the relative situations on opposite sides, these signs are not much to be depended on; and in very many cases an opinion as to the disease has to be formed chiefly from the local and constitutional symptoms. In other cases, with the same symptoms, the physical signs afford unequivocal indications of the existence of tubercular disease. The sound elicited by percussion is evidently less clear under one clavicle, the respiration less soft and easy, and the voice decidedly more resonant than under the opposite clavicle. And, even at this early period, the motions of the upper parts of the chest during respiration may often be seen to be unequal; one side of the thorax being more fully expanded during inspiration than the other, the side least elevated being generally that which furnishes the most evident signs of the presence of tubercles. When tubercles are diffused over a large portion of the lungs, a degree of puerile respiration occasionally indicates their presence. "A marked inequality in the sound of the respiration in different parts of the chest also affords strong suspicion of tubercular disease, when such inequality cannot otherwise be accounted for."

31. *B. SECOND STAGE.*—*a.* The transition from the first to the second stage may be gradual and hardly manifest, or it may be rapid and evident. It is indicated chiefly by a change in the expectoration. The sputum, instead of being colourless, slightly grayish and frothy, either becomes muco-puriform and contains specks or streaks of blood, or presents minute specks of opaque matter, of a pale yellow colour. These specks gradually increase in number and in size, until they form curdly patches, surrounded by the transparent portion of the expectoration. The increased sputum is accompanied with more frequent, often more severe cough; the chills or sense of cold running down the spine, the evening heat of skin, the restlessness in the early part of the night, and the morning perspiration, although more severe on some days than on others, or on alternate days, become more remarkable; and hectic fever is unmistakably established. The pulse is always accelerated, more especially in the evening; the respiration quick, although the patient be at rest; and the emaciation and flabbiness of the flesh increase. Languor, debility, and an inability of bodily and mental exertion, are experienced. The face is generally pale in the morning, but it becomes flushed after a meal, and in the evening, when the fever and heat of

skin are present, the flush in the cheeks being more and more circumscribed as the disease advances. The pains sometimes complained of in the first stage are more frequently felt in this, and are referred most commonly to the vicinity of the collar-bones, or to one or both shoulders, occasionally to either side, and not infrequently to the back, or to one side of the upper half of the sternum. The pain is generally dull or aching, resembles chronic rheumatism; but it is sometimes acute, especially when it is referred to either side, and is then owing to the extension of inflammatory action, of a sub-acute or chronic form to the pleura. Before, in some cases, and more frequently after, this stage is formed, slight or more decided hæmoptysis occurs. In many instances the expectoration is merely streaked with blood, in others the blood is discharged in considerable or large quantity, and unmixed with the sputum.

32. *b.* These symptoms are occasioned by the *softening* of the tubercular matter, and by the changes in the parenchyma of the lungs and in the bronchi which attend it. The softened and diffuent matter, forming the expectoration, proceeds from the dissolution of the tubercles, from the tissues surrounding them, and from the bronchi, into which the softened tubercles open, and along which the softened matter passes, in the course of its excretion. The bronchi and tissues surrounding the tubercles, irritated by the morbid matter, furnish an increased and altered secretion, which, with the softened tubercular matter, constitute the sputum; and this varies in character with the extent and intensity of the inflammatory irritation induced by this matter in the adjoining tissues and in the bronchi. The cough depends upon, and is modified by, the amount and properties of the matters proceeding from these sources, and the degree of irritation thereby produced in the trachea and larynx. While these changes are proceeding in the earlier tubercular deposits and in the adjoining structures, the inflammatory irritation thus induced extends to the pleura, covering the portion of lung chiefly affected, and lymph is effused from it. The exuded lymph, coming in contact with the surface of the costal pleura opposite, gives rise to adhesions, which become cellular, and vary in firmness and extent with the duration and severity of the disease. These pleuritic adhesions are generally greatest over, or are confined to, the parts where the tubercular deposits are greatest; and, especially owing to the inflammatory action producing them, account in great measure for the pains experienced in the upper and lateral regions of the chest. The consequences of the softening and breaking down of the tubercles are the formation of *cavities* and various *changes* in the adjoining tissues and in the bronchial tubes. These cavities are first formed in the superior lobes, while the lower portions of the lungs are gradually becoming tubercular, the disease generally advancing downward.

33. *c.* The *cavities* may be formed by the dissolution of either solitary tubercles, or of conglomerated tubercles, or of tubercular infiltration. They are of all sizes, from the size of a pin's head to that of a large orange, or even larger. Their walls consist either of the lung-tissue infiltrated with tubercular matter, forming a more or less dense layer, and being in some cases of

such firmness as to prevent any dilatation or contraction of the cavity, or merely of a membrane or membrane-like sac, attached to the surrounding tissue of lung. In very old cavities the internal cavities often present a more or less dense, polished or smooth, and serous or sero-fibrous surface, while in others recently formed the surface varies in firmness or softness, presenting neither of the appearances just stated, in any marked form. Between these the changes of the surface are very diverse, according to the size and duration of the cavity. The cavities generally communicate with one or more of the bronchial tubes, and are rarely free from puriform mucus, or from pus, or an ichorous pus, or from blood. Owing to these differences in the size, in the walls and contents of the cavities, as well as in the surrounding structures, and to other circumstances, the physical signs which cavities present are very different and varied.

34. The extent to which the lungs have become tuberculous, as Sir J. CLARK justly remarks, varies, in this stage of phthisis, very remarkably in different cases, without a corresponding difference in the severity or duration of the symptoms. Two patients having symptoms exactly similar, may be the subjects of a very different extent of pulmonary disease. In some cases a few weeks may suffice to develop cavities of greater or less extent, while in others many months, or even years, may pass without any remarkable increase or diminution of the symptoms, or even of the pulmonary lesions. In a small proportion of cases a curative process is established, as will be noticed in the sequel (§ 145, *et seq.*), by which the tuberculous changes are arrested or partially obliterated; and if the patients' general health be maintained, the indications of tubercular deposit may gradually disappear, or at least advance no farther. But by trusting to symptoms alone, the state and progress of the tubercular lesions, without having due reference to physical signs, cannot be ascertained with any degree of precision. It must be evident, however, that a degree of importance beyond that which these signs possess should not be accorded to them, and that the fallacies to which they are liable should be duly estimated.

35. *d. Physical Signs.*—The upper parts of the chest are at this period less freely raised during inspiration than in the healthy state, and this is often more evident on one side than the other.—*a.* The sound on percussion is dull under one or both clavicles. SKODA remarks that when the cavity is formed within a portion of air-containing tissue, the percussion sound remains unchanged; and this is true not only of a small, but even of a tolerably large cavity. The only sound which cavities situated within a healthy structure yield is the cracked-pot sound, but this only in rare cases, where the cavity approaches the walls of the thorax, contains air, and is not smaller than a pleximeter. The sound in these cases is more tympanitic over the situation of the cavity than at other parts of the chest. Cavities containing air, even when deeply seated within a portion of lung infiltrated with tubercular matter, will emit a tympanitic sound if their size be not less than a walnut. Several smaller cavities, seated close together, will produce the same sound. The more flexible and movable the walls of the thorax, the more readily is the tympanitic sound emitted. The sound is clearer the

nearer the cavity is seated to the surface of the lung, and fuller the larger the cavity. The cracked-pot is most readily heard when cavities are large and superficial. "A cavity will not yield a metallic ringing sound unless it be the size of a fist, but it does not necessarily emit such a sound, though it be of that size."

36. *e. On auscultation,* a dry or large-bubbling crepitant râle is heard over large cavities, when their walls are yielding, and dilate and contract during respiration, the lung being attached to the costal pleura. This râle is most readily heard when there are several or many cavities, of the size of a pea or bean, scattered through the lobe; it is never heard alone, but in combination with other râles or whistling or sonorous sounds, owing to the presence of muco-puriform or other morbid exudations in the affected portion of lung, or its vicinity. If these latter be very loud the crepitation may not be heard. SKODA observes that when a few deep-seated cavities are present in a lung which is otherwise healthy, the vesicular breathing, interrupted by a few bubbles of a muffled râle, may be heard over them; generally, however, the murmur in such cases is not vesicular, but indeterminate. "Cavities with membranous walls, situated in the midst of air-containing tissue, even though of large size, never give rise to bronchophony, bronchial breathing, or consonating râles." These râles and whistling and sonorous sounds may take place in cavities, the walls of which have a thickness of at least several lines; and if their thickness be considerable, the breathing and the voice may be accompanied by metallic tinkling and anphoric resonance. When the walls are thick and unyielding, there is neither increase nor diminution of the size of the cavity during inspiration and expiration, the air neither entering into nor passing out of the cavity, and consequently no murmurs are emitted from the cavity; those which appear to proceed from it are *consonating murmurs*. But murmurs may be produced within the cavity, if its walls are flexible, and permit the entrance and exit of air during respiration, especially if adhesions of the pulmonary with the costal pleura exist over or near to the cavity. Râles and whistling sounds can be produced in a cavity only when the current of air is interrupted by the morbid secretion contained in it, or in the bronchial tubes communicating with it. The movement which this secretion undergoes during inspiration, and especially during coughing, is attended by râles, or by whistling sounds, when air as well as fluid is present in the cavity.

37. From the above, and owing to the varying sizes, to the situations, to the walls, to the contents, and to other circumstances, of cavities, it must be manifest that *percussion* and *auscultation* afford very few certain signs of the existence of cavities. In this opinion I am fortified by that of SKODA, the most experienced observer of physical signs in Europe. I may remark, however, that tubercular masses and tubercular infiltrations do not exist for any considerable time without producing cavities. Cavities may, therefore, be safely inferred to be present whenever the tubercular disease is of considerable standing, and when the constitutional symptoms mentioned above have existed for some time. SKODA justly remarks that "loud bronchial breathing, loud large-bubbling râles and bronchophony are often heard over cavities; but we as often, and often-



er indeed, meet with cavities which do not reveal themselves to us by auscultatory signs."

[Dr. AUSTIN FLINT, in opposition to this opinion of SKODA, that "tubercular cavities do not reveal themselves to us by auscultatory signs," remarks as follows: "As regards cavernous respiration, observations directed more especially to the variations in pitch of respiratory sounds, have led me to the conclusion, in opposition to high authority, that the ingress and egress of air, from an excavation of an adequate size, under favourable circumstances, may be readily distinguished; that the cavernous and the bronchial respiration are not, as far as audible characters are concerned, identical; and that the normal laryngo-tracheal respiration is the type of the bronchial, but not of the cavernous respiration. The distinctive features of the cavernous respiration consist of an inspiratory sound, non-vesicular, or blowing, but, compared with the bronchial inspiration, low in pitch, hollow, more slowly evolved, and of an expiratory sound, if present, lower in pitch than the sound of inspiration. A fair number of observations, in which these features of the respiration were localized during life, and found to correspond in their situation with cavities ascertained to exist after death, have led me to entertain the belief that the existence and seat of excavations may be predicated on the auscultatory characters just mentioned, whenever they are distinctly manifested. But owing to the number of circumstances which must be combined, in order that a cavernous respiration may be developed, it will often happen that when cavities have formed, examinations fail to discover the evidence of their existence. Indeed, it is often only after repeated explorations, made at different times, and conducted with much care and patience, that they are detected."—(*The Principles and Practice of Physical Exploration, as applied to the Diagnosis of Diseases of the Respiratory Organs*. By AUSTIN FLINT, M.D. Philadelphia, 1856, 8vo, p. 500.)]

38. *C. THIRD STAGE.*—This period of the disease is merely the former gradually increased in severity—the second gradually lapsing into this. But during its progress various complications, and additional phenomena, present themselves, caused by the extent of lesions in the lungs, the increase of cavities, formation of additional ones, and more extensive tubercular deposits; by the contamination of the circulating fluids, and by disease of related or remote organs.—*a.* The thorax at this stage is generally flat instead of round or prominent; the clavicles appear remarkably prominent, owing to the depression of the ribs, to a hollow space existing between them and the upper ribs, and to the shoulders being raised and brought forward. The sub-clavicular regions are nearly devoid of motion during respiration; and during a full inspiration, the upper regions of the chest seem to be raised forcibly instead of expanding with the elasticity and ease of health.

39. The constitutional symptoms are still more severe than in the former stage. The pulse becomes quicker and weaker; the hectic symptoms more pronounced; the flush in the cheeks more marked and circumscribed, particularly in the evening; the emaciation and debility greater; the cough and expectoration more frequent, especially at night and during the morning; and the breathing shorter and more oppressed. During this stage, the patient is exhausted by copi-

ous perspirations and attacks of diarrhœa, the one sometimes alternating with the other. These assume a colliquative character, and their accession at the commencement of, and continuance during this stage, have led to the denomination of *colliquative stage*, which has usually been applied to it. In addition to these, the feet and ankles often become œdematous; the nails of the fingers, if not before, are now incurvated; the cough and restlessness during night increase; copious perspirations break out as soon as the patient falls asleep; pains in the chest, collar-bones, and shoulders, or in the sides, are much complained of. The sweats and colliquative diarrhœa rapidly increase the emaciation, the integuments covering the more prominent parts of the back becoming inflamed, sore, and liable to ulceration from the pressure to which they are subjected. Nevertheless, the patient's appetite is often not materially diminished, and hopes of recovery are generally entertained nearly unto the last. With the emaciation and exhaustion, the mind becomes enfeebled, although the imagination is often active. During the last few days or weeks of existence, the mouth, tongue, or throat, or all these, become aphthous; the features sunk, collapsed, and sharp; and, in some cases, mild delirium, very rarely violent delirium, followed by sinking or coma, closes the scene.

40. The severity and rapidity of the symptoms and progress of the malady vary remarkably in different cases. In some a progressive wasting, with little pain, without much cough, but with diarrhœa and perspiration, in the last stage, is chiefly observed, sanguine hopes of recovery being entertained. In others, and these the majority, the chills and sinkings following the perspirations during the nights and mornings; the exhaustion and distress produced by the diarrhœa; the harassing cough and difficulty of expectoration; the dyspnœa and sense of suffocation; the pains in the chest, and sometimes in the bowels; the mental struggle between hope and fear, especially in the latter part of this stage, mark not only the severity of the disease, but also the distress experienced by the patient. The termination of the malady is thus characterized by a state of tranquillity, ease, and gradual sinking, in some cases, and by a painful and distressing struggle in others.

41. *b. The physical signs* are generally the same as, or more fully pronounced than in the second stage. *Percussion* generally emits a dull sound over the superior parts of the chest, although the excavations which partially occupy the upper lobes, and the emaciated state of the parietes, may render the sound less dull than in the preceding stage. On *auscultation*, the respiration is obscure in places, or even inaudible, while in others it is particularly clear, bronchial, or tracheal, or the cavernous of LAENNEC. There is a mucous râle, produced by the morbid secretion in the bronchi, and a gurgling sound on coughing; pectoriloquy is frequently distinct, although as often absent, in one or both sides, or present at one time and not at another.

42. *Pectoriloquy*, or the resonance of the voice in a cavity existing in the chest, is one of the most uncertain signs in this and the second stage, for the reasons stated above (§ 35–37). Various indeterminate sounds are also heard in different parts of the chest, often with the signs of pleuritic, pulmonary, or bronchial inflammation.

43. ii. OF CERTAIN SYMPTOMS AND SIGNS DIAGNOSTIC OF PULMONARY PHTHISIS.—The diagnosis of pulmonary phthisis is usually easy in the second and third stages, but often difficult in the first, for in this the physical signs furnish no more certain aid than the constitutional symptoms. Various aids, however, to the diagnosis have been recently recommended.—*A. Observations of the time during which the breath may be retained after a full inspiration* have been recommended (the patient being sometimes desired to count as far as he can), in the first stage of phthisis, in order to assist the diagnosis, and are of some use when carefully made; but the results vary so much in different persons in health, and still more so in other diseases of the chest, which are not strictly consumptive, as emphysema, chronic bronchitis, chronic pleurisy, and pleuritic effusions, diseases of the heart, &c., that little dependence can be placed upon them, unless when viewed in connexion with the existing phenomena and with the absence or presence of the symptoms and signs of these diseases.

44. *B. Observations by the spirometer* are in some degree liable to the same objections as those just now stated. This instrument, invented by Dr. HUTCHINSON for ascertaining the capacity of the lungs for air in diseases, may, however, be used in incipient phthisis with some advantage, but it can be employed only in public institutions. The indications of the extent to which the lungs are obstructed by tubercular deposits, must necessarily have reference to the average capacity of the lungs, of persons of the same size, in health. Consequently, it was requisite to ascertain this latter point, in the first instance; and he found, after a very great number of observations of the capacity of the lungs for air in persons in health, that this capacity increased with the height of the individual in a very determinable proportion. To this part of the subject it is unnecessary farther to refer, than to state that the "vital capacity of the lungs for air" was inferred from the average of upward of a thousand persons in health, whose lungs were thus measured. *The following table shows the comparison of healthy lungs, and of lungs in the first stage of phthisis, or before softening, all cases being males:*

No. of Cases.	Age.	Height.	Vital Capacity.		Difference.
			Healthy.	Diseased.	
		ft. in.	cu. in.	cu. in.	cu. in.
1	28	5 8	238	186	52
2	28	5 4½	206	140	66
3	37	6 2½	286	270	16
4	20	5 3½	198	120	78
5	27	5 7	230	85	145
6	45	6 0½	270	200	70
7	36	5 0½	222	182	40
8	36	5 5½	214	170	44
9	35	5 7	230	160	70
10	38	5 10½	254	140	114
11	33	5 7	230	80	150
12	28	5 7½	230	180	50
13	27	6 1½	274	260	14
14	24	5 6½	222	190	32

45. Cases Nos. 5, 10, and 11, present a great deficiency. In these both sides of the lungs were much diseased, and in the two former emphysema also existed to a considerable extent. The foregoing table, as well as the following, are taken from "*The Medical Report of the Hospital for Consumption.*" The next table shows the comparison of Healthy and Diseased cases in the second stage of Phthisis, or after softening, all being males:

No. of Cases.	Age.	Height.	Vital Capacity.		Difference.
			Healthy.	Diseased.	
		ft. in.	cu. in.	cu. in.	cu. in.
1	27	5 6	214	86	128
2	21	5 5½	214	60	154
3	45	5 9½	246	85	161
4	30	5 6½	222	70	152
5	33	5 8½	238	70	168
6	26	5 6½	222	50	172
7	28	6 0	262	70	192
8	38	5 8	238	60	178
9	41	5 9½	246	90	156
10	42	5 8	238	60	178
11	29	5 5½	214	50	164
12	32	5 7	230	70	160
13	42	6 0	270	140	130
14	29	6 2	286	150	136

46. All the cases in the above table show a very marked deficiency of vital capacity. In Nos. 3, 7, and 8, and probably in others, both lungs were extensively diseased. In the following table "*the vital capacity of phthisical patients is exhibited, indiscriminately, without reference to the stage of the disease, compared with that of the same number of healthy individuals:*"

No. of Cases observed.	Mean Vital Capacity.		Difference.	Difference per Cent.
	In Health.	In Cases of Phthisis, all Stages.		
415	cu. in. 222	cu. in. 129	cu. in. 93	cu. in. 42

47. *The following table shows the comparison of healthy individuals and of cases of phthisis in the first stage, or before softening:*

No. of Cases observed.	Mean Vital Capacity.		Difference.	Difference per Cent.
	In Health.	In Phthisis, 1st Stage.		
241	cu. in. 223	cu. in. 149	cu. in. 74	cu. in. 33

48. *Table showing the comparison of healthy persons and cases of phthisis in the stage after softening.*

No. of Cases observed.	Mean healthy Capacity.	Mean diseased Vital Capacity.	Difference.	Difference per Cent.
	cu. in. 221	cu. in. 105		
174			cu. in. 116	cu. in. 52

49. *C. Hæmoptysis* is often the first symptom which excites the alarm of the patient in phthisis, and the attention of his friends. The older writers often considered hæmoptysis a cause of phthisis, whereas modern research has shown that it is a sign of this disease, tubercular deposits being its cause. The following table, from the Report of the Hospital for Consumption, shows the *existence or non-existence of Hæmoptysis in 1381 cases of Phthisis, arranged according to the sexes, without reference to age: Males, 910; Females, 471. Total, 1381.*

	Males.	Per Cent.	Fem.	Per Cent.	Total.	Per Cent.
Hæmoptysis . . .	563	61.9	307	65.2	870	63
No hæmoptysis	347	38.1	164	34.8	511	37

50. The reporters remark that a large proportion of the above cases was seen at an early period of the disease, and that not a few of them were only a short time under observation. Hence many of those in whom this symptom had not occurred when the cases were noted would in all probability be sufferers from it during the farther progress of the malady. It may, therefore, be assumed that the proportion of cases in which hæmoptysis occurs is still greater than that shown in the table. It would result from the above that nearly an equal proportion of males and of fe-



males are found to present this symptom. The following table shows the existence or non-existence of hæmoptysis in 1084 cases of phthisis; viz., males, 706; females, 378—arranged according to the sexes in decennial periods. Also the per-centage of the cases in which hæmoptysis occurred:

Age.	Hæmoptysis occurred.		Hæmoptysis did not occur.		Total of Cases observed.		Hæmoptysis occurred per Cent.	
	M.	F.	M.	F.	M.	F.	M.	F.
0 to 5	0	3	2	4	2	7		42.9
5 to 15	7	32	14	9	21	41	33.3	78.0
15 to 25	124	107	85	45	209	152	59.3	70.4
25 to 35	175	59	71	42	246	101	71.1	58.4
35 to 45	115	35	48	25	163	60	70.6	58.3
45 to 55	29	7	23	8	52	15	55.8	46.7
55 to 65	3	0	10	2	13	2	23.1	
65 to 75	0	0	0	0	0	0		
Totals..	453	243	253	135	706	378	64.2	64.3

Dividing the age of 70 into two equal periods—into two 35 years—the per-centage of cases of phthisis in males was 64 in both periods; while in females it was 67 for the first 35 years of age, and 54.6 for the second 35 years. In females, also, from 5 to 25 years of age, hæmoptysis occurred in the ratio of 72 per cent.; while between the ages of 35 and 55 it appeared only in the ratio of 55 per cent. The reporters farther state that the stage of the disease in which hæmoptysis occurred was noticed in 696 cases, of whom 453 were males, and 243 females, as in the following table:

	Males.	Per Cent.	Females.	Per Cent.
Before softening	333	73.5	176	72.4
After softening.	120	26.5	67	27.6

This table shows that hæmoptysis is much more frequent (nearly as 3 to 1) in the first period of phthisis than in the second and third conjoined, and nearly equally so in both sexes. It is very difficult to account for this greatly increased frequency of hæmoptysis in the first stage of the disease; but it is probable that it appears greater in this stage than it actually is in practice, the whole progress of the disease having been observed; inasmuch as the reporters admit that many of the cases were only a short time under observation, and were not seen in the far-advanced progress of the malady. There can be no doubt, however, that the occurrence of hæmoptysis in so large a proportion of cases in the first stage establishes it as an important diagnostic symptom of phthisis.

51. *Hæmoptysis* is generally a symptom, but very rarely a cause, although it may determine the development, of tubercles in the lungs of a scrofulous person, or the debility induced by a very abundant hæmoptysis may have a similar effect; and, as M. ANDRAL has shown, the infiltration of a portion of the effused blood into the air-cells and pulmonary structure may form a nidus for the primary deposit of tubercles. Notwithstanding these exceptions, as far as they may be considered as such, hæmoptysis may be considered as generally produced by tubercles, although it may be conceded that, in some cases, especially when slight or moderate, it may be viewed as the result, in common with the tubercular deposit, of the sanguineous congestion of the lungs, often preceding and attending the early stage of phthisis, especially in the scrofulous and sanguineous diatheses. It should not be overlooked that the hæmoptysis may be produced by the pulmonary congestion consequent upon

impaired vital action, or upon structural lesion of the heart, and by the severity of the cough, either independently of or in connexion with these conditions of the heart, the blood effused into the pulmonary tissue and air-cells proving the matrix of tubercles, as ANDRAL contends. When hæmoptysis proceeds from these morbid states it is usually copious, and is often less dangerous than the slighter states of it, more obviously dependent upon the early stages of phthisis. BAILLOU remarked that large discharges of blood from the lungs are less dangerous than small; and although this is very frequently but not absolutely the case, it by no means deserves the importance attached to it by PORTAL. M. LOUIS remarks, respecting this symptom in this and other diseases, that, with the exception of some cases in which it depended upon external injury, or was connected with suppressed catamenia, it indicates, with a high degree of probability, the presence of tubercles in the lungs; and Sir JAMES CLARK states that his experience supports this conclusion. According to LOUIS, hæmoptysis occurred more frequently in females than in males, in the proportion of three to two—a proportion much higher than stated by other observers; and he considers it most frequent in females from forty to sixty-five, that is, after the period of the cessation of the catamenia; but in this also he is not supported by other observers in different fields of observation. The frequency of the attacks, he remarks, was generally in proportion to the duration of the disease, the more copious discharges having rarely occurred oftener than twice or thrice in the same persons. "In all his cases it was present, in a greater or less degree, in two thirds; and the numbers in which it was copious and inconsiderable were nearly equal." In some it was a frequent symptom during the whole course of the disease, in others it never appeared. In persons advanced in life and in young children it rarely occurred, and then chiefly towards the close of the disease. In rare cases it was the first symptom, even before the cough, occurring suddenly, and, as M. LOUIS asserts, in the midst of perfect health, and without any appreciable cause. This latter assertion does not agree with my experience, nor with that of Sir J. CLARK, who very justly remarks that he has generally found the aspect of the patient to have been by no means indicative of perfect health, although he may not have complained; and that he has more frequently known the hæmorrhage to succeed bodily exertion, such as running, ascending heights, or long speaking, than when no such evident cause had occurred. In these cases the hæmoptysis often does not appear until a few hours after the exertion. I entirely concur in the opinion here expressed in opposition to M. LOUIS.

52. The quantity of blood expectorated varies remarkably from a teaspoonful or tablespoonful to one or even two pints; most frequently it is only about two or three mouthfuls. In some, the blood merely appears in clots or streaks in the sputum, in others it is distinct and in some quantity; when the latter, it is generally pure, sometimes frothy or florid; at others dark or slightly clotted. Very large quantities are brought up with varying remissions; but at an advanced stage of phthisis the hæmorrhage is usually continuous, until several pints are discharged, and the patient is sunk by it or suffocated. This copious hæmoptysis is generally owing to the ero-

sion of a considerable vessel by the tubercular ulceration. It is not very often that great hæmorrhage occurs at an early period; and yet I have known cases in which upward of 100 ounces were lost at the commencement of the disease. Hæmoptysis, therefore, taking place either before or after cough or shortness of breathing, should be viewed as indicating tubercles of the lungs, although it may arise from disease of the heart, associated with the same symptoms only in very rare instances.

53. *D. Cough* is generally the earliest symptom of phthisis, but is often so slight as not to excite the attention of the patient or his relatives; and for some considerable time it may occur only or chiefly in the morning. In such cases, and at this early period, the character of the cough, the state of breathing, and the appearance of the features, particularly of the eyes, ought to be examined, and the representation, often adduced, that it is merely a stomach-cough, or from laryngeal irritation, should not receive any attention; for it may be either or both of these, and not the less depend upon, or be connected with, tubercular deposits in the lungs. The continuance of the cough for weeks, or even months, without any expectoration, is of itself sufficient to cause strong suspicions of its origin. The association of the cough with shortness of breathing, any exertion causing cough or increasing the quickness of respiration, is an additional proof of the nature of the disorder. The cough is after a time observed in the course of the day, or upon suddenly changing the apartment or the temperature, or upon reading, exerting the voice, &c., and it is afterward followed by the expectoration of a transparent frothy fluid, which is often represented as coming from the pharynx and fauces. The cough generally increases with the progress of the pulmonary lesions, but such is not always the case; for, as will be stated hereafter, it may be very slight, or almost absent throughout the disease, or appear only a few days before death. Such instances have been remarked by PORTAL, LOUIS, ANDRAL, CLARK, and myself. In the course of the chronic and more protracted cases of phthisis, even when tubercular excavations undoubtedly exist, it is not unfrequently observed that, in favourable circumstances, cough and expectoration disappear for weeks, but return upon exposure, or from errors of regimen. In the advanced progress of the malady cough is generally severe, occurs at all times, often without any evident cause, but especially at night and in the morning, disturbing sleep, occasioning pain in the chest, or even sometimes causing vomiting. In the last stage it is often followed by breathlessness amounting to a sense of suffocation in some cases, or to sinking in others. The cough at the commencement of phthisis is entirely owing to sympathetic irritation of the larynx, and not to a fluid which requires to be expectorated. As the malady proceeds, it is chiefly caused by the discharge of the morbid secretions from the bronchi, or from both the bronchi and the cavities.

54. *a. Tubercular or phthisical cough* may, however, be confounded with the *cough of catarrh*, or of *influenza*, or of *gastric, hepatic, or nervous disorders*. Of the *first* it may be said that the attack is readily referred to its cause, is well marked and preceded by the usual symptoms of catarrh, either slight or acute. It is often attended by hoarseness, by soreness of the chest or

trunk; and although at first dry and hoarse, it is soon followed and accompanied with expectoration, which is at first colourless, frothy, but afterward opaque or mucous, yellowish, or mucopuriform; both cough and expectoration generally diminishing with this change of the sputum, and shortly ceasing altogether. When, however, the catarrh assumes a chronic form, or becomes exasperated, and passes into bronchitis, the difficulty of diagnosis may be much greater. *Bronchitis*, acute or chronic, will readily be distinguished by the symptoms and signs described in the article BRONCHITIS—*Inflammation of*; and *chronic catarrh* will be readily recognized as such, although, in consequence of the state of the lungs before the catarrhal attack, it may pass into phthisis; the shortness of breathing, the increased severity of the cough in the morning, the chills in the early part of the day, the age of the patient, the appearance of the eyes, and the occurrence of hæmoptysis, evincing the transition into, or the pre-existence of, tubercular disease.

55. *b. The cough of influenza* cannot be readily confounded with the cough of phthisis, if the character of the constitutional symptoms of the former, especially the pains in the head, back, and limbs, the general malaise, and the prevailing epidemic be taken into account. Influenza, as well as measles, whooping-cough, and other epidemic diseases, when attacking persons whose lungs are prone to tubercular deposits, may determine or excite the phthisical malady, or may develop it into a very manifest, acute, and rapid form, if it had previously existed in a latent form, or in its first or least apparent stage.

56. *c. Gastric cough* is readily mistaken for the early stage of phthisis, but it is louder and harder than the latter, is more paroxysmal, and often manifestly excited by some of the more prominent symptoms of indigestion, as by flatulency, acidity in the stomach, acid or acrid eructations, by a loaded tongue which is red at the point and edges, and by various other dyspeptic phenomena, especially by disorders of the bowels and liver, and by a loaded or high-coloured state of the urine. Gastric irritation may, however, be associated with the first stage of phthisis, and, when this obtains, the diagnosis will be more difficult; but the former disorder will generally declare itself, and claim the chief attention, as the readiest and surest indication for aiding the latter affection. A *stomach-cough*, often of much severity in the morning, when a gray tenacious mucus is expectorated—the cough being severe in consequence of the difficulty of bringing up the tenacious phlegm—is not so readily mistaken for a phthisical cough, as it is generally observed in connexion with manifest signs of indigestion, and in persons of mature age or advanced in life, and of a gouty or rheumatic diathesis, or in those addicted to full living or to the enjoyments of the table.

57. *d. Hepatic cough*, owing to its dryness, or to the slight mucous expectoration attending it, may be mistaken for the first stage of phthisis. But due attention directed to the state of the hepatic functions and to the region of the liver; the pale, sallow, and sunken appearance of the countenance; the disorders referrible to the stomach and bowels, and various other sympathetic phenomena contingent upon biliary and hepatic affections, will sufficiently indicate the source of the cough, when due attention is directed to it.



58. *e. Nervous* and other *sympathetic forms* of cough are occasionally observed, especially in delicate persons; and, chiefly as occurring in these, both excite suspicions of phthisis, and require investigation. A *nervous cough* is apt to occur in females both after and before puberty, and especially as a sequela of whooping-cough or of measles, and often excites alarm, not merely as it simulates, but as it may actually complicate, the first stage of phthisis. This cough is generally paroxysmal, is severe, and in protracted attacks, being sharp, barking, or tracheal, and without, or with merely a slight watery, expectoration. In females it frequently presents a hysterical character, with indications of nervous irritability and of uterine disorder, as catamenial disturbance, leucorrhœa, pains in the loins and the lowest part of the spine or sacrum; it is often occasioned by masturbation, and not infrequently disguises, as well as complicates, the first stage of consumption. *Intestinal worms* may occasion a cough, especially in young persons, which, owing to the pallor, flaccidity of the tissues, and emaciation, as well as to the short, dry, and hacking form of the cough, may be mistaken for incipient phthisis. Attention to the abdominal functions, to the state of evacuations, and inquiries as to the symptoms of verminous disorder, will generally indicate the nature of this cough.

59. *f.* Although the *diagnosis* of phthisical cough from other forms of cough is important, yet the mere determination of this point ought not to lead us to overlook the fact that they may severally complicate phthisis, especially in its first stage, may mask this stage, and may, moreover, either excite and determine its existence, or develop it into active and manifest forms, when it had previously existed in a slow or latent state. Whether, however, these forms of cough occur independently, or as a complication of phthisis, their removal by judicious treatment is requisite, inasmuch as they are injurious to the constitution, even when existing independently, and are sources of aggravation to the pulmonary disease, when they are complicated with it.

60. *E. Shortness or Quickness of Respiration and Dyspnoea.*—Quickness of breathing is one of the earliest indications of phthisis, especially when occurring in connexion with a hacking or short cough (§ 53). It has generally a marked relation to the quickness of pulse, and the severity of the febrile symptoms; in the more latent and chronic states of the disease it is not experienced unless more or less physical exertion be used; but on ascending a height, or on other occasions of exertion, the breathing is not only quick, but is also attended by more or less dyspnoea and sense of oppression in the chest. As the malady advances, especially in its more febrile forms, and when cough and expectoration are considerable, respiration is very quick, the acceleration being much greater in proportion to that of the pulse than in health or at an early stage; and the sense of oppression and dyspnoea are also greater. These symptoms are evidently caused by the extent to which the lungs are rendered incapable of their functions—to which the capacity of the organ to receive and hold air is impaired by tubercular deposits, by condensation of portions of the pulmonary structure, and by sanguineous congestion of other parts; the occurrence of hæmoptysis, by removing the latter morbid states, often relieving the cough and the breathing for a time.

The state of the heart's action, an impaired contraction of its parietes, distention of its cavities owing to impeded circulation through the lungs, may severally also increase the pulmonary congestion, and the oppression and quickness of respiration, and favour or even occasion an attack of hæmoptysis. In many cases, quick or difficult breathing is not experienced until after an attack of hæmoptysis. In these it may be inferred that the hæmorrhage either increases the weakness of the heart's action, and favours congestion of its cavities, or infiltrates the bronchi and air-cells, or structure of the lungs, so as to impair the capacity of the organ for the reception of air; an increased frequency of respiration being consequently required to make amends for the diminution of capacity. In all cases, therefore, the state of the respiration should receive attention, and the cause of its increased frequency or its difficulty ascertained, particularly as respects the existence of lesions within or without the lungs—in the bronchi, air-cells, and pulmonary tissue, or in the cavity of the pleura, or in the heart.

61. *F. Expectoration* is not usual until the cough and acceleration of breathing, with quickness of pulse, has continued for some time. It is at first scanty, transparent, ropy or tenacious, grayish or frothy; often resembling saliva. After an indefinite period, specks of an opaque matter are seen in the transparent frothy fluid. "These specks differ in appearance, being at one time white, at another yellow, or even approaching to green, and again very frequently of an ash colour; partly sinking in water in little masses." The grayish and ropy portion of the sputum partly float in it, in the form of strim, suspending the minute tubercular masses. Before or about the time of the change of the sputum to this state, streaks, or specks, or even small clots of blood, are occasionally seen in the expectoration. As the malady proceeds, the sputum becomes more opaque, of a yellowish hue, and is coughed up with more ease and in more distinct masses. At a later period, the sputum is of an ash colour, and is brought up in distinct, rounded, flocculent-like masses, enveloped in the transparent ropy portion. If the patient be directed to expectorate in a glass vessel two thirds full of water, some of these masses will be seen to sink to the bottom; others, which are frothy, will float on the surface, and parts of these will be suspended at different depths, often retaining the minute, cheese-like, or flocculent, tubercular specks or masses, or allowing these to sink to the bottom, yet connected with the surface by the more fluid and ropy portion of the expectoration. This change of the sputum into ash-coloured, distinct masses, with more or less of a thin mucous fluid, occasionally occurs only a few days before death, but more generally it has continued for many weeks or even months before this event. In some instances it retains the yellowish, puriform appearance, and forms smooth, flat patches; and in rarer cases it is semi-transparent, tenacious, and gelatinous, and, as in bronchitis, is separated with great difficulty from any vessel containing it. "During the last days of life the expectoration is in a more dissolved state, and sometimes of a darker hue; about this period, also, and often long before, it has a very fetid odour; finally it diminishes gradually, and often disappears entirely some days previous to death."—CLARK.

62. Such are the usual appearances of the ex-

pectoration; but the periods at which it commences, and at which the changes take place, differ in different cases. Its characters also vary, or differ much, as certain complications or intercurrent affections occur in the course of the malady, as catarrhal or bronchial attacks, inflammation of the lungs or pleura, &c. The transparent, tenacious, and frothy sputum, although generally accompanying tubercular deposits, is only a secretion from the bronchi, and may take place independently of these deposits. The yellowish-green sputum, often also observed, is frequently discharged in chronic catarrh, and towards the termination of bronchitis. These, although often abundant in, and forming the chief part of, the expectoration in tubercular phthisis, proceed from the bronchial membrane. The two characters, however, which may be considered peculiar to that attending phthisis, are the striated mass, with a mixture of whitish fragments in it, and the ash-coloured, globular masses, which are observed in the more advanced stage of the disease. I agree with Sir JAMES CLARK in considering these as very rarely unaccompanied with tubercular disease.

63. The quantity of the expectoration varies remarkably in different cases, and is by no means commensurate with the extent of pulmonary lesions. It may be very small, or almost altogether absent, although large excavations are found after death; the disease having advanced rapidly to this issue. Even in an early stage, and while it is still transparent, the quantity is often very great; the disease also in these cases assuming a febrile or rapid form. PORTAL, ANDRAL, CLARK, and the author, have met with rare cases in which the expectoration has been entirely wanting, and the cough very slight up to the very close of life, and yet small tuberculous vomicae and most extensive tuberculous deposits in some cases, and large excavations in others, were found after death. The cases of this description, which occurred in my practice, had been mistaken before I saw them for low nervous or typhoid fevers, although the rapid pulse, the still more rapid breathing relatively to the quickness of the pulse, the appearance of the features, the night-sweats, the emaciation, and the appearances of the fingers and nails, might have shown the nature of the malady, independently of the physical signs. As to the sources of the expectorated matter, it must be evident that, before softening of the tubercles has occurred, and before they have communicated with the bronchi, the bronchial membrane has supplied it, in consequence of the irritation extended to this membrane from the morbid deposit, and of the congested state of the pulmonary vessels, of which the tubercular deposits and the expectoration are the common and combined results. The softened tubercles and the surfaces of the cavities consecutively formed also supply a part, often very small, of the sputa, more especially that part which is the most characteristic of the malady. In cases where the expectoration is either scanty or nearly wanting, the severity of the constitutional symptoms, the rapidity of their progress, and the indications of a contaminated state of the circulating fluids, render it extremely probable that the morbid secretion from the surface of the cavities as well as the liquefied tubercular matter, are absorbed, or imbibed by endosmosis, and carried into the blood, which it thus poisons, thereby heightening and accelerating the symptoms. From the above it may be inferred that

the state of the expectoration should always be viewed in connexion with the other phenomena of the malady; that it affords little evidence of tubercles in their early or crude stage, but when the change takes place in the sputum, and the debris of tubercles are present in it, then a very satisfactory proof is thereby furnished of the existence of the disease in an advanced stage. Besides the appearances of the sputa already considered, there are two others which deserve a special notice, viz.: *hæmoptysis*, from its frequency and importance (§ 49, *et seq.*); and *calcareous concretions*, from the various considerations suggested by them.

64. *The expectoration of calcareous concretions* from the lungs occurs either months or years after the appearance of pulmonary symptoms—generally after years have elapsed—the patient either having recovered or partially recovered, and having experienced a relapse. The size of these concretions varies from that of a hemp-seed to that of a pea or small bean. This last size is the largest I have seen, and was expectorated by a lady in the last stage of the malady, which had been of many years' duration. A medical friend was sent up the Mediterranean in 1820 for change of climate in the first stage of phthisis. He recovered, but expectorated these concretions on several occasions long afterward. He is now alive and in good health. Another medical friend lately called upon me and stated himself to have been then, and long previously, in good health, with the exception of a loud whistling noise, during both inspiration and expiration, which could be heard in any part of the apartment in which he was. He told me that he was considered to have been consumptive many years before that time. I said that he would soon expectorate one of these concretions, and he did so in a few days. It was of the shape and size of a split pea. He is in good health. But these concretions are not met with in these circumstances alone, but also in others much more serious or altogether hopeless, as in the last stage of the more chronic and protracted cases. They are then especially brought up with a copious expectoration, sometimes without any blood, at others with streaks of blood, but rarely with a more copious hæmoptysis. In a case now under my care the patient, in the third stage of phthisis, has expectorated a number of these concretions. She has been consumptive for many years; and for several years before the disease had reached this stage had occasionally brought up, with little apparent ailment, one or more of these concretions. When they appear in a state of apparent health, they are unattended by much or even any sputa beyond a little mucus, or mucus streaked with a little blood or bloody specks. The pathological conditions in which they are usually found will be noticed hereafter (§ 146).

65. *G. Pain*, especially acute pain, rarely attends the early stage of phthisis; but a slight or aching pain is often felt, although not often mentioned by the patient, in the shoulders, or near the clavicles or upper regions of the chest. In the second and third stages, pain, often of a severer character, is frequently experienced, and is generally referred to either side, or to the situation where the tubercular lesions are most advanced or extensive, and where the pleura has become implicated. When adhesions are formed between the opposite surfaces of the pleura, pains often severe are experienced, not only in one or



both sides, but also in the back or under the shoulder-blades. They are different from those of catarrh, bronchitis, and influenza, which are experienced chiefly under the sternum when coughing, and are characterized by a sense of soreness rather than by acuteness or sharpness. In some cases pain has been felt under the short ribs, and, owing to the lowness of the situation, has not always been referred to its true source. But it will generally be found to proceed from adhesions of the pulmonary, to the diaphragmatic or costal pleura. When the bowels are disordered, it may be caused by the state of the colon; but in this case the pain is not persistent, and often shifts its situation.

66. *H. The pulse* often furnishes important indications of phthisis, even before any of the phenomena already noticed can be detected. In persons about or after puberty, who are of a scrofulous diathesis, a frequent pulse, or a pulse above 80, should be viewed with suspicion, more especially if it be associated with a dilated pupil, a clear, or blue, or pearly conjunctiva, and shortness of breathing. In many chronic cases, the pulse may not be accelerated, even throughout the disease, or until its close, and may be considerably under 70 in the minute, especially in phlegmatic and bilious temperaments. A slow or natural pulse, the breathing being not much accelerated, is observed only in the more protracted cases, and when there are indications of amendment. Great quickness, smallness, or softness of pulse occurs chiefly in the more febrile or rapid cases, and in these the chances of amendment are very few.

67. *I. Hectic fever* approaches generally slowly and insidiously in phthisis, often appears in its slightest form early in the disease, and becomes more marked as the second and third stages are reached. In some cases, however, hectic is waiting, or is so slight as not to excite notice until it breaks out suddenly and severely with all the symptoms of an advanced and acute state of the malady. It is unnecessary for me to add at this place to what I have advanced upon this topic, when describing the successive stages of phthisis, and when treating especially of the several states and causes of *hectic fever*. To that article I therefore beg to refer the reader. See *FEVER, HECTIC* (§ 292, *et seq.*).

68. *K. The digestive functions* are generally more or less impaired at the commencement of phthisis, and even before pulmonary symptoms have appeared, assimilation and nutrition being also imperfect. The bowels are often not materially disordered at an early stage. They are, however, frequently more or less slow or confined, but very readily become free, or even profuse, after recourse to aperients. As the malady advances, especially as the pulse becomes frequent and hectic fever developed, the bowels are irregular in action, are sometimes costive, and afterward spontaneously and very freely relaxed, or even purged. In more chronic cases, the bowels often continue regular, and the stools are well coloured with bile, for a long time; but when the disease is far advanced, and especially towards its close, *diarrhœa* generally supervenes, and rapidly emaciates and exhausts the patient. In most cases, even early in phthisis, an active purgative, given to remove costiveness, not infrequently acts excessively; and a gentle aperient, at an advanced period, often produces the same effect,

and occasions a *diarrhœa* which it may not be easy to arrest. It is chiefly in the second and third stages that *diarrhœa* becomes severe or obstinate. M. Louis found it in one eighth of his cases from the beginning unto death; in the majority during the latter stages; in some during the last days of life only; and in four out of 112 cases it did not occur. It is often a most distressing symptom, is preceded and accompanied by severe pains, followed by great sinking and exhaustion, and is followed by rapid emaciation. The evacuations are at first yellow and bilious; but they often become watery, curdly, offensive, or emit a sour odour; the *diarrhœa* depending, as I have shown at another place, upon the state of the follicular glands and mucous surface of the bowels, produced by the morbid condition of the blood, and by the elimination of morbid or effete matters from the circulation, by the intestinal follicles, disease of these follicles and ulceration ultimately taking place (see *ARTICLE FEVER, HECTIC*, § 306). *Diarrhœa* often diminishes the cough and expectoration, but it seldom abates the morning perspirations.

69. *L. Emaciation* is generally present unless the patient is carried off, before it has advanced far, by some complication or intercurrent affection. Frequently more or less wasting may be observed early in phthisis, and in some it is the first symptom which attracts attention, especially when the disease is occasioned by vitally depressing and exhausting causes. In other cases the malady is advanced far before emaciation is considerable. This symptom is often associated with some degree of pallor and indications of deficiency of red globules, or of a thin or poor state of the blood; and this is the more remarkable, as well as the rapidity of emaciation, as the febrile symptoms and the *diarrhœa* increase. The state of the blood, even early in the disease, and the arrest of assimilation and nutrition, the consequent waste of red globules, and the impaired or deficient development of others, readily account for the emaciation, and the state of the circulation, as regards both vascular action and the vascular contents. Emaciation is an early symptom in many obscure cases, especially in persons above thirty or thirty-five years; it is not so generally observed at a very early period in young persons, especially in females, who are still regular or nearly so in their menstrual discharges. When it occurs without any manifest cause, and especially when it is attended by quickness of pulse, by morning chills, or by a sense of cold in the course of the spine, or by a short hacking cough, or by shortness or oppression of breathing, tuberculous disease of the lungs may be inferred; and if all these symptoms be present, the fuss, parade, manipulation, and charlatanism of a physical examination of the bare chest, so often unnecessarily and even injuriously practised, may in most cases be dispensed with.

70. *M. The fingers and nails* often early, but frequently also not until an advanced period, betray the existence of phthisis. The nails become uncut or bent inward upon the extremities or tips of the fingers, which are wasted; the last joints appearing enlarged or rounded, and clubbed or terminating in a coniform shape. This appearance is most remarkable when emaciation exists, and, with the symptoms just mentioned, or even alone, is a most unerring sign of tubercular phthisis.

71. *N. Œdema* of the extremities, especially of the lower, is observed chiefly or only during the last stage of phthisis. It may, however, appear earlier in delicate females, and when the catanemia are suppressed. It is sometimes so remarkable as to amount to anasarca, and, when this occurs, tubercular deposits in the structure of the kidneys, or albuminous changes in the urine, may be suspected.

72. *Morning perspirations* are among the most distressing symptoms of phthisis. The disease may be far advanced, and hectic symptoms long present, before the perspirations become copious or are complained of. When they appear, the second, if not the third stage of the malady, may be considered present; and they are then excessive, in relation to the chills and febrile reaction which precede them. This symptom is rarely absent, but it sometimes does not appear until nearly the close of life. Louis states that he has found it wanting in one tenth of his cases. When it has been wanting, I have observed the surface of the skin remarkably harsh or rough, abounding in epithelial scales, and foul or sordid. In these cases perspiration breaks out about the face and neck. It usually occurs about the same period of the disease as the diarrhœa, and depends upon the state of the blood occasioning that affection. It has been said to be vicarious of the diarrhœa, one being diminished when the other is increased; but this is not commonly the case, or in a slight degree only. The perspirations take place chiefly in the early hours of morning; if at all present early in the disease, they are only slight, or are confined to the head, neck, and chest; but when abundant, or at a far-advanced period, they break out generally over the body, and whenever the patient falls asleep. Occasional intermissions or remissions of them are observed. When they are abundant, a rapid termination of the disease may be inferred. The state of the perspiration is diagnostic of the stage rather than of the existence of phthisis; for when this symptom is manifest there can be no question of its nature.

73. *P. Aphthæ* are common in the last days of phthisical existence, during a week or two before death. They are sometimes slight, and in others severe. They may extend over the mouth, fauces, and pharynx, rendering deglutition difficult, painful, or even nearly impossible. When severe, the patient rarely lives many days; and yet, in two cases of chronic or protracted phthisis under my care, the patients rallied, and lived two years in the one case, and three in the other, after aphthæ were present for a considerable time in a severe form.

74. *Q. The hair* falls out in the advanced stages of the febrile or acute cases, and becomes more and more thin, and, in the mornings, wet with perspiration. But in the chronic and protracted states of the disease, it generally continues abundant, or in its usual state, nearly to the last, or until a short period before death. It often falls out very early when the malady has been caused by masturbation or premature or excessive sexual excitement.

75. There are various other contingent phenomena which sometimes supervene in the course of phthisis. Some of these either accompany certain forms of this disease, or result from complications which will be noticed in the sequel. Irritability of temper, nervous susceptibility, tre-

mors, sinkings, &c., are often observed in the course of the malady, are consequences of the exhaustion of organic nervous power, and the consequent impairment of assimilation and nutrition, and the waste of the tissues and blood-globules. Nevertheless, the appetite of the patient, although fastidious and various, is generally not remarkably impaired. In the more chronic cases it is often natural, or but little diminished, until the last days of life. The mental powers are not materially affected. The reasoning faculties and the imagination are even unusually acute. In some cases, of the febrile form especially, slight or mild delirium occurs towards the close, but it is seldom violent unless the membranes of the brain become the seat of increased vascular action, with or without tubercular deposits, or the treatment is injudicious.

76. *iii. OF CERTAIN FORMS OR MODIFICATIONS OF PHTHISIS.*—The more usual form of phthisis having been described, with due reference to its stages and prominent symptoms, and to those physical signs which indicate the commencement and progress of the malady, in as far as they are entitled to confidence, or deserve to be made the basis of diagnosis, I proceed to notice briefly the more marked forms which the disease may assume under the influence of constitution, diathesis, predisposition, and causes. On this part of my subject much may be advanced, both as topics of speculation, and as matters of important practical interest; much, also, may be remarked requiring farther elucidation and more accurate investigation. Where the data are not positive, doubts may lead to more patient research, and to more positive knowledge.

77. *A. THE LATENT FORM OF PHTHISIS.*—This form is always insidious in its accession and progress. The patient is debilitated, indolent, mentally and physically depressed, and often complains of general malaise. The health is impaired, and lowness of spirits experienced. Emaciation is slight, and advances slowly. This state may continue some months or even years, and may be viewed as owing to nervous debility, or as approaching to hypochondriasis. The digestive, assimilating, and nutritive powers are more or less manifestly impaired; the surface is pallid and cool; the conjunctiva of a pearly hue, and the pupils usually dilated. The pulse is at first slightly or not at all accelerated, or quick or small; but becomes rapid on slight excitement, when also the breathing is short. Slight chills are afterward felt, or a sense of cold in the course of the spine, followed by heat of the palms of the hands or soles of the feet, and an increase of pulse. A short or slight hack or dry cough is observed, especially in the morning, or after exertion, when the breathing becomes short or oppressed. These symptoms are commonly but little attended to by the patient, although they often excite the anxiety of those about him. Aching pains are also sometimes experienced about the clavicles and upper regions of the thorax, but these, also, often fail to excite attention, or are viewed as rheumatic. Upon examination, a slight dulness on percussion, a feebleness of respiration, and a slight tracheal character of the vesicular murmur, or a louder or longer expiratory sound, are the chief physical signs.

78. Latent phthisis may occur in all temperaments, especially in the lymphatic, nervous, and bilious, and at all ages, and not infrequently in



the aged. In younger persons these symptoms sometimes disappear after change of climate and judicious treatment, or they increase and are followed by the grayish expectoration attending the first stage (§ 18); but generally, after many months, or even some years, the disease passes into one of the more declared forms about to be noticed; or the patient, having either partially or altogether recovered, expectorates the calcareous concretions noticed above (§ 64), often with little cough and scanty sputa; the expectoration of these sometimes occurring at intervals, or ceasing permanently, recovery being complete. Most frequently, however, after exposure, or after difficult, scanty, or suppressed catamenia, or after a severe catarrh, bronchitis, or limited pneumonia, or after influenza, measles, fevers, whooping-cough, &c., and even without any manifest cause of exacerbation, the disease passes into a chronic or a protracted, but open and manifest phthisis, or into a consecutively acute form, with the usual expectoration, perspiration, diarrhoea, emaciation, &c., and with the physical signs attending the far-advanced states of the malady. Hæmoptysis is not frequent in this form unless in its latter stages. The disease may continue latent in females, often masked by other ailments, as hysteria, chlorosis, uterine disorders, dyspepsia, bronchitis, or by pregnancy, until, upon the disappearance of the catamenia, or after parturition, or suckling, it breaks out into an open and acute form, and terminates rapidly, generally with fever, and sometimes with delirium.

79. This form of phthisis sometimes follows depressing or exhausting causes, or prolonged or neglected dyspepsia and impaired assimilation and nutrition, or catarrhal or bronchial affections, or hysteria, or pneumonia, or pleurisy, or affections of the throat, or partial anæmia; and these or other contingent or intercurrent disorders may mask its early course, in both sexes and at all ages, until it assumes one or other of the manifest forms about to be noticed. It is frequently connected in its origin and progress with a poor state of the blood, or deficiency of the red globules; this state of the blood, in connexion with impaired organic nervous power, either occasioning or developing the tubercular deposits.

80. The lesions most commonly seen in the lungs in this form are cicatrices in the upper lobes, with or without calcareous formations in or near their centres; crude and softened tubercles; both old and recent cavities, the former being somewhat contracted and having their surfaces smooth, or presenting a fibro-serous appearance, and adhesions both old and recent between the opposite surfaces of the pleura in one or several places.

81. *B. PRIMARY ACUTE OR RAPID PHTHISIS.*—This form occurs in persons apparently in good health, breaks out suddenly, and runs its course rapidly—in from five or six weeks to three months—owing either to the extent and severity of the morbid action, or to the feeble powers and defective vital resistance of the patient's constitution. This state of the disease occurs chiefly in young persons, and is often developed by measles, fever, scarlet fever, influenza, catarrh, bronchitis, pneumonia, or whooping-cough; and, although symptoms of tubercular disease were not evident before it supervened upon these maladies, or otherwise rapidly broke out, it may be inferred that it had previously existed for some time in a latent state, and that, when it had reached a certain ex-

tent, the symptoms and signs of its presence became rapidly manifest. In some cases severe physical exertion, fast running, loud speaking, has determined an attack, with more or less hæmoptysis and all the more violent and unfavourable symptoms of the malady. In these cases, the diseases just mentioned and other efficient causes have called the latent tubercular deposits into activity, not merely developing and accelerating their progressive changes, but also exciting morbid actions in the structures surrounding or adjoining them. That this view is correct is shown by the occurrence of this form chiefly in the serofulous, lymphatic, and inflammatory diatheses, and in members of a family in which others have been subjects either of external scrofula or of phthisis. That the diseases just mentioned, or attacks of pulmonary congestion, or other causes, should have so rapidly given rise to tubercular deposits as the history of this form may indicate, is not very probable. It is most likely that the tubercles, at an early and latent state of their formation, had existed previously to operation of these causes, and had been thereby developed into a rapid maturity.

82. This form of phthisis may be divided into *two varieties*; viz., that in which the more characteristic phenomena of phthisis are present in a remarkable and severe degree, and that in which these phenomena are nearly if not altogether absent, the disease being often mistaken for low nervous or typhoid fever.—*a.* In the former of these the patient is attacked by chills, quickness of pulse, oppressed and rapid breathing, an aching pain and anxiety in the chest and præcordia, the pain or aching extending to the spine and shoulder-blades; a short cough, which is afterward constant and severe, with a scanty and frothy expectoration at first, which soon becomes copious and yellowish; and acute hectic fever, the pulse being very rapid and soft, the remissions slight, and the perspirations excessive and almost continued. The sputum now is generally similar to that ushering in the second stage of the more common form (§ 31). The countenance is anxious, pale, covered with perspiration, the conjunctivæ clear, and the pupils dilated; the surface of the skin has a pallid or dirty hue, the tongue is dark or loaded, and the prolabia somewhat livid; the cough, oppression, and dyspnoea are so distressing as often to prevent the patient from lying down, and the breathing is short, shallow, and rapid. Hæmoptysis to a moderate extent sometimes occurs, but rarely produces relief. Vomiting takes place in rare cases. Diarrhoea occasionally appears towards the close, but is seldom severe, yet emaciation is considerable. At last the pulse can hardly be counted, and the dyspnoea is most distressing, and the cough almost suffocating. Slight delirium supervenes, the fingers and lips become livid, the nails dark and uncut, and death ensues, from four to seven or eight weeks from the attack, preceded for a few hours either by coma or indications of impending asphyxia. On percussion a dull sound is heard over nearly all the chest. Respiration is very weak in some places, and bronchial in others, and a mucous râle is generally present. No crepitation is heard, nor is the sputum characteristic of pneumonia. It is usually yellowish, is sometimes streaked with blood, or contains small clots of blood.

83. This form of the disease generally occurs

in young persons. I have seen it most frequently in females, especially after measles, influenza, and hooping-cough, and the suppression of the catamenia. In these the attack has often been produced by exposure to cold; and in some cases to which I have been called the disease has been considered either as bronchitis, or as pneumonia of both lungs, both which it nearly resembles. Indeed, it may be said to be very nearly allied to congestive bronchitis on the one hand, and congestive or nervous pneumonia on the other; but the previous history of the case, the scrofulous diathesis, the effects of treatment, the remarkable rapidity of breathing, the character of the sputa and of the physical signs, indicate the difference, as well as the alliance, between these diseases, and the appearances after death fully confirm this relation (§ 132). In 1853, a case of this kind occurred in a near relative; and in 1854 I was called to a recently married couple, both under twenty-five years, both of the scrofulous diathesis, and viewed by the father of one of them, himself a physician, as possessing a strong tendency to phthisis. Both were attacked with measles a few weeks after their marriage, and on recovery they went to the sea-side. They resided there for a short time, and, on returning to town, were exposed to cold. The lady had had the catamenia in excess; but she had passed the usual period two or three weeks, without indications of pregnancy. Soon after her exposure she was suddenly seized by chills, oppressed breathing, cough, and the other symptoms just mentioned. The attack was viewed as congestion of both lungs. External derivatives, a moderate cupping over the sternum, followed by dry-cupping in this situation and between the shoulders, and the treatment described hereafter, were prescribed. The disease proceeded as above, and terminated fatally in about five weeks. Her husband was seized in nearly a similar manner, but not so severely, very soon after her death. During her illness he appeared pallid, depressed mentally and physically, and slightly anæmised; his pulse was very rapid and weak. He had soon afterward a very slight, short cough in the morning, no expectoration, but hurried breathing on slight exertion. He did not wish to be considered ill, and refused medicine. Immediately after his wife's funeral, and more than usual exposure, he was seized with the acute symptoms mentioned above, and in a few weeks these terminated fatally, with slight delirium and coma.

84. *b. The lesions in this form of phthisis have been considered by ANDRAL as those of a form of pneumonia, attacking the scrofulous diathesis, the gray tubercular granulations found after death being regarded by him as the results of inflammation of the air-cells. But the crude and more advanced tubercles formed in addition to these granulations, the quantity of tubercular matter infiltrating and consolidating portions of the lungs, the more general extension of these lesions throughout the lungs or to the lower lobes, the indications of vascular congestion of the pulmonary structures, and even of the bronchi, and the presence of some degree of œdema or serous infiltration of these structures; and still more the occasional existence of small recent cavities, partially evacuated of their contents, and without lining membranes, are evidences that the tubercular deposits, from their extent, and the sudden production of congestion of the pulmonic and*

bronchial tissues, had developed, more or less rapidly, a state of vascular action in these tissues, of an asthenic character, that had reacted on the tubercular deposits, and had accelerated their development; the severity and rapid fatality of the disease being occasioned by the great extent of these deposits, and by the associated changes in the lungs.

[The diagnosis of this form of *acute* phthisis is somewhat difficult, the physical signs being less distinctive than in ordinary tuberculosis. A marked disparity in the percussion-resonance is not always apparent, owing to both lungs being simultaneously, and in some cases about equally affected. This affection is characterized by an abundant and extensive deposit of gray, semi-transparent granulations, often in the form of infiltration, which undergoes a rapid process of softening, leaving corresponding excavations, if the patient survives a sufficient length of time. Notable dulness on percussion may not be manifest, if the granulations remain isolated. Auscultation may not furnish morbid phenomena other than are afforded in acute bronchitis, viz., the vibrating and bubbling sounds, including the sub-crepitant râle. The vocal signs of tuberculous solidification, viz., exaggerated resonance, broncophony and fremitus, are wanting. The prominent symptoms are chills, followed by febrile movement, rapid pulse, heat and dryness of skin, great debility, hurried respiration, dispnoea, lividity of the prolabia, cough, more or less violent, dry, or accompanied by little expectoration, which is sometimes bloody, &c. Emaciation is generally much less strongly marked than in ordinary tuberculosis. Reasoning by exclusion, we shall, with due care, be able to distinguish this form of disease from cardiac affections, pneumonitis, bronchitis, or typhoid fever, with which it has sometimes been confounded.]

85. *c. The second variety of acute phthisis closely simulates either nervous, remittent, or typhoid fever, according to the modifications it presents in individual cases, while the first variety closely resembles congestive or nervous pneumonia (see LUNGS, INFLAMMATIONS OF, § 62, et seq.), in some respects, and asthenic bronchitis of both lungs in others (see BRONCHI, &c., § 37, et seq.).—This variety of acute phthisis is rarer than the preceding, and has not been noticed by those who have adopted diseases of the lungs for their speciality, the examination of the bared chest for the grand coup of fussy diagnosis, and the stethoscope as the baton of transcendental medical knowledge, if not of actual inspiration. This neglect is most extraordinary on the part of those who usually consider every case which comes under their view as pertaining to that region of medical science which they suppose themselves to be alone capable of cultivating. As in the preceding variety, so in this, the patient has appeared in good health, and if he have not felt this to have been the case he has not admitted it; nor have his friends detected it until he is seized by an outbreak of disorders which obliges him to keep to his bed and have recourse to medical aid. If this aid be of a proper kind, it will be found and admitted, at least in some cases, that a degree of ailment had been experienced for a considerable time before the accession of acute disease; that depression of spirits, indolence or indisposition to mental and physical exertion, debility, loss of appetite or indigestion, acceleration of breathing when ascending a*



height, weakness in the joints, occasional chilliness, followed by heat in the palms of the hands or soles of the feet, especially at night, some degree of restlessness in the early part of the night, loss of colour or complexion, in some cases loss of flesh, an unusual brightness of the eyes, &c., had been present for some time, but that each or all of these were so slight as not to excite the anxiety of the patient, or they were not so manifest as to rouse the fears of his friends. The patient now feels a general prostration, has a quick pulse, with the usual symptoms of a remittent form of fever, which in a few days assumes a more continued type, the symptoms being, however, somewhat severer on alternate days. The bowels become irregular, at first confined, and afterward inordinately relaxed; the perspirations are usually abundant; the tongue is foul or loaded; the urine rather scanty and high-coloured, with copious deposits; the position in bed is on the back, with the head and shoulders more or less raised, or partially turned to either side; the features are somewhat sunk, the face pallid, and the general surface dusky, with a clammy perspiration, which is abundant over the head, face, neck, and chest; and aching or dull pains are occasionally felt about the clavicles, in the back, and under the scapulæ. During the course of these symptoms little or no cough is observed; if it be present it is commonly slight, dry, and insufficient to attract attention; but the breathing is remarkably quick, somewhat oppressed, and shallow. There is little or no expectoration, the sputum and other local symptoms being insufficient to direct attention to the state of the lungs, or to excite suspicions of the existence of rapid febrile phthisis, both cough and expectoration being apparently absent. The pulse is more and more rapid, slight or wandering delirium occurs, especially when the patient dozes or falls into a waking sleep; the hair becomes thin; the surface more dusky; the emaciation very rapid and extreme; and bed sores readily form on the more prominent parts. Death soon ensues, generally in four or five weeks from the commencement of the acute attack, either from the exhaustion consequent on diarrhœa, or from coma, or sinking following delirium.

86. *d. Lesions.*—I have seen four cases of this variety of febrile consumption, to which I was called in consultation at an advanced period of their course; and at that time the symptoms and signs of phthisis, in its third stage, were more or less manifest, upon a careful and minute examination, and with due reference to the history of the case and to the health of other members of the family. In three of these an *inspection after death* was allowed, and in all several cavities were found in both lungs mostly altogether empty and nearly dry. The blood in the lungs was of a dark colour, and only partially coagulated; few or no adhesions were found between the opposite surfaces of the pleura; and the lower lobes were as much diseased as the upper. The intestinal follicular glands, both solitary and aggregated, were more or less enlarged and ulcerated. Three of these cases occurred in females. The youngest was 18 years of age, the oldest of all was 27 years. It may be inferred that the cavities, which were small, mostly empty, and the smallest only, in two or three instances, full of these usual tubercular and fluid matters, had not communicated with the bronchi, or that the bronchi in

connexion with them had been rendered impervious in the parietes of the cavities, from the condensation of the surrounding tissues, and that the morbid matters in these cavities had become absorbed, had contaminated the blood, and occasioned acute febrile symptoms of a typhoid or adynamic character. The circumstance of the softened tubercular matters in the cavities, and the morbid fluids flowing into them from their ulcerating parietes, not having passed into the brouchi, accounts for the absence not only of expectoration, but also of cough; while the emptiness of the excavations shows that their contents must have been absorbed, and being carried into the blood, explains the acuteness, the rapidity, and the typhoid character of the attendant fever.

87. *C. CONSECUTIVELY ACUTE PHTHISIS* is different from the two preceding varieties, chiefly as regards the character and duration of the symptoms preceding the exacerbation of the disease, and the development of the more acute and dangerous form. In these varieties the patient seems in tolerable health to those about him, and believes himself to be so, until the acute symptoms make their appearance, although the experienced observer cannot fail to remark indications of the approaching evil.—*a.* But the variety now about to be noticed is preceded by a slower and more manifest disorder of the respiratory functions than that preceding these varieties, and is in every way similar to the *latent* form of the malady, described above (§ 77, *et seq.*), although by no means latent to any attentive observer. After pallor of the countenance, or slight indications of anæmia, with or without emaciation, debility and inactivity, mental depression, languid or soft pulse, shortness of breathing, or short cough on exertion, and sometimes after the expectoration of calcareous concretions, have continued for a very considerable or even a long time, or for several months, or even years; and generally soon after exposure to cold, or after unusual exertion, the patient experiences chills or shiverings, or a sense of cold running down the back; or he is seized with hæmoptysis, and all the acute symptoms are fully evolved. Hectic fever, at first remittent, but afterward nearly continued; a rapid, weak pulse; very quick respiration; cough and copious expectoration; pains about the clavicles, scapulæ, or the sides, or the upper regions of the chest; colligative perspirations, diarrhœa, rapid emaciation, aphthæ, sometimes with, but oftener without, slight delirium, ultimately supervene, and terminate life.

88. *b. The lesions* most frequently observed after death in this variety are, tubercles in various states of softening; small, or nearly cicatrized, or contracted cavities, with gritty, calcareous, or cheese-like matters in or near their centres; larger cavities, partially empty or containing blood, if hæmoptysis had preceded dissolution, and their parietes varying in appearance with their duration; condensation of the pulmonary tissue around the excavations, or congestion of portions of the lungs, and redness of the bronchial mucous membrane, &c.

89. *D. PROTRACTED PHTHISIS* may commence either in the usual form, or continue for years, first in a more or less latent, and afterward in a manifest state. It occurs chiefly in the phlegmatic and bilious temperaments. It is often characterized by slowness of the pulse, which seldom rises above 70, and often not above 65 in a min-

ute, by attacks of hæmoptysis, or more rarely by the expectoration of calcareous concretions; but, when the latter occurs, I have very seldom observed the former, unless in a very slight degree. It is sometimes simple or uncomplicated, but it is oftener associated in various periods of its course with one or other of the affections and lesions about to be mentioned. The nature of the disease is generally manifest; and the experienced observer will rarely fail to form a correct diagnosis, even without the aid of a physical examination, between it and bronchitis or chronic pneumonia, with either or both of which, however, it is often associated, at different periods, and even also with partial pleuritis. Percussion and auscultation are of use chiefly as showing the progressive changes and complications of the disease, although they are liable to the fallacies noticed above (§ 35-37), owing mainly to the states of the cavities, when they exist, and of the bronchi, arising from the presence or absence of the morbid matters that usually collect in them.

90. Several cases of very protracted phthisis have come under my notice, several of them in medical men. Dr. T. was attacked by hæmoptysis at the age of 20, when studying in Edinburgh. His circumstances having admitted of his relinquishing practice soon after entering upon it, and having experienced returns of the hæmorrhage with other pectoral symptoms, he travelled or voyaged to several parts in the West Indies, and in the south of Europe, generally passing a part of the year in one or other of these, and returning to England in the summer. Nevertheless, his phthisical symptoms never left him, were exacerbated after considerable intervals, and the hæmoptysis also returned, and was sometimes alarming. This state of health continued for many years, and he continued to pass his winters in some mild climate, most frequently in that which he found to agree the best with him. At about the age of 57 or 58 he first called upon me, told me his case, and informed me that he had consulted all the consumption doctors, and that they were almost equally divided as to the existence or non-existence of cavities. I told him, after a careful examination, that there were cavities in both lungs, but that they were small, and that they most probably were filled up by the accumulated morbid secretions for a considerable time, and thus they escaped detection. He continued under my care for several years, during the periods of his residence in London or its vicinity. But the attacks of hæmoptysis were more frequent, so much so ultimately that he always carried with him pills consisting of the ergot of rye, and a bottle of turpentine. He took the former as soon as the hæmorrhage appeared, and if that failed, he had recourse, as I had directed, to the turpentine. These means generally succeeded, but the other pulmonary symptoms gradually advanced. When about the age of 67, he was seized with hæmoptysis when getting out of a railway-carriage at Paddington, had recourse to his usual remedies, and sent for me.

91. Before I reached his residence he was dead, suffocated by the hæmorrhage. The body was inspected the following day. Several cavities were found in both lungs. None of them were large. The smaller were apparently contracted; their parietes were smooth, fibro-serous, and almost fibro-cartilaginous in parts; and one or two of them so much reduced as to be almost cicatrized;

the parietes being quite smooth and fibro-cartilaginous. The surrounding tissue was condensed. Some of the cavities had membranous parietes, while in others the walls consisted of a somewhat condensed pulmonic tissue, with minute openings, chiefly venous or bronchial. The cavities were all filled with blood, as were also the larger bronchi, and contained but little mucopuriform matter. This case had evidently been of forty-four years' duration; and it presented appearances, as respected the cavities, of the longest and shortest duration.\*

92. *E. PHTHISIS IN INFANTS AND CHILDREN* occurs chiefly in the scrofulous diathesis, or as a consequence of protracted or neglected disorder of the digestive and assimilating functions, which in children may generate both the scrofulous diathesis and tubercular disease. Disorder of these functions may in all temperaments so affect the circulating fluids as to develop that habit of body, in early life, which constitutes the scrofulous diathesis, and which, in its more manifest states, implicates not merely the lungs, but other organs

\* Dr. W. H., who had been editor of the "London Medical and Physical Journal" in the years 1819, 1820, and 1821, in 1823 evinced indications of pulmonary disease, and in the following year he had a most severe attack of hæmoptysis. He came under my care, and I advised him to pass the following winter at Naples. He returned to England in June, but was more or less of an invalid all the summer and autumn. He went to the coast of Devonshire the next winter; and he thus continued to change his place of residence for many years, often returning to London or its vicinity during portions of the summer and autumn. The pulmonary symptoms were sometimes slight, at other times severe. He died about 25 years after his first attack, in the vicinity of London. The treatment of this case, and of Dr. T.'s, was conformable with that which I shall have to recommend in the sequel.

Miss L. came under my care about nine years ago, in the third stage of phthisis. The symptoms and signs of cavities in the lungs had previously been recognised by the physicians whom she had previously consulted. When I saw her these were unmistakable. During the years which have intervened since my first visit, she has experienced intercurrent attacks of bronchitis, of partial pleuritis, &c., which have been successively overcome; and during the severe winter and spring of 1855 she was not confined a day to her apartment, and but rarely to the house. The physical signs and chief symptoms of cavities in the lungs still exist. I could adduce numerous other instances of the protracted form of this disease, if it were necessary to do so.

[We have known many cases of very protracted phthisis where the individuals lived to a good old age, and were capable of performing a considerable amount of labour during their long lives. Dr. W. was a well-known practitioner of New York, who died at the age of 68, and who in early life laboured under all the symptoms of pulmonary tuberculosis. After death extensive cicatrizations were discovered, showing the former existence of cavities. Dr. K., surgeon U. S. army, also laboured under tuberculosis for more than thirty years, during most of which time he was engaged in active service, and enjoyed a comfortable state of health. In both of the above cases hæmoptysis was a frequent occurrence.]

Dr. C., of Utica, is another instance of the same kind, where all the physical signs of tuberculosis of the lungs, inducing cavities, have existed for more than 20 years, and yet he has been able to teach and practise his profession as extensively and successfully as almost any member of it. I could extend this list to more than twenty, which have come within my own observation; but a history of them would only go to confirm what is already well known, viz., the very protracted nature of this disease in particular exceptional cases.

More than 20 years since we attended a female who had laboured under amenorrhœa for more than six years. During the last year, she had a regular monthly attack of hæmoptysis, which lasted two or three days, the amount of blood expectorated being about the same as in an ordinary menstruation. She then married happily, has had several children, has never since experienced any symptoms of pulmonary disease, and is now (Jan., 1856) in the enjoyment of good health.—*Am. Ed.*]



also. When treating of *Scrofula* and *Tubercles*, I have shown that the scrofulous diathesis may either be inherited or generated by the parent, and by the offspring in childhood, by causes which depress or exhaust organic nervous power—impaired digestion and assimilation of the hæmatosine, and imperfect nutrition resulting therefrom—and thus engrafting scrofula and tuberculosis upon any temperament. It is therefore most important that this disorder of the digestive and assimilating functions in childhood should be recognised and traced to its causes, and that these causes should be removed.

93. The aspect of children thus affected suggests the idea of imperfect organic power. The child is languid or fretful; the flesh is flaccid; the skin harsh, dry, and unhealthy to the sight and touch. It is disinclined to play or to active exercise. The face is pale, pasty, or faded. The eyes appear large; the pupils are dilated, and the conjunctivæ white. The tongue is whitish, and dotted with small red points, the extremity and sides being red, and the root and centre loaded, or more or less furred, especially in the morning. The appetite is variable, often craving or unnatural; thirst is not infrequent, and the breath is fetid. The bowels are irregular, most frequently costive, but sometimes very loose; and the evacuations are offensive, often pale, grayish or clayey; occasionally mucus and imperfectly digested food are observed in the stools. The urine is either high-coloured at times, scanty or abundant, turbid or pale. The extremities are usually cold; and sleep is disturbed, and often followed by partial night-sweats. The child often talks when asleep, or grinds its teeth; and hence the complaint is often ascribed to intestinal worms, with which, however, it is not infrequently complicated.

94. If the complaint continue, the symptoms are not only increased, but others are superadded. The countenance is more faded and pasty; the upper lip is thick, tumid, or fissured; the throat and fauces red or sore, or the tonsils enlarged; the eyelids and tarsi are inflamed, or the pupils are dilated, the conjunctivæ pale or pearly; the nostrils are somewhat swollen or sore, or discharge a thick mucus; and mucus, mixed occasionally with blood, is passed from the bowels with frequent offensive and griping motions. These symptoms may continue for some time, the flabbiness and emaciation increasing, and becoming associated with quick respiration, cough, and mucous expectoration, occasionally streaked with a little blood. The skin is harsh and dry, but sweats break out during the night; languor and debility increase; the pulse and respiration are greatly accelerated; and the quickness of the latter relatively to the former increased. The pulmonic symptoms become, in most cases, more manifest, but vary much with the age and temperament, or habit of body, of the child. In the very young, they are often marked by disorder of the bowels, which frequently appears urgent, and is more or less connected with tubercular deposits in the mesenteric glands. In others, the great size of the head and the emaciated state of the limbs lead to the suspicion of incipient disease of the brain or its membranes, which indeed may be actually commencing, either as softening of the central parts of the organ, or as tubercular formations in the membranes; but these changes, as well as those in the mesenteric glands, may be

contemporaneous with tubercular deposits in the lungs also, the amount of disease in this organ either predominating or advancing *pari passu* with that in the others. In many, especially the very young, the pulmonary tubercles never reach the stage of dissolution and tubercular vomica, the disease of the brain, or of the mesenteric glands and bowels, or the extent of tubercular infiltration of the lungs, even of the lower as well as of the upper lobes, terminating life before this stage is approached or advanced, although the emaciation, and the oppression and acceleration of breathing, are extreme.

95. In these cases the cough and expectoration may be slight; but the dulness on *percussion*, and impaired motion of the ribs, are generally remarkable. The other *physical signs* are nearly the same as stated above in respect of the early stage of phthisis (§ 24, *et seq.*); but those of percussion are more to be depended on than of auscultation, especially in young children; and, in those particularly, hæmoptysis rarely occurs, unless at an early period, and then as merely streaking the expectoration; but slight epistaxis is sometimes observed. The younger, also, the child, the more general are the tubercular deposits in the several organs, especially in the lungs, in the bronchial glands, in the mesenteric glands, membranes of the brain, &c.

96. *F. THE DARK RACES* are much more exempt from phthisis than the white; but very much depends upon race, and upon continued residence in the same or similar climate, on the one hand, and migration to a colder climate, on the other.\* Of the degree of prevalence of this malady in different races, some notice, although insufficient, will be taken in the sequel; and I can here only mention the much greater prevalence of this malady in these races, especially the negro race, when they migrate to a temperate, or a cold or changeable climate. As to the usual course of the disease, when it attacks individuals of either a black, brown, or copper-coloured race, I am not enabled to speak with confidence; but, from what I have seen, it commences silently and insidiously, and advances more and more openly and rapidly to its fatal issue. In some cases the attack appears as a vital blight, by which the lungs are especially affected; a lower range of temperature or greater exposure than heretofore experienced, or other depressing or exhausting causes, while they impair organic nervous power, and the assimilating functions, thereby develop tubercular deposits in the lungs, as the parts most predisposed, by structure and exposure, to experience this morbid change, generally without any inflammatory precursors or complications. These races, as far as I have had occasion to observe, rarely or never present the protracted and very chronic states of the malady sometimes seen in the white races; while the more rapid or acute forms are frequently met with, but these generally with fewer indications of febrile or excited vascular action than in the white races. Hæmoptysis is, I believe, less frequently observed as a symptom or complication of the disease in the negro than in the latter races, while it is a severe and frequent symptom in the mixed races of South America.†

\* [Of the blacks who escape from the Southern States to Canada, a large number perish within the first five years from tubercular and scrofulous affections.]

† Dr. ARCHIBALD SMITH, in a very interesting account

## 97. IV. THE STATES OF THE BLOOD IN PHTHI-

*of the Diseases of Peru*, states that "in Spring, a season when many severe cases of pneumonia present themselves, the commonest catarrh generally appears under a more febrile form, and when it unfortunately affects one of a consumptive tendency, it is frequently the exciting cause of a galloping decay. For at this season it is remarked that consumptive patients, with which the hospitals in Lima are well supplied, die very speedily, while at other seasons they linger on for a longer period. Persons who are habitually subject to chronic *bronchitis*, and troubled with what they call crude phlegm, or much mucous expectoration, are apt to fall into a fatal decay, as a consequence of an acute attack originating in cold; and others, who have been in a lingering state of health for some time, with a slow fever and a short dry cough, or a cough accompanied with expectoration, especially in the morning, of clear and frothy sputa, are prone to have their fever increased, and to be hurried into a state of catarrhal consumption. In cases of the latter kind, it is probable that tubercles may have previously existed in the lungs, and that the exception of catarrh only serves to bring phthisis into more decided action. And, indeed, it may be made a question whether those cases of chronic bronchitis to which I have referred may not, sometimes at least, be instances of bronchial irritation, and consequent expectoration of a mucous secretion, sustained by the presence of tubercles. Whatever be the particular form or primary character of pulmonary consumption, certain states of the atmosphere, depending on different degrees of altitude, appear to be either hostile or favourable to its existence or development, according to the particular locality in which the patient happens to reside. Thus on the coast it is a common disease, terminating in purulent expectoration and death, in whatever way it may have originated; but on the intermedial mountains, and in the temperate valleys of the interior, pulmonary consumption is a rare malady.

"A failure of strength and health coming on gradually, or as it were by stealth, with impaired appetite, a slight dry cough, with or without pain at the breast or shoulders, a febrile pulse, with nocturnal heat and restlessness, are symptoms frequently precursory of those which characterize confirmed consumption. This slow fever, so much dreaded by every one as the harbinger of phthisis pulmonalis, and often aggravated by daily provocations, or fretfulness and anger, is always accompanied, if not always preceded, by a diseased condition of the digestive functions. This affection is, I think, well described by Tissot as a disease to which men of letters are subject: 'This slight fever, to which some men of letters are liable, and which, by impairing the nutritious lymph, renders them pale and thin, and throws them at last into a state of decay and consumption, a fever which itself depends on this, that sometimes a strong mental emotion excites the action of the heart and accelerates its pulsations; but more frequently it arises from bad digestion, and a faulty condition of the chyle, which irritates the organs of circulation, and so becomes the cause of the fever; and, also, if the organs of respiration are delicate and sensible, of a cough, which, united to the fever may degenerate into hectic fever and phthisis.'—*De la Saleté de Gens des Lettres*, p. 33. In conformity with these views, which are as applicable to the ordinary cases of incipient phthisis in Lima, as to the explanation of the origin of pulmonary affections in men of letters, according to Tissot, I would remark that the chests of the Linoenos, especially the male part of the white population, are commonly contracted; very rarely open and spacious, except among the dark and labouring classes; and every practitioner entrusted with the medical treatment of these people should constantly bear in mind that their respiratory organs are so delicate and easily affected, that sometimes shaving and washing the face in cold water bring on catarrh; and I have already shown how this latter affection may be the precursor of confirmed consumption."—*Edinburgh Medical and Surgical Journal*, vol. liv., p. 6-9.

Dr. A. SMITH has here shown the very intimate connexion of phthisis with impaired digestion and assimilation, and the want of originality, as well as the limited views of those writers who, since the days of Tissot, have espoused a somewhat similar doctrine. Of *hemoptysis*, in connexion with phthisis in Peru, Dr. A. SMITH remarks: "Spitting of blood from the lungs is exceedingly common in Lima; and not confined to persons of any particular class or colour, though more prevalent among the fairer inhabitants of European descent;" and he points out the frequency of attacks of *hemoptysis*, not only as a prelude, but as an attendant upon the early stages of consumption among the several races peopling Peru.

sis.—Before a precise idea can be formed of the states of the blood in this disease, the healthy conditions of the blood should be considered, with reference to *sex, age, and temperament*, in order that the degrees in which the former differ from the latter may be seen. It should not, however, be overlooked that the *chemical analyses* of DENIS, LECANU, BECQUEREL, RODIER, ANDRAL, NASSE, GAVARRET, SIMON, &c., have presented slight differences, even at the same age, in the composition of the blood in health, so that the results at which they have arrived may be viewed rather as a close approximation to the truth than as absolute certainty. In addition to the differences arising from sex, age, and temperament, others, hitherto not inquired for, may also exist, especially those depending upon race, climate, and season. After examining the mean results furnished by the above writers, I here give those assigned by BECQUEREL and RODIER, as the most precise and as nearly approaching the mean of the other observers.

98. a. The following table, containing the mean of a number of analyses of the blood of *healthy* persons, between the ages of 21 and 55 years, shows the differences between the constituents of this fluid in *males* and *females*, in 1000 grains, or parts.

	Male.	Female.
Density of defibrinated blood	1060.0	1057.5
Density of serum	1028.0	1027.4
Water	779.0	791.1
Fibrin	2.2	2.2
Sum of fatty matters	1.60	1.62
serolin	0.02	0.02
phosphorized fat	0.488	0.464
cholestrin	0.088	0.090
saponified fat	1.004	1.046
Albumen	69.4	70.5
Blood-corpuscles	141.1	127.2
Extractive matters and salts	6.8	7.4
chloride of sodium	3.1	3.9
other soluble salts	2.5	2.9
earthy phosphates	0.334	0.354
iron	0.566	0.541

99. b. The differences of the constituents of the blood at different *ages* have not been determined with sufficient precision; but, according to the researches of DENIS, the water in the blood is somewhat increased after 50 years of age, the solid residue slightly less, the blood-corpuscles are materially diminished, and the albumen nearly the same in quantity. In *childhood*, the water is increased, the solid residue somewhat less, the blood-corpuscles considerably less than at mature age, and the albumen nearly the same as at that age. BECQUEREL and RODIER state that, after 40 or 50 years of age, there is a decided and progressive increase of cholestrin in the blood. As puberty approaches, and as the generative organs are developed, the blood-corpuscles and iron increase, and the relative proportion of water diminishes; the corpuscles and iron serve to maintain the energy of these organs; and until the powers of these organs begin to flag, the blood experiences little or no diminution of its red corpuscles.

100. c. The *constitution* has considerable influence on the state of the blood. At equal ages, the solid constituents and hæmato-globulin are less abundant in the blood in weak than in strong constitutions. According to LECANU and others, the blood of persons of *lymphatic* and *phlegmatic*



temperaments is much poorer in solid constituents, and especially in red globules, than that of persons of sanguineous temperament—the quantity of albumen being the same in all. The following are the results in 1000 parts :

	Sanguineous Temperament.		Lymphatic and Phlegmatic Temperament.	
	Men.	Women.	Men.	Women.
Water . . . . .	786.584	793.007	800.566	803.710
Albumen . . . .	65.850	71.264	71.781	68.660
Blood-corpuscles .	136.497	126.174	116.667	117.300

101. *d.* The chemical analysis of the blood in threatened and incipient phthisis furnishes the same results as those stated in the article on SCROFULA AND TUBERCULOSIS (§ 93, *et seq.*). When phthisis is farther advanced, the changes in the blood are more and more manifest. ANDRAL and GAVARRET state that, in all periods of the disease, excepting the last, the fibrin seems on the increase, and the red corpuscles are on the decrease, progressively throughout; but that the proportion of the increase on the one hand, and decrease on the other, varies with the progress of the malady. If the tubercles be in a crude, unsoftened state, the increase of fibrin is only small, and its whole amount may be estimated at about 4. This, however, according to the researches of Dr. FRICKE, of Baltimore, and others, is too high an estimate. The decrease in the corpuscles in this stage is perceptible, but not very great. As the tubercles soften, the quantity of fibrin slightly increases, and the corpuscles decrease. Upon the formation of vomica, or cavities in the lungs, the fibrin is somewhat farther increased—to 5.5 according to ANDRAL—but it never reaches the amount observed in pneumonia. The results vary, however, with the nature of the associated lesions, which most of chemical observers have not taken into the account; for the occurrence of severe attacks of hæmoptysis, or of partial, sub-acute, or chronic pneumonia, or pleuritis, or peripneumonia, will increase the fibrin and greatly diminish the red globules. In the last stage of phthisis the blood becomes still poorer; the fibrin decreases in nearly the same ratio as the other solid constituents, and even often falls below the healthy standard. The following table furnishes the results of 22 analyses by ANDRAL and GAVARRET, and 9 by BÉCQUEREL and RODIER, in 1000 parts of the blood in phthisis :

	In Men.			In Women.	By Andral & Gavarret.
	1st Ven.-esect.	2d Ven.-esect.	3d Ven.-esect.		
Water . . . . .	794.4	799.8	821.0	796.8	800.7
Solid constituents .	205.2	200.2	179.0	203.2	190.3
Fibrin . . . . .	4.8	4.2	3.6	4.0	4.4
Fat . . . . .	1.55	1.4	1.06	1.729	
Albumen . . . . .	66.2	65.04	62.0	70.5	
Blood-corpuscles .	125.0	122.7	103.5	119.4	100.5
Extractive Matter and Salts . . . . .	7.7	6.7	8.9	7.6	

102. Mr. ANCELL has adduced the results of a great number of researches into the constitution of the blood in phthisis. He views the disease to derive its origin from morbid states of the blood. The chief differences existing between the views of that gentleman and those entertained by me, as stated under the head SCROFULA AND TUBERCLES (§ 101, 102), are, that I consider the changes observed in the blood, the nature and extent of

which I fully admit and describe, not as the origin of tuberculosis, but as effects of originally deficient, or consecutively impaired, power of the organic nervous system—of that system which endows the digestive, assimilating, circulating, and nutritive organs—defective assimilation of the chyle, and an unhealthy condition of the blood, being the consequences of this state of the organic nervous system, and only intermediate links in the chain of pathological results, the extremities of which chain are the state now assigned and the tubercular lesions.

103. *c.* I may adduce the following as the results of my own observations of the state of the blood in the early and in the advanced stages of phthisis: At an early period, or even before the disease has fully declared itself, the blood is thinner or poorer than in health; the colourless globules are more or less abundant, and the red globules less numerous; the clot is somewhat smaller, its crasis less, and it sooner loses its cohesion. As the disease advances, and as febrile action is established, the fibrin is somewhat increased, and this is more certainly the case, if hæmoptysis, or intercurrent inflammations of any of the pulmonary structures take place; the red globules are diminished, and the albumen and fatty matter are not very materially changed in quantity. The alkaline salts are slightly deficient, and lime is somewhat in excess. It should not, however, be overlooked that, among the numerous analyses of the blood in phthisis, there are very great differences in the quantity of fibrin, of albumen, and of fatty matter. I have here given what appears to be the more correct results. Probably the quantity of each of these is not so different as the quality, the intimate constitution, and vital relations. In the last stage of the disease the blood appears still more watery, owing chiefly to the deficiency of red globules; and the colourless globules more numerous than in health. The greater abundance of colourless globules is probably owing to impaired assimilation, or metamorphosis, of these into red globules. The colourless globules in this, and indeed in earlier stages of the disease, have been mistaken for pus globules, the existence of which in the circulation is doubtful, or at least not satisfactorily demonstrated. The vital crasis, as well as the size of the clot, progressively diminishes. It does not appear that the microscopic appearances of the blood in phthisis are different from those now stated, or that the observations which have been made with the aid of this instrument have furnished any additional facts to those now adduced. (See art. SCROFULA AND TUBERCLES, § 93, 94.)

[It must be acknowledged that we are as yet imperfectly acquainted with the true nature of the tuberculous crasis. It is evidently a special *dyscrasia*, connected with causes of debility which induce such changes in the circulating fluid as to lead to the deposition of a substance exhibiting the feeblest traces of organization. This matter would seem to bear little resemblance to fibrin; and yet ROKITSKY seems to regard it as a modification of fibrin, and concludes that "the arterial character—arterial elaboration of the fibrin—constitutes, above all, the cardinal feature of the tuberculous crasis." He also points out how, in consequence of the alteration of the nature of the fibrin, tubercle is continually deposited, even when the blood is very deficient in that constituent; the fibrin that is formed being soon affect-

ed by the peculiar dyscrasia, and deposited in the form of tubercle. The rapid coagulation of tubercle-blastema, which must be effused in a fluid form, its tendency, when coagulated, to soften—its formation being favoured by active arterialization, and prevented by a venous condition of the blood—are circumstances which indicate a real affinity between tubercle and fibrin. When we reflect that various debilitating causes are found to increase the quantity of fibrin, and also that the same are potent in causing the production of tubercle, this hypothesis acquires farther probability. But in a majority of cases, even before this peculiar modification of fibrin has taken place, which leads to its excretion in the form of tubercle, a special impress is stamped upon the system, which betrays to the experienced eye the approaching evil. Its phenomena mark the scrofulous diathesis, so called. There is an opposite diathesis, or condition of the blood, characterized by deficiency in fibrin and excess of albumen, and generally also of blood-globules, which is called by ROKITSKY *venosity*, or *albuminosis*, and by SIMON *hypinosis*, and in which tubercular deposits are extremely rare.]

104. v. COMPLICATIONS OF TUBERCULAR PHTHISIS.—It is manifest that tubercles in the lungs, in their several states and stages, being the effects (as shown in the *art.* SCROFULA and TUBERCLES, § 101, 102) of originally deficient, or subsequently impaired, organic nervous power, and of the consequent changes in the blood, should not be viewed as a special disease of the lungs, or as limited to these organs only, but as a malady, in which the constitution—the whole frame, is more or less implicated. The earlier changes of organic nervous power and of the circulating fluids being such as now stated, it may be inferred that numerous associated and consecutive alterations will appear at early and advanced stages of the malady, more or less intimately connected with the original mischief, or tubercular vice, either as associated or related changes, or as more remote results. As these severally, and often in various associations, may be expected to present themselves in the course of phthisis, it becomes important that a brief view should be taken of them, as they are most frequently presented to us in actual practice, and nearly in the order as to frequency in which they occur.

105. It will appear from the foregoing, as well as from the circumstance of my not having taken particular notice of a form of phthisis, recently called *dyspeptic phthisis*—a form which Dr. A. SMITH has shown above (*see note to § 96*) to have been first insisted on by TISSOT—that I do not consider this as a variety of phthisis, inasmuch as indigestion is, as noticed by Dr. SMITH, an early attendant upon all the forms of this malady, although in different grades; and even when dyspepsia may be so slight as to be overlooked, especially as regards the functions of the stomach, healthy assimilation and nutrition may be very remarkably impaired. Original or acquired defect of the digestive, assimilating, and nutritive functions is not only the attendant upon the commencement and progress of the several forms of phthisis, but it precedes their origins in more or less manifest grades. Indeed, the malady may rationally be viewed as presenting this procession of morbid phenomena. If we admit the earliest change from health in tubercular persons, whether hereditary or acquired, to be impaired function

of the ganglial nervous system, or, in other words, defective organic nervous power—a power which endows and actuates the digestive, circulating, and nutritive organs and functions.

106. A. HÆMOPTYSIS.—I have already considered this occurrence as a symptom of phthisis (§ 49, *et seq.*). It may also be viewed as a *complication* of this disease; and it may supervene upon tubercles of the lungs coexisting with either functional and congestive disorder, or with organic lesion, of the heart. Hæmoptysis may, however, be caused by congestion of, or impeded circulation through, the cavities of the heart, independently of the existence of tubercles in the lungs; but this occurrence is comparatively rare. The blood may proceed: 1st, as a simple exudation from the bronchial mucous membrane, in consequence of the irritation and congestion caused by the tubercular deposits, whether within or without the air-cells and capillary bronchi, and by the impediment they occasion to the circulation in the pulmonary veins; 2dly, from the surface of a cavity owing to the erosion of one or more of the vessels passing to it—a circumstance of much more frequent occurrence than was formerly supposed; 3dly, into the structure of the organ, without any previous cavity, little or even none of the blood being expectorated, asphyxia having been suddenly produced by the extravasation. (See § 134, and *art.* LUNGS, § 186, *et seq.*)

107. The hæmoptysis which takes place at the commencement or at an early stage of phthisis may generally be ascribed to the first of these pathological states; but it may also proceed from the disorders and lesions of the heart already alluded to (§ 51), either independently of, or in connection with, tubercular deposits in the lungs. It should not, however, be overlooked that the hæmoptysis may appear in females as a vicarious menstruation; and as such it may be connected with tubercular deposits in the lungs or morbid states of the heart, or with both states of disease, or it may be independent of either of these. When the hæmoptysis takes place vicariously of menstruation, the lungs are very rarely free from tubercular formations. But, in whatever mode hæmoptysis takes place, the blood, which remains for a time in the bronchi, from or into which it is effused, generally excites more or less irritation, often amounting to inflammation of the bronchial mucous surface, thereby farther complicating the malady. (See *art.* HÆMORRHAGE from the respiratory organs, § 96, *et seq.*)

108. B. BRONCHIAL IRRITATION AND INFLAMMATION.—Bronchitis, most frequently limited, but either acute, sub-acute, or chronic, is a common complication of phthisis. It may exist in one or other of these states. It is generally confined to the bronchi in a portion of one or both lungs, and more especially to the bronchi in the vicinity of, or communicating with the seats of tubercular deposits or cavities. In the first stage of phthisis, these deposits most probably occasion merely a state of irritation, or of sub-inflammation, of the mucous membrane of the adjoining bronchi; but, even in this stage, when external agents or other causes aid the operation of this pathological condition, then a more active disease of this membrane is developed, especially if one or more attacks of hæmoptysis have occurred, and sub-acute or even acute bronchitis results. The effect of this bronchitis, although limited, as now stated, is to develop the crude tubercles and to hasten



their softening. When this has taken place, and the softened tubercular matter has made its way into the adjoining bronchi, then a very obvious cause of irritation and of inflammatory action is superadded to those previously existing. Hence during and subsequent to the softening—during the second and third stages, the sputum becomes much more abundant, and its quantity is owing chiefly to the morbid secretion from the inflamed bronchi—unless, indeed, in those very rare cases when the bronchi are not materially irritated by the disseminated tubercles, or when the softened matter is absorbed and does not pass off by the bronchi. In these stages, the discharge from the surface of the cavities, or the contents of recent tubercular vomicae, are the chief causes of the bronchitis and of its perpetuation; for it is frequently observed that the morbid appearances, both inflammatory and ulcerative, exist chiefly in, or are limited to, the bronchi communicating with the vomicae or cavities, and that these changes may be traced in and from these bronchi to their larger trunks, until the trachea is reached, where also, as well as in the larynx, the same alterations are not infrequently observed (§ 109, 110); while the bronchi which present not this communication, or which extend only to crude tubercles, are either exempt from these changes or present them in a slight degree. Dr. CARSWELL detected ulceration even in the minute bronchi communicating with cavities, showing the extension of the morbid action from the latter by means of the discharge from them.

109. *C. INFLAMMATION, ULCERATION, OEDEMA, &c., OF THE LARYNX AND TRACHEA* are often complications in the course of phthisis. The frequency of this association depends upon the original, concurrent, and consecutive causes, and upon influences and agents acting in the course of the malady. The affection of these parts is to be imputed chiefly to the same changes as occasion the bronchitis—to the tubercular and other discharges from the originally diseased parts; and often the morbid appearances may be traced from the bronchi communicating with cavities to the trachea and larynx. In some cases, however, the affection of the larynx, and even of the epiglottis, commences previously to the softening of the tubercles, and may be ascribed in these to the greater susceptibility of these parts, in the early stages of phthisis, to the usual exciting causes of inflammation and its consequences, and to the irritation extending to them—by sympathy and continuity from the pulmonary and digestive mucous surfaces. In the early, as well as in the advanced stages of phthisis, the digestive mucous surface furnishes many indications of irritation, giving rise to heart-burn, acrid eructations, &c., which very sensibly affect the larynx and epiglottis, and kindle disorder, which is not readily, and even never, put out. That it may thus partly originate in the digestive organs, is shown by the circumstance of the lesions being sometimes either limited to the larynx and laryngeal surface of the epiglottis, or chiefly found in these parts, the trachea being comparatively exempt or nearly so. In other cases, both these and the trachea are affected more or less; and not infrequently the inflammatory changes, ulcerative, &c., are limited to the trachea, and found chiefly either in the posterior or membranous portion of the trachea, or towards the side of it corresponding with the cavities which exist chiefly or only in one lung.

This limitation of the ulceration to one side of the trachea very probably is caused by the passage of the morbid secretion over it during the position of the patient in bed, which is most frequently on the back, or towards the side most diseased, so as to give greater freedom of respiration to the lung least affected. In some cases, the ulceration of the posterior part of the trachea is very extensive, and some of the ulcers very deep, even so much so as to give rise, in rare instances, to a fistulous opening into the œsophagus, one instance of which came under my observation. (See *art. LARYNX and TRACHEA*.) The larynx is rarely attacked primarily, or independently of tubercular deposits in the lungs; it is chiefly in connexion with tubercular disease of the lungs and with syphilis that lesions of this part occur. M. LOUIS states that of 180 persons who died of chronic diseases not phthisical or syphilitic, he found one only with ulceration of the larynx; but that one in five had ulceration of this part or of the epiglottis, and one in three had ulceration of the trachea, among those who died of tubercular consumption.

110. *Inflammation or ulceration of the larynx* is an important complication of phthisis; and when the affection of these parts is severe, and that of the lungs not well developed, or at an early stage, the disease has often been called *laryngeal phthisis*. But in those cases the affection of the larynx is merely symptomatic of the tubercular formations in the lungs, which is often masked by the former affection, especially when it is severe or the tubercular deposits not far advanced. In this state of the larynx there is either hoarseness or loss of voice, with pain in the region of the os hyoides, especially when ulcerations have advanced. The cough is characterized by a harsh, grating sound. It is difficult, suffocative, or attended by a whistling noise. The ulcerations in the trachea are very frequent in the more chronic states of phthisis, and are rarely manifested during life in these slow cases. M. LOUIS observed in some instances that sensations of heat and obstructions were complained of behind and above the sternum.

[It is well to bear in mind that all the rational signs of pulmonary phthisis may be present, including emaciation, profuse sweating, cough, purulent expectoration, mingled with blood, hectic, derangement of digestive organs, &c., without the presence of tubercular deposits in the lungs, but from laryngeal and bronchial disease. Such cases can only be distinguished by a careful auscultatory examination of the lungs and larynx, and actual inspection of the pharynx. In the same manner, chronic bronchitis is often confounded with, or mistaken for, simple throat disease. Dr. BENNETT has remarked very truly that, even when pulmonary tuberculosis does exist, many of the urgent symptoms are not so much owing to disease in the lungs as to the pharyngeal and laryngeal complications; and that local treatment may not only remove or alleviate these complications, but that, in conjunction with general remedies, it tends in a marked manner to induce arrestment of the pulmonary disease.]

111. *D. INFLAMMATIONS OF THE LUNGS, limited to portions of them, and both of these portions and of their bronchi*, especially to parts adjoining the tubercular masses, vomicae, and cavities, often occur at all stages of phthisis. In the first stage, when the tubercles are crude, or disseminated

through the organ, the inflammatory action may, from its grade, or its congestive or scrofulous character, or from being masked by the tubercular deposits, be imperfectly manifested either by the rational symptoms or the physical signs. In this stage it is very difficult to determine whether the tubercles be the cause of the inflammatory irritation, or the latter the produce of the tubercles. It is not improbable that, however originating, the one morbid state acts, and is acted, on by the other. As the tubercles advance to softening, inflammatory or congestive appearances may be detected around them, and the same are often seen around the vomica or in or near the walls of cavities, the bronchii, both capillary and large, participating in these changes. In many instances the structure of the lungs is condensed or infiltrated with tubercular matter around cavities or vomica, the change being a result of inflammation of a scrofulous or congestive character, limited to the situations in which the tubercular deposits are, or have been, most abundant or developed. In other instances, especially at an early stage, the attacks of hæmoptysis, especially when considerable, diminish or subdue the inflammatory condition, and leave the portions of lung not yet disorganized in a better state than previously for the performance of their functions. In some cases, especially where the deposits or vomica are near the surface of a portion of lung, the inflammatory action in the adjoining structure extends to the pleura, giving origin to the next complication, namely, intercurrent *pleuritis*, which is very frequently associated with one or more of those already considered.

112. *E. INFLAMMATION OF THE PLEURA*—in an acute, sub-acute, or chronic form—most frequently limited, but sometimes very considerably extended—generally very sensibly expressed, but occasionally almost latent or not expressed, or rather overlooked during life, is a most common lesion in cases of tubercular consumption; for it is very rarely found on dissection that the lungs in this disease are altogether free from old or recent adhesions. The pleuritic lesion usually arises as just stated, and is in most cases manifested by the pain commonly experienced, and if not by pain, by the physical signs. The inflammation of the portion of pleura covering tubercular deposits or vomica agglutinates it, by the exudation of lymph, to the opposite or costal pleura, thereby preventing, unless in rare instances, the *perforation* of the pulmonary pleura, and the consequences which would follow. The lesions supervening in the pleura in the course of tubercular phthisis, and the contingent results which sometimes ensue, more especially *perforation of the pulmonary pleura*, are fully considered under the heads *PLEURA, Inflammations of* (§ 112, *et seq.*), and *structural Lesions of* (§ 201, *et seq.*), and *PNEUMOTHORAX*, and to these I refer the reader for the farther elucidation of these complications of phthisis.

113. *F. SEVERAL ABDOMINAL COMPLICATIONS* are manifested in the course of phthisis, and evince the general or constitutional nature of the malady—or the origin of it in the organic or ganglionic nervous influence endowing the vascular system and the circulating fluids. These complications may appear at all stages of phthisis, or they even may precede the first stage.—*a.* The complication with *disease of the digestive mucous surface* is one of the most important. The stom-

ach, the lower parts of the ileum, and the cæcum and colon, are most frequently affected. M. ANDRAL justly remarks that “softening of the mucous membrane of the stomach, hyperæmia of the different portions of the intestines, ulceration of the small intestine, accompanied in many instances by a development of tubercles, are all of such frequent occurrence in phthisis, that they may fairly be considered as constituent parts of the disease.” These lesions of the digestive canal most frequently occur in the course of the pulmonary disease, often not until an advanced stage, especially in persons somewhat advanced in age; but they sometimes precede it, particularly in children and younger subjects; and, in some cases, the pulmonary and abdominal affections appear to commence at the same time or nearly so.

114. (*a*) This is more especially the case as respects the complication with *disorder of the stomach*. At the commencement of phthisis this complication is usually of a dyspeptic character; but it may, as the disease advances, or even from the first, assume a severer form, and be attended by nausea, pain, or vomiting. Tenderness, a sense of heat or burning pain, increased by pressure, are present in these cases, and may arise either from inflammatory softening of the villous surface or from ulceration. These symptoms and lesions, although early observed in some cases, the vomiting and pain occasionally being severe and obstinate, commonly appear in the second or third stages of phthisis—oftener in the third. As far as my experience extends, young females have more frequently presented this association than males. *Increased size of the stomach* was observed by M. Louis in more than two thirds of the cases examined by him after death, while only two instances of it were seen in 230 subjects who died of other diseases. In some cases the organ is double or treble its natural capacity, descending in these as low as nearly to reach the pelvis, its coats becoming thinner in the ratio of its increased size.

115. (*b*) *Disease of the intestines*, chiefly of the follicles of the lower portion of the ileum, commencing with tubercular deposits in the solitary and agminated follicles, and terminating in ulceration of these, is a very common complication of phthisis. The follicles are first distended, enlarged, and projected on the mucous surface by the tubercular deposit; they afterward burst, discharge their contents, and ulcerate, the ulcers being seated chiefly in the patches of agminated follicles in the lower portion of the ileum, and in the side opposite to the attachment of the mesentery. In the large intestines, especially the cæcum, the ulcerations are disseminated irregularly. The small ulcers in the ileum generally coalesce, and the ulcers often pass under the mucous surface and detach portions of it. They often proceed deeply, as shown in the article on the *DIGESTIVE MUCOUS SURFACE* (§ 36, *et seq.*), but they rarely perforate the intestines in phthisis, for as soon as they approach the peritoneal surface, lymph is thrown out on it, and the nearly perforated part is agglutinated to the opposite peritoneal surface. This lesion of the intestines is generally attended by the obstinate diarrhœa which occurs in the second and third stages of phthisis, in the latter especially, and has usually been termed *colliquative diarrhœa*. It is chiefly to be ascribed to two morbid conditions, or to either of



them, namely, to the existence of tubercles in the intestinal follicles, or to disease of these follicles excited by the morbid states of the blood, in the course of the elimination of the morbid elements from this fluid by these follicles.

116. The earlier the ulceration of the intestines takes place in phthisis, the more rapid in general is the progress of the malady, and the loss of flesh and strength of the patient. In the more chronic and protracted cases, this lesion seldom supervenes until shortly before their fatal termination. M. LOUIS states that he found tuberculous ulceration of the small intestines in five sixths of the cases he inspected, and almost as frequently in the large intestines, the mucous membrane being often red, thickened and softened in about one half of these cases. In the whole number of phthisical bodies examined by this physician, the large intestines were in a healthy state throughout their extent in three instances only. In the cases which I have inspected, I have always found the *cæcum* more or less ulcerated; and in some I had reason to infer that this portion of the canal was the first to be affected; perforation of the *cæcum* and pericæcal abscess, or fistula, having taken place in two cases in which I was consulted.

117. (c) The *mesenteric glands* are often found tuberculous, especially in young subjects, and in connexion with tubercular ulceration of the intestinal follicles. In the phthisis of very young children these glands are rarely exempt. PAPA-VOINE says that he found this lesion in one half of the cases of phthisis in children. This proportion is less than I have remarked in this class of subjects. In adults, LOUIS found these glands tuberculous in one fourth only.

118. (d) The *liver* is found remarkably changed in a very large proportion of phthisical cases. This change consists in the deposition of *fat* in its structure, this organ becoming enlarged, fawn-coloured, and of diminished consistence, in proportion to the amount of fatty degeneration. The fatty or oily nature of this change is at once shown by the scalpel on dividing the liver, or by pressing a portion of it on paper, or by subjecting it to heat. The organ is equally changed throughout, and with a rapidity nearly equal to that of the tubercular malady, with which this alteration is intimately connected, and upon which it is dependent. M. LOUIS states that of 49 cases of this degeneration, 47 occurred in tubercular phthisis; while of 230 subjects of other diseases, nine only presented this alteration of the liver, and seven of these had tubercles in the lungs. He farther remarks, that it is independent of the patient's age, and of any known cause excepting the existence of tubercles; and that it is not attended by any evident symptom except enlargement, the functions of the organ not being disturbed. Sex appears to influence its occurrence, as of the forty-nine cases seen by LOUIS only ten were males. The most remarkable instances of this alteration in connexion with phthisis which I have seen occurred in females addicted to the abuse of spirituous liquors. In a young female who was thus addicted from childhood, who had never menstruated, and had died of phthisis about the age of nineteen, the fatty, fawn-coloured liver was so remarkably enlarged as to fill the abdomen, the lower edge of it pressing upon the bladder and pelvic viscera, the organ nearly equalling in weight the whole body. In these cases, tubercles are

rarely found in the liver, unless in children. From my own observation, and from a remark made by Sir J. CLARK, this change of the liver is not so frequently seen in phthisical subjects in this country as in France, yet functional disorder of this organ is often observed in the course of phthisis.

119. *G. Various other lesions* take place, especially in the advanced course of phthisis, but these are merely contingent occurrences, and seldom or even rarely met with. The most important of these are lesions of the heart, in rare cases, occasioning sudden death in the course of phthisis, obstruction of veins from coagula in their canals, hæmorrhoids and fistula in ano, tubercular and granular lesions of the urinary organs, and disease of the sexual organs. These require merely a few passing remarks.—*a. Softening and slight dilatation* of the ventricles is sometimes observed in the course of phthisis. In the case of a lady, death took place suddenly in the second stage of the chronic form. The body was examined in my presence, and the only apparent cause of the sudden dissolution was this alteration of the heart. I have, however, seen this change in other cases of phthisis; but, although it may have accelerated the course of the malady, sudden death has not appeared to have been caused by it.

120. *b. Coagula in venous trunks*, especially in the extremities, form in rare cases at an advanced stage of phthisis, occasioning great œdematous swelling of the limb, and are the results of the morbid state of the blood and of impeded circulation in the venous trunks rather than of inflammation of these vessels.

121. *c. Hæmorrhoids* are occasionally a complication of phthisis, and are produced as much by one of the most frequent causes of the latter as by irritation of the rectum by frequent action of the bowels, and by interrupted or impeded circulation in the portal vessels, namely, by masturbation, which determines the circulation to the structures in the vicinity of the anus, and which, with one of its consequences, constipation of the bowels, favours congestion of the hæmorrhoidal veins.

122. *d. Fistula in Ano* sometimes occurs in the course of phthisis, more frequently in the early stages. It may be imputed to the same causes as produce hæmorrhoids. It has the effect of prolonging the duration, or, to a certain extent, arresting for some time the progress of phthisis. Hæmorrhoids, when they discharge at intervals, have a similar effect to fistula in ano on the progress of the disease, as I have observed in several cases.

123. *e. Alterations*, more particularly tuberculosis, of the *urinary and sexual organs*, seldom supervene in the course of phthisis, although the functions of these organs, especially of the uterine organs, are more or less disordered. Tubercular formations are sometimes formed beneath the mucous surface of the urinary passages in the phthisis of children: and in female adults the catamenia are generally delayed, painful, or suppressed in the advanced progress of the malady, which generally assumes a more severe and rapid form when this disorder supervenes. In a case of a young lady, who died about the age of twenty of phthisis, and who had never menstruated, the body was inspected in my presence, and the ovaria were found very small, and their coverings thickened and almost of a fibro-cartilaginous density. The disease had been attributed by me to mastur-

bation, the non-appearance of the catamenia, and the alterations of the ovaria, probably having been caused by this most noxious vice.

124. III. PATHOLOGICAL ANATOMY OF PULMONARY TUBERCLES.—On opening the thorax after death from phthisis, the lungs generally do not collapse, or collapse imperfectly. They are more or less increased in weight, in some cases very remarkably. Dr. CLENNENING found the average weight of the healthy lungs of an adult to be  $4\frac{1}{2}$  ounces; and Dr. BOYD, as stated by Mr. ANCELL, ascertained that in a considerable number of adult males the average weight of tuberculated lungs was  $7\frac{1}{2}$  ounces. The increase is due partly to the tubercular deposit, and partly, in various degrees, by an increased quantity of blood in the vessels, the secretion of tuberculous pus, serous effusion, red or gray hepatization of the lung, or extravasation of blood.

125. In the early stage of uncomplicated phthisis, when the tubercles are distinct, the pulmonary tissue is crepitant around them, and those which are most superficial somewhat raise the pleura. Distinct tubercles in the lungs, according to HASSE, are never larger than hemp-seeds; when they are described as larger, a congeries must be understood. Gray and yellow crude miliary tubercles seldom coexist in the same lung, unless they are deposited at distinct periods. (See SCROFULA and TUBERCLES, § 65–90.)

126. i. *The seats of tubercles in the lungs* are somewhat different in adult and young subjects. In adults tubercular deposits are chiefly aggregated in the upper lobes. Miliary tubercles are most abundant in the posterior parts of the lungs, and through the parenchyma at some distance from the pleura, but there are many exceptions to this distribution. In children the whole lung, or large portions of both lungs, are the seats of deposits, which have appeared to have taken place about the same time. CARSWELL attributed the earlier and the more abundant formation of tubercles in the apices of the lungs to the motion of these parts being more limited than those of the lower lobes. The former also are more exposed to the influence of cold externally, and are more accessible to the air in its varying state of temperature and humidity. LOUIS, ANDRAL, and others consider that tubercles are more frequent in the left than in the right lung. HASSE, however, disputes this, but I believe with insufficient reasons. The question as to the tubercular deposit being *within* the air-cells, or *external* to them, or, in other words, in the parenchyma of the organ, is still disputed. MAGENDIE, CARSWELL, SCHRÖDER VAN DER KOLK, and RAINÉY contend for the former; while ANDRAL, ANCELL, and others consider that tubercles may occur in either of these situations, and in any tissue where nutrition or secretion takes place. According to Mr. RAINÉY, the earliest indications of tubercles in the lungs are deposits of a transparent, or grayish, or yellowish substance in the air-cells, sometimes completely filling and distending them, the minute blood-vessels of the parietes of the cells surrounding the deposits being still perceptible. The deposits sometimes occur in a few only of the cells, but more frequently they fill all the cells of one lobule; and in this case they press upon these vessels, which soon disappear, the whole lobule appearing, after a while, entirely formed of tubercular matter. Tubercles in the lungs thus, according to CARSWELL, originally as-

sume the shape of the air-cells, and are somewhat acuminate in proportion to their projection into the bronchial tubes. When they have been of slow growth, or are deposited in large groups, and occupy numerous cells of a lobule, they resemble the sprout of a cauliflower, the pedicle occasionally extending far into the bronchial tube. In the lungs of ruminating animals tubercular matter is often seen plugging up the bronchial tubes. As the tubercle increases in size, the central parts become farther removed from the vessels by which this matter is deposited; and consequently these parts have the greatest tendency to lose their vital cohesion, and they consequently are softened, this process generally beginning at or near the centre of the tubercle. (See SCROFULA and TUBERCLES, § 78, *et seq.*)

127. ii. *The distribution of tubercles in the lungs* varies much with the age of the patient and the form of the malady. In adults, in the usual and more chronic forms, the tubercular deposit commences, although in different amounts, generally in the apices of both lungs, and descends gradually downward to the lower lobes, the larger and older cavities existing at the apices, smaller ones lower down, and accumulations of softened or crude tubercles, or of both, at the base. This cannot, however, be viewed as an absolute law. The tubercles also in one lung, as the left, may be generally farther advanced in all their stages than those of the right. Besides, one portion of a lung may be the seat of cavities or softened tubercles, all the rest, or the greater portion, of the lung being quite sound. Tubercles which are formed rapidly are generally miliary, and nearly equally dispersed through the lungs. In the more acute states of phthisis they are thus deposited, or are infiltrated more or less extensively or densely.

128. iii. *Lesions of the Lungs associated with Tubercles.*—A. *Pneumonia*, or inflammation of portions of the lungs, and its usual consecutive changes, are often found associated with the several stages of tubercles. The inflammation may have passed on to red or gray hepatization, and it may have preceded the tubercular deposits, or may have been consequent upon them, induced by the usual causes of pneumonia; or it may have been produced by the irritation developed and kept up by these deposits. It should not be overlooked that the changes taking place in the lungs of scrofulous subjects during inflammatory action may be attended by tubercular formations. Yet this may not necessarily be the case, and these formations may exist in the lungs even of scrofulous and sanguineous temperaments without inflammatory action in the lungs being produced by them, this action being chiefly a contingent or intercurrent result of causes unconnected with the tubercular disease.

129. a. According to LOUIS, GRISOLLE, HASSE, ANCELL, and others, *inflammation primarily attacking* the scrofulous subject may produce an exudation of lymph differing from the exudation occurring in pneumonia affecting the healthy person, chiefly in its tuberculous characters, and the disease may run its course, and the exudation may be absorbed; but as frequently, perhaps, the pneumonia of scrofulous subjects is followed by tubercular deposits and their usual consequences. ROKITANSKY calls this latter change hepatization with tuberculous deposit, which, not being absorbed, or becoming purulent, ultimately passes



into yellow tubercle. According to HASSE, this alteration is found more frequently in males than in females, and in persons from 18 to 25 years of age, than earlier or later in life.

130. The alterations produced by *consecutive* or *incurrent inflammation* of portions of the lungs during the progress of phthisis is manifestly much more frequent than the primary form. LOUIS states that he observed the results of the first stage of inflammation, commonly occupying a limited space of the lungs, in 23 out of 123 cases, and the stage of red hepatization, generally in the lower lobe, in 18 cases. He regards the invasion of pneumonia in these cases as preceding death only a few days, and not peculiar to phthisis, as he observed it as frequently in deaths from other chronic maladies. Although the patient may die of pulmonary tubercles without any inflammatory appearances, yet the tubercles are very liable to irritate and inflame the surrounding tissues, and to render the patient more susceptible of the operation of the usual exciting causes of inflammation.

131. *b.* This secondary pneumonia generally assumes the *lobular* or *vesicular form*, and seldom appears until the tubercles have been developed, or have formed aggregated masses, and occasioned irritation in the surrounding structure. The matter exuded by this state of inflammatory action around the individual tubercles, or masses is generally peculiar, scrofulous, and gelatinous, the spaces between being healthy. Sometimes, however, the inflammatory changes are not limited to the patches around tubercles, but extend to the vesicular structure of an entire lobule, and pass on to red or gray hepatization, or even assume in parts a yellowish colour, the pulmonary structure being quite impermeable to air, firm and friable, the tubercles contained in it being more or less softened. In this state of the disease, the associated or intercurrent inflammation presents the usual scrofulous characters, modified by the peculiar structure and antecedent tubercular deposit.

132. *c.* The alterations found after death from the *acute form of phthisis* (§ 84) present many of the appearances consequent upon inflammation of an acute form in the scrofulous diathesis, associated with tubercular deposits, either antecedent to or coeval with the inflammatory action. As in other cases of inflammation in cachectic or unhealthy constitutions, the changes produced by it are peculiar, being diffused, œdematous, and marked by loss of the usual vital cohesion of the tissues. HASSE has well described the appearances in these acute cases. He states that one or both lungs are diseased. I have always found both lungs remarkably affected, although not to an equal amount or extent. In very marked cases the lungs, from their apices to their bases, are loaded with isolated miliary tubercles, mostly yellowish and soft, but sometimes grayish and more solid. The yellow and soft tubercles are in the centres of red or gray hepatized structures, while the gray are imbedded in a texture loaded with a bloody serum. The lungs are tumefied, do not collapse when the chest is opened, are very dark-coloured throughout, preternaturally soft, and gorged by dark fluid blood and serum. The tubercles have every where the same appearance; the pulmonary structure around them, for about a line, is more or less altered, the intervening structure being still permeable. The bronchial mucous surface is either dark-red or violet.

Recent adhesions between the surfaces of the pleura are not seen. If adhesions exist, they have been formed previously to this disease. When the malady has been slower in its progress, the tubercles are more united into groups, or are more densely crowded at the apices and superior lobes than in the lower lobes.

133. *d.* In the more *chronic and usual forms* of phthisis, the alterations often associated with the tubercular deposits are those which are clearly attributable to chronic inflammatory action, and consist of hepatization of a red or gray colour, or of varieties of hue of which these are original types. The parts thus altered are dense, impermeable to air; the bronchi are filled with a dense whitish matter, and the natural structure cannot be traced, the part being firm, but friable, or readily torn. The cut surface is speckled with gray inclining to yellow, is diversified with white stripes and arborescent black patches, and is devoid of the granulations of acute pneumonia. The incision is not followed by any exudation, and pressure yields only a little turbid grayish fluid. The inferior lobe of one or both lungs is thus chiefly affected; the alteration proceeding upward, and meeting the tubercular deposits as they advance downward. According to HASSE, this associated inflammatory alteration, which differs from the effect of common pneumonia in the induration of the lung, invades only the lower portion of one lung only, while the tubercular deposits exist in both.

134. *B. Extravasation of blood* in tubercular lungs is met with in either a fluid or clotted state. 1st. It may occur as a simple exudation from the bronchial mucous surface; 2d. It may proceed from ulceration of the bronchi; 3d. Blood may be infiltrated into the parenchyma of the lungs in connexion with congestive pneumonia complicating tubercles; 4th. It may be infiltrated not only into the parenchyma, but also into the air-cells; 5th. It may be effused from a laceration of the structure of the lung; 6th. It may be effused from the ulceration of a number of capillaries in the parietes of a cavity, or of one large vessel; and, 7th. It may proceed from the rupture of a cavernous band, or of a vessel or vessels in such band. In most of these the blood is found either in a frothy or fluid state in the trachea and bronchi, or partially coagulated; and coagula are contained in cavities, and sometimes in the bronchial tubes. In these several forms, excepting the two last, the effused blood may become the seats of tubercles. Extravasation of blood is met with in all stages of tubercular phthisis. According to HASSE, it is found chiefly where tubercles have been rapidly formed in connexion with inflammatory action, or when the lungs are replete with densely clustered tubercles. CARSWELL considers that the sanguineous effusion is in many cases owing to the compression of the pulmonary veins by the tubercular masses, and to the consequent prevention of the return of the whole of the blood sent to the organ. Both of these explanations may be correct as respects different cases.\*

135. *C. Œdematous infiltration* of the lung is sometimes seen, but generally only to a small ex-

\* [Pulmonary apoplexy, or effusion of blood into the cellular tissue of the lungs, is very often a result of obstruction incident to heart-disease. It may coexist with tuberclosis, where death will often be sudden and unexpected; but pulmonary tuberculosis is rarely associated with cardiac lesions involving obstruction, and this is an important diagnostic fact.—*Am. Ed.*]

tent, and chiefly in the acute form of the disease, in the more cachectic and phlegmatic habits; or when phthisis is complicated with disease of the bronchial glands, or of the kidneys. RILLIET and BARTHEZ consider that serous congestion or oedema of the lungs is sometimes connected with the deposit of tubercles in children; that it may be produced by this deposit; but that it most frequently depends upon compression of the vessels by enlargement of the bronchial glands.

136. *D. Emphysema*.—Vesicular emphysema is frequently found in tubercular lungs, in chronic cases, in connexion with various other lesions, chiefly in the superior and anterior parts. It occurs at an early stage, generally in a diffused form, and is produced by the pressure of disseminated tubercles upon the minute bronchi; the more powerful act of inspiration filling the cells, while the less powerful expiration fails in emptying them. Emphysematous portions of the lungs rarely contain tubercles. But this alteration is seldom found to a great extent, and generally in cases where it had not been detected by the physical signs: "it is usually seen in the upper parts of the lungs, and often in conjunction with cicatrized and collapsed portions. The healing process, by absorption of the more liquid parts of tubercles and of tubercular vomice, by shrivelling the remainder, by cicatrization of the ulcers, and obliteration of blood-vessels and bronchial tubes," produces a vacancy in the space within the thorax, and this space is gradually, or more or less, filled up by the sinking inward of the walls of the chest, and by the dilatation of the air-cells in the adjoining still permeable portions of the lung; this latter result sometimes preventing the occurrence of the falling inward of the parietes of the thorax.

137. *iv. Softened or liquefied Tubercles*.—I have stated above (§ 126) the views of Mr. RAINY as to the softening of tubercles; and those of LAENEC, LOUIS, SCHRÖDER, VAN DER KOLK, HASSE, and others have been stated in the article SCROFULA and TUBERCLES (§ 78, *et seq.*). It is not improbable that the process of softening may not be limited to one only of the modes contended for by these pathologists, but that when it commences or proceeds in the centres of the tubercles, it may also be advancing in their circumferences, owing to the irritation produced by them, and to the fluid effused from the irritated tissues surrounding them; the softening thus advancing from the centre to the periphery, and from the latter to the former of the tubercle. Generally it is found that softening of tubercular deposits first takes place, conformably with the progress of the deposits, in those nearest the summits of the lungs, and proceeds downward. With the process of softening, the pulmonary tissues surrounding the tubercles become more vascular, and inflammatory or congestive changes take place, extending more or less in the parenchyma, and ultimately to the pleura, as already shown (§ 111, 112, *et seq.*). The results of the softening are, discharge of the liquefied matter into the bronchi communicating with these tubercles, and the formation of a cavity, which enlarges by successive tuberculation and softening, by continued discharge, and by the coalition of two or more softened tubercles and small cavities.

[ROKITANSKY calls the yellow tubercle the *croupo fibrinous*, in opposition to the gray, which is regarded as simply fibrinous. The former un-

dergoes two changes: 1st. *Cretification*, which consists in the gradual deposition of calcareous particles in the tuberculous mass, with simultaneous absorption of the animal matter, thus constituting a hard, irregular mass, surrounded by indurated tissue; 2d. *Softening*, where the texture of the mass becomes more lax and moist, till it eventually breaks up into a yellowish, diffuent, cheesy mass, which finally becomes a thin, whey-like fluid, of acid reaction, and containing minute floculi. Softened tubercle, when examined with the microscope, is found to consist, 1st. Of a fluid loaded with diffused granulous matter; 2d. traces of altered nuclei and cells; 3d. free oil, in the form of various-sized drops, and debris of the tissues. The *gray tubercle*, according to ROKITANSKY, undergoes only a kind of drying up into a horn-like substance (*obsolescence*). In some cases it is also the seat of tuberculous deposit. The gray tubercle would seem to be essentially distinct from the yellow; and when it undergoes softening, it is owing to the changes in the yellow tubercle, which is often mixed with it. The same author has called attention to the fact that the behaviour of the two kinds of tubercle corresponds with that of the fibrin, from which they seem to be derived, the gray resembling healthy fibrin in its tendency to contract and shrink up into an indurated mass; the yellow, like the croupous fibrin of coagula and exudations, tends to soften and break up into a fluid substance, the softening commencing, in both instances, in the central portion. The softening is undoubtedly aided by the hyperæmia, and consequent effusion in the pulmonary tissue surrounding the tubercular mass; but the tendency to softening differs very greatly in different cases, and is probably proportioned to the extent of the tuberculous crasis. Where this is great, the softening will go on very rapidly, and a cavity be speedily formed; but where the *dyscrasic* condition of the blood is slight, or improved by proper treatment, then there will be an exudation of fibrin, which will be developed into the so-called induration tissue, or fibroid callus, which either surrounds the tubercle, or forms a wall to and contracts the cavity, if one has already formed, thus favouring cicatrization. We speak now of cases where tubercle is deposited in *tubercoid* masses. The exudation of tubercle-blastema may take place very gradually, or with great rapidity; in the latter case it is usually associated with hyperæmia and inflammation, and tends rapidly to softening and decay.

It is believed that the *cancerous* crasis excludes the tuberculous. Typhus and the exanthemata rarely attack the tuberculous, though they are often followed by tuberculous disease. Sufferers from intermittents, goitre, and rachitis are seldom liable to tuberculous affection; and ROKITANSKY thinks that an especial immunity against tubercle is afforded by an abnormally venous condition of the blood from whatever cause; as congenital malformations of the heart or great blood-vessels; morbid alterations of the same; deformities of the chest, producing contraction of its cavity; annihilation of the function of one lung by pleuritic effusion; abdominal growths, preventing the free descent of the diaphragm; chronic pulmonary catarrh; emphysema and bronchial dilatation; pregnancy, &c.; all which conditions interfere more or less with the due oxygenation of the blood. Tuberculous and scrofulous matter have the same elementary composition, undergo the



same changes, are produced in the same way, and produce the same effects on the tissues in which they are deposited, and hence may be well regarded as identical; and the organs are the seat of tubercle in the following scale of frequency: lungs, intestinal canal, lymphatic glands, larynx, serous membranes, brain, spleen, kidneys, liver, bones, periosteum, uterus, Fallopian tubes, testicles, prostate gland, spinal cord, voluntary muscles; except in children, where the order is lymphatic glands, spleen, lungs, brain, &c.]

138. *v. Tubercular Cavities and Vomicae.*—*A.* Tubercular vomicae, as Mr. ANCELL justly states, are either, 1st, pulmonary; 2d, pleuro-pulmonary; 3d, broncho-pulmonary; or, 4th, broncho-pleuro-pulmonary, according to their connexions with the principal structures of the lungs. The most frequent seat of vomicae and cavities is the summit of the superior lobes of the lungs. They are sometimes seen only on one side, tubercles on the other side being still crude or softening; but when the disease is of long duration they have formed on both sides. When they are found in the lower lobes, or at the base of the lung, they are generally more numerous, larger and older in the summit. Proceeding from above downward, the following grades or succession of tubercular alterations are observed: 1st, old cavities, with firm or almost smooth parietes, generally empty; 2d, more recent cavities with tuberculous deposits in their walls, or softened irregular parietes, containing matters about to be noticed; 3d, softened tubercles, either isolated or aggregated; 4th, crude tubercles; 5th, semi-transparent gray granulations; and, 6th, healthy crepitant lung. This succession arises from the progressive development of the tubercular deposit from the summit to the base. The cavities are generally seated deep in the lung, but in some cases they are superficial or near to the pleura. In the former case they commonly open into the bronchi; in the latter they are disposed to perforate the pleura, but are prevented by the adhesions formed by this membrane (§ 112). Large excavations are usually seated nearer to the posterior than to the anterior surface of the lungs, where they extend to the interlobular fissure, and even sometimes communicate with other cavities in the lobe below.

139. *B. The dimensions and form of the cavities vary much.* Their size varies from that of a pea to that of a large orange; small cavities are generally spherical or oval; but as they enlarge, their form is more irregular, owing to the softening and disorganization of the parietes having proceeded more rapidly in one direction than in another. Where several large cavities communicate, one unequal and sinuous excavation is formed, sometimes with fistulous tracts, and is very irregular in shape, direction, and size, but terminating in one or more ulcerated bronchi. The number of cavities is often considerable, the largest frequently arising from the union of several small ones. A single excavation is comparatively seldom met with. A cavity is surrounded by crude miliary tubercles, with very rare exceptions.

140. *C. The contents of excavations may be air; or viscid, purulent, or sanious fluids, containing whitish, curdy, tubercular matter, more or less softened; or purulent secretions of a dirty grayish, or yellowish, or yellowish-green colour, sometimes streaked, tinged, or mixed with blood; or blood more or less pure, fluid or coagulated. The fluid puriform contents are sometimes fetid, owing*

to their long retention, a communication with a bronchus not having been formed. Old cavities are often empty; recent ones frequently contain purulent or sanious matters, and the softened remains of tubercles. These matters are thus the secretion from the parietes of the cavity, and the debris of tubercles and of the surrounding tissues, altered more or less by retention in the cavities or by the action of the air. Fragments of the pulmonary structure are seldom found in the excavation, but when seen they are more frequently attached to, than detached from, the parietes. Bridles or cords are occasionally found stretching across a large cavity: these consist of blood-vessels, whose coats had become inflamed and thickened, their contents coagulated, and, having resisted the disorganizing process of the adjoining tissues, had been reduced to cords.

141. HASSE describes the blood-vessels forming bands across cavities as often having their coats reduced to a single, uniform, lardaceous substance; and their canals, which still continue, although narrowed, become eventually filled with a thin, reddish, fibrinous plug. The bands, or cords, thus formed by the blood-vessels are, in rare cases, either partially destroyed or torn asunder, before their canals are completely closed; and thus the more violent attacks of hæmorrhage ensue, and often prove fatal, the cavity and bronchi corresponding being found full of coagulated blood, and which also often fills, in a frothy state, the trachea. The bronchi are early destroyed; but, even when completely ulcerated, they often do not admit air into the cavity, nor the exit of the matters contained in a cavity; for they are plugged by lymph formed within the parts nearest the cavity, or by tubercular matter or deposits formed within them. The bronchi are not found in these bridles, which are thinner in their middles than at their extremities, the former having been longer exposed to the morbid processes.

142. *D. The parietes of cavities,* when recent, are merely the pulmonary tissues somewhat condensed by exuded lymph, or infiltrated with a grayish matter, or with gray granulations and crude tubercles. They are very rarely smooth, and formed only of the condensed pulmonary texture. In rare cases they are coloured by a brownish or blackish melanotic deposit. External to these parietes, which may not extend above a line or two into the pulmonary structure, the parts immediately surrounding them are healthy and crepitant. Somewhat older cavities are lined with a slightly adherent and soft false membrane. This lining is friable, white or yellowish, resembles concrete pus, and has no vascular connexion with the surrounding tissues. It seems as a deposit on the surface of the cavity from the matters therein contained. In still older cavities, external to this deposit, a membranaceous, organized layer, of a grayish fibro-cellular substance, is formed, and is closely adherent to the pulmonary structure. This constitutes the true cyst or parietes of the cavity. This capsule becomes after a time more organized, and, from fibro-cellular, it is fibro-serous, semi-transparent, and in patches, or more extensively fibro-cartilaginous, unless where bronchi pass into the cavity. These latter changes are observed only in very old cavities; and vary in colour, vascularity, density, and appearance, with their duration. The internal surface of these parietes or capsules no longer presents the concrete matter first deposited, and forming the car-

ly false membrane, but appears, at a much later period, smooth or velvety, and of a pearl-gray, pinkish, or reddish hue.

143. *E. The discharge or the absorption of the contents of vomica* are matters of interest. The discharge takes place by means of the bronchi, which are destroyed in the seats of vomica, and which become irritated, inflamed, and ulcerated by the matters formed and passed along them; the discharge from the bronchi, communicating with cavities, being often greater than that proceeding from the latter. When the matters contained in vomica are long retained without having communicated with bronchi, they often become very offensive and irritating to the bronchi and trachea during their discharge, and occasion the inflammatory appearances observed in these parts.

144. *F. The absorption of the contents of cavities* may be inferred when they are found empty, without any manifest communication with bronchi—when this cannot be detected upon dissection, and when the history of the case furnishes no proof of the discharge of these contents during life. I have already alluded to instances of acute phthisis which terminated fatally without expectoration and cough, but preceded by the typhoid symptoms characterizing contamination of the blood by the absorption of morbid matters; and in those the cavities, generally small, were empty, their parietes being soft, or covered by a semi-concrete puriform substance.

145. *G. The healing processes presented by tubercles of the lungs* have been described by ROGET, BOUDET, LAURENCE, BAYLE, BENNETT, ANCELL, and others. HASSE conceives that the cicatrization of tubercles cannot take place if the amount of tubercular deposit be considerable or great, and if the softening be, as it usually is, attended by the continued formation of tubercles. The degree, or the procession, of morbid change in the lungs admitting of remedy cannot be defined, even if both were objects of precise observation. The states of organic nervous power and of the circulating fluids should be viewed as the chief sources, from which the local lesions are to derive reparation. And this end can be attained only by supporting this power, by enabling it to improve the digestive and assimilating processes, and thereby rendering the circulating fluid more vitalized, and less capable of forming or perpetuating the tubercular deposits. Under the influence of this system, and of the improved condition of the blood, morbid products are more sparingly formed; those which are formed have their more fluid parts absorbed; they are consequently atrophied, and their more solid, earthy, or saline parts, as respects tubercles especially, alone remain, either in a passive or inert state, and are increased by subsequent depositions, or exist in such condition as gradually advances their discharge. This is the course usually pursued in the removal of tubercular deposits before cavities are formed, and has thus been termed the process of *cicatrification* (§ 146, 147).

146. *a. As regards the formation of these concretions* it may be inferred that the organic elements of tubercle are absorbed, and carbonate and phosphate of lime deposited in their place; so that the concretions cannot be viewed as the mere solid remains of the pre-existing tubercles. HASSE remarks that the calcareous deposit, in some cases, especially in young subjects, takes

place somewhat rapidly, the outside of the tubercle being then changed into a hard crust, while the central part retains its softness. Occasionally the calcareous matter appears to have been deposited at intervals, producing a series of hard, distinct, superimposed strata. Most frequently when the process advances slowly, the tubercles appear like to moist chalk. Thus the volume of the entire mass continues to diminish, so much so that a considerable portion of lung, as may be inferred from the size of the bronchi leading to it, becomes reduced by obliteration and shrivelling, to a hard shell, holding in its centre a chalky tubercle no bigger than a pea. This healing process is by no means rare, its traces being often found in the lungs of very aged persons who have died of different maladies, and not unfrequently also in much younger subjects.

147. *b. Tubercular cavities heal* in the same manner whether they are connected with several bronchi or shut out from the air-passages. In the latter case exactly the same capsule, resulting from inflammatory induration of the surrounding structure, is found, wherein the enclosed tubercular mass is converted first into a chalky pulp, and ultimately into a *hard calcareous concretion*. The majority of these concretions originate in the small and still closed cavities. They are irregularly shaped, with a granular, rough surface, are hard or friable, and often contain mealy or soft nuclei. They are found most frequently at the summits of the upper and of the lower lobes, firmly impacted within a shrivelled and condensed structure. "In rare instances the residue of tubercular matter, left within the larger cicatrized cavities, is by degrees converted into earthy granules. These are loosely held within the scar-contracted cavity, where they mingle with tubercular and muco-purulent fluids, and may become ejected during a violent fit of cough, provided the implicated bronchial tubes still remain open."—HASSE, &c., p. 340.

148. *c. Cavities cicatrize* in different ways. They may disappear altogether, or contract only to a limited extent. In the former case they are united and filled by a cellulo-fibrous substance. In this case the membranous lining or paries of the cavity becomes thickened by a deposition of plastic exudation or lymph, either upon its external or internal surface, most probably upon the former. The membrane thus grows and contracts towards the centre, until the cavity is filled with a fibro-cellular substance. The gradual obliteration of the cavity is farther effected by the condition of the adjoining parts. If the vomica be near the surface of the lung, the pleura becomes much thickened, and the walls of the thorax sink inward, so as to favour the shrivelling process. The corresponding bronchi are closed, and the healing of the cavity is effected, the remaining scar being either thick, or roundish, or elongated.

149. When the cavities contract only to a limited extent, and simply lose their original characters, their walls are moulded out of the aforesaid layer of shrivelled parenchyma, which now neither contains nor secretes tubercular matter. "These extinct vomicae are frequently seen at the apex of the lungs, and might readily be taken for mere bronchial dilatations, were their real nature not disclosed by the relations of the surrounding pulmonary texture, by the coexistence of cretaceous masses, and, above all, by the character of the membranous lining, which essentially dif-



fers from, and does not immediately unite with, the mucous coat of the bronchial tubes." This internal lining usually adheres firmly to the indurated walls of the cavity, and is either thick, reddened, and velvety, or pale, smooth, and thin.

150. The state of the pulmonary structure, both adjacent and more remote, is influenced by the above healing process; and the consequent changes are well described by HASSE. The inflammatory exudation upon which the above alterations depend often involves the whole of the apex, if not the entire upper lobe of the lung, while the collective bronchial tubes degenerate into white, thread-like ramifications. The involved parenchyma of the lung is now converted into an almost cartilaginous mass, impervious to the air, very scantily supplied with blood-vessels, and presenting, when cut, a smooth glistening surface. Obliterated pulmonary vessels, closed bronchi, cicatrices, and parenchyma infiltrated with plastic materials, are hardly to be distinguished from each other; and the whole adheres firmly, by means of the thickened semi-cartilaginous pleura, to the sunken walls of the chest. A few cretaceous tubercles are still found scattered throughout the hard, nearly homogeneous mass, which, below, merges sometimes gradually, but more often suddenly, into the healthy texture.

151. *d.* The deposition of black pigment into the lungs during the healing process is a very remarkable fact. It is found wanting only, or almost wanting, in the rare instances of the repair of tubercular disease by means of calcareous deposits in youthful subjects. In older persons the black pigment is so constant, and so considerable, that it might be doubtful whether it be the cause, or the sequel, of the cure of phthisis. "Not alone the parts closely adjoining calcareous tubercles and cicatrized cavities, but, in like manner, the entire mass of those extensive indurations of the upper lobe, just described, are found densely loaded with this pigment. Even the moist chalk-like residue of tubercular masses is often so imbued, as to exhibit a slate-gray or a bluish-black tinge." In other cases, where tubercles are more limited, and in young persons, the pulmonary structure is puckered, without induration or extensive obliteration; the cicatrices appearing elongated, the cretaceous residue as isolated granules, and the black pigment uniformly but less densely disseminated in the interstices of the air-cells. The cicatrices are surrounded by emphysema and dilated bronchi, and the thorax is seldom found depressed.

[That pulmonary tuberculosis is often arrested, is now admitted by all pathologists. Dr. BENNETT thinks that this happens in the proportion of from one fourth to one third of all who die after the age of forty. Observations made at the Salpêtrière and Bicêtre Hospitals in Paris, among individuals generally above the age of seventy, showed the proportion in such persons to be respectively one half and four fifths.

The arrestment of tubercular ulceration may take place by the gradual transformation of the exudation into cretaceous and calcareous concretions; by expectoration and absorption of the exudation, the collapse of the ulcerated walls, and formation of a cicatrix; or, lastly, by the ulcerated walls becoming covered with a smooth membrane, remaining open, and constituting chronic cavities, which have occasionally been mistaken for dilated bronchi. All these modes of arrest-

ment may be detected in the same lung, thus causing great diversities of appearance in the pulmonary texture. Increased density of the pulmonary tissue, in the neighbourhood of the cretaceous concretions and cicatrices, is often occasioned by black carbonaceous deposits, and this density and contraction is a frequent cause of pulmonary emphysema in the air-vesicles, as shown by Dr. GAIRDNER. This result leads to dyspnoea, so often observed after the removal of pulmonary tubercle. Whether the occurrence of emphysema, in such cases, exerts any curative power, as suggested by RAMADGE, is by no means established. The most important fact yet known in regard to the disease is, that, if we can check farther tubercular exudation, and keep up the strength and nutritive processes of the economy, such tubercular exudations as have occurred will be rendered abortive, and even large ulcerations will heal and cicatrize.]

152. *H.* In children the lungs are less the predominant seat of tubercles than other parts, especially the mesenteric and lymphatic glands and the bones. When deposited in the former in excess the tubercles pass through their stages rapidly. In very young children the pulmonary deposits are often latent, death ensuing from the coexistence or supervention of disease of other parts. In those subjects who have died of other maladies, the lungs contain grayish, transparent, semi-fluid granules or tubercles, not confined to the apex, but existing equally in the lower lobes. The bronchial glands are at the same time very tuberculous. BILLARD met with five instances of tubercles of the lungs in new-born children; HUSSON and KENNEDY in the fœtus. I have seen the disease in the lungs of several infants of the age of a few months only. The disease in young children is generally acute, and it usually is of this form up to the age of seven or eight years. In young children the tubercular deposits may be as great or even greater in the bronchial, mesenteric, and cervical glands; in the liver, spleen, brain and its membranes, and kidneys, as in the lungs.

153. *I.* The tubercular and other lesions, found in the several organs of adults dead of phthisis, are often very numerous. Many of them have been already described when noticing the complications and intercurrent affections of the disease. In the advanced stages, pleural inflammations occur, productive of every variety of false membrane, of adhesions, of milary tubercles upon the pleura and within the exudations on its surface, and of turbid, reddish, serous, or purulent effusion. When the trachea and larynx are affected, as described above (§ 109), as well as in many other cases, the bronchial glands of the neck and those seated along the trachea are similarly affected, and exhibit all the phases of tubercular disease. The heart is quite devoid of fat in most cases. GLÜGE states that he always found the blood within the larger veins and the heart in phthisis to contain pus-globules, to which circumstance much of the constitutional symptoms may be referred. LOUIS and BIZOT have remarked that the aorta is always more or less contracted. The alterations of the liver and alimentary canal are always remarkable, and described above (§ 114-118). From the searches of LOUIS, MOHR, and HASSE, it would appear that tubercles exist in other organs besides the lungs in the pulmonary phthisis of adults in the following ratio: The

bronchial glands were tuberculous in about one fourth the cases; the mucous membrane of the trachea and larynx in one twentieth only; the cervical glands in the same proportion; the intestinal canal in one half the cases; the mesenteric glands in more than one third; the mucous membrane of the stomach very rarely; the serous membranes very often, and in the following order of frequency: pleura, peritoneum, arachnoid, pericardium. The liver, spleen, urinary organs, brain, spinal cord, are occasionally implicated. The testicles, and the mucous surface of the Fallopian tubes are also sometimes affected. With the exception of the brain and the heart, the absolute density and weight of most organs, more particularly of the lungs, liver, and spleen, are augmented in tubercular phthisis. It therefore follows that the enormous loss in weight sustained by the body, amounting, on an average, to about 50 lbs., is due to the loss of adipose substance.

154. IV. TUBERCULOSIS OF THE BRONCHIAL GLANDS.—*Bronchial Glandular Phthisis*.—The bronchial glands may become tuberculated, either *primarily* or *consecutively*, of similar deposits in the lungs. It is chiefly to the *primary* form of tuberculated bronchial glands that attention is now to be offered. This is almost exclusively a *disease of childhood*. In this primary form, originating in adult or advanced age, bronchial glandular phthisis is comparatively rare; and in the aged it is almost always the more attendant of lingering pulmonary phthisis. Primary tuberculous of the bronchial glands generally commences between the first and second dentition, and finishes its course with the appearance of puberty, although its consequences are sometimes manifest beyond this period. It is obvious that this form of the disease may be associated with tuberculosis of the lungs and of other organs. It may, however, and often does, run its course without any tubercles being deposited in the lungs; or the lungs may become implicated at any period of the glandular malady, and be disorganized with the glands; or, lastly, bronchial glandular phthisis may subside.

155. The course of bronchial glandular phthisis is generally chronic; and the destruction and shrivelling of the affected glands proceed so gradually as to allow the organism time to compensate for the loss. "Hence it readily admits of reparation; nor is it in itself perilous, although accidental circumstances may render it fatal."—Hasse, page 349. The glands at the bifurcation of the bronchi are earliest attacked, and first pass through the several morbid stages. Thence the morbid process generally diverges into three distinct directions: first, to the lymphatic glands following the ramifications of the bronchi into the pulmonary structure; secondly, to those placed between the pericardium and the lungs, and along the œsophagus in the posterior mediastinum; and, thirdly, to those which accompany the large vessels in the anterior mediastinum, and pass from thence to the trachea and the cervical plexus. Only where tubercles are primarily seated in the mesenteric glands do they appear to advance to these glands which follow the course of the œsophagus, passing thence to the cervical plexus. In some instances they probably originate in the glands of the neck.

156. An occasion seldom offers of examining tubercles, in these situations, in their nascent

states. In these states they then appear as gray or yellow granules, up to the size of millet-seeds. In a short time the glands become so infiltrated with tubercles as to form a yellowish-white friable substance, in which no vestige of the former healthy texture is discernible. They thus enlarge remarkably, those at the bifurcation of the trachea often attaining the size of a pigeon's egg, those within the lung that of a hazel-nut, their size decreasing with their remoteness from the part first affected. Though but loosely attached in the midst of cellular tissue in the healthy state, they now coalesce by its medium with the adjoining parts, especially with the bronchi, acquiring from the lardaceously condensed cellular tissue a firm isolating envelope.—Hasse.

157. These glandular enlargements but seldom produce very marked symptoms of compression of nerves or blood-vessels, although important trunks and branches run in their vicinity; but it is not improbable that the little attention hitherto paid to the lesions of the bronchial glands in children has led to the misinterpretation of the symptoms and effects produced by them, and to the disorders actually caused by them being imputed to other sources. It is extremely probable that *spasmodic croup* (see *art. CROUP*, § 13, 14), *Laryngismus stridulus*, and other affections of the trachea and bronchi, are either caused, or aggravated, or perpetuated, by tubercular enlargements of these glands, although nervous filaments and arteries are found, on careful dissection, traversing the localities of, and obviously pressed by, these glands. The veins, however, are more susceptible of pressure by them; but the bronchial canals are seldom much affected by them, owing to the resistance furnished by their cartilaginous rings, and to the more yielding structures adjoining. In some cases, notwithstanding, as shown by ANDRAL, the pressure has acted injuriously on the bronchi; and it may, even in adults, be connected with the pathology of some cases of *asthma*.

158. The tuberculous deposit in the bronchial glands may long continue without much change; but more frequently it undergoes softening. Hasse states that, when the softening proceeds from the centre, one or more small excavations are found containing a purulent and gritty matter, and the process is tedious. When the softening commences at the circumference, the filamentous sheaths of the glands are highly vascular and puffy, constituting at last a mere cyst around the thick, yellowish, tuberculo-purulent fluid. From this period the tumour collapses, its contents either becoming gradually absorbed, or escaping through a passage made by them. Absorption proceeds very slowly, being carried on chiefly by the external vascular coat of the tumour, the inside of which coat has a red velvety appearance. Like a vomica, it generally possesses an unorganized membranous lining, formed of thickened pus and tubercle. The cavity thus produced does not, however, like the pulmonary excavation, continue to enlarge: its walls receive no additional deposition of tubercle, but rather protect from this occurrence; and in no case do two adjacent glands communicate or form one cavity. On the contrary, as the fluid contents are absorbed, the cyst contracts upon the more consistent residue, which, lessening gradually, acquires a cretaceous character, and ultimately is converted into a hard concretion. These products are often met with,



even in youthful persons, in the place of one or other of the bronchial glands, especially at the bifurcation of the trachea.—BECKER.

159. "When the tuberculous mass has remained fluid until long after puberty, or the disease has arisen at a later period, black pigment becomes deposited, both in the unsoftened portion and in the pap-like matter." It is so intimately combined with the latter as ultimately to form a uniform, black, smeary pulp. In such cases, the tumour, while gradually contracting in dimensions, retains the same soft condition for years. Sometimes separate calcareous nuclei are found in the midst of the blackened mass. "This deposition of pigment within glands, totally degenerate and partially destroyed, is the more remarkable as furnishing a proof of connexion with the lymphatic vessels. It can scarcely be reckoned an immediate secretion from the glandular cyst, and necessarily concerned with tubercular eicatrization, because this process in other organs (the lungs excepted), and especially in lymphatic glands, is scarcely attended by any deposition of black pigment."—HASSE.

160. Softened tubercle often escapes by perforating the bronchi, generally from without inward, the tuberculo-purulent fluid bursting through the bronchus. Years are in such a case required for perfect recovery, which is brought about either by the gradual healing of the aperture, while the subjacent gland shrivels away, or by the closing of it ere the contents of the gland are entirely voided, the remainder afterward passing through the several phases, until it undergoes the calcareous change. Sometimes the irritation is renewed at a subsequent period, and the concretions come away.

161. Various other consecutive lesions supervene contingently upon those now mentioned; but these are individually of so rare occurrence as hardly to deserve enumeration. The chief of these are, 1st, the escape of the tuberculated contents of a bronchial gland into the parenchyma of the lung; 2d, perforation into the pleural cavity, where the softened glandular mass is situated immediately under the pleura, at the interlobular divisions (BERTON, RILLIET, and BARTHEZ); 3d, perforation of the œsophagus (BERTON and LABLOND); 4th, simultaneous perforation both of the œsophagus of the trachea and of the pericardium (SYMÉ); and, 5th, perforation of the parietes of one of the large blood-vessels. Of each of these only two or three instances have been recorded.

162. In *children*, in whom alone this disease appears primarily or independently, the lymphatic glands of other parts, especially of the mesentery, often afford the sole evidence of concurrent disease. The lungs are, in particular, sometimes quite free from tubercles. PAPAVOINE states that, of forty-nine children affected with tubercles of the bronchial glands, but thirty-eight had tubercles in the lungs. RILLIET and BARTHEZ never found other organs in children tuberculous without the bronchial glands being pre-eminently so. Still, bronchial glandular phthisis in children often induces acute tubercular disease, the lungs, the liver, the spleen, the kidneys, the serous membranes, &c., being all found, in various degrees and frequency, to contain recent tubercles. In *adults*, on the contrary, in whom either recent, or the remains of former, bronchial glandular phthisis may be discovered, tubercular disease of the

lungs always predominates, and is in itself fatal.—HASSE.

[The usual physical signs of this form of tuberculous are, feeble respiratory murmur on one side, from pressure of one or more swollen glands on the bronchial tubes, dullness on percussion in the interseapular regions, bronchial respiration, mucous râles, and perhaps gurgling. If the rational signs of phthisis, as persistent cough, emaciation, &c., are present, while the physical signs are absent, over the chest, except at the parts above named, we may venture to pronounce the disease to be bronchial phthisis.]

163. V. DURATION OF TUBERCULAR CONSUMPTION.—It is not improbable that tubercles may exist in the lungs of a person hereditarily or constitutionally predisposed to phthisis, from an early age, in a quiescent state, or without advancing to the stage of softening, without shortening by many years the duration of life. This is more likely to occur when the determining causes of the disease have either been avoided or have not acted with much intensity. Instances have come under my own observation that have been characterized by the chief symptoms of the first stage, and by occasional attacks of hæmoptysis, from an early period of life, and yet they reached to upward of 60, and in two cases to 68 and 69 years. I have no recollection of an instance of 70 having been passed in such circumstances; but Dr. GREGORY mentions a case of a person who was consumptive from 18, and died of the disease at 72 years of age. Phthisis, with the few exceptions arising from the occurrence of acute stages of the disease, is essentially chronic or protracted. In general its duration is much shorter in hospitals, and wards containing a number of cases of the disease, and in crowded workshops and manufactories, &c. In 215 fatal cases at the Hospital for Consumption, in 193 cases observed by LOUIS, and in 200 noted by BAYLE, the duration was as follows:

Duration.	Hospital.	Louis.	Bayle.
Less than a month . . . .	..	1	1
In one month . . . . .	..	3	1
From 1 to 3 months . . .	1	11	14
" 3 to 6 months . . .	22	52	44
" 6 to 12 months . . .	66	62	64
" 12 to 18 months . . .	34	24	30
" 18 to 24 months . . .	22	17	18
" 2 years to 3 years . .	29		
" 3 years to 4 years . .	13		
" 4 years upward . . .	14		
" 2 years to 8 years . .	..	23	18
" 8 years to 20 years . .	..	..	10
Doubtful . . . . .	14		

Although tubercles in an early stage may long remain latent or quiescent, yet when they begin to soften, there is every reason to suppose that their advancement is progressive, although at varying rates, or even so slow as to be nearly stationary. It is manifest that numerous circumstances after the commencement of phthisis must tend to accelerate its progress on the one hand, or to retard or arrest its course on the other. The continued or occasional operation of any of the causes of the malady—seasons, weather, climate, age, sex, constitution of the patient, medical treatment, diet, and regimen, may operate in either way. In the Hospital for Consumption it was observed that of those who died within 18 months 60.5 per cent. were males, but only 50 per cent.

were females; while of those who lived beyond eighteen months, 31.9 per cent. were males, but 45.5 per cent. were females. According to the tables of LOUIS and BAYLE, the duration of the disease was twenty-three months, which nearly agrees with M. ANDRAL's experience at La Charité. Sir J. CLARK remarks that in the upper ranks of society, where patients have all the advantages of the best regimen, of change of air, and of medical treatment, the average duration of phthisis is probably not much short of three years.

164. VI. THE PROGNOSIS OF PHTHISIS.—The result in most of the cases of consumption will become apparent from what has been already adduced.—1. The slower the pulse, and the less acceleration remarked in it by change of posture, cough, and mental excitement, the more favourable may be the opinion formed of the duration, if not of the ultimate issue, of the disease. The absence of the flocculent and puriform characters of the sputa in the advanced stages, and of the symptoms and signs of pneumonia, pulmonary congestion, pleurisy, &c.; an increase of flesh, strength, and weight, or even the arrest of progressive emaciation; the non-appearance of night or morning sweats or diarrhœa; the respiration remaining only moderately accelerated, or not being accelerated in a much greater ratio than the pulse; the absence of marked anæmia, emaciation, and debility, and of the other complications besides those just mentioned; the persistence of accustomed discharges, and the continuance in females of the catamenia in the natural or accustomed state; the tolerably regular discharge of the several secreting and excreting functions, especially those of the bowels; quiet repose during night; a mild form of the hectic fever, and an improvement in one or more of the chief symptoms and signs of the malady, may severally or all be viewed as indications of a slow or protracted, if not a curable state of the disease.

165. *B. Much less favourable*, and indeed most commonly *unfavourable*, are the following: Rapidity, softness, and smallness of the pulse, or a pulse ranging about or above 110 in the adult; quickness of respiration above the ratio which the respiration bears in frequency to the pulse; the states of the sputum indicating the second or third stages of the disease; the appearance of aphthæ on the tongue or mouth, or the symptoms or signs of any of the chief complications described above (§ 104, *et seq.*); the occurrence of profuse sweats or diarrhœa, without any obvious cause; inability to lie on either side; great emaciation, or the production of bed-sores; manifest anæmia conjoined with great rapidity and smallness of pulse; great dyspnœa and oppression throughout the thorax; suppression of accustomed or natural discharges or evacuations; a clubbed and fusiform state of the fingers, and incurvation of the nails; loss of the hair, with profuse perspiration from the scalp, neck, and chest; pain and constriction extending between the sternum and spine; the occurrence of a wandering delirium during the febrile exacerbation of the evening and night; and the loss of appetite for food, are the chief indications of a progressively fatal state of the disease.

166. The hæmoptysis so frequently indicating the commencement and progress of phthisis, as well as being an important complication, may, according to its character and amount, be either a favourable or unfavourable occurrence. If it

be an early or incipient occurrence, the pulse being neither very frequent nor small; if the pulse fall in frequency, and if oppression in the chest and difficulty of breathing be diminished by it; if it be of a moderate amount, or even if it be very abundant, and be followed by an amelioration of the symptoms, it may prove even beneficial, by removing pulmonary congestion and incipient inflammatory action, although the presence of a portion of the blood in some of the bronchi may excite inflammatory irritation of their mucous surface. When, however, the hæmoptysis is very scanty, or merely streaks the expectoration, or if it be brownish, rusty, or black, and at the same time scanty or very moderate, it then may be viewed as an unfavourable circumstance, or as indicative of active congestion, or of congestive pneumonia of a portion of lung; if it be abundant, protracted, and the blood very dark and gelatinous, no relief of the oppression and dyspnœa following it; and if, in either case, the pulse becomes even more frequent and the respiration more rapid, the danger is great. In a case of this last description, which I saw a few years ago at Lowestoft with Mr. WORTHINGTON, an arrest of the hæmorrhage was procured by means of the oil of turpentine, and the recovery became complete under the treatment advised in the sequel. Hæmoptysis at an advanced period of the disease, more especially when cavities are formed in the lungs and the loss of blood large, is always an alarming symptom. The same opinion should be formed if the expectoration be a sanious, ichorous, or offensive character, or if it contain shreds or small pieces or patches of disorganized substance or tissue.

167. The existence of cavities, although clearly indicated by all the usual physical signs, is not a sufficient reason for viewing the disease beyond amelioration or even cure, if the pulse and respiration be not greatly accelerated, and the other symptoms be not unfavourable, and especially if the flesh and strength of the patient be not very much reduced; for one or even more cavities may exist in the lungs, and still sufficient healthy structure may remain to perform the functions of respiration, provided that these functions be not too heavily taxed, and that the remaining lungs be not the seat of inflammatory action or congestion, or of tubercular deposit. The falling in and immobility of the parietes of the chest, with great acceleration of the respiration and pulse, difficult respiration, sweats, diarrhœa, and aphthæ are in such cases the indications of a not far remote dissolution. If the patient, not having retrograded during winter or spring, experiences an aggravation of all the symptoms upon the sudden occurrence of warm or hot weather, it may be inferred that no amelioration can be expected; for I have observed that patients thus affected by the transition to a range of temperature of about 70° or upward, generally do not survive above a very few months; and that those who are improperly sent to a warm climate at an advanced stage, soon have their existence terminated by the injudicious change.

168. VII. THE CAUSES OF TUBERCULAR PHTHISIS may be supposed to be fully ascertained, and their influence in producing the prevalent and fatal malady duly estimated, individually and concurrently, by the numerous writers who have treated of its forms and symptoms; yet have these causes been often imperfectly ascertained,



or incorrectly imputed, in respect of certain states of the disease, and their sources, nature, and co-operation very insufficiently investigated. Hereditary predisposition is fully admitted, but the other remote or predisposing causes, which appertain especially to the parent or parents, and influence the organization of the offspring, are insufficiently recognised. The predisposition, also, which is generated, and the more direct effects produced in the frame by the causes which depress the vital influence—whether mental or physical—whether morally or corporeally exhausting, in circumstances peculiar to the individual, by the removal of agents to which the frame has become habituated, or which are necessary to health, and by the action of other agencies, which are either obscure or concealed, or are merely concurrent in their operations with more prominent or commonly admitted causes, are often overlooked or not known; and thus the advantages connected with their prevention and removal are altogether lost. Hence, these *causes* being unknown or unsuspected, their *effects* cannot be prevented; and the means necessary to the removal of the former or the cure of the latter are either altogether neglected, or employed accidentally, empirically, and often inappropriately.

[If the mortality produced by pulmonary phthisis is ever to be lessened in any great degree, it will doubtless be effected by *preventive measures*. These means, when known and appreciated by the community, will be adopted to a greater or less extent, and by their adoption a vast amount of human suffering and human life will be saved. The causes of this disease, as stated by our author, have never been accurately ascertained, for the want of an extensive series of systematic, uniform, and exact observations of the external

circumstances, atmospheric, local, and personal, occurring in each case. We would respectfully suggest to the *Am. Med. Association* the expediency of making a united and energetic effort, throughout every state in the Union, to obtain such observations, as well as the annual mortality from the disease in every state, with a view to arrive at a more accurate knowledge of its predisposing and exciting causes. To this end, a form of a uniform register of cases, embracing all questions calculated to throw any light upon the causation of the disease, should be prepared and placed in the hands of every qualified physician in the United States, and the results which would thus be accumulated in the course of a few years would undoubtedly lead to discoveries of the highest importance. For example, 3000 cases of tubercular consumption annually occur in the single state of Massachusetts, and an equal proportion in all the New England States. Suppose we had an accurate history of all the circumstances attending each of these cases reduced to a tabular form, and easy of consultation, can any one doubt that we should be better prepared to adopt preventive measures in regard to the disease?]

169. When treating of SCROFULA AND TUBERCLES (§ 13, *et seq.*), the *causes of these generic states of the disease* were then fully described; but the *causes* which, whether acting singly or in combination, develop *this species of malady* require attention, more particularly with reference to their modes of action. Certain of these causes, however, which have been fully considered in the article now referred to, will hardly be noticed, or noticed only with reference to this specific disease; while others will receive that attention which their importance demands, with due regard not merely of the *causation*, but also of the *prevention* of this malady.\*

#### CLASSIFICATION OF THE CAUSES OF TUBERCULAR CONSUMPTION.

##### I. THE CAUSES APPERTAINING TO ONE OR BOTH PARENTS.

- A. *Hereditary Constitution, or Predisposition.*
  - a. Transmission to the fetus, or infant.
  - b. Extent of hereditary transmission.
- B. *Diseases of the Parents productive of tubercular Consumption.*
  - a. A syphilitic cachexia.
  - b. A constitution impaired by mercurial courses.
  - c. Exhaustion of vital power, or debility caused by excessive sexual indulgences, or by masturbation.
  - d. A gouty diathesis.
- C. *The Ages and the Social Condition of the Parents.*
  - a. Premature congress in respect of either parent.
  - b. Far-advanced age, especially of the male parent.
  - c. Influences of circumcision or uncircumcision.
  - d. Inter-marriages.
  - e. The occupation of the parents.
- D. *The Modes of Living of the Parents in respect of Food and Drinks.*
  - a. Insufficient or unwholesome food—pork, bacon, &c.; blood and viscera of animals, &c.
  - b. A vegetable and animal diet considered; fish, &c.
  - c. Intemperance, and addiction to spirits—in the male, in the female.
  - d. Causes acting on the female during gestation and lactation.

##### II. CAUSES ACTING CHIEFLY DURING EARLY LIFE, OR PREVIOUSLY TO PUBERTY.

- A. *Inappropriate Food, Drink, and Regimen of Infants and Children.*
  - a. During infancy. The milk of strumous or phthisical nurses.
  - b. Insufficient or unwholesome food in childhood.
  - c. Sleeping with the aged, debilitated, or phthisical.
- B. *Contaminated, cold, and humid States of the Air.*
  - a. Overcrowding, congregating, or sleeping in great numbers, in a close apartment, &c.
  - b. Exhalations from privies, cesspools, drains, or from swamps, &c. [local.]
  - c. Emanations from the lungs and skin of the phthisical.

##### C. *Employments, Exercises, Amusements, and Regimen, previously to Puberty.*

- a. Sedentary employments, irksome occupations, &c.
- b. Deprivation of out-door exercises and amusements.
- c. The congregation of numbers in factories, rooms, houses, and sleeping apartments.
- d. Dress, day and night clothing.
- e. The influence of light, sunshine, and temperature, especially the deprivation of these.
- f. The influence of low temperature, humidity, and exhalations, &c., during sleep; sleeping apartments, &c.

##### III. CAUSES MOST FREQUENTLY ACTING DURING AND SUBSEQUENTLY TO PUBERTY.

- A. *Amusements, Exercises, Occupations, Clothing.*
  - a. Studies, amusements, and exercises, in both sexes.
  - b. Positions of the trunk of the body, supports, stays.
  - c. Clothing in respect of the several regions of the body.
- B. *Trades, Employments, and Conditions of Life.*
  - a. Trades which are injurious by preventing exercise in the open air.
  - b. Occupations in which dust, or other irritating matters are inhaled—grinders, sculptors, &c.
  - c. Occupations which are exposed to great vicissitudes of temperature and weather.
- C. *The instinctive Desires and Emotions.*
  - a. Premature or excessive sexual indulgence.
  - b. The vice of masturbation.
  - c. Celibacy.
- D. *Mental Exertions and Affections.*
  - a. Intense or prolonged mental exertion.
  - b. The depressing mental emotions and affections.
  - c. Nostalgia.
  - d. Prolonged anxiety. Disappointed hopes and affections.

##### IV. CAUSES CONSISTING OF CONTINGENT OR ASSOCIATED INFLUENCES OR CIRCUMSTANCES.

- A. *Sex, Age, Diathesis, and Temperament.*
  - a. Sex, age, &c.

170. i. THE CAUSES APPERTAINING TO ONE OR BOTH PARENTS.—A. *The hereditary transmission of phthisis* is proved, 1st. By the frequency of the disease in the offspring of parents of a scrofulous diathesis or taint, whether quiescent or manifested by internal or external tuberculosis; 2d. By the presence of tubercles in the fœtus, and in infants of tuberculous, phthisical, or scrofulous parents; 3d. By the existence of tubercular consumption in the offspring of a scrofulous mother or scrofulous father, and the scrofulous parent having died, the children of a parent of a sound constitution, in cases of a second marriage, having been exempt; 4th. By the occurrence of the malady in a family in which no other cause exists; 5th. By the hereditary transmission of the disease in the lower animals. DELAFOND states that a phthisical ram produced the disease in from sixteen to twenty sheep.

171. Phthisis may be transmitted to the offspring: 1st. As a predisposition, or proclivity, or diathesis, or taint—terms which are nearly synonymous; 2d. As a latent germ, which may be quiescent for many months or years; 3d. In a more or less developed state in the fœtus. The scrofulous taint of the parent, although quiescent, may give rise either to external scrofula or to internal tuberculosis in the lungs, or in some other organ, or in several organs or tissues, especially in children and young subjects. External scrofula, or external glands which have fully suppurated, is less likely to be followed by phthisis than the quiescent scrofulous taint; but either condition will transmit phthisis to the offspring. The transmission may not take place in the children, and yet appear in the grandchildren. The predisposition, arising either from the scrofulous taint or from declared tubercular disease of some organ or tissue, may remain dormant through life,

not having been roused by the exciting and determining causes into activity, or developed in the form either of glandular enlargement, &c., or of tubercular consumption, so that it cannot be inferred that the offspring of a scrofulous or phthisical parent or parents, who has not been affected with either scrofula or phthisis is, therefore, free from the constitutional taint, or, in other words, from the hereditary predisposition. It is manifest, however, and it will appear still more manifest hereafter, that a very varying proportion of those attacked with phthisis in any community or climate shall have been thus afflicted from hereditary predisposition, numerous other predisposing and exciting causes being sufficient to develop the malady in those not hereditarily or even constitutionally liable to the malady.

172. a. As to the proportion of cases of phthisis that may be referred to hereditary taint, authors differ widely. RUYSCH says that four fifths are hereditary; M. PORTAL, two thirds; MR. ANCELL, one third; M. PIGRY, one fourth; BRIQUET, 36 out of 90; RUFZ, 24 out of 35. MR. ANCELL states that in the Consumptive Hospital 24½ per cent. of consumptive patients were born of phthisical parents. M. ROCHE considers that the children of phthisical parents are doomed to the disease, and such may be the case if they be subjected to one or more of the causes which occur previously to, or during puberty and early manhood. M. LUGOL states that more than half the subjects of tuberculosis have consumptive progenitors. Of 141 persons affected with scrofulous glands, whose family history was investigated by DR. BALMAN, the following accounts were furnished:

The <i>Fathers</i> died of phthisis in.....	9
One or more deaths occurred from phthisis in the families of uncles and aunts on the father's side of.....	61
Grandfathers on the father's side died of phthisis.....	11
Grandmothers on this side.....	17
	98
The <i>Mothers</i> died of phthisis of.....	11
One or more deaths from phthisis in the families of uncles and aunts on the mother's side of.....	38
Grandfathers on this side died of phthisis .	9
Grandmothers .....	20
	78

173. In 30 of the 141 scrofulous persons, no death from phthisis in either parents or collateral relations were ascertained; but whether the latter exhibited signs of tuberculous taint or disease does not appear. In the Hospital for Consumption, of 669 males, 122, or 18.2 per cent.; and of 341 females, 124, or 36.3 per cent., were pre-disposed by the disease having existed in a parent or parents.

174. b. As to the relative frequency of the transmission of phthisis in the two sexes opinions are opposite, and statistical information is very imperfect. J. P. FRANK, J. FRANK, M. BRIQUET, RICHARD, and PHILLIPS, favour the more frequent transmission by the father, while HASSE and others entertain an opposite opinion. From the report of the Hospital for Consumption it would appear that, omitting those cases in which both parents were consumptive, the father transmitted

- b. Diathesis and temperament.
- B. *Seasons and Atmospheric Conditions.*
  - a. Humidity, dryness, temperature, and other atmospheric conditions.
  - b. The seasons—winter, spring, summer, and autumn.
- C. *Climate and Locality.*
  - a. Climate and locality of various countries.
  - b. Climate in connexion with modes of living.
  - c. Climate in connexion with religious and social observances.
  - d. Prevalence in England, London, &c.
- D. *Influence of Confinement in Prisons, Workhouses, and of Expatriation.*
  - a. Prisons, hulks, &c.
  - b. Workhouses, &c.
  - c. Expatriation, &c.
- E. *Vicissitudes of Fortune, &c.*
  - a. Poverty and distress.
  - b. Loss of reputation, of friends, &c.
- V. *PATHOLOGICAL CAUSES OF PHTHISIS.*
  - A. *Previous Diseases of the respiratory and circulating Organs.*
    - a. Catarrh, catarrhal fever, influenza.
    - b. Bronchitis, pneumonia, broncho-pneumonia.
    - c. Hooping-cough.
    - d. Vascular lesions of the heart, with or without hæmoptysis.
  - B. *Exanthematous Diseases.*
    - a. Vaccination, small-pox, &c.
    - b. Measles, scarlet-fever, &c.
  - C. *Suppressed or excessive Secretion and Excretion.*
    - a. Suppression of the cutaneous excretions.
    - b. Excessive secretion or excretion—prolonged suckling.
    - c. Disordered, suppressed, or excessive catamenia.
  - D. *State of organic, nervous, or vital Power.*
    - a. Hereditary debility.
    - b. Acquired debility.
  - E. *Morbid State of the Blood.*
    - a. Anæmia.
    - b. Chlorosis.
    - c. State of the hæmato globulin.



the disease to sons in 59.4 per cent., and to daughters in 43.5 per cent.; and that the mother transmitted the malady to daughters in 56.5 per cent., and to sons in 40.6 per cent. The numbers from which the above results are calculated are, however, insufficient to be relied upon; nor can the facts be determined with precision, especially as respects the absence of any taint in either parent. In a few cases in which I observed with care the constitution of both parents, the taint existing only in one parent, was communicated in very nearly an equal ratio to both sexes of the offspring.

175. *c.* The question may be asked, *In what manner or way is the hereditary predisposition transmitted?* Is it by the general organization or constitutional formation, or by the blood, or by miliary germs? But previously to the consideration of this topic, it may be asked, Is the tubercular taint, either quiescent or manifested by internal or external tuberculosis, necessarily transmitted from parent to offspring? That it is thus transmitted when both parents are predisposed or tainted, cannot be doubted. The taint may be latent, not having been developed into active disease owing to the inefficiency of the exciting causes. When, however, one parent only is thus tainted, all, or only some, or even none, of the offspring may be predisposed, the taint being limited to one or more, or extended, in various grades, to several or to all. That the constitutional taint may exist in the offspring in the form of *miliary germs* is possible, inasmuch as several observers as well as myself have detected these germs in the fœtus where the taint has been manifested in either or in both parents; but this cannot therefore be considered as the usual manner in which the evil is transmitted. It has been supposed to be always conveyed in the blood—the taint existing in the blood of the fœtus and of the individual into which the fœtus is developed in all the stages of growth and existence. This supposition may be correct, but various considerations militate against it. 1st. There is no proof, either chemical or microscopic, of the fact. 2d. The predisposition or taint being permanent, it cannot be inferred as always existing in the blood, which is continually undergoing changes by the functions of secretion, nutrition, and excretion—by the processes of assimilation and of waste—by the metamorphosis of the globules from the states of those existing in the chyle, through those forming the red blood, to their final extinction by the secreting and excreting organs. 3d. If it exist in the blood, it must necessarily vary with the changes and constitution of the blood, or even be eliminated from the blood, during the processes just referred to, or by the agents often passing into and affecting the circulation, or in the course of diseases which sensibly alter the states of the blood; but no diminution or alteration of this taint has ever been produced in consequence of any or of all these agencies. That this predisposition or taint is one not existing primarily in the fluids, although more or less manifestly affecting these fluids, both the circulating and the secreted, may therefore be inferred; and that it is present in those parts of the solids upon which digestion, assimilation, and nutrition mainly depend, must necessarily appear as a rational conclusion—that it is as much a part of the constitutional conformation—of the intimate organization of the tissues and organs, as of the conditions and contour of

the several parts and features of the individual, and of the states of intellectual and moral development and power.

176. *B.* *The disorders of the parents predisposing to tubercular consumption in the offspring* are chiefly the scrofulous taint; the syphilitic cachexia; a constitution impaired by mercurial courses, or by excessive doses of mercury; exhaustion of vital power, or the debility caused by age, sickness, excessive sexual indulgences, or by masturbation; and a gouty diathesis. Certain of these have been fully discussed when treating of SCROFULA and TUBERCLES (§ 23, *et seq.*); and the dependence of phthisis upon the scrofulous taint fully insisted upon, as regards a very large proportion of the cases, both under that head and above (§ 170–175). Others of these sources of predisposition require merely a few remarks at this place. Excessive sexual indulgences, and more especially masturbation, particularly as regards the male parent, have a very marked influence upon the constitution of the offspring, if indeed any offspring be produced by persons thus exhausted. In most instances, the children of these parents are puny, very generally tuberculosed, the membranes of the brain, the substance of the lungs, and other organs being often the seats of the tubercular deposits to an extent incompatible with the duration of life for any number of years or even of months; or if the effects are not so severely and early manifested, a predisposition is at least communicated to the offspring to external scrofula, in childhood or about the period of puberty, or to pulmonary tubercles about the same epochs or at later ages.

177. *a.* *The ages and social conditions of the parents* are not without influence in favouring a predisposition to phthisis in the offspring. Among the most important of these are premature sexual congress, in respect of either or both parents, and far-advanced age, especially of the male parent. The effects upon the offspring are, in all respects, the same as those just enumerated; namely, a very early mortality from internal and external tuberculosis, and a predisposition to tubercular phthisis at early or advanced epochs of existence.

178. *b.* *The influences of circumcision and of uncircumcision*, the former as tending to prevent, the latter as favouring, a predisposition to the scrofulous taint, have hitherto been entirely overlooked; or if any attention, even the least, have ever been directed to the matter, it has certainly been by no means adequate to its importance, as respects the constitutional and mental powers of the offspring. The subject has hitherto been viewed entirely as a religious rite, altogether superseded by the doctrines of Christianity; but unjustly superseded by the earliest schismatics in the Christian Church—by some of the apostles themselves. Circumcision, however, as practised by the followers of MOHAMMED, is very different from that inculcated by ABRAHAM. By the latter, the whole of the prepuce was directed to be extirpated at a period of life most proper for the operation; while the former resorted merely to an incision. The advantages of the Jewish rite are not merely those which have usually been imputed to it; namely, the prevention of the usual effects of the retention of the follicular secretion under the prepuce; but chiefly the prevention of that excitement to masturbation about the period of puberty, experienced by, and so frequent among, the uncircumcised, especially in warm countries; and

the more prolonged act of sexual congress, and the more complete as respects the female, than in persons otherwise circumstanced. The general results in connexion with other predisposing causes influencing the constitution of both parent and offspring, notwithstanding several powerful counteracting circumstances, are more prolific marriages, and the less frequent occurrence of the scrofulous, phthisical, and gouty constitutions, in the Jewish than in other races.\*

179. *c. On intermarriages, or marrying in and in, among particular races, families, and religious sects, &c.* I have already offered some remarks, when treating of SCROFULA AND TUBERCLES (§ 27), showing the unfavourable influence this cause exerts on the offspring. As to the influence which the several professions and occupations of life followed by the parents may exert on the health of the offspring, it is most difficult to arrive at a conclusion, as statistics can furnish no precise data. Whatever injurious effect may be produced is certainly manifested in the guise of tuberculosis, in one or other of its forms and seats. The only inference which can be drawn with justice from the professions and employments of the parents is, that such as are most conducive to the promotion of health and strength will be most likely to favour corresponding effects in their children.

180. *C. The modes of living of the parents as to food, drink, &c., have been too generally disregarded in our speculations on the causes of the disorders and diseases of childhood, and of the constitutional powers and predispositions of the offspring.*—*a.* The injurious effects of insufficient and unwholesome food, and of the frequent use of pork and pork meats, and of the blood and viscera of animals—not only on the parent, but also on the offspring; and the respective influences of a vegetable and an animal diet, were considered when treating of SCROFULA AND TUBERCLES (§ 31, *et seq.*). To these topics I need not revert; but the use of fish, or a purely fish diet, including shell-fish, has not been satisfactorily investigated. In the Shetland Isles, where I resided up to the age of sixteen, and visited for short periods for several years afterward, the labouring classes live chiefly, or rather entirely, on fish, potatoes, meal, and cabbages—the kinds of fish being the most wholesome and best—the cod, ling, the torsk, halibut, haddock, whiting, skate, coal-fish, &c.; and these are very generally taken with the oil of the recent livers as the only sauce. Those who live in this manner are healthy, enduring, and but little subject to visceral disease. Shell-fish is more productive of cutaneous affections than the fish now mentioned; and the former is more fre-

quently followed by other injurious effects, especially in persons of a peculiar idiosyncrasy. (See *art. Poisons*, § 428, *et seq.*)

181. *b.* There can be little doubt of the injurious influence of the intemperance of the parents on their offspring; and there is as little doubt that the injurious effects are mainly evinced by the scrofulous diathesis thereby generated in the children, and developed either into external and internal tuberculosis in infancy, or into tubercular consumption in early or late epochs of existence. It is difficult to say in what sex or parent this vice is most productive of these maladies in the offspring. It is, however, evident that the female who addicts herself to the abuse of intoxicating liquors, and especially during pregnancy and lactation—and there are many both in the middle and lower classes who thus devote themselves and their infants to perdition—will bear an unhealthy fœtus, or one which will be imbued with the diathesis and seeds of disease just mentioned; and, if it live so long, will communicate a similar evil to its offspring. How efficiently are our legislators providing the incentives to the destruction of health, constitution, and morals, in the licenses and encouragements furnished throughout the kingdom to the abuse of intoxicating liquors! But what are these important matters to the higher consideration, to them, of aristocratic interest, family patronage, and the influence of party?

[It has been maintained by some writers that the habitual use of alcoholic liquors serves as a prophylactic against attacks of tubercular phthisis. This may be so, and yet the lungs are very frequently the seat of disease in intemperate subjects. Of 73 intemperate persons who died suddenly, 42 by drowning, and the rest from accident or suicide, Dr. Oeston, of England, found abnormal appearances within the cranium in 65 cases (89 per cent.), and in the respiratory organs in 41 cases (56 per cent.); while in 41 per cent. there were marks of disease in the pericardium, heart, or aorta; in 27 per cent., in the stomach; 10 per cent. in the intestines; 41 per cent. in the liver; in the kidneys, 34 per cent.; abdomen, 73 per cent.; in the spleen, 14 cases: of course several organs were affected in the same individual. We have supposed that there was no exception to the general law that all causes which tend to lower the vital forces, or to derange the digestive organs, predispose, in the same degree, to tubercular disease. With regard to the action of alcohol, LIEBIG supposes that its elements combine with oxygen in the body—that its carbon and hydrogen are given off as carbonic acid and water—the oxygen existing in a free state in arterial blood. It is evident that if the power of the elements of alcohol to combine with oxygen were not greater than that of compounds formed by the change of matter, or that of the substance of the living tissues, they could not combine with oxygen in the body. Thus, by the use of alcohol, a limit must rapidly be put to the change of matter in certain parts of the body: the oxygen of the arterial blood, which, in the absence of alcohol, would have combined with the matter of the tissues, or with that formed by the metamorphosis of these tissues, now combines with the elements of alcohol, and the arterial blood becomes venous without the substance of the muscles having taken any share in the transformation. The amount of carbonic acid given off by the lungs,

\* [We do not see clearly the connexion between the cause and the effect here pointed out by our author. That there is no nation more addicted to sexual indulgences than the Jews, we suppose will be generally admitted; and they have always borne this character. Polygamy was allowed "for the hardness of their hearts" (Mark, x., 5), notwithstanding circumcision. There is no evidence, moreover, that the Jews are less addicted to masturbation than other nations; and if they are less liable to scrofula than others, we would attribute the exemption rather to the prohibition of pork as an article of diet. Nor can we subscribe to the sentiment, that circumcision was "unjustly superseded by some of the apostles," by the rite of baptism, unless Christianity itself be regarded as an unjust innovation upon the Jewish religion, which no Christian, we suppose, will concede. The hygienic regulations of Moses, apart from circumcision, are well calculated to promote the general health, prevent the occurrence of "scrofulous, phthisical, and gouty" affections, and render marriage "prolific."—*Ed.*]



however, is diminished under the influence of alcohol, while the animal heat is somewhat lowered, and the general strength diminished, or, as LIEBIG says, "weariness, feebleness in the limbs, and drowsiness, plainly show that the force available for mechanical purposes, in other words, the change of matter, has been diminished." If ROKITSKY'S views in regard to the prophylactic power of venous blood against tubercular disease be well founded, it is possible that the use of alcoholic drinks may, in this manner, exert a similar prophylactic power. Observed facts would seem to lend countenance to such a belief. Thus, the late Dr. SWETT, of New York, in his work on "Diseases of the Chest," p. 238, remarks, "Two medical gentlemen, attached to the public dead-house in this city (New York), in which bodies are deposited which are found in the streets, or without friends, discovered, in about 70 post-mortem examinations of those who had died of the most confirmed and aggravated intemperance, not a single case of tuberculous lungs"—a most surprising result, when we remember that this unfortunate class have probably long suffered from poverty, bad nourishment, and exposure to the weather—influences which are regarded as predisposing to the tuberculous deposit. It should, however, have been stated that in a majority of these same cases there were signs of disease in the pulmonary organs, as pneumonitis, chronic catarrh, pleurisy, hydrothorax, &c., as well as in many other important organs, so that, as far as *longevity* is concerned, nothing is gained by the habitual use of alcoholic drinks. No fact is better established than that the average value of human life is vastly greater in those who entirely abstain from such stimulants in health. As a remedy for phthisis, we have no doubt that alcohol, like cod-liver oil, and other hydro-carbonaceous compounds, is often of great service as a calefacient and nutrient, and by preventing the too rapid disintegration and metamorphosis of the tissues.]

182. Other causes besides intemperance may so affect the mother during the child-bearing period of life, and during pregnancy and lactation, as to favour the development of a scrofulous and tubercular disease in the fetus and infant. Too low living, unwholesome meats, especially the too exclusive use of pork and bacon, anxiety of mind, and all the distressing and perturbing emotions, are more or less injurious to the offspring, and in the way just stated, more especially when conjoined with the other causes of ill health, which abound in all cold, low, humid, and ill-drained localities; in crowded and ill-ventilated houses and apartments, and in crowded or close manufacturing and manufacturing towns.

183. *c. The use of tobacco* in any way, either by smoking, snuffing, or chewing, is most injurious, especially in early life, and as respects its effects upon the constitution of the offspring, more particularly when either of these vices are indulged to excess by the male parent. Numerous instances have come before me of young men who have become habitual tobacco-smokers in early life, and who, having married, have either failed of having a progeny, or had children that could not be reared; or, if they reached any of the early epochs of life, were subjects of tuberculosis in one or other of its forms or seats, and especially of tubercular consumption. (See *art. Poisons*, 523, *et seq.*)

184. *ii. THE CAUSES OF TUBERCULAR CONSUMPTION*

THAT ACT CHIEFLY DURING INFANCY, CHILDHOOD, AND EARLY LIFE, OR PREVIOUSLY TO PUBERTY, have been so fully discussed under SCROFULA and TUBERCLES (§ 30-64), that very little is left for me to add at this place. The reader will find the several agencies arranged under this class considered at the place now referred to. There are, however, a few topics thus arranged which require notice, as being of some importance in a prophylactic point of view.—*A. Sleeping with very old and debilitated persons* is certainly prejudicial to the healthy, both in predisposing to tubercular consumption, and determining or developing the disease in those predisposed by a scrofulous diathesis or other influences. It may also be associated with other causes, and the results become more immediate and severe.

185. *B. Infection.—Emanations from the lungs and skin of persons, in the second or third stages of phthisis especially*, are certainly sometimes productive of consumption, more particularly in young persons of a scrofulous diathesis, and in those who are predisposed by other causes, or who are subjected to several concurring influences. The inhalation by the healthy of the emanations from the lungs and skin of the consumptive, and the consequent appearance of the disease in the former, may, as in other cases of infection, be productive of its injurious effects only in the circumstances now stated, but the disease is caused by infection nevertheless, although the fact is stated loosely by many writers as one of the propagation of phthisis by contagion, and denied by others, as, indeed, the infectious nature of nearly every disease has been denied by some, who consider belief in infection to be credulity, and skepticism to be a proof of a "strong-minded" physician, or rather of an incredulous old woman. Although phthisis, in the circumstances favourable to infection, may be communicated to others, especially when the healthy sleep in the same bed or apartment with the sick, and although this result is, perhaps, more likely to occur in persons under or about the period of puberty than at a much more advanced age, yet for many years after puberty the person thus exposed and predisposed may be attacked; and this result is the more likely to take place in the cases of married, especially recently married, persons. I state this as the result of my observation; and, although the matter has been discussed from the days of GALEN, and the occasional transmission of the disease by infection believed by him, by RIVIERUS, MORTON, VAN SWIETEN, NARDUCCI, RONCALLI, CHAVET, J. FRANK, HUFELAND, HILDENBRAND, and many others, and denied by SALMADE, CASTALLANI, PORTAL, and numerous other writers, it still remains in dispute.\*

186. *C. Employments, Exercises, Amusements, and Regimen previously to Puberty.*—Sedentary employments, irksome occupations, and confine-

\* [Occasional facts have been observed, which seem to favour the doctrine of the contagiousness of tuberculosis, but they are rare, and perhaps were only coincidences. LEGAL states that he had observed scrofula under all its forms for 25 years, and yet had been unable to detect a single case of contagion (*On Scrofulous Diseases*. N. Y., 1845, p. 246). We have met with several cases where the wife, from watching over and nursing a sick husband with phthisis, has gradually declined from the same disease; but then it is to be remembered that anxiety, loss of sleep, depraved appetite, want of exercise in the open air, &c., are powerful predisposing causes, and would probably lay the foundation of the disease, independent of contagion. We doubt, therefore, whether phthisis can ever be truly said to be contagious.—*Am. Ed.*]

ment in close or dark apartments, are more or less influential in predisposing to, or more directly occasioning, tubercular phthisis. The deprivation of out-door exercises and amusements, so requisite at this period of life to the development and strength of the constitution, and the congregation and confinement of numbers in ill-ventilated factories, houses, or sleeping-apartments, blight the vital endowments of the frame; and of all the structures and organs, the lungs, like the leaves of a plant—both being the respiratory organs of their respective bodies—are the first to experience, and the most disposed to sustain injury. Nor are dress, night and day clothing, the influence of light, sunshine, and temperature, at this period of life, undeserving attention as respects both sexes; for, although either of these singly may appear of little importance, yet operating, as they often do, in combination, their effects on the general organization are often remarkable. The frequent practice of leaving portions of the body uncovered by the dress, without reference to the weather and season, during the early periods of life—the very low temperature of sleeping-apartments during the winter season, in this and some other countries, while the confinement of the air by closely-drawn curtains around the beds causes the repeated respiration and consequent contamination of the air, thereby inducing feverish, restless, and unrefreshing sleep, and a contaminated state of the blood, are among the most influential occasions of an imperfect development of the body at a period of life when all the aids to health and strength are most especially required. Not infrequently, also, other agencies are brought in co-operation with those just mentioned, and these too of no mean influence. Deprivation of light and sunshine—of the salutary influence of the sun's rays on the frame—not infrequently, especially when aided by the causes already noticed, produces an etiology similar to that occasioned by this cause in plants; and, although the body grows in height, and the vessels extend in the direction of their axes, as in plants, yet the various structures are loosely, weakly, and insufficiently formed, each one being deficient in tone, firmness, and vital cohesion. Associated with this state of imperfect organization, the blood presents a similar defect of assimilation, and an arrested development of the red globules. It is thin, watery, and, although it may abound in colourless globules, or in those not yet metamorphosed into red globules, these last are very much diminished in number, or in their usual proportions. Nor should the mental depression, the irksomeness, the weariness of both body and mind, occasioned by the circumstances noticed under this category, and their effects upon the youthful constitution, be overlooked. These circumstances, when acting either singly, but protractedly, or in various combinations, exert their injurious influence primarily, although not always manifestly, on the lungs. These organs, although generally the first to suffer, are not always the first to indicate disorder. The functions of digestion, assimilation, and nutrition often furnish the earliest indications of disease to the casual or superficial observer, but the experienced eye, and the informed mind, detect the antecedents of these, and carry the analysis of the morbid phenomena much farther, and until the agencies producing them are fully disclosed. (*See SCROFULA and TUBERCLES*, § 39, *et seq.*)

187. iii. CAUSES OPERATING DURING AND SUBSEQUENTLY TO PUBERTY.—A. It is manifest that when the mental *studies* of the upper and middle classes of society, at this period of life, are pursued too far, or to the neglect of those amusements and exercises requisite to health, and to the proper development of the frame, pulmonary consumption will follow in a large proportion of cases, especially when the constitution is predisposed by original conformation, by the strumous diathesis, or by other causes acting in earlier life, or concurrently with this. If these studies are rendered still more injurious by stooping positions, or by pressure of the side against a desk, whereby the actions of the respiratory apparatus are hampered or confined within too narrow limits, the injurious effects will be more certain. But, where these latter causes are not present, others equally injurious may operate; and these may either be too close cinctures of the lower regions of the chest, the pressure of unyielding, or insufficiently yielding supports in the stays worn by females; the use of steel supports, which conduct the electricity of the frame from the body into the air, and thereby deprive the nervous system of a salutary stimulus; and insufficient clothing on the neck, upper regions of the chest, and shoulders, or even the complete exposure of these parts without any clothing whatever, are not without their influence, either as exciting or concurrent causes, especially where a predisposition to this disease already exists. (*See also art. SCROFULA and TUBERCLES*, § 57, *et seq.*)\*

188. B. *Trades, employments, and conditions of life* are conducive to pulmonary consumption when they prevent exercise in the open air; when they are followed in cold, low, close, humid, and dark apartments or situations, or in confined, bent, or cramped positions of the body, as by miners, &c. As to the comparative liability of persons pursuing different trades and occupations, no precise information has been furnished, as the number of persons occupied in each of these trades, in connexion with the number attacked with phthisis, can rarely be obtained. It is manifest, however, from the researches of Drs. GUY and LOMBARD, that the deaths from this disease in those who follow in-door occupations are about double the deaths of those who pursue out-door employments. Shoemakers, tailors, milliners and dressmakers and other needlewomen, clerks and shopmen, weavers and gloves, compositors and printers, servants, bakers, &c., are among the trades most liable to phthisis. BEDDOES stated that

\* [We think that too little importance is attached to the influence of *diet* as a predisposing cause of phthisis. It is a disease characterized by a deficient and depraved nutrition, an impoverished state of the blood, and constitutional debility of the digestive organs, and whether the result of predisposition or otherwise, its foundation is often laid in mal-assimilation of food, or food of an improper kind. This is evident from the fact that the disease may be warded off by measures directed to the invigoration of the digestive organs, such as appropriate diet of nourishing animal food, abounding in hydro-carbonaceous and protein matters, with suitable exercise, and other tonic regimen. DR. CHARLES HOOKER (*Trans. Am. Med. Assn.*, 1855, p. 478) contends that, in most cases of phthisis and of predisposition to it, among other errors of regimen, four are especially prominent, viz.: 1st. Irregular eating; 2d. A restricted variety of food; 3d. The avoidance of oily nutriment; 4th. An excessive use of drinks; and he urges that if due attention were given simply to the correction of these errors, even with no medication, more could be accomplished in the cure and prevention of phthisis than by the most efficient medication, without attention to dietetic regimen.—*Ed.*]



butchers are less liable to this malady than those following any other employment, and later observations have confirmed the statement. Dr. TROTTER made a similar remark in favour of sailors, and this is rendered more obvious by the more liberal diet allotted to them now than formerly. Dr. WITHERING considered stable-boys, grooms, post-boys, and dragoons less liable to phthisis than other employments, and such appears, upon the whole, to be the case. The occupations in which dust and other irritating particles, whether mineral or vegetable, are inhaled into the lungs are especially productive of diseases of these organs, and particularly of pulmonary consumption, bronchitis, asthma, and various complications of these, either with one another or with other lesions. But this subject, and the several topics connected with it, more especially with relation to the causation of pulmonary diseases, are fully considered under the head ARTS and EMPLOYMENTS as Causes of Diseases.

189. *C. The instinctive emotions and desires* are more important causes of tubercular phthisis than is generally supposed by either medical men or others; and this category of causes are most influential in young persons of a scrofulous diathesis, and in those who are otherwise predisposed, more especially by the causes already mentioned.—*a.* Premature or excessive sexual desires and indulgences, and still more the crime of self-pollution, are the chief of the class of causes in producing tubercular phthisis, and several other maladies. This crime, for it is no less than a crime, and one most severely, but not unjustly, punished by the Mosaic law when detected, is one more frequently practised by both sexes than may be believed by those who have not had occasion to inquire into the matter; and it is most prevalent in those who are sanctimonious and pharisaically censorious of others. The injurious effects of this crime are probably greater in the male than in the female, especially in causing tubercular phthisis; and it is not improbable that the rite of circumcision among the Jews was instituted partly with the intention of preventing the excitement to the commission of it that is liable to occur in the uncircumcised. Various mechanical contrivances for the prevention of the vice in females were employed from very early ages, and several of these adopted in the middle ages may be seen in museums of antiquities. No more certain means of exciting females to this vice can be supposed than riding. Instances have come directly to my knowledge of females having relinquished horseback exercise entirely on this account.

190. *b. Celibacy* may be viewed as a cause of tubercular phthisis, although the reason of its being a cause may not be obvious to many. It is, however, more generally known that the average duration of the life of bachelors is much under that of married men. This is mainly owing to the circumstance of their having become addicted to the crime of masturbation. A very large proportion of those who are thus addicted are impotent, and many of them are conscious of this fact, and do not marry; while others continue this vice in preference to sexual congress, and often pay the penalty by inducing this or other diseases. Several instances have occurred in my practice of persons having admitted, when afflicted with phthisis, or with any other of the maladies entailed by this vice, that they were conscious of the cause only when too late, and often

when their minds and the powers of volition were too much weakened to resist the impulse to its commission. Even married men who had become addicted to it previously to marriage have continued it subsequently, as they have themselves confessed to me in several instances.

191. *D Mental Exertion and the moral Emotions.*—*a.* Mental exertion, especially when prolonged or intense, is more frequently a concurring than an exciting cause, unless where an original or acquired predisposition to phthisis already exists. It is injurious chiefly about or soon after the period of puberty, when the frame, in all its parts, is not fully developed and consolidated, and when exercise in the open air, and in light and sunshine, which it often prevents, and which is requisite to perfect bodily organization, is neglected. This cause is often also heightened by the position of the body, especially by the stooping position, which during mental application is often too long retained.

192. *b.* The depressing emotions and affections, anxiety, longings after the objects of affection, either absent or lost, disappointments, losses of fortune or friends, &c., severely depress the organic or vital influence, impair digestion and assimilation, and predispose to, if they do not actually occasion, this malady.—*c.* Under this category may also be placed nostalgia in its various longings for early abodes, scenes, and objects, and for the society of early or beloved friends. (See also *arts. DISEASE, the Causation of*, § 22, *et seq.*, and SCROFULA and TUBERCLES, § 61, 62.)

193. *iv. CONTINGENT AND ASSOCIATED INFLUENCES OR CIRCUMSTANCES AIDING OR CONCURRING IN OCCASIONING PHTHISIS.*—*A. Sex.*—According to the Registrar-General's returns, the deaths during two years and a half (1837, '8, and '9), in England and Wales, from phthisis were 146,338, being 69,009 males, and 77,329 females; and in 1847 the deaths from this disease were 25,083 males, and 28,234 females. Mr. ANCELL says, that "from the Irish reports, it appears that of 135,590 deaths from phthisis, 63,635 were males, and 71,955 females. In London, however, and in the large manufacturing towns, the proportion of deaths from phthisis in males and females was different. In London, from 1843 to 1846, the deaths were greater in males than in females, by nearly six per cent. According to the returns for 1847, the deaths from scrofula, tabes mesenterica, and hydrocephalus were 8105 in males, and 6542 in females; and from phthisis 25,083 males, and 28,234 females; thereby showing that, while the former scrofulous diseases were more fatal in males than in females, the latter, or phthisis, was more fatal in females by nearly six per cent (5.9). In this country, therefore, it appears that females are slightly more liable to consumption than males. In the metropolitan district, however, the deaths in 1838 from phthisis were 4057 males, and 3630 females; and in 1839, 3749 males, and 3355 females. The deaths in this district, in 1838, from phthisis were 7687, while in the southern counties, the population of which is somewhat greater, they were 5805.\*

\* [In the city of Baltimore, for the year 1850, the mortality among the blacks from phthisis was 50 per cent. greater than among the whites—the males being 43.5 per cent., to 56.5 per cent. for the females. If we compare the sexes at different ages, we find that up to 15 years the per centage is the same for both; from 15 to 45, it is 38 per cent. for the males, and 62 per cent. for the females. After this age the males slightly predominate.

194. *B. Age.*—The several tubercular maladies present a greater or less frequency of occurrence at one epoch of life than at another. Tubercular meningitis and hydrocephalus are most frequent during infancy; mesenteric decline in early childhood, or about the period of weaning; external scrofula, from the period of weaning till puberty; and phthisis from puberty until advanced age. The following abstract from the returns for 1845 and 1846 will show the deaths from phthisis, in London, at successive epochs of life:

Years of Age.	Mortality from Phthisis at successive Epochs.			
	Males.		Females.	
	In 1845.	In 1846.	In 1845.	In 1846.
Under 5 years.	354	234	316	269
5-10	88	88	114	92
10-15	59	61	107	104
15-20	191	219	214	228
20-25	343	387	349	362
25-30	405	450	426	434
30-35	436	456	379	383
35-40	431	454	328	401
40-45	379	397	279	305
45-50	312	346	218	211
50-55	240	234	133	135
55-60	155	179	97	99
60-65	111	104	72	60
65-70	73	66	46	48
70-75	21	36	15	15
75-80	9	14	9	6
80-85	4	1	1	3

195. In 1845 the deaths from phthisis in London, at all ages, were 3624 males, and 3107 females; and from all causes, at all ages, 24,496 males, and 23,836 females; the deaths from phthisis being in both sexes 6731, and from all causes 48,332. In 1846 the deaths at all ages from phthisis were 3729 males, and 3161 females; and the deaths from all causes, at all ages, were 24,941 males, and 24,148 females; the deaths from phthisis, in both sexes, being 6890, and from all causes 49,089. From these returns it appears that the proportion of deaths from phthisis among persons advanced in age, the number of persons thus advanced being considered, continues great to very mature age.

196. The following table is an abstract from a more extended one by Mr. ANCELL, which he had made from the Registrar-General's returns for 1847, in which the deaths by phthisis, in all England and Wales at the several epochs of life, are stated and compared with the mortality by all causes, and with the number of persons living of the specified age in the middle of that year.\*

197. *C. Diathesis and temperament* predispose more or less to phthisis, but it is difficult to determine the extent to which they have this effect. It is even more probable, and more agreeable with experience, that original or early-acquired conformation of the body, arising from causes affecting the parents, has more influence in predisposing to phthisis than the temperaments, as they have hitherto been described by physiologists, or

Years of Age.	Mortality from Phthisis.			Mortality from all Causes.			Estim'd Population of that Age in 1847.		
	Males.	Females.	Both Sexes.	Males.	Females.	Both Sexes.	Males.	Females.	Both Sexes.
Under 1	1,251	1,164	2,415	49,547	39,237	88,784	215,150	234,959	450,109
1 to 2	676	656	1,332	16,666	16,019	32,685	230,463	230,038	460,501
2-3	318	345	663	8,900	8,513	17,413	233,383	235,187	468,570
3-4	212	212	424	5,870	5,803	11,673	217,806	221,556	439,362
4-5	179	182	361	4,123	4,137	8,260	215,225	215,026	430,251
5-10	780	876	1,656	9,768	9,369	19,137	1,020,042	1,022,576	2,042,618
10-15	910	1,432	2,342	5,101	5,330	10,431	942,534	915,115	1,857,649
15-20	2,294	3,232	5,526	6,615	7,126	13,741	836,845	865,094	1,701,939
20-25	3,521	3,899	7,420	8,241	8,324	16,565	774,542	888,360	1,662,902
25-30	2,983	3,683	6,666	7,216	8,190	15,406	657,138	722,120	1,379,258
30-35	2,373	3,094	5,467	6,626	7,623	14,249	604,706	646,972	1,251,678
35-40	2,212	2,545	4,757	6,833	7,387	14,220	465,847	482,871	948,718
40-45	1,847	1,903	3,750	6,909	6,917	13,826	466,338	486,047	952,385
45-50	1,534	1,404	2,938	7,135	6,462	13,597	345,472	349,380	694,852
50-55	1,261	1,111	2,372	6,981	6,684	13,665	328,848	351,469	680,317
55-60	1,025	871	1,899	7,615	6,982	14,597	202,956	217,199	420,155
60-65	749	715	1,464	8,703	8,725	17,428	223,801	247,912	471,713
65-70	515	505	1,020	9,220	9,323	18,543	129,211	149,231	278,542
70-75	253	246	499	9,935	10,782	20,717	111,365	129,120	240,485
75-80	128	109	237	9,357	10,552	19,909	59,546	69,089	128,635
80-85	41	26	67	6,651	7,799	14,450	33,295	42,745	76,040
85-90	9	10	19	3,487	4,380	7,867	10,770	14,881	25,651
90-95	2	3	5	1,006	1,571	2,577	2,662	4,333	6,995
95 et sup.	....	....	....	302	538	840	622	1,175	1,797
All ages.	25,083	28,340	67,964	113,076	207,901	420,977	8,368,914	8,755,174	17,124,088

The deaths from 15 to 20 were 7.2 per cent.; from 20 to 30, 31.2 per cent.; from 30 to 40, 25 per cent.; from 40 to 50, 12.6 per cent.; from 50 to 60, 10 per cent.; over 60, 6.2 per cent.; from 1 to 15, 6 per cent. The mortality from consumption, as compared to the whole deaths, excluding still-born, in the following cities, is as follows:

Baltimore, average from 1850 to 1854 is	1 in 6.2
Philadelphia, 1854.....	1 in 8.0
New York, 1852 to 1854.....	1 in 7.5
Boston, 1843 to 1852.....	1 in 6.6
London, 1853 & 1854.....	1 in 9.2

(CHARLES FRICK, *American Journal of Medical Science*, Oct. 1855, p. 380.)

\* [It is to be regretted that we have no data by which we may judge with any accuracy in regard to the prevalence of tuberculosis in the different sections of the

United States. It is a common belief that the disease is more rife on the Atlantic coast, especially of New England, than in the interior, and at a distance from the sea-board. The mortuary statistics of Massachusetts, however, taken by the state authorities, do not sustain this opinion—the western counties furnishing as large a ratio of deaths from phthisis as the eastern. There is little doubt that, if a correct comparison were made between an equal population in a malarious district of the western country and on the sea-board, where malaria does not exist, the mortality from this disease would be found far less in the former. But between the Northern and Southern States, provided the regions are not malarious, it is probable that very little difference would be



conventionally admitted by medical writers. Temperaments are so mixed with one another, with diathesis, habit of body, and with states of vascular plethora, or its opposite, as to be rarely distinguished with precision, or to be viewed only as states of constitution, which every physician estimates conformably with his own views, although he may not be able to describe them with precision, or agreeably with the conception of others. I have nothing to add at this place to what I have observed above (§ 9, *et seq.*) on this subject, and that is much less satisfactory to myself than I wish.

193. *D. Seasons, weather, and atmospheric conditions and vicissitudes*, have less direct influence in producing phthisis than has generally been supposed. They are, however, frequent concurrent and determining causes, and when they appear most efficient in occasioning this malady, they often act by producing catarrh, bronchitis, or pneumonia, either of which may develop quiescent phthisis into a state of action, or call the latent predisposition into a more manifest form. Cold conjoined with humidity, especially when the already predisposed, or those not accustomed to these atmospheric conditions, are exposed to them, and sudden vicissitudes of cold, warmth, and humidity, or dryness, or rapid alterations of these, are certainly powerful agents, especially in low situations, in developing phthisis. The rapid transference of terrestrial electricity into the atmosphere, during humid states of the air, has an injurious influence on persons predisposed to, or labouring under phthisis. The vicissitudes of temperature to which many expose themselves by passing from a very warm apartment into the

cold external air, or from the latter into the former, and by sleeping in a chamber the temperature of which is many degrees below that of the apartments used during the day, are certainly more or less injurious to persons disposed to phthisis. In cold sleeping-chambers, although the body is protected by warm bed-clothes, the lungs are exposed either to a low range of temperature, or to a higher range generated by breathing the same air repeatedly in consequence of the confinement of the air by bed-curtains. No small injury is often also produced by over-exciting or overheating the body, so as to produce copious perspiration, which often chills the surface, and throws the momentum of circulation inwardly, favouring pulmonary congestion, especially when the external surface is not protected by flannel next to the skin. Living in damp or ill-drained houses, removing into recently-built houses before the walls are quite dry, and living in those which are built on a humid or clay soil, without sunk areas around them, or without sufficient space for ventilation, are more frequent causes of disease, and especially of pulmonary consumption, than they are generally supposed to be, especially in persons of a scrofulous diathesis, or otherwise predisposed.

199. The influence of *seasons* on phthisis is but slight, and almost undetermined. Medical statistics give very little information on this topic, and that little is deficient in precision. The returns of the Registrar-General furnish no data respecting it, for the deaths from phthisis during the four quarters present little difference as to numbers; and when the very remarkable differences of duration presented by this disease are considered, it cannot be expected that the deaths can be an index to the seasons in which the malady was occasioned.

found in this respect; and so, on the whole, little if any advantage is gained by a change of climate. The Federal census of 1850 purports to furnish the mortality in one year in every state in the Union, as well as the diseases, age, nativity, &c.; but so little care was observed in taking the returns, that they are of little if any value to the statistician. If they are to be believed, then Mississippi is a healthier state than Rhode Island, and Alabama twice as healthy as Massachusetts, and four times as healthy as Texas; while the deaths from consumption in Texas are but half as many as in Louisiana, and only one seventh as many as in Massachusetts, and one fifth as many as in Maine! The following table, compiled from the U. S. Census returns of 1850, may, however, have a certain kind of value, and we therefore give it:

States.	Aggregate Population in 1850.	Total Deaths.	Per Cent.	Total Deaths from Consumption.	Per Cent. of Deaths from Consumption.	Ratio of Deaths from Consumption to whole Population.
Texas.....	212,592	10,057	4.7	112	.05	1,898
Louisiana.....	536,135	11,956	2.2	641	.11	838
Alabama.....	771,623	9,091	1.1	362	.04	2,131
Mississippi.....	606,326	8,721	1.4	332	.05	1,826
Arkansas.....	209,897	3,021	1.4	132	.06	1,590
N. Carolina.....	869,039	10,165	1.1	562	.06	1,540
Tennessee.....	1,002,817	11,875	1.1	879	.08	1,140
Missouri.....	652,044	12,292	1.7	648	.09	1,052
Virginia.....	1,401,661	19,050	1.3	1,616	.11	869
Dis. Columbia.....	51,687	846	1.6	135	.25	582
Maryland.....	583,039	9,621	1.6	1,101	.18	529
Ohio.....	1,800,329	28,957	1.5	2,538	.14	739
New York.....	2,581,847	33,717	1.3	5,372	.20	480
N. York City.....	515,547	11,838	2.2	1,319	.24	390
Massachusetts.....	994,514	19,404	1.9	3,426	.34	290
Maine.....	583,162	7,584	1.3	1,702	.29	362

According to the above table, one in 1895 die in Texas of phthisis, one in 2131 in Alabama, and one in 290 in Massachusetts! So that, as we go north from Alabama, we have the following per centage: .05, .06, .08, .11, .14, .18, .25, .34. This statement is sufficient to show the value of the U. S. Census mortality returns.—*Ed.*

200. *E. Climate and Localities.*—*a.* As to the climate of different countries, and as to the influence of situation and locality, either in favouring or in preventing the prevalence of phthisis, our knowledge is altogether imperfect. Much that has been asserted on this subject is more or less inaccurate, the inaccuracy being often in proportion to the dogmatism with which the matter is treated. That some climates and localities present a much greater prevalence of this disease among their inhabitants than others is an admitted fact; but the degree of prevalence, or the amount of influence attributable to climate only, and the shares which may be imputed to situation, circumstances, habits, customs, &c., of the inhabitants, especially the natives, are either very imperfectly known, or not known at all; even at the best an approximation to the truth only is to be expected. Several writers have stated that pulmonary diseases, and more especially consumption, are rare within the tropics, and in the natives of these countries particularly; but Dr. WEBB states that the "records of cases of natives of every part of India show that phthisis and pulmonic affections are at least not uncommon diseases among natives of India, and only yield in frequency to fever, cholera, and dysentery, presenting every form and variety that is to be met with in any other part of the world." Dr. GREEN states that pulmonary consumption is a prevalent disease in the lower provinces of Bengal; and Dr. WEBB, who quotes this statement, remarks that he has himself "observed the disease extensively among the Hindoo race, and the Puharrees

inhabiting the lower belt of the Himalaya range of mountains." The same writer refers to Dr. GODEVE's report of the prevalence of pulmonary disease in *Upper India*; wherein he states, "tubercular phthisis we have had abundance of, as the detailed autopsies forwarded every month show."—WEBB'S *Pathologia Indica*, p. 100, *et seq.*

201. *b.* Dr. ARCHIBALD SMITH, in some valuable communications he kindly sent me respecting the diseases of *Peru*, remarks, that "In the negro hæmoptysis is less frequent, perhaps, as a symptom of phthisis, than it is of disease of the heart or aneurism of the aorta. Hæmoptysis is also very often observed in the congestive stage of fever in the Peruvian negro; but with the fever the sanguineous sputa disappear. Comparatively speaking, phthisis is decidedly less common in the negro than in the cross between the negro and Peruvian Indian, or pure Indian bred in the mountains, but migrated to the coast. The mixed races with preponderating Spanish type or blood, constituting the creole white race, nurtured in luxury, idleness, and pleasure, and consequently with an unhealthy physical and moral training, are delicate and feeble of organization; and therefore, of all the different races, the most prone to ailments and failing health, and also most subject to tubercular consumption. In the *purely* white race phthisis is comparatively rare, except among such youths as are sent from Europe with pulmonary complaints. But, as these are found in mercantile establishments, they are usually sent from one station to another, without trying the benefit of mountain air; for in the mountains there are few European mercantile establishments. In 1792 Lima contained 52,000 inhabitants, of whom 20,000 were whites, 23,000 of the negro race, 6000 of the cross of white and Indian, and 3000 only of the pure Indian. At that period the races were treated in their respective hospitals. The whole deaths by hospital and parochial returns were 2795 for the year given. From the *white* hospitals 650 dead were buried, while 692 died in the negro and Indian hospitals; thus showing a much greater mortality among the whites in general (including the creoles). Now, rest assured that phthisis always maintained its relative position among the causes of death next to fevers and dysentery. In the Indians on the coast the relative mortality is far beyond that of the negro. In Lima phthisis and intermittent fevers are less common in the negro than in the white and Indian races. But diseases of the liver, of the heart and aorta, and of the gastric and intestinal viscera, especially dysentery, commit more havoc in the negro and other dark members of this family than among the other races."

202. In other parts of *South America* the occurrence of phthisis appears to be infrequent, especially among the unmixed dark races; but the information respecting these parts and races is very defective. In *Mexico* this disease is said to be rare; as respects the city of Mexico, this may be owing to its high position above the level of the sea, and to other circumstances; but no information is furnished as to the comparative immunity of different races in this country. According to Dr. HANCOCK, phthisis is almost unknown on the coast of *British Guiana*, and very rare in the mountains. This immunity must have reference chiefly to the native races, as instances of death from phthisis have occurred among both whites and blacks who have removed to that country.

Col. TULLOCH states that in St. Helena the mortality of the population from diseases of the lungs is about 3·2 per 1000 annually.

203. *c.* Upon reference to my notes respecting the diseases of those parts of the *west coast of Africa* which I visited and resided in for short periods many years ago, and which were inhabited almost entirely by true negro tribes, individuals of the white, Arab, or Moorish races being very few, I find it stated that phthisis, remittent and intermittent fevers, appeared very rarely to occur among the former; but when they migrated to somewhat colder climates, even to the West Indies, phthisis was sometimes observed among them; and this became the most fatal malady to them, excepting small-pox, when they were sent to temperate or cold climates. Although dysentery and chronic diarrhœa were among the most prevalent and fatal maladies among negroes in those parts of Africa, yet the liver appeared less frequently diseased than the spleen in this race; and much less so than in the purely white and mixed races. Among negro children, however, I remarked that mesenteric disease was not uncommon.

204. *F. Race.*—After considering the distribution of heat over the globe as displayed by the isothermal lines of HUMBOLDT (see *art. CLIMATES*), and by the later researches and illustrations of Professor DOVE, I infer that less is owing to temperature than to *race* and modes of life in the causation of phthisis. There are numerous circumstances which concur with temperature in producing a climate either favourable or unfavourable to the prevalence of phthisis; and of these coldness and humidity of the air, low elevations from the surface of the ocean, and sudden and frequent vicissitudes of temperature and weather, are among the most influential elements of a climate which favours the production of this malady; while a moderately warm and dry atmosphere, considerable elevation above the sea, especially in warm countries, and regularity of season and temperature and weather, greatly diminish the prevalence of the disease, and favour recovery in the early stage of the malady. But these conditions, favourable and unfavourable, are so associated with numerous other agencies, especially with the influences of race, of social and domestic conditions, of food, habits, and modes of living, &c., that it is impossible to determine the amount of influence which may be ascribed to each.

205. There can be no doubt, however, that the disposition to phthisis existing in different *races* or *varieties* of our species should be viewed in very intimate connexion with the climates in which they reside, and with the food and modes of living adopted by them. Having ascertained the frequency of the disease in the aborigines of a country or climate, it is next of importance to know how far that frequency may be modified—diminished or increased—by change to other countries, either colder or warmer, or of higher or lower elevation, &c., and by the adoption of different food and other habits. Our knowledge of these subjects is deficient, and the difficulties in the way of improving it are many; but, before I endeavour to draw a few brief inferences closely connected with it, I shall succinctly notice such information as I have found calculated to remove a few of these difficulties. Several of the most important topics connected with this subject, and more especially in connexion with pulmonary consump-



tion, are discussed in the article CLIMATE, to which I must refer the reader.

206. In countries in which the isothermal lines of annual temperature range from 70° to 85°, phthisis appears to be rare among the aborigines; but it is more or less increased in frequency in mixed races, and in those who have migrated from very warm to cooler districts, or from a dry and elevated situation to low and humid localities; but the amount of increase under these circumstances cannot be shown. In *Upper Egypt* and other parts of *Northern Africa*, and those places in *Western Asia* where the annual range of temperature is not much above 75°, or below 65°, phthisis is very infrequent, although numerous circumstances combine to occasion external tuberculosis, especially in children, and probably also mesenteric disease; and of these circumstances the most influential are evidently insufficient and unwholesome food, and want of cleanliness. The immunity of these countries, more particularly of *Egypt*, from phthisis, was well known to the ancients from the days of ARISTOTLE; and hence this country was recommended by them as a place of residence for consumptive patients. It is stated by CHARDIN, FRYER, KAYE, KERNS, and others, that consumption is seldom observed in *Syria* and *Persia*; and MM. BROUSSAIS, BOUDET, and other French writers, remark that phthisis is rare in the natives of *Algiers* and of the *Barbary Coast*, the mean annual temperature varying from 68° to 72°. The former of these writers observe, that in *Algiers*, where periodic fevers prevail, of 40,000 cases in the French army only 62 were consumptive; and that the deaths from this disease were 1 in 102, while in the army in France they were 1 in 5. In the *West India Islands* the annual mean temperature varies from 75° to 80°. The statements respecting the prevalence of phthisis in these islands vary remarkably, and are often contradictory; but, upon the whole, it appears that this disease is not infrequent among the dark races, especially negroes who have been brought from Africa, and among creoles. Drs. MUSGRAVE, DAVY, and HUNTER say that it is rare among the indigenous inhabitants. The reports of Col. TULLOCH give five deaths from disease of the lungs annually in 1000 of the population in Jamaica; and a greater mortality from phthisis among white troops stationed in these islands than in their own country, but a much less mortality when stationed in the East Indies.

207. The *East Indies* furnish a variety of climates, according to latitude, elevation above the level of the sea, and the other elements constituting climate (see art. CLIMATE). The annual isothermal lines vary accordingly from 66° to 82°; and although cases of phthisis among the native races are not rare, especially in the jails and other places, where several causes concur with race and climate in occasioning the disease. According to the accounts furnished by STEWART, JACKSON, BALFOUR, SYKES, and others, it appears that external scrofula and phthisis occur, especially the former, in the several races in the East Indies, but in very different degrees of frequency. The writers on this subject generalize from very limited sources of observation, in respect both of climate and race. It is, however, agreed that tuberculosis, both external and internal, are most prevalent in the half-castes, or cross between the whites and natives. Col. SYKES states that in 267,456 cases of all diseases treated during five

years at the dispensaries in *Bengal and North-west Provinces* there were 115 cases of external scrofula and three deaths, and 187 of phthisis and nine deaths; thus showing a low rate of tuberculosis in the natives of India. Dr. BALFOUR states that phthisis is very rare in the natives serving as troops in the *Madras Presidency*, the deaths annually from this disease being only 4 or 3 per 1000. It should not, however, be overlooked that negroes, when removed either to the West or East Indies, are more liable to phthisis than in their native countries.

208. As to the frequency of phthisis in *Madeira* accounts are most contradictory, some writers stating extreme opinions on the subject. Upon the whole, it appears that the disease is not infrequent among the natives, and that it is even common among the lowest class. In *Malta*, in *Italy*, *Spain*, *Portugal*, *Greece*, *European Turkey*, and southern parts of *France*—in all the places to which consumptive patients are so often sent from this country—the disease is more or less prevalent; generally as frequent in all these places as in this country, and in some even more frequent. M. ANDRAL states phthisis to be very prevalent in the Mediterranean Archipelago. Mr. SPENCER WELLS says that one third of the deaths at the Royal Naval Hospital in Malta were from this malady; Drs. BURGESS, LUGOL, ANDRAL, MERVON, and others, state that phthisis is most fatal, especially in certain localities, both in *Italy* and *France*; and of these Orleans, Rheims, Montpellier, Marseilles, Nice, Rome, Naples, &c., are not the least remarkable. Mr. ANCELL gives the following table of the ratio of deaths from phthisis to all deaths in the civil and military hospitals of these countries:

Leghorn....	Civil and military.....	1 in 10·75
Florence ...	Civil .....	1 in 11·5
Rome .....	.....	1 in 3·4
Naples .....	Average of three hosp. .	1 in 2·33
	Military.....	1 in 3·85
Paris .....	Civil .....	1 in 3·25
	Military.....	1 in 12·2

In Marseilles the deaths from this disease are stated to be one in four, in Naples one in eight, in Nice one in seven; but these can be viewed as approximations only to the truth. There can be no doubt that, even omitting the deaths from other tubercular diseases, those which occur from tubercular consumption among the inmates of children's hospitals or institutions, and those brought up in these institutions, are even greater than any just noticed in either of these cities. Dr. CASPAR, of Berlin, gives the following table of deaths from phthisis in different cities in Europe and the United States, the average being about one in six:

Berlin dur. 10 yrs.	1 death fr. phthisis in 5·7 deaths
Paris.....	4 " 1..... 5·5 "
London... 2 "	1..... 6·2 "
Hamburg . 3 "	1..... 4·6 "
Stuttgart . 10 "	1..... 4·7 "
New York . 11 "	1..... 5 "
Philadelphia 7 "	1..... 7·7 "
Baltimore . 8 "	1..... 6·7 "
Boston ... 7 "	1..... 5·9 "

In *Belgium* and *Holland* phthisis is quite as prevalent as in England and France. In *Sweden* the deaths from this disease are said to be about one in nineteen of all deaths. Dr. GELLERSTEDT remarks that the mortality from this malady in

the military hospitals in Stockholm is eight in 1000, and that the life of a soldier is favourable to the production of phthisis, which he believes to be on the increase in Sweden. According to a writer in the British and Foreign Review, this disease is rare in Denmark, and still rarer in Norway, Lapland, Iceland, and the Feroe Isles. In Canada, notwithstanding the severity of the winters and sudden alterations of temperature, the air being dry, tubercular maladies, and especially phthisis, are comparatively rare. In Russia this disease is much less frequent than in the southern countries of Europe, although both Sir A. CRICHTON and Sir G. LEFEVRE state that external scrofula is very prevalent, especially in St. Petersburg and Moscow, and remark that those who bear about them scars from scrofula are supposed to be exempt from phthisis.\*

[The compiler of the "Statistical Reports on the Sickness, Mortality, and Invaliding" among the British troops stationed in every quarter of the globe arrives at the conclusion that *phthisis pulmonalis* is more prevalent in southern than in northern latitudes, and that "it is by no means likely that any beneficial influence can be exerted by climate itself."

Dr. FORRY ("Climate of the United States," p. 236) remarks, that "the conclusion that pulmonic lesions, as regards the annual ratio, are more prevalent in certain systems of climate in southern than northern latitudes, is confirmed by the statistics of the United States Army; but as we proceed in the investigation of this question, in relation to the relative influence of the seasons, the general opinions in regard to change of climate in pulmonary affections, maintained since the days of HIPPOCRATES, will be triumphantly established." Dr. FORRY's remarks, however, apply more particularly to bronchial affections than to tubercular disease. The former, we know, are in nearly all, if not all, cases, benefited by change to a milder climate, while the progress of tubercular disease is often, especially in its last stages, hastened by it. Dr. FORRY remarks, that the "old idea of the air of a marshy country being beneficial in consumption is only partially true, for among Northern troops, stationed at the South through all seasons, consumption of a tubercular nature frequently supervenes upon febrile diseases, more especially in constitutions broken down by intemperance, standing in the relation of those other sequelæ—dropsy, jaundice, and the various chronic lesions of the viscera." The same fact holds, indeed, in the United States as in Europe, viz., that phthisis is more common in the southern than in the northern parts. Thus, while in London 236 out of every 1000 deaths are caused by pulmonary phthisis, in Sweden the ratio is only 63. At St. Petersburg and Stockholm it is much less destructive than throughout Germany, and especially at Berlin, Vienna, and Paris. In the south of Europe, and especially in Italy, where pulmonary invalids resort in such great numbers for the benefit of their health, phthisis is far more common among the natives than in any part of Great Britain or New England. Cold does not *per se* prove favourable to

the development of phthisis pulmonalis, for it has been satisfactorily ascertained that the maximum of liability to the disease is found among those who suffer the least exposure to climatic variations. Dr. FORRY, however, and other writers of authority, recommend a change of climate in this disease as a remedial agent of great efficacy, and especially the peninsula of Florida, as having a temperature not less equable and salubrious in winter than that afforded by the south of Europe.]

209. "In the Southern Temperate Zone, between the isothermal lines of 40° and 70°, comprising the southern part of South America, the Cape of Good Hope, with a portion of South Africa, nearly the southern half of Australia, Van Diemen's Land, and New Zealand, all accounts lead to the conclusion that tuberculosis is much less frequent than in countries situate to the north of the northern tropic." This comparative immunity is owing to the remarkably less liability of the native races to the disease, and to the general dryness of the air, notwithstanding the sudden vicissitudes of temperature. Other conditions, either not known or imperfectly appreciated, may also concur to produce this result. In many parts of Australia, however, the quantity of dust so frequently floating in the air, during the hot and dry seasons, in some measure counteracts the other beneficial influences of the climate as respects phthisis.

210. From the statistical information which has been furnished respecting the prevalence of phthisis in different parts of the globe, and which may be consulted in the works referred to hereafter, the influences of race and of the food adopted by races and by the inhabitants of different countries, are not sufficiently considered, or are even altogether overlooked. Although statistics may nevertheless furnish much that is important on this subject, yet there are other circumstances besides these, which have not been taken into the account. Of these not the least important are, the influences of religious institutions and rites; of the states of social intercourse; of modes of living and of warming apartments in cold and temperate countries; the effects of the soil, of vegetation, of water, and of the emanations from them. Of the agency of these, either in favouring or in counteracting the prevalence or frequency of phthisis, our knowledge is very deficient.

211. From the imperfect information furnished by statistics and by other sources of knowledge, and from what I have stated under CLIMATE, I venture the following inferences as comprising most of what is known of the influence of climate, and of its more important effects in causing tubercular consumption.—*a.* Phthisis is more or less prevalent in the northern temperate zone, especially in the countries of Europe and the United States of North America.

[The deaths from tubercular consumption throughout New England vary from one seventh to one fourth of all that die, according to locality and other circumstances. The seeds of the disease would seem to be more extensively planted in the autumn and winter than at any other season. A vastly greater proportion die of the disease between the ages of twenty and thirty than at any other period; and, during this period, the number of females who die of the disease in New England is nearly double that of males. The same holds true between the ages of thirty and forty. In the

\* ["It is proved by the bills of mortality," says Sir GEORGE LEFEVRE, "that one fifth of the population dies of consumption in the British Isles, whereas the deaths in northern latitudes are infinitely fewer from that disease."—"Thermal Comfort," &c. London, 1844.—*Ann. Ed.*]



country towns of Massachusetts, the proportion of the sexes who die of phthisis is as 39.01 males to 60.99 females; in New York it is as 42.08 to 57.92; and in England, except London, it is as 46.13 to 53.87. It would seem that some causes exist in country towns to extend the disease among females, while different causes exist in cities to aggravate the disease in the other sex. It is a mistaken notion that more die of this disease on the sea-board than in the interior. From 1842 to 1848, in the four western counties of Massachusetts, Berkshire, Franklin, Hampshire, and Hampden, out of 11,803 deaths from all causes, 2398 were from consumption, or 1 in 4.92. During the same period, in the eastern counties, Essex, Plymouth, Barnstable, Bristol, Dukes, and Nantucket, out of a total of 22,930 deaths, 5333 were by consumption, or 1 in 4.29. In Boston, from 1830 to 1849, the deaths from phthisis were 1 in 6.99, or 1 in 7. In New York, from 1838 to 1843, there was, on an average, annually 1 death from tubercular phthisis to 194 inhabitants; in Philadelphia, from 1836 to 1845, 1 in 284; and in London, from 1838 to 1842, 1 in 205. In Portsmouth, New Hampshire, from 1801 to 1825, the deaths from this disease were 1 in 5.02; in Providence, Rhode Island, from 1841 to 1845, 1 in 4.58; in New York city, from 1811 to 1845, 1 in 5.03; in Philadelphia, from 1811 to 1845, 1 in 6.81; in Baltimore, from 1821 to 1845, 1 in 5.97; in Charleston, South Carolina, from 1822 to 1845, 1 in 6.58; in England, from 1838 to 1842, 1 in 6.20; in London, from 1840 to 1847, 1 in 6.97; in Paris, from 1816 to 1819, 1 in 5.55; in Geneva, from 1844 to 1845, 1 in 9.91. Statistics prove that this disease is as prevalent in our Southern States and in the West Indies as in New England, and far more fatal than in Canada and the British provinces of North America.]

212. *b.* This prevalence is most remarkable in the Caucasian race, and in the crosses of this race with any other, more especially with the negro and other dark races.

213. *c.* The natives of countries to the northward of the temperate zone are rarely affected with phthisis while they reside in these countries, and continue the habits and modes of life—of clothing, lodging, sleeping, living, and feeding—which are generally adopted by them; but when they are removed to more temperate climates, and adopt the habits and modes of life of these climates, they evince a manifest tendency to phthisis, which is probably heightened by the nostalgia to which they are subject when removed from their native countries and from accustomed pursuits, habits, &c.

214. *d.* The negro and dark races inhabiting intertropical countries, and the dark races peopling the islands within the tropics, and those in the southern temperate zone are rarely subject to tubercular consumption as long as they remain in their native countries and islands, and continue their usual habits and modes of living; but the offspring from a cross with the Caucasian race, especially when they remove to a temperate or cold and humid climate, and still more these native races when they migrate to such a climate, are even more liable to phthisis than the inhabitants of temperate countries.

215. *e.* The immunity of the natives of the countries to the north of the temperate zone from phthisis is mainly attributable to their active vocations in the open air, to the nature of their

food, and its adaptation to the temperature and climate, to the general dryness of the air, to the warmth of their clothing, whereby the skin preserves its depurating functions, and to the warmth of their sleeping-places. (*See CLIMATE, § 24, et seq.*)

216. *f.* The immunity, or comparative immunity, of the negro and dark races from phthisis, while they reside in their native countries, is chiefly to be attributed to their outdoor modes of living and exercises, to the adaptation of their food to high ranges of temperature, to the influence of miasmatic districts in counteracting the tendency to tubercular consumption, and in no small measure to the increased functions of the skin in these races, these functions being in them more decidedly supplementary of those of the lungs and liver—more actively depurative of the blood than in the white race. (*See art. CLIMATE, § 22.*)

217. *g.* The greater liability of the dark-skinned races to phthisis, when they migrate to a temperate or cold climate, is mainly attributable to the asthenic diathesis of these races, to the depressing influence of cold, especially in cold sleeping apartments, upon the vital condition of their lungs; to the blight which a low range of temperature produces upon the organs of respiration; to the change in their habits, modes of living, food, &c. The proclivity of cross-breeds to this malady is partly owing to the causes just stated, in connexion with their indolence, their debauched habits, their venereal excesses, and indoor occupations, if occupied at all. The dark races and mulattoes, when they migrate to countries whose annual range of temperature is much below that of their native climates, are disposed to congestive or asthenic inflammatory affections of the lungs; in which, owing to the low grades of vital power and vascular action, the morbid exudation is incapable of the usual changes consequent upon sthenically increased vascular action, but instead assumes the tubercular form, or that state which is incapable of organization, and equally incapable of absorption, and which undergoes the alterations characteristic of tubercular matter.

218. *h.* The Mongolian race, especially as typified by the Chinese, does not appear to be more liable to phthisis than the natives of the northern provinces of India, and of the countries in Asia between China and Europe. Of the Chinese, as well as of these latter countries, our knowledge is very imperfect as respects the relative prevalence of disease. But from what I can learn, tubercular phthisis is not a prevalent disease among them, at least as long as they remain in their native climates, and pursue their usual occupations, habits, and modes of living. How far the various races and tribes inhabiting these vast regions may be liable to this malady when they migrate to either colder or warmer countries, is not known; but the results must manifestly depend upon the many circumstances attendant and consequent upon such migration.

219. *i.* The food of man increases the disposition to phthisis in as far as it is not adapted to the constitution and wants of the races in their native countries—to the different races inhabiting cold, temperate, and tropical climates; to each of which it requires to be appropriate in its nature, as shown in the article *CLIMATE* (§ 26, *et seq.*). This adaptation of food to race and climate extends to the beverages used by the inhabitants of

different countries; the neglect of this principle of hygiene being demonstrated by the destructive effects of ardent spirits in the dark-skinned races, which are so little injurious to the natives of cold countries.

220. *k.* The influence of clothing upon the frequency of phthisis requires, equally with food, a reference to race, and the considerations which apply to the one appear in great measure to apply to the other. In all races the clothing, and in the dark races the inunctions of the skin, in addition to the slight clothing required by the vicissitudes of season and weather, tend to promote the regular discharge of the cutaneous functions; the fair-skinned races of Europe and America being those in which these functions are least active in health, and most liable to interruption.

221. *l.* Religion and religious rites may be viewed by many as exerting no influence on the frequency of phthisis or of any other disease in any climate. I believe, however, that religious rites exert some influence, but the extent of that influence I cannot state; indeed, it would be impossible to ascertain it, especially in Mohammedan countries, and in countries to the eastward and the north of the former. There can be no doubt, however, that the strictness of diet, and the rites of the Jews, notwithstanding several countervailing influences to which they have been exposed during many centuries, have rendered scrofula, phthisis, and gout less frequent among them than among other peoples in their vicinity (§ 178).

222. *m.* In our estimates of the influence of climate on the frequency of phthisis in the white races, a cold moist climate, and low situation, and without being miasmatic, or a variable and humid climate, is the most favourable to the production of this disease; while a dry, temperate, and moderately elevated situation, with a regular procession of the seasons, or a limited range of temperature, is that which is most likely to diminish the frequency or arrest the progress of the malady. Other considerations connected with climate will be entertained when the prevention of phthisis is discussed.

223. *G.* Confinement in prisons, barracks, hulks, work-houses, hospitals, and expatriation, &c., are severally productive of phthisis, both in the predisposed and in those who have evinced no marked predisposition, but in the former most especially. In prisons, hulks, and work-houses several injurious influences, physical and mental, combine to produce a more or less marked effect. Insufficient ventilation and exercise in the open air, want of light or sunshine, deficiency of external warmth, low grades of temperature, conjoined with humidity, low and moist situations, and insufficient or unwholesome food, generally combined with depression of spirits, longings after liberty, and weariness of prolonged or hopeless confinement, are the frequent causes of phthisis among the inmates of these places. Dr. BALY states that, in a period of eighteen years in the Milbank Penitentiary, nearly half the deaths and half the pardons on medical grounds were due to tubercular disease, the frequency of this disease progressively increasing after a few months' confinement; and the ratio of mortality in this prison being nearly four times more than that of the metropolis, as regards this malady. Dr. BALY has farther shown that a similar increase of phthisis among prisoners occurs in

other places of confinement, both on the continent of Europe and in the states of North America. Dr. ALLEN WEBB remarks, on the authority of Dr. GREEN, that in the jail of Midnapore, in Upper India, in  $22^{\circ} 30'$  north latitude, and  $87^{\circ} 25'$  east longitude, and in the Calcutta prison, phthisis frequently occurs, although in a hot climate, where this disease is but slightly prevalent. In these intertropical prisons the malady often follows attacks of pneumonia, or it assumes the acute and febrile form, or that described as most common in children (§ 92, *et seq.*).

224. Many of the conditions existing in prisons are, to some extent, present also in barracks and in work-houses. According to the *Army Reports*, the British foot-guards are much more liable to consumption than the general London population; and in most stations, both in temperate and in warm climates, the mortality from phthisis in barracks is much greater than among the officers or the general population of the country. As respects the guards, something may be owing to the height of the men, tall men being more frequently predisposed to this disease than those of middle size; but much more is certainly owing to the congregation of numbers in a limited space, to the irregularities and vices of a barrack life, and to the influence of a vitiated atmosphere. The results are similar, and often more remarkable, in large public or private schools, where a large number sleep in one apartment, and breathe repeatedly the same air.

225. Confinement in *work-houses* and *hospitals* is injurious chiefly by inducing tubercular disease, in some form or other, and especially in that of phthisis. In the hospitals for children this is especially the case, as shown by MM. RILLIET and BARTHEZ. The continued respiration of the air of a hospital or work-house, without removal from the wards or apartments into the open air, is even more injurious than breathing a more impure air than that in these places, when exercise in the pure open air is enjoyed during the day, the continued respiration of even a slightly impure air being more injurious than the respiration, after intervals, of a much more vitiated atmosphere. The impurity of the air in these places is caused by the numbers breathing the same air in a confined space, by the exhalation from the bodies of the inmates, and by the effluvia proceeding from diseases, morbid discharges, &c. Infants of women confined in lying-in hospitals often become generally tuberculous if they remain long in these places, as I have observed on several occasions when consulting physician to one of these institutions.\*

\* [Dr. BENNETT has truly remarked, that an observation of the circumstances which precede the disease, or its so-called causes, clearly indicates imperfect digestion and assimilation as its true origin. Thus phthisis is essentially a disorder of childhood and youth—that is, of a period of life when nutrition is directed to building up the tissues of the body. Tubercular diseases are not induced by diminishing the proper quantity of food taken by a healthy man; but if this be attempted with children, or young persons, they are a very common result. Thus, scrofula and tubercle do not originate among the *able-bodied* men in armies and fleets, to whatever privations they may be exposed; but the contrary happens in the young of founding hospitals, factories, and the poor and labouring classes of the community, as tailors, seamstresses, and others who follow sedentary employments. In the higher classes, they result from imperfect and insufficient lactation during infancy, or the irregular diet caused by carelessness or over-indulgence. No doubt they may frequently be observed in persons whose parents or relatives have been similarly affected. From



226. *Expatriation*, either by transportation for crimes or by emigration, unless the climate to which expatriation takes place be dry and temperate, is generally followed by an increase of mortality caused by tubercular consumption. Even removal from the high lands, and from the scenes of early youth, to the low and humid situations in the same latitude, although the temperature be milder, causes an increased disposition to phthisis. This is partly owing to the mental emotions consequent upon the removal so frequent in young persons thus circumstanced, and is greatly increased by the nostalgia produced in these instances (§ 213).

227. *H. Poverty, and the vicissitudes of fortune and of life*, have no mean influence in both predisposing to and exciting tubercular consumption. MM. LOMBARD, D'ESPINÉ, and LEBERT have furnished sufficient evidence that this malady is much more prevalent among the poor than among the middle and highest classes of society. M. LOMBARD states that the combined statistics of phthisis in Vienna, Paris, Hamburg, and Geneva show that the disease is doubly more prevalent among the poor than in the higher classes. Every competent observer must have remarked the occurrence of phthisis after the loss of fortune, honour, and friends, and have seen mental depression, conjoined with poverty, slowly developing this disease in its most irremediable form, in all temperaments and constitutions, and even independently of hereditary or other states of predisposition. (See also § 170, *et seq.*)

[Dr. RUSH remarks (*Med. Inquiries*, vol. i., p. 37), that "pulmonary consumption is unknown among the Indians in North America," and that "it is scarcely known by those citizens of the United States who live in the first stage of civilized life, and who have lately obtained the title of the first settlers," that "it is less common in country places than in cities, and increases in both with intemperance and sedentary modes of life;" that "females, whose habits are more sedentary than those of males, are more liable to it;" while "ship and house carpenters, smiths, and all those artificers whose business requires great exertions of strength in the open air, in all seasons of the year, are less subject to it than men who work under cover, and at occupations which do not require the constant action of their limbs."—*Loc. cit.* Hence he arrives at the conclusion that the chief method of curing consumption is the invigoration of the body by exercise and labour in the open air—a conclusion at which all known facts and experience constantly point. In regard to this disease being unknown, however, among the Indians, we have observed that it is extremely common among the Chippewas about Lake Superior, and also among the other half-civilized tribes on the borders of civilization. Its prevalence, in fact, is in proportion to the adoption of the vices, manners, and habits of the whites.]

228. V. PATHOLOGICAL CAUSES OF PHTHISIS.—Previous disorder or disease more frequently both

predispose to and directly occasion tubercular consumption than is commonly supposed; and the effect is produced not merely by calling the tubercular germs into activity where they already exist, but also by causing their formation and progressive development where no evidence either of a tuberculous diathesis or of their existence had been previously detected. If we endeavour to trace the pathological changes as they successively occur, and remark their nature, from those characterizing the previous disorder, to those which interpose between that disorder and those which constitute the incipient stage of phthisis, we shall be especially struck by the influence produced upon the vital and constitutional powers by the disorder, although apparently slight, which has occasioned this malady. Several of these disorders are so insidious, and others of a more important nature are in some cases so mild, as not to excite any apprehension as to the effects they may produce, and thus they are allowed to proceed, or are exasperated by exposure and neglect of proper treatment and regimen, until the changes or states which either indirectly lead to tubercular deposits or directly produce them more or less fully supervene. In other cases severe attacks of disease, either inflammatory or exanthematous, are injudiciously treated or neglected towards and during convalescence, owing to the desire of the patients or their friends to get rid of medical attendance; or are imprudently or prematurely exposed to the various internal and external causes of disease, and especially to those which in such circumstances more particularly depress organic nervous power, disorder digestion and assimilation, and blight the vital functions of the respiratory organs. During convalescence from epidemic and exanthematous maladies, and from inflammatory affections of the respiratory passages and organs, the patient is often left, by his own self-will and ignorance, without those means which are required to restore his exhausted vital energies, to renew the vigour of the organic nervous system, to improve digestion and assimilation, and to promote the healthy metamorphosis of the colourless chyle globules into the red globules of the blood. In many diseases, and especially in exanthematous and other fevers, the waste of the hæmato-globulin is progressive, and at the period of incipient convalescence it is generally greatest, and the blood is then poorest and most deficient in red globules. Now if these states of exhausted organic nervous influence and of impoverished circulating fluids be not improved by judicious treatment and regimen, or by change to a healthy air, &c., and more particularly if they are influenced by injurious exposures or agents, digestion, assimilation, and nutrition are liable to be perverted, and tubercular germs are thereby rapidly developed, or are directly or primarily produced.

229. *A. Previous disease of the respiratory and circulating organs* has no mean influence in predisposing to, or in directly occasioning phthisis. Frequent attacks of catarrh, catarrhal fever, influenza, hooping-cough, bronchitis, broncho-pneumonia, pneumonia, &c., are severally calculated to develop phthisis, particularly in the serofulous and lymphatic diathesis. In these diseases the evil is not always to be ascribed to the development during their course of the germs of tubercle which had previously existed, but to the primary formation of these germs or deposits during their

facts of this kind it has been supposed that hereditary predisposition, a vitiated atmosphere, changeable temperature, certain occupations, humidity, particular localities, absence of light, &c., predispose to phthisis. Very frequently several of these are found united, so that it is difficult to ascertain the influence of each. When they so operate, however, they invariably produce, in the first place, more or less disorder of the nutritive functions, and are associated with dyspepsia or other signs of mal-assimilation of food.—*Ed.*]

progress and decline, or their periods of decadence, constituting the early stage of convalescence. In this stage excited action has subsided into more or less of exhaustion, vital power is locally or generally impaired, the circulating fluid somewhat wasted as respects its most assimilated elements, and the digestive and assimilating functions considerably weakened. Diseases of the heart, especially valvular diseases, causing either congestion of the lungs or hæmorrhage from the bronchial tubes, have also no mean influence in developing phthisis; for the congestion thus occasioned is not unfrequently productive of an exudation either into the air-cells or into the parenchyma of the lungs, which passes into the tubercular form, or is converted into or becomes the nidus of fully-developed tubercles. Similar results may also follow the exudation of blood from the bronchi, especially if the fluid pass into the air-cells.

230. *B. Exanthematous diseases* are often followed by phthisis; and this latter malady is more likely to originate during the decline of these diseases, or in their early and advanced stages of convalescence, than at an early period. Of all this class of diseases there is none that is more productive of phthisis, or more rapidly develops it where the germs of the malady already exist, or where a predisposition to it is present, than *measles*, and this is more especially remarkable in persons about or above the age of puberty. I have often observed persons who, by diathesis, hereditary predisposition, or other circumstances, were possessed of a consumptive tendency, pass through measles without any marked pulmonary complication, or any pulmonary disorder that could be detected by auscultation or otherwise, and yet, during the progress of advanced convalescence, or soon afterward, indications of incipient phthisis have appeared, especially if any exposure or want of care had favoured the development of the malady. In this, and in others of the exanthemata, the decadence of the disease, and the consequent convalescence present, as just stated, the most favourable occasions for the origination of phthisis, and these should be carefully guarded against.

231. Of all the exanthemata, there is none so unfrequently followed by phthisis as *small-pox*. It would appear that this latter malady either carried off most of those predisposed to phthisis, when small-pox was a more prevalent disease than it is now, or it destroyed the predisposition to phthisis. I have long remarked, and I believe that others have also remarked, the very rare occurrence of phthisis in any one even but slightly marked with small-pox. It is manifestly otherwise with *vaccinia*, for what I have stated with respect to its influence on the frequency of *SCROFULA* (§ 47-49) is equally applicable to phthisis. It does not appear that *scarlet fever* is influential in producing or developing phthisis farther than that the debility consequent upon it, during convalescence, requires a careful protection from exposures and other exciting causes of this latter malady. Scarlet fever is often attended or followed by enlargement and suppuration of the glands of the neck, especially in serofulous subjects; and in these cases, as well as in other serofulous cases, when these glands suppurate, the liability to tubercular consumption is thereby greatly diminished.

232. *C. Suppressed or excessive secretion or excretion* is often more or less concerned in occasioning phthisis. The suppression of an accu-

tomed evacuation or discharge, or the drying up of an issue, seton, or ulcer, or the healing of a fistulous ulcer, as *fistula in ano*, has been followed by phthisis; but in all such cases as have fallen within my observation the disease had commenced previously, or had even made some progress, the suppression of the discharge, especially of hæmorrhoids, or the catamenia, or of the cutaneous excretions, having been followed by a more acute form of the disease, or having developed a chronic, or slow and insidious state of phthisis, into the congestive, inflammatory, acute, or hæmorrhagic, according to the diathesis or habit of body of the patient.

233. On the other hand, excessive discharges, whether hæmorrhagic, secretory, or excretory, may so weaken the constitutional powers—may so depress organic nervous energy, and impoverish the blood, by wasting its hæmato-globulin, as to be followed by tubercular phthisis, either where a predisposition to it already existed, or where causes tending to blight the vital condition of the lungs were in operation—as cold, humidity, &c.; excessive losses of blood, by operation or from hæmorrhoids, from menorrhagia, flooding, &c.; prolonged or improper suckling, diarrhœa or dysentery, enteric fevers, masturbation, and venereal excesses, have severally not unfrequently either caused or developed phthisis, especially where a predisposition to it was present.

234. *D. Impaired organic nervous or vital power*, or debility, whether hereditary, original, or acquired during childhood, youth, or maturer age, is more intimately connected with the occurrence of phthisis than is generally supposed, and is directly concerned with the causation of the impaired conditions of digestion, assimilation, and nutrition, which constitute a large portion of that circle of morbid actions characterizing the commencement and early stage of tubercular consumption. (*See DEBILITY.*)

235. *E. Morbid states of the circulating fluids*, both the chyle and blood, that are so often present at an early stage of phthisis, or even before this state has manifested itself, are the first results of impairment of the organic nervous power; and although comparatively rarely declared in the form of anæmia or chlorosis, yet they consist of a greater or less deficiency of the hæmato-globulin, and especially of the red globules, with an excess of the colourless globules, and a weakened crasis or diminished vital cohesion of the fibrin, and consequently of the coagulum.\*

\* [It is now admitted by the best pathologists that tubercle is an exudation of protein material in a solid form and of a low grade of development, its shape depending chiefly on the tissue in or upon which it is deposited. It is the opinion of ROKITSANSKY that an especial immunity against tubercle is afforded by an abnormally venous condition of the blood, from whatever cause this may originate; and also by congenital malformations of the heart or great blood-vessels; morbid alterations of the same; deformities of the chest, producing contraction of its cavity; annihilation of the function of one lung by pleuritic effusion; abdominal growths, preventing the free descent of the diaphragm; chronic pulmonary catarrh; emphysema and bronchial dilatation; in short, by whatever prevents due oxygenation of the blood. Pregnancy, also, delays the advance of tuberculous disease, by impeding the respiratory function, thus inducing a venous condition of the blood; and aneurismal and tuberculous diseases do not coexist, because the deposits on the inner surface of the sac exhaust the fibrinous constituent of the blood. Typhus and the exanthemata do not often, if ever, attack the tuberculous, although they may lay the foundation of phthisis. Persons labouring under intermittents, goitre, or rachitis, are seldom liable to tubercular disease; and the same



236. VIII. OF THE OPERATION OF THE CAUSES OF PHTHISIS.—*Phthisis*, whether hereditary, congenital and proceeding from causes affecting the parent, or produced by causes acting during early or mature age, generally arises from a concurrence of causes, one or more of which may be much more effective than the rest; they may act either contemporaneously or successively, or the influence produced by one or two may be reinforced or determined by others acting subsequently.

237. i. The causes, then, either affecting the parents, and the offspring through them, or the individual only during early childhood, or subsequently, in the many modes of combination or succession that most necessarily arise from their numbers, are of such natures as to impair vital power, especially as manifested by the organic nervous system, and by the organs and functions endowed by this system.

238. ii. As this system actuates the vascular system and the blood, and as it influences also the digestive, assimilating, and nutritive functions, the secretions and the excretions, so it necessarily follows that causes which depress or exhaust, or otherwise impair the influence or power of this system—the organic nervous—will co-ordinately affect the states of the assimilating functions, of the blood, and of nutrition.\*

239. iii. The following may thus be inferred as the successive or morbid phenomena resulting from the action of the causes of phthisis, whether occurring singly, or in various combination, or in succession: 1st. Depression of the organic nervous or vital power of the frame, or an imperfect development of this power, owing to hereditary or congenital, or to more immediate or direct causes operating in early or advancing epochs of life; 2d. Morbid states of the circulating fluids, especially of the chyle and blood, commencing with the slow or imperfect development of the chyle globules, and followed by a slow or impaired metamorphosis of these and the blood globules, or of the former into the latter—the plasma or *liquor sanguinis*, with its fibrin, being deficient in vital endowment; 3d. A wasting or diminution of the red globules, and an impairment of the crasis or vital endowment of the plasma by excessive secretion and excretion from the lungs, skin, and bowels; 4th. The nutrition and vital cohesion of the tissues—the organization of the frame ultimately suffers.

240. iv. These changes in the organic nervous influence or vital power, in the circulating fluids, and in the nutrition of the structures, produced by the causes of phthisis, may take place contemporaneously and co-ordinately; but they may more reasonably be supposed to advance in succession, will hold true in regard to cancer. No doubt is now entertained in regard to the identity of tuberculous and serofulous matter, they both having the same elementary composition, undergo the same changes, are produced in the same way, and produce the same effects on the tissues in which they are deposited.—*Ed.*

\* [Prof. AUSTIN FLINT observes on this point as follows: "Tuberculosis has been supposed by some distinguished authors to be often preceded and accompanied at its commencement by notable disorder of the digestive function. *Such has not been the fact in my experience.* I have not observed that dyspeptics are prone to become affected with tuberculous disease; and, conversely, tuberculosis has seemed to me, oftener than otherwise, to originate without being attended by any marked evidence of gastric disorder. So far, then, from dyspepsia contributing any ground for anticipating that the evidence of tubercles will be discovered, I have come to regard it in an opposite light."—*Loc. cit.*—*Ed.*]

cession, however rapidly, impaired organic nervous power accelerating and increasing the other subsequent changes. That this procession of morbid changes actually obtains may be inferred from the modes in which the causes may be presumed to operate; for those causes which primarily and chiefly affect, by depressing or impairing, or imperfectly developing, organic nervous power, as hereditary influence, the depressing emotions of mind, &c., may rationally be presumed to operate consecutively, and to no slight extent also impede and disorder digestion, assimilation, and the healthy metamorphosis of the chyle and blood globules, and ultimately the nutrition and vital cohesion of the tissues. Many other causes which more directly tend to prevent the development of the chyle and blood globules, or to promote their waste or destruction, as insufficient food, increased discharges, &c., depress organic nervous or vital power, while they impair or arrest nutrition. Certain causes, again, exert a still more extended influence; for they act directly and manifestly, both by depressing or exhausting vital power and resistance, and by accelerating or increasing the waste and destruction of the hæmato-globulin; nutrition, and the healthy conditions of both the fluids and the tissues being more or less impaired. The most influential of these last causes are premature or excessive sexual indulgences in either sex, masturbation, excessive secretions and discharges, sedentary occupations in ill-ventilated and over-crowded apartments, impure air of any kind, confined and insufficient exercise, defect of light and sunshine, &c.\*

241. IX. TREATMENT OF TUBERCULAR CONSUMPTION.—i. HISTORICAL SKETCH OF THE TREATMENT RECOMMENDED BY AUTHORS.—It was remarked by Dr. YOUNG, one of the greatest of the many names that adorn the literature and science, not only of our profession, but of our country, in his learned work on "*Consumptive Diseases*," that although we may not obtain from the medical writings of the ancients any great variety of information immediately applicable to practical purposes, we may still feel a sufficient interest in the history of a science which deeply engages our attention, to induce us to enquire how long the

\* [Dr. HUGHES BENNETT maintains, with great probability, that the peculiarity of phthisis is, that an excess of *acidity* exists in the alimentary canal, whereby the albuminous constituents of the food are rendered easily soluble, while the alkaline secretions of the saliva and of the pancreatic juice are more than neutralized, and rendered incapable either of transforming the carbonaceous constituents of vegetable food into oil, or of so preparing fatty matters introduced into the system as will render them easily assimilable. Hence an increased amount of albumen enters the blood, as shown by chemical analysis, while fat is largely supplied by the absorption of the adipose tissues of the body, causing the emaciation which characterizes the disease. In the mean while, the lungs become especially liable to local congestions, leading to exudation of an albuminous kind, which is tubercle. This, in its turn, being deficient in the necessary proportion of fatty matter, elementary molecules are not formed so as to constitute nuclei capable of farther development into cells; they remain, therefore, abortive, and constitute tubercle corpuscles. Thus a local disease is added to the constitutional disorder, and that compound affection is induced which we call phthisis pulmonalis—consisting of symptoms attributable partly to the alimentary canal, and partly to the pulmonary organs. We may, therefore, conclude with Dr. B., that, 1. An oily emulsion must be formed to constitute a proper chyle to be converted into blood; 2. That in pulmonary and other forms of tuberculosis, this process is interfered with; 3. That, consequently, a state of the constitution is induced favourable to the deposition of tubercular exudation into various tissues, but especially into the pulmonary organs.—*Ed.*]

few truths which are fully established with regard to it have been sufficiently demonstrated. "When, indeed, a fact is once well authenticated, no accumulation of authorities can be sufficient to invalidate its credibility; yet we cannot help placing a greater degree of confidence in opinions which we are, for other reasons, inclined to adopt, when we are informed that they are sanctioned by the observations of the most respectable authors of every age." It is necessary to premise that, until the commencement of the nineteenth century, the sub-acute and chronic forms of *bronchitis* were very generally described and treated as forms of *consumption*, and even as true *tubercular phthisis*; and that this want of precision in the diagnosis of these diseases led not only to a much greater diversity of opinion as to their treatment, but also to a marked difference in the reputed results of the means employed. The general misconception existing among writers respecting the precise nature and seats of bronchitis, and tubercular formations in the lungs, and their consequences, should be kept in recollection in reading the following sketch; for it will then become apparent that much of the benefit produced by many of the means recommended was actually not manifested in the cases of tubercular consumption, but in those of sub-acute, or asthenic, or chronic bronchitis. (See *art. BRONCHITIS*.)

242. HIPPOCRATES frequently mentions tubercular consumption by the name *phthisis*, *phthoe*, and *empyema*, and states that the age most liable to it is from 18 to 35. He notices many of its most prominent phenomena; as the taste and appearances of the expectoration, the pain between the back and sternum, the frequency of hæmoptysis, the quick, wheezing respiration, the cough, the condition of the hair and nails; the sweats, diarrhoea, emaciation, pleural adhesions, &c. His treatment is not always consistent with itself. He advises caustics externally, emetics, purgatives in moderation, oxymel, milk diet, especially asses', goats', and mares' milk, warm from the animal; walking exercise; avoiding the extremes of heat and cold. In addition to these, several other, and often opposite means, are advised in different parts of his writings, to which it is unnecessary to refer.

243. In the works of ARISTOTLE is to be found the earliest notice of the opinion that phthisis is infectious. He states that this disease makes the breath corrupt and offensive, and that those who approach the diseased person breathe air vitiated by him. PLAUTUS mentions resin and honey as being employed by the Romans for hæmoptysis; and DIOSCORIDES, the physician of Cleopatra, and the greatest writer on the materia medica in ancient times, recommends sulphur—a substance which has been employed in various forms, even down to the present time. ARETÆUS considers ulceration of the lungs as genuine consumption, called it *phthoe*, and gives a good description of the disease. Most of the chapter on the treatment is lost, but in what remains milk diet and sea-voyaging are strongly advised.

244. CELSUS states that, in genuine consumption, a long sea-voyage and change of climate are most advisable, if the strength will permit, and the climate of Alexandria is preferred by him. He remarks that the worst air for any disease is that in which it has originated. Among various other means he recommends milk diet, with garlic, leeks, &c., with vinegar; farinaceous articles,

occasionally some mild animal food; flour boiled with mutton suet, and some light and austere wines. He advises the cautery on various parts of the chest, and the ulcers not to be healed as long as the cough continues. He mentions several other remedies, as horehound with honey; the juice of plantain; garlic in wine, raw or soft; eggs with sulphur; hyssop; turpentine boiled with butter and honey; carriage exercise; sailing on a long sea-voyage. For hæmoptysis he advises bleeding, cupping, wool wet with vinegar to be placed where pain is felt; a cool apartment, and rest. The elder PLINY enumerates many substances as specifics for consumption, especially ammoniacum, a course of milk in the mountains, the juice of plantain, a linctus of betony with honey; goats' fat in gruel, or with honey and water, and a little rue, and various other means less rational.

245. The works of GALEN furnish many prolix and digressive discussions on phthisis. The expectation of cretaceous concretions was first noticed by him. He believes in the infectious nature of the disease. He prescribes vinegar much diluted with water for the hectic; bleeding, an emetic, purgatives, frictions, baths, exercise, a mild opiate at night, and removal to *Stabie* for the advantages of the air and milk of that place. He remarks that the air of that place is dry, the pastures healthy, the hills of moderate height, three miles from the Bay of Naples, sloping gently to the west, and near to Vesuvius, which makes the air still drier by its volcanic heat, and defends it from the northwesterly winds. At *Stabie*, he says that the milk of cows is used; but he considers asses' and goats' milk preferable, the former being lightest, the latter of an intermediate nature. In order to allay the cough and improve the expectoration, he prescribes frankincense, myrrh, saffron, squills, liquorice, nastich, tragacanth, &c., with sirup of grapes and honey. When the discharge is excessive, he employs opium and castor, or aloes, mastich, and saffron; or the juice of hyoseyamus with pepper; or a lozenge of *Scribonius Largus*, containing liquorice, myrrh, turpentine, and tragacanth; or sulphur, with cardamoms and cinnamon. Most of GALEN's prescriptions were copied from those of the physicians who had preceded him. Various modes of preparing the *diacodium*, consisting chiefly of sirup of poppies and honey, are given; and for dry coughs, iris with honey is recommended; and for hæmoptysis, roses, gum, tragacanth, bole, linseed, and polygonum; and for the consumption consequent on it, iris with hyssop, bitter almonds, the juice of squills, with honey, southern-wood, and various other substances.

246. CÆLIUS AURELIANUS gives a tolerably correct account of the disease by the name of *phthisis* or *phthoe*. The medicines he prescribes are honeyed water, fenugreek, iris, aristolochia, arum, and horehound; also fir-cones, with honey and liquorice; and *diacodium*, with butter and honey. Sailing, especially to a distant climate, and reading aloud, are also advised. He censures the use of emetics, and considers the cold bath dangerous. For hæmoptysis he directs astringent electuaries, and pomegranate with aloe, as advised by THEMISON. If the hæmorrhage continue in moderation, he prescribes blood-letting on the third day, as inflammation will then take place; but if the symptoms are urgent with dispnoea, bleeding should be practised at an earlier period. ORIBA-



sius gives merely an abstract of GALEN's practice, and remarks that a milk diet is of more importance than all other remedies. AETIUS makes a similar remark respecting asses' milk. He also recommends venison fat dissolved in soup, and caustics to the chest. ALEXANDER TRALLIAN gives ripe fruit for the hectic of phthisis, especially grapes. When concretions are expectorated he employs a cooling diet; and for the cough the juice of lettuce with liquorice; and the diacodium for relieving thirst and excessive perspiration. He also mentions the hermodactyls and their combinations. In the writings of PAULUS ÆGINETA and ACTUARIUS, there is nothing beyond what is contained in the works of GALEN.

247. The *Arabian* writers exhibit no views of the nature and treatment of phthisis different from those which have been given by the Greeks. RHAZES, the most original of these, strongly recommends a milk diet, and fumigations from a mixture of orpiment, aristolochia, myrrh, styrax, and galbanum in equal parts, with a sufficient quantity of butter. AVICENNA prescribes camphor lozenges; in the early stages, bleeding; and generally a dry air, a milk diet, and sugar of roses. In all else he closely follows GALEN.

248. The medical writers of the fifteenth, and of the first half of the sixteenth century, follow the doctrines and practice of the ancients, with the exception of PARACELSUS. He recommends a powder for phthisis, containing crude antimony and crocus martis. He considers diet to be of the greatest consequence, and advises a bath to be tried containing a decoction of herbs with sulphur. FUCHSIUS was the first to notice digitalis, but in a very imperfect way. FERNELIUS, whose reputation was high in the sixteenth century, praises asses' milk, and small bleedings for hæmoptysis; in all things he principally followed HIPPOCRATES. LOMNIUS notices the infectious influence of the expectoration and breath in phthisis, and the hereditary character of the malady. The work of NICOLAS PISO is only a compilation from GALEN and other ancient writers. PROSPER ALPINUS merely states, in his work on the Diseases of Egypt, that phthisis is one of the endemic maladies of the country. FORESTUS was among the first to give cases in detail; but he professes merely to follow the doctrines and practice of GALEN. Among the means which appear to have been most beneficially used by him in consumptions are asses' and goats' milk, and sulphur with the white of egg. SCHENCK notices the use of turtle broth, and snails fattened on sugar and flour for hectic; but his materials are chiefly compiled from other writers. Most of the remedies he mentions have been already noticed; but we find that AVENZOAR prescribed olive oil, RUBÆUS sulphuric acid, and J. G. SCHENCK the balsam of sulphur, in phthisis. The voluminous writings of BALLONIUS or BAILLOU, a physician in large practice in Paris at the end of the fifteenth century, contain nothing more deserving notice respecting phthisis than a remark as to the frequent occurrence of the disease in those who have nursed others affected with it.

249. POTERIUS, a physician to the French court, struck out novel modes of practice in this disease, but kept the preparation of most of his chemical medicines secret. These, as far as they are known, seem to have been oxydations of tin, of mercury, of silver, of antimony, of gold, &c., with various other substances. He employed su-

gar of lead as a refrigerant; and a preparation which, under the name of the anti-hectic of POTERIUS, long enjoyed a great reputation. Dr. YOUNG states that this medicine appears to have consisted of two parts of tin and one of antimony, oxydated by means of nitre. He professes to have cured phthisis by giving five drachms of balsam of sulphur every morning with sirup, and the anti-hectic in the evening, sulphur lozenges and iris being held constantly in the mouth, with a diet of wine and animal food. The balsam of sulphur he recommends to be made with the oil of almonds, and given in milk; other oils make it too heating. SPIGELIUS states that consumptions are more common in England than elsewhere, owing to the habit of confining the chests of females by tight dress; and that in Venice, where this habit does not exist, females are more healthy.

250. SENNERTUS, whose works were very generally confided in at the commencement of the seventeenth century, closely follows GALEN. He considers the debility, diarrhoea, &c., to depend, in phthisis, upon an acrid or morbid secretion generated in the lungs. He prescribes many medicines, especially rhubarb, with infusion of roses and goats' whey; and he cautions against too copious evacuations of any kind. He advises an issue in one or both arms, if the debility and emaciation be not extreme. He remarks that sulphur was first recommended in phthisis by DIOSCORIDES; and he makes favourable mention of honey, roses, horehound, hyssop, &c. He quotes other authors in favour of guaiacum and ginseng. BONTIUS, in his *Medicine of the Indies*, gives a case in which he supposes that fragments of the bronchi were expectorated, but which are mere false membrane formed on the bronchial surface. For true consumption he praises his opiate extract of saffron, which, he says, stops bleeding, quiets the cough, and has alone cured many desperate cases. He also prescribes conserve of roses with poppy seeds and sulphur, and decoction of ginseng or of sarsaparilla. Verily there are much worse modes of treatment employed in recent times than those adopted by SENNERTUS and BONTIUS. TULPIUS furnishes nothing more deserving notice than the advantage obtained in a case of the disease by eating oysters daily. FABRICIUS HILDANUS describes several dissections of phthisical subjects, and notices the complication of pulmonary with mesenteric lesions, and the presence of calcareous concretions in the lungs. He relates several instances of successful recourse to setons.

251. Our countryman BENNET, as VAN SWIETEN and Dr. YOUNG very justly remark, has much surpassed his predecessors, and most of his successors also, as a writer on consumption, which he experienced in his own person. He pays marked attention to the breathing and the sputa, to the prognosis, and to the several contingent affections in the course of the disease. For hæmoptysis, leading to phthisis, he advises bleeding, warmth to the extremities, and bleeding from the feet in females, if the catamenia be scanty or suppressed. He recommends milk and milk diet, but prefers medicated whey, and reprobates the use of saccharine substances, as productive of an injurious fermentation. He considers the best expectorants to be those which contain resin and turpentine. BENNET also has recourse to frictions and fomentations, and to balsamic fumiga-

tions. These last should consist, in his opinion, of frankincense, turpentine, and styrax, with cinnamon, colt's-foot, and other articles, made into a powder or troche, and burned on coals. He prescribes also mixtures of herbs, on which boiling water is poured, and the vapour to be inhaled by holding the head over the vessel containing them. Issues are much praised, and, according to my experience, with very great justice. He directs them in various situations, according to the symptoms, and he considers that they may be kept sweet by using peas of orris root, and when the discharge should be promoted equal parts of hermodactyls and wax. He recommends Welsh flannel to be worn next to the skin, and not to be too frequently changed. Animal food, neither very fat nor lean, is allowed, and a gentle emetic is given when the stomach is loaded, and a decoction of sarsaparilla and other woods with ginseng is recommended for drink. If we except the recent employment of cod-liver oil in phthisis, in what, it may be asked, has the treatment of this disease been advanced since the appearance of the work of BENNET, by the voluminous writings of specialists and stethoscopists in recent times?

252. The continental writers of the middle of the seventeenth century afford very little information as to the treatment of phthisis beyond what was previously known. SILVATICUS confided chiefly in bleeding, issues, and sulphurated lozenges. RIVERIUS notices the infection of persons who had nursed phthisical patients. Among the many substances already mentioned he particularizes guaiacum, Peruvian balsam, and the stomachic, and the diaphoretic gold, of POTERIUS. BARTHOLIN furnishes nothing deserving notice farther than that sitting apartments may be made, by suitable vapours or medicated effluvia, useful substitutes for a voyage to Egypt or other warm countries. SYLVIVS attributed phthisis to the existence of glandular tubercles, which, when in a state of suppuration, constitute the vomica. For the cure of the disease he administers opiates, demulcents, and emulsions, fumigations, decoctions of the woods, hermodactyls, &c. He praises balsam of sulphur, prepared slowly with oil of anise seed, and says that it facilitates expectoration and relieves the breathing. He considers the milk of sulphur to be much inferior to it. To promote the appetite he prescribes the elixir proprietatis, which is made of myrrh, saffron, aloes, sulphurous acid, and spirit of wine, digested together. The diet he allows comprises wheat bread, broths, milk, yolks of eggs, biscuits, with a little generous wine.

253. GIDEON HARVEY gives a tolerably good description of phthisis, notices bleeding, and remarks that great caution is required in practising it. He prefers whey to milk, gives it liberally with conserve of roses, and mentions the imperatoria as being recommended to him for this disease. WILLIS remarks that the atmosphere of towns is not always unfavourable to consumptive patients, for he has observed many have better health and less cough in London than in the country. He prescribes sulphur in all forms, several balsams, and tar-water. After bleeding, he advises narcotics, the muscus pyxidatus, warm bathing, frictions, blisters, &c. DIEMERBROECK mentions the case of a person who was cured by taking goats' milk thrice daily for three months, without any other medicine. BONETUS furnishes some information as to the lesions formed in

phthisical cases, but it is of a very loose and imperfect kind, chiefly furnished by former writers, many of them of little reputation.

254. Of the writings of SYDENHAM, which have been extravagantly praised, but which are now more justly estimated, Dr. YOUNG justly observes that, "among the practical writers on consumption he cannot be considered, even by his warmest admirers, as holding a distinguished rank." His pathology of the disease hardly deserves notice. For a confirmed consumption, medicines are, he remarks, of little use; but bleeding, mild purgatives, and pectoral remedies may be tried, with inaccessants or attenuants, according to circumstances. For the fever he gives refrigerents, asses' milk, emulsions, and opiates. For hæmoptysis he directs bleeding, cathartics, and the avoidance of animal food. Horse-exercise is very strongly recommended by him; and he states, with the truth that many cannot fail to appreciate, that riding cures consumption as certainly as bark cures intermittents. Carriage-exercise is also praised by him. For simple cough he prescribes abstinence from wine and meat for a few days; ten drops of anised balsam of sulphur, taken occasionally on a lump of sugar; lozenges containing liquorice, alecampane, anise seed, angelica, iris, and sulphur; and a linctus of oil of almonds, with sirup of capillaire and violets. If the cough be obstinate or attended by fever, he orders bleeding and cathartics; and if the patient becomes consumptive, ten drops of Peruvian balsam three times a day, a decoction of bitter plants, riding being the chief remedy. G. HARVEY, after ridiculing the treatment of consumption proposed by his predecessors, concludes that there is a single cheap remedy which does wonders; but this remedy he conceals. The only remark made by him deserving notice is, that hectic is generated by the pus which enters the blood; for the disease is partly an affection of the fluids, and not, as has sometimes been supposed, of the solids alone.

255. The *Phthisiologia* of MORRIS was for more than a century the basis of practice in consumption, although in all most important matters it was anticipated by the writings of BENNET. There remain, therefore, but few topics deserving notice. Chalybeate waters are considered by him as preferable to all other means for the prevention of the disease, especially in scrofulous constitutions; he directs them to be taken freely, either cold or warm. He considers catarrh to be the most frequent cause of phthisis; and infection sometimes to occur, for he believes that it may be communicated to a bed-fellow. When proceeding from this latter cause, he considers it to be most fatal. He recommends bleeding in the early stage, but views it as fatal in the advanced stages, and opiates for the cough with purgatives, as the aloetic tincture. After bleeding, emetics are viewed by him as of great benefit, in the first stage, but they ought to be followed by opiates. He frequently prescribes his stomachic pills, consisting of aloes, myrrh, mastich, saffron, cloves, wormwood, nutmeg, calamus, mace, rhubarb, musk, cardamoms, &c. In scrofulous and scorbutic consumption he recommends pills of gum ammoniac, with benzoïn, balsam of Peru, and sulphur. But in all forms of phthisis, especially in the more advanced stages, he considers cinchona the great and general febrifuge. Several forms and complications of consumption



are particularized by him as requiring different or additional means of cure. He says that, in asthmatic phthisis, opium is injurious, by increasing the dyspnoea; but that ammonia and the citrate of potass are most useful remedies. In the melancholic and hysterical phthisis, emetics, he avers, act like magic, and opium is particularly requisite. For phthisis complicated with hæmoptysis, after venesection and other remedies, he gives the bark in doses of a drachm every four hours. He remarks that calculi may form in the lung, may lie there a long time inactive, or they act as foreign bodies. Consumption consequent on syphilis he considers to be of an asthmatic nature. Chlorosis often passes into phthisis, he justly observes, by imperceptible degrees, if not treated by chalybeates and purgatives. When he suspects internal ulceration, he gives from 20 to 30 grains of calomel every third or fourth morning, and the diaphoretic antimony at night. BRUNNER states that he "entertained strong doubts of the propriety of MORTON'S practice of giving cinchona in hæmoptysis, till he found by experience that it succeeded, where every thing else had failed."—YOUNG, p. 203.

256. ERMÜLLER recommends emetics early in phthisis, and a diet of milk and raw new eggs. BAGLIVI furnishes us with nothing novel, excepting that he supposes ipecacuanha to be the best remedy for this disease, and for all hæmorrhages and discharges. WEPFER furnishes some of the earliest information as to tubercles. In his observations on diseases of the head, he gives an account of an *endemic* consumption at Waldschut, on the Rhine, where there is a cavern in which mill-stones are dug and wrought. The air is there always hot—even in winter, and a very fine dust floats in it. All the workmen employed in it become consumptive, if they remain a year, or even a shorter time.

257. STAHL'S opinions as to the treatment of phthisis are not worthy of his reputation. His remarks are chiefly directed to the non-efficacy of most of the means which had been advised up to his time, and many of his observations are just. He reprobates the use of balsams, opiates, expectorants, cinchona, myrrh, balsam of sulphur, &c., and confides chiefly in bleeding, and nitre in moderate doses; and asses' milk, he says, is fit only for asses. The too general or inappropriate use of these and other medicines—the universal employment of a medicine because it has been advised, or found useful in one or even a few cases, is mere empiricism. It is the appropriate exhibition of a medicine to inferred pathological conditions which constitutes rational practice. He remarks that females are more frequently consumptive than males; but they have a greater chance of escaping its fatal termination. He considers exercise on horseback or in a carriage to be the most beneficial remedy for phthisis. FULLER agrees with STAHL as to riding on horseback being most salutary in this disease, when "without fever or ulcer;" but he adds that "the patient must be a Tartar, and live on his horse."

258. F. HOFFMANN, the rival of STAHL in reputation, fully discusses the treatment of hectic fever and phthisis. He remarks that hectic attended by indigestion may often be relieved by an emetic of ipecacuanha, followed by a dose of aloes. If amenorrhœa be a concomitant, bleeding in the feet and deobstruents are prescribed by him. If mesenteric disease complicate phthisis,

as often observed in children, warm bathing, nitre, sulphate of potass, and sal-ammoniac are recommended. In all hectic he considers milk a principal remedy, especially woman's milk, asses' milk, goats' milk, or cows' milk, with manna or conserve of roses, or with Seltzer-water. He also ventures to give the tincture or infusion of roses, cascarilla, cinchona, and nitre. He gives the muriate of potass when the appetite is weak. Bleeding, he says, should be practised with much caution. He adverts to a patient who was kept alive thirty years by losing some blood twice a year, and drinking a decoction of ginseng and sassafras. The treatment which he more especially advises for phthisis is somewhat similar to the foregoing. He thinks justly that, where a predisposition to the disease exists, it may be called into action by attendance on a consumptive patient. When a milk diet occasions acidity, he substitutes whey; with which, or with milk, mineral waters, or lime-water, may also be mixed. He considers the best laxatives in phthisis to be manna, magnesia, rhubarb, or senna taken in milk; and milk or whey with parsley-seeds, or celery-seeds, to be the best diuretics. He is not favourable to the use of gum-resins or balsams, if they occasion, or if given during, febrile action. Myrrh, saffron, copaiba, opium, honey, wax, spermaceti, and oil are viewed more favourably. In the young and plethoric, small and frequent bleedings, air, exercise, and warm baths are, he believes, the best prophylactics. He considers half the cases of consumption to originate in hæmoptysis, and he advises that the bleeding should not be stopped too soon by astringents. In advanced cases, bleeding to the amount of an ounce only, often relieves the breathing. He says that emetics and strong cathartics are injurious. He makes favourable mention of issues, and of a stomachic elixir, composed of myrrh, saffron, nutmegs, and buck-bean, which is to be taken at meals, consisting chiefly of milk diet, broth, and ptisan. For the colliquative perspiration he gives nitre and opium in small doses. He often prescribes also sulphur and diaphoretic antimony; and the combination of milk with mineral waters is much praised by him. It will be seen that the treatment adopted by this great physician is, in most respects, of great excellence, and when employed appropriately to the circumstances, form, and stage of the malady, by no means inferior to any adopted at the present day.

259. MUSGRAVE was the first to point out the connexion of phthisis in some instances with irregular gout. The treatment he advises is not materially different from that recommended by BENNET, HOFFMANN, and others. BOERHAAVE furnishes no information as to the treatment of phthisis in any way worthy of his great reputation; his practical judgment appears to have been overlaid by his hypothetical doctrines. The respectable synopsis of ALLEN furnishes one very good suggestion, namely, the propriety of the liberal use of buttermilk in consumption. He also believes in the contagious nature of the disease in certain circumstances favourable to its operation. WHERLHOF comes to the defence of cinchona and MORTON against the attacks of STAHL. DOVER, in his ancient Physician's Legacy, appears in his heroic character of buccaneer in the treatment of phthisis. He advises a frequent repetition of bleeding in small quantities, horse-exercise, crude quicksilver in large quantities, a

substance much in fashion at the commencement of the eighteenth century; and anise seed and crocus martis made into pills with the balsam of Locatelli, in the morning, and elixir of vitriol in the afternoon. He gives also his powder, which originally contained nitre instead of the sulphate of potash of the modern powder. He advises the antiphlogistic regimen.

260. P. DESAULT deserves notice for his having been the first to contend that tubercles in the lungs constitute the essence of consumption; that they are generally antecedent to hæmoptysis; and that ulceration of the lungs is merely an effect, and not a cause. He adds nothing to what has already been stated as to the treatment. JUNKER, the methodizer of the doctrines of STAHL, furnishes but little information respecting phthisis, and almost none deserving notice, excepting his approval of riding, and his disapproval of warm balsams and aloes. WAINE-WRIGHT considers CHEYNE correct in concluding that the quantity of blood is much diminished in hectic, and thinks that pectorals and balsamics are injurious, unless they serve as stomachics and diuretics. He prescribes gentle emetics, mild stomachics, riding, pure air, frequent blisters, and a light, digestible diet. Dr. THOMSON is in favour of small doses of antimonial wine in consumptions.

261. Dr. HUXHAM's reputation induces a desire to know his practice in phthisis. He remarks, that catarrh occasions this disease only when tubercles had previously been formed in the lungs, and that the malady may be fatal before an ulcer is formed. Instead of sweet, oily, emollient, and other substances, which often disagree with the stomach, and occasion acidity and diarrhœa, he employs gentle diaphoretics, blisters between the shoulders, mild cathartics with anodynes interposed, the decoction of cinchona, with guaiacum and styrax, and inhalations of drying fumigations. He advises those of a consumptive tendency to remove into the country in the spring, and to lose a little blood as a precaution. RUSSEL's work on glandular decline is of some importance as recommending a remedy within the reach of most persons, and one of great efficacy when judiciously employed, namely, sea-water, especially when taken internally, warm or cold, according to the circumstances of the case. He employs it also externally, at different temperatures.

262. Dr. MEAD insists on the intimate connexion of phthisis with scrofula, and considers that the use of bark in the disease is indicated by the periodicity of the attendant fever; but he believes it to be injurious when the lungs have become ulcerated. Goats' milk and whey are recommended; and when milk disagrees with the bowels, it may be boiled with roses, pomegranates, and cinnamon, with the addition of water. The fumigations advised by BENNET, change of climate, a voyage to Naples or Lisbon, are severally noticed with approbation. Dr. BRYAN ROBINSON praises emetics, especially those with ipecacuanha, in hæmoptysis, and adduces evidence of their effects. Dr. HORSBURGH gives some cases showing the benefits produced by the aluminous chalybeate spring, the Hartfell Spa near Moffat, at an advanced stage of consumption.

263. Dr. GILCHRIST adduces numerous cases showing the great advantage accruing from seaweeds. He considers hæmoptysis a conse-

quence of tubercles previously existing, and remarks that there are still tubercles to be resolved, even after ulceration has taken place, and hence the difficulty to give appropriate remedies for every stage in which tubercles may be found. But sailing and sea-air appear the best calculated to fulfil all the indications. On a rocky coast, where the inhabitants live much on shell-fish, he observed consumption decidedly more rare than in the country inland. He considers that the practice in this disease should consist in a proper administration of bleeding, issues, mercurials, balsams, diet, sea-voyaging, and sea-air. The practice of Dr. MARRYAT has been very generally adopted, at least in many of its parts, until modern times. He strongly objects to bleeding in consumption, and recommends a nourishing diet, especially of pork broth, and exercise on horseback, but, above all, the "dry vomit," consisting of a grain of tartar emetic, with three of ipecacuanha, to be taken fasting twice or thrice a week, without drinking after it. If there be diarrhœa, he directs a grain of sulphate of copper with four of ipecacuanha. If ulceration exist, he gives twenty drops of copaiba in sugar night and morning. For hæmoptysis he gives his emetics in increased doses. Bark, nitre, sulphur, chermes mineral, and alum are also severally employed, according to circumstances. For scrofula he prescribes corrosive sublimate, with the addition of a few drops of the hydrochloric acid, &c.

264. There are few topics connected with the treatment of phthisis more important than that respecting the employment of opium, and to this TRALLER has devoted much attention, in a prolix and discursive work, in which the general treatment of the disease also is fully discussed. He considers opium to be useful in the first stage, but to be injurious afterward. He thinks that it is not even a palliative. He, however, gives it in enemata with decoction of bark and milk, for the palliation of the colliquative diarrhœa, and admits that it is useful in small doses when the cough is violent, for which also he gives the sirup of poppies. He recommends PLUMMER's pill, ammoniacum, soap, squills, and honey, milk diet, milk with lime-water, emulsions, and farinaceous substances. The works of MORGAGNI furnish no precise information as to either the morbid anatomy or the treatment of pulmonary consumption, beyond what was previously known. Of the other contemporary writers on medicine there is none who gives any information respecting the treatment of consumption deserving notice, until we arrive at the works of Sir JOHN PRINGLE, DONALD MONRO, and others.

265. The observations of Sir JOHN PRINGLE deserve the high estimation in which they have always been held. In recent coughs he gives, after bleeding, mucilages, oils, and ammonia, in the form of an emulsion; and at night laudanum with oxymel of squills, or gum ammoniac. When the symptoms assume the form of hectic, he repeats the bleeding, recommends low diet, and the employment of setons or issues, which he justly considers still more beneficial than bleeding. If thirst or heat be great, acidulated drink, or buttermilk, without animal food, are advised. To check the sweats he uses sulphuric acid, or lime-water, conserve of roses, air, exercise, a milk and vegetable diet, and where there are debility and lowness of spirits, the bark is recommended. DONALD MONRO appears to have adopted the



practice of PRINGLE in phthisis. He has recourse to bleeding when there is pain, and to cinchona when neither pain nor difficulty of breathing is experienced. Setons and issues, he says, are always of use. A gentle emetic is advised for difficulty of breathing. For diarrhœa rhu- barb and afterward opiates are given.

266. LIEUTAUD, in his *Synopsis of Medical Practice*, considers bleeding injurious, and advises chiefly a milk diet, with pectoral decoctions, balsams in small doses, sulphur, tar-water, or MORTON'S balsamic pills, the fumes of balsamic herbs, the waters of Bonnes or Seltzer, or lime-water mixed with milk, riding, issues between the shoulders. For the consumption produced by hard study, he prescribes camphor with HOFFMANN'S anodyne, baths, frictions, change of air, horse-exercise, and generous wine. LINNÆUS suggests the use of the lichen pulmonarius in phthisis. The Lichen Islandicus was known to earlier writers, according to Dr. YOUNG, although it is not mentioned by LINNÆUS. Mr. READ lauds a residence in a cow-house in cases of consumption, and says that it is preferable to any fumigations. The recommendation of a medicine called the decoction of a thousand flowers, which was much used from two to three centuries ago for the different forms of consumption, is more rational than this singular residence. This decoction, or infusion, as sometimes prepared, was made from the recent dung of cows while feeding in open pastures, warm or cold water being mixed with it, and allowed to stand a considerable time, and the clear fluid being poured off for internal use. The bile existing in the dung was thus partially extracted, and employed as a stomachic.

267. The works of HEBERDEN, SAUVAGES, and FOTHERGILL furnish no additions to the method or means of treating phthisis already known. STORCK is extravagant in his praises of hemlock in this disease. VAN SWIETEN, in his commentaries on the aphorisms of BOERHAAVE, observes that persons exerting their voice in their professions are more liable to hæmoptysis than others; and that MOLIERE died of an attack of this disease immediately after performing his "Malade Imaginaire" for the fourth time. He believes in the communication of phthisis by infection, and considers that an hereditary disposition to the disease does not necessarily imply its actual existence. He approves of camphor as prescribed by AVICENNA (§ 247), and of the treatment adopted by PRINGLE. He praises the use of milk, small but frequent bleeding, horse-exercise, the cautious employment of cinchona, and of opiates. For relief of the diarrhœa, he directs an enema of a drachm of turpentine, rubbed down with yolk of egg, adding half an ounce of theriac and four ounces of new milk. The treatment recommended by MACBRIDE is, in most respects, the same as that already so frequently noticed, namely, gum ammoniac, soap, and ammoniacal iron, early in the disease; gentle emetics to promote expectoration and relieve dyspnœa; bark, in some cases, goats' whey, asses' milk, buttermilk, Seltzer, Bristol, or Malvern waters; riding, and especially sea-voyaging, setons, or issues, &c. For hæmoptysis, he directs bleeding, opiates, and demulcents. WINTERINGHAM disapproves of fumigations, as prescribed by BENNET and MEAD, but thinks that the steam of hot water containing vinegar of squills may be inhaled with advantage.

268. Dr. JAMES SIMS, the founder of the Medical Society of London, is favourable to emetics, to sulphur, and to cinchona, suitably employed. Tar-water is also useful, but he considers tar pills to be preferable. The following remarks are correct: Females not uncommonly have a respite from consumption when they marry, but sink under the disease after having had two or three children. The catamenia may remain natural till the last stage, but this, I may add, occurs only occasionally, and chiefly in the more chronic and protracted cases. SCHOENHEYDER employs the decoction of Iceland moss, especially in phthisis consequent on measles, or after the removal of inflammatory symptoms. TONE very judiciously gives the bichloride of mercury in the infusion of cinchona, with Iceland moss, and a milk diet, in syphilitic consumption. Dr. MOSES GRIFFITH is deserving of notice, chiefly for his recommendation of chalybeates in consumptions, and more particularly for his *Mixtura Ferri Composita*. This mixture is, however, varied by him according to the circumstances of the case; adding nitre in young subjects and recent cases, myrrh at a more advanced stage, and when there is more debility. He farther advises a diet of asses' milk, or skimmed milk, puddings, rice, potatoes, and a little light animal food, once a day, and, above all, snail-broth, or snails boiled in milk. LINNÆ reports favourably of the *Hypericum perforatum* in hæmorrhagic and ulcerous phthisis, a handful of the tops of the plant being made into a decoction with Spanish wine, boiled down to one third, and an eighth taken morning and evening.

269. The treatment adopted by CULLEN for phthisis was generally followed in this country until early in the present century. When expectoration of purulent matter, with hectic fever, is present, he believes that ulceration exists. He views catarrh as rarely a cause of phthisis in persons not predisposed to this disease, but it ought not to be neglected. Spasmodic asthma not unfrequently terminates in phthisis. In two cases of the expectoration of chalky concretions, the patients recovered by the aid of milk diet, &c. Consumption from hæmoptysis is less universally fatal than other forms. "Hæmoptysis is not always followed by ulceration, nor is ulceration always attended with hectic. Pregnancy retards the symptoms, but they generally recur and become fatal soon after child-birth." In the hæmorrhagic form of the disease he thinks the acetate of lead dangerous, and chalybeates and cinchona improper, as tending to increase the phlogistic diathesis, and as having been found injurious in his practice. He prefers evacuations of all kinds, a low regimen, and blisters to the breast or back, followed by issues. Sea-water and other mineral waters are wholly useless, and mercury is prejudicial. Milk is a chief remedy; and violent exercise, and the extremes of cold and heat, are to be avoided. He thinks that sea-air is desirable only for its moderate temperature; that the balsams, myrrh, &c., have sometimes done harm; that bark increases the phlogistic diathesis, and even when it relieves for a time, the symptoms speedily return; that acids are useful, especially vegetable acids; that opiates are necessary for allaying the cough, but they often increase the sweats; that demulcents frequently disagree with the stomach; that the diarrhœa requires astringents and mucilages, and that all purgatives are dangerous, but ripe fruits are often both agreeable

ble and beneficial. M. BRILLONET records cases illustrating the connexion of tubercular phthisis with scrofula, and the successful treatment of the former by small doses of corrosive sublimate, and by a diet of soup, eggs, and vegetables.

270. STOLL offers some judicious observations, although others are more open to objections. For tubercular hæmoptysis he advises small and repeated bleedings; gentle emetics; acid and nitrous drinks, and afterward lichen, polygala senega, or cinchona. For hectic diarrhœa he gives the powder of the root of arnica. He disapproves of balsams, bark, and astringents, where there is any inflammatory complication. BERGIIUS strongly recommends the Iceland moss in phthisis. When its tonic qualities are not required, he directs the bitterness to be extracted by previous maceration. Dr. MUDGE employs the inhalation of medicated vapours for consumption. He believes hæmoptysis to result from the obstruction caused by tubercles; and for this state of the disease he advises nitre in solution, a moderate bleeding, and emetics; for cough, the inhalation of emollient vapours, the ammoniacum with laudanum, or half a drachm of the anisated balsam of sulphur, a very large scapulary issue, if these fail, and a milk diet and vegetables. He reprobates the use of small issues, and advises them to be large and efficient—a recommendation agreeable to my experience.

271. Dr. SIMMONS notices the form of consumption produced by dry-grinding, or by breathing the minute particles of sandstone and iron. He considers the practice of bleeding to have been carried too far by DOVER. He prescribes nitre and camphor, myrrh with spermaceti; and oranges and ripe fruit in preference to sulphuric acid. Setons and issues, he says, are useful, opiates mischievous, and ripe fruit and antiseptics are the best remedies for diarrhœa. A little animal food, plainly dressed, may be allowed if much desired. Change of air is advised; but he justly adds that migration to a warm climate, late in the disease, merely hastens death. Emetics of sulphate of copper, twice or thrice a week, in the early stage, preceded and followed by a draught of water, are also given with the vain hope of dispersing the tubercles. The observations of HOME, DUNCAN, and REID furnish little or no information. The last-named physician advised chiefly the exhibition of ipecacuanha emetics, morning and evening, and considered sea-voyaging beneficial, mainly by producing nausea and vomiting. Verily his treatment seems to have been as bad as the disease. BORSIERI again thinks emetics injurious, and balsamic remedies hazardous; but he approves of bark in incipient cases, of camphor, and of balsam of tolu and turpentine in advanced stages. POUTEAU advises, when pain is experienced, bleeding, and cupping, and blisters.

272. Dr. STARK's posthumous observations contain the earliest correct account of the anatomy of tubercles. He is favourable to bleeding in the early stages, to oleaginous and demulcent medicines, and to vinegar of squills, &c., when cough and dyspnœa are urgent. RACLIN's views as to the treatment of phthisis are in some respects heterodox. He is more correct in recommending ipecacuanha in the catarrhal complications of the disease. He considers gums to be preferable to emulsions; and the preparations of casearilla to be appropriate for the sweats and for diarrhœa. Sir-up of tolu with ptisans; and myrrh, camphor, and

a little opium every night, are very generally prescribed. He praises opium in large doses for hæmoptysis; and the mineral waters of Caunterets and Bonnes for convalescents. Dr. WITHERING, in 1785, in his account of the foxglove, notices the recommendation of this medicine by Mr. SAUNDERS in consumption, and states that he found it of advantage in several cases when it was given in a decided manner. Dr. DARWIN, however, is doubtful of its good effects; and Sir G. BAKER is of opinion that its influence in phthisis is owing to the sickness it occasions.

273. Sir G. BLANE considers the best climate for the consumptive to be between 30° and 40° north latitude. VOGEL prescribes the vegetable acids with gum arabic; and, for phthisis after fevers, the taraxacum, bitter extracts, and horehound, or the cold infusion of cinchona with rhubarb, if inflammatory symptoms be absent. The cold infusion of bark he gives most frequently with acids or nitre, or made with whey, and preferably during the remissions of the hectic. He agrees with SIMS as to the use of oysters as an article of diet. QUARIN considers emetics unsafe in phthisis; he gives bark with sulphuric acid for the sweats; Spa water with milk in preference to Seltzer water; and the senega when the expectoration is difficult. Dr. MOSELEY believes that England furnishes change sufficient for an invalid; but that a voyage to Madeira early in the disease may be of advantage. For hæmorrhagic phthisis and pulmonary oppression he prescribes a vitriolic solution with the sulphates of zinc and alumina as an emetic, instead of bleeding, followed by a sea-voyage.

274. Dr. MAY states that, in a well-marked case of phthisis in a young person of a scrofulous constitution, the patient took laudanum night and morning, an ipecacuanha emetic when the stomach was loaded, and cinchona; and that the diet consisted of soup, meat, wine, porter, brandy and water, eggs, oysters, &c., with proper condiments. Swinging was employed twice daily, and horse-exercise completed the cure. A similar case was published by Dr. KENTISH. I recollect meeting Dr. MAY in 1820. He argued strongly in favour of his tonic and nourishing method of treating phthisis, which then appeared heterodox, but which is now more or less adopted. Dr. GRIEVE notices his employment of koumiss, a fermented liquor made from mare's milk, in the early stage of phthisis. The fermented whey of cow's milk is used as a popular beverage in this disease in Norway and the Shetland Isles. Dr. CRICHTON gives a favourable report of the Iceland moss in cases of phthisis uncomplicated with inflammation. BANG, of Copenhagen, recommends the oil of asphaltum, in doses of eight drops morning and evening in rye broth. The pneumatic treatment, first tried by FOURCROY, and more fully discussed and employed by BEDDOES, furnishes no satisfactory results. Dr. SENTER, of the United States, prescribes emetics of ipecacuanha and sulphate of copper, every second or third morning, without eating or drinking, and as much of GRIFFITHS's chalybeate mixture (§ 268) as the stomach will bear in the intermediate time. For children especially, the sulphate of zinc is a preferable emetic. A milk diet is also directed.

275. The first volume of the "Medical Inquiries" of Dr. RUSK, of Philadelphia, contains some of the most important observations on consumption which appeared towards the close of the last



century. He was himself subject to consumptive symptoms during a considerable portion of his life—a circumstance which imparts additional weight to his advice. He recommends, upon the first indication of the disease, or as soon as heat in the hands, weakness of the eyes on wakening, dryness of the feet, inactivity, and other slight febrile symptoms appear, the patient to have recourse to a more active life, with bathing, bark, and steel. When the pulse is hard, with pain or bloody expectoration, he directs frequent bleedings, and where bleeding cannot be employed, emetics and milk diet. In the last, or typhus stage, as he terms it, he considers that a temporary benefit is derived from balsams, horehound, vegetable tonics, bitters, cinchona, &c., the diet being now stimulating and nutritious. He believes damp situations injurious in all states of the disease, and a high, dry, and temperate residence in the country most beneficial. He advises also flannel always to be worn next to the skin, the dilute vapour of tar, or the smoke of resin to be inhaled, opiates to be given in small doses during the day, and more largely at night, and repeated blisters and small issues to be employed. He admits of a moderate exercise of the lungs in speaking, reading, and singing; and a gradually increased exercise of the body, especially of the limbs.

276. Dr. GREGORY, of Edinburgh, in his lectures considers mercury injurious; cinchona of little use, and myrrh of less. The mineral acids he views as palliatives only, and as inferior to the citric acid. Emetics are sometimes useful, even without operating powerfully; sulphur is liable to be too laxative, but beneficial nevertheless; and purgatives hazardous as either inducing or aggravating the diarrhœa. Dr. FERRIAR finds digitalis with change of air of service in the mucous consumption (chronic bronchitis), and in checking incipient phthisis, when the patient is too weak to bear evacuations. The pneumatic means, so much and so sillily vaunted at that time, and like other means puffed, with their authors, into undeserved notice much more recently, he justly considers quite undeserving adoption. Dr. GARNET introduced several chemical medicines into practice about the end of the last century. He prescribes the sulphuret of potass, and powdered charcoal, in the florid states of consumption, and gives a drachm of each of these, four or five times a day, in warm water, with the effect of promoting expectoration and improving the other symptoms. I question, however, the ultimate good arising from medicines which “promote expectoration,” as I have too frequently seen them promote other more unfavourable symptoms.

277. In the writings of DARWIN, in which there is a mingling of hypothesis, fancy, and poetical imaginings, with ill-assorted experience, I find nothing on the treatment of phthisis deserving notice, or at least nothing worth attention which had not been previously advised by many of his predecessors. J. FRANK professes himself an advocate for the tonic and nutritious treatment in phthisis proposed by SALVADORI, MAY, and others, though with much more moderation in the degree; palliating the urgent symptoms by opium, and endeavouring to relieve the debility by cinchona, lichen, milk, wine, exercise, and nutritious food—a treatment, however, by no means admitting of general adoption. Dr. BARTON men-

tions the *Arum triphyllum* boiled in milk as a remedy in phthisis, states that he has known only of one case of the disease cured by digitalis; and that he finds more benefit from emetics of sulphate of zinc than from other means.

278. Dr. FOWLER and Dr. FERRIAR relate cases of consumption cured by digitalis given as decoction or infusion; but it is not improbable that more benefit was imputed to the medicine than it really deserved, as most of the cases were characterized chiefly by hæmoptysis, and as those are often attended by prolonged periods of amendment. That it is, however, followed by some degree of benefit, especially early in the hæmoptysical form of the malady, appears from the testimony of BEDDOES, MOSSMAN, MACLEAN, SHERWEN, and others, although this position is denied by Dr. BREE. Dr. MAGENNIS's success with digitalis may be attributed chiefly to the very large doses, and to the early period of the disease in which he prescribed it. BUSCH in his researches employs chiefly aconite, hemlock, henbane, and dulcamara, combined with either ipecacuanha, chermes mineral, or honey of squills. He prefers the leaves of aconite to the extract, and gives two grains every two hours, increasing the dose to a drachm daily. Dr. BEDDOES insists upon the propriety of confining the phthisical patient to a temperature varying only from 60° to 65°, and believes that the muriate of lime is sometimes of service.

279. Dr. HEBERDEN considers asses' milk to be of use in allaying the fever; decoction of bark and sulphuric acid in relieving the sweats; opium in quieting the cough and favouring sleep; bleeding to the amount of five ounces only, when pain is urgent; and the application of a blister when the pain is obtuse. He advises a vegetable diet chiefly, and the purest water for drink. Dr. THOMAS recommends an emetic every second or third day, especially in the early stage, GRIFFITH's iron and myrrh mixture, and digitalis. Dr. TROTTER is favourable to cinchona and sulphur; and to digitalis with opium. Dr. WILSON considers sulphuric acid to be most efficacious in checking the sweats; and a demulcent mixture with spermaceti and a little laudanum most useful for the cough. He allows animal food in moderation; and the vapour of warm water, in which onions have been boiled, to be inhaled in order to facilitate expectoration. Dr. BOURNE furnishes experiments on the use of the *uva ursi* in consumption, from which he infers it to be of service early in the disease, in doses of ten or twelve grains, twice or thrice daily, sometimes taken with a small dose of opium. The end of the last century and the commencement of the present abound with writings on the treatment of phthisis, many of them most inconclusive, some of them trifling or puerile, and nearly all of them deficient in precision of description, and in logical inference. Most of these are filled with discussions and cases proving and disproving the efficacy of digitalis, and commenting upon the operation of this medicine.

280. Dr. BADHAM, in 1808, was the first to distinguish between asthenic and chronic bronchitis and tubercular phthisis, the former having been generally viewed as varieties of pulmonary consumption, and thus confounded with the tubercular disease. A large proportion of the recoveries of cases which had been considered tubercular, was evidently cases of bronchitis. Several writ-

ers at this period added nothing to our knowledge, or placed before us the "crambe bis coctum," or rather decies coctum, of their predecessors. RUSSELL expresses a favourable opinion of bark, calumba, chamomile, sulphuric acid, and iron, with hemlock. But these require discrimination as to the cases in which they may be individually prescribed. He considers the virtues of hemlock to be much overrated. Both he and THOMSON state the muriate of lime to be without any efficacy. In the more purely scrofulous phthisis, he considers issues to be decidedly beneficial, and sulphuric acid and salines as preferable to cinchona in the early stage. BARTON and others in America employ the super-acetate of lead with ipecacuanha and opium in the hæmoptysic form of phthisis.

281. The remarks of Dr. PARR are upon the whole judicious. He advises the pain in phthisis to be pursued by blisters as it changes its place; emetics to be given chiefly in hæmoptysis, and without informing the patient, ipecacuanha being preferred; and mild diaphoretics in an early period. He considers balsams of use only when expectoration is checked by debility; myrrh occasionally of service as a slight tonic and sedative; hemlock to be preferable to opium in palliating the cough without occasioning sweats; cicuta and the seeds of hyoscyamus to be often useful; and digitalis to do more harm than good. Asafetida is recommended for flatulency and as an expectorant. In the last stage, emetics and other means are quite inefficacious, or palliatives merely. The work of PORTAL, although interesting at the time when it appeared, contains very little of importance in respect of treatment. He considers the mildest food the best, and particularly new-laid eggs; and issues, setons, and moxas, of service. Dr. BUXTON furnishes additional evidence to that adduced by BEDDOES in favour of a regulated temperature in phthisis, of from 60° to 65°. Dr. SHEARMAN notices the connexion of consumption with amenorrhœa, and observes that GRIFFITH's chalybeate mixture has been more successful in females than in males, owing to this connexion. There is much truth in this: early in the disease this mixture is advantageously conjoined with the compound decoction of aloes and conium, and even in more advanced stages, if it do not increase the severity of the cough.

282. M. BAILEY very justly referred many of the cases of imputed recovery from phthisis to the circumstance of chronic bronchitis, or chronic pulmonary catarrh having been mistaken for phthisis; and he described, with greater precision than heretofore, the structure of the tubercular deposits, and the pulmonary and the associated lesions. The granulated form of this writer is merely the earlier stages of the disease, excavations not having taken place. In this state he advises, according to the features of individual cases, composing and emollient medicines, occasionally bleeding, blisters, and issues; aconite, hemlock, henbane, nightshade, and opium, and, where the expectoration is very copious, balsamic and resinous medicines. In the state of ulceration, he employs medicated vapours and external drains and revulsants of various kinds. In cases complicated with chronic bronchitis or catarrh, the lichen, with diaphoretics and balsams, is prescribed; or with bark, when there are well-marked rigours. Streaks of blood in the expectoration require lemonade or orangeade, and bleeding if the pulse be hard; blisters, if soft. As pro-

phylactics, he recommends travelling, voyaging, change of air and climate, nutritious diet, antiscorbutics, tonics, alkalies, muriate of ammonia, &c.; for incipient cases, repeated emetics, bitter and stomachic purgatives, a sea-voyage, exercise, the sulphuretted waters of Bonnes, Cauterets, Bagnères, or Mont d'Or; and later in the disease, mild tonics, as the lichen, sirup of cinchona, &c.

283. Dr. WELLS contends that phthisis is much less prevalent in marshy countries and districts where agues are endemic, and advises that consumptive patients should be removed, at least for some time, to these places. He quotes several authorities and statistics, by both which the subject is placed in exaggerated points of view. It is not yet satisfactorily proved that malarial situations are beneficial in either the early or the advanced stages of phthisis; at least the matter should be farther investigated, as well as the assertion that places wherein ague is endemic are free, or nearly free, from phthisis; inasmuch as the position is controverted by several more recent writers, although contended for by MARSHALL, WEEKES, HARRISON, and others, towards the close of the last century and at the commencement of the present.

284. Dr. ROBERTS has endeavoured to discover a more effectual remedy for consumption among the active mineral salts and other substances, than those hitherto employed. He has, however, only to record the failures of his experiments, with the nitrate of silver, superacetate of lead and opium, sulphate of zinc, oxyde of zinc, alone or with myrrh; white oxyde of manganese (10 grains); arsenite of potass; black oxyde of cobalt (one to four grains); ammoniated copper, muriate of baryta, nitric acid, phosphoric acid, aconite, henbane, stramonium, belladonna, and toxicodendron.

285. Dr. A. DUNCAN gives the results of his long experience in the treatment of phthisis. He considers hæmoptysis as often a salutary occurrence early in the disease; bleeding with low living to have hastened death in many cases; emetics to be of use in promoting expectoration, but to be useless as respects the cure of the disease; and blisters to be of service in most forms of the malady. He believes that vegetable acids are more beneficial than the mineral or acetous; that digitalis is of little use, and sea-voyages are counteracted by the inconveniences and risks attending them; that bark, myrrh, lichen, or these with hemlock, are sometimes of service in scrofulous cases, but that the pneumatic practice is altogether unsuccessful; that the diarrhœa may be moderated by mucilaginous fluids and broths, melted jellies, rice, catechu, opium, &c.; that the inspissated juice of the common lettuce is one of the best substitutes for opium, and that the patient should take asses' milk, wear flannel next to the skin, and have walking and riding exercise. Dr. SOCRNEY has remarked upon the frequency and infrequency of phthisis in different countries. He is in favour of the use of issues, of digitalis for hæmoptysis, of a regulated temperature, by means of a stove, from 60° to 65°, of riding, sailing, and swinging, and of change of air, at an early stage, to Valencia, Hières, &c.

286. Dr. THOMAS YOUNG, in his able and learned work on Consumptive diseases, has given an interesting account of the treatment of these diseases, and a full digest of the means employed for this purpose in this country during the first quarter of the present century; and until the di-



agnostic method of LAENNEC and the pathological and numerical disquisitions of French writers allured the minds of practitioners to the neglect of rational therapeutical doctrines. Dr. YOUNG considers *bleeding* an important remedy at an early period of the malady, for the removal of inflammatory and congestive symptoms, and for obviating the suppuration and debility consequent on them. From six to twelve ounces of blood, he remarks, may be taken away with safety in every incipient case, and the operation may generally be repeated with advantage three or four times, at proper intervals; but to do more than this might justly be called an experiment which, however laudable in proper circumstances, is not to be recommended in the ordinary routine of practice. Dr. YOUNG was himself bled twice, by the direction of his uncle Dr. BROCKLESBY, and was in favour of small bleedings, to the extent of three or four ounces—locally, when there is pain in any part of the chest. He advises *purgatives* at an early stage, and considers that fears of promoting the diarrhoea by them at this period should not be entertained. He justly views *sulphur* as an excellent aperient in the disease, and especially when complicated with hæmorrhoids. Dr. YOUNG also recommends *emetics*, and prefers *ipæacuanha*, especially in cases of hæmoptysis, combining it with acetate of lead or other means, according to circumstances. On *sorbefacients*, especially *digitalis*, *mercurials*, and *alkalics*, he places very slight reliance, although they may be prescribed in some circumstances of the disease with advantage. *Epispastics* and *issues* are viewed by him much more favourably. He considers that the tendency to night sweats is not a just reason against the use of *sudorifics*, especially DOVER'S powder and antimonials. In *expectorants* he has little faith, although *ammoniacum*, *squills*, *senega*, *myrrh*, and *ipæacuanha* may be employed with benefit in some cases, in conjunction with hemlock and other *palliatives*. *Dennulcents* and *narcotics* are prescribed by him in circumstances indicating their use, sometimes with balsams, the benzoic acid, &c. Of *astringents*, when required to moderate the secretions of the skin and of the intestines, the sulphuric acid is considered the best, especially when conjoined with aromatics and opiates; but he is also in favour of catechu, kino, the extract of logwood, with chalk mixture, or the compound powder of chalk.

287. Dr. YOUNG believes *cinchona* to be the most important *tonic*, and both its advantages and inconveniences to have been exaggerated. He has known it decidedly beneficial at the commencement of the disease, and he has never observed that it increased the hectic symptoms at any period. Besides the powder, and the decoction, he has employed the cold infusion with Seltzer water, in his own case, as well as in others. He has had little experience of *chalybeates*; but he justly remarks that, when they can be taken alone, or with myrrh, as in GRIFFITH'S mixture, without increasing cough or pain—effects which may also proceed from cinchona—they are sometimes beneficial. The *diet* most favourably mentioned by Dr. YOUNG consists chiefly of milk and the farinacea, especially asses' milk twice daily, cow's milk boiled with soda-water or lime-water, butter-milk, new eggs, vegetable and farinaceous articles. He has found milk boiled with mutton suet of great service. *Exercise* in the

open air, riding, walking, &c., are also severally advised. *Change of climate* is recommended, and he considers that the remark of CELSUS, that the worst air for the patient is the air which has given rise to the disease, is founded on good sense.

288. I have now brought down the *Historical Sketch* of the treatment of phthisis to a sufficiently recent period. Notices of some more modern writers will appear in the sequel only in so far as they may furnish any thing deserving notice. Their works will, however, be mentioned in the *Bibliography* and *References*; so that the reader may be aided in satisfying himself as to the views of those who have written on this difficult subject, or on topics appertaining to it. I shall next endeavour to state those means of prevention which seem most efficacious against this malady, and afterward proceed to give the results of my experience as to the means which appear to me the most appropriate, or which have been advised for the several stages and states of this disease, conformably with the division above adopted (§ 17, 76, et seq.).

289. ii. OF THE PREVENTION OF PHTHISIS.—The full exposition of the *causes* of phthisis which I have given above, and which many readers may consider tedious and unnecessary, will not be viewed in this light, when it is admitted that a knowledge of these causes, and of their modes of operation, is the most certain basis of rational means of prevention. By ascertaining the causes, and the ways in which they act, as far as they may be ascertained, we are enabled either to avoid or to counteract them. When we can neither avoid nor arrest the causes, we should endeavour to arrest or to palliate their effects, by means rationally selected and employed—guided by the lights of science, and by careful observation and induction. The great objects, therefore, of treatment are, in the first place, to avoid and to counteract the causes of the malady; and, secondly, when this end cannot be attained, to arrest or palliate their effects. The former constitutes the *prevention*, the latter the *cure*, of the disease. But in the procession of morbid conditions from the first impression of the causes, there is an intermediate state between the operation of the causes and the development of their effects in a manifest form, that requires the prompt recognition of the physician, and rational decision as to treatment. This state of incubation—of threatened or incipient phthisis—requires great acumen for its detection, and equal promptness for its arrest. For this state *measures of prevention* should be conjoined with *means of cure*, either predominating according to the circumstances of individual cases.

290. The *prevention* of phthisis is either *radical* and *efficient*, or *conditional* and *uncertain*. The avoidance or removal of the causes is required for the former; the counteraction or the arrest of their more immediate or early effects is all that can be expected from the latter; the one is *positive*, for the causes have not existed or acted; the other is *contingent*, for the causes have been present, have probably acted and produced their more immediate effects, the means of counteraction or of arresting these effects either succeeding or failing, as numerous circumstances may determine. Prevention thus may be divided into, first, that which consists of the avoidance of all the causes of the malady; and, second, that which attempts the counteraction, or the removal

of their more direct and immediate effects, before the malady is fully developed.

291. *A. The efficient prevention of phthisis* consists in the avoidance and removal of the causes which predispose to, and directly occasion, the malady. Those which affect one or both parents, or which operate during the earliest epochs of childhood, have generally produced their effects upon the constitution before professional advice is obtained. The transgressions of the parent have already injured the offspring, and the scrofulous taint has either been communicated to, or generated in, the child, before efficient measures of prevention could be instituted. The remarks which I have offered on the prevention of SCROFULA (see § 148, *et seq.*) apply with equal, if not greater, force to the prevention of phthisis. Consumptive persons who marry are even more culpable in this than those who are imbued with the scrofulous diathesis, or who have been affected with external tuberculosis. The offspring of the former may be scrofulous, but the taint is more likely to be manifested in the form of tubercular consumption, while the offspring of the latter are more liable to external tuberculosis, although they may be attacked with phthisis, especially when the external malady has not occurred. When the *predisposition*, whether it be hereditary or occasioned by the habits or the diseases of the parents, or by the management of infancy and childhood, has been produced, the radical and complete prevention of the malady can then rarely be effected, the best efforts to this end being merely conditional or uncertain. It is only by the avoidance of those causes which I have arranged under the head of *Causes appertaining to one or both parents*, aided by the removal of those which usually act during the early epochs of life, that the efficient or certain prevention of this disease can be expected.

292. *B. The conditional prevention of phthisis*, although uncertain, should not be neglected. Where the predisposition, arising from either the constitution or the health of the parents, already exists, prevention may be hoped for, but it cannot be insured.—*a. During infancy and childhood* the hygienic precautions which were offered when treating of SCROFULA (§ 148, *et seq.*) are even more urgently required when tubercular consumption has appeared in the family of either parent, or when the causes mentioned under the first class of the arrangement have injured the constitution of one or both parents. For children thus circumstanced, a dry, pure, and mild air, considerably elevated above the surface of the sea; frequent change of air; clothing suited to the temperature and season; exercise in the open air; light, digestible food, with strict attention to the digestive functions; a milk, farinaceous, and vegetable diet, with a moderate proportion of wholesome animal food, as childhood advances; but the milk of a healthy nurse, asses' milk, &c., during infancy, and the other means advised in the place just referred to, strictly avoiding the causes incidental to this period of life (§ 49, *et seq.*), are severally of great importance, especially when aided by such other means as the circumstances of individual cases will suggest.

293. *b. During puberty and adult age*, the causes of phthisis which have been noticed as most frequently operating in these epochs of life (§ 184, *et seq.*) should be carefully avoided, especially those which relate to schools, sleeping

apartments, &c. A strict surveillance ought to be instituted over youths of both sexes in order to prevent masturbation, and as soon as this vice is detected, its enormity should be represented to the delinquent, and measures taken to prevent the mental contamination from extending to others. The sleeping rooms should be well ventilated; but their temperature ought not to be much lower in winter than that of the sitting apartments, especially for the delicate and predisposed. For these a physical and mental regimen should be enforced, aided by proper food and clothing; by change of air, preferably to a warm, dry, and pure air; by chalybeates in forms suited to the peculiarities of the case; and, where the predisposition is manifest, by travelling to and in healthy, warm, or mild and dry countries, as Egypt, Syria, Upper Egypt, South of Spain, or north coast of Africa, &c.

294. These preventive measures are chiefly suited to the rich only; and to these especially hunting, riding, farming in a dry, elevated district, and field sports are remarkably beneficial. The selection of professions and trades for those who are hereditarily or otherwise predisposed to phthisis is attended by great difficulty. Agriculture and the out-door exercises which it involves are salutary to those who can adopt them. Gardening offers some advantages, but these are inferior to those furnished by other agricultural occupations. Poorer persons should become sailors and butchers; but the life of a soldier, even in the best circumstances, is very unfavourable to those in any way predisposed to phthisis. To such persons especially, and even to the most robust, several trades are most injurious. Sculptors, stone-masons, miners, millers, flax, wool, and cotton dressers and workers, weavers, tailors, bakers, milliners, dress-makers, and other needlewomen are severally more or less liable to phthisis in consequence of their occupations; and so liable are "dry-grinders," knife, fork, razor, scissor, and needle grinders to tubercular consumption and other pulmonary diseases, that it has been said by Dr. C. HOLLAND that about one fourth of those engaged in these occupations died every five years.\* (*See ARTS AND EMPLOYMENTS in relation to disease.*)

\* All nuisances, all dangerous and insalubrious establishments, especially in large towns, besides being productive of several other maladies, are liable to develop phthisis, especially in the predisposed. The government of this country has as yet paid little or no attention to the due regulation of these as regards the public health; but in France, as Dr. WALLER LEWIS has recently shown, these establishments are divided into three classes, and before they are permitted to be carried on, certain authorizations and formalities are indispensable. In the first class are placed those establishments that must be isolated from private habitations, but not necessarily from the outskirts of a town; in the second are included those factories which do not rigorously require their isolation from habitations, but which it is important not to allow until assurance has been obtained that the operations proposed to be carried on in them are executed so as not to be a nuisance to the neighbourhood, and not to cause damage. In the third class are such factories as may remain without inconvenience near dwellings, but which should be subject to the surveillance of the police.

As regards the effects on health of various professions and occupations, it is shown by M. LOMBARD that, in 1000 deaths, consumption had furnished the following proportions, viz.: Occupations with vegetable and mineral emanations, 176; with various dusts, 145; with sedentary life, 140; with work-shop life, 138; with hot and dry air, 127; with stooping posture, 122; with sudden movements of arms, 116; with muscular exercise and active life, 89; with exercise of the voice, 78; living in the



295. iii. TREATMENT WHEN PHTHISIS IS THREATENED.—When phthisis is imminent, the measures of prevention already noticed, conjoined with others of a more strictly medicinal kind, should be adopted, according to the predisposition, age, diathesis, and circumstances of the patient. The digestive and assimilating functions ought to be promoted by the usual means, and especially by change of air, by voyaging, by travelling in warm and dry countries, more particularly in those already mentioned (§ 293), by suitable clothing, and by attention to the temperature and ventilation of sleeping-places. The preventive and curative influences of districts where malaria and the diseases which proceed from this source abound have been insisted on by Dr. WELLS and several of his contemporaries. He states that it was common for the consumptive in Flanders to remove to the marshy parts of the country. In Minorca, where agues are endemic, consumption, according to Dr. CLEGHORN, is very rare. Dr. SEQUEIRA states, that in the marshy country of Alentejo phthisis is rarely seen. VOLNEY says that consumptive patients are frequently sent from Aleppo to the sea-coast, where intermittents prevail. Other instances are adduced by Dr. WELLS in favour of his opinion; and, although it has been controverted by several writers, yet I believe, from several facts with which I am acquainted, that it is not quite devoid of truth.

296. In this, as well as in other periods of the disease, the clothing, especially that worn nearest the skin, should be warm, and the best suited to the preservation of the functions of this part of the frame. With this object flannel ought to be worn during the night and day; and the dress in females should be sufficiently high to protect the upper regions of the chest and the neck. Close cinctures of the chest and steel supports in corsets are injurious. Due attention ought always to be paid to the digestive and excreting

open air, 73; with animal emanations, 60; and with watery vapour, 53. In manufactures the majority of workmen are affected with scrofula; this scourge marks the children and the youths with its scars, swellings, and deformities, and attacks more especially the weavers.

The women furnish more maladies and diseases than the men, partly owing to the comparative paucity of their earnings, from which it arises that the poor workwoman is ill-fed, ill-clothed, and ill-lodged. In one sense, indeed, not money, but the want of it, may be denounced as the root of all evil. So, in this case, "want is a bad adviser, and quickly triumphs over the weak resistance of a conscience without religious light to guide it." Debauchery, followed by excesses of all kinds, comes in to consummate the work of destruction commenced by distress. The worst occupations are those of needlewomen, or *couturières*, dress-makers, embroideresses, and *modistes*, from whose ranks the public women are largely recruited.

The separation of the sexes in work-shops is a measure imperiously demanded for the moralization of the working classes.

As to the healthfulness of employments much depends upon whether they are carried on in the open air or in confined air. Consumption is twice as frequent in the first as in the second case; the latter group comprising occupations carried on in vast spaces well aerated, and in others which confine the workmen in close localities. In the latter phthisis is far more prevalent. The action of dusts on the lungs is in the direct ratio of the volume, weight, and consistence of their molecules. The inhalation of coarse particles is less dangerous than that of dusts finely divided, which penetrate more easily into the last ramifications of the air-cells. Dusts from hard substances cause a far greater number of consumptive cases than dust from soft bodies, or of ordinary hardness. The specific gravity of the dusts does not affect in any marked manner the production of phthisis. The order of the respective fatality of dusts is as follows: viz., 1, mineral; 2, animal; and, 3, vegetable.—*Report*, &c., by Dr. W. LEWIS.

functions, and to the state of the uterine discharges, which are often more or less disordered in the states of the disease now being considered. In many instances cod-liver oil may be of service; in others, as well as in these, sulphuretted or chalybeate springs, or a course of the one following that of the other. For females, the mixture *ferri composita*, and the decoction *aloes compositum*, in varying proportions, according to the state of the bowels, are often of service, especially when the pulse is languid, the catamenia scanty or difficult, and when the cough is not increased or rendered hard or dry by these medicines. In these cases flannel drawers, in addition to the other articles of flannel clothing, and woollen stockings should be worn. In other circumstances, or when the natural secretions and excretions are not suppressed, the infusion, or a weak decoction, of cinchona, with a mineral acid; or other tonic infusions, with aromatics, &c.; or the tinctura *muriatis ferri*, either with or without the preparations of columba and an increased quantity of the acid, may be prescribed, and may even be made the vehicle on the surface of which the cod-liver oil may be taken. Confined positions of the body, the labours of the desk, and close application to either study or business, ought to be avoided, and a due restraint should be placed on the instinctive desires and passions. Mental and physical occupations ought to be pursued as much as possible in open and airy places and apartments, and in a temperature never lower than 60° nor higher than 70°; and should not be such as to fatigue, but such as moderately or pleasantly engage the mind and body.

297. In this state, as well as in the preceding, and more particularly when the predisposition is marked, or the tubercular cachexia manifest, warm or tepid salt-water bathing, or sponging the surface of the body daily with a warm, tepid, or cold solution of salt—the temperature and strength of the solution varying with the state of the patient and the effects produced—is often beneficial; but this practice should always be followed by rubbing the surface smartly with a rough towel, and by the constant use of flannel nearest the skin. Various medicated fluids or lotions have been advised as washes for the chest and neck, in the circumstances now being considered, as well as in the first stage of the disease. Of these, however, the most deserving notice are, a weak solution of the nitro-muriatic acid, a weak solution of the pyroligneous acid, and tar-water, varying in strength with the circumstances of the case. This last lotion has been employed only by myself, the temperature of it, as well as of the others, being varied according to the feelings of the patient and the state of the air. Friction of the surface also should always follow a recourse to either of these.

298. iv. TREATMENT OF THE USUAL FORM OF PHTHISIS.—*Treatment of the First Stage of this form.*—The imminence of tubercular consumption may be viewed almost in the same light as the commencement of this stage; and the treatment advised for the former is altogether applicable to the latter, with various additional means adapted or modified to the circumstances of individual cases. When this stage has commenced, as indicated by the symptoms (§ 187, *et seq.*), the question is no longer, Are tubercles already formed? This must be answered in the affirmative. But their development may be delayed or pre-

vented by judicious treatment; or their absorption may even be procured, although this is a doubtful or rare occurrence. The great principle of treatment in this stage, as well as when the disease is merely threatened (§ 295, *et seq.*), is to develop the powers of life, and increase the vital resistance to the farther advance of the malady, without producing or augmenting febrile symptoms: 1st. By diet and regimen—by hygienic means; 2d. By medical treatment. A selection of means belonging to each of these heads, appropriately to the peculiarities of the case, will frequently promote the assimilation of the chyle globules and of the colourless globules of the blood, by supporting or developing the powers of life.

299. *A. The food and regimen of the patient* are of the utmost importance in this stage.—*a.* The food has always been discussed, questioned, dogmatically prescribed, and often pertinaciously persisted in, according to the doctrines of the day and the views of prevailing authorities; and instead of accommodating it to the peculiarities of the case and to the effects produced by it, an indiscriminating mode of administering it has been too generally adopted. At different periods of medical history, and by different physicians, very opposite kinds of food have been recommended. Some have praised a milk diet; others farinaceous and vegetable food only; many a combination of both; some have allowed a large proportion of animal food; and even not a few have permitted the use of fat meats, and a rich, full, and nutritious diet. The praises of certain kinds of diet have often been accompanied by denunciations of all others. Thus the inexperienced, and those who treat a disease according to its name and not according to the successive pathological conditions it presents, are bewildered, and an important part of the treatment is adopted and applied not more rationally than if it were drawn by lot, or were the turn-up of the die. Now each of those kinds of diet, modified and added to, according to circumstances, is appropriate and beneficial when appropriately employed, and when aided by a regimen judiciously prescribed. The diet in this stage should always have strict reference to the regimen which the situation and circumstances of the patient permit, and especially to the locality, temperature, and air in which he resides; and both diet and regimen ought to be directed according to his temperament and diathesis, to the states of vital power and vascular action, as indicated by the pulse and by the febrile symptoms, and to the indications of existing local lesions.

300. When the disease is not ushered in by hæmoptysis, or by indications of active congestion, and especially when it is traced to depressing or exhausting causes, then a nutritious diet, animal food in moderate proportion, the white kinds of fish, boiled, with a squeeze of lemon, with little or no other kind of sauce, and shell-fish, especially oysters, may generally be adopted. The fresh livers of the cod, torsk, ling, haddock, and coal-fish, and the fresh oil of their livers, may be very beneficially used as sauce for these kinds of fish; or the oil may be taken in a more strictly medicinal form soon after a meal. In these and in similar states of the disease even richer and more nutritious kinds of food than those may be tried, and the effects carefully observed. I have often advised a frequent use of fat venison

in some cases, and the fat of lambs or of mutton boiled in milk in others, with much benefit. In cases where this stage is characterized by little or no acceleration of the pulse, by despondency, by a poor state of the blood, and by absence of sub-inflammatory or congestive symptoms, a dry and nutritious diet, or a more full and restorative diet; animal food, consisting of mutton, game, &c., and even wine or malt liquors in moderation, may be allowed, if exercise in the open air, especially horse-exercise, short of fatigue, be regularly taken.

301. For persons of a fuller habit of body, or more sanguineous temperament than those just referred to, and especially when oppression, or constriction, or pain at the chest, or a dry, hard cough is complained of, the diet should consist chiefly of milk and of farinaceous and vegetable substances, ripe fruits, &c., and the antiphlogistic regimen should be adopted in every respect; but it should not be carried too far, especially in the scrofulous diathesis. In these cases, local depletions, issues, and other derivatives, as will be hereafter mentioned, should be employed according to the state of the pulse and other peculiarities of the case. For these, buttermilk, whey, and skimmed milk are excellent beverages and aids to diet. After the more inflammatory and congestive symptoms are removed, and when issues or setons have commenced to discharge, then a more liberal and nutritious diet may be allowed, and the cooling, antiphlogistic, and febrifuge medicines hitherto prescribed may be changed for those which are more restorative, and more calculated to support vital power and to promote a healthy assimilation. In these circumstances the fish diet, as advised above (§ 300), may be first employed, and the more nutritious articles of food be afterward given with caution.

302. *b.* In this stage, *change of air, voyaging*, more particularly in latitudes from 30° to 50°, or from 10° to 15° or 30° in winter, in vessels possessing comfortable accommodations; *travelling* in temperate and warm climates, with due regard to the temperature and climate, and to season; residence in a warm and dry air, the elevation above the surface of the sea, and the degree of atmospheric dryness being such as the patient finds to be most beneficial; regular exercise in the open air, preferably on horseback, and short of much fatigue; are severally of manifest advantage. Exercise on horseback is, however, rarely of benefit to females, and is generally too exciting, and consequently exhausting to them; walking or driving in an open carriage being more beneficial. In all cases, extremes of temperature, and sudden changes or vicissitudes of temperature, must be avoided, even by those who are able to take active exercise, as well as by those who are much less able.

303. *Travelling*, at proper seasons and hours of the day, is generally beneficial, especially when the patient is able to travel on horseback. Travelling on land by other conveyances is less serviceable; although an open carriage, when the weather will admit, is little inferior to riding, especially in the cases of females. But when a close carriage is used, the patient should sit with his back to the horses; and when he travels by railway, this seat should always be taken, a sufficient ventilation of the carriage being always preserved.

304. *Tepid and cold-sponging*, and washing the



surface of the body, or the surface of the chest merely, with variously medicated lotions, have been advised in this stage; but, excepting with those already mentioned, or with the lotions, liniments, and embrocations about to be noticed, this practice is seldom of much service when this period is far advanced, unless exercise can be regularly taken in the open air, and flannel be constantly worn nearest the skin. It is, however, beneficial when employed as a preventive measure for the predisposed, and for those of a tubercular cachexia (§ 170, 171); and when adopted at the commencement of this stage, and followed by very active frictions of the surface.

305. *c. A winter residence* is of the greatest importance in this stage to patients in cold or temperate climates, for that residence should be selected which will admit of regular and daily exercise in the open air. But this is not the only consideration by which we ought to be guided. Elevation above the surface of the sea, a situation near the level of or close to the ocean, or removed at a distance from it, and frequent or prolonged voyaging on it, are severally topics which require to be duly considered. As to the last of these—*voyaging*—very well-founded expectations of success from it may be formed, if it be commenced in this stage, or before the second be far advanced, more especially in cases which have been attended by hæmoptysis at their commencement or early course, and if it be continued for a sufficiently long period. Voyaging in the Mediterranean or in the Atlantic between the degrees of latitude named above (§ 302), and preferably in the Pacific Ocean, especially when prolonged, either in naval cruisers or by repeated voyages, so as to avoid the winter and spring of this and other countries unfavourable to consumptive patients, deserves to be more frequently recommended than it has hitherto been. Now that the passage across the isthmus of Panama is easy, voyages thence, in various directions in the Pacific Ocean, may be made, and a return to this country effected in May or June.

306. Elevation above the surface of the sea, especially in warm climates, and when dryness of air is attained by elevation, is generally beneficial. Even in temperate climates, where elevation is conjoined with dryness, the diminished temperature which results is not so injurious as generally believed. The cold of Canada is by no means injurious to the consumptive, owing to the dryness of the air being great in proportion to the lowness of temperature. If such a residence admits of regular exercise in the open air, it may be salutary, although a warmer air, and an exemption from sudden atmospherical vicissitudes, may be preferred.

307. The only question connected with residence that remains to be considered is, whether preference should be given to a sea-coast or to an inland locality. This is a difficult question to answer; and judging from the indisputable advantages derivable from sea-voyaging, and the very frequent recommendations of places on the sea-coast by modern physicians as winter-residences for the consumptive, it may be inferred that these places are actually the most healthy. But this inference is neither logical, nor practically correct as respects phthisical cases. The benefit derived from voyaging depends chiefly upon uniformity of temperature and the motions of the vessel, aided by the influence of a pure

sea-air on the digestive and assimilating functions. Residences on the sea-coast furnish only two of these elements of benefit, in an imperfect manner, but they are altogether deprived of the third and that which appears to be the most important. We must therefore refer to the results of observation for a decision; and, as far as my experience enables me, I may state, where two localities, one inland the other on the sea-coast, possess equal advantages as to dryness of the air; as to annual, monthly, and daily ranges of temperature; and as to vicissitudes of weather, and facilities for out-door exercise, that the inland situation should be preferred.

308. Whatever be the locality adopted for the consumptive, or however the patient may be limited in his choice, exercise should not be neglected, in air and sunshine, while he is able to enjoy it; and the temperature of his sleeping apartment should not fall below 60° or rise above 70°. The advantages derived from stoves, when properly regulated, are shown by their preservation of the warmth of apartments at all hours of the night; but a due ventilation ought always to be preserved where they are the only means of keeping the temperature at a proper elevation. Having insisted upon regulation of *diet and regimen* appropriately to the pathological states of the case in this stage, and upon the advantages of *change of air, of travelling, voyaging, and of suitable residence* during the winter and spring months, the *means* which are more strictly medicinal are next to be considered.

309. *B. The strictly medical treatment* of the first stage of phthisis must depend entirely upon the diathesis, temperament, and habit of body of the patient, and upon the states of vascular action, of local lesion, and of vital power. The predisposing and determining causes should also be kept in view; for these should influence or even almost change our indications and means of cure.—*a.* In cases where vascular action is excited, or the pulmonary circulation is oppressed or congested, or where pain is felt in the thorax, or where hæmoptysis occurs without being very copious, neither anæmia nor vital exhaustion being remarkable, *bleeding* ought not to be either neglected or delayed. The only consideration is, in what manner may it be most advantageously resorted to. Venesection, unless the patient be robust or plethoric, is rarely required. Scarification and cupping are most frequently to be preferred, as the circumstances are few in which this operation may not be efficiently performed, and a due quantity of blood withdrawn in a very short period, the operation itself generally proving a salutary derivative. When the quantity of blood to be taken is small, and in certain complications, the application of leeches may be preferred.\*

310. The quantity of blood abstracted at one

\* [We are obliged to dissent from the opinion here expressed, that bleeding is occasionally proper in this stage of the disease. When we bear in mind that weakness and defective nutrition are its essential characteristics, and that cases of uncomplicated pneumonia, where hepatization is well marked, will frequently recover sooner and better without blood-letting, we cannot but call in question the expediency of resorting to this heroic remedy in tuberculosis. Hence, as BENNETT well remarks, the great effort of the practitioner, so far from diminishing the strength, ought to be to support it, and favour cell-growth and disintegration; then, when the blood is loaded with the effete matter thus introduced into it, to assist its excretion by means of diaphoretics, diuretics, and purgatives, according to circumstances.—Ed.]

time should be small, or at most not great. In the majority of cases it may vary from four to twelve ounces; this last amount being allowed only where the habit of body and circumstances of the case appear the most to require depletion. Time should be allowed to observe the effects of the first bleeding; and after a due interval, if the symptoms still continue, or upon the return of the indications for having recourse to it, the operation may be repeated. The amount and the repetition of the depletions should be determined only by the peculiarities of the case and the judgment of the physician. It will often be observed that even when bleeding appears to be required, it is but ill endured, although the quantity withdrawn has been small. When this stage is developed by the suppression of an acustomed discharge, as of the catamenia, or of hæmorrhoids, then the necessity of having recourse to vascular depletion is obvious, and that method of performing it which is most likely to re-establish the interrupted discharge should be adopted. Leeches may be applied around the anus when the hæmorrhoidal discharge has been suppressed; and beneath the groins when the catamenia are interrupted, difficult, or scanty; and, for both causes of aggravation, calomel, the preparations of aloe, and warm fomentations or the hip-bath, may be prescribed. The older writers advised bleeding from the feet when immersed in hot water, in cases of catamenial obstruction, and this mode may be adopted by those who prefer it. I have sometimes prescribed it, and seen it employed, with benefit.

311. Vascular depletion has been advised in the first stage of phthisis by some authors, and reprobated by others. I have now stated many of the circumstances which require it; but there are others, more especially certain complications hereafter to be noticed, which also are benefited by it. But cases are common for which, even at an early period, bleeding cannot be ventured on with safety; or, if employed at all, it can be prescribed only to a small amount, and in the immediate vicinity of parts which appear to require it. The numerous class of cases caused by the depressing and exhausting causes mentioned above (§ 192), by want, by misery, by debilitating discharges, by confinement and etiolation in factories, close apartments, &c., and by sedentary and ill-rewarded occupations—those cases which present anæmied, cachectic, discoloured, and debilitated appearances, or in which the pulse is either slow and beneath the healthy condition, or very quick, small, or soft, or when the blood is inferred to be thin and poor in red globules—are severally injured even by the smallest local depletions, unless they be prescribed for the removal of the pains occasioned by pleuritic complications, for which the additional and often more successful means hereafter to be noticed should be employed.

312. The indications for and against vascular depletion in an early stage of phthisis are, however, not always to be depended upon. While many are manifest, others may be doubtful. Much, therefore, should be left to the close observation, the enlightened experience, and the acumen of the physician, in the interpretation of these indications and the discovery of others. The season, climate, peculiarities of race, modes of living, and prevailing constitution and character of disease, the prevalence of a sthenic or an asthenic condition of morbid action, are severally weighed in his

mind before bleeding in any way, its amount and its repetitions are decided upon, and before other important means are prescribed. The prevailing constitution of disease, so much insisted upon by SYDENHAM, differs most remarkably in different periods of time. The sthenic constitution, so general in the first quarter of the present century, was changed to the asthenic in the second quarter, and this latter still appears to continue. The vital energies of the residents in large cities and manufacturing towns, especially in low situations, are weaker than those possessed by the inhabitants of rural districts and elevated localities; and these differences, with others manifested by individual cases, require due consideration when devising our indications and means of cure.

313. The necessity of having recourse to vascular depletions, especially to local depletions, when congestion, sub-inflammatory action, pain, the state of respiration or of cough, or other symptoms, require them, does not necessarily prevent the exhibition of nutrient and even of restorative means, more particularly when vital power appears depressed and vascular action is not much increased. Indeed, in large cities and manufacturing towns, these latter medicines, or even more tonic remedies, are often required, although local depletions are equally necessary for the local lesions. For these milder tonics, conjoined with sedatives and narcotics, as the infusions of cheyrcita or calumba, with hydrocyanic acid, or conium, or hyoscyamus, or the tinctura camphoræ comp., may be first prescribed, and be followed, according to the effects observed, by infusions or decoctions of a more tonic kind. When, with debility, a cachectic or an anæmied appearance is present, the preparations of iron may be given, commencing with the mildest. I have generally preferred the *mistura ferri composita*, with the extract or tincture of conium, or the powder or extract of liquorice; and, if the bowels be sluggish, and the catamenia be deficient, with a sufficient quantity of the *decoctum aloes compositum*, or tinctura aloes.

314. The effects of chalybeates of every kind require to be closely observed in this as in every other stage and state of the disease. This class of medicines are contra-indicated where any inflammatory complication exists, or where a tendency to hæmoptysis is observed, unless hæmorrhage has occurred to a large amount, when the *tinctura ferri hydrochlorici*, with additional acid and appropriate medicines, may be given in a suitable vehicle; but on all occasions the effects of chalybeates on the respiration and the cough should be strictly watched, and, if rendered more oppressed, difficult, or hard by them, they ought to be relinquished. I have often prescribed the iodide of iron, in sirup of sarzæ, or in other sirups, with conium, or some other anodyne; but I have not considered it more beneficial than GRIFFITH'S myrrh mixture, even in cases where the catamenia are deficient; and I have found it in some cases to aggravate the cough and tightness of the chest more than that mixture.

315. When the above medicines are either not indicated or prove inefficacious, the infusions of cinchona, prepared either with cold or with warm distilled water, may be prescribed with hydrocyanic acid, or with any of the preparations of conium or hyoscyamus; and it may be taken in milk in which a little of the bicarbonate of potash or of soda has been dissolved. When fe-



brile symptoms harass the patient, the liquor ammoniæ acetatis may be given with the infusion of cinchona, and the spirit of nitric ether and hydrocyanic acid added to them. In some instances the liquor ammoniæ acetatis may be prescribed with an excess of acetic acid, especially where hæmoptysis occurs; and in others, particularly where sinking or exhaustion is present, with an excess of the carbonate of ammonia, other substances which the symptoms will suggest being also added.

316. In this early period of phthisis the functions of digestion—of both stomach and liver, are often more or less impaired; and it is often beneficial to them, as well as to the state of circulation in the lungs, to commence the treatment with an *emetic*. The older writers recommended this practice, and experience has shown that, when the emetic has been judiciously selected, and the treatment otherwise appropriate, benefit has been produced by it. The Italian physicians, and after them LAENNEC and his pupils, prescribed tartarized antimony as an emetic in this disease, having, as they believed, derived great advantage from it in the more strictly inflammatory diseases of the lungs; and not only did they employ it as an emetic, but as a contra-stimulant, and in doses which were seldom efficacious in reducing the febrile symptoms, but which rarely failed in reducing the vital powers of the patient. I frequently saw the effects of this substance while it was in vogue, and sometimes prescribed it; but I considered it of inferior utility to ipecacuanha and to sulphate of zinc as an emetic in phthisis, their operation being facilitated and increased by a draught of a weak infusion, tepid, of chamomile flowers. Afterward demulcents or emollients, or stomachics, with the addition of a little hydrocyanic acid, if the retching or vomiting be more than we desire, may be prescribed, and subsequently the other internal remedies which the features of the case will suggest.

317. The effect of the emetic early in this stage, and the repetition of it when the functions of digestion are disordered, will generally be beneficial, as shown by the appetite and the state of the evacuations, especially when followed by the medicines just mentioned, or by small doses of the nitro-muriatic acids taken in the tonic infusions already noticed, or in others which the state of the case appears to require. If the bowels become irritable, the tinctura camphoræ comp., or the pilula saponis composita, will correct the disorder; the former being given in the mistura cretæ, or any other suitable vehicle or form of combination, the latter with small doses of ipecacuanha, and of an aromatic powder. If the biliary secretion be deficient, as not infrequently observed in this period, although the bowels are relaxed, PLUMMER'S pill or blue pill may be cautiously given, with soap and extract of taraxacum, instead of the nitro-muriatic acids; or these latter may be prescribed instead of the mercurial, an occasional dose of which should only be taken. In this stage of the disease the bowels are more frequently confined than much relaxed, and the intestinal secretions and excretions are very often more or less disordered. It thus becomes an important object to improve these secretions, and to regulate the function of defæcation. The medicines just named will often aid in attaining this end; but they require to be either conjoined with others, or followed by suitable laxatives or aper-

ients, conjoined with vegetable tonics, stomachics, &c. I have also observed great benefit result from the following, when appropriately administered or modified:

No. 350. R Pulv. Ipecacuanhæ, gr. viij.; Extracti Fel-lis Bovini, ℥ij.; Pilulæ Rhei comp. (vel Pil. Aloes cum Myrrha), ℥ijss.; Extr. Conii (vel Extr. Hyoscyami), ʒss.; Saponis Castil., gr. xij.; Olei Anisi, q. s. Contunde bene et divide massam in pilulas xxxvj. quarum capiat duas horâ somni.

No. 351. R Extr. Glycyrrh., ʒss.; Tinct. Aloes comp. ʒss.; Tinct. Conii, ʒj. (vel Tinct. Hyoscyami, ʒij.); Decocti Aloes comp. ʒvss. Aquæ Carui ad ʒviij. Misce. Fiat mist. ejus capiat cochl. ij. vel iij. ampla horâ somni vel primo mane.

No. 352. R Pilulæ Rhei comp., ℥ijss.; Pilulæ Scillæ comp. et Pilulæ Conii comp., aa., ʒj.; Saponis Castil., gr. x. Contunde bene et massam divide in pilulas xxiv. Sumantur binæ horâ somni.

318. These medicines are most suitable in cases devoid of any inflammatory complication, which, as occurring either in this or in subsequent stages, will be more particularly considered in the sequel. The objection of not being applicable to these and other complications cannot, however, be urged against equal proportions of magnesia and sulphur as an aperient in this stage, especially when rendered more agreeable by the addition of liquorice powder and a little ginger. Where this aperient proves too depressing, or where vital power and vascular action and assimilation are much impaired, a little powdered casearilla may be added to the former, the whole being taken in some water.

319. *b. External medication* is a very important part of the treatment of phthisis; and, as will be seen from the historical sketch given above (§ 242, *et seq.*), it has been considered such from a very early period of medical history. Probably external derivation by means of moxas was as early resorted to in eastern countries for this and other diseases, as by issues and setons among the Greeks and Romans; but there can be no doubt of the benefit to be derived from these and similar means in aid of judicious internal treatment and regimen. As it was in respect of internal, so it has been as regards external means, different kinds and various modes of prescribing them having been advised in successive ages, and those which had fallen into disuse having been revived from time to time, again to be neglected or forgotten. The moxas employed in far eastern countries from time immemorial came into vogue in Europe after the former were visited by voyagers and travellers from the latter; but failed in superseding issues and setons, which have always held their place, and deservedly, in the treatment of this disease, especially with the judicious and experienced. Early in the present century moxas came again into use in some places on the continent of Europe, and pustulation by means of tartarized antimonial ointment, or of croton oil in this country; the latter means having so entirely superseded issues and setons as to have caused the complete disuse of them. I have seen much of these modes of derivation, and have had considerable experience of their effects, both in phthisis and in other diseases. *Moxas* are of more or less use according to the amount of discharge which may be procured subsequently to their incandescence; but their operation is uncertain. Both the tartarized antimonial ointment and the croton-oil liniment produce external irritation, but little discharge, their influence on the disease being seldom beneficial,

while they distress the patient and even augment the constitutional disturbance in some cases.

320. *Issues*, made sufficiently large, have proved most beneficial in my practice. I have always prescribed them when I have seen the patient in the first, or even in the second stage, and several persons are now alive who had recourse to them from twenty to thirty years ago, as I advised them. I have generally recommended them to be made near the margins of the ribs, when the patient is not much emaciated; or in any other situation which may be preferred. The chief objection to them is the preliminary measure of destroying the integuments for the lodgment of the peas. Where *setons* appear preferable, as respects the state of the patient, or the situation in which they may be inserted, so as least to incommodate him, care should be taken, in respect of them as well as of issues, that they should be sufficiently large to be effective, and that a free purulent discharge be uniformly procured from them. When both issues and setons are objected to, especially the formation of an issue in the usual way, then the inner bark of the mezereon, previously moistened, may be placed on a part of the surface of the extent of a crown-piece, and confined there by means of a larger piece of adhesive plaster spread on paper or leather, the bark being renewed from time to time. This latter plan, however, is not preferable to a blistered place of this extent kept open and discharging by the usual means; but neither the one nor the other is so effective as an issue or a seton, the benefit being derived chiefly from a uniformly copious discharge. When this is procured, the internal treatment and regimen of the patient should be more restorative and generous than in other circumstances of the disease; tonics, chalybeates, animal food, restorative beverages, &c., being allowed, according to the peculiarities of the case, especially as respects the vital and vascular conditions.

321. I have, since 1819, never neglected to prescribe an embrocation to the chest, in phthisis and in some other diseases, which acts less as an external irritant and derivative than as a source from which a salutary agent is inhaled into the lungs in so mild a form as neither to irritate nor to stimulate, while it is slightly absorbed. This embrocation I have employed in many internal diseases, in various forms or modifications, as a liniment, or as an embrocation or epithem—sprinkled on folds of flannel, or on spongio-piline, and covered over by a napkin, or otherwise—and varied as respects the constituents, the principal one being always present.

No. 353. R Linimenti Terebinthinæ, Linimenti Camphoræ compositi, ʒiij, ʒjss.; Olei Olive, ʒss. ad ʒvj.; Olei Cajuputi, ʒj. ad ʒjss. Misce et sit embrocatio.

No. 354. R Linimenti Terebinthinæ, Linim. Saponis cum Opio, ʒiij, ʒj.; Linim. Camphoræ comp., ʒjss.; Olei Cajuputi, ʒjss. Misce.

322. When it is desired that external irritation should follow the first of these, the olive oil may be omitted. Either of these should be renewed every night, the vessel being previously shaken, and applied, by the means already mentioned, to a sufficiently large surface, either of the front, or of the back of the chest, or of the side, where pain or uneasiness is most felt. It should be kept applied all night, or the following day, and even be renewed again in the morning, the quantity sprinkled over the surface of the flannel or spongio-piline being sufficient to moisten, or more complete-

ly to wet these substances, according to the effect we wish it to produce, whether by inhalation of the fumes proceeding from it, or by the external derivation it may occasion, in addition to the former mode of action.

323. Blisters, mustard poultices, the cauteries, urtication, and dry-cupping have severally been resorted to as derivatives in this stage. Blisters are often of much service, especially when applied after local depletions; and when a discharge has been procured from them for some time. The others, excepting the cauteries, are seldom productive of much or permanent benefit. The tartarized antimonial ointment and liniments with croton oil have deservedly fallen into disuse. The actual and potential cauteries were not infrequently employed in former times for this disease, a discharge from either having always been promoted. They are now never resorted to in phthisis.

324. c. In this, as well as in more advanced stages of the disease, the *inhalation* of medicated vapours, and of certain fumes, effluvia, and odours, has been recommended and been adopted. I have, however, very rarely observed much benefit derived from it, especially as commonly employed by means of an inhaling apparatus. The substances, also, generally prescribed for inhalation have been used in so concentrated a form, or are so acrid or stimulating, as often to increase the existing irritation in the bronchi, or the morbid action in the substance of the lungs, and in the seats of vomica or of cavities. It is also very questionable whether or no the inhalation of vapours—whether watery, emollient, or anodyne, or narcotic, or possessed of all these properties—is actually beneficial in phthisis, more especially at an early period of the malady. The inhalation of these may be useful as palliatives at an advanced stage, especially when an irritable cough, a sense of constriction in the chest, difficult expectoration, &c., are much complained of; but, in other circumstances and stages of the disease, they only tend to obstruct or impair the functions of the lungs, by interrupting the progressive metamorphosis and oxygenation of the globules of the blood, and by favouring congestion or a partial collapse of the organ. The modes of inhalation, or of having recourse to the respiration of the effluvia of substances which are calculated to prove beneficial in this disease, will be considered in the sequel.\*

325. *C. Treatment of the second stage of the common form of Phthisis.*—At the commencement of this period, or when the symptoms, especially the appearances of the expectoration, and the character of the febrile action, indicate the recent supervention of this stage on the first, then it

\* [We unhesitatingly concur in the truth of these remarks, as will doubtless every practical physician who has had much experience in regard to inhalation in this disease. That it may palliate the cough, when harassing and of an irritative character, when proper substances are used, is a matter of common observation; but we cannot admit that it exerts any decided curative power. Forceful inspiration, which expands the air-vesicles, is far more efficient than the local contact of aerial or vapoury medical agents; for a more perfect oxygenation of the blood aids materially the nutritive function, primary and secondary assimilation. It is possible that certain substances, such as chlorine and iodine, which act as stimulating and tonic alteratives, when introduced into the circulation, may exert the same curative influence as when taken into the stomach. But these are few in number, and it is very possible that the local irritant effects exerted on the lungs may overbalance any good effects which they otherwise might produce. We reserve further remarks on this and other allied topics to the APPENDIX.—Ed.]



will become a question how far the means which have been or still are in use may be continued, and in what they may be modified or changed, or what additions may be made to them. In this the physician will be guided by the peculiarities of each case; but in the circumstances of most the same principles and means as have been discussed should be continued, modified so as to meet prominent symptoms, and commencing or fully developed complications, or intercurrent affections. The softening of the tubercles in this stage is generally attended by an increase of cough and expectoration, of the hectic symptoms, and of the morning perspirations, with occasional attacks of diarrhoea or disorder of the bowels. One or more of these usually become more prominent as the disease advances; or other phenomena are superadded, requiring the treatment to be directed more especially to them.

326. *a.* The cough generally suggests palliatives, in connexion with the other means which the state of the patient demands. Thus hydrocyanic acid, or henbane,\* or hemlock, or the compound tincture of camphor, may be added to mixtures containing the liquor ammoniæ acetatis, and any demulcent which may appear most appropriate to the nervous and vascular conditions of the case; or they may be conjoined with bitter or tonic infusions or decoctions, when the states of the pulse, of the fever, and of the vital powers require them: these latter are often rendered more beneficial by the addition of the solution of the acetate of ammonia, and of the sweet spirits of nitre. Where there is much pallor of the surface, the pulse being either weak or but little accelerated, any of the anodynes above mentioned may be added to the *mistura ferri composita*, and the effects upon the cough and upon the hectic and other symptoms carefully observed.

327. *b.* The perspirations during the night or early part of the morning are always productive of great exhaustion, and are the most difficult to restrain or prevent. They have been very differently treated by both ancient and modern physicians, but most frequently by mineral acids, and by various refrigerants, astringents, and tonics, as shown in the historical sketch given above (§ 241, *et seq.*). Either of these may be prescribed in combinations suited to the case, with emollients, stomachics, or tonics, and may be made the vehicle, on the surface of which the recent cod-liver oil may be taken shortly after a meal, twice or thrice daily, and in sufficient quantity; this being the substance most deserving of reliance for moderating this distressing symptom. Some of the medicines advised with this object have often disordered the bowels, or induced an attack of diarrhoea, and even augmented the suffering of the patient, without effectively diminishing the perspirations and their consequent exhaustion; but these results rarely follow from the use of

this oil. The *mistura ferri composita* is sometimes of service in allaying the severity of the hectic and the excessive perspirations, especially when there is no inflammatory complication present, and when it neither produces headache nor renders the cough harder or more severe. Dr. Watson has found the *tinetura ferri muriatis* successful in allaying the perspirations after other means had failed.\* The dose he prescribes of this medicine is twenty minims thrice daily. I have likewise given this preparation with advantage in the infusion of calumba, with an additional quantity of the acid, and have sometimes made this combination the vehicle on the surface of which the cod-liver oil was taken.

328. *c.* When diarrhoea occurs it is often induced by some purgative medicine, or by errors in diet, or by means employed to moderate the perspirations. The cause of it should be ascertained, and the medicines to restrain it be suggested or selected accordingly. It is, however, frequently independent of either of these causes, and the result of indigestion—of the acidity and the accumulation of sordes in the *prima via* consequent upon the imperfect performance of the functions of primary assimilation. In either of these circumstances antacids and absorbents, conjoined with muelages, anodynes, or narcotics, or with mild tonics, will prove of service; as the cretaceous mixture with the compound tincture of camphor, or the tincture of hop, &c., and with the tincture of catechu, or with other vegetable astringents, if they be required. But the bowels should not be confined by these or other medicines; and when there is any risk of such an occurrence magnesia may be given with sulphur or rhubarb, or with casearilla; or the compound decoction of aloes may be prescribed with the tincture or with other suitable medicines.—[Opium is well suited to such cases, and may be used freely with the best effects.]

329. *d.* In this stage of the disease *emetics* and *bleeding* are seldom beneficial, unless the states of the digestive and respiratory functions require a recourse to the former, and the occurrence of pain or the appearance of an inflammatory or congestive complication demand the latter. Ipecacuanha is in most instances the best emetic, and local bleeding the most beneficial, especially when the embrocation prescribed above (§ 321) is afterward applied and duly persisted in. Although it may be necessary to have recourse to these means, others of a restorative or even tonic kind—both medicinal and regimenal—may be equally required; often, however, in different cases, but not infrequently in the same case, and sometimes even soon after the more antiphlogistic measures have been employed. Generally, when local depletions are required, febrifuge medicines, chiefly such as the solution of the acetate of ammonia,

\* [Great caution is necessary in regard to the use of hydrocyanic acid, henbane, or any other powerful sedative in tubercular disease, inasmuch as the vital powers, already prostrated, may be still farther reduced by the influence of the remedies. When there is "great pallor of the surface with weak pulse," we have found the night sweats augmented by the use of the above-named drugs, as well as the *veratrum viride*, and the general prostration aggravated, under which circumstances the disease invariably makes more rapid progress. We have, however, used of late, with apparent advantage, TILDEN'S "*Fluid Extract of Hyoscyamus*," with paregoric, which serves to allay the pulmonary irritation without causing any increase of debility.]

\* [The *oxide of zinc* will be found one of the most efficacious remedies for the night sweats of phthisis. It may be made into a pill with *extract of hyoscyamus*, two grs. of each to a pill, of which one, and in some cases two, may be taken at bed-time. Dr. BARLOW recommends one gr. *sulph. zinc* and four grs. *ext. of hyoscyamus* to be taken in one pill at bedtime, and generally finds it successful. As the *oxide of zinc* is insoluble, Professor WOOD advises the use of the *sulphate*; but though the former, like calomel and many other mineral substances, be insoluble in water, they find their appropriate solvent in the stomach or intestinal canal; so that, in fact, the *oxide* is just as efficient as the *sulphate*, and less irritating to the mucous membrane. We have found a combination of *sulphate of quinine* and *morphia* very useful for the night sweats of phthisis.]

camphor mixture, &c., are the most appropriate; but they may be afterward conjoined with others of a more tonic nature, such as the infusion of hop or the infusion or decoction of cinchona, and to these anodynes may be added, the selection of which should depend upon the features of the case. Hydrocyanic acid, monkshood, hemlock, henbane, meadow-saffron, and digitalis, have been individually employed in combination with these or other medicines; but they require caution in their use, and careful observation of their effects. Monkshood, or *aconite*, is most appropriate in the more inflammatory tendencies of this and the preceding stage, but it especially demands a most cautious observation of its effects; a remark not less applicable to colchicum and digitalis, which are suited to the same states of the disease as those for which *aconite* may be given; these being useful chiefly as antiphlogistic means, either in aid of vascular depletion, or when the condition of the blood and of vital power contra-indicate a recourse to depletion; although the local morbid action requires to be restrained or even lowered.

330. *c.* The remarks offered above respecting *issues*, *setons*, and other derivatives (§ 319–323), apply to this as well as to the first stage. Instances are rare in which either the one or the other should not be resorted to. The great difficulty often is, owing to the emaciation of the patient, in which situation they may be placed, so as to produce the least amount of discomfort. When emaciation is not very remarkable, then the margins of the ribs may be selected; but in different circumstances an issue of good size may be formed over the pectoral muscle, or between the shoulder-blades. When this stage in females is characterized by suppression or marked diminution of the catamenia, the issue may be made near the groin, in the anterior aspect of the thigh. When setons are preferred, the arm, near the axilla, may be selected. If neither of these nor moxas be adopted, *blisters*, kept open as long as possible, and renewed from time to time, are generally necessary. The *embrocations* advised above (§ 321) ought not to be overlooked, inasmuch as, in the more urgent cases, they may be applied while the foregoing means are also in operation, and as they are sources both of derivation and of inhalation. When the above produce a sufficient discharge, then GRIFFITH'S myrrh mixture, or other chalybeates or tonics, may be prescribed, with anodynes, narcotics, &c.; and their effects upon the cough, the pulse, and the hectic should be carefully observed. If these symptoms become aggravated by them, they ought to be relinquished, and the salines, especially the solution of acetate of ammonia, or of eitate of potash, with hydrocyanic acid, conium, &c., as noticed above (§ 329), may be substituted. If these effects do not result, then the more generous regimen recommended for the first stage (§ 314, *et seq.*) is equally, if not even more, required for this.

331. *f.* *Inhalation* of dilute medicated vapours and fumes may be tried in this stage, as well as in the first. The opinion I have formed of them, and stated with reference to that period (§ 324), is not materially different as regards this. Cases may occur in which they will be more serviceable in the second than in the first stage, and still more so in the third than in either of the foregoing; but the amount of benefit, or the want of it, will entirely depend upon the substances selected for this mode of administration, and upon the way

of effecting this intention (*see* § 412). But mild or weak *fumigations* of the patient's apartment are generally much more beneficial than inhalations, which often irritate and increase the local lesions (§ 413).

332. *g.* In females the state of the *catamenia*, as respects both the intervals and the duration and quantity of the discharge, is of the greatest importance, especially in the first and second stages of the malady. Excessive discharge, whether as to frequency of recurrence, the duration of its continuance, or the quantity, not infrequently predisposes to, or more directly occasions, phthisis; and the same disorders of this function, if allowed to proceed, will also aggravate or hasten the progress of this malady, if they occur in either the first or second stages. The rapid or sudden disappearance of this discharge, on the other hand, is even more certainly and rapidly injurious, in whatever stage this may take place. A difficult or scanty catamenial discharge requires attention, although it is not so dangerous as either of the former states, especially the latter. Excessive states of the catamenia should be moderated with caution, and by such means as are not likely to be followed by suppression. The decoction or infusion of cinchona with either of the mineral acids, or the sulphate of quinine in the compound infusion of roses, and tincture of orange-peel may be prescribed, or the sulphate of quinine may be mixed in some water and taken without any addition. If anæmia have been produced by this discharge, the tincture of the sesquichloride of iron may be given, either alone or with the preparations of calumba or quassia. It should not be overlooked that the disorders of the catamenia in the early stages of phthisis are often caused by masturbation; and when this is suspected, and when advice can be prudently given and precautions taken against this vice, it becomes the duty of the physician to act accordingly. In these, as well as in other circumstances of profuse catamenia, ipecacuanha, conjoined with extracts of gentian, catechu, and a narcotic, may be given in such quantity as to occasion some degree of nausea to even retchings.

333. Scanty or difficult menstruation requires means appropriate to the peculiarities of the case; for either of these states may be attended in one patient with an anæmic or chlorotic appearance, and in another with little or no apparent deficiency or poorness of blood. In the former case, the compound mixture of iron, with as much of the compound decoction or the tincture of aloes as will act moderately on the bowels, or prevent constipation, with a little of the extract or tincture of conium, will generally be of service. In other cases, where there is no deficiency of blood, a few leeches may be applied below the groins shortly before the expected period of the catamenia; and the hip-bath and pediluvia, at a sufficiently warm temperature and with the addition of salt or mustard, resorted to.

334. In cases attended by suppression of this discharge, strenuous efforts should be made to restore them. The hip-bath, pediluvia, &c., rendered stimulating by bay salt and mustard, leeches applied around the anus or beneath the groins, the preparations mentioned above (§ 333), walking exercise, or riding on horseback or in a carriage, and the several emmenagogues advised for suppression of the catamenia (*see* MENSTRUATION, § 64–95, *et seq.*), should be prescribed in combi-



nations or forms suited to the state and stage of the pulmonary disease.

335. In this stage various complications appear, either as temporary or intercurrent affections, or as morbid associations, which continue to the termination of the malady. These will be noticed in the sequel; but there is one which is rarely absent, and which renders the treatment difficult, namely, the bronchitic affection. This, in many cases, becomes the prominent disorder, and requires the treatment to be more especially directed to it; the most generally serviceable means being, according to the accompanying fever and the state of the patient, the solution of the acetate of ammonia with the spirit of nitrous ether, dilute hydrocyanic acid and camphor mixture; or in somewhat different states, with carbonate of ammonia, compound tincture of camphor, or henbane or opium. If there be a hæmorrhagic tendency, the acetic acid may be added; and in most cases the terebinthinate embrocation should be applied to the chest.

336. *h.* The diet and regimen in this stage may in a very large proportion, if not in the majority of cases, be altogether the same as I have advised for the prevention and for the treatment of the first stage of the disease (§ 292–308). In many cases a fish diet will agree well in this stage; the white kinds of fish, always boiled, but never fried, a squeeze of lemon, with little butter, but preferably with the liver of fish, being the chief or only sauce. The fish and their livers, which are most beneficially used as articles of diet, are the *Gadus brosmius*, or torsk; the *Gad. morrhua*, or cod; the *Gad. molua*, or ling; the *Gad. æglefinus*, or haddock; the *Gad. merlangus*; the *Gad. callarius*; the *Gad. carbonarius*, or coal-fish; the *skate*, *turbot*, *soles*, &c. The recent livers of all these species of the genus *Gadus*, boiled in such a manner as to preserve their oil, may be used either as sauce to the fish, or may be eat with it, or the oil may be taken after the meal, in the usual medicinal way. They are beneficial both as articles of diet and as medicine. When quite recent they have no fishy or unpleasant flavour, and are easily digested—the more easily the more oil they contain.

337. As to other articles of diet, regimen, change of air, exercise, travelling, voyaging, and choice of residence, the remarks which I have made above (§ 292–308), and in the sequel (§ 420, 421), and in the article CLIMATE (§ 42, *et seq.*), are applicable to this stage, according as the strength of the patient and the prominent symptoms will admit of their adoption, and as the presence or absence of any of the more important complications will suggest.

338. *D.* The treatment of the third stage of the common form of phthisis (§ 38, *et seq.*) is frequently but little different from that already advised. The state of the patient may not, in some instances, be materially different from that characterizing the second stage, although cavities—one or more—have already formed in one or even both lungs. The patient may not be materially worse in respect either of strength or degree of emaciation, or of cough and respiration, especially if the more aggravated symptoms and complications have not as yet been experienced. More commonly, however, he is much worse as regards all these; and colliquative perspirations, attacks of diarrhœa, severe paroxysms of cough and of oppressed breathing, and pains in various

parts of the chest or its vicinity from inflammatory congestion of portions of the lungs or from the extension of the morbid action to the pleura, are more or less experienced, and are generally relieved with greater difficulty than in the preceding stages. The treatment depends chiefly upon the complication, or rather complications, which characterize this stage.

339. *a.* In all cases there is more or less *bronchitis*, chiefly, however, of the bronchi communicating with the softened tubercles and cavities; but there may be in addition *inflammatory* or *sub-inflammatory* action in the surrounding portions of lungs, or even also in parts of the pleura in the vicinity. These may require, or at least suggest, a treatment which neither the strength nor vascular condition of the patient may well bear, especially when carried so far as to subdue the superinduced local mischief. But to leave these complications to their natural courses, when clearly manifested by symptoms, may be more injurious than the effects of judicious means prescribed for their removal; and, as far as my experience enables me to decide, the employment of such means is the safest alternative. For these states of this stage, therefore, local depletions, by leeches or by cupping, are required, according to the condition of the patient and symptoms of the case, the quantity of blood taken at first being small. When the indications for having recourse to this measure are doubtful, dry-cupping, afterward blisters, the terebinthinate embrocations already advised (§ 321), and the febrifuge medicines recommended above, are most appropriate. Of this class of medicines, the solution of acetate of ammonia, in forms and combinations already noticed (§ 315), is the most generally of service.

340. *b.* In this stage, especially in its advanced course, the colliquative perspirations and diarrhœa exhaust the patient, and more or less waste the red globules of the blood. While these symptoms should be restrained, the powers of life and the supply of duly assimilated blood-globules must be supported and promoted. The means which fulfil the one indication often also aid the other. This is more particularly demonstrated by the effects of cod-liver oil, and by medicines which improve the digestive and assimilating processes, and correct, counteract, or remove the contaminating matters which are carried into the circulation from the lesions seated in the lungs, whether softened tubercles or ulcerating cavities, and which thereby affect the cutaneous and mucous surfaces and follicles, so as to give rise to these exhausting and distressing symptoms of the malady. Numerous means, beside those already mentioned, have been proposed for these morbid conditions, especially the acetate of lead with pyroligneous acid and laudanum, the sulphate of zinc with sulphuric acid, the sulphate of copper with opium, the substances containing tannin, gallic acid, &c., and catechu, kino, krameria, hæmotoxylum, nux vomica, &c.; but very few of these, even while they restrain the diarrhœa, diminish the perspirations, or in any other respect alleviate the malady. Indeed, in some cases they aggravate the disease, and only accelerate its progress to a fatal issue by preventing the elimination by those emunctories of the effete, morbid, and contaminating materials conveyed into and circulating in the blood.

341. *c.* Much more rational and efficient indications for the abatement of the colliquative diar-

rheæ and perspirations in phthisis would be the improvement of the digestive and assimilating functions by such means, or combinations of means, as would at the same time, by their partial absorption into the circulation, correct, change, or counteract the contaminating matters which are imbibed from the seat of the disease; whether these matters be purulent or tubercular, or the sanious fluid formed in or on the surface of ulcerating parts, and whether they are actually present in the blood, or are more or less changed in the course of the circulation of the blood. That they actually contaminate more or less this fluid, however small may be the quantity which passes into it, and thereby give rise to the most distressing and dangerous symptoms of phthisis, cannot be doubted, the skin and the bowels being two of the chief channels through which they, and other injurious matters they may form, are eliminated from the circulation; but the selection of the means of fulfilling these indications is much more difficult than devising them, and depends entirely upon the peculiarities of individual cases, as respects especially the progress of the disease and the states of respiration and circulation. The bicarbonate and the nitrate of potass, prescribed in tonic infusions or decoctions, with aromatic or astringent or narcotic tinctures, according to the state of the case; magnesia and sulphur, with the powder of cascarrilla or of cinnamon or ginger and liquorice powder, or with other substances, as the state of the bowels will suggest; the compound iron mixture, or the aromatic mixture of iron (D. P.); the bitter or tonic infusions, with carbonate or citrate of potass or of soda and anodynes; balsams, the purified or inspissated ox-gall, with conium or with the compound soap pill and ipecacuanha, or with the purified extract of aloes, according to circumstances; and camphor, the terebinthines, tar or tar water, conjoined with such of the foregoing medicines as the features of the case require, may severally be employed. In some instances where the colliquative state of the bowels and other symptoms indicated a contaminated state of the blood, and consecutive alteration of the mucous surface and follicles of the bowels, I have prescribed the following pills at night, or night and morning, or with the meals; the bitter vegetable tonics, with alkalies, &c., having been taken in the intervals between meals:

No. 355. R Pilulæ Ferri comp.; Pilulæ Rhei comp.; Extracti Fellis bovini; Picis liquidæ, ʒi. ʒss. Misce et contunde bene, dein divide massam in pilulas xxx.; quarum capiat unam ad tres pro dose.

No. 356. R Extr. Fellis Bovini; Sulphuris præcipit.; Picis liquidæ; Confect. aromat. in pulv., ʒi. ʒss.; Olei anisi, q. s. Contunde bene et divide in pilulas xxxvj. Sumat j. ad iij. pro dose.

No. 357. R Magnesie carbon.; Sulphuris præcipit., ʒi. ʒij.; Confect. aromat. in pulv. ʒss.; Creasoti ʒi. ʒij. ad xij.; Olei anisi, et mucilag. q. s. Misce et fiant secundum artem pilulæ xxxvj. Capiat j. ad iij. bis terve in die.

342. It may be noticed that the above, both mixtures and pills, may be modified, or receive additions, so as to meet the peculiarities of the case. If irritation or pain in the bowels be experienced, small doses of the extract of opium or the soap pill with opium, may be added to either of the foregoing; and if diarrhœa, or tenesmus, or dysenteric symptoms be present, ipecacuanha in full doses may also be conjoined with these.

343. With the other distressing symptoms, to which I have directed notice, there are others for

which relief is required, and although we may be unable to impart it, we should at least attempt it. The dyspnœa, difficulty of breathing, the feelings of suffocation, &c., in this stage, are sometimes distressing. In many instances the terebinthinate embrocations already mentioned (§ 321), applied over the chest or between the shoulders, will afford some relief; and an opiate conjoined with either of the pills just prescribed, or with expectorants and antispasmodics, or the compound galbanum pill, or with stimulants and other means indicated by the state of the case, as already mentioned, will often be of service. When the dyspnœa is urgent or distressing, an emetic will be found to afford most relief. The aphthæ which, towards the close of this stage, often appear in the mouth, tongue, and throat, farther increase the distress of the patient, and require the treatment advised for this condition of the mouth and throat in the articles THROAT (§ 40, *et seq.*) and THRUSH (§ 11, *et seq.*).

344. *d. Delirium* rarely occurs in this form of phthisis until shortly before dissolution, unless in females, when this stage of the malady is accelerated by, or occurs in the puerperal state, or in cases where the nature of the medicines or the idiosyncrasy of the patient has given rise to this symptom. Most of the narcotics and anodynes, especially henbane, conium, aconite, opium, morphia, digitalis, &c., will have the effect of inducing delirium in the advanced progress of this stage, especially in nervous and exhausted states of the patient, and when either of these substances are given in too large doses, or continued too long; or when substances which are calculated to prevent or to correct their injurious effects have not been conjoined with them. The delirium, in most instances, is slight; but it is sometimes more severe or acute, and is attended with restlessness and sleeplessness, or it approaches the character of delirium tremens. For these modifications of mental disorder, lowering means only hasten a fatal issue. If they have been occasioned by either of the medicines just mentioned, they will frequently disappear after the cause has been removed, especially if judicious means be prescribed; but under every circumstance the state of vascular action, especially as respects the brain and membranes, should be observed. If it be increased in these, cold-sponging the head, mustard pediluvia, &c., are required; and even when such increase is present, it will be more readily relieved by restoratives, prescribed in small and moderate doses, and their effects watched, than by opposite means. The medicines from which most relief may be expected in the delirium occurring in this period, are camphor, ammonia, the solution of the acetate of ammonia, the carbonate of ammonia, the compound spirit of ether, the spirit of nitric ether, the hydrochloric ether, the preparations of serpentaria, of arnica, and of sumbul. These may be prescribed individually, or in combinations of two or more, or with the alkaline, saline, and restorative medicines I have mentioned as being useful when the blood is contaminated, the delirium often arising from that condition, as well as from exhausted organic, nervous, or vital influence.

345. *v. TREATMENT OF THE LATENT FORM OF PHTHISIS.*—This variety of the disease (§ 77, *et seq.*) generally eludes the notice of the friends and the fears of the patient until it has advanced



to a state hardly admitting of hope. If, however, the symptoms characterizing it should alarm either friends or patient, if depression of spirits, impaired digestion and assimilation, or other indication of disorder lead to the procuring of medical advice, and the detection of the malady in its silent and stealthy course, although no prominent or unmistakable sign be present, the treatment which will be found most beneficial is that which has been already advised for the *prevention* and for the *threatened appearance* of the malady (§ 292-298). It is obvious, however, that the best-devised means will have no beneficial effect if the causes which injured the constitution still continue to act. The physician should endeavour to ascertain what these are; and if they be such as may be removed, the necessity of making the attempt should be insisted upon, and the patient be made acquainted with the consequences of the neglect of this advice, especially when the removal of these causes depends upon himself. In most of the cases of this variety the causes are usually depressing and exhausting; and in many, as soon as the nature of the malady is suspected, the digestive and assimilating functions require restoratives, mild tonics, change of air, moderate exercise in the open air, travelling, and pleasurable occupation of the mind; the regimenal and medical treatment I have advised above (§ 299-324) for the first stage of the usual form of the disease being also necessary. In this latent or silent course of phthisis vascular depletions are not well sustained; and if they be at all attempted, they should be small, and their effects watched. In the great majority of cases of this form, and especially when depressing or exhausting causes have occasioned the malady, medicines of a decidedly restorative or tonic kind, attention to the digestive functions, cod-liver oil, and the other means recommended at the place referred to, should be adopted. These may arrest the disease; but if it should advance nevertheless, and become unmistakingly developed, the treatment must necessarily be the same as I have advised for the more common form of the malady, modified as above, according to the manifestations of the advanced stages.

346. vi. PRIMARY ACUTE or RAPID PHTHISIS. —A. The symptoms of the *first variety* of this form (§ 82-84) have been described by me as intermediate between those of congestive bronchitis on the one hand, and of congestive or nervous pneumonia on the other (§ 83), both lungs being more or less affected. The cases which I have observed have been consecutive of measles in a serofulous diathesis, or of delayed, suppressed, or excessive catamenia. In these bleeding seemed injurious, or was of no avail. Emetics, the solution of the acetate of ammonia, with ether or ammonia, small doses of camphor, the terebinthinate embrocation applied over the chest or between the shoulders, and blisters, were the means which appeared to be of most service. Cod-liver oil was either not retained, or was nauseated and not taken, or failed of producing any benefit. The infusion or decoction of cinchona, with nitrate of potash and bicarbonates of the alkalis, or with the solution of acetate of ammonia and various ethereal preparations, and small doses of camphor with aconite, &c., were also prescribed in different cases, or in the same cases at different periods of the disease, but with no marked advantage.

347. B. The *second variety*, or more strictly febrile form of acute phthisis described above (§ 85, 86), is often mistaken for low nervous or typhoid fever, which it closely resembles, especially in its advanced progress. In the few cases which have fallen under my observation I prescribed the remedies I have just mentioned (§ 346); and of these, the last-mentioned, or those consisting of the preparations of cinchona with the substances stated to have been conjoined with them, the chlorate of potash, camphor, the terebinthinate embrocations, &c., appeared to be of service only in prolonging the life of the patient for a few days. The nature of these cases precludes any hope of farther advantage than this from any treatment whatever.

348. vii. CONSECUTIVELY ACUTE PHTHISIS (§ 87) is merely the supervention of either of the acute varieties of the disease described above (§ 81-86) upon the latent form (§ 77-80), of the development of this latter form owing to an attack of hæmoptysis in its course, or to some determining or aggravating cause or occurrence. Although an attack of hæmoptysis often relieves the pulmonary symptoms when they have been unequivocally manifested previously, at least for a time; yet it is sometimes followed by an acute state of the disease, most frequently by the more common form, when it occurs in the course of the latent variety. In the consecutive manifestation of acute symptoms the treatment should depend upon the character of these symptoms and upon the associations they present. If hæmoptysis take place, the treatment I have advised for it (§ 353-5) may be adopted as far as it may be appropriate to the peculiarities of the case. If the local symptoms and signs indicate congestion or inflammatory action in one or both lungs, local vascular depletions, or even a repetition of them, emetic, antiphlogistic, and saline medicines, especially the solution of the acetate of ammonia, terebinthinate embrocations, blisters, and other means already noticed, will be of service; and if the disease assume the acute or febrile states, the medicines noticed above (§ 346, 347) may be prescribed, although with little or no hope of benefit from them. In some instances the malady assumes a less acute or febrile form, the treatment having temporarily mitigated the severity of the symptoms. This is probably owing to the congestive and inflammatory states of the bronchi and substance of the lungs, which had supervened upon an extensive but latent formation of tubercles in both lungs, having been partially subdued by the means employed. In these cases the development of the tubercles by the morbid action in the bronchi and substance of the lungs afterward prevents this action in these parts to subside; and thus both these morbid conditions act and react on each other, so as to occasion an acute state of disease. The extension of these lesions in a more or less marked degree through both lungs generally terminate fatally before large cavities, or even any cavities, are formed.\*

\* Of 750 cases of acute pneumonia treated in the great hospital of Vienna from 1847 to 1850, pulmonary abscess was observed in but a single instance, and with regard to the physical signs of excavations thus formed, SKODA remarks as follows: "I have frequently examined patients suffering from pneumonia, in whose lungs newly-formed abscesses were found after death; but I have never, in any single instance, recognised the presence of abscess by the aid of auscultation or percussion. In every case, the abscess, though communicating with the bronchial tubes, was filled with pus or sanies."—SKODA

whereas, in the common form of the disease, the greatest part of the lungs remains free from change, although other portions are ulcerated, excavated, or otherwise disorganized. In these circumstances the principles of treatment already developed should be adapted to the peculiarities of individual cases.

349. viii. PROTRACTED PHTHISIS (§ 89-91), especially when early recognised or manifested, and judiciously treated, furnishes many chances either of recovery or of prolonged existence. For this variety, particularly when the pulse and respiration are not much disturbed, the several Hygienic means advised for the *prevention* of the disease and for the treatment of the first stage (§ 292-323) are generally of great service, more especially change of climate, voyaging, exercise and agreeable occupations in the open air, and in a dry and temperate situation, attention to the digestive and assimilating functions, aided by digestible and nutritious food; by sulphur, balsams, a farinaceous and milk diet, &c.; by tonics, stomachics, and chalybeates when the disease appears to have proceeded from depressing or exhausting causes; and by emetics and other antiphlogistic means, or by small bleedings, issues, setons, terebinthinate embrocations, blisters, &c., according as vascular excitement or congestive or inflammatory complications may occur. In the simpler states of this form, when the pulse is weak or slow, and no congestive or inflammatory complication is present, and especially if the blood be deficient or thin, the *mistura ferri composita*, or the *tinctura ferri muriatis*, will be given with benefit; and with either of these other medicines may be conjoined, especially cod-liver oil, anodynes, &c.

350. ix. PHTHISIS IN INFANTS AND CHILDREN (§ 92-95) requires more particularly the Hygienic measures I have recommended under the head SCROFULA AND TUBERCLES (§ 148-153); and in the sections above on the *prevention* and *early treatment* of the usual form of phthisis (§ 292-308). Asses' milk, a milk and farinaceous diet, moderate exercise in the open air, change of climate, strict attention to the promotion of the digestive and assimilating functions by means of diet, regimen, and suitable medicine, the cod-liver oil in as large quantity as the stomach will bear, and taken in the modes hereafter to be noticed, are the chief means in which confidence can be placed, although others should be added whiel the circumstances of particular cases will suggest. When the disease advances to the second or third stage in children, then the treatment advised above for these stages, in the usual form of the disease, will, with due reference to the ages and states of the patients, be equally appropriate for them.

351. x. PHTHISIS IN THE DARK RACES (§ 96, and *note*)—The forms and states of the disease may reasonably be considered as varying with race and climate (§ 200-222), and also with the habitual food and clothing, or amount of clothing, of these races (§ 219-222, 420, 1. and CLIMATE, § 42, *et seq.*) From what I have seen or gathered from writers respecting the disease in these races, I conclude that for them a tonic and restorative treatment, with attention to the digestive organs and to the functions of the skin, is espe-

cially and generally required. In other respects the means of cure advised above for the several forms of the disease in the white races are also suited to these forms when they appear in the dark races. In these latter the causes are commonly depressing and exhausting. Confinement to close situations, where the air is rendered impure by frequent respiration or by numbers, removal to colder and more humid climates than those from which they have been taken, venereal excesses, and insufficient food, are the most frequent causes of phthisis in these races, and hæmoptysis is a common occurrence at the accession or early stage of the disease. For these the more astringent tonics, the preparations of cinchona or of cascarilla, conjoined with laxatives or aperients, or with diaphoretics, according to the states of the bowels and skin; ipecacuanha combined with the balsams and restoratives, chalybeates with stomachics, and terebinthinate embrocations externally, are most frequently indicated. If febrile action be present, the warm and restorative febrifuges and diaphoretics are required; especially the solution of acetate of ammonia, the carbonate of ammonia, camphor, and the infusion or decoction of cinchona. If the bowels become disordered, ipecacuanha in large doses, with opiates, the bitter extracts, and such of the medicines already mentioned as the circumstances of the case will suggest, will be found most appropriate. Dr. ARCHIBALD SMITH states that the several dark races, and the crosses between these races, on the coast of Peru especially, when attacked by the hæmoptysie form of phthisis, were most benefited by a residence for several months in the mountains at an elevation of 5000 to 10,000 feet above the level of the sea.

352. xi. TREATMENT OF COMPLICATED PHTHISIS.—The *complications* which severally appear from the accession to the close of this disease require a few remarks. These complications are not confined to any one form or stage of the malady, but occur in all; although more frequently perhaps in some cases than in others, owing to the constitution and predisposition of the patient, to the exciting and determining causes, and to the exposures and other influences in operation during the progress of the malady. Some of these complications may appear in the character rather of prominent or more urgent symptoms than of actual superinduced or intercurrent affections; but as phthisis may, and actually often does, run its whole course without the appearance of any of them, or of one only in some cases, and of another in others, while two or more may occur even in the same case, although not at the same time, they may be more correctly considered as contingent symptomatic affections, complicating, and often rendering the tubercular or original malady more severe and more rapidly fatal. With a few exceptions, these affections have already been considered with reference to treatment when discussing the successive stages.

353. A. *Hæmoptysis* is a frequent occurrence in phthisis. The treatment of it should depend upon the state of the pulse, the age and habit of body of the patient, the stage of the disease, and the amount of blood lost. I have, however, so fully treated of hæmoptysis under the head HÆMORRHAGE FROM THE RESPIRATORY ORGANS (§ 123-141), that it is quite unnecessary to entertain this subject farther than to remark that hæmoptysis is generally the result, at the accession



or at an early stage of phthisis, of capillary congestion arising from the obstruction or irritation caused by tubercular deposits, and at an advanced stage either of the same cause or of exudation from an ulcerated cavity, or of discharge from an eroded vessel or vessels. The older writers, observing the relief following a free discharge of blood at an early stage of the disease, advised that the hæmorrhage should be allowed to proceed for some time. But to do this would often greatly alarm the patient, and be running the risk of the blood passing into and obstructing or irritating many of the bronchi which had remained free from disorder. It is, therefore, safer to arrest the hæmorrhage by suitable means, such as those which I have detailed under the article HÆMORRHAGE (§ 123–141), or by general or local bleeding, or by the internal exhibition of the spirits of turpentine in doses of twenty or thirty drops every half hour or hour, and by the turpentine embrocation or epithem applied over the chest. There are numerous other means which may be employed, and which are mentioned in the article just referred to; but these are most generally of service. The bleeding should be rather repeated than large, and be regulated by the circumstances already stated. Large doses of ipecacuanha, or one or two grains given every quarter or half hour, are also of great service; but if the bowels be confined, half an ounce each of spirits of turpentine and castor-oil may be taken in a suitable vehicle, and the same substances in larger doses administered in gruel as an enema. Dr. CHEYNE advises, especially in cases of hæmoptysis with inflammatory symptoms, a quarter, or even an eighth of a grain of tartarized antimony with five to ten grains of nitre every hour. The chief advantage from ipecacuanha and from antimony is produced by the nausea they occasion. Much, also, of the benefit experienced from sea voyages, especially in this form or complication of phthisis, is produced by the nausea thereby occasioned.\*

354. When called to these and other forms of hæmorrhage I have often found the practitioner assiduously applying cold or ice to the chest. The instantaneous shock or impression of cold sometimes does good; but if this effect does not immediately follow, to persist in these applications, especially in hæmoptysis, always does mischief, by increasing or perpetuating congestion of, and vascular determination to, the lungs.

355. When hæmoptysis has not sufficiently relieved the congestion or the inflammatory symptoms attending it, then bleeding, general or local, should be repeated, according to the effect or to the circumstances at the time or subsequently. When, on the other hand, the quantity of the discharge, the existing symptoms, the stage of the disease, and state of the patient, require an immediate arrest of hæmoptysis, without having recourse to vascular depletion, then the other means advised are the most efficient, the spirit of turpen-

tine or ipecacuanha acting more promptly than the acetate of lead or other astringents. The secale cornutum I have also found to act very promptly in hæmoptysis, five grains of it being given every five, ten, fifteen, or twenty minutes, until it produces the effect, or causes vomiting or much nausea. The repetition of small bleedings, or of other means subsequently, should depend upon the state of the pulse, the existence of *pain* in any part, or of dyspnœa and the state and stage of the disease; but in most cases the terebinthinate embrocations already advised should be continued to those regions of the chest where most uneasiness is felt.

356. *B. Inflammation of portions of the lungs* or of the *bronchi*, or of the *trachea* or *larynx*, followed by more or less of the consequences of these, as stated above (§ 109–112), often complicates phthisis, and requires means of an antiphlogistic kind in some respects the same as those just advised. It should, however, be recollected that the inflammatory action affecting one or more of these parts, owing to its asthenic or congestive character, to impaired constitutional power, to previous disease, and to the associated morbid conditions, admits not of the same treatment as that which is found most beneficial in idiopathic or some other states of this action. Vascular depletions, generally local, as in hæmoptysis and pleuritic attacks, are required, and sometimes should be repeated. When the state of the case admits of venæsection, to however small an extent, this should be preferred to the application of leeches, to which also cupping ought to be preferred.

357. *a. Pain* in the chest, independently of hæmoptysis, is often relieved by small bleedings, by cupping or leeches, by blisters, and by the continued application of the terebinthinate embrocation. The usual cause of this pain—its connexion with *partial pleuritis* (§ 112)—should not be overlooked; and the advantage generally following a recourse to mercurial and antimonial preparations in combination, and sometimes also to anodynes, demulcents, &c., in the intervals between the exhibition of the former, ought to be kept in view.

358. *b. Cough* is often a most distressing symptom, especially in the advanced stages of phthisis, and more particularly when it is associated with *dyspnœa*. In the less urgent states of cough, compound tincture of camphor, or hydrocyanic acid, will often give relief. The preparations of anise seed have long been highly esteemed for their effects in ameliorating the cough and even the dyspnœa. To the preparations in common use Dr. WATSON states that Dr. PROUT preferred an infusion of three drachms or half an ounce of the bruised seeds of anise seed in half a pint of distilled water, at a temperature not exceeding 120°, allowing it to stand until it is cold. This may be made an excellent vehicle for the compound tincture of camphor, hydrocyanic acid, or conium, &c. But the severer attacks of cough, in the advanced stages, require more energetic means, especially the preparations of opium or of morphia. These, however, often are followed by unpleasant symptoms, particularly morphia, if they be not conjoined with aromatics and gentle stimulants—with small doses of camphor, of spirits, or oil of caraway, or of lavender, or of anise seed, &c. Opium may be given in the form of the confectio opii, or conjoined with a little of the confectio aromatica;

\* We have rarely known the *Gallic acid* fail in checking hæmoptysis. Dr. JAMES FOUNTAIN strongly recommends an infusion of the common *Witch Hazel* (*Iamæmelis Virginica*). As the flowers of this singular shrub appear after it has shed its leaves, in autumn, and the fruit is not perfected till the following season, all manner of magical properties have been ascribed to it. It possesses *astringent* properties, and perhaps slightly *anodyne*. An empirical preparation is kept in the shops, prepared from this shrub, which goes under the name of "Coryle Extract," the proprietor mistaking it for the "*Corylus Americæ*" or *Hazel-nut*.]

or the pilula galbani composita, or the pilula saponis composita, or the pilula styracis composita may be prescribed with either of the foregoing. I have frequently preferred the following solution of the acetate of morphia, conjoined with aromatics, in order to counteract the depressing effects often produced by it.

No. 353. R Morphiæ acetatis, gr. vj.; Liq. Ammonia acetatis, ʒj.; Acidi aceticæ diluti, ʒij.; Spirit. Anisi, ʒss.; Spirit. Carui et Spirit. Lavand. Comp., aa ʒijj.; Mist. Camphoræ (vel Syrupi Tolutani) ad ʒijj. misce. Fiat mist. cujus capiat ʒj. pro dose, vel ʒj. hora decubitus, et ʒj. primo mane, in aquæ hordei cyatho vinario.

359. *C. Laryngeal and tracheal affections* are often the most distressing of those which occur in the course of phthisis (§ 109, 110), and in some of the usual or more protracted forms of the disease present more or less of the characters noticed above (§ 109, 110), or of the sub-acute or chronic states described in the article on Diseases of the LARYNX AND TRACHEA (§ 105, *et seq.*). Since this article was written, the diseases of these parts have been ably investigated by Dr. HORACE GREEN. He contends that inflammatory affections of the larynx, trachea, and throat are seated in the mucous follicles. It is, however, chiefly in the sub-acute and chronic affections of these parts that the follicles are either primarily or consecutively implicated, and especially when these affections are complications of phthisis, and are produced either by the protracted irritation of the trachea, larynx, epiglottis, and even of the pharynx and fauces, by cough, and by morbid secretions passing through them, or by the existence of tuberculous matter in their follicles or muciparous glands. At first these sources of irritation and contamination enlarge these follicles, increase their discharge, thicken and somewhat soften the mucous and sub-mucous tissues, and ultimately occasion an ulceration of the mucous follicles, and an atrophy, with increased softening, of the mucous and sub-mucous membranes. That the affection of the muciparous glands, in the advanced course of phthisis, is occasioned not only by the morbid secretions passing over them, but also by the deposit of tuberculous matter in them, is extremely probable. Dr. H. GREEN insists upon this latter change, although it is denied by several eminent pathologists. In either case, the treatment cannot materially differ. Dr. H. G. found this complication of phthisis most frequent between the ages of 25 and 38 years. He also often observed this affection of the throat and larynx after influenza, eruptive fevers, and more particularly in persons habitually using tobacco. Dr. GELLERSTEDT considers the ulcerations so commonly found in the larynx, in phthisis, to be of tubercular origin; while those of the trachea he regards, with LOUIS, as of an aphthous nature, arising from the constant irritation of the cough and expectoration.

360 The treatment of this complication of phthisis has been by inhalation, insufflation, lotions, and the application of the solid nitrate of silver to the tonsils, uvula, and pharynx. Dr. LAYCOCK remarks, in an able article in the *British and Foreign Medical Review* (vol. xxiv., p. 497), that the application of the nitrate of silver to the cavity of the larynx is not, however, to be classed among these ordinary methods; and the practice of it by Dr. GREEN seems to have been received with so much incredulity in the United States, that he has thought it necessary to multiply evi-

dence as to the fact that he has introduced a strong solution of nitrate of silver within that cavity. "TROUSSEAU and BELLOC are supposed, by Dr. GREEN, to have been the first to prescribe and employ topical medication in chronic laryngeal disease. They found a solution of the nitrate of silver, in the proportion of two drachms, or sometimes four drachms, to an ounce of distilled water, to be the most efficacious and harmless application. Two methods were adopted by them: the one was to saturate a small sponge attached to a bent rod of whalebone, and to manipulate so that the solution be expressed into the larynx: the other was to use a small silver syringe, with a tube suitably adapted for effecting the same object. Dr. GREEN, however, several years before the appearance of Messrs. TROUSSEAU and BELLOC's book, had instituted experiments, and come to a similar conclusion." Dr. LAYCOCK farther remarks that, without wishing to disparage the labours of our Gallic or American brethren, Sir CHARLES BELL successfully adopted the method of treatment so fully illustrated by Dr. GREEN; and Dr. L. refers to cases published by Sir C. BELL (*Surgical Observations, &c.*, Lond., 1816, p. 34), for which this practice was employed. Dr. WATSON states that Sir C. BELL had recourse to this local application of the strong caustic solution in a case under his care; and remarks in his Lectures as follows on the practice: "It is said that a little practice will enable a person to pass his finger into a patient's throat, and to familiarize his sense of touch with the ordinary condition of the upper part of the respiratory apparatus, so as to be able to detect swelling, or irregularity, or thickening about the chink of the glottis. And great advantage is said to have been obtained from applying remedies directly to the diseased or irritable part. This practice was much followed by the late Mr. VANCE, who had been for many years a naval surgeon; and he called it, in naval phrase, *swabbing* the affected organ."\*

\* As the question of priority in regard to local applications to the larynx has given rise to some discussion, and is alluded to by Dr. LAYCOCK and our author, it is proper to state the principal facts relating to the subject. There can be no doubt that Sir CHARLES BELL and Mr. VANCE were in the habit of making local applications to the inner surface of the larynx with the sponge and probang, much after the manner of Dr. GREEN. The statement that "Dr. GREEN, several years before the appearance of Messrs. TROUSSEAU and BELLOC's book, had instituted experiments, and come to a similar conclusion," is quite erroneous. The work above mentioned was published in Paris in the summer of 1837, and was reviewed by Dr. JOHNSON in the October number of his *Review* for 1837, and the January number of 1838. In the summer of 1838, Dr. GREEN had a conversation in London with Dr. JOHNSON on the subject of the treatment of laryngitis, "and the suggestion was made," says Dr. G., "that if proper applications could be applied below the glottis, no difficulty would occur in successfully treating the disease. Acting upon this suggestion, after my return home, I made the attempt, and was successful in entering the larynx, and thereby succeeded in curing a well-marked and severe case of laryngeal disease. With the like success other cases were treated in the same year, and the appearance of the TROUSSEAU and BELLOC soon after, confirmed my confidence in a method of treatment which I have since pursued," &c. (*Preface to Treatise on Diseases of the Air-Passages, &c.*, New York, 1846.) Dr. G. probably refers to the *American Translation of Trousseau and Belloc*, which appeared in 1841; the original work, however, we have seen, was published four years, and reviewed more than three years before this period. It is to be remembered, moreover, that these authors do not claim to have entered the larynx with the probang and sponge, and TROUSSEAU has expressly disclaimed it in a published letter to Dr. GREEN. The similarity of their modes of procedure will appear, however, from the fol-



361. Where the laryngeal complication occurs in the advanced course of phthisis, this practice can prove only of temporary benefit. I have been consulted in many cases of this description where it had been said to have been resorted to, but apparently either with no advantage, or with very temporary relief. However, in idiopathic or primary cases, or when the complication occurs in an early stage of phthisis, for which a rational and an appropriate treatment is prescribed, this local medication of the laryngeal complication may be employed, by one capable of performing it, safely and satisfactorily. I do not, however, believe that the appliances here advised enter the larynx and trachea once in twenty times; whatever benefit results arises from the applications to the under surface of the epiglottis and adjoining parts. I have, since the commencement of my practice, trusted much in those cases to the inhalation of the weak vapour of turpentine arising from the application of the embrocation so often mentioned, either around the throat and neck, or to the chest, or between the scapulæ.

[In this connexion, we should bear in mind that diseases entirely located in the larynx or pharynx are often mistaken for pulmonary tuberculosis; that even when tubercles exist, the more prominent symptoms may be owing to the pharyngeal and laryngeal complications; and that these complications may be greatly alleviated, or even removed, by local treatment, and in this way, as suggested by Professor BENNET, thus tend to arrest the pulmonary disease. Dr. HORACE GREEN has extended topical medication in pulmonary diseases to the injection of a solution of nitrate of silver into the bronchial divisions by means of a gum-elastic tube or catheter passed down the trachea. In the volume of *Transactions of the American Medical Association* for 1856, he has reported over one hundred cases of pulmonary and bronchial disease treated in this manner. Of these, 71 were stated to be cases of *tuberculosis*, and 32 cases of *advanced phthisis*, in which cavities were recognised in one or both lungs; 39 were reported cases of *incipient phthisis*. Of the first division, *advanced phthisis*, 14 died, 25 were said to be more or less benefited, and 7 not benefited by the injection. Of the 39 cases *incipient tuberculosis*, 12 apparently recovered, and 5 convalescent at the time of making the report (May, 1856). Of the remain-

ing 22 cases, 17 "have been greatly improved, 3 moderately benefited," and 3 only failed to find relief. Of the 28 cases of *bronchitis*, 16 were reported as cured; all the others had been greatly benefited, though some were still under treatment.]

362. *D. The Abdominal Complications* of phthisis have been already partly considered, when remarking upon the treatment of the diarrhoea (§ 328), and of the impaired digestion and assimilation (§ 234) so generally observed previously to, and in the course of the malady. But the functions of the liver are also not sufficiently discharged in the course of the disease; and due attention has not hitherto been directed to them. That this organ has been long disordered in cases of phthisis is shown by the nature of the organic lesions it generally presents after death (§ 118). It has been insisted upon by an able and close observer of the causes and nature of disease (Dr. McCORMAC, of Belfast), that phthisis is not only caused, but is also perpetuated, by an imperfect supply, and an insufficient digestion and assimilation of pure air in and by the lungs; consequently, the red globules of the blood are not oxygenated and assimilated to such an extent or amount as to supply the requisite materials by their waste for the elaboration of healthy bile: owing also to this cause, the carbonaceous and hydrogenous elements are not sufficiently combined with the oxygen of the respired air, so as to contribute to healthy assimilation and nutrition; and they consequently, under the influence of life, form morbid or adventitious products, and give rise to the fatty enlargement of the liver so generally found after death (§ 118).

363. The great importance of promoting the digestive and assimilating processes from the very commencement of phthisis, whatever other means of treatment be adopted, will appear from what has been advanced above; and I know of no surer means of attaining this end, than by improving the secretions and excretions by suitable medicines and food, and by removing the patient to a high, dry, and temperate air, where he may enjoy the advantages of sunshine and exercise, and avoid those causes which reduce organic nervous or vital power. In general physicians have been, during the last half century, in which such wonderful advances have been made in the practical sciences, so much occupied in listening to sounds which they often could neither interpret nor refer to their proper sources—in splitting the diagnostic hairs floating before their troubled, if not always dazzled vision, and in hearing what they believed even when not believing what they heard—as to be carried along by the pathology in fashion, neglecting those great views of physiological pathology which alone furnish the true basis of rational and successful practice. While a murmur, a bruit, a râle, a ronchus, and every sound for which a term could be coined, and their various grades, cadences, &c. were observed, or were feigned to be observed, and were noted, and paraded and admired, on all occasions, the conditions of the vital powers and functions, upon which both disease and recovery from disease mainly depend, were entirely neglected. But attention to these latter, to the states of the secretions and excretions, to the manifestations of impaired vital power, to the causes of this impairment, to the removal of those causes, and to the true means of restoring lost energy, as regarded

lowing quotation from Messrs. T. and B.'s work (*Am. Trans.*, p. 125):

"When we wish to cauterize the pharynx, the base of the tongue, and the top of the larynx at the same time, we take a whalebone at least a line and a half thick, that it may not bend readily; this is heated an inch or more from one end, and, when sufficiently softened, we curve it at an angle of 45°. To this end we fasten a spherical piece of sponge six lines in diameter; the sponge is to be moistened with a solution of nitrate of silver, the mouth opened, and the tongue depressed. When the isthmus of the gullet is passed, there occurs an effort of deglutition which elevates the larynx, and we seize this opportunity to draw forward the sponge, which had been at the entrance of the œsophagus. By this manoeuvre we get at the glottis, and then it is easy to express the solution into the larynx; the cough which now occurs favours the introduction of the caustic," &c. Dr. GREEN, instead of a spoon, uses a broad spatula, bent at right angles, and instead of "expressing the solution into the larynx," passes the sponge directly into the cavity. To him, therefore, undoubtedly belongs the credit of establishing the possibility and utility of the direct introduction of nitrate of silver into the laryngeal cavity; just as Dr. MORTON proved the safety and advantage of the inhalation of ether as an anæsthetic, although it had been suggested and used occasionally by others for similar purposes.]

a malady the most fatal, the most prevalent, and the most constant in its prevalence, was practically discarded; and fussy manipulations, striking examinations—where such examinations and manipulations were often unnecessary—were paraded in the place of these, and of other more profound, more physiological, and more practical investigations.

364. *E.* Several other complications, of less frequent occurrence than the above, have been mentioned (§ 119–123), but the means appropriate to each will readily suggest themselves to the physician. *Edema* of the lower extremities (§ 120) not unfrequently occurs in the advanced stages of phthisis, and is sometimes diminished by prescribing small doses of bicarbonate of soda, or of potash, with the tonic infusions or the diuretics, or with the means employed for the disease. Pressure on the course of the veins of the lower extremities, by the sitting or other posture of the body, sometimes favours the *œdema*, and even occasions a permanent obstruction of these vessels.

365. xii. BRIEF REMARKS ON SOME OF THE MEANS ADVISED FOR TUBERCULAR PHTHISIS.—Having considered the treatment which appears the most suited to the several forms and stages of phthisis, I am next desirous to notice the medicines which have been recommended by writers for this disease, and to mention the circumstances or states of the malady in which they may be prescribed, and in which they are contra-indicated. Most of these medicines have been prescribed empirically in phthisis; for, although the treatment of the disease had assumed a rational aspect in the works of our countrymen BENNET and MORTON, there were few besides, even among the most eminent of medical writers, who presented us with a plan of cure which was even tolerably appropriate to the stages and states of the disease; and, even among those who had cultivated the most the diagnosis and pathology of this malady, there were very few who recommended their favourite remedies with due reference to the states and complications of the disease, and to the pathological conditions which they had themselves described or admitted. I shall, therefore, attempt to inquire, in my brief notices of the substances recommended, into the circumstances in which either experience or the operation of these substances warrants their use.

366. *Acids*.—Most of the *mineral and vegetable acids* have been employed in phthisis, but seldom with any definite object, or to fulfil a rational indication. The chief intention with which they have been prescribed in recent times is to repress or prevent hæmoptysis, or to act as a refrigerant when the febrile action is considerable, and the night-sweats exhausting. They are merely palliatives—and in this they often fail, and sometimes they even render the cough harder and more severe; and, with the exceptions of the hydrocyanic and boracic, they are injurious to the sub-inflammatory states, and in the inflammatory complications of the disease. The *acetic acid* has long been employed in phthisis, and when the contra-indications just mentioned do not prevent recourse to it, either simply or in the form of raspberry-vinegar, or oxymel more or less diluted, it is a grateful and cooling medicine, especially after hæmoptysis has been considerable or excessive. In states of great exhaustion or colliquation, when it is desirable to produce an antiseptic as well as an astringent effect, the pyroligneous

acetic acid may be given, or even a drop of the aromatic.

367. *Sulphuric acid*, much diluted, has been commonly prescribed in phthisis, and generally with the same object as the acetic. BANG gave it with mucilages; JOERDENS with the *Phelandrium aquaticum*, a medicine much employed in Germany for this disease, and PORTAL in states of weak dilution, as a cooling drink; ROLLO and HUFELAND considered it useless; but COLLBATCH, GRANT, DE HAEN, HOME, FOTHERGILL, SIMMONS, SIMS, and MARX, entertained a more favourable opinion of it, especially in the form of *acidum sulphuricum aromaticum*, or *vitriolic elixir*. QUARRIN very justly cautions against its use in the more inflammatory states and complications of the disease. Weak dilutions of the *nitric* and the *hydrochloric acids* may be prescribed, in the same states as those which admit of the use of the foregoing; and the combination of the two—one part of the former to two of the latter—when the contra-indications mentioned above are not present; and when exhaustion, colliquation, and other symptoms of vital depression are urgent, these two may be added to the infusion of cinchona, or other restoratives, especially when the functions of the liver are much impaired. I have prescribed them with benefit in such cases, and sometimes given the cod-liver oil on the surface of a mixture of these or of similar substances.

368. *Hydrocyanic acid* is one of the most useful medicines in this disease. It was introduced into practice by MAGENDIE, GRANVILLE, and ELLIOTSON, who took a just view of its effects both in phthisis and in dyspepsia—complaints so intimately allied in their origins and in their pathology, as already shown. Its influence in the latter benefits the former, while it exerts a soothing effect on the cough, without aggravating, but rather ameliorating, any complication which may appear in the course of the malady. It may, moreover, be advantageously conjoined with other acids, with the neutral salines, most of which it is incapable of decomposing, and with the great majority of other medicines usually prescribed for phthisis. Of the other acids, the most important are the *citric*, the *benzoic*, and the *boracic*. The *citric* is serviceable in the states of the disease for which the acetic is given; but, either in the pure form or as it exists in lemon-juice, it is most useful as an adjunct to beverages, or in combination with the alkalies. In these latter states it aids, with other means, in preventing, counteracting, or removing the morbid conditions of the circulating fluids in the advanced stages of phthisis. *Benzoic acid* has been frequently advised in various combinations for this disease, but has rarely been confided in alone. It is chiefly in the more asthenic and colliquative conditions that it is at all of service. I have seen more benefit from the *boracic* than from benzoic acid. Either of these acids may be given conjoined with mucilaginous, balsamic, and expectorant medicines, when these are indicated. The boracic acid and its alkaline salts—the bicarbonate of soda and B. of potash—are not contra-indicated by the inflammatory diathesis, and may be given in those states in which the mineral acids are inappropriate. I have found the *dilute phosphoric acid* of much service in the few cases in which I have tried it. It may be prescribed in doses of 20 to 40 minims in cases of phthisis characterized by vital depression or exhaustion, especially when



the disease appeared to result from depressing causes, or from masturbation. For such it may be given in the infusion of absinthium, or of ginseng root, with or without the addition of the tincture of sumbul.

369. *Aconite* was first prescribed for phthisis by PORTAL, who afterward relinquished the use of it. BUSCH gave the powder of the dried leaves in doses of two grains every two or three hours, and increased the dose until a drachm was taken in the twenty-four hours. I have prescribed the powder in smaller doses in a few cases, and the extract in doses of a quarter of a grain in others, cautiously increasing the dose; but I have ventured upon it only in the more inflammatory states as a substitute for bleeding. I cannot say that it was so beneficial as BUSCH and HAREL DU TANEL have stated it to have been. It had, however, the effect of lowering the pulse, of causing perspiration, of diminishing pain, and of affording ease; and although I cannot view it, with the writers just mentioned, as a cure for phthisis, yet I consider it as an excellent medicine in the more inflammatory states and complications of the disease, when prudently exhibited, or when its doses are increased, or its use interrupted and resumed from time to time, as circumstances require.

370. *Alkalies and alkaline salts* are serviceable in several states of phthisis. The former, and their sub-carbonates, were much praised by BARKER and SPALDING. I have often prescribed the liquor potassæ and BRANDISH's alkaline solution in the serofulous forms of the disease, with sarsaparilla, demulcents, and nareotics, and, in the protracted form, with tonics or bitters and anodynes, with temporary, and sometimes with permanent benefit. In certain states, and more particularly when the blood is probably more or less contaminated by the passage into it of morbid matters from the lungs, the alkalies are often advantageously combined with the solutions of the neutral salts, as the bicarbonate of potass with the nitrate, or the solution of the acetate with the carbonate of ammonia, and with the other substances now mentioned.

371. *Ammoniacum* was frequently prescribed in phthisis, and often injudiciously, especially in combination with squills or other heating gum-resins. It should be given only in the more chronic states of the disease, and even in these with caution, and rarely with the medicines now mentioned. I have prescribed it with benefit when an expectorant was required, and when no inflammatory complication existed; but if the cough became severe or hard during its use, it was always relinquished. I generally gave it as follows:

No. 359. R Ammoniaci, ʒjss. tere cum Aq. Destill. ʒivss.; dein adde Vini Antimonialis, ʒij.; Liq. Ammoniac acetatis, ʒij.; Tinct. Conii (vel Tinct. Hyoscyami), ʒij.; Syrupi Altheæ officialis ad ʒviij., miscce. Sit mistura, cujus capiat cochl. j. vel iij. largā, 4tis vel 6tis horis.

No. 360. R Ammoniaci, ʒjss.; Tinct. Benzoini Comp., ʒij.; Tinct. Camphoræ Comp., ʒss.; Aquæ Flor. Aurantii, Aq. Sambuci, ʒā, ʒiij. Tere bene, et adde Tinct. Conii, ʒjss.; Acidi Hydrocyanici diluti, ʒss.; Syrupi Tolantii, ʒij.; Syrupi Altheæ officialis ad ʒviij. Miscce. Capiat cochl. j. amplum, 3tis vel 4tis horis.

No. 361. R Ammoniaci, Balsami Sulphuris Anisati (vide § 400), ʒā, ʒj.; Extr. Hyoscyami (vel Conii), ʒij.; Saponis Castil., ʒss.; Extr. Glycyrr., ʒss. Miscce. Fiant, secundum artem, Pilulæ L. quarum capiat unam vel duas, omni 4ta vel 6ta hora.

No. 362. R Ammoniaci, Galbani, Extr. Conii, Saponis Castil., ʒā, ʒss.; Fol. Belladonnæ, gr. xv.; Antimonii Potassio-tart., gr. v. Contunde bene, et fiant secundum

artem Pilulæ xxxvj. Sumantur binæ vel tres ter in die. (The Pills prescribed by RICHTER (*op. cit.*) for tubercular phthisis.)

372. *Balsams* have been long in use in chronic pectoral diseases, and especially in phthisis; and although they are sometimes of service, they are as often injurious, unless they be given with great discrimination. Under this denomination the *Copaiba*, the *Peruvian*, and the *tolu balsam* fall more strictly; the others more correctly belong to the terebinthines and to the gum-resins, and to these likewise the older writers often extended the term. The circumstances and the combinations in which the balsams, and even the other substances often ranked in the same category, may be prescribed in phthisis, are the same as those which I have stated in respect of the exhibition of ammoniacum (§ 371). When it is considered that these medicines, and those closely allied to them, are appropriate only in certain states of the malady, that an empirical use of them may be as often injurious as beneficial, we should not be surprised at finding them recommended by DE HAEN, GODBOLD, SIMMONS, RUSH, &c.; and denounced by FOTHERGILL, FRIZE, and others. The *Copaiba balsam* was preferred by FULLER, HOFFMANN, MONRO, and GESSNER; but it is now seldom prescribed for phthisis. A substance becomes a remedy only by its appropriate use.—*Barytes*, the *hydrochlorate*, has been recommended in phthisis by HUFELAND, HERZ, and CRAWFORD; but although it has been prescribed by many, yet no satisfactory result has been adduced respecting it.

373. *Bitters and tonic infusions*, as those of absinthium, Gentian, Calumba, Chereita, &c., have been advised for phthisis by CÆLIUS AURELIANUS, CHALMERS, SALVATORI, RUSH, MAY, and PEARS, generally also with a nourishing and digestible diet. Although too generally and empirically prescribed by these and other writers, yet these medicines are often required in the usual and more chronic states of the disease, especially with the view of removing the symptoms of indigestion so frequently attending phthisis from its commencement, and of supporting the vital powers. These infusions, moreover, may be made the vehicles in which other medicines, whether saline, anodyne, or alternative, or nareotic, may be prescribed.

374. *Camphor* was given in phthisis by BURNERIUS; by MARX, with nitre and hydro-chlorate of ammonia; and by KORTUM with this latter salt. It is useful chiefly as an adjunct to other more appropriate medicines, or when it is given with the object of abating urgent symptoms. In small doses it is beneficial, especially when conjoined with nitre, the spirits of nitric ether, and a solution of the acetate of ammonia, in allaying febrile action and inflammatory complications. In larger doses, and combined with the sesquicarbonate of ammonia, it is of service in the advanced stage of phthisis, in rallying the vital power and in counteracting morbid conditions of the blood, while it promotes expectoration; and with the extract of conium or of henbane, or with a preparation of opium, it allays irritation, both locally and generally.

375. *Carbon or charcoal* was formerly much employed in the colliquative states of phthisis, in dysentery, and in putro-adyynamic fevers. I have given it at an early period of my practice in several cases, but generally with camphor, chalk, cascarilla, and aromatics, in doses varying from a

scruple to a drachm, and chiefly with the intention of correcting the fetor of the excretions. SOBERNIEM states that SCHÖNLEIN gave it in phthisis with digitalis; and GARRETT prescribed it with sulphur and the extract of the smaller centaury. I suspect, however, that whatever benefit resulted from these combinations cannot be imputed to the carbon. M. JOURDAN justly remarks, "Lorsque les théories chimiques régnaient en Médecine, on attribuait au Charbon végétal puissantes vertus dans la phthisie pulmonaire, la dysenterie, et surtout les maladies putrides. Le temps n'a justifié aucune des espérances qu'on avait conçues à cet égard."

376. *Cascarilla* was often prescribed with the same intention as cinchona and the medicines last noticed. I have given it only in the form of infusion in the more colliquative states and non-febrile forms of phthisis, and have generally made this preparation the vehicle for such other medicines as the peculiarities of the case suggested. *Cascarilla* has received the approbation of THULENIUS, WENDT, KRUGELSTEIN, and HECKER, in the usual and more chronic forms of the disease, indeed, in the states for which I have prescribed it. The historical sketch I have given above will sufficiently show the diversity of opinions as to the propriety of employing the tonic and astringent barks in phthisis, and more particularly as to the use of cinchona, &c.

377. *Chalybeates* have been already mentioned in connexion with the states of the disease in which they may be prescribed. They have been recommended by GRIFFITH, GÜNTHER, STANGER, SCHULLER, VELSEN, and many others. The compound mixture of iron, the ammonio-citrate of iron, the ammonio-chloride of iron, the solution of the pernitrate of iron, the potassio-tartrate of iron, the tinctures of the acetate and of the murate of iron, and the compound pills of iron, are severally of use in certain states of phthisis; but there are few medicines which require greater discrimination and caution in their use in this disease than they. Cases which proceed from depressing and exhausting causes, in which the blood is poor in red globules, or which are free from inflammatory or hæmoptysic complications, are often benefited by chalybeates, as well as by other tonics, especially if dyspeptic symptoms are prominent; but their effects upon the cough, expectoration, breathing, pulse, and the accompanying hectic, should be carefully watched; and any aggravation of these should cause the discontinuance of the medicines and the adoption of other means. The good effects of chalybeates may be aided by other medicines, with which they may be conjoined according to the stage and complications and other peculiarities of the case.

378. *Cinchona*.—While DESAULT, DE MEZA, and ROMANS considered it injurious, and FOTHERGILL said that it was rarely of use, QUARIN, VOGEL, RAULIN, MARX, JAEGER, HORN, SCHMIDTMANN, and others, recommended it. HALLER, HOME, and CHAPMAN prescribed cinchona with a milk and vegetable diet. CALLISEN gave it with a powerful stimulant, the oil of asphaltum, of which notice will be taken hereafter; THOMANN with opiates; and RYAN and MAY with animal food. STOLL advised cinchona, when inflammatory symptoms were absent, and SIMMONS when the expectoration was abundant and puriform. METTERNICH preferred the extract, and gave it in large doses. In more recent times, the *sulphate*

of *quina* has been substituted for the preparations of cinchona, in phthisis as well as in other diseases; but I doubt the advantage of the substitution as respects this malady, for the infusion, the decoction, the extract, and the compound tincture of cinchona, furnished the physician with the means of selection according to the features of the case for which he was prescribing. However, the sulphate of quina is an excellent medicine, when it is desirable to have recourse at the same time to an acid and to an astringent; and then it may be given in the compound infusion of roses, and at the same time also, as advised by GUENTHER, AMELUNG, DROSTE, and some other German writers, with the tincture of digitalis, or with the powder of digitalis in the form of pill. I have prescribed it with small doses of camphor and conium, with benefit in some states of the disease.

379. *Conium* has, from the days of STÖERCK down to the present time, been more generally employed in phthisis and scrofula than perhaps any other medicine. It has been praised by QUARIN, ZEVIANI, FOTHERGILL, ADAIR, BUTTER, BUSCH, HUFELAND, and many others; and yet there are few medicines whose effects in phthisis are more equivocal, and, as usually employed, are more uncertain. At the present day it is seldom confided in alone; and when given as an adjunct to other means it is often in insufficient doses, or in imperfect states of preparation, and not persisted in for the time required to evince its effects.

380. *Creasote* has been recommended for phthisis by SCHROEN, REICHENBACH, CARTONI, RAMPOLD, and others. I have employed it, since its introduction to medical practice, chiefly as an adjuvant of other means in the last stage of the disease, and for the mitigation of the disorders of the stomach and bowels—of nausea, vomiting, diarrhoea, &c. It is also of great benefit when used to slightly impregnate the air of the apartment in which the patient chiefly resides (§ 413). *Creasote*, however, should not be prescribed in the circumstances contra-indicating chalybeates and tonics—when the cough is dry, hard, or constrictive—when a state of erythema or of active congestion is inferred, and when an inflammatory complication or active hæmoptysis is present. It is chiefly in the colliquative or asthenic conditions of phthisis that it is a valuable adjunct of other means, and especially when the excretions are more or less fetid, and the circulation is contaminated by the passage of morbid matters into it from the primary seat of disease.

381. *Digitalis* has been recommended by some, and praised by others, for phthisis. Indeed there is, perhaps, no other medicine which has been more generally employed in this disease, and whose operation has been less understood, than digitalis—has, in short, been more empirically prescribed. It has been sanctioned by BEDDOES, WITHERING, DARWIN, FERRIAR, SPENCE, FOWLER, KINGLAKE, MAGENNIS, MEYER, and THOMAS. Dr. DRAKE says that citric acid counteracts its unpleasant or cumulative effects, when given in too frequent or too large doses. While the above, and many continental writers, are favourable to the use of digitalis in phthisis, BREE and BAILEY contend that it is injurious in some cases and useless in others. I have, however, seen some benefit derived from the infusion, prescribed at first in very large, and afterward in rapidly



diminished doses; especially in the hæmoptysic and febrile states, and in the congestive and inflammatory complications of the disease.—*Dulcamara* was advised for phthisis by BURSERIUS, and afterward by STARK, RICHTER, and HUFFELAND, who generally gave it in conjunction with the Iceland moss.

382 *Emetics* have been recommended for phthisis since the days of HIPPOCRATES to the present time. MORTON, BRYAN-ROBINSON, MARRYAT, SIMMONS, SIMS, KENTISH, MARET, REID, METTERNICH, SWEDIAUR, PARR, RICHTER, DUMAS, &c., advise emetics at an early stage of the disease; some, as REID, BAYLE, and others, with a frequency which appears to be excessive or even injurious; others, as YOUNG, CLARK, WITT, &c., in a more moderate and rational manner. Many physicians in Italy, early in the present century, pretended to have cured phthisis by the exhibition of a solution of tartar emetic, in the infusion of the flowers of the *sambucus nigra*, or in other emollient infusions—generally three grains of the former in six ounces of the latter. A quantity sufficient to produce vomiting was directed night and morning, and milk and water were drunk freely. If diarrhoea supervened, digitalis and ipecacuanha were prescribed in small and frequent doses, with other means calculated to moderate or arrest the diarrhoea, and the emetic tartar was relinquished.

383. Emetics are often of service, especially in the early stage of the malady, and when advised as above (§ 306, 317); but they should be prescribed with caution, and with strict reference to the functions of the stomach and liver, and to the assimilative and vital powers. I have already mentioned those which may be preferred; but even they ought not to be given so as to impair digestion and assimilation; and if these functions be weakened by them, or in cases where this risk appears great, mild tonics and a restorative and digestible diet, aided by external derivation, should be prescribed. In the advanced stages of phthisis, emetics are of more doubtful advantage, but even in these they may be of service. BLUMENBACH recommended them even in the third stage; but either in this or in an earlier period, they sometimes constitute an important part of rational practice, especially if appropriately selected, when the digestive mucous surface appears to be loaded by sordes, when the expectoration is difficult or scanty, the breathing suffocative or oppressed, and the biliary secretion interrupted, or deficient in the evacuations. But even in these circumstances, vital power should not be exhausted by a too frequent recourse to them, and the digestive functions ought to be restored soon afterward by suitable tonics and anodynes, as the infusion and tincture of calumba, or of chereita, or of other bitter tonics, with hydrocyanic acid, conium, &c.; or with one of the vegetable extracts, the purified ox-gall, &c., in the form of pill. *Ipecacuanha* is useful in phthisis not merely as an emetic, but as a nauseant, expectorant, and promoter of digestion, and as a corrector of morbid actions in the bowels, according to its dose and mode of administration. As a nauseant it was praised by PIDERIT, BARBARI, and others; and it certainly is a valuable medicine in the more inflammatory and hæmoptysic states of the disease; and in the form of pill with bitter tonics and anodynes, or astringents when the bowels are much relaxed.

384. *The iodides*, especially the iodide of potass,

have been employed in phthisis, but are appropriate only in the more chronic states of the disease. Since the discovery of iodine, the use of its preparations in scrofula had extended to tubercular consumption. The earlier prescribers of this substance, and of iodides generally, erred in giving them in too large doses, in scrofulous and other diseases, and in neglecting to conjoin them with a sufficient quantity of alkalies, whereby the irritating effects of the iodine, or the decomposition of the iodide, by the acids of the stomach, might be prevented. Thus, even when a very small dose of the iodide of potass is prescribed in a vehicle suited to the features of the case, the solution of potass or the bicarbonate should be given in sufficient quantity to prevent the decomposition of the iodide. Whatever form or combination of iodine is given in phthisis, the effect upon the digestive functions, the pulse and the cough should be watched, and if it induce dyspeptic symptoms, or aggravate those already present, it should either be relinquished, or the dose of it much reduced. *The Karageen Moss*, or *Fucus crispus*, has been long employed as a popular remedy in consumption, and it has been favourably noticed by M. BÉRAL, myself, and others. It, as well as others among the fuci, may be used as a demulcent in this disease, with some benefit, probably arising in part from the minute quantity of iodine this class of sea-weed contains.

385. *The Lichen Islandicus* has been very commonly used in consumptive cases by QUARIN, BERGIUS, THILENIUS, MARX, RÉGNAULT, RICHTER, SCHMIDTMANN, CHRIGHTON, and others. It is one of the most generally useful medicines in this disease; its bitter, demulcent, and tonic properties, divested of exciting action, rarely proving injurious, even in the most febrile cases. WENDT, myself, and others, prescribed it with milk, adding to these such other medicines as the circumstances of the case required. SACHTLEBEN recommended a decoction of three ounces each of the lichen, and of the *polygala amara*, of six drachms of liquorice-root, and of three drachms of *dulcamara*, to be made with milk, as a preferable mode of prescribing the lichen in consumption. The decoction of these substances is best made with water to which a small quantity of the carbonate or solution of potash is added, boiled milk being added to the strained decoction, and such anodynes or other remedies as the peculiarities of the case suggest.

386. *Lactucarium* was much employed by DUNCAN, ROTHAMMEL, and FRANÇOIS to allay the cough in phthisis and bronchitis, and was considered appropriate in the inflammatory state of the disease. It may be given under almost any circumstances with this intention, and may be conjoined with the ipecacuanha, digitalis, demulcents, mild tonics or bitters, or other medicines suited to the case.

387. *Lead, the acetate of*, has been often prescribed in phthisis, but chiefly with the view of arresting hæmoptysis, and it has then been given either with opium and ipecacuanha, in the form of pill, or in solution, with the addition of acetic acid. These combinations of acetate have been advised by KOPP, STARK, ETTMÜLLER, AMELUNG, HILDEBRAND, HORN, and others. WEBER prescribed the acetate with digitalis, myrrh, balsam of Peru, extract of hellenium, and mucilage, in the form of pills. HOFFMANN preferred the

phosphate of lead, in the dose of a grain, to the acetate, and conjoined it with the extract of henbane.

388. *Lime water* and the *muriate of lime* were advised by QUARIN, MARX, BEDDOES, and HUFELAND. Effervescing lime water (*Carara water*) is very advantageously given with milk, especially when the bowels are much relaxed. For this state of the malady not only may catechu, kino, and other means already recommended for it, be employed, but the nitrate of silver, the extract of nux vomica, tar made into pills with liquorice powder, &c., also be individually tried.

389. *Mercurials* are occasionally of service in phthisis, especially in certain states of the disease, and when judiciously combined with other medicines. Mercury with chalk, the blue pill, or Plummer's pill, will be of service, when the biliary functions are torpid, either alone or with soap and taraxacum, or with the compound rhubarb pill, or with the aloes and myrrh pill, when the digestive functions require to be assisted. In the more inflammatory states or complications of the disease calomel may be prescribed, as advised by BEDDOES; although it should not be pushed so far as to produce salivation, as recommended by RUSH, unless the disease be consequent upon syphilis; when the very unfavourable state of the malady may require this decided treatment. When partial pneumonitis, or pleuritis, or pneumo-pleuritis complicate phthisis, then calomel may be employed, and be beneficially conjoined with antimonials, or with ipecacuanha, or with opium, or with other narcotics. The beneficial effects of the bichloride of mercury, prescribed in the decoction, or in either of the tinctures of cinchona, in scrofulous cases, have induced me, as well as other physicians, to employ the same combination in the more manifestly scrofulous states of phthisis, and in some instances with much benefit; but in my own cases, as other means were also employed, especially the external treatment about to be noticed, the amount of benefit derived from the former could hardly be determined. SCHAEFFER and VALENTIN have also given the bichloride with tonics and opium in phthisis, and, as they conceived, with advantage.

390. *Myrrh* and various gum-resins, especially *asafoetida*, *galbanum*, &c., are most appropriate in the more chronic or protracted forms of phthisis, when they are attended by dyspnoea or difficult expectoration, and in females when the catamenia are difficult or scanty, or when the disease has been caused by depressing or exhausting causes. They are contra-indicated during inflammatory states and complications, and in the febrile forms of the malady; and are best suited to the circumstances of the disease which admit of chalybeates, tonics, balsams, cinchona, &c. In the form of GRIFFITH'S mixture (§ 314, 377), or when conjoined, as in the compound galbanum, or compound iron pill, or when farther combined as with soap, extract of conium, or extract of henbane, they are sometimes of service.

391. *The oils*, especially *fish oils*, have only recently been employed in consumptive diseases, although they have been long previously used in other disorders. HANKEL appears to have been the first to prescribe the *cod-liver oil* in phthisis in Germany, and Professor BENNETT in Edinburgh, to whom the credit of having first recom-

mended it is clearly due. Contemporary with the earliest employment of it in this country, it was prescribed for a lady, whom I frequently saw in consultation with my friend Dr. BAIRD; and at that time it was not to be had in London, Mr. MORSON having procured it, at our request, from the continent. Since then I have employed it in this and several other diseases, and have always seen more or less benefit derived from it, especially in the more usual, and in the protracted states of phthisis. It may be given in various ways; but generally with greatest benefit, from an hour to two hours after a meal, in the dose of half an ounce or even more for an adult, on the surface of any agreeable vehicle, as of an infusion of orange peel, or of any bitter tonic or aromatic infusion, with either a little acid or carbonate or citrate of an alkali, and any anodyne, &c.; or on the surface of milk, or of ginger or orange wine, &c. This oil may be taken twice or thrice daily, and in all stages of the disease. After continuing it for some days or weeks, it may be intermitted for a few days, and medical treatment may then be directed more especially to the digestive functions, and to the promotion of the biliary and intestinal secretions and excretions; and after such intermission, its use should be resumed and continued for a time which the state of the case and its effects will indicate.

392. All the *fish oils*, especially the oils from the livers of the *Torsk*, *Cod*, and other fish which I have enumerated above (§ 336), are beneficial in phthisis, especially when they are recent or fresh, and then they may be taken in larger quantity. The common use of fish oils in the most northerly countries of Europe probably is partly the cause of the infrequency of phthisis in those countries. The use of vegetable oils, especially *olive oil*, in countries near the Mediterranean, and in the north of Africa, may have the effect of diminishing the number of phthisical cases in those countries; and the adoption of the *palm-oil nut*, as an article of food, in Western Africa, and of the oil for daily inunction of the surface of the body, may have a similar effect on the natives of that part of the world. It is not unlikely that other mild vegetable oils, as *linseed*, *almond*, &c., may also prove of service when taken in sufficient quantity, and when judiciously conjoined with other medicines. Formerly the *oil of asphaltum* or of bitumen was often prescribed for phthisis, especially by CALLISEN, BANG, THILENIUS, HEALDE, and others. QUARIN said that it was only slightly palliative, while FRIZE considered it injurious. It was probably employed then, as other things have been used recently, or are praised now, merely with the object of being, with their abettors, talked of.

393. *Opium* and *Opiates*, in various forms, have been advised in phthisis by many writers, and condemned by others. There are, however, states of the disease which indicate the propriety of having recourse to them, and circumstances which contra-indicate their use. They are more frequently injurious than beneficial in the first stage of the disease, although TRALLÉS has given a different opinion. Sometimes in the second stage, but most frequently in the third stage, opiates, or even the preparations of morphia, are of great service; but much of the benefit produced by them will depend upon the combinations in which they are prescribed. MARCUS gave them with myrrh and Peruvian balsam,



and, in the advanced and more chronic states of phthisis, this combination, or that with the compound galbanum pill and the compound soap pill, will be appropriate. PEART advised opiates to be given with the carbonate of ammonia, ether, and aloes; and J. FRANK laudanum, with the aromatic sulphuric acid. In the third stage of the disease, preparations containing more or less opium, especially the compound tincture of camphor, the compound styrax pill, pills of ipecacuanha and opium, &c.; and, when diarrhoea is present, the opiated cretaceous powder, the compound cretaceous powder with opium, the compound ipecacuanha powder, the compound kino powder, or the combination of opium with the extract of nuxvomica, or with the nitrate of silver, or with the sulphate of copper, or with the sulphate of zinc, will be found individually of service, when judiciously prescribed. When there is much debility, opiates should not be given in full doses, unless they be combined with aromatics, tonics, or stimulants, or with balsams or gum resins; and when the preparations of morphia are preferred to other opiates, then this recommendation should be especially kept in recollection, because I have seen much distress result from its neglect.

394. *The Phyllanthium aquaticum*, or water hemlock, especially the seeds and herb, has been much recommended for phthisis by STERN, OSWALD, FISCHER, J. FRANK, RICAMIER, ROSEN-MÜLLER, HENNING, MICHAELIS, &c., who have employed chiefly the powder of the seeds, in doses of ten to twenty grains, the decoction and tincture. Its action is stimulant, narcotic, and diuretic. Some of the authorities now adduced have given this medicine with sulphur. LANGE prescribed it after bleeding, in robust or plethoric cases, in goats' milk twice or thrice daily; HERZ, with nitrate of potass, sugar of milk, and gum Arabic, thrice daily; and HUFELAND, MÜLLER, CHIAPPA, RENER, BERKUN, and HEINE, in various forms and combinations—in powder, decoction, and tincture.

395. *The Polygala amara* has been much praised in phthisis by THILENIUS, PLENCIZ, COLLIN, BAUME, FRIZE, &c., and is certainly to be preferred to the *Polygala senega* in this disease, as it is more tonic and pectoral than this latter. It was formerly much employed in consumptive diseases, but has now fallen into undeserved neglect. The root is chiefly used; and either in powder (from fifteen to thirty grains), or in extract or infusion, or decoction, in which forms it is directed in several of the Continental pharmacopœias. The *Polygala Senega* is much more stimulating than the *P. amara*, and is not appropriate in the more inflammatory and complicated states of phthisis, unless it be given with ipecacuanha, or with antimonials, so as to occasion nausea or vomiting. The decoction is, however, sometimes of use, not only when prescribed with this intention, but also in the less febrile and more chronic forms, or in the advanced stages, when it is desirable to promote expectoration or to relieve dyspnoea; and in these circumstances it may be conjoined with orange-flower water, or with hydrocyanic acid, or conium, or the compound tincture of camphor, or with other anodynes, as the peculiarities of the case will suggest.

396. *Salix*, &c.—Besides the barks already mentioned (§ 376, 378), others, especially the

*willow*, the *cedar*, the *larch*, and *fir-barks*, have also been employed in phthisis, but they are useful chiefly as tonics and astringents, and have few other virtues to recommend them. GOURAUD and SCHNEIDER prescribed an extract of the middle bark of the *willow* in this disease; and the *cedar* and *pomegranate* barks were prescribed not merely as tonic in phthisis, but also with the object of destroying intestinal worms, with which this disease was sometimes complicated, especially in low, cold, and damp localities.

397. *Sage* is an old and popular remedy for coughs and colds; it was also much used in pulmonary consumption. It is by no means a bad adjunct to other medicines, and may be advantageously combined with the decoction of *marsh mallows*, in which form it was prescribed by QUARIN and others.

398. *Salts and saline solutions* of various kinds have been prescribed for phthisis, with the intention of moderating the hectic and other symptoms rather than with hopes of curing the disease, although several of them may be as rationally considered capable of effecting this latter object as many other medicines which have been employed with this expectation. Of this class of substances none are more generally useful than the solution of the acetate of ammonia, and of the citrates of the fixed alkalies, of ammonia, and of magnesia. The solution of *acetate of ammonia* is of service chiefly in the early stage of phthisis, and may be prescribed, according to the state of the case, with the nitrate of potash, sweet spirits of nitre, and camphor mixture, with hydrocyanic acid, or with compound camphor mixture, or with conium, henbane, &c. In more advanced or chronic states the ammonia of the acetate may be given in excess, and other medicines substituted for some of those now mentioned. The *citrates of potass*, of *soda*, and of *magnesia* are of service, either individually or with the nitrate of potass and the other substances enumerated, chiefly in advanced stages of the disease, when the blood becomes contaminated by the absorption of morbid materials. In similar states of phthisis the *carbonates of the alkalies* are also of service, especially when given with the *nitrate of potash* or with the *chlorate of potash*, in solution or in vehicles—bitter, tonic, or demulcent—suitable to the requirements of particular cases. The *hydrochlorate of ammonia* was much employed by THILENIUS and MARX in phthisis, as well as in all forms of hectic and in some other fevers, periodic and continued; and was a favourite remedy in these diseases among German physicians early in the present century.

399. *The secale cornutum* has been found very efficacious in arresting the hæmorrhage, in the hæmoptysic states of phthisis. Dr. T—, who had been for many years subject to attacks of hæmoptysis, had recourse, and generally with success, to the secale, in doses of five grains, at intervals of a few minutes, until the discharge began to cease. It was not until at an advanced period of life, and when travelling on the railway, that he was disappointed in the effects of this remedy, for he always carried it on his person. I saw him on his arrival in town, and prescribed oil of turpentine. The hæmorrhage returned some time afterward, and produced suffocation. I had an opportunity of examining the lungs. The appearances are noticed in another place

(§ 91). The hæmorrhage proceeded from ulcerated vessels.

400. *Sulphur* was formerly much employed in phthisis, and was prescribed either in combination with myrrh and various balsams, gum resins, or powders, or in the form of a balsam or electuary, prepared with an essential oil, as the oil of anise seed, or with honey or sirup, and given with such other medicines—demulcent, emollient, anodyne, absorbent, or narcotic—as the state of the case suggested. The anisated balsam of sulphur was especially, and other combinations of this substance, were strongly recommended by ETTMÜLLER, BUSCH, SIMS, AGRICOLA, ROLLO, and others. HUNOLD prescribed it with charcoal in the advanced stage of the disease. The anisated balsam of sulphur, the preparation most frequently used, consisted of one part of the flower of sulphur and four parts of the oil of anise seed, which were digested in a sand-bath. If diarrhœa was present, the sulphur was given with preparations of chalk, or with astringents and tonics. Sulphur has long since fallen into disuse in phthisis; but I have seen much benefit from it in several states of the disease, when judiciously combined and prescribed.

401. *Tartar emetic* was prescribed by SCHLEGEL in small and frequent doses, and was probably employed by him and others on account of the apparent benefit derived from it and other antimonials in the inflammatory complications of the disease. The contra-stimulant doctrine in vogue in Italy at the end of the last century, and in France at the commencement of this, carried the use of tartar emetic in diseases of excited action to an extravagant height; and very probably more injury than advantage was derived from it, owing to its improper use. However, in the more inflammatory, and in the more active hæmorrhagic states of the malady, it is often of service when given either as an emetic, or in frequent small doses, as a contra-stimulant.

402. *Tussilago farfara* has been for ages a popular remedy for chronic coughs and consumptions; and the several parts of the plant have been used in the form of infusion, decoction, electuaries, sirups, &c., for these complaints. It was recommended for phthisis by PERCIVAL, REUSNER, KRAMER, and others; and the mucilaginous, bitter, and mildly tonic virtues of the plant appear to warrant their recommendation.

[The *Black Snake-root* (*Cimicifuga racemosa*) has long been a very popular remedy in consumption in this country, and has been highly recommended by several able practitioners, as Dr. GARDEN, of Virginia (Am. Medical Record, Oct., 1823), and Dr. HILDRETH, of Ohio (Am. Jour. Med. Sci., N. S., iv., 281). It is believed to allay pulmonic irritation like the wild cherry bark, and to exert a sedative influence over the circulation. Dr. HILDRETH recommends employing it in the early stages of the disease, in connexion with *iodine*.]

403. *Turpentine*, in the various modes of its existence, from the essential oil through the terebinthinate balsams to the pine-tops, tar, and tar-water, have been for ages found of benefit in various states of phthisis, some in certain states, and others in other states. These substances, in their several modes of employment, are often of service, not only when exhibited internally, but also when employed externally, and when the much diluted vapour, or even the odour from

them, is inhaled into the lungs. In the hæmoptysic states of phthisis, when it is proper to arrest the hæmorrhage, there is no remedy that is more certainly efficacious than turpentine, when exhibited in small and frequently repeated doses, epithems of the same substance being applied over the chest. It may be taken in doses varying from twenty minims to a drachm every hour, or two or three hours, according to the urgency of the case; or even oftener, either mixed in honey and liquorice powder, as prescribed by GASSER and myself, and as advised in a memoir on the use of this medicine, published in 1820, in the London Medical and Physical Journal; or as directed in a case lately attended by Mr. W. BARNWELL and myself.

No. 363. R Olei Terebinthinæ, ʒiiss.; Spirit. Ætheris Sulphurici Comp., ʒij. Pulv. Tragacanth. Comp., ʒiiss.; Mist. Camphoræ, ʒij.; Syrupi Rosæ et Syrupi Tolutani, aa, ʒjss.; Aquæ destillatæ ad ʒvj. Misce. Fiat mistura, cujus sumatur pars quarta, quartâ quaque hora.

404. The quantity of the oil may be diminished or increased, or the frequency of the dose increased or otherwise, according to the circumstances of the case. There are almost no complications of phthisis which contra-indicate the use of this remedy, when judiciously prescribed, as respects the dose and mode of exhibition; and especially when employed externally also, as hereafter recommended. The terebinthinate substances, in which the essential oil exists in different forms and combinations, are also beneficial when suitably prescribed. The infusion of *pine tops* was praised by CÆLIUS AURELIANUS for phthisis; *tar-water* was recommended by Bishop BERKELEY for this and other diseases; and *tar* was given by SIMS for this malady. I have had recourse to these, especially to tar and tar-water. Tar, in the form of pill, with liquorice powder, is often of great service in the colliquative states of diarrhœa, and when there is reason to fear incipient ulceration of the mucous follicles of the bowels. Tar-water, when sufficiently weak not to be unpleasant to the patient, is also of service in this state of the disease, and in its hæmorrhagic and congestive complications. Indeed there are several states of this malady, and several other diseases, in which both tar and tar-water may be very usefully employed. The injudicious or rather extravagant praises of some writers at the commencement of the last century have caused the complete disuse of an excellent remedy.

405. *Uva ursi*, in powder, decoction, and extract, was recommended for phthisis by Dr. BOURNE, and subsequently by Drs. HAMILTON and DAVY. The tannic and gallic acids it contains, and its astringent and tonic qualities, would justify its use in several states of this disease, especially in the hæmoptysic, and in the colliquative sweats and diarrhœa which occur in the advanced stages. It may, moreover, be combined with other remedies—demulcent, tonic, and anodyne—with opiates, bitters, &c., according to the peculiarities of the case.

[*Alcohol* has recently come into extensive use, not only as a prophylactic, but also as a curative agent in the treatment of tuberculosis. Dr. MARSHALL HALL a few years since extolled very highly the efficacy of alcoholic inhalation, as calculated to check both the deposition and softening of tubercular deposits; one part alcohol to three water is applied, at first tepid, afterward



of the temperature of the air, by means of a few folds of soft linen across the upper part of the chest, the compress to be fastened to the shoulder-straps or other part of the dress, and moistened every few minutes by means of a small sponge. Dr. H. recommends that it be applied every five minutes during the day, so as to secure a constant effect, and he states that it possesses a power in checking the progress of the deposition and softening of tubercle in the lungs beyond any other which he has ever tried. He speaks also of "numbers of patients who have recovered under its use. When taken in this way, as well as through the medium of the stomach, alcohol promotes digestion, retards the metamorphosis of tissue, and sustains the animal heat." As the process of tuberculization, as we have seen, is due to defective hæmatisation and imperfect nutrition, we might, *a priori*, expect that alcohol would prove beneficial. Its prophylactic power, however, we believe to be overrated. The alleged facts on this point need revision. The whole treatment of this disease may be summed up in the aphorism of Dr. RUSH: "The remedies for consumption must be sought for in those exercises and employments which give the greatest vigour to the constitution."]

406. *Venesection* and other modes of vascular depletion, as by cupping or leeches, or by the application of these last to the anus, as insisted on by PLENCIZ and LÄKEREN, with antiphlogistics, emollients, and demulcents, have been advised by many in the early stage of the malady. At this stage venesection, hardly amounting to more than eight or ten ounces at a time, and repeated according to circumstances and to its effects, has been recommended by MORTON, MEAD, PRINGLE, MONRO, FOTHERGILL, SALVADORI, STOLL, HOSACK, FARR, CHEYNE, and others. I have stated above (§ 309-313) the circumstances in which the practice may be adopted; and that it should not always be accompanied with other antiphlogistic remedies, either in an early stage, or when prescribed for inflammatory or hæmorrhagic complications; for depletion, although manifestly indicated, may be followed, in many cases, by suitable tonics and nutrients, provided that exercise be taken with due care in the open air, and that the *external derivation* about to be noticed (§ 415, 416), such as issues or setons, be kept discharging. RUSH advised, for cases requiring venesection, recourse to it in preference, in spring and autumn. But this recommendation is in conformity rather with an old custom than with correct pathological inference. RHODIUS, TRACY, and RUSH considered an attack of hæmorrhage from the nares, rectum, or even from the lungs, beneficial, and the larger the better, and that it should not be too soon arrested, unless manifestly injurious. The opinion is certainly often correct, but the numerous exceptions should not be overlooked.

407. *Various other substances* have been prescribed for phthisis by eminent writers; and, although they may be of little use, farther than as adjuncts to other more beneficial remedies, they may be very briefly enumerated at this place. The *arum triphyllum* was recommended by BURTON, in the form of decoction with milk, the *carduus benedictus*, either in decoction, infusion, or extract with senna, by THILENIUS; the *cryngium campestre*, by HOFFMANN; the *geum urbanum*, by BUCKHAVE, in doses of a scruple and

upward of the powder of the root, as a tonic and astringent; the tops and flowers of *hypericum*, for its balsamic, bitter, and tonic qualities, by LINNÆUS; the *nasturtium aquaticum*, by POUTEAU and BRILLONET; *myrrh*, conjoined with *sulphur*, or various other substances, by numerous writers; the *rhus radicans*, by GIBSON; the *raphanus*, or horse-radish, by SCHENCK and OSIANDER; the *marubium vulgare*, by ALIBERT, a popular remedy, in various forms of preparation, for pectoral complaints in most European countries; the conserve and other preparations of *roses*, by MOSELEY and very many other writers; the *phosphoric acid*, by GORDIN; the *sulphate of iron*, by STRANGER; and *taraxacum*, by SCHMIDTMANN. These hardly require any remark. They may be employed under circumstances which prevent the use of other more beneficial remedies; or in conjunction with such means as have already been advised, as with the Iceland moss, digitalis, conium, &c., or with bitters, as absinthium, calumba, cascarrilla, arnica, &c., when a restorative diet is required, or when indigestion, flatulence, or sinking are experienced. In certain states or complications, as in those just named, the preparations of ammonia, as the carbonate, &c., or the ethers, may be conjoined with other means with benefit. Of the ethereal preparations, the compound spirit of sulphuric ether, the spirits of nitric ether, and the hydrochloric ether are the most useful. In cases where I have prescribed the hydrochloric or nitro hydrochloric acids, with or without the hydrocyanic acid, I have often added the hydrochloric or other ethers when the state of the case required such an addition.

[In this connexion the *wild-cherry bark* deserves favourable mention, for its admirable combination of sedative and tonic properties. The cold infusion of the inner bark of *Cerasus Scrotina* has long had a high reputation in this country, in cases of general debility, with feeble digestion, and frequent pulse, and especially in pulmonary tuberculosis. It rarely fails to lessen the frequency and increase the force of the pulse, while it invigorates all the functions. "Few remedies," says Prof. WOOD, "are better adapted to hectic fever, from whatever source it may proceed." The best preparation is the cold infusion, made with half an ounce of the bark to a pint of water, prepared by percolation, and given in doses of two ounces three or four times a day. It may be used to great advantage in connexion with cod-liver oil.]

408. xiii. MINERAL WATERS have been recommended by several authors; but they require much caution and consideration before entering upon the use of any of them, when the disease has fully declared itself. In the scrofulous diathesis, and when the disease is threatened, or when its prevention should be attempted, these mineral waters are often of great benefit, when taken in proper quantity, and in suitable dilution, in certain cases. The quantity of these waters usually recommended is often not duly regulated, or suited to the nature of the case and to the effects produced; and hence they are either inefficacious or injurious. There are three kinds of mineral waters, which, when used in proper quantity and combination, and their effects watched, are sometimes beneficial both in the prevention and in the treatment of the early stages of phthisis; these are the *chalybeate*, the *sulphureous*, and the *alkaline*; each, however,

being suited only to certain states or forms of the disease. It should not, however, be overlooked that all these waters contain various proportions of different saline ingredients—the oxides or salts of iron, or sulphureted hydrogen, or alkaline carbonates, being present in certain of these waters also in various proportions.

409. *a.* The *chalybeate mineral waters* are chiefly indicated in those states of the disease for which the compound iron mixture has been recommended above (§ 378), more especially in lymphatic and phlegmatic temperaments, and when the pulse is weak, small, or slow, and the blood poor in red globules. Generally the weaker chalybeates, or the stronger more or less diluted, are most beneficial, and should be preferred for cases where their use is of doubtful propriety. The mineral waters of *Aix-la-Chapelle*, especially the sulphureted chalybeate, have been recommended for this class of cases; but the mineral waters of this country, of a similar composition, are equally appropriate with those, especially the chalybeate and saline spring at *Harrowgate*, which may be taken alternately with the sulphureous waters of that place. The mineral waters of *Kissingen* are also of service early in the disease, or when phthisis is threatened, especially when the several springs are employed under judicious medical direction.

410. *b.* *Sulphureous mineral waters* are often beneficial in phthisis, especially if the composition of the several springs containing sulphureted hydrogen gas be such as may be appropriately employed for individual cases. The several springs at *Harrowgate* supply a sufficient variety of composition to suit the various states of different cases. The waters of *Moffat* and *Strathpeffer* are stronger in sulphur than those of *Harrowgate*, but they present a less variety of composition. The waters of *Enguien* and *Barèges* may also be tried, but they offer even fewer advantages than those already mentioned.

[There are several mineral springs in the United States whose waters are reputed beneficial in phthisis pulmonalis, especially the chalybeate waters of *Saratoga*, and the sulphur and saline springs of *Virginia*, particularly the *Red Sulphur*. The latter, containing *carb. acid*, *nitrogen*, *oxygen*, *hydro-sulphuric acid*, *sulphate soda*, *carb. lime*, *carb. magnesia*, *sulphur compound*, &c., have the property of reducing the frequency of pulse and tranquillizing pulmonic irritation in a very remarkable degree. It is not uncommon for a hectic pulse of 120 to be reduced to the natural standard in the course of a few days under the use of the waters, while at the same time the appetite is increased, the night-sweats checked, and the general system invigorated. The medicinal virtues of these waters, together with the delicious climate in summer and autumn, the romantic scenery, and the accommodations and comforts afforded to the guests, render the *Virginia Springs* a pleasant and profitable resort to the invalid. The sulphur springs of *Richfield*, *Sharon*, and *Avon* also deserve favourable mention in this connexion.]

411. *c.* The mineral springs abounding in the *carbonates of the alkalis*, as well as holding various other substances in solution, have likewise been recommended for threatened and incipient phthisis. The chief of these are the waters of *Ems*, *Seltzer*, and *Vichi*. These are usually most beneficial when taken with milk or with whey.

The *Ems* waters are much praised by *BRUCHMAN* and others, and the *Seltzer* by *BANG* and *KRAMER*, in this disease, especially when diluted with milk or whey. The waters of *Cauterets* have also been recommended by many; and those of *Bonnes* and *St. Saurcur* of the *Pyrenees* have proved most beneficial in several instances which have come before me. Whatever mineral water be adopted, other means, medicinal, regimènal, and dietetic, are generally also required. Some advantage, moreover, is derived by consumptive invalids from change of scene and of modes of living, and from dryness of the air and elevation above the level of the sea, when they visit some of the inland or continental watering-places. Increased exercise in the open air, and in open day and sunshine, is also not devoid of some benefit.

412. *xiv.* *INHALATION* of various fumes and vapours, chiefly medicated in various ways, and by diverse means, has been advised by many.—*a.* I have seen several modes of inhalation employed, and have prescribed certain of them, but without any very manifest benefit. The great disadvantage of most of these means is occasioned either by the amount of aqueous vapour thus passed into the lungs, or by the irritating or other effects produced in the air-passages by the ingredients employed. I have already noticed the subject of inhalation above (§ 324), and when treating of *bronchitis* (see art. *BRONCHII*, § 98, *et seq.*); and the opinion I have stated under this latter head a farther experience has fully confirmed. I may mention, however, that the inhalation of sulphuric ether, with the vapour from preparations of conium, was advised by *Dr PEARSON*; of vapour containing the fumes of *Burgundy pitch*, by *HOMÈ*; of aqueous exhalations from *henbane*, *myrrh*, and “*naphtha vitrioli*” (sulphuric ether), by *JOERDENS*; of the fumes from *pine-tops*, and various balsams, by a number of writers; and of tar-vapour, by *CRICHTON* and *PAGENSTECKER*. But the usual modes of inhalation, especially those in which inhalers are employed, are most objectionable, and much more injurious than beneficial.

[After much experience in the use of inhalation in phthisis, we fully agree with our author that, in general, it is, as practised, more injurious than beneficial. We have tried a great variety of substances, as *iodine*, *chlorine*, *creasote*, *tar*, *bals. Tolu* and *Perru*, *styrax*, *benzoïn*, *copaiba*, *turpentine*, &c., and we cannot say that we have ever seen any essential, permanent benefit from their use in tubercular phthisis. In bronchial disease they often prove useful by their local alterative action, and doubtless in many such instances exert a curative influence. As consumption is generally connected with bronchial irritation and inflammation, medicated inhalation often proves a useful palliative, allaying irritation, and affording some relief to the cough. Hence the popular belief in its efficacy in such cases. But in a constitutional affection like tuberculosis, the local application of medicines to the bronchial tubes, whether by inhalation or any other method, can only be expected to palliate, never to cure, the disease. Patients are often flattered into a belief that they are rapidly improving under this process, while all that is effected is a slight diminution of the most harassing symptom, viz., the cough. This mode of practice is now chiefly resigned to the hands of noted quacks and empirics, where it properly belongs.]

The late *Dr. MORTON*, of *Philadelphia*, em-



ployed inhalations to a considerable extent in every stage of phthisis, and, as he believed, with beneficial effects. In some cases he combined conium with iodine, after the manner of Sir CHARLES SCUDAMORE, as follows :

R Iodini puri, Iodidi Potassii, āā, gr. vj.; Aquæ distillatæ, ℥v.—℥vj.; Alcoholis, ℥j. Fiat mistura.

From 3ss. to 3j. of the saturated tincture of conium is added, with the same quantity of the iodine mixture, to the water in the inhaler of 120°, at each inhalation of 8 to 10 minutes' duration, increasing the quantity of each according to circumstances. We have tried this combination in several cases of phthisis with apparent temporary benefit. Instead of the above, Dr. MORTON came at last to prefer the following preparation :

R Iodini puri, gr. iv.; Foliorum Conii, gr. viij.; Etheris Sulphurici, ℥j.

Digest for 48 hours; add a teaspoonful to a wine-glass of warm or tepid water; hold in the hand, and inhale the vapour as it rises. In 10 to 15 minutes the evaporation is complete. If it causes cough or dizziness, use a smaller quantity, or hold it farther from the nostrils. Dr. MORTON preferred this method to the inhaler. The most that inhalation, however, can do, in any case, is to palliate some of the symptoms.]

413. *b. Weak fumigations* diffused through the apartment occupied by the patient are much more beneficial than any mode of inhalation; and the vapour, or the weak fumes, or rather the odours, exhaled from the substances employed for the purpose of impregnating the air of the apartment, are sufficiently strong to be respired by the patient in most cases. The greatly-diluted fumes or vapours proceeding from creasote, from tar, from turpentine or the several terebinthines, from pine-tops, from various balsams, from the ethers, especially pyroligneous ether or pyroxalic spirit, from cedar, and from resins, gums, &c., independently of any combination with aqueous or narcotic vapours, are generally much more beneficial and pleasant to the patient than the inhalations commonly employed. The embrocations so frequently recommended for this (§ 321, 322, 403) and several other diseases act beneficially, chiefly in consequence of the inhalation by the patient of the ingredients as they are evaporated, or as their dilute fumes are exhaled and diffused in the air surrounding him. A young man, who had repeatedly come under my observation in an advanced stage of phthisis, completely recovered his health after he had been for a considerable period employed in the manufacture of creasote. When the cough is distressing, the fumes of ether, arising from the sprinkling of one or other of these, especially of the spiritus ætheris sulph. comp., the pyroligneous ether or pyroxalic spirit, or the hydrochloric ether, or of chloroform, on the bed-clothes of the patient or on any article more or less removed from him, will often have a very palliative effect.

414. XV. THE EXTERNAL MEANS of treating phthisis have been already partly noticed (§ 319, 323). —A. Among these, *medicated and mineral baths* have been advised by several writers, more especially the warm mineral springs of the continent. Sulphureted chalybeate baths were recommended by LENTIN; the baths of *Baden* were praised by SCHENCK, and those of *Weisbaden* by RITTER, especially for the early stages of phthisis; but they are more likely to be of service for the pre-

vention of the disease, aided by more beneficial means; for very little dependence can be placed upon thermal springs or baths, either in the prevention or cure of this malady. Whatever benefit is derived in some cases is to be imputed as much to change of air, exercise, and regimen as to the effects of the baths.

415. *B. External derivatives and exutories* have been advised for phthisis from the earliest periods of medical history. I have stated above (§ 319–323) the modes in which these may be employed, and the general results of my experience of them. I shall only notice the opinions of a few writers respecting them: the views of many eminent authorities on this important department of medical practice may be gathered from the historical sketch I have given above (§ 242–287). During the course of my medical experience I have not observed this practice employed in the manner in which it is most efficacious. Tartar-emetic ointments, croton-oil liniments, &c., have been frequently resorted to in recent times; but issues and setons have been rarely employed, although the experience of numerous writers, as well as my own experience in several cases, has demonstrated their great utility. The selection of a situation in which an issue may be made or a seton inserted is often the chief difficulty in the way of either. BARTHOLIN directed an issue to be made in the back, below the scapulæ; DUPLAN and RIVIERUS between the scapulæ; GEBEL, DREYSIG, and BILLARD, in the upper arm; SIMMONS recommended a seton to be inserted in the nape of the neck; MONRO, PORTAL, and HILDENBRAND, in the arm; ZACUTUS LUSITANUS, at the edge of the pectoral muscle, near the axilla; WHYTT and RUSH preferred the same situation for a seton, or near the sternum for an issue, LENTIN also selecting these places in preference to others. While these and many other authors have thus resorted to these means in phthisis, they have not considered them suitable to all states or stages of the malady. QUARIN, WINTINGHAM, and SOUVILLE, who have been less in favour of these means than the writers just referred to, consider them worse than useless in the far-advanced course of the disease, and when there is much exhaustion. Having often employed them with advantage—in some instances in the families of medical men of my acquaintance—I am enabled to state that I have generally preferred issues, kept discharging by means of a number of peas, to setons; that, when the patient is not much emaciated, some part of the breast, or over the margins of the false ribs, has been preferred; that this practice is of service chiefly in early stages, before cavities are formed, and in the more usual and chronic forms of the disease; that it is more especially beneficial in the hæmoptysic and congestive complications; and that it should not be resorted to in the more febrile, debilitated, and emaciated cases, and when the signs of cavities are manifest. It ought to be farther recollected that time is a necessary element in the development of the effects of this treatment; that the other means of cure, the diet and the regimen adopted, should be restorative and nutritive, without being heating or stimulating, especially as the discharge from the issue or seton becomes copious; and that air and exercise in the open day, avoiding injurious exposure, should not be neglected.

416. *C. Blisters, rubefacients, and embrocations*

(§ 319-323) have been sufficiently noticed. The first of these, when kept discharging for some time or frequently renewed, is often of service, and may be substituted for issues or setons when these latter will not be adopted by the patient. The *embrocations* which I have so often mentioned are of service, both as irritants or rubefacients, and as furnishing the best means of inhalation. *Cauteries*, actual or potential, formerly employed and recommended by HIPPOCRATES, GALEN, and others of the ancients, and by PORTAL, AULAGNIER, GARDOUIN, &c., among the moderns, are rarely prescribed; and even *moxas*, although much praised by LARREY and other recent writers, are seldom resorted to. *Urtication*, which was recommended by LANGE, is also superseded by other means. That pustular eruptions and purulent discharges artificially produced have more or less influence in delaying or arresting the progress of phthisis, when the disease is not far advanced, is among the most important facts in medical practice; but much more is required than an empirical recourse to such means. A knowledge of the cases, states, and stages of the malady in which they are likely to be of service, or at least not to be detrimental, and of the other means, constitutional, local, external, and regiminal, which may be brought to their aid, is essential to success in the employment of them. That the production of a purulent discharge or the formation of a purulent eruption has sometimes cured phthisis, appears to have been known from the earliest periods of medical history. After the appearance of small-pox, it was observed that a copious eruption in that malady often cured pulmonary consumption in an early stage, and as often accelerated the progress of this latter disease in an advanced stage. This was remarked by MÜYNIK, BRACHET, and others; and it has been stated by writers that phthisis is rarely observed in persons much marked with small-pox (§ 231)—a statement which has appeared to be confirmed by my own observation.

417. xvi. STATES OF THE AIR were much discussed by writers from the middle of the last century until early in this, in respect of consumption, and all sorts of air were considered with reference to the cure of this disease. The air of cow-houses was advocated by some, of marshes by others (§ 295). Even the mephitic air produced by bilge-water (arising chiefly from the action of salt-water upon the ship's timbers) was considered by BEDDOES and HARRISON as the cause of the benefit derived from voyaging. The use of fixed air, soon after its discovery, in the treatment of phthisis, was most unprofitably discussed by writers from 1780 to the commencement of this century; and although the influence of the carbureted and sulphureted hydrogen, and other gases given off from bilge-water, may be considered by some as disposed of, yet it is still viewed as not without some favourable influence by those who believe in the good effects of marshy exhalations in threatened phthisis.

[Dr. S. G. MORTON, in his "Illustrations of Pulmonary Consumption," first published in 1833, suggested (p. 261) that, as the only equable climate of the United States is that of the Mammoth Cave of Kentucky (its temperature differing but little the year round from 56°, and perfectly dry), it might at some future period become a place of hibernation for invalids, "where they will be shielded alike from the cold, the wet, and the

noise of the world above them." This hint was taken advantage of by its proprietor soon after, and several huts were erected a mile or more from the entrance of the cavern, which were inhabited throughout the winter months by consumptives from different parts of the United States. The first effect of the under-ground residence in a few cases appeared decidedly favourable; the cough was arrested in a great degree, and a quiet, placid feeling pervaded the system. The absence, however, of light, the want of exercise, the monotony of life, the smoke from fires and lights, &c., rendered existence under such circumstances intolerable, and, on emerging again to the light of day, the disease progressed with astonishing rapidity to a fatal termination. Altogether, twelve different patients tried the experiment of living within the cave from one to six months each, but in no instance with any permanent benefit.—See 31st vol. *Boston Medical and Surgical Journal*, June, 1844.]

418. That fixed air contained in fluids is a useful palliative in this disease, and for the dyspeptic symptoms which accompany, cannot be doubted; and that the sulphureted hydrogen contained in some mineral waters is often beneficial, as most preparations of sulphur are also more or less so, in tubercular states of the lungs, must be admitted, as far as medical observation and experience warrant the belief. But this refers only to the gases impregnating fluids taken into the stomach.\*

419. Of much greater importance is the determination of the questions, whether or no the air in very elevated situations, or in low places, and whether that near the sea, or at a distance from it, is the most beneficial to phthisical cases? Or, in other words—1st. What is the state or states of the air which the phthisical patient may breathe with greatest benefit? 2d. Should the states of the air, found beneficial in certain seasons, be continued in other seasons? and, 3d. If change of such an air be found requisite, how should it be most appropriately and beneficially changed with the procession of the seasons?

420. 1st. *Sea voyages* were praised by CÆLUSUS, ARÆTEUS, and others among the ancients; and by GRANT, SAVARY (*Lettres sur l'Égypte*, t. iii., p. 8), and many among the moderns. But it is very doubtful what share of the benefit observed proceeds from the sea air itself, or from the motions and other circumstances connected with the voyage. It is not improbable that the sea air may contain certain elements beneficial to morbid states of the lungs, and sufficient to counteract any injurious influence which humidity alone might produce. But persons living on the seacoast are not much more exempt from phthisis than those living inland, where equally humid states of air, within the same ranges of temperature, usually exist. A greater exemption may be experienced, but the amount has not yet been ascertained, or even an approximation to it. The ancients inferred benefit from sea air, because the

[\* If we bear in mind that the principal indication in phthisis is to improve the faulty nutrition, which is the cause of the tubercular exudation, and invigorate the general system, we shall avoid the use of such drugs as tend to impair the tone of the digestive organs, and we shall find, moreover, that as the digestive powers and the general health are strengthened by suitable hygienic means, the local as well as general symptoms will yield, and there will be little occasion for those special remedies for sweats, cough, diarrhoea, &c., which have hitherto been in such general use.]



voyages for the cure of pulmonary diseases were generally made to Egypt, and very probably the relief manifested soon after the arrival of patients in that country was partly at least attributed to the voyage. Although Dr. SMYTH is not in favour of sea air for consumptive cases, yet I know that voyaging in the Mediterranean and in the Atlantic has been most beneficial in several cases in which I have advised it. But I agree with CÆLIUS AURELIANUS, GILCHRIST, BLANE, REID, and many others, in saying that, in order to be of service, it should be adopted early in the disease; if it be resorted to at a far-advanced period, and if a very warm latitude be entered into, the disease will most probably be accelerated to a fatal issue. The doubt expressed by me above (§ 307) of the superiority of the sea-coast to inland situations, other circumstances being equal, appears to be confirmed by the observations of Dr. RICHARDSON respecting the climate of Nubia, of Dr. BARCLAY on the climate of Egypt, and of Dr. ARCHIBALD SMITH on the influence of high elevation in warm climates on consumption. In *Nubia, Egypt*, the South of *Spain*, and at a considerable elevation on the *Andes*, cases of this disease, whether attended by hæmoptysis or not, were remarkably benefited soon after their arrival; and a removal from the last-named place to the sea-coast was often followed by a return of the malady. From the testimony and experience of these eminent writers, and from what other sources of information have furnished, I infer that dry states of the atmosphere, in moderate grades and ranges of temperature, and at considerable or even moderate elevations above the sea-level, are most favourable to consumptive patients; that the places just named, and Malaga, and various other places in Syria and the East, are most to be preferred; and that, before the commencement of the hot season, Nubia, Egypt, and other places, where the temperature rises very high, should be relinquished for others which are more temperate.

[*Climate in Tubercular Phthisis.*—With regard to the influence of the climate of different regions of the United States in the causation of tubercular phthisis, the positive facts bearing on the subject are not yet sufficiently numerous to enable us to draw any very positive conclusions. The late Dr. SAMUEL FORRY, in his able work on "The Climate of the United States and its Endemic Influences" (based chiefly on the records of the Medical Department and Adjutant-general's Office, United States Army), having first established the *isothermal* and *isochermal* lines, representing the mean temperature of summer and winter (from which it appears that the same parallels of latitude present systems of climate very diverse in character, as, 1st. The regions bordering on the ocean; 2d. Those under the influence of inland seas; and, 3d. Those remote from such controlling powers), demonstrates very clearly that these laws of climate maintain an intimate relation with the etiology of pulmonic diseases, and that the prevalence of *catarrh* and *influenza* in each system of climate increases and decreases in proportion as the seasons are contrasted, thus maintaining an unvarying relation with the extreme range of the thermometer as connected with the seasons.

The following table from his work, exhibiting the ratio of cases per 1000 of mean strength, will show the comparative prevalence of pulmonary diseases in each system of climate:

NORTHERN REGION OF THE UNITED STATES.	Mean Strength.	Catarrh and Influenza.	Pneumonia.	Pleuritis.	Phthisis Pulmonalis.	Total.
Atlantic Ports .....	3,130	233	22	26	9	290
Posts on the Lakes .....	5,975	500	19	30	9	538
Posts remote from the ocean and the Lakes. }	12,604	552	17	28	5	602
Total.....	21,707	439	18	28	7	490
SOUTHERN REGION.						
Coast from Delaware to Savannah .....	3,799	271	25	32	13	341
Southwestern Stations .....	11,140	290	39	52	11	392
Posts on the Lower Mississippi. ....	3,381	218	22	28	9	277
East Florida.....	4,607	143	15	24	9	191
Total.....	22,327	246	29	49	11	236

If these statistics are reliable, the annual ratio of pulmonary diseases, with the exception of catarrh and influenza, is lower in the northern than in the southern regions of the United States; pneumonia, pleuritis, and phthisis pulmonalis are most prevalent, however, in the middle regions of the United States, and Florida has a lower average than any other. The ratio of deaths per 1000 of mean strength is, in the northern region, 2.1, southern 4.4, from phthisis; and in the former 0.5, the latter 1.8, from pneumonia, pleuritis, and catarrh. This corresponds with the conclusions deduced from the "Statistical Reports on the Sickness, Mortality, and Invaliding" among the British troops stationed in every part of the globe. The reporter shows by numerical results that phthisis pulmonalis is more prevalent in southern than northern latitudes, and infers "that it is by no means likely that any beneficial influence can be exerted by climate itself in pulmonary affections."

These facts also correspond with what has been observed in Europe. Phthisis is far more prevalent in the middle and southern regions of Europe than it is farther to the north; while in Sweden the ratio of deaths from this disease is only 63 in 1000, in London it is 236. The northern parts of Russia are comparatively exempt from the disease, while from the 35th to the 45th parallel of latitude it is very common.

The popular notion that a changeable climate favours the production of phthisis is undoubtedly erroneous. Those who are most exposed to the vicissitudes of climate are least exposed to pulmonary disease of every kind. Statistics have fully proved that the maximum of liability to phthisis is found among those who suffer the least exposure to climatic variations; and it will even be found true that the most variable climates are best calculated to develop the physical and mental powers. Doubtless, it is owing to this cause that the Indians, our frontier inhabitants, and the hardy backwoodsmen of the West, are so little liable to attacks of phthisis. The above holds true also, according to Dr. FORRY, in regard to pleuritis, pneumonia, and catarrhal affections, which, he says, are far less prevalent in the moist and changeable climate peculiar to the Atlantic coast and the borders of our great lakes than in the dry atmosphere of the interior parts of the continent. The above facts are also corroborated by the recent "Statistical Report on the Sickness and Mortality in the Army of the United States, compiled from the Records in the Surgeon-General's Office," for sixteen years (Washington, 1856, 4to). For example, Surgeon WOTHERSPOON, in giving an account of the "Medical Topography and Diseases of Fort Kent" (lat. 47° 15' N., long.

68° 38' W.), remarks that "the climate of Fort Kent does not seem favourable for the production of pulmonary phthisis. During my sojourn at the post, I have neither seen nor heard of a case of this disease among the French or American settlers. Assistant-Surgeon ISAACS, who, during the two years he was resident at the fort, had a much better opportunity than myself of becoming acquainted with the diseases of the country, informs me, not only that he never saw a case of consumption in the country, but that some of the inmates of the garrison, who were affected with suspicious symptoms, recovered from them entirely" (p. 27).

From this recent "Report" we copy the following "Consolidated Table," exhibiting the amount and ratio of sickness and mortality in the several regions from phthisis pulmonalis:\*

Regions.	Mean strength.	Number treated.	Deaths.	Ratio of Cases per 1000 of mean strength.
Coast of New England ..	3,963	19	5	4.8
Harbour of New York ..	9,387	56	35	5.9
West Point .....	6,901	6	8	0.8
North Interior, east....	3,553	17	10	4.7
The Great Lakes.....	10,346	47	33	4.5
North Interior, west....	7,330	30	15	4.1
Middle Atlantic.....	6,249	16	19	2.5
Middle Interior, east...	2,456	6	3	2.4
Newport Barracks, } Kentucky.....	1,454	5	4	3.4
Jefferson Barracks and St. Louis Arsenal....	5,580	23	21	4.1
Middle Interior, west....	5,319	28	13	5.2
South Atlantic.....	2,800	26	5	9.2
South Interior, east....	5,919	43	23	7.2
South Interior, west....	10,013	20	25	2.
Atlantic Coast of Florida	835	2	1	2.3
Gulf Coast of Florida ..	2,299	16	3	6.9
Texas, southern frontier	4,450	13	11	4.
Texas, western frontier.	6,324	25	12	3.9
New Mexico .....	5,873	8	3	1.3
California, Southern....	1,707	9	5	5.2
California, Northern....	1,599	9	4	5.6
Oregon and Washington	1,831	6	2	3.2

From this table we gather that the lowest ratio of cases of consumption occurs in New Mexico, being only 1.3 per 1000, and the highest in the South Atlantic region, where it is 9.2 per 1000. Assistant-Surgeon HAMMOND observes that he had never seen but two cases of the disease in the country (New Mexico), and those came from the United States. The south interior, east, and Gulf coast of Florida give the next highest proportions, being respectively 7.2 and 6.9 per 1000 of mean strength. The ratio for these three regions, and also for California, are higher than for any of the regions in the United States. The compiler of this work, Dr. COOLIDGE, arrives at the following conclusions in regard to climatic influences in the production of this disease:

"1st. That temperature, considered by itself, does not exert that marked controlling influence upon the development or progress of phthisis which has been attributed to it.

"2d. That the most important atmospherical condition for a consumptive is *dryness*.

"3d. That next to *dryness* in importance is an *equable* temperature—a temperature uniform for long periods, and not disturbed by sudden or frequent changes. A uniformly *low* temperature is

much to be preferred to a uniformly *high* temperature. The former exerts a tonic and stimulating effect upon the general system, while the latter produces general debility and nervous exhaustion. The worst possible climate for a consumptive is one with long-continued high temperature, and a high dew-point." The British Army Statistical Reports confirm the truth of these statements, the ratio of cases of phthisis among the troops in Canada being 5.7 per 1000 of mean strength, while in Bermuda it is as high as 8.9.

Such being the facts in regard to climatic influences in the production of tuberculosis, the important question recurs, are consumptive patients to be sent away from home; and if so, whither shall they be sent? English physicians have from time immemorial been in the habit of sending their pulmonic cases to Rome, Naples, Nice, Florence, and other parts of Southern Italy, Montpellier, Lisbon, &c., places particularly subject to bronchial and tubercular affections, and where a greater proportion of the native inhabitants perish from this class of diseases than in any part of Great Britain. Even in Madeira, so vaunted as salubrious in tuberculous cases, consumption and scrofula are very common diseases, and the average duration of life is inferior to that of our own country. Indeed, all known facts seem to prove that the notions which have hitherto prevailed in regard to the beneficial effects of change of climate in this disease are utterly unsound and fallacious. As Dr. BURGESS\* has well remarked, "We may seek in vain along the entire range of organized existence for an example of diseased animals being benefited by removal from a warm to a cold, or from a cold to a warm country. There appears nothing in the Book of Nature so violently inconsistent. The fishes which inhabit the waters of the British islands will not thrive in the Arctic seas, nor those of the latter in the ocean of the tropics; our birds generally die when carried to Europe, and the wild animals of Africa and Asia perish when translated to our own continent. Man, it is true, is a cosmopolite, and can bear sudden changes and unnatural transitions better than any other animal; still, his constitution and health are endangered by such opposite conditions, as we see among the blacks removed from the South to Canada, and among the inhabitants of northern latitudes who remove to the tropics, and *vice versa*. Well may it be asked, if such extreme changes of climate prove obnoxious to the health of individuals having naturally a sound constitution, how are we to expect persons in a state of organic disease to be thereby benefited? Nature has, in fact, adapted the constitution of man to the climate of his ancestors, and that is the natural climate of man in which not only he himself was born, but also his blood relations for several generations. This is his natural climate, as well in health as when his constitution is broken down by positive disease, or unhinged by long-continued neglect of the common rules of hygiene." We believe, therefore, with BURGESS, that *change of air in his own climate*, or removal to one nearly approaching to it, is the natural indication, and will effect whatever good climate can effect in consumption.

When tubercular disease, then, is fully established, a residence at home, if in a favourable sit-

\* The northern division includes that portion of the United States north of the 40th degree of latitude and east of Rocky Mountains; middle division lying between 35th and 40th parallels of latitude; southern division between 30th and 35th degrees of latitude. Besides these are the divisions of Florida, Texas, New Mexico, California, Oregon, and Washington Territories.]

[\* "Climate of Italy, in Relation to Pulmonary Consumption." London, 1852.]



uation, with all the comforts and consolations of home, is far preferable to any of the remote resorts recommended in such cases. We have seen that more cases of phthisis originate in warm than in cold climates, and are also more speedily fatal; and it would be easy to show that while cold retards the progress of the disease, heat accelerates it. Tubercular softening, as we have had many opportunities of observing, is much hastened by warmth and moisture, as in removing from New England to Cuba, or any of the West India islands. We admit, however, that there are exceptional cases, where consumptive persons seem relieved as soon as they reach a warmer and more uniform climate. But these are either cases of pure bronchial disease, or *broncho-tubercular*, where a warm, moist air allays the irritability of the bronchial mucous membrane, and affords great relief to the cough and the general sensations of the patient. It is a mistake, however, to suppose that rapid variations and an extensive range of temperature are unknown to warm climates. Such variations are very great and frequent in Southern Italy, and along the Atlantic coast of Florida and our Southern States.

If, however, it is thought desirable, for the patient or physician, that a change of climate should be made, there is no necessity that he should be sent abroad while we have every possible variety of climate in our own country. *Change of air in the same climate* is what should be sought, and not a climate greatly foreign to that of his own. An *equable* temperature is what is required, and every consumptive patient who has tried a change of climate will testify that a low degree of temperature, with a limited range, gives more permanent ease than a high degree subject to frequent alternations. Such a winter climate is found in many parts of the United States. We have little doubt the time is not remote when, instead of sending tuberculous cases to spend the winter at the South, southern invalids will seek the bracing atmosphere of the North, and return home in the spring greatly invigorated. The above remarks, I am aware, are in opposition to the maxim of CELSUS, that "the air in which a man grows sick is the very worst air for him;" and also in opposition to the opinions of many enlightened physicians, like Professor DICKSON, who thinks a change of climate in such cases "is always desirable;"\* and that "a northern winter should be avoided by migrating to a southern latitude; and that a southern summer is almost equally dangerous in its ultimate effects," &c. Dr. RUSN advised American patients to pass the winter and a part of the spring in South Carolina and Georgia; in summer to go northwardly into Canada as far as Quebec, and to return in autumn to Pennsylvania and New Jersey.† He inculcates strongly the necessity of keeping far from the sea-coast, believing a mixture of sea and land air highly prejudicial. Dr. DICKSON remarks that "the atmosphere of islands, of many points on the coast, Madeira, the West Indies, St. Augus-

tine, and Savannah, is found to be generally salubrious to pulmonary patients."—*Loc. cit.* Of the numerous patients we have sent to these different places with confirmed phthisis, we can scarcely call to mind a single case which was essentially benefited, while in numerous instances the patients became suddenly worse. Great relaxation and debility ensued, with an increase of the night sweats, hæmoptysis, and diarrhœa, if present; the high temperature rendered exercise in the open air next to impossible, while there was a general absence of those comforts and appliances procurable at home. The appetite usually fails on transference to a tropical clime, and tubercular softening makes rapid progress.

Admitting that the ratio of pulmonary diseases is as high, or higher, in southern than in northern latitudes, we grant it does not necessarily follow that benefit may not be derived from change of climate in the way of a *winter* residence. This must be decided by actual experience only, and experience we hold to be generally adverse to the doctrine. The late Dr. FERRY, who was personally acquainted with the climate of Cuba, Florida, and our Southern States, was in the habit of recommending a residence in those localities during the winter months, in cases of bronchial disease and incipient or threatened phthisis, or "when mostly limited and merely nascent," but never after the latter disease was unequivocally established. Sir JAMES CLARK also remarks that "the climate of the West Indies is an improper one for patients with tuberculous disease of the lungs."—"On Climate."

The idea is a prevalent one in the profession, that residence in a malarious district acts as a prophylactic against tubercular phthisis; but the evidence on this point is very conflicting. It is

*The Mean Temperature at Brunswick, Maine, for the Winter Months, December, January, and February, from the Year 1807-8 to 1867 inclusive.*

Year.	Mean Temperature.	Year.	Mean Temperature.	Year.	Mean Temperature.
1807-8	25.29	1824-25	23.60	1841-42	28.52
1808-9	19.88	1825-26	24.33	1842-43	24.86
1809-10	24.75	1826-27	22.25	1843-44	24.87
1810-11	23.54	1827-28	27.69	1844-45	22.37
1811-12	21.57	1828-29	22.03	1845-46	27.81
1812-13	21.79	1829-30	22.18	1846-47	21.37
1813-14	24.80	1830-31	27.66	1847-48	23.13
1814-15	20.97	1831-32	23.14	1848-49	22.75
1815-16	22.09	1832-33	22.05	1849-50	22.06
1816-17	21.29	1833-34	26.54	1850-51	23.07
1817-18	21.52	1834-35	22.95	1851-52	20.39
1818-19	26.99	1835-36	29.31	1852-53	24.52
1819-20	23.74	1836-37	25.64	1853-54	21.52
1820-21	23.23	1837-38	31.06	1854-55	17.95
1821-22	19.73	1838-39	23.55	1855-56	20.07
1822-23	17.47	1839-40	32.39	1856-57	20.14
1823-24	22.73	1840-41	27.25		

*The Mean Temperature at Brunswick, Maine, North Latitude, 43° 53', for the Summer Months, June, July, and August, from the Year 1803 to 1856 inclusive.*

Year.	Mean Temperature.	Year.	Mean Temperature.	Year.	Mean Temperature.	Year.	Mean Temperature.
1803	64.80	1821	63.57	1833	62.16	1845	61.72
1809	65.70	1822	65.70	1834	64.20	1846	62.87
1810	65.24	1823	67.69	1835	63.18	1847	61.22
1811	66.59	1824	65.97	1836	61.99	1848	61.03
1812	63.58	1825	69.97	1837	65.08	1849	62.72
1813	66.08	1826	71.70	1838	69.76	1850	61.79
1814	64.90	1827	67.56	1839	67.24	1851	60.23
1815	67.13	1828	66.87	1840	69.76	1852	61.70
1816	63.39	1829	64.54	1841	64.90	1853	61.84
1817	64.88	1830	61.64	1842	63.57	1854	62.87
1818	70.03	1831	66.17	1843	62.29	1855	60.66
1819	69.31	1832	55.77	1844	61.21	1856	61.71
1820	67.40						

[\* Essays on Pathology and Therapeutics, p. 317, vol. ii. (1845).]

† It is a common belief that there has been a gradual change in the temperature of our summer and winter months during the last 50 years, our summers growing hotter and our winters colder during that period. An examination of the following tables, for which we are indebted to the kindness of Professor PARKER CLEVELAND, LL.D., will show that there has been no essential change in these respects during that period:

doubted whether malaria exerts any antidotal or curative power in regard to tuberculous affections. On the contrary, it is stated on good authority that malaria powerfully predisposes to such attacks, and that a malarial fever frequently lays the foundation for tubercular disease. Nothing, indeed, is more common than to witness the superposition of rapid pulmonary consumption in constitutions deteriorated by malarial diseases. "An attack of ague," says Sir JAMES CLARK, "is much more likely to favour the occurrence of consumption than to prevent it."—"On Climate." "Whenever any cause," says Dr. FORRY, "depresses the vital energy, and lowers the power of assimilation beyond a certain point, the tubercular diathesis will be produced. Moreover, the connexion of pulmonary phthisis with congestion and derangement of the abdominal viscera has been long since noticed; and as abdominal plethora is the predominant character of the prevailing diseases of tropical latitudes, we have a ready explanation of the high ratio of tubercular consumption in the West Indies. Hence malaria has a tendency to develop this disease, for it tends to destroy the balance of the functions and diminish the tone of the system, thus robbing the blood of that rich, fibrinous, and vital condition, by which proper nutrition and the organic functions are sustained. Malaria holds a prominent place among the causes productive of the cachectic condition of the system which precedes the formation of tubercle."—*Loc. cit.*, p. 266.

The opinion generally prevails that a mixture of sea and land air, such as exists on all our maritime situations, is unfavourable to delicate lungs, especially where there is phthisis, or a strong predisposition to it. Such was the opinion of the late Dr. S. G. MORTON, Sir JAMES CLARK, and perhaps a majority of writers on this disease. Such also is the result of our own observation. But it conflicts with the statements of Dr. FORRY, and other statistical writers, that pulmonary diseases are scarcely half as prevalent on the moist and variable coast of New England, as well as the Lakes, as in the dry and less changeable regions of the same latitude. We regard this question, however, as far from being settled. The laws and conditions regarding the causation of tubercular disease are probably far from being the same as those connected with inflammatory affections of the lungs. LAENNEC has remarked that few consumptive cases occur near the sea; the comparative ratio, however, may vary in different countries in the same latitude, and also at different latitudes. In Georgia and Florida the opinion prevails that the dry air of the interior, in conjunction with the aroma of pine forests, is more congenial to delicate lungs than the moist air on the coast. The ancients sent their consumptives to the pine-forests of Egypt. CLOT BEY, in his recent work, states that Egypt enjoys an exemption from lung diseases, especially from phthisis, and he therefore recommends it as a residence for persons predisposed to or labouring under this disease. Such pulmonary invalids as seek a milder winter climate may be safely recommended to the pine regions of the interior of South Carolina, Georgia, or Florida, where all the advantages of a change of climate may be found which are to be expected in such cases.

Mr. A. KEITH JOHNSTON ("The Physical Atlas of Natural Phenomena," ed. 1856) observes, as regards consumption, as follows: "It originates

in all latitudes—from the equator, where the mean temperature is 80°, with slight variations, to the higher portion of the temperate zone, where the mean temperature is 40°, with sudden and violent changes. The opinion long entertained that it is peculiar to cold and humid climates is founded in error. Far from this being the case, the tables of mortality of the army and navy of this and other countries, as well as those of the civil population, warrant the conclusion that consumption is more prevalent in tropical than in temperate countries. Consumption is rare in the Arctic regions, in Siberia, Iceland, the Faroe Islands, the Orkneys, Shetlands, and Hebrides. And, in confirmation of the opinion that it decreases with the decrease of temperature, FUCHS shows, from extensive data, that in Northern Europe it is most prevalent at the level of the sea, and that it decreases with increase of elevation to a certain point. At Marseilles, on the sea-board, the mortality from this cause is 25 per cent.; at Oldenburg, 80 feet above the sea, it is 30 per cent.; at Hamburg, 48 feet above the sea, it is 23 per cent.; while at Eschwege, 496 feet above the sea, it is only 12 per cent.; and at Brotterode, 1800 feet above the sea, it is 0.9 per cent.\*]

421. The second and third questions are partly answered by what I have now stated; for although a continued residence in these climates may not be injurious to many consumptive patients, yet it may give rise to diseases of a different nature, or may occasion complications of phthisis which otherwise might not have occurred; or it may prove too exhausting, or otherwise injurious to the patient: in many cases, if not in the majority, a change to a more temperate climate is therefore beneficial before the hot season commences; and if the change can be made to a climate both dry and temperate, it will generally prove of the greatest advantage. Patients who are subject to hæmoptysis, or other states of the more usual or the chronic forms of phthisis, will derive very great benefit from a voyage to Alexandria, and a journey thence to Cairo and Upper Egypt, and, having resided there or in Nubia some time, proceeding thence to Syria, they may return by Malaga, Granada, or other places in Andalusia, in April or May, to England; or, if it be preferred, a voyage may be made across the Atlantic early in September with great benefit; and having crossed the isthmus of Panama, the Pacific may be traversed; and having visited Lima, a residence in the mountains of Peru may be tried at the elevation and in the season found most beneficial for phthisical patients. After a satisfactory residence in this locality, the patient may return to Europe by the same route as that by which he went out, or by one more direct, taking care, however, to return to England about May or June.\* If this

\* There are many places in the south of Spain that may be chosen for winter residences by persons either threatened by or in the first stage of tubercular consumption, especially in Andalusia; and if the vicinity of Malaga, or of Granada, or of Seville be not selected, other places in the above extensive province may be tried. During the warmer months the more elevated situations on the southern side, or the southern ridges of the Sierra Morena, furnish many situations which cannot fail of possessing most of the advantages required by phthisical invalids.

Dr. MITCHELL (*Brit. and For. Medico-Chirurg. Rev.*, No. xxxiii., p. 226) states that "the climate of Algiers, during winter and spring, vies with that of Madeira, being as warm and steady in temperature, but drier and more bracing."

It has been a generally received opinion among medi-



plan be followed out for two, or three, or four seasons, at an early stage, with due precautions

and scientific men that very high elevations above the level of the sea are injurious to tubercular consumption, especially when it is either ushered in, or attended by, or even threatened with hæmoptysis. Dr. ARCHIBALD SMITH's very interesting account of the very remarkable benefit he saw, in numerous cases (see above, § 420), derived from residing at an elevation above the sea-level of 5000 to 10,000 feet, completely upsets this opinion. This very able and experienced physician has farther remarked upon this subject, in a communication he has kindly favoured me with since the earlier pages of this article were published; and he has stated, respecting a diminished or increased frequency of phthisis in the aborigines of a country by change to a colder or to a warmer climate, or to a higher or lower elevation, "that, as regards Lima and the coast of Peru generally, the change to the maritime climates of Chili and Ecuador—the first colder, the second warmer—has a decidedly bad effect on the Peruvian phthisical invalid; but the higher elevation on his own mountains of 5000 to 10,000 feet has a decidedly curative influence. In these regions the climate is moderately dry and temperate, favourable to exercise in the open air, and the patient is also removed from a luxurious and sensuous society, as well as from a warm, humid, and relaxing atmosphere. Very possibly the decided benefit received by the natives of Peru from the change from coast to mountain may not be equally shared in by strangers. I hope, however, that this may be a fair trial, and, as you recommend navigating by Panama to the Pacific, that you will find room to recommend, on fair trial, to Europeans, the migration to elevated spots on the Andes, from time immemorial known of paramount importance to the native races affected with pulmonary consumption." Dr. ARCHIBALD SMITH's very long and extensive experience of the diseases in this part of the New World renders his opinion of the greatest value on this subject. He farther remarks: "I observe at § 218 what you say with respect to the effect of migration on the Chinese; and I can say that, among the thousands of this race lately introduced into Lima, I never met with an instance of phthisis. It is likely, however, that this disease will show itself in their offspring born in Peru of Indian or dark women. When the Chinese crop their hair and take on the Peruvian dress, it is not easy to distinguish them from native Peruvian Indians." Is not this last remark in favour of the opinion that the Indian races are offshoots from the Mongolian, or Chinese?

Dr. RICHARDSON, in his account of his travels in Egypt and Nubia, published more than thirty years ago, has strongly recommended these countries, and especially the latter, as winter and spring residences for phthisical invalids. The more recent evidence of my eminent friend, the Rev. Dr. BARCLAY, fully confirms this recommendation. The very interesting account given by Dr. BARCLAY of the climate of *Middle and Upper Egypt, Malaga, &c.*, is so very important to our profession and to phthisical patients, coming as it does from one whose great talents and acquirements I have long known and admired, that I quote it at this place without abridgment, of which, indeed, it does not admit:

"The object of this communication is to draw attention to those characteristics of the Egyptian climate by which an opinion may be formed of its curative influence in cases for which a removal to a milder and warmer atmosphere is usually recommended. The result of my own observation and experience, during five months spent in that country, is a thorough conviction that there is no accessible part of the world so well adapted for the relief of most of that formidable class of diseases to which the respiratory organs are subject. In venturing to express this opinion, however, I am far from affirming that all Egypt, or any part of Egypt at all seasons, fulfils the conditions required in a climate suitable for such cases. On the contrary, it will be readily perceived that no part of the Delta is at any season adapted to patients who are subject to these affections, nor, it may be added, to those who are either dyspeptic or rheumatic; and from the beginning of May to the end of September the heat in every part of Egypt is too great for a European constitution weakened by disease. But in Middle and Upper Egypt, from the beginning of October to the end of April, the invalid may breathe, under a bright and cloudless sky, an atmosphere at once of a warm and equable temperature, of perfect purity, and free from all excess of humidity. The climate of other regions may be equally distinguished by one or more of these properties (though even that is doubtful), but assuredly there is no other habitable part of the globe in which they are all combined in so great perfection.

"The malady for which I sought relief in a southern

against injurious exposure, the disease will either be arrested for some years, or altogether over-

climate was chronic bronchitis in its most aggravated form. All the usual remedies, both external and internal, had been resorted to and steadily persevered in, under the ablest medical advice, but with little temporary and no permanent benefit. I had tried with the same unfavourable result those places on the south coast of England which are usually recommended to invalids. The symptoms obstinately resisted every medical measure. The chronic character of the disease was frequently exchanged for attacks of a sub-acute form. These always commenced with inflammation of the pharynx, creeping insidiously down the glottis and trachea to the bronchial tubes, which became gorged with mucus throughout their whole extent, and on every spot on which the stethoscope could be planted over the lungs the mucous rûle was to be heard. Dyspnoea, accompanied with loud wheezing, was at all times distressing; but its nocturnal exacerbations, which invariably occurred after a short sleep, like fits of spasmodic asthma, were often so fearfully violent as to threaten suffocation. The digestive organs were deranged, I had no appetite for food, my frame was emaciated, and my strength prostrated.

"I was so enfeebled as to be unable to encounter the voyage till the month of November, and thus I lost two months of the season suitable for the residence of an invalid in that country. Yet the benefit which, by the blessing of Providence, I reaped from that delicious climate was most signal, and far exceeded all that my most sanguine hopes had ventured to anticipate.

"On the passage outward I stopped five days at Malta, but found the heat so oppressive in the daytime, and the chills in the evening so severe, that I was glad to make my escape. The extreme humidity of the atmosphere in that island, notwithstanding its high temperature, must always render it, I apprehend, an unfit resort for a bronchitic patient; and the greatness of the diurnal range of the thermometer, at least in winter, makes it questionable how far it is an eligible residence for consumptive patients. It is believed that an inquiry into results will not tend to give a favourable idea of its sanative influence on that class of complaints. Of the climate of Alexandria also I have reason, as I shall show afterward, to speak unfavourably. In Cairo, however, a very different climate was found; and I had not been many days there when I began to experience its effects in allaying the irritability of the respiratory mucous membrane. The coldest season there is the latter part of December and the early part of January; and though the temperature even then is equal to that of our best summer weather, yet the evenings are somewhat chill. The following observations, made with the register thermometer and Dollond's hygrometer, show the temperature and the dryness of the atmosphere at Cairo during the coldest fortnight of the year:

Date.	Lowest temp. by night.	Highest temp. by day.	Diurnal range.	Degrees dry.	Degrees damp.	State of weather.
Dec. 25.	50	64	5	7	..	Bright sunshine.
" 26.	58	63	5	7	..	Do.
" 27.	58	62	4	5	..	Do.
" 28.	57	60	3	..	5	Rain and blowing.
" 29.	57	60	3	1	..	Showery.
" 30.	58	60	2	..	4	Wind and rain.
" 31.	59	64	5	5	..	Bright sunshine.
Jan. 1.	60	64	4	8	..	Do.
" 2.	57	62	5	4	..	Cloudy.
" 3.	58	63	5	0	0*	Do. and blowing.
" 4.	58	64	6	5	..	Bright sunshine.
" 5.	57	64	7	4	..	Cloudy.
" 6.	58	61	3	..	4	Drizzling.
" 7.	57	60	3	..	1	Cloudy and windy.

"From these observations it will appear that, warm and equable as the winter temperature is at Cairo, the weather at that season is not free from frequent and sudden changes. It is in Upper Egypt that the invalid must seek entire exemption from these, and there he will not be disappointed.

"While I was there my register was kept on the Nile, and consequently it shows a lower temperature, at least in the night time, than would be denoted at a little distance from the river, while the dryness indicated by the hygrometer in the latter case was many degrees greater than that registered on the river.

\* The zero of the hygrometer corresponds to summer drought in Britain.

come, in a great many cases—indeed in most, if it be not delayed to a too far advanced stage.

[The following table shows the mean temperature for each season, each month, and the whole

year, at St. Augustine, Fort Brooke (Florida), Nice, Rome, Naples, and Madeira, for the years 1825, 1828, 1830, rejecting decimals :

Place.	Lat.	Mean Ann'l Temp-erature.	Mean Temperature of the Seasons.				Mean Temperature for each Month.											
			Winter.	Spring.	Summer.	Autumn.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
St. Augus- tine . . .	29 48	72.24	62.85	70.55	82.05	73.56	62.15	64.97	66.53	68.68	76.44	81.12	82.36	82.68	79.56	73.61	67.47	61.38
Ft. Brooke.	27 57	73.19	65.02	71.71	81.04	74.59	63.75	66.56	66.48	71.27	77.39	80.90	81.43	80.79	79.01	75.04	69.71	64.76
Nice . . . .	43 41	59.48	47.82	55.23	72.26	61.65	45.85	49.00	51.45	57.00	63.00	69.00	73.50	74.30	63.35	61.55	53.70	48.60
Rome . . . .	41 54	60.79	48.90	57.65	72.16	63.96	47.65	47.45	52.05	56.40	64.50	69.17	73.30	74.02	69.50	63.60	58.80	49.62
Naples . . .	40 50	61.40	48.50	58.50	70.83	64.50	46.50	48.50	52.00	57.00	66.50	71.00	75.00	76.50	72.50	65.00	54.50	50.50
Madeira . .	32 37	64.57	59.50	62.20	69.33	67.23	59.50	58.50	61.06	62.50	63.00	65.00	70.00	73.00	71.50	67.50	62.70	60.50

The above table shows very conclusively the superiority of the climate of Florida during the

winter and spring months to that of the most celebrated places of resort abroad.]

"The following table contains the result of the observations noted between Thebes and Asouan, the uppermost town in Egypt, and from these an idea may be formed of the winter climate in that region :

Date.	Lowest temp- by night.	Highest temp- by day.	Diurnal range.	Degrees dry.	State of weather.
Jan. 17.	64	70	6	7	Cloudless sky and bright sunshine every day; the firmament blazing with stars every night; no evening chills.
" 18.	63	68	5	7	
" 19.	66	70	4	5	
" 20.	64	60	5	12	
" 21.	61	71	7	7	
" 22.	60	72	7	6	
" 23.	63	72	4	10	

"The benefit I derived from breathing the genial air of Thebeid was very decided. The periodical night attacks, though still occurring, were less violent and of shorter duration; my breathing was greatly relieved; and my strength was so far recruited that I was able, without fatigue, to make daily excursions, sometimes of many miles, to the monuments with which this part of the valley of the Nile is studded.

"At Thebes, which for several reasons should be made head-quarters in Upper Egypt, the day temperature, from the middle of January to the middle of February, ranges from 68° to 79°, and after the latter date the heat becomes rather too great to be borne with comfort. The invalid should then commence his downward voyage, and by the time he reaches the latitude of Cairo he will find the climate there nearly as delightful as that which he left at Thebes. My register during the first week of March at Cairo was as follows:

Date.	Lowest temp- by night.	Highest temp- by day.	Diurnal range.	Degrees dry.	Degrees damp.	State of weather.
Mar. 1.	66	72	6	9	..	Gentle breeze, sunny.
" 2.	67	74	5	4	..	Do. do. do.
" 3.	68	75	7	0	0	Fog.
" 4.	63	76	8	6	..	Calm and sunny.
" 5.	71	71	3	..	2	Haze.
" 6.	69	72	3	6	..	Cloudy and sunny.
" 7.	65	69	4	6	..	Drops of rain.

"In a city like Cairo, with a dense population of more than two hundred thousand people, and with narrow streets walled in by lofty houses, and constantly watered to lay the dust, the air can neither be so pure nor so dry as in the desert. Accordingly, the medical gentlemen of Cairo are in the habit of sending almost all their convalescent patients to reside for some time in the adjoining desert, to enjoy the benefit of its invigorating air. In it there is no water, either running or stagnant, to produce humidity by evaporation, nor is there any decaying matter, either vegetable or animal, to taint the air with noxious exhalations. It is in the desert, therefore, that the qualities of warmth, equability, dryness, and purity, which are characteristic of the Egyptian climate in general, are to be found in the most perfect union. The

soothing influence of the desert air on delicate organs of respiration, and its invigorating influence on a debilitated frame, can be appreciated by those only who, like myself, have experienced its marvelous effects. It is at once balmy and bracing; and the invalid, while breathing it, feels as if he were drinking in health at every pore. I quitted Cairo for the desert of Ghezeel on the 12th of March, and took up my abode in the neighbourhood of the Pyramids; and there a sudden change came over me, as if by magic. The second night I passed in the desert was marked by sound and uninterrupted sleep, and the absence of the periodical fit of dyspnoea, the first occasion on which I had enjoyed the one or had been exempted from the other for more than two years. My appetite soon became excessive; both the flesh and the strength I had lost during my illness were restored; every symptom of my complaint disappeared, and at the end of a month I returned to Cairo in perfect health. The following table contains the meteorological register kept by me while I lived in the desert:

Date.	Lowest temp- by night.	Highest temp- by day.	Diurnal range.	Degrees dry.	State of weather.
Mar. 13.	63	69	6	10	High wind.
" 14.	63	70	7	12	Bright sunshine.
" 15.	63	68	5	12	Do.
" 16.	63	63	5	13	Do.
" 17.	63	67	4	13	Do.
" 18.	63	70	7	12	Do.
" 19.	63	73	10	14	Do.
" 20.	67	72	5	17	Do.
" 21.	63	70	7	18	Do.
" 22.	63	71	8	18	Do.
" 23.	66	76	10	19	Do.
" 24.	71	76	5	16	Cloudy.
" 25.	67	71	4	10	Do.
" 26.	63	77	8	13	Bright sunshine.
" 27.	63	71	8	12	Do.
" 28.	64	73	9	11	Do.
" 29.	63	74	11	15	Do.
" 30.	63	71	8	12	Do.
" 31.	66	71	5	12	Cloudy.
April 1.	67	81	14	23	Khamseen.
" 2.	67	72	5	10	Cloudy and blowing.
" 3.	65	72	7	11	Bright sunshine.
" 4.	68	71	3	12	Do.
" 5.	65	71	6	16	Do.
" 6.	65	73	10	19	Do.
" 7.	64	70	6	3	Rain.
" 8.	65	71	6	10	Bright sunshine.

"The only other place in Egypt whose meteorology it seems necessary to notice is Alexandria. When it is borne in mind that this city is surrounded on three sides by the Mediterranean Sea, and that on the land side it is enveloped by the Lake Marcotis, a moist atmosphere may be expected, and accordingly the degree of humidity indicated in the following extract from my register is excessive. In this respect the state of the atmosphere in Alexandria, during the early part of May, will be found to contrast remarkably with that of Cairo and its vicinity during the latter part of April; while the greater equability of temperature in the former city, both from day to day and during the twenty-four hours, is no less observable:



422. THE DIET in phthisis has been already discussed in general terms, and chiefly with respect to my own experience (§ 299–301), but a few authorities and particulars may be farther adduced at this place.—*a*. HIPPOCRATES advised, for phthisis, *animal food* to be taken in small quantity, and often, when fever is absent; and the opinion has been followed by SALVADORI, MAY, RUSII, VOGEL, ROLLO, and KINGLAKE. Animal fats, marrow, and fat meats were recommended by LANGE and BERTIN. The circumstances in which these may be adopted have been stated above (§ 299–301).

[Many physicians of the present day make but little if any discrimination in prescribing the diet and regimen of phthisical patients. The directions are to eat beef-steak, mutton, fat ham, butter, cream, and drink porter, ale, brandy, using

all the exercise possible in the open air; forgetting that the diet of consumptives must, as in other diseases, be regulated by the stage of disease and the circumstances of each particular case; in the early stages enjoining usually a milder diet, especially in cases complicated, as it often is, with inflammation. If the patient is able to take active out-door exercise, the food may be of a more nourishing quality, and in larger quantity, than if confined to the house; but we have almost invariably found that if the patient was chiefly confined in-doors, a rich diet of animal food excited fever, and aggravated the cough and other symptoms. Carbonaceous matters, however, must be supplied in sufficient quantity to combine with the oxygen taken in, otherwise the waste and loss of weight will be rapid. Sir JAMES

Place and Date.	Lowest temp. by night.	Highest temp. by day.	Diurnal range.	Degrees dry.	Degrees damp.	State of weather.
Cairo.	°	°	°	°	°	
April 19.	63	70	2	6	..	A gentle breath of wind and bright sunshine by day. Always calm towards evening and during the night.
" 20.	67	70	3	5	..	
" 21.	66	72	6	5	..	
" 22.	67	72	5	4	..	
" 23.	69	74	5	9	..	
" 24.	70	77	7	9	..	
" 25.	75	79	4	5	..	
" 26.	72	75	3	4	..	
Alexandria.						
April 28	70	73	3	..	10	Sunshine and calm.
" 29.	70	73	3	..	13	Do.
" 30	71	73	2	..	12	Do.
May 1.	72	74	2	..	15	Do.
" 2.	72	74	2	..	14	Do.
" 3.	73	75	2	..	15	Do.
" 4.	72	74	2	..	14	Do.
" 5.	73	76	3	..	15	Do.

"Now far Alexandria, during the months of March and April, may be a more suitable residence than Madeira or Italy for those whose complaints require a climate at once warm, equable, and moist, I leave it to gentlemen of the medical profession to judge; but I do think myself fully warranted to denounce it as a most unsuitable place for a bronchitic patient. During all the time I was there I felt as if inhaling steam; my breathing was excessively affected, and my whole system was languid and relaxed. These effects, however, by the time I had been twenty-four hours at sea, were completely dispelled, leaving no doubt whatever as to their cause.

"I may add that dyspepsia is very prevalent among the European residents in Alexandria; and I was informed that cases of pulmonary consumption, though not common, do occasionally occur among the natives of the whole northern sea-board of Egypt; but the inhabitants of Middle and Upper Egypt, as far as I could learn, are entirely exempted from that fatal disease. The prevailing maladies throughout all Egypt are dysentery and ophthalmia, both induced, it is believed, by exposure of the heated frame to currents of cold air.

"These observations on the subject of Egyptian climate would be very incomplete if I failed to notice its influence in arresting hæmoptysis. Several instances of its efficacy in that respect were mentioned to me, and one very decided case fell under my own observation. A. B., a middle-aged gentleman, of a clear and florid complexion, had been for years afflicted with this complaint to an alarming extent. He had spent a winter in Italy without experiencing the smallest mitigation of his ailment. He had next been sent to Madeira, and there the malady was very greatly aggravated. He was at Malta when I went to Egypt; but finding no relief there, he came to Cairo in the end of December, and took up his abode at the hotel at which I lodged. The effect of the change of climate was immediate. The spitting of blood ceased at once, nor did it ever recur during his stay at Cairo, which was prolonged till the end of April. He then went to the south of Spain, and remained there till the month of June, when he returned to England, apparently in perfect health, and fully resolved to spend the whole of the following winter in Egypt with the view of confirming his cure.

"The transition from the climate of Egypt to that of

Britain is too violent to be hazarded by one whose respiratory organs are in a delicate or dubious condition, especially as the season at which it is necessary to quit the one country is far from being genial in the other. I therefore stopped in Spain on my homeward passage, and spent the latter part of May and the greater part of June in that country and in Portugal. Having heard that the air of Malaga was remarkable for its mildness, I repaired thither, and was both delighted and surprised to find in Europe a climate scarcely inferior in any respect to that of the latitude of Cairo. The register I kept while there, and from which I subjoin an extract, shows a temperature which was probably only a few degrees lower than that of Cairo at the same date, while its equability was greater than I had noted any where except at Alexandria; and, what is still more remarkable, the dryness of its atmosphere exceeds that of Cairo, and contrasts surprisingly with the humidity with which the air of Alexandria is loaded.

"The atmospheric conditions indicated by the following table are doubtless to be referred, partly to the geological structure and the physical conformation of the country around Malaga, and partly to the latitude in which it is situated. I am persuaded that, in a therapeutic point of view, the climate in this part of Andalusia is deserving of more attention than it seems hitherto to have received. Those who take it for granted that the climate of Italy must be the mildest and warmest in Europe seem to forget that Malaga is 248 miles farther south than Naples, 318 miles farther south than Rome, and 518 miles farther south than Venice; and those who have not adverted to the fact will probably be surprised to find that it is 5 miles farther south than Algiers. Both Gibraltar and Cadiz are somewhat south of Malaga, but both have a great diurnal range of temperature, and are nearly equal to Alexandria in the humidity of their atmosphere, the one standing on an almost insulated rock in the Mediterranean Sea, and the other on a narrow spur of land projecting into the Atlantic Ocean.

Date.	Lowest temp. by night.	Highest temp. by day.	Diurnal range.	Degrees dry.	State of weather.
May 20.	°	°	°	°	
" 21.	70	72	2	9	Bright sunshine.
" 22.	71	73	2	12	Do.
" 23.	71	73	2	12	Do.
" 24.	69	72	3	11	Rain.
" 25.	67	70	3	10	Do.
" 26.	66	69	3	10	Do.
" 27.	68	70	2	14	Bright sunshine.
" 28.	69	72	3	16	Do.
" 29.	69	73	4	15	Do.
" 30.	69	73	4	15	Do.
" 31.	69	72	3	16	Do.

"In the beginning of June I moved northward to Lisbon, but on its climate and that of delightful Cintra no information is needed. In the end of June, 1853, I returned to Scotland; and though I was threatened soon after I reached home with a recurrence of bronchitic symptoms, these now yielded readily to medical treatment. I am most thankful to be able to add that during the last twelvemonth I have enjoyed excellent health, nor have I been affected during that time by any of the changes of weather to which our variable climate is subject."—*The Climate of Egypt*, by the Rev. THOMAS BARCLAY, D.D. Svo. Edinburgh, 1854.

CLARK is of opinion that "the cases likely to be cured by the stimulating plan of treatment—by beef-steaks and porter—bear a very small proportion to those who are injured by it."—Art. "*Tubercular Phthisis*," *Cyclop. Pract. Med., Am. ed.*, p. 570. This statement will hardly hold good, perhaps, when applied to the disease among us, although we are satisfied that more discrimination should be used in regard to the diet prescribed, and that injury is often done from neglect of due caution on this subject.]

b. *A fish diet* is often of service, especially in the more chronic and hæmorrhagic states, or when the biliary organs are congested; but on all occasions the white kinds of fish should be selected, and always be boiled. Oysters were praised by TULPIUS and SIMS, but they ought to be taken immediately upon being opened, and a small number only at one time.

c. *Vegetable food* has been advised by many writers in preference to any other, while as many recommend a due proportion of animal and vegetable diet. Of the more unusual articles, at least in this climate, new figs, dates, the nuts yielding the palm oil, olives, &c., are the most likely to be of service. Grapes, both recent and dried, were praised by RIVIERIUS; pickled red-cabbage by LANGE; and cucumbers, with vinegar and sugar, by SCHMALZ, FRIZE, QUARIN, MARX; but these last should be thus dressed without having had their outer rinds removed. Of oranges, lemons, limes, &c., the utility is manifest.

423. *d. Milk* has always received great commendation in phthisis, but writers have differed respecting that which is most beneficial. Thus ZACUTUS LUSITANUS and BLEGNY prefer human milk; ARETEUS, BURSERIUS, and STOLL, asses' milk; DIEMERBROECK and VELSCHIUS, goats' milk; SCHENCK, either asses' or goats' milk; HIPPOCRATES, either mares' or asses' milk; and HEISTER, the whey of cows' milk. STOLL considered that asses' and human milk should be diluted, and that they are injurious in the inflammatory complications and in the last stage of the malady. Whatever may be the diet and regimen adopted, milk of various kinds, in suitable forms and states of dilution, constitutes an important part of the treatment of phthisis.

424. *e. The beverages* allowed the patient should depend on the form and stage of phthisis. In an early stage whey is one of the best that can be taken. At a far-advanced stage, or if diarrhœa be present, it is apt to run off by the bowels. Fermented whey, or serum of milk, or the whey of butter-milk, or recent butter-milk, may be given according to circumstances. In northern or Scandinavian countries, and also among the Tartars, the fermented serum of milk is very commonly employed, and it has been recommended by SIEVERS and others. Spruce-beer is one of the best beverages that can be used; weak tar-water is also sometimes beneficial. Seltzer-water, with milk, and lime-water or Carara-water, with milk, when the bowels are much relaxed, are also of service.

425. *f. In recommendation of exercise* in the open day, according to the strength and state of the patient, it is unnecessary to add any thing to what has already been stated. Of all kinds of exercise, walking and horse-exercise are the best. Although the latter was considered of little use by QUARIN, yet by SYDENHAM, HALLER, MARX, DARWIN, and others mentioned in the historical

sketch (§ 214, *et seq.*), it was strongly recommended. STOLL advised it in the non-inflammatory states, and when the abdominal viscera were torpid or congested. In the inflammatory complications, active exercise, either on horseback or otherwise, can rarely be taken.

426. In concluding the above imperfect view of the treatment of phthisis, it will be manifest that no one plan of cure, class of medicines, kind of diet, or regimen—no single method, whether medicinal or regimenal, or both, is appropriate to all cases, or even to the great majority of cases, of phthisis. The rational physician, after having endeavoured to ascertain the existing morbid conditions, will merely select and combine, from the stores above indicated, such means as he believes to be most energetic in arresting, counteracting, or removing these conditions, as far as circumstances may warrant the attempt or may promise success.

BIBLIOG. AND REFER.—*Hippocrates*, Opera omnia, ed. Fesius, Geneva, fol. 1657; *Prædict*, 91; *Aph. v.*, 11, 14; *vii.*, 15, 16, *et pluries*.—*Aristotle*, *Probl.* *iii.*, 8.—*Plautus*, *Merc.*, i. 1, 3.—*Ovid*, de *Pont.* i. 3.—*Dioscorides*, v. 124.—*Areteus*, de *Morb. Acut.*, ii. 2; *Morb. Chron.*, i. 10, 12; de *Cura Chron.*, i. 1, 8.—*Celsus*, i. *iii.*, c. 9; *iv.*, 4, 5.—*Pliny*, lib. xxiv. 6; xxvi. 11; xxviii. 17.—*Galen*, Opera omnia. Bâle, 5 vols. fol. 1538; i. 249; *iii.*, 290–295, 321, *et pluries*.—*Cælius Aurelianus*, de *Morbis Libri Octo*. Amst., 4to, 1722, p. 378, 420.—*Oribasius*, *Synopsis ix.*, 3, 4.—*Aëtius*, *Terr. ii.*, i. 92; *iv.*, 67.—*Alexander Trallian*, *xii.*, 4.—*Pavulus Epigena*, *iii.*, 32, 33.—*Avicenna*, *lib. iv.*, fasc. i., tr. 3, c. 1.—*Paracelsus*, Opera omnia. Geneva, 3 vols., fol. 1658; i. p. 499.—*Fuschius*, de *Hist. Stirpium*, fol. Bâle, 1542, p. 892.—*Fernelius*, *Pathologia*, v. 10, *Consil.*, Nos. 19, 21.—*Lonovicius*, *Observat. Medicinalis*, 8vo. 1560, p. 120, 197.—*Prosperus Alpinius*, de *Medicina Egyptiorum*, i. 13, 14.—*Forestus*, Opera omnia. Rouen, 1653.—*L. et I. G. Schenkius*, *Observat. Medic.*, fol. Frankf., 1609, p. 259, 828.—*Balloonius*, Opera omnia, 4 tomes. Ven., 4to; *Cons.*, *iii.*, 69, 115.—*P. Poterius*, Opera omnia, 4to. Frankf., 1698; *Obs.*, i. i. 3, 21, 23, 40; *ii.* et *iii.*, *pluries*.—*D. Sennertus*, *Præctica Medicina*. Wittenb., 2 vols., 8vo, 1629.—*Bontius*, de *Med. Indor.*, 4to, 1630.—*Tulpius*, *Observ.* *Morb.*, 8vo. Amst., 1672; i. 7–14; *iv.*, 21.—*G. Fabricius Hildanus*, Opera *Observ.* et *Curat.*, fol. Frankf., 1646; *Obs.*, *ii.*, 29, 44; *iii.*, 38.—*C. Bennet*, *Tabidorum Theatrum*, item *Tabid. Vestibulum*, 8vo. Leyd., 1742; *Th.*, p. 87, 93; *Vest. Ex.*, 12, 14, 15, 20, *et pluries*.—*B. Silvaticus*, *Consilia*, fol. Padua, 1656; *ii.*, 40.—*L. Riverius*, *Præcos*, *vii.*, 7; *Observ.*, i. 35, 99.—*F. Sylvius de la Boe*, *Præcos Medicine Idæa nova*, 5 vols., 12mo. Leyd., 1674; *vol. iii.*, i. *iv.*, Nos. 26, 42, 51, 52, 70, 130, 160.—*G. Harvey*, *Morbis Anglicis, or the Anatomy of Consumption*, 8vo. Lond., 1672.—*T. Willis*, *Pharmaceuticæ rationalis*, &c. Oxf., 1675, *vol. ii.*, ch. 7, &c.—*Haworth* on *Consumption*, 8vo. Lond., 1682.—*T. Sydenham*, Opera *Universa*, 8vo. Leyden, 1726, p. 285, 415, 629.—*Bellini*, de *Urinis et Pulvis*, de *Missione Sanguinis*, de *Febribus*, et *Morbis Capitis et Pectoris*, 4to. Leyd., 1730.—*Morton*, *Phthisiologia*, 8vo. Lond., 1691, *pluries*.—*Leigh*, *Phthisiologia Lancastriensis*, 8vo. Lond., 1694.—*G. Baglivi*, *Praxis Medica*, 8vo. Rome, 1696.—*Stahl*, *Theoria Medica vera*, 4to. Halle, 1708, p. 1014.—*F. Hoffmann*, Opera *Physico-Medica*, 5 vols., fol. Geneva, 1740, *vol. ii.*, 175; *iii.*, 284; *iv.*, 112, 147.—*Martin* on *Consumption*, London, 1722.—*R. Blackmore* on *Consumption*, 8vo. Lond., 1724.—*E. Darry* on *Consumption of the Lungs*, 8vo. Dubl., 1726.—*J. Allen*, *Synopsis Medicinæ Practicæ*, ch. *iv.*, art. 29.—*T. Dover*, *Ancient Physician's Legacy to his Country*, 4th ed., 8vo. Lond., 1733.—*P. Desault*, *les Mal. Ventr. la Rage, et la Phthisie*, 12mo. Bord., 1733, p. 331–390.—*I. Funcker*, *Consp. Medicinæ Theoretico-Practicæ*, 4to. Halle, 1734, 34, 69, 70.—*Wagner*, de *Hæmoptoes habitualis Curatione* in *Haller*, *Disput. pr. ii.*, n. 55.—*J. Huxham*, *Observat. de Acre et Morb. Epid.*, Plymouth, 2 vols., 8vo. Lond., 1752, v. *ii.*, 3.—*R. Russell*, de *Tabe Glandulari*, sive de *Usu Aquæ Marinae* in *Morb. Glandularibus*, 8vo. Oxf., 1750, *pluries*. (*Sea-water internally*).—*R. Mead*, *Monita et Præcepta Medica*, 8vo. London, 1751, i., 10.—*B. Robinson*, *Observ. on the Virtues and Operations of Medicines*, 8vo. Dubl., 1752, p. 62, 146.—*C. Packe* on *Boerhaave's Aphorisms treating of Phthisis Pulm.*, 8vo. London, 1754.—*Gervasius*, de *Usu Aquæ Frigidæ* in *Hæmoptysi*, 4to. Rom., 1756.—*E. Glæchrist* on *Sea Voyages in Medicine*, 2d ed., 8vo. Lond., 1757, p. 17, 47, *et pluries*.—*Whytt*



- on Blisters for Coughs with Infarction and Fever, Ph. Tr., p. 569.—*T. Marryat*, Therapeutics, Bristol, 1788.—*E. L. Tralles*, Usus Opil Salubris et Noxius, 4to. Breslau, sec. iv., p. 1.—*Stephens* on Consumption, 1761.—*A. De Haen*, Ratio Medendi in Nosocomio Practico, 8vo. Leyd., 1761, i., 108; ii., 81, 165, 168.—*J. B. Morgagni*, de Sed. et Caus. Morb., 2 vols., fol. Venice, 1761, Ep. xix., 53; xxii., 6, 13, 20, 21, 25, 26, 28, &c.—*Avenbrugger*, de Percussione Thoracis, 8vo. Vienn., 1763.—*J. Pringle*, Observ. on the Dis. of the Army, and 4to ed., 8vo. Lond., 1764, p. 163.—*D. Monro* on the Dis. of the British Military Hospitals, 8vo. Lond., 1764, p. 124.—*J. Lieutaud*, Synopsis I. niverse Praxeos Medice, 2 vols., 4to. Amst., 1765, p. 181, 283, & 11st. Anatomico-Medica, 2 vols., 4to. Paris, 1767, *pluries*.—*Heberden*, Med. Trans. of Coll. of Phys., vol. ii. Lond., 1772, p. 8.—*F. B. De Sauvages*, Nosol. Methodica, &c., 2 vols., 4to. Amst., 1768, i., 316; ii., 446.—*Stoerck*, Libellus de Cicut. 3d ed., 8vo. Vienn., 1776, p. 217.—*Dickson*, Med. Obs. and Inq., iv., p. 206.—*G. L. B. Van Swieten*, Comment. in 11. Boerhaavi Aphorismos, 5 vols. Leyd., 1741-72, ss. 60, 80, et vol. iv., *pluries*.—*D. Macbride*, Method. Introduct. to the Theory and Practico of Physic, 4to. Lond., 1772, p. 393, 404.—*J. Sims*, Observat. on Epidemic Disorders, 8vo. Lond., 1773, p. 117.—*Percival*, Essays, 4th ed., 8vo. Warrington, 1789, p. 308.—*Schoenheyder*, Collect. Soc. Med. Haun., i., p. 126.—*Farr* on Blood-letting in Consumption, 8vo. Lond., 1775. (*Against it.*)—*Fothergill*, in Med. Observ. and Inq., vol. v., p. 345.—*M. Griffith* on the Cure of Hectic and the Pulmonary Consumption, 8vo. Lond., 1776.—*W. Cullen*, First Lines of the Practice of Physic, 4 vols., 8vo. Edin., 1771-1789, ii., p. 255.—*M. Stoll*, Ratio Medendi in Nosocomio Practico, 8vo. Vienn., i., 1777, p. 201; ii., 1778, p. 4, 98, 354; iii., 1780, p. 78.—*J. Mudge*, Radical Cure for a recent Catarrhus Cough, 2d ed., 8vo. Lond., 1779, p. 44-78.—*S. F. Simons*, Pract. Observ. on the Treatment of Consumption, 8vo. Lond., 1780.—*Duppe*, Trattato delle Malattie de Petto, Cosciento sotto il nome de Tise Pulmonaire, 8vo. Nap., 1780.—*Molz*, Von der Lungenschwindsucht, Hann., 1784.—*N. Godbold*, a Letter on Consumptions and their Cure, 8vo. Lond., 1785.—*R. Charles*, Essay on the Treatment of Consumption, 8vo. Lond., 178.—*A. Duncan*, Medical Cases, 8vo ed. 1784, p. 86, 367.—*Deslongueois*, de la Pulmonie, 12mo. Paris, 1781.—*T. Reid*, Essay on the Nature and Cure of Phthisis Pulmonalis, 2d ed., 8vo. London, 1785.—*Evers*, de Contagio Phthisis, Gött., 1782.—*Burserius*, Institut. Medicinæ Practicæ, 4 vols., 8vo. Ven., 1782-5. Transl. by Brown, in 5 vols., 8vo. Edin., 1800-3, vol. v., 55, 53, 73, 83-91.—*Pouteau*, Œuvres Posthumes, 3 vols., 8vo. Paris, 1783, i., 277, 313-332. (*Advises Mozas, les Actual Causeries*, &c.)—*Trnka de Krzowitz*, 11st. Febris Hectice, &c., 8vo. Vienn., 1783, ss. 7-8, 52-77.—*Keir*, in Medical Commun., i., p. 157. (*Ulceration of the Trachea, opening into the Esophagus in Phthisis*).—*Stark*, Posth. Observat. on Consumption, by C. Smyth, p. 359.—*Rautilin*, Traité de la Phthisis Pulmonaire, 8vo. Paris, 1784.—*W. Withering's* Account of the Foxglove, 8vo. Birm., 1785, p. 83, 96, 159.—*G. Baker*, in Med. Transact. of Coll. of Phys., iii., p. 287.—*G. Blane*, Observ. on Dis. of Seamen, 8vo. Lond., 1785, p. 39-91.—*Vogel*, Handb. der Pract. Arzneiwissenschaft, i., p. 141.—*J. Quarin*, Animad. Pract. in diversos Morbos, 8vo. Vienn., 1786, p. 47, 78-103.—*J. C. Smyth*, of the Effects of Swinging in Pul. Consump. and Hectic Fever, 8vo. Lond., 1787.—*B. Mosely*, Treat. on Tropical Diseases, 4to ed., 1804, p. 74.—*W. May*, in London Med. Journ., ix., 1783, p. 268; and in vol. xi., p. 255; and Essay on Pulmonary Consumption, with Histories of Recovery, 8vo. Plym., 1792.—*Grieve*, in Duncanson's Ed. Med. Comment., xiv., p. 126.—*Crichton*, in London Medical Journal, vol. x., p. 229.—*W. Hunter*, Observat. on the Nature and Method of Cure of the Phthisis Pulmonalis, 8vo. York, 1792.—*B. Rush*, Med. Inquiries and Observ., 8vo. Philad., 1789, p. 188; and vol. ii., 1793, p. 86.—*T. Beddoes*, Observ. on Calculus, Sea-scurvy, Consumption, Catarrh, and Fever, 8vo. Lond., 1793, p. 118, 157, 270; also Letter to *E. Darwin* on a New Method of treating Pulmonary Consumption, 8vo. Brist., 1793; also Essay on the Causes, Early Signs, and Prevention of Pulmon. Consumption, &c., 2d ed., 8vo. Lond., 1799.—*A. Carrick*, Dissertation on the Bristol Water, with Pract. Obs. on the Prevention and Treatment of Consumption, 8vo. Lond., 1797.—*Senter*, in Trans. of Coll. of Phys. Philad., 8vo. Philad., i., p. 232.—*Baume*, Traité de la Phthisis, Par., 1805.—*J. Frank*, Ratio Instituti Clinici Ticinensis, 8vo. Vienn., 1797, p. 290.—*Johnstone*, in Mem. of Med. Soc. of Lond., vol. v., p. 89. (*Grinder's Rot.*)—*Sulton*, Consid. regarding Pulm. Consump., 8vo. Lond., 1799.—*J. N. Thomann*, Annales Instituti Medico-Clinici, 8vo. Wurtz., i., 1799, 162, 214. (*On Tracheal Consumption*).—*C. Pears*, Cases of Phthisis Pulmonalis treated by Tonics, 8vo. Lond., 1801.—*Mossman* on Scrofula and Consump., 1800.—*J. J. Buseh*, Recherches sur la Phthisis Pulmonaire, 8vo. Strash., 1800.—*R. Willan*, Reports on the Dis. of London, 12mo. Lond., 1801, 14, 147, 261.—*W. Heberden*, on the Increase and Decrease of different Diseases, 4to. Lond., 1802, p. 44.—*G. Heberden*, Comment. de Morb. 11st. et Cur., 8vo. London, 1802.—*R. Thomas*, Modern Practice of Physic, 2 vols., 8vo. Lond., 1802.—*T. Beddoes*, Hygeia, or Essays Moral and Medical, 3 vols., 8vo. Brist., 1802.—*Briende*, Traité de la Phthisis, 2 vols., 8vo. Paris, 1803.—*T. Trotter*, Medicina Nautica, 3 vols., 8vo. London, 1804, iii., 325-369.—*A. P. Wilson*, Treat. on Febrile Diseases, 4 vols., 8vo. London, 1804, iv., p. 460.—*E. Pearl*, on Consump. of the Lungs, with a New Mode of Treatment, 8vo. Lond., 1805.—*W. Lambe*, Inquiry into the Origin, &c., of Constitutional Diseases, especially Scrofula, Consumption, &c., 8vo. Lond., 1805.—*J. J. Buseh*, Untersuchungen ueber die Natur der Lungenschwindsucht, 8vo. Duisb., 1805, & ueber die nervose Lungenschucht, 8vo. Strash., 1807.—*F. G. Parrot*, Physikalische Theorie der Schwindsucht, 8vo. Dorpat, 1807.—*A. Weinholdt*, Abhandlung ueber die Ansteckung der Schwindsucht, 8vo. Brem., 1807.—*M. Briende*, Traité de la Phthisis Pulmonaire, 2 tomes, 8vo. Paris, 1808.—*J. B. Demaille*, Sur la Nature et le Traitement de la Phthisis Pulmonaire, 8vo. Paris, 1804.—*Giraudy*, Manuel de Phthisiques, Paris, 1804.—*R. Bourne*, Cases of Pulmonary Consumption treated with Uva Ursi, 8vo. Oxford, 1805.—*Salmaud*, sur la Contagion de la Phthisis, Paris, 1805.—*J. Reid*, Treat. on the Origin, Progress, Prevention, and Treatment of Consumption, 12mo. London, 1806.—*Wichelhausen*, Ueber die Lungenschucht, Mannheim, 1806.—*W. Hamilton*, Observ. on the Preparation, Utility, and Administration of Digitalis, 8vo. Lond., 1807, p. 61, 70-103.—*J. Sanders*, Treat. on Pulm. Consumpt. and on the Medical Properties of Digitalis, 8vo. Edin., 1808, p. 126.—*W. Woolcombe*, on the Frequency and Fatality of different Diseases, and on the Increase of Consumpt., &c., 8vo. Lond., 1808.—*B. Gaspar*, Recherches Pathologiques sur les Phthisis, 8vo. Chalons, 1809.—*C. Badham*, Observ. on Inflammatory Affections of the Muc. Mem. of the Bronchia, 12mo. Lond., 1808.—*R. Watt*, Cases of Diabetes, Consumption, &c., &c., 8vo. Paisley, 1808.—*J. Russell*, Treatise on Scrofula, 8vo. ed., 1803, p. 39-116.—*A. Portal*, Mem. sur la Nature et le Traitement de Plusieurs Maladies, 3 vols., 8vo. Paris, i., 248; ii., p. 70, et sur la Nat. et Traitement de la Phthisis Pulmonaire, 2 vols., 8vo. Paris, 1809.—*E. Parr*, London Med. Dictionary, 2 vols., 4to. Lond., 1809, ii., 326.—*J. Dutton*, Essay on the Use of a regulated Temperature in Winter Cough and Consumption, 12mo. Lond., 1810.—*W. Shearman*, on Amenorrhœa as a cause of Consumption, in Edin. Med. and Surg. Journ., vi., p. 75.—*G. L. Bayle*, Recherches sur la Phthisis Pulmonaire, 8vo. Paris, 1810.—*J. B. Cayol*, Recherches sur la Phthisis Tracheale, 4to. Paris, 1810.—*Wells*, in Trans. of Soc. for Improvement of Medical and Chirurg. Knowledge, iii., p. 471.—*Roberts*, Med. Trans. of Coll. of Phys., v., iv., p. 119.—*A. Dumcan*, Observ. on the Symptoms of three different Species of Pulmonary Consumption, 8vo. Edin., 1813.—*T. Turton*, Observ. on Consumption, &c., 8vo. Lond., 1812.—*G. Rees*, Practical Treatise on Hæmoptysis, 8vo. Lond., 1813.—*C. Pears*, Observations on the Nature and Treatment of Consumption, 8vo. Lond., 1814.—*H. H. Southey*, Observations on Pulmonary Consumption, 8vo. Lond., 1814.—*T. Young*, a Pract. and Historical Treat. on Consumptive Diseases, &c., 8vo. Lond., 1815.—*J. A. Gallup*, Sketches of Epidemic Diseases in Vermont, with Remarks on Pulmonary Consumption, 8vo. Bost., 1815.—*W. Lambe*, Addit. Reports of the Effects of a peculiar Regimen in Constitutional Diseases, &c., 8vo. London, 1815.—*H. H. Tullidge*, Inquiry into the Nature of Pulm. Consumption, 8vo. Lond., 1817.—*Lanthois*, Théorie Nouvelle de la Phthisis Pulmonaire, 8vo. Paris, 1818.—*J. G. Mansford*, an Inquiry into the Influence of Situation on Pulmonary Consumption, 8vo. Lond., 1818.—*P. Magendie*, Recherches sur l'Emploi de l'Acide Prussique dans le Traitement des Maladies de Poitrine, &c., 8vo. Paris, 1819.—*J. A. Walther*, Ueber das Wesen der Phthisischen Constitution und der Phthisis, 2 Ede., 8vo. Leipz., 1819-23.—*D. A. G. Richter*, die Specielle Therapie, &c., B. iv., p. 588, et seq.—*Cheyne*, in Dublin Hosp. Reports, vol. v. (*Small bleedings early in Phthisis*).—*Howack*, in American Med. and Philosoph. Register, vol. ii., p. 470. (*Small bleedings*).—*Baron*, Notes on the Use of Iodine, Midland Med. and Surg. Reporter, vol. i., p. 241.—*Abercromby* on the Pathology of Consumptive Diseases, in Edin. Medical and Surg. Journ., vols. xvii. and xviii.—*Andral*, Archives Génér. de Médecine, t. ii., p. 205. (*Cases of rapid Phthisis*).—*Rogues*, in Nouv. Journ. de Méd., t. iv., p. 161. (*The Use of Tobacco as a Cause of Phthisis*).—*Andral*, in Revue Médicale, t. ii., 1825, p. 49.—*Several Authors*, Review of, in Medico-Chirurg. Rev., No. 23, p. 97-241.—*W. Stokes*, in Trans. of Irish College of Physicians, vol. v., p. 303.—*Storer*, in Trans. of Med. and Chirurg. Society of Edin., vol. iii., p. 613.—*P. W. Philip*, Trans. of Med. and Chirurg. Society, vol. vii., p.

- 494.—*A. B. Granville*, a Historical and Pract. Treatise on Hydrocyanic Acid in Consump., 2d ed., Svo. Lond., 1820.—*Maggiarini*, in Dict. des Sciences Médicales, t. xlii. Paris, 1820, art. *Phthisie Pulmonaire*.—*K. A. Koek*, Darstellung des Verlaufs der Ursachen, &c., der Schwind-sucht, Svo. Leipz., 1822.—*A. Crichton*, Pract. Obs. on the Treatment and Cure of the Varieties of Pulmon. Consumption, and on the Effects of Tar Vapour in that Disease, Svo. Lond., 1823.—*G. F. Weber*, Grundzüge der Consumtions-Krankheiten des Lungen-Organ, Svo. Glessen, 1823.—*J. F. Engelhard*, die Lungensucht in ihren verschiedenen Formen und Zeiträumen, Svo. Auran, 1823.—*Andral*, Dict. de Méd., t. xvi., art. *Phthisie*.—*P. C. A. Louis*, Recherches Anatomico-Pathologiques sur la Phthisie; translated from the 2d edition, by *W. H. Walshe*, for the Sydenham Society, Svo. Lond., 1844.—*A. Hammersley*, Dissert. on the Remote and Proximate Causes of Phthisis Pulmonalis, 2d edition, 12mo. New York, 1827.—*J. Clark*, the Influence of Climate in the Prevention and Cure of Chronic Diseases, more particularly of the Chest and Digestive Organs, &c., 2d ed., Svo. Lond., 1830.—*J. Murray*, Treatise on Pulmonary Consumption, Svo. Lond., 1830.—*E. Blackmore*, a Practical Treatise on Pulmonary Consump., Svo. Lond., 1832.—*Carswell*, in Cyclop. of Pract. Med., vol. iv., p. 255; and Illustrations of the Elementary Forms of Disease, Fasc. *Tubercle*.—*J. Clark*, Cyclop. of Practical Medicine, vol. iv., p. 272; and a Treatise on Pulmonary Consumption, &c., Svo. Lond., 1835.—*Pagenstecher*, Jour. des Progrès des Scien. Méd., t. viii., p. 270.—*R. T. H. Laennec*, a Treatise on the Diseases of the Chest, and on Mediate Auscultation, translated, with Notes, &c., by *J. Forbes*, 3d ed., Svo. Lond., 1829.—*Crucvelhier*, Archives Génér. de Méd., t. xviii., p. 293.—*M. E. A. Naumann*, Handbuch der Medicinischen Klinik, Svo. Berl. 1829, B. i., p. 660, *et seq.*—*W. Stokes*, a Treatise on the Diagnosis and Treatment of Diseases of the Chest, part i.: Diseases of the Lung and Windpipe, Svo. Dubl., 1838.—*T. Davies*, Lectures on the Diseases of the Lungs and Heart, Svo. Lond., 1835, p. 251, *et seq.*—*T. Watson*, Lectures on the Principles and Practice of Physic, &c., 2 vols., Svo. Lond., 3d ed., 1843, vol. ii., 177, *et seq.*—*J. D. Morton*, Illustrations of Pulmonary Consumption, Svo. Philad., 1824.—*Bardsley*, Hospital Facts and Observations, p. 123.—*C. J. B. Williams*, the Pathology and Diagnosis of Diseases of the Chest, &c., 3d ed., Svo. Lond., 1835.—*Reynaud*, Journal Hebdomadaire de Méd., t. vii., p. 61.—*Lombard*, Archives Génér. de Médecine, t. xxv., p. 69.—*Sasche*, in Amer. Journ. of Med. Sciences, t. vi., p. 161.—*H. Rose*, Lancet, Dec. 30, 1837, p. 479.—*D'Espine*, in Med. Chirurg. Review, vol. xviii., p. 270.—*Brichteau*, in Ibid., vol. xxviii., p. 264.—*Costallat*, in Ibid., vol. xxviii., p. 267.—*Home*, in Edin. Med. and Surg. Journ., Jan., 1838, p. 1.—*Fournet*, in British and Foreign Med. Review, vol. vi., p. 534.—*Archibald Smith*, on the Diseases of Peru, &c., in Edin. Med. and Surg. Journ., vol. liv., p. 6.—*C. E. Hasse*, an Anatomical Description of the Diseases of the Organs of Circulation and Respiration, transl. by *W. E. Sweeney*, Svo. Lond., 1846.—*P. Blakiston*, Practical Observations on Certain Diseases of the Chest, and on the Principles of Auscultation, Svo. Lond., 1848, p. 288, *et seq.* (Many interesting Cases, and much valuable Matter).—*S. Flood*, an Exposition of the Pathol. and Treat. of Tubercular Phthisis, 12mo. Lond., 1842.—*W. H. Madden*, Thoughts on Pulmonary Consumption, with an Appendix on the Climate of Torquay, Svo. Lond., 1849.—*H. Green*, a Treatise on Diseases of the Air Passages, comprising an Inquiry into the History, Pathology, Causes, and Treatment of Affections of the Throat, Larynx, &c., Svo. New York, 1846, p. 120, *et pluribus*.—*W. T. Gairdner*, on the Pathol. and Treatm. of Phthisis, in Edin. Med. and Surg. Journ., vol. lxxxi., p. 396.—*P. L. Gellerstedt*, Bidrag till den Tuberkulösa Lungstens Nosographi och Pathologi, Svo. Stockholm, 1844; reviewed in Brit. and For. Medical Review, vol. xxiii., p. 429.—*J. H. Bennett*, a Treat. on the Oleum lecoris Aselli, or Cod-liver Oil, as a Therapeutic Agent in certain Forms of Gout, Rheumatism, and Scrofula, with Cases, Svo. Edin., 1841.—On the Spontaneous Cure of Pulmonary Consumption, and the Indications for its Rational Treatment, in Edin. Med. and Surg. Journal, 1845.—Also on the Pathology and Treatment of Pulmonary Tuberculosis, and on the Local Medication of Pharyngeal and Laryngeal Diseases frequently mistaken for or associated with Phthisis, Svo. Edin., 1853; also various papers on Tubercular Consumption in London and Edin. Monthly Journal of Med. Science in 1842, 1849, 1850, and 1852.—*The Physicians*, the First Report of the Hospital for Consumption and Diseases of the Chest, &c., Svo. Lond., 1849.—*J. Turnbull*, an Inquiry how far Consumption is Curable, with Observ. on the Treatment and the Use of Cod-liver Oil, &c., 2d ed., Svo. Lond., 1850.—*W. M. Burslem*, Pulmonary Consumption and its Treatment, Svo. Lond., 1852.—*T. Barclay*, the Climate of Egypt, &c., in Edin. Med. and Surg. Journ., October, 1854. (*I consider the account of the Climate of Egypt, Malaga, &c., by my very eminent and able friend, so valuable to the Medical Profession and Consumptive Patients, as to induce me to give it above [p. 1282-1284] almost entire.*)—*H. Ancell*, a Treatise on Tuberculosis, the Constitutional Origin of Consumption and Scrofula, Svo. Lond., 1852.—*R. P. Cotton*, the Nature, Symptoms, and Treatment of Consumption, &c., Svo. Lond., 1852.—*J. Skoda*, a Treatise on Auscultation and Percussion, translated by *W. O. Markam*, Svo. Lond., 1853.—*J. Spurgin*, the Physician for all, his Philosophy, his Experience, and his Mission, Svo. Lond., 1855, p. 221.—*T. Thompson*, Clinical Lectures on Pulmonary Consumption, Svo. Lond., 1855.—*A. Clark*, Microscopic Appearances of Expectoration in Phthisis, in Transact. of the Pathological Society of London, vol. vi., p. 74, 1855.—*H. M'Cormac*, on the Nature, Treatment, and Prevention of Pulmonary Consumption, and incidentally of Scrofula, with a Demonstration of the Cause of the Disease, Svo. Lond., 1855. (See also *Bibliog. and Refer.* to art. on SCROFULA AND TUBERCLES.)
- [AM. BIBLIOG. AND REFER.—*Samuel G. Morton*, Illustrations of Pulm. Consumption, its Anatomical Characters, Causes, Symptoms, and Treatment, to which are added some Remarks on the Climate of the United States, the West Indies, &c., with 13 col'd plates, Svo. Philad., 1837 (one of the best works on this subject).—*Benjamin Rush*, Medical Inquiries and Observations, 4 vols. in 2, 5th ed. Phil., 1819. Dr. Rush recommends particularly long journeys on horseback for the cure of this disease; also, in particular cases, stimulants and tonics, as *copaiba, bals. Peru, oil amber, turpentine, tar, garlic, eliz. vitriol, dandelion, houndswort, wild cherry bark, cinchona bark, cold bath*, &c.; also a cordial and stimulating diet, dry air in elevated situations, *remote from the sea in all cases*; appropriate clothing, blisters, and issues in the inflammatory stage, moderate use of the lungs, salivation, and in some cases bleeding. For cough, *demulcent teas, strips and lozenges, opiates, tar vapour*, &c.; for night sweats, *eliz. vit. and lime-water*; for diarrhœa, *chalk julap*, with *tinct. opii* and *tinct. cinnamon*, and astringent injections. The above are called palliatives. The radical remedy is long-continued horseback exercise.—*Wm. Sweetser*, a Treatise on Consumption, embracing an Inquiry into the Influence exerted upon it by Journeys, Voyages, and Change of Climate, with Directions for the Consumptive visiting the South of Europe, and Remarks upon its Climate, Svo. Bost., 1836, p. 24. This work, adapted for general reading, is written in a pure classical style, and is one of the most instructive on this subject in our language. The remarks on the best modes of prevention and the climate of different places in Southern Europe, the result of the author's personal observations, are worthy of the particular attention of the American reader.—*John Bell* and *W. Stokes*, Lectures on the Theory and Practice of Physic, 2 vols., Svo. Phil., 1848, 4th edition. Dr. Bell has embodied a vast amount of facts and personal observations in regard to this disease in seven lectures devoted to it, which may be found in the 2d vol. The treatment recommended is judicious, and in accordance with the present prevailing doctrines on this subject.—*Parish*, North Am. Med. and Surg. Journ., vol. viii. Dr. P., following in the footsteps of Dr. Rush, recommends the tubercular invalid "to rough it" on horseback, on long journeys and in all kinds of weather, as the principal mode of cure.—*Samuel Forry*, The Climate of the United States and its Endemic Influences, Svo. New York, 1842.—*Horace Green*, a Treat. on Diseases of the Air Passages, Svo. N. Y., 1846; also Report on the Use and Effect of Applications of Nitrate of Silver to the Throat, either in local or general disease, Trans. of Am. Med. Assoc., 1856; also Am. Med. Month. for Jan., 1855, and March, 1856, and Trans. of N. Y. State Med. Soc., 1855, &c.—*Lenuel Shattuck*, Report of the Sanitary Commission of Massachusetts, 1850, Svo. Mr. S. has embodied in his report some very interesting facts in regard to the prevalence of consumption in Massachusetts. He shows from the statistical reports that the seasons do not exert much influence upon the disease, especially its terminating period. In four years, from 1845-8, there were 3443 males and 5384 females died of this disease in Massachusetts, of whom 533 females were under 15, and 464 males; over 60,916 females, 753 males; from 20 to 30 the number of females who perish from it is nearly double that of the males. In the country towns the proportion of the sexes is as 39.01 males to 60.99 females; in New York city, as 42.08 to 57.92. What are the peculiar causes affecting females in the country predisposing them to the disease? The proportion of deaths from phthisis in the western counties does not vary much from that on the sea-coast, being 1 in 3.92 in Barnstable county, to 1 in 5.43 in Berkshire. As 5.935, one tenth of the whole, are returned without a specified cause, the proportion of deaths from consumption in Massachusetts must be somewhat greater than the above (*loc. cit.*).—*H. Hunt*,



Observ. on a Change of Climate in Pulm. Consumption, North American Med. and Surg. Journ., vol. i., p. 282.—*Thomas Henderson*, Cases of Pulm. Consumption, Am. Journ. of Med. Science, vol. viii.—*N. S. Davis*, in Trans. of Illinois Med. Soc., 1856, on Alcoholic Liquors in Tub. Consumption.—*Wm. M. Fahnstock*, in Am. Journ. of Med. Sci., vol. v., p. 366.—*John Spence*, Case of Pulm. Consumption, showing the Influence of a Sea Voyage on that Disease, in *Ibid.*, vol. ii.—*G. W. Steadman*, Case of Tub. Consumption, in which milky urine was voided, in *Ibid.*, vol. ii., p. 295.—*James Stewart*, on the Lungs and their Diseases. New York, 1849. In this small work Dr. Stewart shows that in all classes of animals there is found a certain relation between the composition of the body and the development of the apparatus of respiration, which explains very clearly the production of scrofula and tubercle by breathing too little or too foul air. He shows that in the lowest form of organization albumen predominates greatly over all other animalized substances, the proportion being diminished as animals rise in the scale of being. In those of the lowest organization respiration is least active, and as they rise in the scale respiration becomes more and more elaborate; so that the greater the proportion of albumen in the animal, the less important is the function of respiration, and the less the proportion, the more complicated, more developed, and more important is this function. Now, as tubercle and scrofula consist almost wholly of albumen, Dr. S. supposes that from a want of sufficient oxygen, where too little air is respired, or from inhaling an impure air, the albumen is not converted into healthy animal tissue, but deposited in the lungs, glands, &c., in its nearly pure form, constituting tubercular or scrofulous disease. Hence the deleterious influence of certain occupations which restrict the movements of the chest, as tailoring, engraving, shoemaking, &c., as well as tight lacing.—*John H. Griscom*, The Use and Abuses of Air, 12mo. N. Y., 1850, p. 249. In this work Dr. G. has most ably pointed out the influence of air in sustaining life and producing disease, with remarks on the ventilation of houses, and the best methods of securing a pure and wholesome atmosphere inside of dwellings, churches, court-rooms, workshops, and buildings of all kinds.—*Samuel Henry Dickson*, Essays on Pathology and Therapeutics, 2 vols. Svo. Charleston, 1845.—*Austin Flint*, Physical Exploration and Diagnosis of Diseases affecting the Respiratory Organs, Svo., p. 636. Philad., 1855. The ablest work on the subject yet published; also Prize Essay "on Variations of Pitch," Trans. Am. Med. Asso., 1854.—*George B. Wood*, a Treatise on the Practice of Medicine, 2 vols., Svo. Phil., 1847.—*Meredith Clymer*, Notes and Additions to "A Practical Treatise on the Diseases of the Respiratory Organs," &c., by C. J. B. Williams, Svo. Phil., 1845.—*Henry J. Bourditch*, "Revisions and Alterations" of Pathological Researches on Phthisis, by P. Ch. A. Louis, Svo. Bost., 1836; and the Young Stethoscopist, Cases of Anomalous Development of Tubercles, &c., Am. Med. Monthly, N. Y., 1855 (1 to 150 at base of lung).—*Robley Dunglison*, The Pract. of Med., &c., 2 vols., Svo. Phil., 1848.—Notes to Am. edition of Cyclopaedia of Practical Medicine. Phila., 4 vols., Svo; and "Human Health," &c., &c.—*D. F. Condie*, Notes to Watson's Practice of Physic, octavo. Phil., 1844.—*O. W. Holmes*, Notes to Am. ed. of Marshall Hall's Pract. of Medicine, Svo. Bost., 1845.—*N. Chapman*, Lectures on the more important Diseases of the Abdom. Viscera, Svo. Phil., 1845.—*John A. Swett*, on Dis. of the Chest, Svo. N. Y., 1850. Cases of Thoracic Disease in which the diagnosis was attended with unusual difficulties, in New York Journal of Med., July, 1845.—*David Hosack*, Lectures on the Practice of Medicine, Svo. New York; and in Am. Med. and Phil. Register, 4 vols. New York, 1813, '14, '15, '16. Dr. Hosack was a strong advocate for bleeding, blistering, and emetics, "in the first or inflammatory stage," as he considered it, followed by mercurial salivation, and tonics in the suppurative stage, in this respect following Dr. Rush.—*George P. Cammann* and A. Clark, a New Mode of ascertaining the Dimensions, Form, and Condition of Internal Organs by Percussion, in New York Journ. of Med., vol. iii., p. 62, 1840.—*R. L. Allen*, a Historical, Critical, and Ther. Analysis of the principal Mineral Fountains at Saratoga Springs, together with General Directions for their Use, 18mo., p. 271. Saratoga, 1844. Dr. A., though a resident at the Springs, remarks as follows: "I have never seen a case where I thought there was even a degree of palliation produced by a use of the water in pulmonary phthisis; but, on the contrary, always injurious, increasing all the alarming symptoms of this most formidable disease." Again: "My advice to all who are labouring under the corroding influence of this disease is, not to drink of any one of our mineral fountains, recently or remotely discovered and brought into notice."—*William A. McDowell*, Some Physiological Evidences of the Curability of Tubercular Consumption, in New York Journ. of Med., vol. x., p. 32. Under the head of "Therapeutical Resources for Promot-

ing the Removal of Tubercles," Dr. McD. states that "they must consist mainly of such articles as best promote the transformation of albumen of the blood into red globules; and of these the most important are iron, alcohol, naphtha, iodine, animal food, and common salt."—*W. H. Hyford*, on the Physiology of Exercise, Am. Journ. of Med. Science, vol. lix., 1855, p. 32.—*J. P. Hall*, Pulm. Lesion treated as an event arising in the Progress of Constitutional Decline under the Tubercular Diathesis, in *Ibid.*, July, 1855, p. 50.—*C. G. Conneys*, on the Etiology and Curability of Phthisis Pulm., in Transact. Ohio State Med. Soc., 1855.—*L. M. Lawson*, Pract. Observat. on the Diagnosis of Phthisis Pulmonalis, in *Ibid.*, 1855. Dr. L. doubts the existence of the supposed antagonism between a miasmatic influence and the production of tubercular diseases, and states that such diseases are not infrequent in miasmatic districts.—*G. R. Grant*, Report to Am. Med. Asso. (in Trans. of *Ibid.*, 1858) on Epidemics of Tennessee and Kentucky. Dr. G. states that phthisis pulmonalis is as common in malarial as in non-malarial regions, and that the disease is very common and fatal in Memphis, Tenn., the place of his residence, "where malaria is almost as common as in the Pontine Marshes." "One half of the 54 cases reported to have died of it occurred from July to October, the season when malaria is most prevalent." He also remarks, that as far south as 35th degree of latitude, in a region notoriously subject to malarial diseases, pneumonia and consumption occasion 25 per cent. of the mortality.—*D. Drake*, The Diseases of the Interior Valley of North Amer., 2 vols., Svo. Cin., 1850. (Dr. D. also states that "in those regions where periodical fevers prevail, consumption is also a prevalent disease")—one of the most elaborate and able works on medicine ever published in our country.—*W. A. Hammond*, U. S. A., The Physiological Effects of Alcohol, &c. (As connected with the question of the use of alcohol in tubercular diseases, the results of experiments on the healthy body are worthy of record in this connexion. The chief conclusions arrived at are, that alcohol increases the weight of the body by retarding the metamorphosis of the old tissues, promoting the formation of new, and limiting the consumption of fat. Under the use of alcohol, the carbonic acid and aqueous vapour given off in respiration were lessened in quantity, the amount of feces diminished, the quantity of urine reduced, and the urea, chlorine, and phos. and sulph. acids diminished in amount.)—*D. D. Saunders* and *John C. Draper*, on the Value of the Red Line of the Gum in the Diagnosis of Consumption, New York Journ. Med., Jan., 1857. (The conclusions from an examination of several hundred cases of phthisis are: 1st, that the red line, though it occurs frequently in phthisis and chronic blood diseases, is by no means characteristic of them; 2d, that in pregnant and recently delivered women the line occurs more frequently and better marked than in any other cases; 3d, that age or sex exercises no influence on the existence of the line.)—*S. B. Hunt*, Editorial in Buffalo Med. Jour., Nov., 1856, on the Use of Alcohol in Phthisis. (Dr. H. advocates its use on the grounds that it is a carbonaceous food, that it stimulates the pancreatic secretion, that it acts as a substitute for pancreatic juice, emulsifying the fat in the stomach, and, lastly, that it improves the whole digestive function by its influence over the stomach, &c., through the coeliac plexus).—*George Bartlett*, Topical Treatment of the Respiratory Passages, Boston Medical and Surg. Journal, 1850.—*Jules Richard*, on the Influence of Sea Life and Warm Countries on the Progress of Pulmonary Phthisis, Am. Med. Monthly. N. Y., 1856. Dr. R., from much experience in the French Navy in various parts of the world, concludes that sea voyages accelerate the progress of pulmonary tubercularization much more frequently than they retard it; that it is a very common disease among sailors, much more so, indeed, than in the army; that phthisis progresses aboard ship much more rapidly than on land. He advises that young men threatened with phthisis should be interdicted the naval profession, and expresses the opinion that warm countries, especially within the tropics, are very prejudicial to consumptives, though there may be a few places on the confines of that region, and concentrated in a narrow space, which may be exceptions; and that if change of climate ever does good in phthisis, it is in the first stage.—*W. W. Gerhard*, Remarks on Tubercular Affections, &c., Am. Journ. Med. Sci., N. S., vol. xxi., p. 368.—*A. Stille*, Review of Fourcault on "Chronic Diseases," in Am. Journ. Med. Science, vol. x., N. S., p. 359.—*Charles Hildreth*, on Cinchona and Iodine in Phthisis Pulmonalis, in *Ibid.*, vol. iv., N. S., p. 251.—*J. B. S. Jackson*, in New England Quart. Journ. of Med. and Surg., 1842. Dissections of 604 cases of persons dying of all diseases in 10 years in Boston. Dr. J. states that intemperance does not appear to develop phthisis, and that of 35 drunkards 26 presented no signs of tubercle.—*Andrew Hamnerley*, Prize Essay on the Remote and Exciting Causes of Phthisis Pulmonalis, American Medical

Recorder, 1825, p. 681. — *John W. Gloninger*, Cases of Consumption successfully treated by Mercury, in Amer. Med. Recorder, 1822, p. 514. — *Wm. C. Wallace*, Jewish Hygiene, in Bost. Med. and Surg. Journ., vol. xxxi., p. 340. — On the Use of Charcoal in Consumption, *Ibid.*, p. 419. — *J. Comstock*, in *Ibid.*, vol. xxx., p. 489. — *C. M. Durrant*, on the Nature, Diagnosis, and Treatment of Incipient Phthisis, in *Ibid.*, vol. xxviii., p. 409, 429, 449, 469. — *S. D. Gross*, Elements of Patholog. Anat., 2 vols., 1028. Bost., 1829. — *H. G. Wiley*, in Boston Medical and Surg. Journ., vol. xviii., 1848, p. 85. — *Joseph Tuckerman*, on the Climate of Santa Cruz, in *Ibid.*, vol. xvi., 1837, p. 257. — *Thomas Glysson*, Haemorrhagic Phthisis, in *Ibid.*, vol. xv., p. 163, 1836. — *S. W. Gold*, on the Causes of Phthisis Pulmonalis, in *Ibid.*, vol. xiii., p. 151, 1835. — *Charles Macomber*, Thoughts on Phthisis Pulm., *Ibid.*, vol. xii., p. 184. — *J. A. Brereton*, U. S. Army, Value of Chlorine Inhalations in Phthisis, in Balt. Medical and Surg. Journal and Review, 1834. — *Andrew Anderson*, on the Climate of St. Augustine as a resort for Consumptive Patients, in Boston Med. and Surg. Journal, vol. ii., p. 792; also Circular Letter, 1830. — *Wm. P. Devese*, a Practice of Physic, &c., Svo. Phil., 1833. — *John D. Fisher*, Am. ed. of Forbes's Laennec, Svo. N. Y., 1833. — *J. E. Coze*, Practical Treatise on Medical Inhalation. Phila., 1841. — *C. B. Coventry*, Essay on Tuberculosis and Tub. Pneumonia, New York State Med. Trans., vol. xi., 1856. — See also the various works on the Practice of Medicine, viz., Wood's, Dunglison's, Dickson's, Eberle's, Hosack's, &c. — *X. Tessier*, on Effects of Cold Climates in Pulmonary Consumption, New York Medical and Phys. Jour., vol. vii., p. 525. — *Charles Drake*, on the Effects of Respiring Cold Air in Pulmonary Diseases, *Ibid.*, p. 199. — *M. Mattson*, The Curability of Consumption, Boston Med. and Surg. Journal, vol. xliii., p. 429. — *J. G. F. Wurde-mann*, Climates of Florida and the West Indies, Southern Journal of Med., vol. ii., p. 509. — *George Haycard*, Statistics of Pulm. Consumption in the Cities of Boston, New York, and Philadelphia, for 30 years, with Remarks, New England Med. Journ., vol. i., p. 297.]

TYMPANITES.—(From *τυμπανον*, a drum.) *Τυμπανιτης*, *τυμπανιας*, Hippocrates, Celsus, Galen. *Tympanites*, *Tympanitis*, Auct. Latin. *Tympanites*, Sauvages, Vogel, Sayar, Cullen, &c. *Affectio Tympanitica*, Hoffmann. *Tympanita*, Sennert. *Meteorismus*, Sagar, et auct. var. *Emphysema Tympanites*, Parr. *Tympama*, Ploucquet. *Emph. Tympaniticum*, Young. *Emph. Abdominis*, Good. *Hydrops siccus*, Auct. *Windsucht*, *Trommelsucht*, Germ. *Tympanite*, Fr. *Tympanitide*, Ital. *Tympany*, wind dropsy, dry dropsy, inflation of the abdomen.

1. CLASSIF.—4th Class, 6th Order (Cullen). 6th Class, 2d Order (Good). I. CLASS, I. ORDER (Author in Preface).

2. DEFINIT.—An inordinate generation and accumulation of a gaseous fluid within the digestive canal, generally with retention of it, occurring chiefly symptomatically, either terminating acute disease, or complicating chronic affections, and occasioning great abdominal distention, and a drum-like sound on percussion.

3. I. PATHOLOGY.—*Tympany* is generally the result of greatly impaired vital power, as manifested chiefly through the organic or ganglionic nervous system upon the digestive canal, whereby not only is the tonicity of the coats of the canal remarkably impaired, but also gaseous fluids are exhaled from the digestive mucous surface. That the air is generally contained in the canal, where it is retained either by spasm in parts of the canal near to its outlets, or by the inability of the muscular structure of the canal to expel it, cannot be doubted. It has been supposed by some writers that the air may be on some occasions exhaled into the peritoneal cavity. If this occurrence take place at all, it must result from the decomposition of matters effused into the cavity, as in cases of chronic peritonitis, or of puerperal peritonitis, or of perforation of the intestines, when some of the intestinal contents have passed into this cavity. The occurrence of tym-

pny from these changes is however, rare, but less rare when the intestines are perforated by any of the causes of this lesion of the intestines. (See art. *INTESTINES*, § 29.)

4. Several varieties of tympany have been enumerated by writers of the seventeenth and eighteenth centuries, according as the gaseous accumulation has occurred in the advanced course of acute maladies, or has complicated chronic diseases, the primary affections, with which tympany is associated, furnishing the basis of arrangement. Of these it is quite unnecessary to take any notice, as such occurrences of tympany are merely contingencies of advanced and dangerous diseases, and are merely symptoms of these or of hysterical or uterine disorders; often, however, assuming very prominent and distressing characters, especially in the last stages of peritonitis, of puerperal and malignant fevers, &c.. That the air which accumulates in the digestive tube in these and various other circumstances of disease cannot arise, to any great amount, from the decomposition or retention of alimentary materials, or of morbid secretions accumulated or retained in the canal, is demonstrated by the absence of these sources of the gaseous collection in the more extreme cases. We are compelled, therefore, to view the accumulation of air as the result of a morbidly increased exhalation of it from the digestive mucous surface, resulting from depressed vital or organic nervous power, in connexion with lost or impaired tone of the muscular coats of the canal; this last condition, equally with the augmented exhalation, proceeding from the loss of vital power. According to this view *tympany* is merely an extreme state of *flatulence* (see that article), the gaseous exhalation having accumulated in the former, so as to produce extreme distention, but being discharged in the latter at intervals or absorbed.

5. That this exhalation must necessarily proceed from the blood, in great measure, or, in as far as it does not arise from the decomposition of alimentary matters, or of the secretions, must necessarily be inferred, particularly in the more extreme and sudden accumulation of the gaseous fluid. JOHN HUNTER and CULLEN believed that the fluid was thus generated, and MAGENDIE and GERARDIN endeavoured to prove the occurrence by experiment. They included a portion of intestine between ligatures, returned it into the abdomen, yet air, nevertheless, was found in it, although it contained no materials for the generation of air. That the air was exhaled from the digestive mucous surface had long been believed in, and supported by observation and analogy. FABRICIUS HILDANUS, HOFFMANN, PORTAL, VIDAL, GASPARD, NYSTEN, MERAT, and many others, have contended for this doctrine, and have adduced facts in support of it. BICHAT has shown that friction with sulphur communicates the odour of sulphureted hydrogen to the gas which collects in the bowels. The swimming-bladders of fishes are known to be supplied with air from the blood only; and BLAINVILLE, DUMAS, MAGENDIE, and others, have shown that a division of the pneumo-gastric nerves is followed by gaseous distention of the stomach.

6. Tympanitic distention of the abdomen may therefore be referred, firstly and chiefly, to the extrication of air from the digestive mucous surface, owing to the states of organic nervous en-



downment, or to the irritation or morbid action of matters received into the alimentary canal, as in various kinds of poisoning, or to changes in the blood itself; secondly, in a small degree, from the deglutition of air with the food or with the saliva; and thirdly, and in a very variable degree, from the decomposition or fermentation of alimentary matters, or of secretions and excretions. In cases of weak digestion, or when the organic nervous influence is much depressed, the quantity of air which may be formed, as shown by Dr. HALES, from the fermentation of fruit or raw vegetables in the stomach is often very great.

7. According as either of these sources of gaseous collections in the digestive canal predominates or is increased, so may the nature of the gaseous fluid be supposed to vary. The states of the blood, the nature of the ingesta, whether alimentary, medicinal, or poisonous, the seat of the collection, will severally modify the composition of the gaseous fluid. MM. JURINE and CHEVREUL have shown that generally the proportions of oxygen and carbonic acid decrease, while that of nitrogen increases, in descending from the stomach to the rectum.\* Although there does not appear to have been any analysis of the air collected in tympany, yet there is every reason to infer that it does not materially differ from that usually formed in the digestive canal, unless under the influence of acute or malignant diseases, when, with an admixture of carbonic and nitrogenous gases, and a little hydrogen, sulphureted, carbureted, and even phosphoreted hydrogen, may severally exist in varying proportions.

8. II. THE CAUSES OF TYMPANY—*whether predisposing, exciting, concurring or determining*—are in some respects the same as those which are noticed under the head FLATULENCY; but they exist in the former, or are rather associated, with one or more of the following pathological states: 1st, with mechanical or other obstruction to the discharge of the gaseous exhalation from the alimentary canal; 2d, with impaired or lost contractile power of the muscular coats of the canal; 3d, with alterations of the blood from absorbed matters or from vital changes, affecting the absorption of gases from the air, or the generation or extrication of them from the blood; 4th, with changes in the circulation in the lungs, and in the respiratory functions. Where one or more of these conditions are present, and in proportion

as they are increased by depression or exhaustion of the vital manifestations or endowments of the digestive canal, in so far will the tympany become remarkable or extreme, and the possibility of its removal be diminished.

[There are two principal sources of flatulence; the first, chemical changes in the ingesta; second, secretion, or exhalation from the mucous membrane of the gastro-intestinal surface. There is also a third cause, not usually recognised, but of the reality of which we are fully satisfied from careful observation, and that is inefficient action of the liver, and a want of bile in the intestines. In a considerable proportion of the cases of flatulence which have come under our notice, we have found it relieved by medicines which promoted the hepatic secretion, as small doses of blue-pill or calomel. These cases are often associated with constipation, a furred tongue, foul breath, &c., all pointing to hepatic torpor, and the flatulence as well as the other symptoms are very certainly relieved by mercurials. In retrocedent gout, where the disease is transferred to the stomach and intestinal canal, attended, as it usually is, with very painful cramp of the stomach, colicky pains, constipation, and great flatulence, we have found large doses of calomel very successful in affording relief. In a case of this kind which recently came under our care, where the disease suddenly left the extremities and fastened on the digestive organs, and where the pain, flatulence, gastric sensibility, and cramp were so severe as to threaten the life of the patient, perfect and permanent relief was afforded by the administration of calomel, at first in large, and afterward alterative doses, which resulted in bringing away large quantities of thick, black bile. It is very probable there may be here, as in gastro duodenitis, a complete temporary occlusion of the mouth of the ductus communis choledochus, from vascular congestion of the duodenal mucous membrane, thus causing an obstruction to the flow of bile, and leading to flatulence, flatulent eructations, &c. In the flatulence accompanying ordinary dyspepsia, an alterative pill of blue mass, aloes, rhubarb, and gentian, will generally afford relief. The flatulence of low fevers may be due to exhalation, or to the play of the ordinary chemical affinities in the aliment or excretions in the stomach or intestines, from the low condition or suspension of organic nervous power. On the same principle we may perhaps account for the eructation of air in gastritis, hepatitis, &c., although it is more probable that in such cases it is the result of exhalation or secretion.]

9. The causes of tympanites, or rather the circumstances in which flatulent distention of the abdomen chiefly occur, are pathological, or consist of antecedent disorders or most dangerous organic changes. While such disorders are productive of the less severe and dangerous states, or those which more nearly approach the conditions described under the head Flatulence, the most dangerous organic changes and malignant maladies give rise to the extreme instances of meteorismus or tympany. The *slighter* cases of flatulent distention are produced by the nature of the food, especially by saccharine and acescent matters and vegetables, by indigestible and otherwise injurious articles of food, by constipation or the retention, by mechanical or vital obstruction, of the intestinal excretions, as in cases of

* In the Stomach.	Oxygen.....	11.		
	Carbonic acid.....	14.		
	Hydrogen.....	3.55		
	Nitrogen.....	71.45		
		100.		
In small Intestines.	Carbonic acid.....	24.39	40.6	25.0
	Hydrogen.....	55.53	51.15	8.4
	Nitrogen.....	20.08	8.85	66.6
	In three cases.		In one.	
In large Intestines.	Carbonic acid.....	43.5	70.0	
	Carbureted hydrogen with trace of sul- phureted hydrogen.	5.47	11.6	
	Nitrogen.....	51.03	18.4	
	Carbonic acid.....	12.5		
In the Cæcum.	Hydrogen.....	7.5		
	Carbureted hydrogen	12.5		
	Nitrogen.....	67.5		
		100.		
In the Rectum.	Carbonic acid.....	42.86		
	Carbureted hydrogen	11.13		
	Nitrogen.....	45.96		
		100.		

colic and ileus, and by hysteria or uterine and spinal irritation.

10. The *extreme* instances of tympany occur chiefly after poisonous ingesta, more particularly after poisonous meats, poisonous fish and shell-fish, and indeed during the last and most dangerous stage of poisoning by other deleterious agents (see *art.* Poisons generally, and especially § 427-528); in the advanced stages of puerperal fevers and puerperal peritonitis; in gastritis and interitis, particularly when perforation of the intestinal canal has taken place, and then air may escape into, or be developed in, the peritoneal cavity; in misplaced gout of the stomach or bowels; and in the last stage of adynamic and typhoid fevers, and of malignant continued and eruptive fevers. They also occur as terminations of fatal ileus, of hernia, of intersusceptions and strictures of the bowels, of lead colic, &c. Even a moderate degree of tympanitis in adynamic or typhoid fevers should be viewed with alarm, inasmuch as it is an indication of ulceration of PEYER'S glands.\*

11 III. The signs and symptoms of gaseous distention of the abdomen are very manifest, and even the seat of distention may be correctly inferred, especially when it is not extreme.—A. Palpation and percussion, in some cases even simple inspection, of the abdomen, are sufficient to show the seat and nature of the morbid condition. When the distention is chiefly of the stomach, the region of this organ is elevated above the margin of the false ribs, and the ensiform cartilage is protruded, the lower abdominal regions being less prominent. A similar elevation of the upper regions of the abdomen exists when the colon is the chief seat of distention, but the course of the colon, from the distended cæcum to the termination of the bowel, may be observed on inspection; and it is farther evinced by the hollow sound on percussion, especially when the cause of obstruction to the escape of flatus exists in or near to the sigmoid flexure or rectum. In the extreme instances of tympany, arising from any of the causes stated above (§ 8-10), the inflation is generally greatest in the small intestines, although it may be more or less in other portions of the digestive tube. In cases of hysteria, the distention is more limited, varies in its seat, and in the sympathetic sensations and pain it occasions; and owing to the spasm and contractions, successively affecting different portions of the tube, occasions borborygmi, and the propulsion of flatus into the stomach and œsophagus. The

mechanical effects of abdominal inflation are chiefly the pressure of the diaphragm on the heart, lungs, and large veins, and the arrest of the peristaltic motions of the intestine and of the propulsive efforts by which the intestinal contents are excreted. To these various subordinate effects others may be added, consisting of disturbance and arrest of the several secreting and excreting functions, of congestion of the lungs and large vessels, and of imperfect oxygenation of the blood, &c.

12. B. The *source and nature* of the abdominal inflation are to be inferred chiefly from the history of the case; from the antecedent disorder; from the seat, nature, and duration of pain; from the indications furnished by percussion of the several abdominal regions, and from the states of the excretions and of the pulse and tongue, with the various constitutional symptoms.

13. The flatulent distention is generally that of the intestinal canal, and not of the peritoneal cavity, although I would not say that this latter may not in rare cases be its seat, especially if the fluids effused into this cavity undergo more or less of decomposition previously to dissolution; but it is not improbable that the instances of gas thus evolved in this cavity, as observed by HEISTER, DUSSEAU, LIEUTAND, MORGAGNI, PORTAL, and others, are merely those in which the gas had escaped into the cavity owing to a perforation of the digestive canal. Tympanites has been occasionally observed in most of the organic lesions affecting the biliary organs, the digestive tube, and the abdominal and pelvic viscera. It is often an attendant on gout of the stomach or intestines.

14. C. The *appearances* observed in fatal cases are a very large proportion of those lesions which have been very fully described under the heads DIGESTIVE CANAL AND INTESTINES. In some cases the distention of the tube has been remarkably great throughout the greater part; and in others it has been more limited; as to the CÆCUM and COLON (see *those articles*). It has rarely been such as to rupture the bowel, sphacelation of the more distended portions being more common. The small intestines, especially the ileum, are always remarkably distended by flatus, and the glands, more particularly PEYER'S, are often more or less ulcerated, &c.

15. IV. THE TREATMENT of *tympany* is generally difficult, often hopeless, and always dependent upon the pathological conditions of which it is merely a symptom or contingent effect. In many cases it is productive of so much and so urgent distress that it becomes requisite to attempt the removal, or the amelioration of it, before the morbid states, from which it results, should occupy our attention with the view of directing the means of cure to them more especially. The *indications* are, therefore, 1st, to remove the tympanitic distention by such means as we possess, when it is distressing and most urgent; and, 2d, to subdue the pathological states upon which the distention depends, by appropriate treatment, either when this urgency is removed or does not yet exist.

16. i. The *removal of the flatulent distention* of the intestines by mechanical means was first recommended by Dr. DARWIN to be attempted by the introduction of an enema-pipe into the rectum, in order to remove the resistance of the sphincter ani to the passage of flatus. TRNKKA

\*AUSTIN FLINT, in an analysis of 56 cases of continued fever, reports tympanites present in 16 out of 23 hospital cases of *typhoid*, and in 8 out of 13 cases of *typhus* fever (*Clin. Rep. on Contin. Fever*, p. 84), being about an equal ratio in both, or as 4 to 6. In private practice it was less frequently observed. In *typhoid* fever it was accompanied in a majority of cases with diarrhoea; in *typhus* the diarrhoea was uniformly absent. In no case was this symptom considered to be present, except where there was obvious distention of the abdomen, as well as resonance on percussion.

In a second analysis of cases of continued fever, Dr. F. found tympanitis present in 22 out of 39 cases of *typhoid* fever, or in both collections 34 in 47 cases. In 5 cases the tympanitic distention was slight or moderate in 13, and considerable in 4. Of 10 cases of *typhus*, tympanitis was present in 8, being slight in every case but one. It was less marked in *typhus* than *typhoid*. Of 7 fatal cases of *typhoid*, it was present in 6; in one fatal case it was slight, in 3 moderate, in 2 considerable. Of 4 fatal cases of *typhus*, it was present in 3, but slight in each. The results show that this symptom occurs in a much larger proportion of cases ending fatally than of those in which recovery takes place.]



proposed that the gas should be removed by the air-pump; and Dr. OSBORNE, of Dublin, adopted this means, in the mode most likely to render the recommendation successful. After other means had failed, he introduced a gum-elastic tube of nearly three feet in length, with a button and hole at its extremity, and, having applied to it a stomach-pump, he proceeded to withdraw the gas, and "was enabled to do so with few interruptions, which were speedily overcome either by shifting the place of the tube in the intestine, or by injecting warm water to clear the holes by accidental stoppage. In about an hour the abdomen was reduced to nearly the natural size."—(*Lond. Med. Gaz.*, vol. vii., p. 825.) Dr. GRAVES employed similar means with success in two cases.—(*Lond. Med. and Surg. Journ.*, vol. ii., p. 781.) I had recourse to it in one case with temporary benefit, and have advised it in consultation in two or three instances, but in neither with permanent advantage. It should not, however, be neglected, as more or less relief is produced by it. In many of the more severe cases I have prescribed enemata containing the extract or confection of *rue*, or *asafetida*, or both *rue* and *asafetida*, and enemata with *oleum olivæ* and *oleum terbinthinae*, or the other carminative injections recommended for the removal of obstinate CONSTIPATION.

17. While the operation of these and similar means is expected, *frictions* over the abdomen with either of the *liniments* referred to in the APPENDIX (F. 311) may be resorted to, and medicines may be exhibited by the month. When the tympany is not attended or caused by mechanical obstruction, and is to be imputed rather to a paralyzed state of the muscular coats of the canal than to either constriction or strangulation, then the extract of *nux vomica* in small doses, or the usual carminatives, especially *rue*, *asafetida*, capsicum, turpentine, &c., are often of service. Turpentine, either as a confection or as a draught, with the *oleum olivæ*, or *ol. ricini*, on the surface of an aromatic water, or of common gin, in cases of hysterical tympany, or of spirit-drinkers, if prescribed with discrimination, is the most efficacious, especially if enemata or liniments with this substance be employed also.

18. When the tympanitic distention has arisen from obstruction in the vicinity of the cæcum or in the large bowels, then the injections into the latter should consist chiefly of warm, oleaginous, and saponaceous substances. Olive oil in large quantity may be thus employed, and this oil may be taken in small and frequent doses, oleaginous frictions being also resorted to. In several instances where tympany was caused by the obstruction arising from hysterical pica—by chewing paper in two cases, by sealing-wax in one case, and by bleached wax and spermaceti in another, the obstruction was removed, in all, by these means, the causes of the disorder having been made apparent, by the numerous balls of these substances, agglutinated by the mucus of the bowels, and moulded in the cells of the colon, which were voided.

19. ii. Having removed the more urgent symptoms, the *Pathological conditions* producing the tympany requires close attention and appropriate treatment. These conditions are so numerous and so different that it is impossible to state all that may be required to fulfil this intention. This is, however, the less necessary, as the circum-

stances under which tympanites occurs, and the pathological causes producing it, are duly considered, with the treatment required for each, in the articles on *Adynamic Fevers*, inflammations of the *intestines* and of other portions of the intestinal tube, *hysterical affections*, *colic*, *ulcus*, and on other disorders upon which tympania is often contingent. The diverse sources of this affection, and the very opposite pathological states which may occasion it, sufficiently explain the success which has sometimes followed very different or even opposite indications and means of cure. Thus, when depending upon inflammatory action, the antiphlogistic treatment and regimen, as advised by J. P. FRANK and others, are then required; but when depending upon a paralyzed state of the intestines, consequent upon either organic lesion in some part of the digestive tube, or upon a morbid condition of the blood, as in the advanced stage of low or malignant fevers, then stimulants, tonics, carminatives, and restoratives, as turpentine, camphor, musk, ammoniacum, asafetida, galbanum, capsicum, myrrh, rue, &c., are equally necessary. In these latter circumstances, and especially when the bowels are loaded by offensive sordes or morbid excretions, then powdered charcoal, as advised by FRANK, and employed by myself in such cases, in conjunction with antiseptics or other means, or with one or more of those just named, may be employed. The carbon may be administered in doses of half a drachm to a drachm, twice or thrice daily, in the state of powder, in any suitable vehicle. In the case of a very celebrated general, attended some years ago by Dr. F. HAWKINS and myself, this substance was administered in that quantity and even in more frequent doses, and was conjoined with active medicines; it having been adopted chiefly for the removal of the fetor characterizing the evacuations and tympania in the advanced stage of low fever. For inflation of the bowels in the last stage of fevers, in dysentery, in chronic diarrhœa, in misplaced gout, &c., the treatment already advised (§ 17) is often beneficial; and in many of these, especially in aged subjects, charcoal is often of use, and seldom fails of removing the fetor characterizing these cases.

[When chronic, or owing to atony of the muscular coat, *electricity* by the electro-magnetic apparatus has often been found useful. We have known also the *galvanic belt* worn round the body to afford much relief, and exert a curative action. Cold applications to the abdomen, the various preparations of iron, sea-bathing, horse-back exercise, a firm band about the abdomen, all may prove advantageous in cases where these remedies are indicated. *Articles of food* prone to fermentation, or the extrication of large quantities of air, must be avoided, such as *peas*, *beans*, *turnips*, *greens*; also fermented liquors, sweet wines, pastry, &c. The bulk of a meal should be small, and condiments used, as pepper, mustard, &c.]

BIBLIOG. AND REFER. — *Celsus*, l. iii., cap. 21. — *Aræta-us*, Chronic, l. ii., cap. i. — *Avicenna*, Canon, l. iii., Fem. 14, Fr. 4, cap. i. — *Zacutus Lusitanus*, Prax-admir., l. ii., obs. 55. — *Heister*, Wahrnehmungen, l. n. 15. (*Ex aëre in cavum abdominis effusus*?) — *Bonet*, Sepulchret, l. iii. See xxi., obs. 2, 3. (*Uti viscerum*). — *Ballontus*, Epidem., l. ii., p. 221. — *R. Blackmore*, Dissert. on a Dropsy, a Tympany, &c., Svo. London, 1721. — *Willis*, Pharmac. Rat., P. ii., sec. ii., cap. 4. — *Brendel*, Opera, t. ii. — *Hoffmann*, Med. Rat. Syst., t. iv., P. iv., c. 15. — *P. Combault-sier*, Pneumatopathologia. Paris, 1747. — *Kaempfer*, Amoen. Exot., Fasc. iii., obs. 5, p. 543. — *Hautesier*, Re-

cueil, t. ii., p. 583.—*J. B. Careno*, de Aëris ingressu, in venterium, 8vo. Medioli., 1757.—*Zeviani*, Trattato del Flato, &c., 4to. Veron., 1761.—*C. F. Kadelbuch*, de Tympanitidis Pathol. et Therap., 4to. Leips., 1772.—*Morgagni*, De Sed. et Caus. Morb., Ep. xxvii., 23, 24, 25. (*Tymp. Intestinalis*, *T. Abdominalis*).—*De Haen*, Rat. Medendi., p. ii., c. v.; p. iv., p. 65.—*Dusseau*, Journ. de Médecine, 1779.—*Lienlaud*, Hist. Anatom. Med., l. i., 16. (*Intestinalis enormiter distenta*), 270. (*Aër in cavo abdominali et in intestinali*), 1775. (*Aër extra intestinali*).—*M. Stoll*, Prælect., t. i., p. 89.—*Trnka de Krozowitz*, Historia Tympanitidis. Viudo., 8vo, 1788.—*Pleuker*, De Meteorismo ejusque speciebus, in Eyerell. Coll. Disser., l. iii.—*Stoerck*, Ann., Med. ii., p. 191, 194, 199. (*Inflammatio causata*).—*Dang*, in Acta Reg. Soc. Med. Haun., t. i., p. 206.—*Askow*, in Ibid., t. i., p. 373.—*G. L. Marup*, le Malattie Flatuose, 4to. Nap., 1786.—*Bergius*, Mat. Medica, t. i., p. 199. (*Ascarfetiæ enematæ*).—*Portal*, Cours d'Anatomie Médicale, t. v., p. 142. (*Aër in cavo abdominali*).—*Odier*, Manuel de Med. Pratique, p. 210. (*In Febre adynamia et in F. Puerperale*).—*J. P. Frank*, De Curand. Hom. Morbis, l. vi., p. i., p. 124. (*Carbo interne*).—p. 117. (*Venæsectio*).—p. 121. (*Frigus*).—*N. V. A. Gerardin*, Recherches Physiologiques sur les Gas intestinaux, 4to. Paris, 1814.—*J. G. Deutner*, de quibusdam Prædisiis in pneumatosi abdominali administrandis. Heid., 1815.—*Mérat*, Dict. des Sciences Méd., t. xxxiii., art. *Meteorisme*.—*Pinel et Brieheteau*, in Ibid., t. iv., vi., art. *Tympaniti*.—*Fradini et Santoli*, Med. and Surg. Journ., vol. v., p. 167, in British and For. Med. Rev., Oct., 1836, p. 552. (*Camphor*, *Musk*, et *Ammoniacum pro Tympe*).—*W. Kerr*, Cyclop. of Pract. Med., vol. iv., 238.

[See various Am. works of Prac. of Med. already referred to; also *Plint's* "Reports on Continued Fever," and *Bailett* on Fever.]

URINARY BLADDER.—*SYNON.*—*Vesica Urinaria*; *Vesica urinialis*; κύστις, *Cystis*; *Urocystis*; —*Vesica*; — *Vessie*, Fr. *Harnblase*, Germ.

1. The urinary bladder is a musculo-membranous reservoir for the reception of the urine, until the accumulation of a certain quantity solicits the discharge of this secretion. This reservoir is situated in the hypogastric region, between the pubes and rectum in man, and between the pubes and vagina in the female. Its several connexions with the urinary and sexual passages, in both sexes, and its other anatomical relations, need not be noticed at this place. It is sufficient that we bear in recollection that, in addition to the disorders and lesions which are seated in it solely or chiefly, it is liable, in consequence of these connexions, and of the nervous and vascular communications existing between it and other parts, to several sympathetic affections, the most important of which are those depending upon lesions of the kidneys and ureters, and upon those of the prostate gland and urethra. In all cases, therefore, when the urinary bladder appears to be the seat of disease, our attention should be directed also to the states of these organs and passages; and not be limited to these, but be extended even farther, and more especially to the composition and condition of the urine and of its deposits, with the several relations of digestion and assimilation.

2. I. IRRITABILITY OF THE BLADDER.—CLASSIF.—II. CLASS, III. Order. (*See Preface*.)

3. DEFINIT.—*A frequent and urgent desire to micturate, independently of febrile symptoms and of inflammation, and of organic lesion of the urinary bladder and prostate gland.*

4. i. SYMPTOMS.—A person otherwise in good health feels an urgent desire to void his urine after very short intervals, and if the desire be not gratified, either he is incapable of retaining it, or he retains it with great difficulty, and with more or less pain. The effort at micturition is sometimes attended by pain in the glans or under the frænum, and by straining; and although the

calls are frequent, the quantity passed at each call is very small. These latter symptoms are most frequent in old or aged persons, and in those who have been addicted to masturbation or sexual excesses, in whom the prostate is more or less tumid or enlarged. Hysterical persons are often liable to this disorder; but in these the urine is more copious and pale, and contains less than the usual proportion of solid ingredients, the nature of which are not altered. When irritability of the bladder has continued long—the organ having for a long period ceased to be distended by the accumulation of urine—the capacity of it becomes permanently accommodated to the paucity of its contents, and incapable of containing more than two or three ounces.

5. Mr. COULSON, in his admirable work on Diseases of the Bladder and Prostate Gland, remarks that, notwithstanding this contracted state, if there be no stricture or disease of the prostate, the parietes of the bladder are often thinner than natural; and that it would seem that protracted irritation produces absorption of part of the substance of the organ. Opportunities of examining after death the bladder of persons who laboured under this affection in its idiopathic form are very rare. Mr COULSON examined the body of a gentleman of a very nervous temperament, long a sufferer from this disorder, who was carried off by disease of the lungs; but he could not detect the least alteration in the appearance or structure of the bladder, or of any of the urinary organs.

6. ii. THE CAUSES of this disorder require recognition in each case which comes under treatment. Old persons, or the aged, and next the very young, are more liable to irritability of the bladder than youths or the middle-aged; but the causes producing it in the aged are generally very different from those occasioning it in children. The nervous temperament, weak, irritable and anxious dispositions, and gouty and rheumatic persons are most predisposed to it. Those subject to chronic dyspepsia, to nervous giddiness, tremors, or to sealy eruptions, are often also afflicted with this complaint.

When it occurs in females it is sometimes referable to injury from pressure, either during pregnancy or in parturition, or to disorders or lesions of the uterus, ovaria, or vagina. It may be occasioned in both sexes by hæmorrhoids or irritation of the rectum by ascarides, or by chronic states of dysentery. It may occur, in a slight form, even independently of hysteria, in males as well as in females, from self-pollution, or from irritation of the spinal nerves increasing the organic sensibility of the bladder.

7. a. The most frequent causes are probably those which are referable to the *states of the urine*, arising either from the nature of the ingesta, or from the changes consequent upon primary or secondary assimilation. It has been well remarked by Dr. PROUT, in his celebrated work, that cases of irritable bladder, depending on functional derangement of the kidneys, usually result from the unnatural properties of the urine. All deviations from the normal condition of the urine, whether in deficiency, or in excess, or in kind, are recognised by the containing organs, and may prove a source of irritation in the bladder. "Hence, whenever the urine is very dilute or very concentrated, or is preternaturally acid or alkaline, or contains any unnatural ingredient, the urinary organs in general, and the bladder in particular,



though perfectly healthy, are liable to become excited and irritable, and the individual has no peace until the unnatural secretion is discharged. In such cases the fault lies, not in the bladder, but remotely in the kidneys and assimilating organs."—(*Op. cit.*, p. 366.)

8 The use of various fruits, ripe or unripe, especially by children, and even by adults, and disorders of digestion and of assimilation, occasioned by these or by other causes; the elimination from the blood of unwholesome substances, conveyed into it from the organs of digestion, whether subsequently altered or unaltered by the kidneys; the excessive use of alkalis, or of these combined with the vegetable acids, and alkaline states of the urine from these or other causes; and the prolonged use of acids, or of the nitrate of potass, or of the oxide of potassium, or of other diuretics, may severally occasion this complaint.

9. *b.* The irritation of ascarides in the rectum, and morbid states of the urine, caused either by unwholesome food, by unripe fruit, or by impaired assimilation, or by spinal affections, or by rickets, are the most common causes of this affection in children. Mr. COULSON met with cases in children which were caused by so great a contraction of the orifice of the prepuce as hardly to admit the point of a probe; circumcision cured the complaint. When irritability of the bladder occurs in this class of patients about the periods of dentition, it may generally be imputed to disorder of the digestive organs, and to consecutive alterations of the urine. The connexion of irritability with paralysis of the bladder is not unfrequently met with in children (§ 36).

10. *c.* *Symptomatic irritability* of the bladder is much more common than the idiopathic disease. Granular and other organic lesions of the kidneys are generally attended, especially during the night, with frequent and urgent desire to evacuate urine, this excretion being always more or less morbid even from an early period. Diseases of the prostate gland and of its vicinity, organic, inflammatory, or malignant very generally, and strictures of the urethra not unfrequently, are accompanied with this complaint. Indeed, strictly speaking, irritability of the bladder is merely symptomatic, either of disease of some adjoining or some closely related organ, or of morbid conditions of the urine; and this may be the case even in those considered purely nervous, or most devoid of manifest structural change.

[*Gonorrhœa* and *masturbation* are among the most frequent causes of irritability of the bladder, the irritation being transferred from the urethra to the neck of the bladder; causing frequent micturition, with tenesmus, pain, bloody urine, &c. All the stimulating class of diuretics may cause the same difficulty; also those resinous cathartics, like *aloes*, which act on the lower portion of the intestinal canal. Turpentine, cantharides, and nitrate of potass are the most likely, perhaps, of the diuretics, to irritate the bladder.]

11. *iii.* THE DIAGNOSIS of this complaint is often of importance; and nothing tends more to determine this than a careful examination of the urine. Irritability of the bladder will not be mistaken for *diabetes*, if the quantity and quality of the urine be ascertained. Although irritability is a symptom of inflammation of this viscus, yet it is necessary to ascertain its independence of inflammatory action; and this is to be inferred chiefly from the absence of those local and con-

stitutional symptoms characterizing cystitis, either in an acute or chronic form. The absence of pain in the region of the bladder, and of frequency of pulse or of other febrile symptoms, especially towards evening, will indicate the independence of the recent state of the complaint of acute inflammation; while the more chronic state of irritability will not be imputed to chronic inflammation of the bladder, if the constitutional powers of the patient be not very sensibly impaired by it. The dependence of the complaint upon disease of the prostate gland may readily be ascertained by an examination *per rectum*. Not only, however, may there be irritability, but also pain of the bladder, without any manifest disease of this viscus; the mischief being confined to the kidneys, chiefly in the form of calculi of these organs. Instances of this kind are adduced by MORGAGNI, PROUT, COULSON, H. J. JOHNSON, and others, and have come under my own observation. Dr. PROUT remarks that, in certain renal affections in particular habits, even where the urine is not very unnatural, the pain is confined chiefly to the neck of the bladder; but where the urine is actually diseased, and especially when it is alkaline, we may be certain that the kidney is functionally, and if the patient be of a scrofulous habit, and the case of long standing, very probably organically affected.\*

12. *iv.* TREATMENT — *a.* In recent cases, the states of the general health and of the urine will frequently indicate a successful treatment. When the urine is very acid, or scanty, or furnishes a red sandy deposit, and when the complaint appears in connexion with either gout or rheumatism, then bicarbonate of potash may be given, with or without the nitrate of potash, in tonic or bitter infusions or decoctions; the carbonates of soda and of ammonia being inappropriate, the former owing to its favouring the formation of urate of soda, the latter to its influence in generating urea and uric acid. Mr. COULSON states that great relief will sometimes be obtained from cupping on the perineum. This will be more especially the case if any congestion of, or vascular determination to, the prostate gland be present. Liquor potassæ, prescribed in bitter infusions, with henbane or opium, or with small doses of colchicum, in the gouty or rheumatic diathesis, is also of great service. Where the potash, in either of the states now mentioned, is not productive of relief, magnesia may be given so as to preserve the bowels in an open state, an occasional dose of equal parts of the compound infusions of gentian and senna being also taken.

13. *b.* In cases which manifest a nervous character, or which seem to be results of abuse of the sexual organs, tonics are especially required, either in combinations already mentioned, or with the mineral acids; as the infusion or decoction of *cinchona* with the nitro-muriatic acids, and with henbane or opium, or with a few drops of tincture of opium, or with the compound tincture

[\* This disease has sometimes been mistaken for stone in the bladder. We have known two instances where the operation of lithotomy has been performed without finding any calculus in the bladder. Dr. GROSS relates a case of a boy four years of age, who had a constant desire to micturate, complained of severe pain in the urethra and neck of the bladder, pulled constantly at the prepuce, and strained violently whenever he voided his urine, which was occasionally tinged with blood. On sounding, no stone could be found, and he was cured with alterative doses of calomel and rhubarb, with carb. soda, and in the intervals quinine and Fowler's solution.]

of camphor. The mineral acids may also be given with the decoction of *pareira brava*, or of *uva ursi*, or with the infusion of *buchu*, and with the additions just mentioned. I have prescribed the tincture of the muriate of iron in *calumba* or *quassia*, and *anodynes*, with benefit, for cases of this kind. Mr. COULSON remarks that the decoction of *uva ursi* and the infusion of wild carrot seeds will occasionally give great relief; but that no medicine is so generally successful in irritability of the bladder as the infusion of *diosma*; and he adds that, from time immemorial, the *buchu* leaves have been held in great esteem by the natives of the Cape of Good Hope as a remedy for irritative and inflammatory affections of the urethra, bladder, prostate gland, and rectum, and also for rheumatism, indigestion, and gravel. The natives of the Cape and the Dutch are partial to the spirit of *buchu*, made by distilling the leaves in the dregs of wine, and call this spirit *buchu brandy*; and they use it for all chronic diseases of the stomach and bladder, especially colic, spasms, &c.\* A tincture of *buchu* is ordered by the Edinburgh and Dublin Colleges; and half a drachm to a drachm of it may be given for a dose. In these and similar cases of irritability an opiate suppository, or a starch enema containing from one to two drachms of sirup of poppies, or about thirty drops of tincture of opium, may be administered at night; or a pill with opium, or henbane, and extract of colchicum, shortly before bed-time.

[Dr. GROSS (*loc. cit.*) speaks favourably of the *tinct. of cantharides* in this disorder, and states that he has used it with marked advantage in several cases during the last few years, especially in the irritation of the bladder in young children and hysterical girls, when carried to the extent of producing slight strangury. *Haerlem oil* has sometimes succeeded when every thing else has failed, in doses of from 10 to 20 drops. The saturated tinct. of the *Phytolacca decandra* was often prescribed in this disease by the late Dr. PUYSC, in doses of two drachms every 7 or 8 hours. The decoction of *soot*,  $\zeta\text{ij}$ . to one lb water, and filtered, is highly recommended by Dr. GIBBON (*Bull. l'Acad. de Méd.*, March, 1837).]

14. *c.* When this complaint is *symptomatic* of granular or other organic disease of the KIDNEYS, or of enlargement or other lesions of the PROSTATE GLAND (see those articles), then the treatment must be based on the primary and chief malady. When it is connected with the gouty or rheumatic diathesis, or with either of the scaly eruptions, then the bicarbonate of potash, or the solution of potash, and small doses of the iodide of potassium, in equal parts of the compound tincture of cinchona and of the fluid extract of *sarsaparilla*, with one of the narcotics already mentioned, are often beneficial. If the urine becomes alkaline, or if the iodide appear to perpetuate the irritability, the alkali and the iodide should be relinquished. In this state of the disease, colchicum may be conjoined with the above, or even a small quantity of opium may be added to them. In most cases, especially when the nightly rest of the patient is much disturbed, an opiate in some suitable form should be given in the evening or at bed-time.

15. *d.* When the complaint occurs in *hysterical females*, or in connexion with the accession, or with disorder of the catamenia, the prepara-

tions of iron, or of valerian, or of *asafœtida*, or of aloes, the bowels being acted upon by preparations of the latter, are generally beneficial. In these cases also, the tincture of *sumbul*, in doses of twenty to forty drops, with five or six of the tincture of opium, is often of service.

16. *e.* The incontinence of urine often afflicting children, and generally during sleep, seems to proceed from an association of irritability with partial paralysis of the bladder, or at least with impaired tonicity of the sphincter vesicæ. In most of these cases the general health, the digestive functions, and the state of the urine are more or less disordered; and to these especially medical treatment ought to be prescribed. In many instances, while due means are employed for these, stimulating liniments rubbed along the spine, or sponging the back and sacrum with a strong solution of salt night and morning, will prove of service. (*See also* § 39.)

17. *f.* In all cases of irritable bladder the *diet* and *regimen* of the patient should be duly regulated, and with especial regard to the states of the digestive functions, of the urine, and of the organs most intimately related to the offices of the bladder. Fruit and vegetables are often injurious. Much animal food is even more hurtful, especially in the gouty, rheumatic, and uric acid diathesis. Malt liquors and spirits are still more injurious, and wine is very rarely of service. Sexual excesses ought also to be avoided, and sexual intercourse seldom indulged in. The calls to micturate should be deferred as long as possible, and the mind be diverted from it; for a constant response to each early call ultimately gives rise to a habit which increases and becomes confirmed from the want of opposition to it.

[*Neuralgia of the bladder* may be noticed with propriety under this head. This is a painful affection of the organ, generally referred to the neck of the bladder, occurring in paroxysms daily, or every other day, at about the same period of time. It is met with most frequently in miasmatic districts, and in hysterical subjects, though by no means confined to females. For the most part it occurs in the old or middle-aged. The attack is generally preceded by a sense of uneasiness in the perineal region, with occasional numbness, aching, or a sharp, tingling pain; and these symptoms, with remissions, may last several days, the attacks becoming more distinctly paroxysmal; the paroxysms lasting from two to six hours, and the pain resembling that produced by a fit of the stone. Dr. GROSS represents the pain as extending to the neighbouring organs, as the rectum and anus, the urethra and inside of the thighs. In the female the *uterus* is sometimes involved, and the spermatic cords in the male. The pain is generally very severe in the sacral and lumbar regions in both sexes. The desire to micturate frequently is strongly marked, although attended with difficulty; and a sensation of heat and burning is felt along the urethra, but especially at the extremity of the penis, from whence it frequently extends to the neighbouring parts. "The paroxysm," says Dr. GROSS, to whom we are indebted for this description, "generally goes off gradually, leaving no other inconvenience than a sense of soreness, or aching in the neck of the bladder, perineum, and posterior part of the urethra. During the intermissions the urine is voided without difficulty, and the patient feels comparatively comfortable, almost as

\* The fluid extract is far preferable to the tincture. Tilden's preparations are altogether reliable.]



well, indeed, as if he had not suffered any pain. When the attacks assume the quotidian type, they usually occur in the evening, during the night, or early in the morning. Occasionally they make their appearance soon after eating, and in a few instances they occur twice in the 24 hours; thus leaving the poor sufferer scarcely a moment free from pain.\*

This affection is rarely accompanied with fever. There is usually much derangement of the digestive organs, with torpidity of the bowels; the sleep is disturbed, the pulse quick and irritable, the extremities cold, and the general health greatly impaired. In severe and obstinate cases there is a gleet discharge from the bladder, with soreness in the perineum and hypogastric region, and a sense of coldness, with numbness, in the neighbouring parts. The urine is generally normal in quantity and quality, except in gouty or rheumatic subjects, in whom it is generally acid, scanty, and mixed with red sand.

The *diagnosis* of this affection is not always easy, as its paroxysms closely resemble those produced by calculus in the bladder. Dr. Gross advises sounding the bladder. The most important signs are the sharp and darting pains, the paroxysmal character of the disease, the itching and scalding in micturition, the attempts at which are frequent, urgent, and difficult, and the numbness in the perineum, scrotum, groins, and thighs.

The *causes* are obscure, though they are probably the same as excite neuralgia in other parts. No doubt, masturbation, venereal excesses, stricture of the urethra, stone in the bladder, piles, uterine diseases, may excite it in nervous, irritable subjects; and malaria, indigestion, the depressing passions, and a morbid state of the urine, may act as predisposing, if not exciting causes. Its seat is supposed to be, as in other cases of neuralgia, in the nerves of the part, though dissection has thrown no light on this point. The *prognosis* of vesical neuralgia must be guarded. Though it seldom, perhaps, terminates fatally, yet it is apt to prove obstinate in spite of the most judicious management. Sometimes it disappears suddenly, like other neuralgias, but more frequently it persists for years, undermining the health, and terminating in serious organic mischief. The treatment of this affection must be regulated by the predisposing and exciting causes, if ascertainable. In miasmatic regions, the usual antiperiodics, quinine, Fowler's solution, &c., promise best. If inflammatory symptoms be present, they are to be combated by the usual antiphlogistics. Dr. Gross recommends early, copious, *general blood-letting*, repeating it every day or two till the force of the attack is abated, and this to be followed by leeches to the perineum, or over the seat of the pain. *Purgatives* are also advised, especially if the affection is of miasmatic origin, trusting to those which produce free evacuations, but avoiding drastics. Mercurials are useful adjuncts, but salivation is to be avoided. "I am convinced," says Dr. Gross, "that a systematic course of purgation is not only unequivocally beneficial, but absolutely indispensable to a speedy and permanent cure."

The preparations of *iron* will sometimes prove useful, but they are inferior to *quinine* and *arsenic* in this affection. These, as well as *strychnine* and *aconite*, with opium, are recommended by

Dr. Gross in pill, according to the following formula:

R Acid. Arseniosi, gr. ij.; Strychninæ, gr. j.; Ext. Aconiti, gr. viij.; Pulv. Opii, gr. v. M. ft. 16 pills. One pill to be taken every 6 hours.

If opium disagrees, *lupuline* or *hyoscyamus* may be substituted for it. If nausea results, the dose is to be diminished, or the pills taken less frequently. It is also advised not to continue the pills longer than a week or ten days at a time, resuming them in the course of two or three days. Under this course the disease is often cured; and the same combination will prove useful in other forms of neuralgia. To relieve the violent pain of the paroxysms, *narcotics*, in full doses, are necessary; of which the salts of *morphia* will prove among the best. We have found *stramonium*, in the form of *Tilden's fluid extract*, very efficacious in every form of neuralgia. It is to be given in large doses, and the system kept under its influence for some time. *Belladonna suppositories* are also worthy of a trial, if other means fail. When the disease occurs in a malarious district, and is associated with hepatic or gastric derangement, an emetic will often arrest or cut short the paroxysm. The wine of *colchicum*, with *morphia*, at bed-time, will be beneficial, especially in rheumatic or gouty subjects, alternated with mercurial purgatives. If there be acidity of stomach or flatulence, a combination of bicarbonates of soda and potash may be advantageously given, or an occasional dose of calcined magnesia.

Dr. Gross condemns the use of *bougies* in vesical neuralgia, as advised by M. CIVIALE (*Gazette Medicale*, July, 1836), after considerable experience in their use. He thinks more favourably of injections of acetate of lead and opium, or of a watery solution of opium and hyoscyamus, employed tepid, cool, or cold, as is most agreeable to the patient. If the disease prove very intractable, then *counter-irritation* to the perineum, the supra-pubic region, the sacrum, the upper and inner parts of the thighs, by the moxa or Vienna paste, will be advisable. When the disease depends on piles, stricture of the urethra, foreign bodies in the bladder, &c., the treatment must be directed to the removal of the original cause, which is always to be assiduously sought for, else it may be overlooked by the practitioner. The *warm bath* is an important remedy in every form of the disease. But, as in all other diseases, although our remedies be carefully selected and judiciously applied, yet without strict attention to *diet* a cure can not be expected. All kinds of alcoholic liquor must be sedulously avoided, as well as accecent fruits and vegetables, new bread, strong coffee, cheese, &c. The digestive organs must be strengthened, and all the usual hygienic appliances faithfully carried out. If the patient reside in a malarious region, a change to a more healthy district will be useful.]

18. II. SPASM OF THE BLADDER.—CLASSIF.—II. CLASS, III. ORDER. (*See Preface*.)

19. DEFINIT.—A sudden and violent attack of pain in the region of the bladder, extending along the urethra to the glans, with either involuntary expulsion or retention of the urine.

20. A. This disorder is most commonly *symptomatic* either of stone in the bladder or of gonorrhœa, especially when this latter is treated by injections; or of organic disease of the kidneys, or of parts adjoining the bladder. Dr. PROUT remarks that it may be caused by acid urine, by

\* "On Diseases of the Urinary Bladder," &c. Phil., 1835, p. 264.

abscess of the kidney, by ulceration or other disease of the prostate gland, bladder, &c., or by retention of urine, or by gout, or by venereal excesses. Irritating diuretics, cantharides taken internally, the application of blisters, hysteria, masturbation, the irritation of ascarides in the rectum, dysentery, or tenesmus, may severally excite an attack. When it is connected with gonorrhœa or the treatment of it, then the sphincter vesicæ is thereby either irritated or inflamed, and spasm supervenes as soon as urine passes into the bladder.

21. *B.* The sudden and violent attack of pain in this viscus, *characterizing* this complaint, is attended by a constant desire to void urine, without the ability to do so, and the agony felt during these attacks is excessive. The contraction of the bladder excites the muscular coats of the rectum, and occasions also a desire to evacuate the bowels, or more or less tenesmus. Mr. COULSON remarks that the closure of the ureters at their vesical extremities has given rise to dilatation of these ducts and of the pelvises of the kidneys, and to serious changes in the kidneys; and that, after an attack of spasm, from which the patient has apparently recovered, it sometimes happens that a new train of symptoms appears, indicating the injury which the tubular and secreting structure of the kidneys has received. Frequent attacks of spasm also sometimes injure the tone and contractility of the bladder so much as ultimately to induce a partial or more complete paralysis of the organ (§ 27).

22. *C.* The *diagnosis* of spasm of the bladder is not difficult; it may, however, be confounded with inflammation; but in this latter the pain is constant, commences with uneasiness, and gradually becomes more and more severe. Spasm occurs suddenly; the pain is violent and constrictive; whereas in inflammation the pain, when greatest, is either lancinating or throbbing, and is attended by more or less febrile action, of which the former is generally exempt. In both the urine is usually retained, or passed in the latter in very small quantities, and after remarkably short intervals. Spasm may, however, be associated with inflammation of the mucous coat of the bladder, as spasm of the coats of the colon is associated with inflammation of the mucous coat of the intestine. In such cases the spasm is only a symptom aggravating the character of the inflammation, febrile symptoms more or less manifestly attending this latter.

23. *D.* The *treatment* of spasm of the bladder will appear from the above to depend chiefly upon the pathological state occasioning it. If it be consequent upon inflammatory action, either of the sphincter vesicæ, upon suppressed gonorrhœal discharge, upon the use of irritating injections, or upon inflammation of the bladder, *bleeding*, according to the grade of morbid action and habit of body of the patient, should be prescribed, either by venæsection, cupping, or by leeches, and be repeated if required. The warm bath, fomentations, cooling aperients, and diaphoretics should follow vascular depletion; and demulcents with anodynes, emollient enemata with anodynes or narcotics, &c., should also be prescribed. If the complaint supervene on gonorrhœa or the use of injections, the above treatment is appropriate; local bleeding, however, generally proving sufficient.

24. If spasm of the bladder occur in the gouty diathesis, or upon the suppression of a paroxysm of gout, or as misplaced gout, the regular form of the disease should be solicited by means of mustard pediluvia, and mustard poultices to the feet, while the soothing and anodyne remedies above mentioned are exhibited. In cases of this kind, as well as in many others, magnesia and sulphur may be taken, with small doses of colchicum, of camphor, and of opium; and if the former be given in decided doses, so as to act upon the bowels, a more rapid effect will be produced upon the spasm than by any other means. If the state of the urine occasion or aggravate the spasm, appropriate means should be used to correct this state.

25. When the disease is symptomatic of a calculus in the bladder, or in the kidney, or passing the ureter, the warm bath, fomentations, demulcents, emollients, and narcotics, or anodynes, taken by the mouth and administered in enemata, are generally of service; but when the calculus is in the bladder, these means are only of temporary benefit—permanent relief must be looked for only from the surgeon. Cases of spasm affecting chiefly the sphincter vesicæ, and causing retention of urine, are generally symptomatic of irritation or of disease of adjoining parts, and are relieved by the *tinctura ferri sesquichloridi* taken in doses of ten to twenty drops in water every quarter of an hour, or by a suppository containing the extract of belladonna, or by a belladonna plaster applied over the perineum, while the emollients and anodynes already advised are taken internally. Mr. COULSON recommends a poultice containing powdered camphor to be applied over the perineum, or a liniment composed of camphor and opium; and states that emollient clysters containing some of the watery extract of opium often afford instant relief.

26. III. PARALYSIS OF THE BLADDER.—CLASSIFICATION.—I. CLASS, II. ORDER. (See Preface.)

27. DEFINITION.—*Partial or complete loss of the contractile power, and of the organic sensibility, of the bladder; often also with loss of power of the abdominal muscles, whereby the urine is partially or completely retained.*

28. *i.* HISTORY.—Paralysis of the bladder, whether partial or complete, whether temporary or permanent, depends on loss of power, either originating in the organ itself, or affecting it consecutively upon injury or disease of the spinal chord, or of the brain, or of their membranes.—*a.* A *partial* form of paralysis sometimes occurs as a symptom of extreme debility or exhaustion in the course of acute or chronic maladies, as of typhoid or adynamic fevers, of hectic, and of the last stage of organic diseases. In these circumstances, the contractility and organic sensibility of the bladder is more or less impaired, and the power of the abdominal muscles to aid by their contraction the expulsive efforts of the detrusor urinæ, is equally lost.

29. *b.* In some cases the loss of power in both is *general and complete*, and this state of the disease, especially in its advanced or protracted form, may be attended by a constant dribbling of the urine, owing to the over-distention of the bladder having overcome the resistance of the neck or sphincter vesicæ. Thus incontinence of urine is superadded to retention, and the latter is sometimes mistaken for the former. In such cases examination of the abdomen and region of



the bladder, or the introduction of a catheter, will disclose the state of matters; and strict attention should be paid to the excreting functions of the urinary organs in all fevers and constitutional maladies.

30. *c.* Paralysis of the bladder, giving rise to retention, may come on gradually, especially in advanced age; either in consequence of disease of the kidneys, or of the prostate or urethra, or after a prolonged neglect of evacuating the bladder or the suppression of the desire to evacuate. In these circumstances, however, the paralysis and the retention may be at once complete. Although this form of the affection is most frequent in aged persons suffering from disease of some other parts of the urinary apparatus, yet it may also affect the middle-aged, especially when the desire of evacuation has been long suppressed; the consequent over-distention having overcome the power of contraction, the abdominal muscles either failing to expel the urine, or expelling it only partially. In these and similar circumstances a frequent desire to micturate occurs, and after expulsive efforts made by the abdominal muscles a small quantity only is expelled; and this state may be mistaken for a form of irritability of the bladder; but upon a strict examination of the abdomen, or upon the introduction of a catheter, a large accumulation of urine is found in the viscus.

31. In some persons even of middle age, a more or less manifest state of paralysis is consequent upon impaired health caused by anxiety, fatigue, excessive application to business, and neglect of calls to micturate, or by venereal excesses or masturbation. When these latter causes have existed, a state of complete or incomplete *tubes dorsalis* supervenes, with manifest weakness of the loins and lower limbs; and if relief be not obtained, paraplegia, with complete paralysis of the bladder, ultimately results. In both this and the immediately preceding cases, as well as in some others, the over-distention of the bladder, or the distention of it to a certain extent, occasions a frequent desire or effort to evacuate the urine, and a small quantity only is passed, the power of contracting farther being lost, or the contractions of the abdominal muscles being sufficient only to expel that small quantity. In such cases the catheter is often required.

32. *d.* *Injuries and diseases of the spinal cord and brain, and their membranes,* occasion the most complete and severe instances of paralysis of the bladder; more especially lesions seated in the spinal cord or its membranes, and whether in the cervical, dorsal, or lumbar regions. In this class of cases the effects produced upon the bladder and upon the state of the urine are different, or vary more or less with the amount of injury or disease, or with the rapidity of progress of the latter in the nervous centres; but they are generally remarkable according to the severity or danger of either. At first, or immediately after the occurrence of these, the urine may be more or less acid and free from mucus; but especially after injury of the spinal cord it soon becomes alkaline, turbid, and ammoniacal, evincing this state at its discharge; and when it cools it deposits much adhesive mucus. After a short time phosphate of lime is found in the mucus, which afterward is sometimes blended with blood. The urine collected in the bladder is altered, either during the process of secretion or during its re-

tention in the bladder, and is generally changed in the following manner: The urea is converted into carbonate of ammonia, which irritates the mucous surface of the bladder, and causes the exudation of much viscid mucus. The neutral triple phosphate of magnesia and ammonia contained in the secretion forms prismatic crystals, and presents different degrees of transparency. The inflammation of the bladder consequent upon paralysis of the bladder, caused either by injuries or disease of the nervous centres, extends from the mucous to the other coats of the organ, if the patient live for some time; and the parietes become thickened and incapable of contraction; the urine requiring to be drawn off, and always presenting a fetid and alkaline character. The question in these cases is whether the change in the urine is owing to the altered nervous power of the kidneys, or is it the result of retention in the bladder? From some attention which I have paid to this question, I conclude that the change in the urine takes place primarily and chiefly in the kidneys, owing to the loss of that portion of nervous power which the spinal nerves convey to the renal ganglia; and that it is increased during the retention of the urine in the bladder, the paralyzed state rendering this viscus more prone to inflammation, and to the more rapid supervention and progress of the changes consequent upon inflammation.

33. As this state of disease proceeds, the pain or uneasiness of the neck of the bladder and glans penis at first experienced subside and ultimately disappear, although distention may continue or increase. The desire to pass urine is not expressed; and while the local symptoms subside the constitutional become aggravated. The pulse is much accelerated, thirst is increased, and restlessness and anxiety of mind are augmented. The fur on the tongue is thicker, deeper, and darker-coloured. Delirium supervenes, with a urinous odour of the perspiration, and stupor or profound coma supervenes, and the patient dies in this state; the complaint being, perhaps, mistaken for typhus fever, if due attention have not been directed to the states of the urinary functions and bladder. Patients, especially those advanced in life, when attacked by fever, owing to the congested states of the nervous centres, may experience similar changes in the urine, and a similar paralysis of the bladder; and if this unfavourable complication of fever be overlooked, it rarely fails of being the chief cause of a fatal issue.

34. Paralysis of the bladder occurs chiefly in the aged; and although in them, as well as in some younger persons, it may be favoured or caused by the states of the spinal cord or of its membranes, it is most frequently consequent upon disease of the prostate gland or neck of the bladder, or of the urethra, causing over-distention of the organ. When this complaint affects females, especially from puberty to the decline of life, it is generally connected with *hysteria*, or with the advanced stage of spinal congestion (hysterical paraplegia) caused by uterine irritation. I have seen several cases of hysterical paraplegia where a surgeon was required to draw off the urine, the complaint having been imputed to masturbation. When it occurs in married females, it may be either a symptom of pregnancy, or of injury experienced during labour or delivery. In the fourth month of pregnancy, or about that time, or near the period of confine-

ment, retention of urine may occur, and if it be neglected, a paralyzed state of the bladder may supervene from distention. Similar results may follow retroversion or anteversion, or prolapsus of the uterus. Imperforate hymen, and obstructed catamenia from this cause have even occasioned this complaint.

35. *e. Hysterical paralysis* of the bladder is believed by Sir B. C. BRODIE, and very justly, in many cases, to be owing to defective efforts of volition. He remarks that, in the first instance, it is not that the nerves are rendered incapable of conveying the stimulus of volition, but that the effort of volition is itself wanting; and this corresponds with what is observed in other affections connected with hysteria. "As the distention increases the patient begins to be uneasy, and at last suffers actual pain, and as soon as this happens volition is exercised as usual, and the bladder begins to expel its contents." If not relieved by means of the catheter, the hysterical retention of urine is thus of short duration; but if the catheter be had recourse to, the natural cure is prevented, and the disease may be indefinitely prolonged. "The general rule," Sir B. BRODIE adds, "in the treatment of these cases, is to interfere but little;" but this rule is not without exceptions, for, in a few cases where the bladder has been very much distended, it loses its power of contraction, and even though the patient endeavours to micturate, no water flows. Under these circumstances artificial aid should be obtained.

36. *f. The affection* which sometimes occurs in children, especially in delicate boys, and which is characterized by the discharge of urine during sleep, has been variously explained; by some it has been imputed to irritability of the bladder, by others to a morbid state of the urine, causing irritation of this viscus, and by some to paralysis of the neck of the bladder, occurring during sleep. That this last condition may obtain is not unlikely, as the affection is not unfrequently associated with prolapsus of the rectum after a motion, and with deficient tonic contraction of the sphincter ani. It may, however, depend, in different cases, upon the association of all these morbid conditions in different degrees, the share that a morbid state of the urine may have in its production being ascertained by the examination of this excretion.

37. *ii THE TREATMENT* of paralysis of the bladder is, 1st, *constitutional*, and, 2d, *local*; but in many cases the latter should precede the former, especially as respects the urgent necessity of obtaining immediate relief. As to the best means of attaining this end I must refer to surgical writers, and especially to the able and precise instructions of Mr COULSON, in his work on the "*Diseases of the Bladder*," &c.—*A. The constitutional treatment* must chiefly depend upon the nature of individual cases, upon the pathological conditions occasioning this disease; but in most cases, and particularly in old cases, medical treatment is of little avail; surgical appliances, especially frequent introductions of the catheter, being required during the life of the patient. Trial, however, may be made of strychnine, gradually increasing the dose, and carefully observing its effects on the nervous and muscular systems. I have generally preferred the extract of *nux vomica*, in doses of a quarter of a grain, gradually increased to one grain, given twice or thrice daily, and combined with the aloes and myrrh pill, and

purified extract of ox-gall, or with the compound galbanum pill. I have also prescribed terebinthinate embrocations or epithems, to be applied over the loins and sacrum. In the great majority of cases, and especially in aged persons, serious lesions supervene in the kidneys and in the pelvis of these organs, and thus complicate and farther aggravate the disease, and render recovery altogether hopeless.

38. *B. Hysterical paralysis* of the bladder is not unfrequently caused by masturbation, and a moral discipline is required, although it may not prudently be either suggested or enforced, unless with the utmost discretion. Indulgence and sympathy, on the part either of friends or of the physician, should be withheld, and the most nauseous anti-hysterical medicines should be exhibited, especially asafetida, turpentine, &c., both by the mouth and in enemata. In a case where this affection was rather simulated or feigned than actually present, I recommended, in the hearing of the patient, the actual cautery to be applied to the sacrum; but the complaint vanished soon after mention was made of the remedy, and directions given as to its employment.

39. *C. The paralyzed or relaxed state* of the neck of the bladder in children, noticed above (§ 36), generally disappears as the constitutional powers of the patient improve. I have found tonics, stomacheic aperients, chalybeates, and stimulating embrocations applied over the loins, the spine and sacrum being sponged every morning with a strong solution of salt, of great service. The patient should sleep on a hair mattress, covered with a water-proof cloth. Change of air, sea bathing, or sponging with sea or salt water, where the plunge-bath causes alarm, and exercise in the open air, are also beneficial, indeed are almost essential in these cases.

[The treatment of palsy of the bladder must of course, as in all cases, be regulated by its pathological cause, and the attending circumstances. The urine must first be drawn off, and care taken to keep the bladder emptied by using the catheter at stated intervals, as every four or six hours. This alone will often be all that is required to effect a cure. If the continued use of the instrument be required, the patient may be taught to introduce it for himself. In exceptional cases, the catheter may be allowed to remain in the bladder, removing it, however, sufficiently often to prevent any accumulations upon it. Dr. GROSS (*loc. cit.*) advises not to remove all the water at once, in cases of over-distention, for fear of severe depression on the removal of the stimulus of distention, as a fatal result may in this way be induced. This is good advice, and so is that of swathing the abdomen by a bandage, as after tapping in ascites.]

The use of the catheter should always be discontinued at the earliest possible period, and the patient should be urged, from time to time, to make propulsive efforts, so that the use of the instrument may be dispensed with; otherwise the bladder, becoming accustomed to its use, may lose entirely its contractile power.

The tone of the bladder must, in the next place, be restored, if possible; and this may be done by cathartics, where the paralysis is associated with paraplegia or great intestinal torpor. For this purpose calomel, with jalap or rhubarb, will be preferable. The cathartic may be repeated every other day, or, at first, every day, with



decided benefit. Dr. Gross states, also, that *emetics* are sometimes of signal benefit in this disease, especially when associated with derangement of the digestive organs and general torpor. Afterward, *strychnia*, *cantharides*, and *arnica* may be used with advantage, unless the affection be of an inflammatory form. These may be given in combination, one-sixteenth of a grain of *strychnia*, one-eighth of *cantharides*, and three to five grains *arnica*, in a pill, every six hours, watching closely the effects. We have used with great satisfaction the *extract of Ignatia Amara*, in this and other forms of palsy, in doses of one half to two thirds of a grain, three or four times a day. Dr. Gross recommends the *arnica* (forty to sixty drops of *tincture*), especially, in palsy of the bladder consequent on typhoid and other fevers, masturbation, and general exhaustion. The *ergot of rye* has been strongly recommended in this disease by Dr. ALLIER of France (*Jour. des Connaissances, Med. Chir.*, 1838), and Dr. DAY of London (*Treatise on the Diseases of advanced Age*), by whom it is preferred to *cantharides* and *arnica*. There can be no doubt that *ergot* exerts a specific action on the bladder as well as uterus, exciting the muscular contractility of both organs, and probably in an equal degree.

The *inflammatory* form of this affection must be treated strictly on antiphlogistic principles, viz., general and local bleeding, fomentations, warm baths, anodyne enemata, &c. When the disease occurs in the aged, or those debilitated by other diseases, *tonics* of the chalybeate class will prove beneficial. *Hysterical vesical palsy* is to be treated on the same general principles as other forms of hysteria. There can be no doubt that the disease is sometimes feigned, as many other diseases are, by hysterical subjects, for what object, often, it would be difficult to say, unless to gratify a morbid taste for notoriety, or to excite the sympathy of friends and relatives. *Asafœtida*, *valerian*, *musk*, *castor*, *iron*, and *morphia* may all be brought into play, and the patience of the practitioner well-nigh exhausted, before an acknowledged cure will be effected. Dr. Gross (*loc. cit.*) speaks highly, also, of a succession of *blisters* over the dorso-lumbar region, followed by an emollient poultice, and the surface sprinkled with one fourth of a grain of *strychnia*, after removal of the cuticle and adherent lymph, and repeated every twelve hours; and he remarks that "there is hardly any form of vesical paralysis, excepting, perhaps, the inflammatory, in which this mode of counter-irritation will not prove more or less advantageous." For farther details in regard to the treatment of this and other affections of the bladder, we refer to the above-quoted and most able work, *passim*.]

#### IV. INFLAMMATION OF THE URINARY BLADDER.

—SYNON.—*Cystitis* (from *Cystis*, a cyst or bladder), Sauvages, Vogel, Cullen, &c. *Inflammatio vesicæ*, Sennert, Hoffmann. *Cauma Cystitis*, Young. *Empresma Cystitis*, Good. *Uro-cystitis*, *Cystiphlogosis*; *Inflammation de la Vessie*, Fr. *Entzündung der harnblase, blasenentzündung*, Germ.

CLASSIF.—1. *Class*, 2. *Order* (Cullen). 3.

*Class*, 2. *Order* (Good). III CLASS, I.

ORDER (Author in Preface).

DEFINIT.—*A sense of pain in the region of the urinary bladder, increased on pressure, with a frequent desire to micturate, generally preceded by chills or rigors, and attended by inflammatory fever.*

40. i. STRUCTURES AND PARTS PRIMARILY OR CHIEFLY AFFECTED.—Inflammation of the bladder most frequently commences in the mucous coat, to which it may be limited, or it may extend to the external coats. When it thus commences it may be circumscribed, or it may affect all this coat. When the former obtains, the part covering the neck of the bladder and the cystic triangle is most commonly affected; but inflammation, whether limited to the mucous surface or affecting the other coats also, or even the whole parietes of the organ, generally commences in this situation, owing to the irritation of sabulous matter, of calculi, &c. The imperfect emptying of the bladder, especially in connexion with engorgement of the prostate, the contiguity of this part to the prostate and urethra, the liability of the extension of inflammation to it from these parts, and the participation in irritation of the rectum and vagina, also account for the more frequent commencement of cystitis in this part. From the extension of disease, cystitis may be consecutive upon inflammation of the rectum or vagina, upon metritis, and upon hæmorrhoids; and it is often consequent upon and complicated with inflammation of the prostate. In addition to these modes of commencement, cystitis may primarily attack the peritoneal covering of the fundus. This is comparatively a rare occurrence. The fundus of the organ is much less frequently the seat of the disease, particularly at an early stage, than the neck of the bladder and the parts situated posteriorly between the sphincter and entrance of the ducts. When inflammation commences in the peritoneal coat of the organ it usually arises from the extension of the morbid action from adjoining parts, as the rectum, cæcum, colon, or omentum. Uro-cystitis has thus been observed in the course of colonitis or inflammatory dysentery, of peritonitis, and of inflammation of the generative organs in females; and the connexion of these maladies has often been rendered manifest by examinations after death. Inflammation may also attack all the coats of the bladder either primarily or consecutively. The former is of rare occurrence, the latter is much more frequent, owing to its extension from the mucous or serous surface of the organ, and to injuries and operations.

41. Uro-cystitis, with reference to its *seat*, may be viewed, 1st. As to its limitation to the mucous surface of the organ; 2d. As to its extension to the coats forming the parietes; 3d. As to the part of the viscus most frequently affected either primarily or secondarily; 4th. As to the nature of the morbid action; 5th. As to its consequences; and, 6th. As to its complications. Each of these heads will be considered in detail.

ii. INFLAMMATION OF THE MUCOUS SURFACE OF THE BLADDER.—SYNON.—*Blennorrhagia vesicalis*, Swediaur. *Dysuria mucosa*, Cullen. *Catarrhus vesicæ*, Lieutaud. *Rheuma vesicæ*, Stoll. *Pyuria mucosa*, Sauvages. *Catarrhe de la vessie*, Fr. *Muco-cystitis* (Author). [*Cystorrhœa*]

42. Inflammation of the mucous coat of the bladder generally proceeds from the common causes of inflammation, and from those which are usually productive of cystitis (§ 84, *et seq.*), especially the extension of inflammation of the urethra to the neck and internal surface of the organ, the use of irritating injections, of irritating diuretics and aphrodisiacs, the irritation of calculi, &c. This form of cystitis is of frequent oc-

currence, and presents every degree of activity, from the most acute to the most chronic, owing to the diathesis and habit of body, age, and mode of living of the patient, and to its causes.

43. *A.* The acute form of the disease is characterized by severe pain, increased by pressure, sense of heat or tension in the hypogastric region, and uneasiness in the perineum, and by frequent urgent calls to discharge the urine, attended by difficulty and increased pain. These symptoms are often preceded by chills, horripilations, or rigors, and are followed and attended by febrile reaction and its usual concomitants. Sometimes neither chills nor horripilations are felt, especially when the disease has extended from the prostate gland or the urethra, the pain in the region of the bladder, and the frequent desire to urinate being the invading symptoms. The urine is passed often and in small quantities, with much smarting heat and repeated efforts. It is generally acid, of a deep lemon or orange colour; at first clear, but in a day or two numerous small shreds of lymph or mucus are seen floating in it. Sometimes the urine is reddened and turbid, and deposits a thick sediment, consisting chiefly of a muco-puriform matter. In a few days the irritation and febrile disturbance are diminished; the severity of the pain in the region of the bladder is abated; but often, even when this abatement is well marked, the quantity of mucus or of muco-puriform matter in the urine is increased. The local and symptomatic irritation, and the frequency and the difficulty of urinating, generally more or less subside about the same time.

44. *B.* The consequences and terminations of acute muco-cystitis vary with the severity, the causes, and the nature of the attack, and the constitution and other circumstances of the patient. If the inflammation proceed no farther than the mucous surface of the neck of the bladder and of the parts in the immediate vicinity, the above symptoms diminish gradually, and the disease terminates in resolution. But very different consequences occasionally ensue. If the inflammation be very acute, it may rapidly extend to all the tissues of the organ, and even partially to others in the vicinity, the disease becoming extremely dangerous or even fatal. In this case it passes into a state of uro-cystitis, to be noticed hereafter. More frequently, however, the acute inflammatory symptoms gradually subside, especially the febrile action, but the local ailment subsists for some time, or continues with greater obstinacy, the disease becoming chronic.

45. *C.* Chronic inflammation of the mucous surface of the bladder sometimes supervenes on the acute, as just stated; but it often occurs in a primary form.—In this latter case its invasion is slow, and it is not accompanied with any or much febrile disturbance, unless the inflammation assume an intermediate grade between the acute and chronic. Sometimes the febrile action is very slight or remittent, and the local symptoms are chiefly remarkable, especially irritability of the bladder, pains in its region, or at the extremity of the urethra, previous to and at the time of passing the urine. This excretion furnishes, especially as it cools, a mucous or muco-fibrinous deposit, of various shades of colour in different cases, and often an ammoniacal odour. A sense of weight in the perineum, or of heat in the bladder and along the urethra, frequent calls to micturate, and shooting pains to the anus, are also

often experienced. The discharge of mucus in the urine is more or less considerable—hence the term *catarrhus vesicæ*—but varies much in different cases and at different times.

46. *A.* Sometimes the disease is slight; but in old cachectic subjects, and when complicated with disease of the kidneys or of the prostate, or with both, it is often dangerous, or even proves fatal. In this latter state, or when the disease has gone on to ulceration, the heat in the bladder and urethra amounts to scalding, the desire to pass the urine becomes more frequent and urgent, and the efforts more violent or straining. The expulsion of the last portion of urine is more or less painful; and retention of urine is not infrequent, owing to the obstruction caused by clots of mucus or fibrinous exudation lodged in the passage. Pain is felt at the extremity of the penis, in the perineum and anus, sometimes in the loins and thighs. There are thirst, costiveness, or irregularity of the bowels, uneasiness or restlessness, wasting of flesh, and loss of strength.

47. *b.* The mucus discharged in the urine varies much in quantity and appearance. It is sometimes small, at other times or cases it is so great as to amount to pounds in the twenty-four hours. In small quantity the urine is rendered turbid or flaky by it, and it settles to the bottom of the vessel. It is occasionally stringy, ropy, or of a lumpy or viscid consistence. The urine is generally acid early in the disease, but it becomes neutral or alkaline as the mucous secretion is increased. When acute muco-cystitis passes into the chronic the quantity of mucus is often considerable, in some cases extremely great, forming glairy or ropy streaks in the urine, which are afterward deposited. When the disease has not been of long duration, the mucus in the urine is generally whitish-gray or yellowish-gray, tenacious or stringy, inodorous, and presenting no distinct appearance of pus. But in the more chronic or obstinate cases a purulent matter is evidently present, mixed with and often more or less predominating over the mucus. In these cases the morbid matter is less abundant, less tenacious, of a yellowish colour, more readily miscible with the urine, and is sometimes streaked with thin bloody filaments. It is also sometimes fetid, is not so readily deposited at the bottom of the vessel as the mucous secretion, nor is it so tenacious. It does not form albuminous flocculi when boiling water is poured upon it, nor does it coagulate, or but imperfectly, when boiled. When these appearances are seen in cases of considerable duration, ulceration of the mucous surface, affecting chiefly the follicles, and the extension of inflammation to the connecting cellular tissue, may be inferred. This inference will be still more fully borne out if there be slight fever assuming a remittent, or intermittent, or hectic form, constant pain in the organ, emaciation, restlessness at night, and the undoubted presence of pus in the urine, with more or less alkaliescence.

48. *c.* Pus may be distinguished from mucus not only by the above appearances, but by its being miscible with the urine, which it renders opaque. If the urine contain pus as well as mucus, the former is deposited upon the latter, and is yellower in tint, and opaque, the mucus being translucent. The microscope aids the diagnosis in these cases by showing the presence of pus-globules of the diameter of 1-2500th part of an



inch. If the urine be acid, the nucleus of the pus-globule may be seen without the aid of reagents; but, as it is more frequently alkaline, the addition of a drop of acetic acid will bring the nucleus into view by rendering the corpuscle more transparent. \* A copious sediment resembling pus is sometimes produced by a large quantity of triple phosphate in the urine. But the nature of this is shown by its solution in nitric acid, and by the shape of the crystals under the microscope. When the urine containing pus presents an acid reaction, pyelitis may generally be inferred; when it is alkaline, cystitis may be considered to exist. Purulent urine becomes clear on standing, a more or less abundant sediment is formed, the supernatant fluid is often of a greenish-yellow tint, and contains albumen.

49. Dr. PROUT states that, in the advanced stage of the disease, the mucus in the urine is diminished, it becomes opalescent and of a greenish tint, and can in part be easily diffused through the urine, rendering it glairy or opaque, or milky like pus, the morbid matter being in fact mucopuriform. The urine is now generally deep-coloured, or serous, or alkaline, having an ammoniacal odour, and effervescing with an acid. In this latter case there is an excess of carbonate of potash or of soda in the urine, derived from the serum of the blood. "When these symptoms have continued for a longer or shorter period, the urine becomes scanty, still more high coloured, and occasionally even acid; the mucus, and even the pus, gradually diminish, and almost disappear; and after a short period of comparative ease the patient expires."

50. *d. Intermediate grades of muco-cystitis*, between the acute and chronic states of the disease, are occasionally met with in practice. These have often been termed *sub-acute*. They are to be distinguished by more or less of the symptoms already adduced, generally all of them, but in different degrees of severity, and attended by remittent or hectic febrile action. They may occur primarily or follow the acute, which may subside into the sub-acute, and ultimately into the chronic state, terminating at last in ulceration and thickening of the organ or some other structural lesion. The chronic form of the disease may even pass into the acute, although not so often as the converse, either having presented an intermediate grade of morbid action, or having, owing to some exciting cause, suddenly assumed the acute form. In this latter case the extension of inflammation still farther should be dreaded and guarded against.

51. *e. The duration of muco-cystitis is extremely various*: it may be from one month—it being seldom much less in the acute—to two or three months in the sub-acute, to several months to two or three years in the chronic. It depends entirely on the cause, the age, and constitution of the patient, on the degree to which the inflammation may have extended to the other coats of the viscus and to adjoining parts, and on the complications the disease may have presented. The same circumstances also influence the prognosis and treatment (§ 83, 89).

iii. INFLAMMATION OF ALL THE COATS OF THE BLADDER.—*Cystite profonde*, CLOQUET; *Cystitis vera*—*true Cystitis*.

52. This form of cystitis is not often met with as a primary disease. It much more frequently supervenes on one or other of the forms of muco-

cystitis, and it occasionally occurs from the extension of inflammation from contiguous viscera; as from inflammation of the uterus and ovaria or Fallopian tubes, or of the rectum, colon, cæcum, peritonæum, omentum, &c.; from extensive hæmorrhoids, and from diseases of the prostate. It will be seen that true cystitis, in some of these consecutive states of occurrence, commences in the peritoneal surface of the fundus, and that it extends to all the coats. It is, indeed, extremely rare for true cystitis to commence in this part of the structure of the bladder, unless when it supervenes in the manner now alluded to.

53. *True Cystitis* is thus more frequently secondary or consecutive, and but rarely primary. But whether originating in the one way or in the other, it is a severe and dangerous disease; and, owing to its consequences, is often speedily followed by the most serious effects. While the mucous coat only is the seat of inflammation, the function of the muscular coat is seldom affected in such a manner as to allow inordinate accumulations of urine within the viscus, unless the disease is attended by an obstruction to the discharge of the urine by associated disease of the prostate or urethra, or by the impaction of a calculus or fibrinous clot in the neck of the bladder. When, however, these obstructions occur, the inflammation of the mucous coat soon extends to the other coats; the previous irritability of the muscular coat is overcome by the distention consequent on obstruction, and rapidly passes into almost total paralysis or incapability of contraction, one of the most dangerous states of the organ in cystitis.

54. When true cystitis follows muco-cystitis or catarrhus vesicæ, the abundant mucous or muco-purulent secretion which characterized the latter is either much diminished or ceases altogether. This arises from the transfer of the inflammatory action chiefly to the more external coats of the bladder, and the diminution of it in the surface, which was formerly its only seat. The occurrence of this change has led Dr. PROUT to think that the inflammation of all the coats of the viscus is of a different kind from that of the mucous coat; but I infer that the difference consists merely in the different functions of the parts affected in both these forms of cystitis.

55. *True Cystitis* presents various grades of activity, from the most acute to the chronic. The pathological states through which the disease passes, and the consequences to which they lead, are also diverse, and not always referable to the violence of the attack, but are dependent upon a number of circumstances connected with the causes, complication, and other peculiarities of the case. Thickening of the coats of the bladder, owing to an infiltration of an albuminous serum into the connecting cellular tissue, is very frequent, especially when the inflammation is sub-acute or chronic, or has extended from the mucous coat and is dependent upon obstruction to the discharge of urine or the presence of calculi. In these cases the distention of the bladder is a frequent occurrence; and even when this form of the disease is primary, and is not accompanied with obstruction to the discharge of urine, a loss of the power of the muscular coat, and consequent retention of urine, is a frequent attendant upon it. Although true cystitis affects all the coats of the bladder, a part of the organ may be more particularly affected by it than the

rest, especially the parts near the neck, and extending thence to the ureters. This is especially the case when the disease has followed inflammation or other morbid states of the prostate gland, urethra, rectum; or has proceeded from hæmorrhoids, or from injuries caused by the use of the catheter, by lithotomy, lithotritry, or other operations.

56. *A. Acute Cystitis.*—*a.* The symptoms of this state of the disease are, generally after chills or rigors, severe pain, at first behind, afterward above the pubes, a sense of uneasiness in the perineum, heat and tenesmus, and heat and smarting in the course of the urethra. The patient has frequent calls to pass urine, which are always attended by more or less difficulty, often amounting to dysuria. The urine at last escapes only by drops, with more or less scalding and pain, and ultimately with unavailing efforts to discharge it. When the symptoms arrive at this pitch much anxiety and tension of the abdomen are experienced. The distended bladder rises above the pubes, and the hypogastric region is very tender. The frequent calls to pass the urine and the dysuria may mislead the physician, a large quantity of water accumulating and causing injurious distention of the bladder before the circumstance is suspected. This accumulation may be explained by the irritable state of the sphincter vesicæ, the tumefaction of the inflamed parts having diminished the outlet of the bladder, and by the want of due action in the muscular coat, owing to the inflammation in which it and the other coats are involved. Hence it is thrown into frequent and inefficient action, a portion of urine is often passed; but as soon as it reaches the irritable and inflamed parts immediately below the sphincter, spasm of these parts, and of the sphincter itself, takes place, which the contractions of the fundus are unable to overcome. The secretion of urine proceeding, distention so great as to destroy the powers of reaction results, and complete paralysis of the muscular coat supervenes. If in this state a portion of the urine passes off, it is owing to partial relaxation of the sphincter for a moment, and to the position admitting of the discharge by gravitation. This difficulty of voiding the urine and the consequent accumulation are not owing to the muscular coat of the bladder only; for in many cases the parts near the neck of the bladder are chiefly affected, the tumefaction of these being so great as nearly to obliterate the canal, and mechanically to obstruct the flow of urine and the introduction of the catheter. In complications of the disease, with enlarged or inflamed prostate, this is obviously the case, a circumstance tending materially to influence the prognosis. Independently of this complication, there is every reason to infer, from the nature of the morbid secretion and structure of the parts, that this swelling contributes its share with the other lesions to the production of this very unfavourable symptom. In cases of cystitis produced by injuries of the spine, the paralytic state of the muscular parts of the bladder is the cause of the accumulation of urine and of the consecutive inflammation; but in other cases the inflammation is the cause of the retention and of the loss of muscular power, as above stated.

57. When the disease has reached this stage, and the accumulation in the bladder is manifest, the symptoms soon run on to a dangerous height, if relief be not soon afforded by medical or surgi-

cal treatment. The patient is anxious, distressed, and fevered, the pulse is frequent and hard, the tongue white and loaded, the appetite is lost, thirst is great, costiveness with frequent calls to stool, painful tenesmus, and difficulty of passing a motion, especially when the disease is seated chiefly about the neck of the bladder, or is complicated with disease of the bladder, as frequently is the case, especially in old men, are also experienced. In these cases, and in others proceeding from some irritation acting in a special manner on the bladder, as when the cystitis has arisen from the improper use of cantharides, the presence of calculi, &c., the urine which is passed is often sanguineous, or contains a considerable quantity of blood.

58. The disease, having reached the state now described, will often evince signs of diminution, or rapidly present those of a still more dangerous character. If accumulation of urine and over-distention of the bladder have been prevented, and the treatment otherwise judicious, the former will generally be the result. But when the bladder still continues over-distended, great prostration of strength, with extreme restlessness, takes place; the pulse becomes small, frequent, intermittent, constricted, and at last weak and scarcely perceptible; the skin is hot and dry, afterward moistened with a urinous or fetid perspiration; the tongue is dry, the thirst extreme; and to these sometimes supervene cardiacalgia, vomiting, hiccough, stupor or low delirium, cold extremities, sometimes convulsions, coma, and death.

59. *b.* Cases of true cystitis occasionally occur wherein little or no urine accumulates in the bladder, owing to the inflammation and consequent tumefaction of that part of the viscus surrounding or in the vicinity of the opening of the ureters into it, or to the effusion of coagulable lymph having entirely shut up their outlets. In these cases inordinate distention of the ducts and pelvis of the kidneys must occur, and, in addition to the above symptoms, those of dangerous disease of the kidneys and suppression of urine supervene, especially fulness, pain, and tenderness in the loins, numbness of the limbs, vomiting, constant hiccough, cold or urinous perspirations, rigors, subsultus tendinum, coma, &c.

60. *c.* When cystitis has followed the healing of old eruptions or ulcers, or the sudden stoppage of accustomed discharges, as the hæmorrhoids, the catamenia, or fluor albus, or if it have arisen from the misplacement or metastasis of rheumatism or gout, or if it have attacked persons of these diatheses, the several tissues of the bladder are liable to be affected nearly at the same time; but the symptoms are generally less severe than in the strictly primary and phlogistic form of the disease, and more frequently assume a sub-acute form, or some grade intermediate between this and the chronic form next to be described.

61. *d.* The duration of the disease in persons of the phlogistic diathesis, and at an early age, often is extremely short. True cystitis may reach its height as early as the third or fourth day, and its termination in the course of the first or second week. But in more delicate or less inflammatory constitutions, or in those weakened by previous disease, if it assume the acute form, it is more inclined to lapse into a sub-acute or chronic state, and to continue an indefinite time. It may, moreover, assume from the commencement a sub-acute or intermediate character between the acute



and chronic. But in all cases of this form of cystitis very much depends upon the nature of the exciting and concurring causes, the complications which certain cases present, and the attention paid to the unloading the bladder of its contents, and to other indications and means of cure.

62. *c. Terminations of Acute Cystitis.*—True cystitis terminates—1st. In resolution, with a gradual amelioration of all the symptoms; 2d. In the chronic state, with relief of the most urgent symptoms, and continuance of a dull pain, uneasiness, and tenderness in the region of the bladder, dysuria, &c. (§ 65, *et seq.*); 3d. In suppuration, when the disease is very acute, this issue generally occurring within twenty-four hours after the disease has reached its acme; 4th, and very rarely, in gangrene; 5th, and still more rarely, in rupture of the viscus.

63. (*a*) *Suppuration* is preceded and attended by pain and throbbing in the region of the bladder, or behind and above the pubes, and occasionally referred to the seat of the rectum, by horripilations, chills, or rigors, followed by flushes of heat, and sometimes by perspiration. There are often also painful tenesmus, costiveness, and fever. The urine afterward has a turbid, purulent appearance, or contains a whitish-yellow matter, sometimes streaked with blood, and has the odour characteristic of pus. In many of these cases the purulent secretion proceeds from the internal surface of the bladder, but small abscesses formed in the parietes of the viscus have opened internally and furnished this secretion. This latter is more frequently the case when the parts near the neck of the organ are more especially affected. CHOPART has recorded several instances of this occurrence, as well as of another, more unfavourable, when the abscess is formed more exteriorly, and makes its way, externally to the bladder, into the loose adipose cellular tissue at the bottom of the pelvis. If in such cases the patient survives, the abscess ultimately points in the perineum, or near the margin of the anus. Abscess of the bladder is seldom so situated as to break into the peritoneal cavity. In all cases of abscess of this viscus the danger is great, particularly in the latter cases.

64. (*b*) *Gangrene* may supervene in the most acute cases, or in cachectic constitutions; but it is a very rare occurrence, and is never met with unless the disease be attended by retention of urine of two or three days' duration. In these circumstances an eschar or small sphacelated spot is formed at one or more situations in the organ. This advances, and at last the bladder bursts, and the urine is effused, generally into the abdominal cavity. M. CLOQUET thinks that the rupture may occur without the previous sphacelation, from the distention, the greater tenuity of the bladder, and the deficient support of its parietes at this situation. Admitting that ruptures of the bladder are generally in the fundus, yet they are less to be imputed to want of support in this situation, and to greater tenuity, than to previous ulceration and deficiency of vital cohesion characterizing the advanced stages of acute inflammation, although these circumstances may contribute to the event. But very few of the cases of rupture that occur depend upon previous sphacelation, which is an extremely rare occurrence in this disease.

65. *B. Chronic Cystitis.*—When the acute form of true cystitis has not terminated completely in

resolution, it frequently passes into a chronic state of the disease. But this form may exist from the commencement, and, appearing in a mild state, it is often neglected, and hence becomes an enduring disease. As in other inflammations, cystitis is observed of every intermediate grade of severity and of duration, from the most acute to the most chronic, according to the nature of the exciting and concurring causes and the peculiarities of the individual. The consequences resulting from the sub-acute or chronic forms of cystitis also vary with the severity of the attack. When the chronic is merely a continuation of the acute in a less severe degree, the nature of the disease is manifested by the persistence of the local symptoms especially, which are of a nature readily to be recognised and understood, and are chiefly those already adduced, but in a milder form.

66. When chronic cystitis occurs primarily, its accession is sometimes slow, and scarcely so severe at first as to excite the anxiety of the patient. In other cases it is of a much more marked character, and more nearly approaches a sub-acute or an acute form. But in general it is characterized by permanent pain referred to some part of the viscus, by frequent calls to void the urine, attended by difficulty, as if occasioned by stricture of the urethra; by the presence of mucus or purulent matter in the urine; by tenesmus at stool and costiveness; by slight fever, especially in the evening, and sometimes by fever of a remittent or intermittent form; by a loaded tongue; by inability to retain much urine at a time; and by an exacerbation of some or of all the symptoms after fatigue, exposure to cold, or errors of regimen, especially after drinking spirituous, vinous, or malt liquors. These symptoms vary in degree, and one, more, or even all of them, are more severe the more nearly the disease approaches a sub-acute or acute form.

67. The duration of this form of cystitis varies, according to the severity of the symptoms, from two or three months to as many years, or even longer. An acute or sub-acute state may supervene upon the chronic and shorten its duration, or the same result may follow the extension of disease to adjoining parts and the presence of serious complications. When it arises from calculi in the bladder, or from disease of the prostate or urethra, thickening of the walls of the viscus is a common consequence. It may, when it approaches the acute or sub-acute forms, terminate in abscess, in ulcerations, or perforation, or give rise to other lesions by extension of the inflammation to adjoining parts, as noticed in respect of the acute disease (§ 63).

68. *C. Ulceration of the urinary bladder* may result from any one of the forms of inflammation of the mucous coat of the organ already noticed, but most frequently from the sub-acute, chronic, and most protracted states. It may, however, also follow the acute form and the more chronic states of true cystitis. It is often difficult to decide as to the existence of ulceration; but when disease of the bladder has been of long duration, the pain severe and continued, with a frequently recurring desire to micturate, and an increasing difficulty and pain in passing the urine, then the existence of this lesion should be suspected, and, if the urine presents the appearances stated above (§ 48), especially if it contains pus streaked with blood, it need not be doubted. *Ulceration of the*

bladder may take place differently : it may commence in the mucous follicles, especially in the more chronic cases ; or it may follow the acute form, lymph being first exuded from the inflamed surface, and subsequently detached, leaving this surface tender and susceptible of irritation from the urine, and liable to experience ulceration from the continuance of the irritating cause. In acute cases the mucous surface may thus be nearly all destroyed by the softening and ulcerating processes produced and perpetuated by the urine on the inflamed surface, the walls of the viscus becoming thickened, even although the muscular coat may be laid bare in parts.

69. When the ulceration is seated or commences in the follicles, *perforation* of the bladder may result, the disease having assumed most frequently a chronic form. When ulceration or destruction of the mucous coat follows acute cystitis, all the coats forming the parietes of the organ rapidly become implicated, and the disease soon terminates fatally. The more limited states of ulceration, especially when commencing in the follicles, may perforate the coats of the viscus, and, having reached the peritoneal surface, occasion the exudation of lymph, by which the bladder becomes united to adjoining parts, thereby preventing the escape of urine, or forming a fistulous opening into some other viscus. In this manner a fistulous communication may be formed between the fundus of the bladder, the sigmoid flexure of the colon, or the œcum, or the ileum, &c. When a fistulous opening is thus formed between the bladder and any portion of the bowels, feces may pass into the bladder, unless the opening be formed between the under surface of the bladder and the rectum, and then the urine is usually voided with the feces. Fistulous communications between the bladder and the rectum are more frequent, especially in females, than between the former and other portions of the intestinal canal. When communications are formed in this situation, either by ulceration commencing in the bladder or in the rectum, an abscess below the reflected portion of the peritoneum often forms, owing to the inflammation of the connecting cellular tissue caused by the urine or by the feces. Mr. Coulson (*op. cit.*, p. 140) has recorded some interesting cases of fistulous openings between the bladder and intestines, to which I may refer the reader. Ulceration and perforation are always attended by hypertrophy or thickening of the coats of the bladder, whether they be consequent upon muco-cystitis or the more chronic or sub-acute states of true cystitis. When the ulcer is seated in the posterior and inferior part of the bladder, it may penetrate the coats so that the urine will pass into the cellular tissue between the bladder and rectum, producing the most destructive effects.

70. iv. COMPLICATIONS OF CYSTITIS.—One or other of the forms of cystitis may be associated with some other disease or structural lesion. These diseases may be the causes of the inflammation of the mucous coat of the bladder, as well as its complication. This is especially the case with gonorrhœa, gleet, stricture of the urethra, syphilis, calculus in the bladder, rheumatism, gout, &c. *Gonorrhœa* often induces a severe and obstinate form of muco-cystitis, the discharge from the urethra being diminished as that from the bladder becomes more copious and the other symptoms more distressing. On the other hand, the chron-

ic forms of muco-cystitis, especially when they go on to ulceration, perforation, &c., induce disease of the kidneys, most frequently of the left kidney (RAYER, RICHTER, P. FRANK, COULSON, &c.). In these latter cases a dull pain is felt in the loins, is increased by pressure, and is ushered in by chills, rigors, sickness at stomach, and an albuminous urine, which also contains large quantities of puriform matter, often tinged with blood.

71. With ulceration of the mucous coat, hypertrophy of the muscular coat, contraction and thickening of the parietes of the organ generally result. The bladder, owing to its irritability, is constantly contracting upon the urine poured into it ; and spasm of the sphincter often causes a regurgitation into, or an obstruction of the ureters ; which thus become distended and tortuous, and still farther changes are thereby induced. " The mucous membrane, extending upward along the ureters to the pelvis and the infundibula of the kidneys, becomes inflamed and rough, and pours out a quantity of pus. The glandular structure of the kidney undergoes from pressure slow absorption. The capsule adheres with preternatural firmness to the exterior of the gland. Upon making a section of a kidney so diseased, we find that, although apparently of large size, it consists in great part of dilated tubes, and that the true vascular or secreting part is in smaller proportion than usual."—(*Op. cit.*, p. 144.)

72. The complications either of muco-cystitis or true cystitis are chiefly with diseases of adjoining parts, and arise from the extension of inflammatory action, either to these parts from the bladder, or from the latter to the former. Inflammation of the urethra, prostate gland, strictures of the urethra, calculus vesicæ, hæmorrhoids, colonitis or inflammatory dysentery, inflammations of the rectum and of the uterine organs, and kidneys, &c., may severally extend to, or excite inflammation of the bladder. On the other hand, this latter may involve the adjoining parts : it may extend from the fundus to the omentum, or to some of the convolutions of the intestines, or it may occasion peritonitis. This is not a frequent occurrence ; but firm adhesions of one or other of these parts to the fundus of the bladder have been found on rare occasions, where, from the history of the cases, the bladder was the original seat of disease.

73. Inflammation may extend from the mucous coat of the bladder to the ureters, and along their course even to the kidneys ; but this very frequent and important complication of uro-cystitis is most probably not often produced in this manner, but much more frequently by the occlusion of the ureters where they pass through the coats of the bladder, owing to the tumefied state of the inflamed parts at this situation. In this case the urine is secreted for a while, but cannot pass into the bladder, owing to this condition of parts. Inordinate distention of the ureters, pelvis, and tubular structures is the consequence, and serious disease and disorganization, not only of these parts, but also of the constitution, result.

74. The extension of inflammation of the bladder to the uterine organs is not infrequent ; occasioning not merely adhesions between the serous surfaces, but also, particularly when cystitis is consequent upon, or is attended by retention of urine, retroversion or obliquities of the uterus, leucorrhœa, &c. The most frequent complication



of cystitis is stone in the bladder, the inflammation being consequent upon, and generally occasioned by the solid concretion. The frequent connexion also of the several forms of uro-cystitis with gout and rheumatism, either as consequences of the misplacement or metastasis of these, or as occurring from other causes, owing to the predisposition to urinary disease occasioned by them, should not be overlooked when ascertaining the causes and the relations of cystitis, or when determining the indications and means of cure.

75. v. APPEARANCES AFTER DEATH. — These vary much in different cases, and are more generally the consequences than the states forming the early, or even the advanced, states of the disease. — *A. After acute muco-cystitis*, the inner surface of the bladder is thick, rough, of a reddish-pink hue, from capillary distention, with small ecchymoses, owing to exudation from the congested capillaries. The inflammation in most fatal cases is found to extend over the whole inner surface, although greatest in some parts, especially near the neck of the organ. Coagulable lymph is sometimes found covering or attached to the mucous coat. This tunic, in the most acute cases, may be detached from the muscular in parts, or even throughout, forming a grayish layer resembling a false membrane. In many instances the mucous coat has been destroyed by ulceration; "sometimes, however, round ulcerated spots, the size of a sixpence, are found in different parts, with elevated edges and a red surface." Ulceration generally commences at or near to the neck of the bladder, and extends more or less to the fundus; but it sometimes begins in the latter, and advances to the former. In the most severe cases the muscular coat is involved in the inflammation, presenting gangrenous or disorganized spots. One or other of the kidneys is also generally diseased, the pelvis being dilated or ulcerated, containing pus, and the ureters also being dilated and ulcerated at their vesical extremities.

76. *B. In the slighter or early states of chronic muco-cystitis* the mucous coat is found, in cases of death from other diseases consequent on the former, injected, discoloured, thickened, and softened, and its follicles enlarged and inflamed. It separates readily from the adjacent coat, is abraded in parts, and is even detached in spots by extravasations underneath. The parietes of the viscus are thickened and contracted, the muscular coat is greatly hypertrophied, and ulceration of the mucous coat penetrates to the muscular, or even farther (§ 68, 69). When the ulceration is extensive, the hypertrophied muscular fibres appear, and resemble the columnæ carneæ of the heart, presenting a purplish-red colour; the mucous coat between the columns thus formed being pale, soft, and swollen. Pouches, or sacs, generally coexist, with dilated ureters, between these muscular columns, and are formed by the contractions of the bladder and of the abdominal muscles, in expelling the urine, forcing the mucous coat in places between the muscular fibres. These pouches are lined with a diseased mucous coat, which secretes an alkaline mucus, and are "sometimes the receptacles of a mortar-like matter, and finally of calculi, consisting generally of phosphate of lime." As the disease proceeds in the mucous coat it extends to the ureters, to the pelvis, and to the tubular structure of the kidneys;

and pyelitis supervenes. Ultimately the ureter leading to the kidney affected becomes dilated, tortuous, its lining membrane inflamed, granulated, or ulcerated, or sometimes covered with lymph. The pelvis and infundibula are much dilated, while the secreting structure of the kidney is reduced to a thin layer.

77. *C. In the more chronic states* and other cases of *muco-cystitis*, patches of a red colour, more or less deep, or from a bright red to a violet shade, are found in the mucous coat; and small ulcerated specks or points, apparently affecting the mucous follicles, are seen in these patches. In the more chronic cases the ulcers are of considerable size. When numerous they are generally small. Sometimes an albumino-puriform matter, adhering at points of the mucous surface, gives it an ulcerated aspect on a superficial view; and occasionally this surface appears elevated at numerous points, owing to an albuminous exudation in the subjacent cellular tissue. The whole internal surface is but rarely affected, although the greater part generally is, in the form of large irregular patches. In protracted cases the mucous surface is thickened, and this change often extends to the connecting cellular tissue; while the blood-vessels are more numerous and more engorged than natural. With these appearances the bladder is generally contracted, and the mucous coat forms a number of large wrinkles or folds, is often softened, and is occasionally incrustated, or covered in parts with a calcareous deposit. The prostatic gland is often enlarged in these cases, is somewhat diminished in consistence, and readily admits of being divided.

78. *D. In true cystitis*, especially when chronic, in addition to increased vascularity, more marked in some places than in others, the parietes of the bladder are much thickened, and more or less contracted; but the extent of these changes varies greatly, being generally greatest in cases of chronic cystitis arising from the presence of stone. In some cases the thickening is moderate, yet attended by a varicose state of some of the veins of the viscus. Adhesions to adjoining parts of the fundus of the bladder, ulcerations, &c., are also seen in the circumstances and complications of the disease described above (§ 63-69).

79. vi. DIAGNOSIS. — *A. Muco-cystitis*, when acute, may be mistaken for inflammation of all the coats of the bladder; but in the latter the desire to void the urine is much less frequent than in the former, and sometimes is not experienced until a large accumulation has taken place, and then it occurs in most severe paroxysms. The sense of scalding along the urethra felt in muco-cystitis is either slight, or absent when all the coats are inflamed. Occasionally the power to pass the urine is lost in this latter form of the disease, even when the desire is most urgent, and the act can be accomplished only after repeated efforts, or by surgical aid.

80. Many of the symptoms of acute muco-cystitis are experienced when stone is present in the bladder. But in cases of stone the pain is chiefly felt after the bladder has been emptied; whereas in acute muco-cystitis the pain is most intense when the bladder contains urine, and it subsides when the viscus is empty: in cases of stone, also, larger quantities of blood are passed than in muco-cystitis, and the urethra is seldom so irritable. (Coulson.)

81. *B. Irritability of the bladder* is to be dis-

tinguished from muco-cystitis and true cystitis by the symptoms noticed above (§ 11), and by the severity of the local affection, and of the constitutional disturbance. When, however, the irritability depends upon organic disease of the kidney, the diagnosis is more difficult. Mr. Coulson remarks that the intense pain which attends inflammation and ulceration of the mucous coat of the bladder soon exhausts the patient, while in irritable bladder from diseased kidney there is sometimes, but not always, pain in voiding the urine; that the frequency of micturition is the most distressing symptom; and that, even when pain exists, it is never so severe as to wear the patient out, but may be, and often is, endured for years.

82. *C. The chronic states of muco-cystitis* are readily recognised. When mucus is passed in the urine in small or moderate quantity it may be mistaken for the involuntary discharge of semen, or of the prostatic fluid, which accompanies the evacuation of the fæces or of the urine in some persons; but semen differs from mucus in its color, in its property of liquefying on cooling, in its insolubility in water when recent and thick, and its solubility when liquid, and in the radiating crystals which it produces after evaporation. The prostatic fluid may be distinguished by its remarkable transparency, by its stringy and slimy properties, and by its retention of these conditions until it is dried. The prostatic secretion is often mistaken for the seminal in cases where it is discharged, both being passed immediately after the bowels and the bladder are evacuated; but the prostatic fluid is passed much more frequently than the seminal, which is thus voided much more rarely than is often believed to be the case. Chylous urine is different from the urine voided in muco-cystitis, in being of a uniformly whitish hue, and the sediment formed by standing readily mixes with the urine on shaking; whereas the urine in this form of cystitis is at first turbid, and on standing the sediment becomes viscid, ropy, flocculent, or muco-puriform, or even purulent, and it has the appearances already noticed (§ 47-49).

83. *vii. THE PROGNOSIS* depends much upon the age, constitution, diathesis, and habits of the patient, and on the exact seat, severity, and duration of the disease. It may even still more depend upon the consecutive lesions already produced, and upon the presence or absence of complications. If the disease be primary and uncomplicated, and the patient young or middle-aged, and of a sound constitution, or has not previously been subject to disease of the urinary organs, the prognosis is *favourable*; but, on the contrary, if he be aged, cachectic, has been subject to previous disease of the urinary organs, to stricture, or to any of the complications mentioned above (§ 70, *et seq.*), especially to disease of the kidneys, and still more particularly to this latter, occurring consecutively upon chronic muco-cystitis, the prognosis is *unfavourable*. In the more acute cases, as well as in the subacute and chronic, if the pain continue, notwithstanding a judicious practice; if the micturition be still frequent; if the urine be loaded with a muco-puriform matter, epithelium, and a little blood; if a dull, heavy, and continued pain be felt extending from above the pubes to the sacrum or sacro-iliac symphyses, and especially if it be experienced in the loins and extend to the thighs; if emaciation and hectic

be marked; and if vital exhaustion be rapid or extreme—ulceration of the bladder, and consequent disorganization of the kidney, may be inferred, and a fatal issue be expected. If the states of true cystitis be followed by retention of urine, or if either form be followed by suppression, renal symptoms supervening, and no urine being found in the bladder, the danger is generally extreme. Whenever any of the severe symptoms mentioned above (§ 56, *et seq.*) occur, whatever may be the stage, form, or progress of the disease, a most cautious prognosis should be formed.

84. *viii. CAUSES OF CYSTITIS.*—*A.* The several forms of cystitis are most frequently met with in persons advanced in age, and in adults—particularly in the former. MM. LESAIVE and BOISSEAU have, however, seen them in children between two or three years of age, and I have met with them as early as four and five years; but instances at this age are very rare, unless when accompanied with calculus in the bladder, or after injuries and operations. Cystitis frequently occurs in cold and humid climates, especially that form of it which is limited to the mucous coat; and it is common in persons addicted to fermented or spirituous liquors. Sedentary habits and occupations also *predispose* to it, especially in aged persons who are either confined to a sitting posture or to bed. An habitual neglect of immediately attending to the first desire of voiding the urine is a usual predisposing as well as exciting cause; the retention of this excretion occasioning irritation of the mucous surface and over-distention and diminution of contractility of the muscular coat. Females are less subject than males to muco-cystitis; but they appear quite as liable to the acute form of true cystitis, while they are less frequently affected with its chronic state, and to the complication of the disease with calculus and with disease of the kidneys. This partial immunity is owing to calculous concretions being less frequent and more easily removed in females; while diseases of the prostate and of the urethra are very frequent causes of the forms of cystitis in the male sex.

85. There are, perhaps, few causes which more frequently predispose to inflammations of the bladder than long-neglected disorder of the digestive organs, and especially to those states of cystitis which are complicated with calculous formations. There also seems to be a predisposition constitutionally inherent in some persons to diseases of the urinary organs, and consequently of the bladder, and especially in those of a gouty diathesis. Indeed, both the gouty and calculous diatheses often originate in the same sources, namely, in deficient vital energy, and long-continued disorder of the digestive functions connected with an excessive use of animal food relatively to the amount of exercise in the open air. The connexion of the former state of the system with disease of the bladder is very evident, and the intimate relation which both diatheses hold to each other in respect both of their common sources and of their exciting causes, are satisfactory proofs of predisposition independently of the evidence furnished by experience of the frequency of cystitis in gouty habits. Persons of a serofulous diathesis, or who have been addicted to venereal excesses or to the habitual use of highly seasoned dishes, to much animal food, and to sedentary occupations, are generally disposed to cystitis.



86. *B.* The most frequent *exciting causes* are, too long retention of the urine, exposure to cold and moisture, sitting on damp couches, sofas, or seats, or on cold stones, or on the ground; damp clothes on the lower extremities; damp feet; cold drinks while the body is perspiring; the abuse of diuretic and lithotriptic medicines; the excessive use of common gin; the incautious exhibition of emmenagogues; the internal use of cantharides or turpentine in too large or too frequent doses; the abuse of aphrodisiacs; the introduction of a catheter or sound, especially by unskilled hands; irritating or improper injections thrown into the bladder; the irritation caused by calculi or by morbid states of the urine; external injuries, or blows on the hypogastrium, especially when the bladder is full; coitus when the viscus is distended with urine; horseback exercise, with inattention to the evacuation of the urine; the pressure of the fœtus upon the unemptied bladder during labours; protracted labours and the use of instruments to facilitate the process; operations performed on the bladder; the suppression of accustomed discharges, as of fluor albus, hæmorrhoids, catamenia, and the sudor pedom, to which some persons are subject; the incautious suppression, without suitable internal treatment, of cutaneous eruptions, or healing of external sores or ulcers; the retropulsion or misplacement of gout and rheumatism; inflammations of adjoining parts; obstructions to the discharge of urine from strictures of the urethra, or from enlargement or abscess of the prostate gland; repelled gonorrhœa, and the use of injections for its cure.

87. AMBROSE PARÉ, CABROL, and CHOPART have recorded some cases in which large quantities of cantharides had been taken as a cure for agues, and had occasioned cystitis of uncommon severity and fatal issue. The same result has followed the use of this substance as an aphrodisiac. Cystitis may also be the extension of inflammation from the pelvis of the kidneys to the bladder, or it may arise from the irritation of a calculus in that part of the ureter which passes between the coats of the bladder. It may also supervene in the progress of fevers, particularly of those characterized by stupor, coma, or delirium, or by congestion of the spinal cord, owing to the accumulation of urine of a highly irritating property; the local affection failing to excite the sensibility of the patient in these states, or the attention of the physician. The frequency and importance of this complication in fevers and in diseases of the brain and spinal cord should attract attention to it on every occasion, and on every visit.

88. Injuries and diseases of the spinal cord, its membranes, &c.; compression of, or hæmorrhage on, the cord; concussions of the brain or spinal cord, &c., are frequent causes of retention of urine, and thereby of cystitis. Even sudden jerks, as missing steps on descending stairs, coming with a jerk upon the feet when the body is erect, falling from a height on the feet, especially when much water is in the bladder and a predisposition to inflammation of it exists, are occasionally causes of the disease. It may be remarked, that a single cause will in some persons more certainly produce its effects than the concurrent operation of several causes where little or no predisposition to the disease exists.

89. ix. TREATMENT.—*A. Of Acute Muco-Cystitis.*—The antiphlogistic regimen and treatment

are required in all their details in this form of the disease. General and local *bleeding* should be prescribed, and even repeated, according to the age, habit of body, and constitution of the patient. Cupping over the sacrum, or leeches applied above the pubes or on the perineum, and repeated when circumstances indicate the propriety of the measure, are requisite; and in the milder cases, and in the less robust subjects, the local may supersede general bleeding. In some cases, especially when the symptoms indicate congestion or torpor of the abdominal viscera, or accumulation of sordes in the *prima via*, an *emetic* will be given with benefit. After its operation has been freely promoted the bowels should be sufficiently moved by means of *cooling aperients*, as the infusion of senna with magnesia, the neutral salts, or the carbonate of magnesia and sulphur, &c. Bleeding ought not to be carried too far, especially in the inhabitants of large towns, and in the aged, cachectic, or delicate. Nor should those purgatives which are liable to irritate the rectum or colon be employed; but the bowels ought to be kept regularly open. A warm general *bath*, or hip-bath, is always of service, and should be resorted to as early in the disease as possible after the above means have been employed, and should be repeated as often as the state of the patient will indicate. When the bowels have been evacuated, *opiates*, and *demulcents* or *emollients* are required, both to support the patient and to allay the local irritation. These may be variously combined and exhibited, and may be conjoined with the alkaline carbonates. Morphia, or the preparations of opium, may be used, according to the medicines intended to be given along with either of them or at the same time. I have generally preferred the soap and opium pill, conjoined with an equal quantity of Castile soap. If these fail or lose their effect, emollient enemata should be administered, with either the sirup of poppies or compound tincture of camphor added to them. When these also prove insufficient to allay the local irritation, opiate suppositories may be resorted to, and a belladonna plaster be applied above the pubes, or over the perineum, or a suppository containing some extract of belladonna may be tried. The state of the urine must be daily tested, and, as long as it continues acid, the carbonates of the fixed alkalies may be given, in demulcent vehicles, with such other medicines as the peculiarities of the case may suggest. As the disease lapses into a subacute or chronic state, the warm or hip-bath, opiates with soap or alkalies, the infusion of *parira* or of *diosma*, the preparations of *cubebæ*, small doses of *copaiba* or of the other balsams, and the infusion or tincture of hops, may be severally prescribed.

90. The acute form of muco-cystitis will be protracted, or pass into the subacute, and ultimately into the chronic form, if the *regimen* and *diet* of the patient be not duly regulated. All spirituous, vinous, and malt liquors should be relinquished, as well as acidulated or sweetened drinks or fluids. The food ought to be farinaceous, demulcent, and vegetable, and prepared in as bland a form as possible. The drink should consist entirely of linned-tea, barley-water, or toast-water, gum-water, or marsh-mallow tea taken in moderate quantities.

91. In severe or obstinate cases some practitioners have recommended the injection of oil

and opium into the bladder by means of a gum-elastic catheter. As to this treatment, Mr. COULSON has very justly remarked, that the pain and irritation caused by the introduction of any instrument along the urethra are so severe as to deter him from resorting to this treatment; for, unless there be retention of urine, the use of the catheter, sounds, and bougies should be avoided.

92. *B. Treatment of Chronic Muco-Cystitis.*—This form of the disease is often complicated with stricture of the urethra, or with disease of the prostate or kidneys; and it often also is consequent upon the acute form of the disease, owing either to neglect or to the constitution of the patient. In all cases the treatment of this form of muco-cystitis is difficult, and more especially when it is complicated, and in the aged and cachectic. When the disease is simple, or consists chiefly of an abundant secretion of mucus (cystorrhœa), the decoction of pareira, or the infusion of buchu, with opium or morphia, or with the dilute phosphoric or nitric or nitro-muriatic acids, and the decoction or extract of uva ursi, are generally of service; but, where there are also much irritability and pain of the bladder, opiates given by the mouth or in enemata are most requisite, and should be conjoined with every other method of cure. Sir A. COOPER recommends the balsam of copaiba, in doses of eight or ten drops thrice daily, with mucilage, sweet spirits of nitre, and camphor mixture. Mr. COULSON advises small doses of copaiba, or of the essential oil of cubebs with hyoseyamus, either to be given alone, or with the infusion of buchu, or with the decoction of pareira. He adds, however, that both copaiba and cubebs should be given with care; for, after the prolonged use of these remedies, an aggravation of the disease may result. He frequently, therefore, gives the compound tincture of benzoin, in the dose of a tea-spoonful, three times daily; and, when the urine is alkaline, and contains much mucus with the phosphates, an infusion of the dried *Alchemilla arvensis* (one ounce to a pint of boiling water), the dose being two ounces of the infusion three times in the day. The muriated tincture of iron, the ammoniated tincture of iron, the balsams, Chio turpentine, and other kinds of turpentine, uva ursi, with camphor and nitre, the sulphates of iron and of zinc, have also been severally employed in this state of the disease, and are generally of service when aided by opiates, and when the digestive organs and bowels are duly regulated. DUPUYTREN relied much upon turpentine when the mucous secretion was great; and I have had occasion to observe its good effects; but it should not be long continued, although it may be given at intervals, or alternately with other means.\*

\* The *copaiba* is much employed in this country in cases of vesical catarrh, and often with decidedly beneficial effects. It should be given in moderate doses, as 10, 15, or 20 drops every four hours, in emulsion of gum arabic and sugar. If it gripes, nauseates, or purges, *tinct. opii* or *morphia* should be combined with it; and if pyrosis or acid eructations be present, bicarbonate of soda is a very useful adjunct. Its use must be continued in chronic cases several weeks, the patient using at the same time the fluid extract of *uva ursi*. If its taste become disgusting, *turpentine* may be substituted for it. We have in many cases used the *uva ursi*, in connexion with alkalies, with a successful result. The *chimiphila umbellata* is also very useful in this disease. The *epicaca repens* (May-flower) is extolled by Dr. IVES, of New Haven, as a highly useful remedy in this affection. A wine-

93. Persons of a scrofulous diathesis, or those addicted to venereal excesses, or who have suffered from syphilitic affections, or who are subject to hæmorrhoids or to gout, are liable, when they are attacked, to an obstinate form of this disease. For these the treatment should have more or less reference to the state of constitution, while the local affection also obtains sufficient attention. The aged and cachectic also require to have their constitutional powers supported while the urinary disease receives requisite care. But in these latter persons palliation alone can be hoped for; and the prolongation of life, by means of a restorative or tonic treatment, opiates, and a regulated diet, is often the whole amount of benefit that can be expected.

94. When chronic muco-cystitis is associated with stricture of the urethra, or is produced by it, the treatment is extremely difficult. Mr. COULSON remarks that "the pain and irritation along the urethra are often so great as to render the use of catheters and bougies impracticable: and, unless the state of the urethra improve, no material benefit can be expected from internal remedies." Under these circumstances, having calmed the pain and irritation by means of sedatives, he proceeds to dilate the urethra with bougies or the gum-elastic catheter; and, if the stricture be of long standing and very narrow, he commences with armed bougies, introducing them once in three or four days.

95. The frequency of this, as well as other forms of cystitis in the gouty, and even also in the rheumatic diathesis, and of the occurrence of the disease in connexion with, or upon the disappearance of gout, suggests the propriety of modifying the treatment conformably with this connexion. In these cases I have found the opium and soap pill, with the extract of colchicum, taken at bed-time, and a sufficient dose of magnesia and sulphur, or magnesia and rhubarb, early in the morning, to prove of great service. One or other of the other means already mentioned, avoiding the acids, may also be given in the course of the day, as circumstances may indicate.

96. Other means, which more especially belong to the province of the surgeon, have been advised in the more severe and protracted cases of muco-cystitis. Sir B. BRODIE states that when "the symptoms are at their greatest height, the mildest injections (into the bladder), even those of tepid water, will do harm rather than good. They are especially to be avoided when the mucus deposited by the urine is highly tinged with blood. When, however, the symptoms are abated, the injection of tepid water, or decoction of poppies, is, in many instances, productive of excellent effects." The fluid should be allowed to remain in the bladder about thirty or forty seconds, and not more than two ounces should be injected each time. Distention of the bladder by the injection so as to cause pain is injurious, and should be avoided. The operation may be repeated once or twice in the twenty-four hours. When the symptoms have abated and assumed a still more chron-

glassful of a decoction, made with two drachms to half a pint of water, is to be given every two hours. In its effects it is closely allied to the *uva ursi* and buchu (*Trans. Amer. Med. Assoc.*, vol. iii., p. 314). See also a paper by Dr. LA ROCHE on *copaiba* in this affection, in *Am. Jour. Med. Science*, vol. xiv. Dr. GROSS speaks very favourably of the *benzoë* acid, given alone, or in combination with bals. *copaiba*, in doses of 15 to 20 grs. three or four times a day, or with a few drops of Haerlem oil.]



ie form, and the mucus is free from blood, then one minim of the strong, or ten minims of the diluted nitric acid, to two ounces of distilled water, may be used as an injection; the proportion of the acid being afterward increased. Mr. COULSON remarks that the tenacious mucus produced in this state of the disease deposits phosphate of lime; and when phosphate of lime from this source coexists, as it often does, with the triple phosphate in the urine, a compound salt is formed; and in such cases a weak solution of nitric acid (beginning with one minim of strong acid, increasing the quantity to two, to two ounces of distilled water) injected into the bladder acts as a salutary stimulant. As to LALLENAND's cauterization of the mucous membrane of the bladder with solid nitrate of silver, in cases of chronic catarrh, and as to DEVERGIE's injections with balsam of copaiba and narcotics, I must refer the reader to the work of the author just mentioned, and to other surgical works.\*

97. It should not be overlooked that excessive mucous secretion from the surface of the bladder, if neglected, or treated too long with some of the more heating substances which have been advised, may be followed by a chronic inflammation of all the coats of the bladder, and ultimately by a subacute or an acute form of the disease, which may destroy the patient. This result is most likely to occur when the *diet* and *regimen* so requisite to the success of treatment have been neglected. In the milder form of the disease, animal food in very moderate quantity may be taken. The diet should be chiefly farinaceous, but the white kinds of fish, boiled, may be allowed.† In the severer states animal food should be still more sparingly taken. If in these the vital powers be much depressed, sufficient light nourishment may be given, and tonics with the alkaline carbonates, opiates, &c., may be prescribed. Spirituous, vinous, and malt liquors should be strictly prohibited, and all irregularity of diet and regimen carefully avoided. When there is great debility, dry

(\* Dr. GROSS (*loc. cit.*) recommends, in obstinate cases of this disease, *counter-irritation* in the form of a seton, issue, or tartar-emetic pustulation, over the perineum or the suprapubic region. If there is reason to suspect renal disease, the counter-irritation should be over the sacrum or in the loins by means of a seton, and the discharge kept up for a long time. When *irrigation* is practised, a better mode than that recommended is to use a double catheter, and gently inject a pint of tepid water, so as to wash out the bladder thoroughly; and it may be repeated twice a day, unless the urine is bloody, or there are symptoms of cystitis present. With regard to the various medicated injections for a local alterative effect on the mucous membrane, we greatly prefer a solution of the *nitrate of silver*, in combination with the fluid, watery extract of *opium* or *hyoscyamus*, beginning with a weak solution, and gradually increasing its strength, throwing in about two ounces each time, and allowing it to be retained from five to ten minutes; the patient placing himself in different attitudes to bring it in contact with every part of the bladder, and repeating the injection once a day, or every third day, according to circumstances.

Where every thing has failed, it has been proposed by Mr. GUTHRIE to open the neck of the bladder by an incision, as in lithotomy, so as to allow a free outlet to the mucous secretion as fast as it is poured out, and thus afford the bladder comparative repose; on the same principle as the knife is recommended for anal fistule and fissure. This operation has been performed by Dr. W. PARKER, of New York, with evident relief of the symptoms, but the patient succumbed four weeks after from organic dis ease of the kidney and bladder. (See *New York Journ. of Med.*, 1850.)

[† We have generally found an entire abstinence from animal food the preferable course, and only allow mild broths when convalescence is fully begun. *Vegetable acids* are always prejudicial in this disease.]

sherry may be allowed, especially if acidity of the *prima via* be not experienced. In all cases the functions of the skin as well as of the bowels should be duly promoted.

98. *C. Treatment of Acute Cystitis—of Acute Inflammation of all the Coats of the Bladder* (§ 56).—It has been above (§ 55) stated that the inflammation may affect one of the tissues of the bladder more than the others, or may implicate them all, chiefly through the medium of the connecting cellular tissue, and that a portion of the bladder may be thus affected, or the whole of the organ; that when the inflammation is seated in the neck of the bladder, the urine is retained by the tumefaction occasioned by it; and that when the parts through which the ureters pass into the bladder are chiefly affected, the swelling which results more or less obstructs the passago of the urine, and occasions dilatation of the pelvis, ureters, &c., by its accumulation in these parts and suppression of this excretion. The consequences of the *retention* on the one hand, and of the *suppression* on the other, are always most serious, and should be prevented by a most active treatment as soon as these important and always dangerous states are present. The former may be removed by surgical aid; the latter by prompt and judicious medical treatment. But in most cases the treatment should have reference to the cause of the disease and the diathesis of the patient. When the malady is produced by cold in any form, then the phlogistic form may be inferred, and suppuration may take place, especially in the phlogistic temperament and full habit of body. When it is occasioned by spirituous liquors, aphrodisiaes, or the suppression of the gonorrhœal discharge, although all the coats may be implicated, the mucous wall generally be chiefly affected, and retention or suppression of urine less frequently result. If the disease occur in the gouty or rheumatic diathesis, or follow upon suppression or metastasis of either gout or rheumatism, all the coats may be affected, and neither the fundus nor its peritoneal covering escape.

99. In all these circumstances the treatment should be prompt and decisive, and the quantity of urine retained in the bladder carefully watched, by examining the hypogastrium and the quantity excreted. If the patient be young, or robust, or plethoric, although advanced in life, venæsection should be prescribed and even repeated, and be followed by the local depletions, which may be sufficient for the delicate or weak, by cupping on the perineum, or by leeches applied to the part or to the pubes. Hot baths; warm fomentations above the pubes or on the perineum; the removal of the urine by means of the catheter whenever it may be required; emollient, laxative, and anodyne injections; cooling saline aperients, preceded by calomel and opium when the febrile symptoms are severe and the biliary functions are impaired; and demulcents with diaphoretics—are the means of cure which may be safely resorted to in all the circumstances of the malady just noticed. If the disease be consequent upon gonorrhœa, oleaginous or mucilaginous demulcents, with small doses of camphor, nitrate of potash and henbane, in addition to appropriate depletions, diaphoretics, aperients, &c., will generally remove the more urgent symptoms. If it be connected with gout or rheumatism, magnesia and sulphur in equal parts, either alone or with demulcents, and small doses of colchicum, will

be found very beneficial, by moderately promoting the abdominal secretions and the functions of the skin; this latter being too generally overlooked, especially in gouty affections. Under the above treatment the symptoms generally subside gradually; but if retention of urine be long neglected, or if the urine be suppressed, owing either to delay in adopting the above means, or the constitution of the patient and violence of the attack, delirium, coma, and death will generally result. It may be asked, What should be done in cases where the urine has become suppressed? I would answer, after the above means have been judiciously employed, that warm flannels, or stupes, moistened with spirits of turpentine, should be applied over the hypogastric region and perineum, and that emollient enemata, containing equal parts of this substance and castor oil, and one or more ounces of olive oil, be administered and repeated as they may be required, while diaphoretics should be assiduously continued.

100. When the inflammation of the fundus of the bladder implicates the peritoneal coat, or is associated with inflammation of the uterine organs or peritoneum, the treatment is not then materially different from that recommended above. Cupping over the sacrum, leeches to the hypogastrium, &c., the warm terebinthinate embrocations, or stupes, in these situations, calomel and opium, followed by the enemata and diaphoretics already advised, are the means most generally appropriate.\* If cystitis be complicated with hæmorrhoids or inflammation of the rectum or colon, or with fistula, calomel should be withheld, as it generally increases these affections, and thereby prevents the resolution of the uro-cystitis; but the other means ought to be employed.

101. *D. Treatment of Chronic Uro-Cystitis.*—Chronic uro-cystitis is often consequent upon the acute, but it is oftener a consequence of stricture of the urethra, of enlargement of the prostate, of stone in the bladder, of prostatic calculi, of the abuse of spirituous liquors, especially of common gin; of the use of cantharides, or of cubebæ or copaiba; or protracted gout and rheumatism, especially the former; and of the retention of the urine in the bladder after the desire to pass it. The nature of the cause influences more or less the treatment to be adopted. In strong, young, or plethoric subjects, and especially when considerable pain is experienced, local depletion, followed by warm baths, the semicupium, fomentations, &c., is always required. In many cases the removal of the primary disease should be the first indication, especially in the case of stricture of the urethra; and with this indication the employment of means which act more or less directly on the bladder should also be adopted. In most instances the selection of these means should be guided by the state of the urine. If this be acid or scanty, the bicarbonates of the fixed alkalies with nitrate of potash and sweet spirits of nitre, in demulcent or emollient vehicles, will be generally of great service; and anodynes, such as the sirup of poppies, tincture of henbane, compound tincture of camphor, tincture of hop, opiate suppositories, &c., will also be prescribed in many cases with advantage. The preparations of pareira brava, or of the diosma, or of uva ursi [or *Epigea repens*, or *chimiphila umbellata*] may, in the more obstinate or chronic cases,

be given with the above, or the decoctions or infusions of these latter may be the vehicles for the exhibition of the former. When the disease occurs in the gouty or rheumatic diathesis, or appears after the suppression of either of these diseases, then the extract, tincture, or wine of colchicum in small doses, may be prescribed with the alkalies, and a small dose of opium or of morphia; and when the pulse presents much strength or hardness, the tincture of aconite, in the dose of one, two, or three drops, may be resorted to, although this latter is more appropriate in the more acute cases, and when the peritoneal covering of the viscus is implicated in the disease. The infusion of parsley-root is sometimes of service in chronic uro-cystitis, especially when made the vehicle for some of the medicines mentioned above. Mr. COULSON states that he has tried the infusion of wild-carrot seeds in this form of the disease with advantage, but that it should not be given if there be any irritation of the mucous membrane; and he adds that, as in these cases the bladder is, by its own efforts, seldom completely emptied, a catheter should be introduced from time to time, and the patient be instructed to do this for himself. Unless this direction be strictly attended to, the patient will become worse, and serious consequences ensue.

102. *E. When inflammation is extended to the peritoneal coat of the bladder*, either from the internal coats, or from parts in the vicinity of, or in contact with the peritoneal, the symptoms may then be very acute, and become chronic from neglect or injudicious treatment. This form of the disease is most frequent in females, especially after parturition or in some period of the puerperal state, and is generally contingent upon the occurrences which sometimes take place during this state. In some cases it is strictly a partial peritonitis, confined chiefly to the pelvic peritoneum; the symptoms, local and general, being distinctive of its nature and seat. (See art. PERITONEUM, *inflammation of*, § 76.) The seat of pain, tenderness, and tension, the rapidity of the pulse, the position of the patient, the expression of the countenance, &c., indicate the nature of the disease, which may be limited to the pelvic peritoneum, especially when coagulable lymph is thrown out, which forms adhesions between the opposite surfaces, and prevents the extension of the malady. In unhealthy constitutions, and in females in the puerperal states, the inflammation, instead of being thus limited, generally extends over the peritoneum; in place of coagulable lymph, a serous fluid, of varied appearances, is thrown out, and the morbid action, commencing in the hypogastric region, extends through the abdomen, which becomes tender and tympanitic. The pulse is so rapid as hardly to be counted; hiccough supervenes, and the disease presents the course and termination described in the article PERITONEUM (§ 19–36). In these cases the treatment is the same as I have advised in that article (§ 137–159, *et seq.*).

103. In rare instances an abscess forms below the peritoneum, between the bladder and the symphysis pubis, or some other adjoining part, as in a case related by Dr. ELLIOTSON. Sometimes also a pseudo-abscess is seated within the pouch of the peritoneum, between the posterior wall of the bladder and the rectum. Lymph, in these cases, agglutinates some folds of the intestines, or the sigmoid flexure of the colon and the fundus

\* Anodyne suppositories are better suited to this disease than enemata.]



of the bladder, and pus collects in the pouch formed by these parts. The contents of this pseudo-abscess may be absorbed, if in small quantity, old adhesions alone remaining; or they may find their way into the peritoneal cavity, and occasion general peritonitis and death. Cases of this nature are mentioned by Mr. COULSON, and they have been seen by myself, but only in females, and as consequences of pelvic peritonitis after parturition (see *art. PERITONEUM*, § 76, *et seq.*, and *PUERPERAL DISEASES*, § 221, *et seq.*).

104. V. MALIGNANT AND OTHER FORMATIONS are sometimes found in or attached to the parietes of the urinary bladder.—*A. Tubercle* is occasionally deposited in the parietes of this viscus, generally either under the peritoneal coat, at the fundus, and in the mucous membrane, near the urethra. In this latter situation the small granular deposits pass rapidly to ulceration. Tubercle of the vesical mucous membrane is, according to ROKITANSKY, rare, and is not always formed in connexion with tubercular affections of the urinary and sexual organs. Tubercle on the exterior of the bladder is generally seen associated with the same formations in the vicinity, especially in the female sexual organs. Mr. COULSON remarks that the morbid deposit may be so great as to glue together the different organs, and thus interfere with the free action of the detrusor urinae; but this can only occur when the tubercular cachexia is inordinately developed. The most frequent appearance of tubercle in connexion with the bladder is in cases of tubercular peritonium, that part of the membrane covering the bladder partaking in the general alteration, the deposit being commonly in small distinct masses, the membrane being spotted, dark-coloured, or rugous, or otherwise altered. (See *PERITONEUM*, § 111, *et seq.*)

105. *B. A polypous excrescence* from the internal surface of the bladder is very rarely observed. Dr. BAILLIE saw only one example of it, and that filled up the greater part of the cavity of the viscus. An instance of it occurred to Mr. CROSSE, of Norwich, in a child. Other cases of polypus vesicae have been recorded by Mr. WARNER and others, but they require no particular notice. The very interesting and instructive case published by the late Mr. CROSSE will be found in Mr. COULSON's work.

106. *C. Malignant formations* in the bladder are not very rare. The worst form is that described by Mr. TRAVERS and others as the malignant medullary fungus, which arises from the sub-mucous tissue, and projects into the cavity of the viscus as a soft, vascular, and cauliflower-like mass, which bleeds upon the slightest touch. Mr. TRAVERS states that it springs from "the mucous coat of the bladder, and resembles that of the nares and uterus, breaking, bleeding, and reproduced as quickly as it is displaced. It is of very extensive attachment, and gradually reduces the cavity to very small dimensions. Portions of fungus and coagula of blood become plugged in the urethra, and form firm pellets, so as to produce retention of urine. It is a very painful disease. It keeps the patient in constant anxiety to void urine, which is more or less tinged with blood, and frequently he passes blood alone. He dies hectic and wasted." Mr. COULSON states that this malignant fungus is generally first developed near the neck of the bladder, the trigon, or the posterior surface; and that cases occur in

which the vegetations fill a diverticulum or sacculus, where they form a tumour which may cause retention of urine by its pressure. These tumours vary in size, some being, when solitary, as large as a goose's egg; others are small, especially when they are numerous. Another form of medullary cancer has been described by ROKITANSKY as occurring in small masses between the muscular and mucous coats of the bladder. It may make its way through the mucous coat and form a deep carcinomatous ulcer, or may protrude externally through the muscular and peritoneal coats. Fibrous or scirrhous cancer, although sometimes affecting the uterus and ovaries, very rarely attacks the urinary bladder. These malignant formations cannot be assigned to any local cause of irritation, or to any other cause beyond the cancerous diathesis, hereditary or acquired. (See *art. CANCER*, § 23, *et seq.*)

107. *a. The symptoms* of malignant tumours of the bladder frequently resemble those of stone. WARREN states that the first sign of this disease is a discharge of blood with the urine. The quantity is at first so small as scarcely to tinge the urine, but it gradually increases until it becomes an exhausting symptom. The amount of pain attending it varies in different cases, being slight or moderate in some, and severe in others. Constant desire to pass urine is one of the most common symptoms, accompanied with sympathetic irritation of the rectum and inclination to stool. When blood passes from the bladder after the introduction of a sound or catheter, or after the flow of urine has terminated, or very nearly terminated, there is much reason to infer that it proceeds from the coats of the bladder; and when this occurs in connexion with the other signs, and especially with the sense of the existence of a body or substance in the bladder, felt either by the patient or the operator when a sound is introduced, the existence of a malignant tumour, fungus, or polypus may be inferred. Ultimately, in these cases, consecutive disease and disorganization of the kidneys, with more or less marked disorder of the stomach and bowels, and exhaustion of the powers of life, is followed by a fatal issue. I may refer the reader to Mr. COULSON's work for some instructive cases and *post mortem* appearances of this disease.

108. Disease of a disorganizing nature may extend to the bladder from malignant disease of the rectum in men, or of the womb in females; and by means of ulceration a communication may be established between the rectum and the bladder, or between the bladder and vagina.\* Mr. TRAVERS, however, doubts whether the ulceration of the bladder in these cases be truly cancerous. In this doubt Mr. COULSON appears to partake. I have seen a few cases of extension of malignant disease from the neck of the uterus to the bladder, but in most of them have had reason to infer that the disease in the latter partook of the same character as that of the former.

109. *b. The treatment* of malignant disease of the urinary bladder is chiefly palliative, by means

\* The mode of treatment by *suture*, in cases of vesico-vaginal fistula, has been in vogue since the 17th century; but the profession is under great obligations to Dr. J. M. SIMS, of New York, for his improvement of the ordinary operation, which is sufficiently easy, simple, and safe, and in a very great degree successful. For a full description of his mode of procedure, see *New York Medical Gazette*, vol. v., 1854; *American Medical Monthly*, Feb., 1854; and GROSS on "Diseases of Bladder," p. 156.]

of narcotics, sedatives, &c., administered by the mouth, or in enemata, or in suppositories, as advised when treating of CANCER, and of diseases of the UTERUS, &c. In many of these cases the hæmorrhage from the bladder is so excessive that means are required to arrest the discharge and to sustain the powers of life. For these the tincture of the sesquichloride of iron, the decoction of pareira brava, with nitric, or hydrochloric, or sulphuric acid, if the urine be alkaline; the uva ursi, with the alkalies, if the urine be acid; the secale cornutum, spirits of turpentine, and other anti-hæmorrhagics and astringents, the recumbent posture, &c., are the means chiefly to be confided in, conjoined with opiates, &c.

110. VI. ABNORMALITIES OF THE BLADDER are sometimes observed, either alone or in connexion with malformation of other parts of the urinary or sexual organs. They are generally congenital, and proceed from irregularities of fetal development. Numerous cases and various forms of irregularity of formation are on record; but as respects any treatment which may be adopted for them, they concern the surgeon more than the physician, and sufficient reference may be made to them in the subjoined Bibliography.

111. *Foreign bodies* are often found in the bladder, having been introduced at some previous period, or having passed into it from the rectum or some part of the intestinal canal, through a perforating ulcer or sinus formed between the bowel and bladder.\* In many instances, when a foreign body has been found in this viscus, it had become incrustated by the urinary deposits to a greater or less extent. This subject will be found more appropriately discussed in surgical works, where also *rupture of the bladder*, *hernia of the bladder*, and *wounds and injuries of the bladder*, are most ably treated of by their respective authors.

BIBLIOG. AND REFER. — *Aretæus*, Curat. Acut., l. vii., cap. 9; Chronic., l. ii., cap. iv. — *Oribasius*, Synopsis, l. ix., cap. 26, 31. — *Alexander Trall.*, l. iii., cap. 36. — *Paulus Ægin.*, l. iii., p. 45. (*Injections into the Bladder*, &c.) — *Avicenna*, Canon, l. ii., fin. 19. Tract. i., cap. 14. — *J. F. Arna*, De Vesicæ et Renis affectus Dignotione et Medicatione, Svo. Bugella, 1550. — *Rufus Ephesus*, De Vesice Renisque Morbis, Svo. Paris, 1554. — *Jugenius Horat.*, Epist., l. x., n. 5. — *Boyrin*, Ergo Ienium et Vesicæ affectus per Dijectionem expurgantur. Paris, 1599. — *Amatus Lusitanus*, Cent. v., cap. 79. — *Zacutus Lusitanus*, Med. Pract. 11st., l. ii., n. 130. — *J. M. Müller*, Dissert. de Inflammatione Vesicæ Urinarie, 4to. Altd., 1765. — *Vater*, Dissert. de Ulceris Vesicæ Signis et Remediis. Witteb., 1709. — *Bonet*, Sepulchret., l. iii., sec. xxv., obs. 18; sec. xxix., obs. 10. — *Warner*, in Philos. Trans.,

n. 495. (*Sarcomatous Excrecence removed by Ligature and Excision*). — *F. Lallier*, a Dissertation on Disorders which affect the Neck of the Bladder, 12mo. London, 1722. — *F. Hoffmann*, Dissert. de Exulceratione Vesicæ. (Opera, Sup. ii., 2, 4to.) Hal., 1724. — *C. Barrère*, Obs. Anatomique tirées de l'Ouverture des Cadavres, Svo. Paris, 1571. — *Friend*, Comment. de Febribus, p. 142. (*Abcess opening into the Rectum*). — *Morgagni*, de Sed. et Caus. Morb., Epist., xlii., 20; lxii., 2. — *J. G. de Arnaud*, Plain and Easy Instructions on Disease of the Bladder, 12mo. Lond., 1763. — *C. Biset*, Medical Essays and Observations, Svo. Newcastle, 1766. — *Valisneri*, Opera, t. iii., p. 310. — *C. Perry*, Disquisitions on the Stone and other Diseases of the Bladder, Svo. Lond., 1777. — *Walter*, Anat. Mus., b. i., p. 62. (*Abcess opening into the Abdomen*). — *Leutin*, Beyträge zur Ansiebenden Arzneywissenschaft, b. iii., p. 53. (*Attributes Paralysis of the Bladder to shortening of the Spine in old Persons*). — *Le Clerc*, in Journ. de Méd., t. iii., p. 11. (*Enormous Dilatation of*). — *Fothergill*, Memoirs of Med. Soc. of London, vol. i., n. 12. — *Hunter*, in Ibid., vol. i. — *Waring*, in Ibid., vol. iii. — *J. P. Frank*, Oratio de Vesica Urinariæ et vicinis Morbis ægrotante, Svo. Pappe, 1786. — *M. Troja*, Lezioni intorno al male della Vesica Urinaria, &c. Svo. Nap., 1786. — *Dencker*, De Catarrho Vesicæ, in Tract. Doering, l. i. Duisb., 1759. — *Ford*, London Med. Journ., 1752, p. 80. (*Disease of B. with Caries of the Os pubis*). — *Isard*, in Journ. de Méd., t. ix., p. 263. (*Abcess of, opening into the Rectum*). — *Desgenettes*, in Journ. de Méd., t. xxi., p. 159. (*Gangrene of*). — *J. P. Frank*, De Curand. Hom. Morbis, l. ii., p. 294. (*Abcess of, opening into the Rectum*). — *l. v.*, p. 82, 266; (*Scirrhus of*). — *l. vi.*, p. 28; (*containing 30 lbs. of urine*). — *Sandifort*, Observat. Anatom. Pathol., l. iii., cap. 3, p. 58; et l. iv., p. 75; et Mus. Anat., i., p. 265, 262. — *Wichmann*, Ideen zur Diagnostik, t. iii., p. 13. — *Lodwell*, in Mem. of Med. Soc. of Lond., iii., ap. i. (*Communicating with the Colon by perforating Ulcer*). — *Prochaska*, Anat. Acad., fasc. iii., cap. 3, obs. 2. (*Adherent to the Uterus*). — *A. Portal*, Cours d'Anatomie Médicale, t. v., p. 392. — *Zeviani*, in Mem. della Società Ital., t. vi. — *W. Hunter*, Plates of the gravid Uterus, No. 26. (*Great Distention of 36 Pounds of Urine*). — *J. Foot*, Cases of the successful Practice of Vesicæ Lotura in diseased Bladder, Svo. Lond., 1799. — *J. Sherven*, Observ. on the Diseased and Contracted Urinary Bladder, Svo. Lond., 1799. — *F. A. Walter*, Einige Krankheiten der Nieren und der Harnblase, 4to. Berl., 1800. — *M. Baillie*, Series of Engravings, &c., fasc. vii., pl. 1. — *Prochaska*, Annot. Acad., fasc. iii. — *Klein*, in Lodor Journ. für die Chirurgie, b. iv., st. d. 4. p. 864. (*Polypous Excrecences within the Bladder*). — *H. Johnston*, Practical Observ. on Urinary Gravel and Stone, and on Diseases of the Bladder and Prostate Gland, Svo. Edin., 1815. — *J. P. Frank*, Interp. Clinic., t. i., p. 253, 262. (*Carcinoma*). — *Derends*, Dissert. de Cystirrhœa Mucosa. Frank., 1806. — *W. Schraud*, Ueber die Krankheiten der Harnblase, &c., Svo. Wien, 1806. — *Forster*, in Medico-Chirurg. Trans., vol. i., 9. — *W. Schmid*, Ueber die Krankheiten der Harnblase, Vorsteher-Drüse und Harnröhre, Svo. Wien, 1806. — *T. Soemmering*, Abhandlung über die Krankheiten der Harnblase. Salz., 1809. — *M. Nauche*, Des Maladies de la Vessie, &c., chez les Personnes avancées en Age, Svo. Paris, 1810. — *L. Bell*, in Transact. of Medico-Chirurgical Society of Lond., vol. iii., p. 171. — *J. Shaw*, in Ibid., vol. xii., p. 461. — *P. Larbaud*, Recherches sur le Catarrhe, et de la Vessie, Svo. Paris, 1812. — *Renauldin*, Art. Cystite, in Dict. des Sciences Méd., t. vii. Paris, 1813. — *C. Bell*, Treatise on the Diseases of the Uræthra, Vesica urinaria, &c., Svo. Lond., 1820. — *J. Wilson*, on the Structure and Physiology of the male Urinary and Genital Organs, and on the Nature and Treatment of their Diseases, Svo. Lond., 1821. — *S. T. Soemmering*, Ueber die Tödlichen Krankheiten der Harnblase und Harnröhre aller Männer, Svo. Franck., 1822. — *R. Eingham*, a Practical Essay on Diseases of the Bladder, Svo. Lond., 1823. — *Ferrus*, Art. Cystite, Dict. de Méd., t. vi., Svo. Paris, 1823. — *J. Hovship*, a Practical Treatise on the Symptoms, &c., of Complaints affecting the Secretion of Urine, Svo. London, 1824. — *Dupuytren*, in Archives Génér. de Méd., t. xviii., p. 423. (*Carcinomatous Tumour*). — *Wolf*, in Journ. des Progrès des Sci. Méd., t. xiv., p. 274. — *J. Davidson*, Trans. of Med. and Phys. Soc. of Calcutta, vol. vii., p. 16. — *W. Coulson*, in Med. and Chirurg. Rev., July, 1833, p. 166. — *O'Brien*, in Ibid., vol. xxix., p. 554. — *Cramer*, in Rev. Méd., t. ii., 1825, p. 189. (*Mur. Ammon. et Mucil. in Cystitis*). — *M'Dowell*, Trans. of Irish Coll. of Phys., vol. iv., p. 131. (*Buchu Leaves*). — *Beglin*, Art. Cystite, in Dict. de Méd. et de Chirurg. Pratique, t. vi. Paris, 1831. — *Cumin*, in Cyclop. of Pract. Med., vol. i., p. 502. Lond., 1832. — *R. Willis*, Urinary Diseases and their Treatment, Svo. Lond., 1838. — *G. J. Guthrie*, on the Anatomy and Diseases of the Urinary and Sexual Organs, Svo. Lond., 1836. — *B. C. Brodie*, Lectures on the Diseases of the Urinary Organs, 3d ed., Svo. Lond., 1842. — *W. Prout*, on the Nature and Treatment of Stomach and Urinary Dis-

\* *Worms*, chiefly of the *ascariidæ* genus, have not unfrequently been found in the human bladder, having crept thither from some part of the intestinal canal, either by perforating its coats or through some ulcerous opening. Mr. LAWRENCE and T. B. CURRIE, of London, have both described instances of this kind (*Medical Clin. Trans. of London*, vol. ii., p. 385, and vol. xxii., p. 279); and in this country, among several others, Dr. BARDWELL, of Indiana (*West. Journ. of Med. and Phys. Sci.*, vol. vii., 1834), and Dr. CAMPBELL, of Conn. (*Am. Journ. of Med. Sci.*, vol. xxi., p. 130). In the former case, many thousand worms were passed in the course of six months, of a lumbricoid kind, from six to nine lines in length, and about the thickness of a horsehair, with a black and rather large head, the body of a dark, dirty white. Some of them lived 24 hours after they had been voided. The patient, a man aged 30, recovered under the use of turpentine. In the latter case the worms were small, red-headed, and about half an inch long, the bodies composed of many minute cartilaginous rings, and furnished with a number of legs, arranged in two rows from one extremity to the other. They were hard, very active, strong, and tenacious of life. See also a case in Dr. GROSS's work, so often quoted (p. 332, 2d ed.), with a history of symptoms, treatment, and all there is known on the subject.]



eases, being an Inquiry into the Connexion of Diabetes, Calculus, and other affections of the Kidney and Bladder with Indigestion, &c. Lond., 1843, 4th edit.—*W. Coulson*, on the Diseases of the Bladder and Prostate Gland, 4th edit., 8vo. Lond., 1852. (See also BIBLIOG. AND REFER. to the next Article.)

[AM. BIBLIOG. AND REFER.—*S. D. Gross*, a Practical Treatise on the Diseases, Injuries, and Malformations of the Urinary Bladder, the Prostate Gland, and the Urethra, 2d ed., 8vo, p. 925. The ablest and most comprehensive work, on the subjects of which it treats, hitherto published. It is remarkably full, clear, and accurate in its statements, and the medical and surgical treatment recommended for its various affections is in the highest degree wise and judicious. There are numerous articles, reports of cases, essays, &c., relating to the bladder and its diseases, scattered throughout the American medical journals, many of which are worthy of special mention. We shall, however, refer to only a few, as the book of Dr. Gross supercedes the necessity of more particular mention.—*J. B. S. Jackson*, Descriptive Catalogue of the Anatomical Museum of the Boston Society for Mutual Improvement, 8vo, p. 352. Bost., 1847. (See *Malformations of the Bladder*.)—*C. P. Johnson*, Medical Examiner, July, 1850, p. 356.—*E. R. Peaslee*, Case of Rupture of Bladder, *Am. Journ. of Med. Science*, N. S., vol. xix., p. 383, 1850.—*Stephen Smith*, Case of Rupture of Bladder, *N. Y. Journ. of Medicine*, N. S., vol. vi., p. 374, 1851.—*W. Walker*, Lithotomy, *Med. Com. of Mass. Med. Soc.*, vol. vii., 1845. For a full description of Dr. Sims's mode of operation for vesico-vaginal fistula, see *Gross on Urinary Organs*.—*N. R. Smith*, Surgical Works. Phil., 1844.—*A. Brigham*, Worms in the Bladder, simulating Stone, *Am. Journ. of Medical Science*, vol. xx., p. 59.—*Joseph Bossuet*, *New Eng. Journ. of Med. and Surg.*, vol. vi., p. 134, 1817. (Case of *Fœtal Remains in the Bladder*.)—*P. S. Dorsey*, System of Surgery, 2 vols. Phil., 1813. (Retention of Urine, &c.)—*Dr. Le Seur*, *Am. Journ. of Med. Science*, 1854, Ap., p. 403. (Case of *inter-pubic puncture of Bladder*.)—*W. Parker*, S. Cooper's First Lines of Surgery, N. Y.—*P. F. Eve*, *Southern Med. and Surg. Journ.*, 1849. (Case of *Lithotomy, in which 170 calculi were removed from the Bladder*.)—In *Gibson's Surg.*, vol. ii., p. 220, may be found an account of Dr. Purystock's operation for lithotomy on Chief Justice Marshall, in which upward of 1000 calculi were removed from the bladder.—*G. Blackman*, *N. Y. Journ. of Med. and Surg.*, 1852, p. 198. (Lithotripsy).—*G. S. Pattison*, *Am. Med. Recorder*, vol. v. (Anatomical Cause of Infiltration of Urine after Lithotomy).—*George McClellan*, *Surgery*, Phil. Other references will be given under "*Urine and Urinary Deposits*."] ]

## URINE AND ITS DEPOSITS.—CLASSIF.—

### GENERAL AND SPECIAL PATHOLOGY, AND THERAPEUTICS.

1. The urine is one of the chief depurating secretions in the animal economy, and one which, when interrupted or arrested, rapidly terminates existence. This secretion in some form or other occurs in all animals, either by a distinct apparatus, or by a vicarious or associated function, in which latter form it also takes place even in the vegetable creation; and in all it is characterized as the excretory function of nitrogenous elements and compounds, variously associated with other substances. In the human subject and in the more perfect animals the conditions of the urine depend upon the states of the frame generally, upon the states of the urinary organs, and upon the food and drink of the individual. Hence these conditions are of the greatest importance to the pathologist, by enabling him to recognise, 1st, those states of the system with which they are severally connected; 2d, those lesions, functional and structural, of the kidneys, of which they are often the symptoms and effects; and, 3d, the influences produced by the food and drinks of the individual upon his system and urinary organs.

2. The urine is derived from the blood—is a depurating secretion performed by the kidneys from the blood as long as these organs are actuated by the organic nervous influence distributed to them, aided by whatever share of influence may

be transmitted to them or their ganglia by the spinal nerves. The urine being derived from the blood, and being one of the chief depurating secretions by which the blood is preserved in due or healthy quantity and quality, it must be manifest that the phenomena connected with the urine and its secretion become important indications, not merely of the states of the blood itself, but also of the several sources by which the blood is altered or contaminated.

3. It was stated in the first part of this work, and then explained (in 1832), that the kidneys conveyed from the blood the fluids carried into the blood, and with these fluids the effete materials, the ultimate results of animalization, and various other elements and substances resulting from indigestion and mal-assimilation, or otherwise absorbed into the circulating mass. As long as the kidneys discharge their functions, an excess of the fluid elements of the blood, and of various saline and nitrogenous materials, are prevented from accumulating in the blood; these functions being strictly depurating, as respects the purity or quality of the blood, and eliminating, or excretory, or excrementitious, as respects not only the quality but also the quantity of the circulating mass.

4. It is thus obvious that the urine consists chiefly of the fluids and of the fluid parts of the aliments taken into the stomach, and carried into the blood; and that it contains not only saline and other ingredients derived from the ingesta, and from the changes which the ingesta undergo, in the digestive canal, and in their passage into the blood, but also the effete nitrogenous materials resulting from the waste and absorption of the tissues, which are first conveyed into the blood by the absorbents and veins, and afterward eliminated from the blood, with the fluids in excess, by the action of the kidneys.

5. Such being the source of the urine, it may be inferred that the quantity and condition of this excretion will depend upon a variety of circumstances which require the recognition of the pathologist in his investigations of disease—upon the states of the digestive and assimilating functions; upon the states of the circulating organs and of the blood; upon the states of the urinary apparatus; and upon the states of the other depurating and eliminating functions—upon those of the skin, lungs, liver, and intestines. In recent times, and in recent writings, the conditions of the urine have received a due, if not an excessive, share of attention, especially from the chemical pathologists; yet these conditions have been insufficiently investigated in their relations to the other depurating functions, and especially to that of the skin, this particular function being either altogether overlooked, or very imperfectly inquired into. When treating of the Blood (see § 115–160), and when giving a succinct view of pathology under the head of DISEASE (see § 94–104, and 163, *et seq.*), I there stated the same doctrines as those now enunciated, but more explicitly and fully than I have now done; and since then (published in 1832) the same views have received the approval of, because they have been altogether adopted by, more recent writers, although without acknowledgment of their long previous existence in the pages of this work. I may request those who are curious in this matter to read what I have stated in the articles and in the sections just referred to, and to peruse the

fundamental doctrines in Dr. GOLDING BIRD'S work on "*Urinary Deposits*," where the subject of urinary pathology has been very ably discussed, and where not only the views, but even the terms, first adopted by me have been followed and employed. I should not have referred to these principles of urinary pathology if it had not been necessary, by asserting my own priority in respect of them, to defend myself from the contingent imputation of adopting the ideas of others.

6. *b.* The doctrines insisted upon in the early parts of this work respecting the depurating functions of the kidneys and of other organs, have been much more recently carried out by Dr. G. BIRD, as regards those of the kidneys, and in many places so conformably with these doctrines—although with too manifest a leaning to chemical pathology and neglect of a controlling vital influence—as to induce me to refer to his evidence on several topics, where I believe it to be accurate, or to support my own views. The fundamental principle he has laid down is correct as far as it extends, but it is too limited, inasmuch as it is confined to the functions of the kidneys. He states that "it is, indeed, a general law, that any substance which has entered the circulating mass, and not been required for the nutrition of the body, nor forming a normal element of healthy blood, always escapes from the system by the kidneys, providing it exists in a state of complete solution. Hence these most important emunctories have the duty of removing any imperfectly assimilated elements of the food which had been absorbed while traversing the small intestines, and entered the circulating mass, as well as excreting the often noxious results of unhealthy digestion. To effect these most important conditions, it is essential that the substance to be removed should be soluble, or at least capable of being readily metamorphosed into a body soluble in the water of the urine, as nothing can be excreted from the kidneys, without breach of surface, unless in a state of solution. The third function performed by the kidneys is their serving as outlets to evolve from the animal organism those elements of the disorganization of tissues which cannot perform any ulterior process, nor be got rid of by the lungs or skin. The disorganization of tissues here alluded to is a necessary result of the conditions for the growth and reparation of the body." "The old and effete atoms of the animal structure are not excreted in the form of dead tissue, but, becoming liquefied, they re-enter the circulation, their elements being rearranged. One series of combinations thus produced, rich in nitrogen, is excreted by the kidneys, while those products which contain a preponderance of the inflammable elements, carbon, hydrogen, and sulphur, are called upon to perform, chiefly through the medium of the liver, an important office previous to their final elimination from the system. Thus the blood is not only the source of the elements derived from the food which serve for the nutrition of the body; but it also serves, like a sewer, to receive the matter arising from the waste and liquefaction of the old and exhausted tissues." (P. 256.)

7. Now all the ideas contained in this quotation will be found fully and explicitly stated, as referred to above (§ 3-5) and in other places, but more correctly and more conformably with pathological conditions than in the above passage, in the *first volume of this work*, published many

years before the appearance of "*Urinary Deposits*." Besides, Dr. G. BIRD has overlooked the functions of the skin in relation to those of the kidneys, and has not taken a correct view of those of the liver in connexion with the functions of the lungs, while those of the follicular apparatus of the intestinal canal and of the skin have been altogether neglected. Yet all these functions, as I have elsewhere shown (see the articles BLOOD, CRISES, DISEASE, and EXCRETIONS and EXCRETING FUNCTIONS, &c.), are more or less intimately related to each other and to the depurating functions of the kidneys, and often evince, even in health, a vicarious increase when one or more of the others are impeded or diminished, and a marked diminution when they are augmented. It should also be recollected, when estimating the source and nature of the functions of the kidneys and of other eliminating organs, that it is not only the materials mentioned in the above quotation which are eliminated from the circulation by the kidneys, but also a portion of those resulting from the waste of the red globules and fibrin of the blood, and that the kidneys are not the only depurating organs, the functions of the skin, liver, bowels, &c., being generally more or less impaired or otherwise disordered in those diseases which evince the most remarkable alterations in the state of the urine, these functions, especially that of the skin, being too generally neglected by modern physicians in favour of the popular attractions furnished by the functions of the kidneys.

8. It is obvious, from what I have stated now and in earlier parts of this work respecting the sources of the urine, that this depurating secretion will vary in quantity and sensible appearances and physical properties, and even be remarkably altered, by a variety of causes—1st, by the quantity and nature of the ingesta, alimentary and liquid; 2d, by the imperfect and disordered products of indigestion and mal-assimilation resulting from impaired vital power or simple or complicated ailments; 3d, by the metamorphosis and waste of the several tissues and of the blood—the removal of effete materials into and from the blood—during the healthy processes going on throughout the frame; 4th, by the waste and metamorphosis of the structures and of the blood, when accelerated by local or constitutional diseases; 5th, by the absorption of morbid secretions, and deposits or formations carried into the blood, and partially, chiefly, or altogether eliminated by the kidneys and other emunctories; 6th, by the varying states of the other depurating functions—by the increase and diminution of one or more of these, diminishing, increasing, or altering more or less the functions of the kidneys.\*

\* "In morbid states of all the principal organs the urine is remarkably liable to change. This arises from various causes. If the stomach be the primary seat of disease, or if its condition be disturbed through sympathetic influences of other diseased organs, as is almost constantly the case, digestion is imperfectly performed, and the chyle, in consequence, becomes more or less unfitted for the purposes of nutrition and secretion. The kidneys, therefore, carry off more than their wonted quantity of excrementitious matter, while this matter appears under conditions more or less varied from the natural product. The whole office of appropriation is, also, more or less impaired, which farther modifies the condition of the blood and the formative action of the kidneys; though a part of the office of excretion, under these circumstances, devolves upon the skin and lungs. A great cause of the variability of the urine consists in unusual vital decomposition or wasting of the body, or of some of its parts, when it devolves upon the kidneys



9. Dr. PROUT considered that the elements of the albuminous tissues of the frame are so arranged, during the processes of metamorphosis or waste, as to be converted into uric acid, or urate of ammonia, and that the atoms or elements not composing these bodies form certain ill-defined principles. The ulterior changes which the gelatinous tissues undergo during destructive assimilation this very celebrated physician supposed to be intimately connected with their conversion into urea, and some saccharine principle, or its close ally, the lactic acid. BARON LIEBIG followed in the path pointed out and first trodden by Dr. PROUT, and has been in several matters supported by the researches of MULDER, TAYLOR, B. JONES, and others. According to LIEBIG's theory, the elements of muscular tissue are carried into the circulation, combined with water and oxygen; the latter, by its union with the carbon of the effete tissue, supports the temperature of the body. On reaching the structure of the liver, 50 atoms of carbon, 1 of nitrogen, 45 of hydrogen, and 10 of oxygen, with an unascertained but considerable proportion of sulphur, are filtered off from the portal blood in the form of bile. The more highly nitrogenized elements of the metamorphosed or wasted tissues are separated by the kidneys from the blood, chiefly in the form of urea and uric acid, while the carbonic acid formed by the slow combustion of the carbon of the original atoms of muscle in the capillaries is exhaled from the surfaces of the skin, and bronchi, and air-cells.

10. It is manifest that the atoms or elements of tissues, which have become worn out, or which have given place to new deposits in the course of nutrition, are carried into the circulating mass, where they undergo progressive changes under the influence of vitality, and are ultimately eliminated from the blood by the depurating organs. It has been supposed that the states in which the several materials are found on their elimination are such as may be altogether imputed to the action of the excreting organs; but it is more probable that the atoms or elements composing the

to co-operate, beyond their natural habit, with the lungs and skin, in removing the redundancy of waste materials. A fourth cause of the urinary changes, and an important one, lies in actual morbid states of the kidneys themselves. The kidneys, however, are not often the seat of morbid affections beyond those of a simple functional and transient nature, as induced by sympathetic influences exerted by the diseases of other parts, but to which influences the kidneys are extremely liable, and therefore to consequent modifications of the urinary product. Briefly, then, every alteration of the natural action of the kidneys, whether primary or sympathetic, and every defect in assimilation and appropriation, is attended by some change in the urine; while an endless variety is imparted to it by the qualities and quantities of the ingesta. From this circumstance, which should have prompted other conclusions, has arisen the belief that the state of the urine supplies some of the most important signs of pathological conditions, not only of the kidneys themselves, but of remote organs with which they may sympathize. From HIPPOCRATES to our day, elaborate disquisitions have appeared concerning the changes of the urine as indicative of particular forms of disease, of their special seats, of the different stages of their rise and decline, and of their degrees of severity and danger. The humoralists were apt to regard the unusual conditions of this product, and other "vitiated secretions," as the disease itself; and in this respect they are imitated by the humoralists of the 19th century. Chemistry has been also brought to bear upon the fluctuating states of the urine, and has increased the factitious importance of a symptom which is often as likely to denote some alimentary substance, or diverse forms of disease, or imperfect digestion, or some remedial agent, as the source from which it emanates."—*The Institutes of Medicine*, by Martyn Paine, 8vo, N. Y., 1847.]

materials removed from the structures, as well as those composing the blood, more especially the albumen, fibrin, red globules, and even the saline ingredients, undergo a succession of changes or modifications during their circulation through the body, until the great or ultimate change is produced by the organs which discharge them from the economy. It is not, however, conformable to the laws of the human frame that each organ should perform so simple and definite a function as the chemical pathologists believe. The skin certainly exhales carbonic acid; but it also discharges other materials by means of its follicular apparatus; while the bowels, chiefly by the same or a similar apparatus, also excrete effete materials from the circulation; and, although the combinations which are found during their elimination may be viewed as chemical, they are the results of vital action in health, are more or less modified in disease, and are such as rapidly undergo farther changes after their discharge, or after death, which changes are more decidedly chemical, and such as their individual elements chemically dispose them to assume.

11. I. IN HEALTH, the urine presents certain conditions, *a.*, especially as respects *specific gravity*, at different periods and in different circumstances. These have been distinguished into, *first*, the urine which is excreted shortly after drinking freely of fluids, the nature of the fluids modifying the appearances and odour of the secretion. This (the *urina potus*) is generally pale, and of a specific gravity varying from 1.003 to 1.010. *Second*, the urine secreted shortly after the digestion of a full meal (*urina chyli*), varying in physical characters with the nature of the food, and other circumstances, and presenting considerable density, its specific gravity varying from 1.020 to 1.030. *Third*, the urine passed after a night's rest (*urina sanguinis*): this is of intermediate density, and varies from 1.015 to 1.025. In order to ascertain the specific gravity of the urine, in health or in disease, the portions passed before retiring to rest, and on rising in the morning, should be separately tested by the urinometer, and the average density of the two will be a near approach to accuracy. Dr. PROUT assigned 1.020 as the average gravity of healthy urine. M. BECQUEREL stated that it is 1.0189 in men, and 1.0151 in women, the mean in both sexes being 1.017; and Dr. ROYER that the average of 18 healthy cases gave a specific gravity of 1.021.

12. The specific gravity of the urine at different periods of the day varies in disease, as well as in health, although in a less marked degree, and in some diseases more than in others; but this part of the subject has not been sufficiently investigated, and it is, moreover, liable to many sources of fallacy, as emotions of the mind, articles of diet, the beverages or drinks employed, the medicines taken, &c., all combine to render the results of observation uncertain. The nature, the stages, states, and course of disease, as of hysteria and other nervous disorders, febrile diseases, &c., also remarkably increase the difficulty.

13. *b.* The *quantity* of urine passed in the 24 hours, as well as its density and ingredients, varies very much in health, but still more remarkably in disease. The quantity and quality are modified by temperature, by exercise, by the functions of the skin, &c., by modes of living, clothing, &c. Dr. PROUT estimated the quantity at

30 to 40 ounces in the 24 hours. Dr. ROUTH found the average of 18 cases to be 35 ounces. M. BECQUEREL considered the quantity to be 43 ounces in men, and 47 in women, the general use of soups and weak sub-acid wines in France being productive of the increased discharge; but among the beer-drinkers of this country the amount given by Drs. PROUT and ROUTH would be found much below the average.

14. *c.* The quantity of the urine is, however, no measure of the depurating actions of the kidneys; for 20 ozs. of urine in the 24 hours may carry off as much *solid materials* as 40 ozs. at a different time or in a different person; for a density of the former amounting to 1·030 will furnish an equal quantity of those materials to those afforded by the latter at 1·015. Dr. DAY has shown that the formula for calculating the solids contained in the urine given by Dr. CHRISTISON is the most correct; and the following table, calculated from it by Dr. G. BIRD, will show at a glance the quantity of fluid and of solids existing in 1000 grains of urine of different densities. The gravimeter having shown the specific gravity, the proportion of solid matter is at once indicated by this TABLE:

TABLE I.

Sp. Gr.	Solids.	Water.	Sp. Gr.	Solids.	Water.
1001	2·33	997·67	1021	48·93	951·07
1002	4·66	995·34	1022	51·26	948·74
1003	6·99	993·01	1023	53·59	946·41
1004	9·32	990·68	1024	55·92	944·08
1005	11·65	988·35	1025	58·25	941·75
1006	13·98	986·02	1026	60·58	939·42
1007	16·31	983·69	1027	62·91	937·09
1008	18·64	981·36	1028	65·24	934·76
1009	20·97	979·03	1029	67·57	932·43
1010	23·30	976·70	1030	69·90	930·10
1011	25·63	974·37	1031	72·23	927·77
1012	27·96	972·04	1032	74·56	925·44
1013	30·29	969·71	1033	76·89	923·11
1014	32·62	967·38	1034	79·22	920·78
1015	34·95	965·05	1035	81·55	918·45
1016	37·28	962·72	1036	83·88	916·12
1017	39·61	960·39	1037	86·21	913·79
1018	41·94	958·06	1038	88·54	911·46
1019	44·27	955·73	1039	91·87	909·13
1020	46·60	953·40	1040	93·20	906·80

15. By measuring the quantity of urine passed in a given time, the weight of solids excreted by the kidneys may readily be calculated by means of the foregoing and the following tables, a pint of distilled water weighing 8750 grains. The following table is given by Dr. G. BIRD:

TABLE II.

Specific Gravity.	Weight of one Pint.	Specific Gravity.	Weight of one Pint.
1010	8837 grains.	1022	8 51 grains.
1011	8846 "	1024	8960 "
1012	8855 "	1025	8968 "
1013	8863 "	1026	8977 "
1014	8872 "	1027	8986 "
1015	8881 "	1028	89 5 "
1016	8890 "	1029	9003 "
1017	88 8 "	1030	9012 "
1018	8907 "	1031	9021 "
1019	8916 "	1032	9030 "
1020	8925 "	1033	9038 "
1021	8933 "	1034	9047 "
1022	8942 "	1035	9056 "

16. It may readily be calculated from these tables, that if 1000 grains of urine, of the specific gravity of 1·020, hold 46·6 grains of solid matter in solution (Table I.), a pint of the same specific gravity, weighing 8925 grains (Table II.) will hold 415·9 grains solid matter; and that, if two pints and a half of urine be passed, 1039·72 grains will be discharged in the 24 hours. Dr. GOLDING BIRD has calculated from Dr. CHRISTISON'S

formula a very useful table for showing the number of grains of solids in, and the weight of, a fluid ounce of urine, of every density, from 1·010 to 1·040.

TABLE III.

Specific Gravity.	Weight of one fluid Ounce.	Solids in one fluid Ounce.	Specific Gravity.	Weight of one fluid Ounce.	Solids in one fluid Ounce.
1010	441·8	10·283 grains.	1025	448·4	26·140
1011	442·3	11·336	1026	449·8	27·188
1012	442·7	12·377	1027	449·3	28·265
1013	443·1	13·421	1028	449·7	29·338
1014	443·6	14·470	1029	450·1	30·413
1015	444·0	15·517	1030	450·6	31·4·6
1016	444·5	16·570	1031	451·0	32·575
1017	444·9	17·622	1032	451·5	33·663
1018	445·3	18·671	1033	451·9	35·146
1019	445·8	19·735	1034	452·3	36·831
1020	446·2	20·792	1035	452·8	37·923
1021	446·6	21·852	1036	453·2	38·014
1022	447·1	22·918	1037	453·6	39·104
1023	447·5	23·981	1038	454·1	40·206
1024	448·0	24·951	1039	454·5	41·300

17. By multiplying the number of ounces of urine passed in the 24 hours by the two last figures of the specific gravity, the quantity of solids excreted will be obtained. Thus, if three pints, or 60 ounces, be discharged in the 24 hours, and the density of the several specimens give an average of 1020, the 60 ounces multiplied by 20·79 would give a product of 1247 grains, the quantity of solids excreted in the 24 hours. Dr. G. BIRD estimates the average amount of solids excreted by the kidneys of the healthy adult to be from 600 to 700 grains in the 24 hours; numerous circumstances connected with occupation, exercise, diet, regimen, &c., modifying the results.

18. *d.* The tints presented by the urine in different diseases are of great importance in respect both of diagnosis and of treatment. These tints vary with the degree of dilution and the nature of the ingredients from nearly colourless, to the usual pale amber colour, to deep brown. When very watery, urine presents a faint greenish tint, as in early infancy, and in hysteria and chlorosis. If bile or blood be present in the urine, a variety of colours, from red to brown, blackish-green, or apple-green are produced, the latter hue being sometimes indicative of *cystine*. A reddish tint may be caused by *purpurine* or by *blood*; if by the former, congestion of the portal circulation, or disease of the liver or spleen, may be inferred; if by the latter, hæmorrhage in some part of the urinary passages has occurred. In the former case the specific gravity is moderate, and heat produces no change; in the latter, heat and nitric acid occasion turbidity, and blood-disks are seen under the microscope. A brownish tint is caused by a concentrated or dense state of the urine, as in fevers, the specific gravity being high; or by obstruction to the discharge of bile in some part of the biliary apparatus, and the presence of some or all the elements of bile in the circulation; or by the existence of blood in a less degree or altered state, and shown by the tests just mentioned. Blood and bile may occasion a greenish-brown tint, the former when the urine is alkaline, the latter when the urine is very acid. A grass-green hue of the urine indicates excess of sulphur and the presence of cystine. It is unchanged by heat or nitric acid. It should not, however, be overlooked that numerous articles of diet and of medicine affect the appearance of the urine. Chima-phyla, hæmatoxylin, indigo, rhubarb, senna, &c., produce this change in a marked degree.



19. *c.* The *fluidity* of the urine sometimes varies. It is more or less viscid, owing to the presence of mucus or pus, or both, especially when alkaline, and in the layer formed at the bottom of the vessel; and in a slight degree in diabetes mellitus, when the frothiness caused by agitation continues for some time. Although fluid while warm, it becomes in rare cases jellatinous on cooling, owing to the presence of self-coagulating albumen or fibrin. This state indicates severe organic disease of the kidneys. I have, however, met with it at advanced stages of pregnancy.

20. II. The *CHEMICAL COMPOSITION OF THE URINE* has engaged the attention of chemists and physiologists for many years; and even now the elements contained in this fluid, although nearly, if not altogether, ascertained, are still topics of controversy, as respects either the origin of certain of them, or the successive changes of which they may be the ultimate products. As to the general principle, that the urine is an excretion by which the blood is depurated from the effete materials carried into the circulation from the metamorphosis and waste of the tissues, &c., as stated above (§ 3-10) and in the commencement of this work (*see* BLOOD, § 115-160), no doubt can now exist; but the successive changes which these elements or materials undergo during their absorption and passage from their origins and sources, during their circulation, and during their ultimate discharge—from their origins to their elimination from the body—have been long topics of research and discussion, especially by the chemical physiologists and pathologists of recent times, who have been more disposed to view them as altogether chemical, than as vital and as modified, and even more or less altered, by the states of vital power and vascular action. To the specialist in medicine the chemical doctrine presents itself in its most favourable

aspect, as placing urinary pathology in an isolated yet scientific position. To the general or legitimate physician, the conditions of the urine, in all their phases, and in the successive changes from their origins to their ultimate results, are viewed as ever-varying effects of the influence of vitality throughout the frame, as manifested by the functions of digestion, assimilation, nutrition, metamorphosis, waste, and depuration; all which are not only under the complete and constant dominion of life, but are also the necessary agencies of the continuance of life; this department of pathology being inseparable, in its philosophic as well as in its practical relations, from all others which comprise the whole range and circle of morbid actions.

21. The *urine in health* contains: 1st, certain *organic products*, namely, urea, uric acid, creatine, creatinine, colouring and odorous elements; these more especially result from the metamorphosis and waste of the tissues and of the blood, and are separated from the latter by the kidneys; also other ingredients, more particularly lactic and hippuric acid, developed during the process of assimilation, and accidental matters carried into the circulation; 2d, *inorganic products*, being saline combinations, derived from the food, especially sulphates, phosphates, chloride of sodium, and soluble salts taken with the ingesta, and often decomposed in their transit into and from the blood; also saline substances, generated chiefly from the processes of destructive metamorphosis and waste, and of depuration, as sulphates and phosphates; 3d, *matters derived from the urinary passages*, being chiefly mucus, debris of epithelium, and a minute quantity of phosphate of lime present in mucus. M. BECQUEREL gives the following as the average composition of urine in males and females, and the quantity discharged in the 24 hours.

	Urine in Men.		Urine of Women.		Mean of Both.	
	In 24 Hours.	In 1000 Grs.	In 24 Hours.	In 1000 Grs.	In 24 Hours.	In 1000 Grs.
Weight of urine .....	19516		21124		20320	
Specific gravity .....	1·0189		1·0151		1·0170	
Solids .....	610·	31·1	526·8	24·95	568·	28·
CONSTITUENTS OF SOLIDS.						
Urea .....	270·	12·8	240·	10·366	255·	12·
Uric acid .....	7·6	0·391	8·6	0·406	8·1	0·398
Fixed salts .....	150·	7·63	126·	6·14	138·	6·9
Organic matters and volatile saline combinations. }	176·	9·26	145·	8·	160·5	8·6

22. *a.* *Urea*.—This important excretion, composed of C 2, N 2, H 4, O 2 = 60, is the form in which a large quantity of nitrogen is eliminated from the body; 270 grains of urea being discharged by a healthy man in the 24 hours. This substance is the product of the destructive metamorphosis or waste of organized parts (§ 9, 10); but it is so rapidly carried out of the blood by the kidneys as to admit of only minute quantities of it escaping by the skin, unless when the functions of the kidneys are interrupted, and then it is discharged both by the skin and by the intestines in greater quantities. The *food* has a remarkable influence upon the quantity of urea in the urine. Dr. LEHMANN found the quantity of urea excreted by his kidneys while living on

strictly animal food, and while restricted to vegetable diet, as shown by the preceding table.

[*Urea* has been repeatedly detected in the blood under ordinary circumstances, and especially after extirpation of the kidneys in the lower animals; but it is removed with such rapidity by the kidneys, that there is probably never more than a fiftieth of one per cent. of the circulating blood. Though its source is supposed chiefly to be found in the food and the waste of muscular tissue, yet both *creatine* and *inosic acid* produce it in their descending metamorphosis. From the fact that *caffeine* and other substances increase its amount, the seat of its production would seem to be the blood itself. Dr. J. C. DRAPER, of New York (*Inaugural Dissertation*, 1856), from experiments on the urine of persons in different conditions of motion and rest, and by an examination of the diurnal and nocturnal variations in the amount of urea voided, con-

	Animal Food.	Vegetable Food.	Mixed Diet.	Non-nitrogenized Diet.
Urea in the urine } in 24 hours..... }	519·2	346·5	500·5	237·1

pared with an invariable standard, gives reasons for concluding that the differences in the amount of urea excreted are almost entirely attributable to the influence of the food, an individual in such a state of comparative rest as is observed during treatment for a fractured leg not excreting by any means so much less urea as might have been anticipated when compared with another individual who walked thirteen miles at the rate of four and a half miles an hour. But on examining the influence of the food it appears to be well marked. The greatest amount of urea is excreted within a few hours after dinner. Another maximum occurs also just after breakfast; but during the eight night hours far less is excreted than during the same period in the afternoon. The ingestion of food thus exercising so rapid and marked an influence on the quantity of urea, he refers to it as the cause of the increased excretion of that substance during the course of the day rather than to the increased motion of exercise then indulged in; and in view of this conclusion, it becomes probable that the nitrogen of the wasting muscular tissues escapes, not under the form of urea through the kidneys, but through the skin, or perhaps even as free nitrogen from the lungs. (*"Human Physiology,"* by J. W. DRAPER, 8vo, New York, 1856.)

23. According to LECANU, the quantity of urea and of *uric acid* excreted in the 24 hours is very much influenced by age. The following are the results of his experiments, as to the amounts of these substances excreted in the 24 hours:

	Urea.	Uric Acid.
Adult men .....	431.9 grs.	13.09 grs.
Adult women.....	294.2 "	10.01 "
Very old men (34 to 86 years).....	124.8 "	6.77 "
Children (under 8 years).....	133.2 "	3.98 "

[To detect urea, Dr. BIRD recommends to place a drachm of urine in a watch-glass, and add about half that quantity of colourless nitric acid. If a normal proportion of urea exist, no change, except a darkening in tint, and the evolution of a few bubbles, will be observed, unless the weather be very cold, or the glass be placed in a freezing mixture, and then a delicate plumose crystallization of nitrate of urea will commence at the edges of the fluid. Under ordinary circumstances no crystals of urea will appear, unless the urine be concentrated by previous evaporation. In some cases an excess of urea exists, and then a rapid formation of crystals of nitrate of urea occurs, sometimes so copious that the mixture becomes nearly solid. Dr. B. thinks it important, when this is the case, to measure and ascertain the specific gravity of the whole quantity of urine passed by the patient in 24 hours; for unless this equals or exceeds the average proportion of health, there is no proof that an actual excess of urea is excreted by the kidneys. A particular specimen of urine may appear richer in urea than natural, from the diminished amount of water present.]

24. *b. Uric Acid.*—Uric or lithic acid, composed of C 70, N 4, H 4, O 6 = 168, is excreted by the kidneys to the amount of 8.1 grains in the 24 hours. Dr. PROUT's opinion, confirmed by Dr. B. JONES and Dr. G. BIRD, is that the greatest portion of the uric acid always exists in the blood in combination with ammonia; for this acid requires 10,000 parts of water at 60° for solution, while there does not exist quite 2500 times its weight. Urate of ammonia is soluble in 480

times its weight of water; and as it occurs in urinary deposits, it requires for solution 2789 parts of urine, according to the researches of Dr. B. JONES, who has shown that the presence of a moderate quantity of saline matter increases its solubility. Dr. G. BIRD states the following as the mode in which uric acid exists in healthy urine. "Uric acid, at the moment of its separation from the blood, comes in contact with the double phosphate of soda and ammonia, derived from the food, forms urate of ammonia, evolving phosphoric acid, which thus produces the natural acid reaction of urine. If the whole bulk of the urine be to the urate of ammonia formed, not less than about 2701 to 1, the secretion will, at the temperature of the air, remain clear, but if the bulk of fluid be less, an amorphous deposit of the urate will occur. On the other hand, if an excess of uric acid be separated by the kidneys, it will act on the phosphate of soda of the double salt, and hence, on cooling, the urine will deposit a crystalline sediment of acid sand, very probably mixed with amorphous urate of ammonia, the latter usually forming a layer above the crystals, which always sink to the bottom of the vessel." (*Op. cit.*, 84.)

25. Without referring to LIEBIG's views as to the physiological origin of uric acid, which are contradicted by the experiments of LEHMANN, and merely stating that these views are not corroborated by any subsequent researches, I may give the results of the researches of this latter physician:

Diet.	Quantity excreted in 24 hours of		Proportion of Uric Acid to Urea.
	Uric Acid.	Urea.	
Exclusively animal	22.64 grs.	819.2 grs.	1: 36.1 grs.
Mixed animal and vegetable.	18.17 "	505.0 "	1: 27.5 "
Exclusively vegetable	15.7 "	346.5 "	1: 22. "
Food free from nitrogen.....	11.24 "	237.1 "	1: 21. "

Dr. BENICE JONES, who has investigated this and other subjects connected with the chemico-pathology of the urine, with great scientific acumen, has shown the *immediate* influence of food on the quantity of uric acid contained in the urine to be as follows:

	Specific Gravity.	Grains. Uric Acid.
<i>In 1000 Grains of Urine:</i>		
After animal food.....	1027	1.022
Before " ".....	1024	0.049
After vegetable food ..	1025	1.010
Before " " ..	1024	0.049

From these and other researches and considerations, it may be inferred that uric acid is derived from the nitrogenized elements of the effete molecules of the tissues, and from the elements of food abounding in nitrogen, which are not assimilated into the healthy constituents of blood; and probably from the latter source, in larger proportion; and thus these nitrogenized elements are excreted from the blood in the states of uric acid, of uric acid combined with ammonia, and of urea; the causes of the preponderance of either of these being not satisfactorily explained.

26. *c. Lactic acid and lactate of ammonia* were said by BERZELIUS to exist in the urine, but were denied by LIEBIG. That lactic acid exists in the blood, and is excreted by the skin in health, and more largely in some diseases, is admitted. It is,



however, found in the urine of herbivorous animals; and it probably undergoes some change before it is excreted by the kidneys in the human subject. Dr G. BIRD considers that what was mistaken for lactic acid in urine is really a mixture of *creatine* and *creatinine*, these substances being forms in which the nitrogenized elements of worn-out structures, especially muscular tissues, are removed from the system. Dr. PROUT believed that several of the constituents of urine were derived from the destructive metamorphosis of distinct and separate tissues, and these substances appear to support his views.

27. *d. Hippuric, or urobenzoic acid*, exists chiefly in the urine of herbivorous animals, and occasionally in that of man. Its quantity in health is not constant, probably owing to the nature of the food. It is, next to *bile* and *purpurine*, the richest in carbon of any of the products of vital chemistry; and hence its abundance in urine may depend upon the states of biliary secretion and of the respiratory functions, impairment of these increasing its excretion by the kidneys.\*

[Though we are not disposed to deny that chemistry has been of great service in the diagnosis of calculous and urinary disorders generally, yet there is reason to believe that the treatment, to be successful, is not always to be regulated by the chemical indications present. The alkalies, especially the bicarbonate of potash and bicarbonate of soda, when given freely, especially at or near the times of eating, interfere with the process of digestion, by neutralizing the gastric acids, and thus aggravate the difficulty by deranging this important function. These, as well as other alkaline substances, should be given at least two hours from the time of meals, in connexion with the vegetable tonics. Prof. M. PAINE, in his very able work, "*The Inst. of Medicine*" (p. 233), thus speaks of the aid derived from a knowledge of the chemical constitution of the urine: "Coming to the bed-side, we find that all that is practically useful in relation to the urine is generally best ascertained by mere inspection; and upon this subject we have all, and more than is desirable, from HIPPOCRATES himself. Those philosophers, however, who are employed in interrogating disease by chemical analysis, are not often, or long, in the chambers of the sick. They carry on the investigation of morbid processes in the laboratory of the chemist, and then and there fabricate the appropriate reagents. He who studies organic nature according to the method of solidism and vitalism, has neither the leisure for these most difficult, unattainable, and laborious analyses, nor would they have any influence on his judgment as to the pathology or treatment of disease in the midst of such a multitudinous variety as is presented by the vital phenomena of disease. Of one thing, also, we may rest assured, that nature has supplied all those ready means for interpreting disease that may be necessary for immediate action; nor can we often delay the treatment of acute disease

\* To detect *hippuric acid*, evaporate a few ounces of urine to a sirupy consistence, and then add an excess of hydrochloric acid; a mixture of hippuric and uric acids will then be separated and fall to the bottom of the vessel. After a few hours' repose, the supernatant fluid should be decanted, and the deposit washed in a very little cold water. On boiling the residue in alcohol, in which uric acid is insoluble, the hippuric acid will be dissolved, and by spontaneous evaporation is left in thin, delicate needles, strongly coloured from adhering impurities.]

for consultation with the laboratory. In respect to the blood, were it even practicable to learn from analysis its variable conditions in disease, it would reflect no light upon morbid states of the organs, since the qualities of that fluid vary with every varying change in the vital conditions of the solids, and therefore, too, would fail to indicate in the least the appropriate remedies. This is also true, in a general sense, of the urine and all other excretions and secretions. The ready sight, their sensible properties, the vital phenomena, physical signs, experience, and general principles, must be our guide. These may sometimes be facilitated by extraordinary modes of observation, but which are always within the reach and clear understanding of every practitioner, such as the usual mode of examining the blood in inflammatory diseases, evaporating the urine in diabetes, &c. On the contrary, were the humoral doctrines correct, the teaching and the practice of medicine should be restricted to chemists alone, since there is no branch of inquiry so difficult as organic analyses, while their uncertainty would soon prove that the *vis medicatrix naturæ* is the only ordination of nature for the maladies of the urine race."]

28. *c. Butyric acid* is sometimes found in the urine, and may be either referred to the butter used in food, or to the imperfect assimilation of saccharine matter. It is seen also in the creamy deposit formed in diabetic urine. This acid may also be derived from protein compounds.

29. *f. The colouring matter of urine* has been differently accounted for by SIMON, PROUT, HELLER, G. BIRD, and SCHERER. The last-named physician attributed it to the destructive metamorphosis or waste of red-blood corpuscles. Dr. G. BIRD investigated its nature and composition, gave it the name of *purpurine*, and viewed it as a principle of urine chiefly in disease, and as a result of impaired excretion of carbon by the lungs and liver, this element being, when existing in excess in the blood, partly eliminated by the kidneys in this form (§ 27, 28).

30. *g. Sulphur extractive* exists in urine, and is derived from the metamorphic destruction of albuminous and fibrinous tissues, which contain sulphur and traces of phosphorus. "While the greater quantities of their protein elements are converted into creatine and its allies and urea, a small proportion containing the sulphur and phosphorus is eliminated by the kidneys in the form of this peculiar extractive matter." The taurine, a constituent of bile, may also be one of the sources of the sulphur extractive of the urine. The nature of the food may also contribute materially to the quantity of this constituent

31. *h. Ammonia* exists in urine "combined with uric acid, and probably with phosphoric acid and soda, forming the triple compound known as microcosmic salt."

32. *i. The fixed salts of urine* are those which are left after the other ingredients are destroyed by a red heat. They amount to nearly 140 grains in the 24 hours, and consist of combinations of chlorine, sulphuric and phosphoric acids, with soda, lime, magnesia, and potass. Of these the combinations of chlorine and phosphoric acid are probably derived from the food. Dr. G. BIRD considers that the phosphoric acid and soda in the urine exist in the state of the common rhombic phosphate unless it be combined with the phosphate of ammonia. The soluble phosphates

far exceed in quantity the insoluble salts, and are derived directly from the food, as well as from the albumen and other elements of the blood. The insoluble phosphates, forming part of the structure of the body, and derived from the blood during the process of nutrition, are conveyed back to the blood during the metamorphosis and waste of the structures, and are eliminated by the kidneys. "Some portion of the phosphoric acid of the urine is in all probability generated from the action of oxygen on many of the structures of the body, into the composition of which phosphorus largely enters, as the brain and nervous system generally. But the greatest part of the phosphoric acid is derived ready formed from without; the phosphates of lime and magnesia abounding in milk and most varieties of vegetable food; while the basic alkaline phosphates exist in flesh, in wheaten flour, leguminous seeds, as beans, peas, &c." The interesting researches of Dr B. JONES have shown that the quantity of phosphates, in a given quantity of urine, bears some relation to the periods of taking food, and to the nature and composition of the food. He found the quantity of phosphatic salts to be much greater after a diet restricted to vegetable, than to animal food. The quantity of phosphates of lime and magnesia in the urine is considerably increased after the ingestion of soluble salts of these two earths. The alkaline phosphates are most abundant shortly after a meal composed chiefly of bread, and are not materially affected by the circumstances which influence the excretion of the earthy salts. "A part only of the earthy phosphates contained in the food is absorbed into the circulation, the greatest proportion escaping by the intestines." BERZELIUS found in three ounces of human fæces six grains of earthy phosphates. The insolubility of the salts in water accounts for their presence in the fæces. A small quantity of phosphorus also exists in the urine in a non-oxidized form. The excess of phosphoric acid often found arises from the oxidation of the phosphorus of the urine.

33. *k.* The quantity of *sulphuric acid* in the urine is too great to be accounted for by its presence in the food as saline combinations; and sulphuric acid has been found in the urine while food quite free from sulphates has alone been taken. According to G. BIRD and MULDER, the origin of this acid is to be referred to the oxidation of the sulphur which exists with phosphorus in those tissues which contain albumen and fibrin. During the metamorphosis or waste of tissues, oxidation of the sulphur occurs, and explains the presence of at least a portion of the sulphuric acid met with in the urine. The existence of more than twenty per cent. of sulphur in taurine—one of the products of the metamorphosis of bile—accounts for a portion of the sulphuric acid, by referring it to the oxidation of the biliary sulphur during the recrementitious offices of bile in the economy. As a portion of sulphur is excreted from the body in a non-oxidized form, a part only of the sulphur not required for the purposes of the animal economy undergoes oxidation. Professor RONALDS found, in five specimens of urine of healthy persons, the proportions of sulphuric acid, and of the non-oxidized sulphur, existing in 1000 grains, to be as follows: 1.06; 0.17—1.46; 0.18—1.42; 0.18—2.44; 0.153—1.32, 0.165.

34. Dr. BENCE JONES has shown, by his interesting researches connected with the subject, that

the salts of this acid are increased in the urine by any kind of vegetable or animal food; that exercise does not appear to increase them, nor the administration of sulphuric acid, unless in large quantities; and that the ingestion of sulphur, or of the sulphates of soda or magnesia, always greatly augments the quantity of the sulphuric salts in the urine.

35. *l.* The *chloride of sodium* of the urine is obviously derived from the common salt taken with the food. Some of the saline constituents of the urine may be readily recognised by the crystalline forms they present when the urine is evaporated on a glass plate. MM. REGNAULT, REISER, and BURRAL have shown that the chloride of sodium increased the excretion of nitrogen, as evinced by the augmentation of urea and the nitrogenized compounds in the urine. It may be inferred that common salt produces salutary effects: 1st, by furnishing hydrochloric acid to the stomach; 2d, by furnishing soda to the bile; 3d, by aiding the metamorphoses of the blood globules and of the tissues; and, 4th, by promoting the depuration of the blood. The absence or diminution of chloride of sodium in the urine of patients labouring under pneumonia, noticed by REDTENBACHER, was attributed to the alteration of diet during this disease. But Dr. LIONEL BEALE has established the following propositions, which show the insufficiency of this explanation: 1st. Chloride of sodium is totally absent from the urine of pneumonic patients at the period of complete hepatization of the lung. 2d. The chloride reappears after the resolution of the inflammation. 3d. The chloride exists in the blood in the largest quantity when most abundant in the urine, and *vice versa*. 4th. The chloride exists in very large quantity in the sputa of pneumonic patients. 5th. There is reason to believe that the chloride in pneumonia is determined toward the inflamed lung, and is reabsorbed and removed on the resolution of the inflammation. (*Transactions of Medical and Chirurgical Society*, vol. xxxv., p. 374, &c.) I may, however, remark that the quantity of chloride in the expectoration is increased beyond that existing in healthy pulmonary mucus, and is diminished in the urine, in acute bronchitis, in pleurisy, and in phthisis, although not so remarkably as in pneumonia.

36. III. THE FORMATION OF URINARY DEPOSITS.\* *Et seq.*—When the several constituents

\* CLINICAL EXAMINATION OF THE URINE.—Dr. COLDING BIRD has given the following recommendations for ascertaining the state of the urine in disease, provided that it be an average specimen of that passed in the preceding twenty-four hours, or that resulting from the first micturition after a night's rest, unless the urine secreted at other times be required.

*A. Urine without Deposit, or poured from the Sediment.*—After ascertaining the acid, alkaline, or neutral states of the urine by means of test-papers, a little of the urine should be heated in a metallic spoon over a lighted candle, or in a test-tube over a spirit-lamp; and if a deposit occurs, albumen or an excess of the earthy phosphates is present; the former if a drop of nitric acid does not redissolve the deposit, the latter if it does. "If the urine be very highly coloured, and be not rendered opaque by boiling, the colouring matters of bile or purpurine are present. To determine this, pour a thin layer of urine on the back of a white plate, and allow a few drops of nitric acid to fall in the centre; an immediate and rapid play of colours, from bluish-green to red, will be observed, if bile; but no such change will be observed if purpurine alone exists. Should the high-coloured urine alter in colour or transparency by heat, the presence of blood should be suspected. If the addition of nitric acid to deep-red urine, unaffected by heat, produces a brown deposit, an excess of uric acid exists. If a specimen of urine be pale, immerse the gravimeter, and if the spe-



of the urine are in due relation to each other, the urine is clear, and of a pale amber colour. Its transparency is but slightly affected on cooling by the gradual subsidence of a slight mucous cloud sometimes entangling a few microscopic crystals of uric acid; but when one or more of these constituents "exist in real or comparative excess, or a new substance is superadded, the urine does not generally remain clear, but either immediately

specific gravity be below 1012, there is a considerable excess of water; but if above 1025, the presence of sugar, or a superabundance of urea, is indicated. To determine the existence of either of these conditions, place a few drops of the urine in a watch-glass, add an equal quantity of nitric acid, and allow the glass to float in some cold water; crystals of nitrate of urea will appear in two or three minutes if the latter exists in excess. Should this change not occur, the urine must be examined specially for sugar, which, it must be remembered, may exist in small quantities, without raising the specific gravity of the fluid." For this purpose, boil a small portion with an equal bulk of liquor potassæ, in a test-tube, and the development of a brown colour will show the almost certain existence of sugar. An excess of colouring matter, rich in carbon, should always be sought after on account of its pathological importance. "This is readily done by boiling some urine in a tube, and, while hot, adding a few drops of hydrochloric acid. If an average proportion of the pigment exist, a faint red or lilac colour will be produced; but if an excess is present, it will be indicated by the dark-red, or even purple tint assumed by the mixture. Should the urine be alkaline, add a drop of nitric acid; if a white deposit occurs, albumen is present; if brisk effervescence follows the addition of the acid, the urea has been converted into carbonate of ammonia" (p. 16, 17).

*B. Examination of the Sediment deposited.*—"If the deposit is flocculent, easily diffused on agitation, and scanty, not disappearing on the addition of nitric acid, it is chiefly made up of healthy mucus, epithelial debris, or occasionally, in women, of secretions from the vagina, leucorrhœal discharge, &c. If the deposit is ropy, and apparently viscid, add a drop of nitric acid; if it wholly or partly dissolves, it is composed of phosphates; if but slightly affected, of mucus. If the deposit falls like a creamy layer to the bottom of the vessel, the supernatant urine being coagulable by heat, it consists of pus. Urine sometimes appears opaque from the presence of a light flocculent matter diffused through it, presenting neither the tenacity of mucus nor the dense opacity of pus. Although scarcely sufficient in quantity to interfere with the perfect fluidity of the urine, if a little be placed in a test-tube, and agitated with an equal bulk of liquor potassæ, the mixture will often become a stiff, transparent jelly. This peculiar appearance is demonstrative of the presence of the exudation, or large organic globules formed under the influence of irritation, providing the urine does not coagulate by heat; for should it do so, the existence of minute quantities of pus may be suspected."

"If the deposit is white, it may consist of urate of ammonia, phosphates, or cystine; the first disappears on heating the urine, the second on the addition of a drop of diluted nitric acid, while the third dissolves in ammonia, and the urine generally evolves an aromatic odour like the sweet-briar, less frequently being fetid. If the deposit be coloured, it may consist of red particles of blood, uric acid, or urate of ammonia stained with purpura. If the first, the urine becomes opaque by heat; if the second, the deposit is in visible crystals; if the third, the deposit is amorphous, and dissolves on heating the fluid. Oxalate, and, more rarely, oxalurate (?) of lime, are often present, diffused through the urine, without forming a visible deposit; if this be suspected, a drop of the urine, examined microscopically, will detect the character of the crystals. If the urine be opaque, like milk, allowing by repose a cream-like layer to form on the surface, an emulsion of fat with albumen is probably present. Agitate some of the urine, with half its bulk of ether, in a test-tube, and, after resting a few minutes, a yellow ethereal solution of fat will float on the surface of the urine, a tremulous coagulum of albumen generally forming beneath it."

Dr. G. BIRD adds, that much of the little time required for the investigation thus sketched may be saved by remembering the following facts:—"If the deposit be white, and the urine acid, it, in the great majority of cases, consists of urate of ammonia; but should it not disappear by heat, it is phosphatic. If a deposit be of any colour inclining to yellow, drab, pink, or red, it is almost sure to be urate of ammonia, unless visibly crystalline, in which case it consists of uric acid" (p. 18-21).

ly upon being voided, or at least on cooling, becomes more or less turbid." When the urine, on cooling, becomes covered with a thin membrane-like scum, a *pellicle* is said to exist. When the substance causing opacity floats between the surface and the lower portions of the fluid, it is said to form a *cloud*. And when this falls toward the bottom of the containing vessel, the appearance was termed *encorema*. When a positive deposit collects at the bottom of the vessel, the term *sediment*, the hypostasis of the ancients, is commonly applied. The terms *pellicle*, *cloud*, and *deposit*, or *sediment*, are those commonly used in describing the states of the urine. These appearances are generally not fully developed until the urine is cooled down to the temperature of the air. This is especially the case with those deposits which are soluble in warm water; as the urates, particularly the urate of ammonia, which constitutes the chief part of reddish and fawn-coloured amorphous sediments.

37. *Urinary deposits*, including all substances which disturb the transparency of urine by their presence, whether they subside to the bottom of the vessel or not, have been divided by Dr. G. BIRD into: 1st. "Deposits composed essentially of ingredients derived, directly or indirectly, from the metamorphoses of tissues—(to which I would add, from the metamorphosis and waste also of the red globules, fibrin, and other constituents of the blood)—or from the organic elements of food; namely, uric acid and urates, uric oxide, oxalate of lime, oxalurate of lime, and cystine. 2d. Deposits composed of ingredients for the most part of inorganic origin, including phosphate of lime, ammonio-phosphate of magnesia, carbonate of lime, silicic acid. 3d. Highly-coloured deposits (black or blue) of doubtful origin; viz., cyanourine, melanourine, indigo, Prussian blue. 4th. Deposits consisting of non-crystalline organic products, including—*organized*: blood, pus, mucus, organic globules, epithelium, spermatozoa, confervoid bodies, vibronces; *non-organized*. milk, fatty matter, stearolith."

38. *i. DEPOSITS OF URIC ACID AND OF ITS COMBINATIONS.*—Uric acid, uncombined with a base, forming a deposit, is invariably in crystalline forms. But the crystals are seldom so large as to admit of their figures being recognised without the aid of the microscope. Uric acid presents a yellow or amber colour, unless when mixed with urate of ammonia, which is frequently the case, and then it is of a much paler hue. These deposits present every shade of colour, from the palest fawn to the deepest amber or orange-red. The deeper the colour of the urine the darker are the deposits

39. *A. Diagnosis of Uric Acid Deposits*—When heated in the urine, the uric acid deposit is not dissolved; the crystals merely become opaque. When mixed with urate of ammonia, Dr. G. BIRD recommends the urine to be warmed in a watch-glass; the acid then becomes visible at the bottom of the glass as soon as the urate dissolves. Heated with liquor potassæ, the uric acid deposit dissolves, forming urate of potash of ready solubility in the alkaline fluid. "Hydrochloric and acetic acids are without any action; but nitric acid readily dissolves it, and by careful evaporation a residue of a beautiful pink colour, becoming of a rich purple on being held over the vapour of ammonia, is left. This coloured residue is the murexid of LIEBIG, the purpurate of ammonia of

**PROUT.** Exposed to heat in a platinum spoon, the uric acid deposits readily burn, evolving an odour of bitter almonds, and finally leave a small quantity of a white ash, which contains phosphate of soda, or lime, or both."

40. *When urine contains an excess of uric acid* it generally forms crystals on cooling, uric acid being seldom deposited before emission. Sometimes, especially in the urine of gouty persons, many hours elapse before any is deposited, although a large quantity is present. Occasionally the acid is not deposited, but remains on the surface as a crystalline pellicle, presenting an iridescent play of colours in a bright light. Urine of a deeper amber colour than natural, or of a reddish-brown colour, usually deposits the largest amount of this acid; but very high-coloured urine seldom deposits uric acid until after the addition of a stronger acid; and urine does not deposit all its uric acid until decomposition has commenced. Urine depositing this acid always reddens litmus paper, and often contains an excess of urea, so as to crystallize when mixed with nitric acid. Its specific gravity is generally above 1.020, excepting in infants, in whom deposits of uric acid are common, although the urine may be pale and of a much lower density. These deposits "appear as a yellow crystalline sand, while the supernatant urine is of low specific gravity, often 1.006, as pale as water, and contains very little urea." This circumstance admits of explanation from the small proportion of alkaline phosphates, the presumed solvent for uric acid in the urine of infants. For the various microscopic characters of uric acid deposits, which can only be satisfactorily shown by engravings, I must refer the reader to Dr. G. BIRD's interesting work.

[*Microscopic Characters.*—All the varieties of uric acid crystals may be traced to some modification of the *rhombic prism*, the normal crystalline form of this substance. The rhomboidal crystals are sometimes so thin as to be merely pale, lozenge-shaped laminae; more generally, however, they are thicker. Many of them appear nucleated, as if one crystal included another. It seldom happens that the angles of these are sharply defined, the two obtuse angles being most generally rounded off, and sometimes the acute angles are blunted, so that the whole crystal appears elliptical. Where the deposit has been of long continuance, the rhomboid outline of the crystal is replaced by a square one. Several accidental varieties of these rhomboid and square crystals exist, the most curious of which presents a spindle-like figure, the obtuse edges being rounded, and the margin on either side excavated; and some appear to be composed of flattened cylinders. Some are very thin, longer than broad, representing square tables, with smooth or serrated sides and edges. Another variety forms thick, rhomboidal, cohering prisms, and another still, aggregated lozenges in spinous masses. When the urine cools very suddenly, or a strong acid is added to it, uric acid is sometimes precipitated in irregular masses resembling irregular fragments of yellow quartz. We have observed this appearance this very day (June 28, 1857) in the urine of a patient labouring under renal calculus of the uric acid kind.]

41. *B. Diagnosis of Deposits of Urate of Ammonia.*—These vary in colour, from white, through every tint, to a pale fawn (the oftenest met with), brick-red, pink, or purple. All these deposits

have certain characters in common. They never take place until the urine has cooled, and quickly disappear on the application of heat. The darker coloured deposits require a higher temperature for solution than the paler; and when the urine is scanty and concentrated, as in acute rheumatism, the addition of a little water may be required before they quite disappear. The addition of liquor ammoniæ or liquor potassæ quickly dissolves deposits of urate of ammonia, rendering the urine a little turbid from the precipitate of earthy phosphates. Deposits of urate of ammonia always contain small quantities of the urates of lime and soda, and often of magnesia and potass.

42. *Urine depositing urate of ammonia* presents several modifications: 1st, a pale urine of low specific gravity (1.012) with a nearly white deposit, which, instead of entirely falling, forms masses in the fluid, and appears as a mucous pus. The application of heat shows at once its real nature by causing its disappearance. 2d. A pale amber-coloured urine, of a specific gravity about 1.018, which, on cooling, deposits a copious fawn-coloured substance resembling powdered bath-brick mixed in the water, but very readily disappearing on applying a gentle heat. This deposit occurs often, readily disappears, and frequently attends a cold, obstructed perspiration, or slight indigestion. 3d. A deeper coloured urine, of a higher specific gravity (from 1.022 to 1.026), and deposits, on cooling, a reddish-brown sediment—the well-known brick-dust or lateritious sediment. This variety generally is present during febrile excitement, and becomes turbid on the addition of a drop of nitric acid, "not from the coagulation of the albumen, but from the precipitation of uric acid in very minute microscopic rhomboidal crystals." 4th. Urine of a very deep colour, approaching to a copper or purplish tint, or to purplish hue. This colour Dr. G. BIRD attributes to the presence of *purpurine*. He adds that, whenever a deposit of urate of ammonia occurs in such urine, either spontaneously or by immersing it in a freezing mixture, it combines with the pink pigment, forming a kind of lake, and which is often so abundant as not to entirely disappear by heat, until the urine is diluted with water. This state of the urine is often observed in acute rheumatism, gout, in diseases of the liver, spleen, &c., and has been attributed to the obstructed elimination of carbon.

[*Microscopic Characters.*—Dr. BIRD states that when a drop of urine, turbid from the presence of urate of ammonia, is placed between two pieces of glass and examined with the microscope, a mere amorphous precipitate is first seen; but, on minute examination, this is seen to be composed of myriads of excessively minute globules adhering together, forming little linear masses, often mixed with crystals of uric acid. Sometimes, especially if the urine has been long kept, the minute particles cohere, and form small opaque spherical bodies, appearing black by transmitted light, on account of their opacity. When examined by reflected light, on a black ground, they present a buff or fawn colour. On the application of slight heat to the drop of urine, the particles of urate of ammonia disappear, again becoming visible on cooling. A good mode is to place a drop of the turbid urine in a watch-glass and gently warm it. As soon as it has become clear, add a drop of almost any acid (the hydro-



chloric is perhaps the best); the muddiness previously produced by the urate will, on examination, be found to be replaced by lozenges of uric acid of a rhomboidal form. Very rarely the urate of ammonia occurs in large globules mixed with crystals of uric acid. This is occasionally observed in albuminous urine, and by its opacity is best observed by reflected light.]

43. ii. PATHOLOGICAL RELATIONS OF URIC ACID AND URATE OF AMMONIA.—Independently of changes in the quantities of these substances in the urine, caused by the quantity and nature of the food, very important alterations of the proportions of these substances accompany and characterize various pathological conditions of the frame. Uric acid and its combinations have been attributed to two sources, viz., the waste or disintegration of the tissues, and nitrogenized food. But it appears to me that too large a share of these sources has been imputed to the former (which is more correctly the nutritive metamorphosis, and waste of the tissues), while the metamorphosis and waste of the globules, fibrin, and albumen of the blood, as contributing to the formation of these substances in the urine, have been overlooked. In disease, especially in acute diseases, as long as the kidneys are enabled to discharge their functions, an increase of uric acid and its compounds appears in the urine; and this increase is to be imputed chiefly to the waste of the tissues and of the hæmato-globuline, for little or no nitrogenized food is generally taken in these cases, but emaciation, and with this more or less of anæmia supervene. The anæmia, which is often remarkable, especially in the advanced progress of these diseases, is often overlooked in acute rheumatism, gout, fevers, diseases of the liver, spleen, &c., the elements and sources of uric acid and its compounds are abundantly supplied by the states of the blood to the kidneys, and uric acid, both pure and combined, is greatly in excess in the urine. MM. BECQUEREL and L'HERETIER found, in eleven cases of inflammatory fever and twelve of continued fever, the uric acid more than double that in health.

	Acute Inflammations.	Fever	Health.
Specific gravity of the urine .....	1·0216	1·0229	1·017
Uric acid in the urine.	1·041	1·312	0·371

44. That uric acid and its combinations may be formed to some extent in the blood, at least in some diseases, especially gout, rheumatism, erysipelas, &c., and eliminated by the kidneys, is rendered probable by the circumstance of urate of soda having been detected in the blood by Dr GARROD. But the presence of this combination in the blood does not preclude the elaboration of a portion of the uric acid and its compounds, or the modification and metamorphosis of one or more of them, or their elements, by the kidneys.

45. In diseases of debility, especially in those characterized by depressed or exhausted organic nervous power, and by a poor or anæmic state of the circulation in hysteria, chlorosis, disorders of irritation, &c., uric acid and its compounds are greatly reduced in the urine, unless the quantity of urine passed be remarkably diminished, and no deposits are formed.

46. The state of the perspiratory function is too often overlooked by those who attend especially to the urine. Whenever the functions of the skin are impeded or interrupted, those of the

kidneys are augmented; and the results are reversed when the perspiratory actions are increased. But the increase or diminution of either does not consist merely in the watery element, but also in the nitrogenized and other materials held in solution. This reciprocative or vicarious function, and more especially the frequent want or imperfection of compensation existing between these functions, are most intimately connected with the origin of many diseases, and are not the less productive of most dangerous results in the progress of others. I have always insisted, in my lectures (delivered from 1826 until 1842), upon the influence of an insufficiently depurated blood—of effete materials circulating in the blood—owing to impaired function of either the kidneys, the skin, or the intestinal mucous surface and follicles, or of two or all of these; or to an imperfect compensation of function of the others, when one is impaired or interrupted, in causing diseases not only of a serious and acute character, but also of a chronic and obstinate, although not dangerous kind. Most of the diseases of the skin, especially those which are most disposed to become chronic, are induced, or perpetuated, or both, not only by impaired depurating function of the skin and its follicles, but more especially and remarkably also by imperfect action of the kidneys, and of the intestinal mucous surface and follicles; the effete and nitrogenized elements and materials, and their combinations, retained and accumulating in the blood, irritating the cutaneous capillaries, and the capillaries of predisposed and sensitive surfaces and tissues. The crises of fevers and inflammatory diseases are merely the returning functions of depurating organs, and the free discharge by these emunctories of effete nitrogenous elements and materials and their compounds, chiefly by the kidneys, bowels, and skin. This doctrine has been fully elucidated in the *articles* BLOOD, CRISES, and DISEASE (published in 1832 and 1833), and has been applied to the illustration of the causes and phenomena of CRISES (see § 15–20). Long after the publication of my views, Professor LIEBIG referred the products of elimination from the blood by the emunctories, and especially those discharged by the kidneys, to chemical changes, but his explanations are opposed to clinical observation, while the researches of M. BECQUEREL (*Séméiotique des Urines*, &c., 8vo, Paris, 1841) tend to confirm the opinion contained in the articles now referred to.

47. (a) Excess of uric acid, or of its combinations with bases in the urine, the quantity of this fluid being natural, occurs in fevers, acute rheumatism, gout, erysipelas, inflammatory diseases, hepatic and cutaneous complaints, &c., chiefly from the waste and absorption of the tissues, and the metamorphosis of the elements and materials derived from these sources, and from the blood aided by oxygen conveyed into the circulation by the red globules. (b) A similar excess may also arise from an excessive indulgence in animal food, especially in highly nitrogenized flesh-meats, or from an indulgence in this kind of food beyond what is required for the nutrition of the several structures, or from a more moderate use of this food, due exercise, especially in the open air, being neglected. (c) Excess of these substances may occur in the urine, although the supply of nitrogenized food is very moderate, owing to impaired digestive, assimilative, and nutritive func-

tion. (d) Excess may also occur in consequence of impaired or arrested action of the skin and bowels; the kidneys discharging a more or less compensating function, and eliminating a portion or the whole of those elements and their combinations usually discharged by these other emunctories.

48. *Calculus Deposits of Uric Acid and the Urates*.—An abundance of uric acid and of the urates in the urine may occur without producing much disturbance to the urinary or other functions. This is especially the case with urate of ammonia, which can hardly be ascribed to disorder, but rather to the healthy discharge of the depurating function of the kidneys. But, as Dr. G. BIRD has justly remarked, "Uric acid or urates may be deposited in an insoluble form in the kidneys or bladder, and, aggregating, form a mass, on which, by a kind of imperfect crystallization, great quantities of the acid or its salts may be deposited, giving rise to the formation of a calculus. Uric acid is of more serious importance than most other elements of calculous formations, not only from its constituting a large proportion of all urinary calculi, but even when they are chiefly composed of other ingredients, the nuclei on which they are deposited are, in the great majority of cases, composed of uric acid. Of 374 calculi contained in the Museum of Guy's Hospital, at the time I examined them, the nuclei are in 269 composed of uric acid or urate of ammonia. On account of its solubility, urate of ammonia is not a frequent component of entire calculi, although it often enters with other ingredients into their composition. Indeed, calculi wholly composed of this compound are almost peculiar to childhood; in Guy's Museum there are but eight concretions entirely consisting of this substance, although it constitutes the nucleus in eighteen." It is hence very probable that if ever by medical treatment we can succeed in overcoming a calculous diathesis, or dissolving a stone in the act of growth, it will be by means directed to the solution of the uric acid or its combinations" (*Op cit*, p. 154)

[The symptoms attending the crystalline lithic acid deposit are sometimes severe, and chiefly met with among those who use considerable animal food and take but little exercise. The tendency to such deposits is often marked by sharp lancinating pains in the extremities, and by lumbar pains, combined with more or less irritation during micturition; and these symptoms are generally absent if the deposits are of a lateritious character, unless they occur in rheumatism, fever, or gout, when they may be expected to be present. Such crystalline deposits are to be suspected, when transient but sharp pains are experienced by the patient, and a sensation of scalding or irritation is felt after or during micturition, and no other symptom of constitutional disturbance is observed. The patient may labour under more or less derangement of the digestive organs, but not so strongly marked as in the phosphatic and oxalic forms of deposit, which are usually characterized by severe dyspeptic symptoms and constitutional disturbance.]

49 iii TREATMENT OF DEPOSITS OF URIC ACID AND URATES.—From the foregoing, it is apparent that excess of these materials in the urine, and the deposit of them, either in some part of the urinary apparatus, or after the urine is discharged, are contingent upon a variety of ante-

cedent disorders or pathological conditions, which, in individual cases, require due recognition and appropriate means; and not upon those alone, but also, in different cases, or in different circumstances, upon an excessive or improper diet and regimen, or upon insufficient exercise. One of the most important and most generally prevalent of these conditions, more especially when these materials are deposited in large or unusual quantities, and still more particularly when they are deposited in any of the urinary organs, is depressed or exhausted organic nervous power, occasioning impaired digestion, assimilation, and nutrition. This condition suggests the employment of such means as experience has shown to be most efficacious in restoring the organic nervous power to its former energy, throughout the organs devoted to digestion, assimilation, and nutrition. This indication of cure should be fulfilled, 1st, by medicinal treatment; 2d, by suitable diet and regimen; and, 3d, by exercise in the open air, and residence in a healthy locality.

50. a. *Medicinal treatment* comprises the several means of cure already recommended under the separate heads of INDIGESTION, GOUT, PYRO-SIS, &c.; but there are substances to which special reference may be made for removing and dissolving the deposits above noticed, and for counteracting the disposition to their formation. The medicines which may be employed in these cases are either restoratives and tonics, or are solvents of uric acid; and others may be so combined as to operate in this double capacity. The first of these consist chiefly of the tonic vegetable infusions and decoctions; the second of alkalies and alkaline salts; the former being generally made the vehicles for the exhibition of the latter—more especially of the following, viz., the liquor potassæ, BRANDISH's alkaline solution, the carbonates of potass and soda; the citrates, acetates, and tartrates of potass and soda; magnesia, and the citrate and carbonate of magnesia; the biphosphates of potash and of soda; the phosphates of soda and of ammonia, and the benzoic and citric acids. Certain mineral substances are likewise of use, especially the alkaline preparations of iron, the nitrate and oxide of silver or bismuth, and the sulphate and oxide of zinc, which may be given in various states of combination, and in the form of pill. It may be remarked respecting certain of the foregoing, that the preparations, especially the carbonate of the fixed alkalies and the liquor potassæ, are often most beneficially conjoined with the iodide of potassium, and prescribed in a tonic bitter mixture; that the phosphate of soda may be taken freely in gruel, so as to act gently on the bowels; that magnesia will be most beneficial when given with sulphur, and so as to act upon the bowels, kidneys, and skin, which it will generally do when taken at night; and that the biphosphates may be prescribed in stomache infusions with salts of the vegetable acids. Benzoic acid was recommended by Mr. A. URE, to prevent the formation of uric acid. It may be given in doses of five to ten grains, thrice a day, with carbonate or phosphate of soda, or with the carbonate of ammonia, dissolved in boiling water. Citric acid was strongly recommended by Dr. OWEN REES for diseases, especially gout and rheumatism, in which uric acid and urates are abundantly formed; and whether it be given as an addition to the patient's drink, or in combination with the alkalies, it is often of great service. With



magnesia, either in the form of citrate, or as recent lemon-juice or lemonade taken immediately after the magnesia, it is equally beneficial.

51. Most of the diseases, or slight states of disorder in which uric acid and the urates are deposited, are characterized by deficiency of the cutaneous excretion, and insufficient attention is directed to this function in many cases. The restoration of this excretion by means of the warm bath, or the vapour bath, followed by frictions of the surface, by walking, or other active exercises in the open air, is a most important indication of cure where these deposits appear in the urine, both in preventing and in permanently removing the complaints in which they are the general concomitants.

52. *b. The mineral waters* which contain the alkalies, or sulphur, as those of Vichy, of Ems, or of Harrowgate, will also be resorted to with benefit. But whatever be the treatment, the quantity of the flesh-meats used as food should be abridged, and farinaceous and vegetable substances, or the white kinds of fish, boiled, be partly substituted, more especially when active exercise in the open air is not enjoyed, and when the functions of the skin are imperfectly performed.

[We have generally been in the habit of recommending the free use of the *Saratoga* (*Congross-water*), fresh from the spring, if possible, in uric acid gravel, and have rarely failed to find it beneficial. It should be used as freely as possible, short of exciting purgation, and taken at different times in the course of the day. The *Sharon* and *Avon* sulphur waters, as well as those of *Virginia*, have also considerable reputation in the treatment of these cases; and they would be far more beneficial were proper attention paid to the diet.]

53. *c. Uric Oxide—Xanthic Oxide—Xanthine, Pathological Relations of.*—This substance is a very rare ingredient of calculous deposits or concretions, and it has been observed only in single instances by MARCET, LANGIER, LANGENBECK, DULK, BERZELIUS, and MORIN. The chemical constitution and the diagnosis of uric oxide are given by Dr. G. BIRD, to whose work I may refer the reader. The character of urine depositing this substance is not known. The microscopic examination of a fragment of calculus consisting of uric oxide did not furnish any information as respects a crystalline arrangement. The only recorded cases of the formation of this deposit occurred in children, and the calculi formed by it did not exceed a few grains in weight.

54. *iv. PURPURINE, ITS PATHOLOGICAL RELATIONS.*—Deposits of urate of ammonia coloured by this substance (§ 39-42) present tints varying from pale flesh-colour to the deepest carmine. "The presence of purpurine interferes with the ready solubility of the deposit with which it is combined on the application of heat, and free dilution with water is often required to aid its solution." Dr. G. BIRD states that he has never seen purpurine colouring any other deposits except those of urate of ammonia, and hippuric acid when precipitated from concentrated urine by hydrochloric acid. Uric acid scarcely appears to have any affinity for it. It cannot be mistaken for blood, on microscopic examination, owing to the absence of blood-disks. The chemical composition of purpurine occurring in disease is not exactly known. SCHERER states that that generated by the action of hydrochloric acid on urine

consists of 62.51 of carbon, 5.79 of hydrogen, and 31.70 of nitrogen and oxygen. Urinary calculi sometimes present layers of urate of ammonia stained with purpurine. Dr. G. BIRD remarks that all the deposits with which it is combined were, as far as he had observed, amorphous.

55. *A. The Characters of the Urine containing Purpurine.*—When an excess of urate of ammonia is present, it falls to the bottom of the vessel as the urine cools, carrying with it a great part of the purpurine. "If this excess be not present, the urine simply presents a pink or purple colour, and on dissolving white and pure urate of ammonia in it by heat, it is precipitated on cooling, deeply coloured by the purpurine. The presence of the yellow extractive which yields purpurine can be readily discovered by the action of hydrochloric acid. On evaporating urine containing purpurine to the consistence of an extract, and digesting it in alcohol, a fine purple tincture is obtained—the intensity of the tint being rather heightened by acids and diminished by alkalies." The specific gravity of this high-coloured urine, when the colour is as deep as that of brandy, varies from 1.022 to 1.030.

56. *B. The pathological indications of an excess of purpurine* are important. Dr. G. BIRD remarks that the existence of purpurine in urine appears to be "invariably dependent upon some imperfection in the excretion of carbon by these organs, whose special function it is to eliminate this element from the blood, as the liver and lungs, but especially the former. It is hence almost always connected with some functional or structural mischief of the liver or spleen, or some other organ connected with the portal circulation." I have for many years ascribed the presence of this colouring substance in the urine to an increased waste of the red globules of the blood, or of the hæmato-globulin by the kidneys, and that the diseases in which it most remarkably occurs, as fevers, gout, acute rheumatisms, phthisis, &c., are characterized not only by a rapid waste of the tissues, but also of the globules of the blood, giving rise in most cases to marked anæmia. There can be no doubt of biliary disorder, torpor, &c., of the liver—enlargements of the spleen, &c., being often associated with these and other diseases in which purpurine exists in the urine; but in these the waste of the blood-globules is not the less remarkable, this substance disappearing from the urine when the waste is diminished to the natural amount by restoration of vital power, by due oxygenation of the blood, and by improved digestion and assimilation.

57. *v. CYSTINE, ITS PATHOLOGICAL RELATIONS.*—This substance does not exist in healthy urine, and rarely occurs in morbid urine. It is probably derived from the sulphur extractive of urine (§ 30). In its chemical composition it contains no less than 26 per cent of sulphur. Cystine, Dr. G. BIRD states, has been found in urinary sediments by very few observers, and it was not recognised in this form until a long period after its discovery in calculi by Dr. WOLLASTON. In the rare cases in which it has been observed, it formed a nearly white or pale fawn-coloured pulverulent deposit, resembling pale urate of ammonia. The greatest proportion of cystine may be inferred to be merely diffused in the urine while in the bladder, as at the moment of discharge the urine is turbid, and immediately deposits a copious sediment. Dr. G. BIRD states that, on apply-

ing heat to the urine, the deposit undergoes no change, and very slowly dissolves on the subsequent addition of hydrochloric or nitric acid. "Pure cystine is soluble in the mineral, and insoluble in the vegetable acids; with the former, it forms imperfect saline combinations, which leave by evaporation gummy masses or acicular crystals. It is readily soluble in ammonia and the fixed alkalies and their carbonates, but insoluble in carbonate of ammonia. Heated on platinum foil it burns, evolving a peculiar disagreeable odour." Cystine may be distinguished from a deposit of urate of ammonia by not disappearing on heating the urine, and from the earthy phosphates by being soluble in very dilute hydrochloric or strong acetic acid. "The best character of cystine is its ready solubility in ammonia, mere agitation of some of the deposit with liquor ammoniæ being sufficient to dissolve it; and a few drops of the fluid, when allowed to evaporate spontaneously on a slip of glass, leaves six-sided tables of cystine. The ammoniacal solution, when kept for some time in a white glass bottle, stains it black, from the combination of the sulphur of the cystine with the lead in the glass."

58 *a. The character of urine depositing cystine* is that of a pale yellow, or more of a honey-yellow than of an amber tint, presenting an appearance like diabetic urine. It is below the average specific gravity, is passed in larger quantity than usual, and is often neutral, seldom acid to litmus paper, and soon becomes alkaline. The odour of this urine is peculiar, and resembles that of sweet-brier. It is more rarely fetid, and when it is, the colour is generally greenish or greenish yellow. "A certain portion of cystine exists in solution in the urine, as the addition of acetic acid always precipitates a small quantity." Even when this deposit has vanished for some days together, crystals of cystine are then precipitated by acetic acid. Urea and uric acid are present in very small quantities, and in some instances the latter is nearly absent.

59 *b. Calculi* composed of cystine are generally pale yellow or fawn-coloured, but by long keeping they become greenish-gray, or a fine greenish-blue, probably owing to the action of light. The *microscopic characters* of cystine are very obvious. When it occurs as a deposit, it is always crystallized, never being amorphous. Among the crystals a few regular six-sided laminæ are often seen, but the great mass is composed of a large number of superposed plates, so that the compound crystals thus produced appeared multiangular; but I must refer the reader to Dr. G. BIRD's work, where this topic is well illustrated by wood-cuts.

60 *c. The pathological origin of cystine* is no farther known than that it is inferred to proceed from the waste of tissues, [especially the albuminous,] and probably also of the hæmato-globulin, or rather of some derangement of the normal course of this waste connected more especially with an excessive elimination of sulphur; every ounce of cystine containing more than two drachms of this element. Cystine may thus be formed from those elements of the tissues normally producing urea and uric acid with an excess of sulphur, owing probably to a deficiency of the process of oxidation in connexion with impaired vital energy. That these latter states obtain is evinced by the occurrence of cystine, or of cystin-uria, in scrofulous, chlorotic, and anæ-

mied subjects. The hereditary nature of this condition of the urine has been noticed by Dr. G. BIRD, who states that in one family alone several members were affected with cystin-uria; and that one instance exists in which it can be traced with tolerable certainty through three generations. In one case under the care of Mr. LUKE, extensive disorganization of the kidneys co-existed with a cystine calculus. Dr. PROUT has seen fatty matter mixed with the urine in cystin-uria, and suggests the probability of its connexion with fatty liver. Dr. G. BIRD thinks it not unlikely that the excretion of cystine may be a means, under certain circumstances, of compensating for deficient action of the liver *quoad* the excretion of sulphur. The existence of cystine in the urine of chlorotic and debilitated females has been met with in several cases by Dr. SHEARMAN, of Rotherham.

[According to our observations, *cystine* is not often met with in the urine of the human species, though very common in the dog. Dr. WOLLASTON called it *cystic oxide*, because peculiar to the bladder, and resembling some few of that class of substances in being soluble in both acids and alkalies. In calculi it exists in a perfectly pure form. It dissolves in dilute nitric, hydrochloric, sulphuric, oxalic, and phosphoric acids, but will not combine with the tartaric, acetic, or citric acids. It is dissolved by caustic ammonia, but not by the carbonate of that alkali; also by the fixed caustic alkalies and their carbonates. A dark brown colour is produced by evaporating nitric acid on cystine. It is insoluble in alcohol, and nearly so in water. The *carb. of ammonia* is the best precipitate for it, when in solution in acids, and the *acetic acid* from alkalies. The best mode of detecting cystine is to dissolve the calculous matter in caustic potash, then add a solution of acetate of lead in such proportions that the oxide of lead shall not precipitate, but be retained in solution by the excess of potash. This liquor becomes black when boiled, if cystine is present, a reaction dependent on the presence of sulphur in the cystine. Before the blowpipe it is consumed, yielding a very peculiar fetid smell. It may be easily distinguished from the other components of calculi by its being soluble in dilute hydrochloric acid, and a solution of *carb. of potash*.]

61. *d. Indications of Cure*.—Dr. PROUT advises the prolonged use of nitro-hydrochloric acid, and found it of benefit in some cases. Having viewed the existence of cystine in the urine as a result of debility in connexion with imperfect oxidation of the blood-globules, I have in one case prescribed the chlorate of potash with tonic infusions. This view of the pathology of cystine is suggestive also of the employment of the tincture of the chloride of iron, of the iodide of iron, of chalybeate mineral waters, and of other tonics, for its removal, aided by a generous diet, by active exercise in the open air, and by due attention to the functions of the skin and bowels. (See also the *Treatment of Debility*, of CHLOROSIS, and of SCROFULA.)

62. *vi. HIPPURIC ACID*—HIPPIURIA.—This acid is constantly present in the urine of the horse, and generally also in that of herbivorous animals.—*a.* LEHMANN found it in diabetic urine, and LIEBIG detected it in healthy urine, although in minute quantity. As this substance never appears as a sediment until after the addition of a stronger acid, the *diagnosis* of it entirely depends



upon the characters of the urine containing it. The urine containing an excess of hippuric acid is either very slightly acid, or neutral. It may be even alkaline. When this state of urine is caused by the ingestion of benzoic acid, it is then very acid. Its odour is commonly that of whey, and its specific gravity is below the healthy state, varying from 1.006 to 1.008. Deposits of the triple phosphate of magnesia are not infrequent in it. For the modes of detecting this acid, and for its microscopic characters, I must refer the reader to Dr. G. BIRD's work.

[To detect *hippuric acid*, evaporate a few ounces of urine to a sirupy consistence, then add an excess of hydrochloric acid, when a mixture of hippuric and uric acids will be separated and fall to the bottom of the vessel. After a few hours' repose, decant the supernatant fluid, and wash the deposit in a little very cold water; boil the residue with alcohol (in which uric acid is insoluble), when the hippuric acid will be dissolved, and, on evaporation, will be found in thin, delicate, strongly-coloured needles. Hippuric acid requires nearly 400 times its weight of cold water for solution.]

63. *b. The pathological states* causing this state of urine are not always obvious. In the lower animals it proceeds from vegetable food, it being constant in such as are not exercised, and replaced by benzoic acid in those that are worked. When in excess in human urine, it is ascribable to diet; thus it has been found after a prolonged milk diet, after an excessive use of apples, and in the urine of infants. This acid does not necessarily interfere with the production of uric acid, but generally it is attended by a deficiency of urea. It has been found in urine containing albumen. Dr. G. BIRD ascribes it to a diet deficient in nitrogen, or to the mal-assimilation of the carbon in the food, and infers "that hippuric acid may be one of the agents by which the kidneys perform a vicarious function for the liver, in removing an excess of carbon from the system." In this respect it may be viewed as an analogous result to the production of purpurine and bile-pigment, each removing 63.93, 62.0, and 68.18 per cent. of carbon, respectively, from the system. It should be looked for in the urine when the functions of the liver, lungs, and skin are defective, when the food is deficient in nitrogen, and when the urine is copious, is slightly acid or neutral, and of low specific gravity.

64. vii. **OXALATE OF LIME—OXALURIA.**—Oxalate of lime often exists in the urine, and is frequently a constituent of calculous concretions. Its chemical and pathological relations have been ably investigated by Dr. G. BIRD, who contends for its frequent appearance as a crystalline deposit in the urine, in fine and well-defined octahedral crystals, and for "the connexion between the occurrence of this substance and the existence of a certain series of ailments generally characterized by nervous irritability." He considers that the depressing influences, always present in densely populated cities, are more productive of this than of earthy phosphatic deposits; and that traces of oxalate of lime, in the minutest microscopic crystals, may be detected in the urine of persons free from any apparent disease. Hence he regards it as one of the common results of metamorphosis of tissue. But this is very different from its presence in large crystals and in considerable quantities, these constituting a truly pathological condition.

65. *a. For the detection* of oxalate of lime in the urine, I must refer to the work already quoted for the full details; generally, however, the existence of this substance may be ascertained by pouring off the upper six sevenths of the water passed a few hours after a meal, having given it time to repose in a glass vessel. A portion of the remaining seventh may be warmed in a watch-glass to dissolve the urate of ammonia. Having removed the greater part of the fluid, and replaced it by distilled water, a white glistening powder like diamond dust now becomes visible; and this under the microscope will be found to consist of crystals of oxalate of lime in transparent octahedra, with sharply-defined edges and angles. Dr. G. BIRD states that, out of a great number of specimens of urine containing the oxalate, it has scarcely ever appeared in the form of a distinct deposit, but has remained diffused in the urine, even when present in so large a quantity that each drop, when placed under the microscope, was loaded with its crystals. But if any substance capable of being a nucleus were present, the oxalate would be deposited around it, although scarcely in cohering masses, and invariably colourless and beautifully transparent. The oxalate of lime, although absolutely insoluble in water, must be soluble in urine, for its lustrous crystalline form sufficiently indicates its previous solution, and it is not until after the urine has been voided several hours that the crystals of oxalate can be detected.

66. Occasionally some remarkable crystals of the oxalate resembling *dumb-bells*, or two kidneys with their concavities opposed, are met with, their surfaces being finely striated. But it is doubtful whether or no these are an oxalate of lime. Dr. G. BIRD considers them an oxalurate of lime, a salt which differs from the oxalate in ultimate composition only in the presence of the elements of urea and absence of the constituents of water. Dr. BACON has investigated these crystals minutely, and has concluded that the dumb-bell crystals consist of a "salt of lime containing either oxalic, oxaluric, or perhaps some other organic acid easily converted into oxalic acid; but the exact nature of the acid remains to be determined by future examination."

67. *b. The characters of urine* containing the oxalate of lime are those of a fine amber hue, sometimes darker than in health, in a few cases paler than natural, and of a lower specific gravity, the odour being generally natural, or rarely aromatic like mignonette. Frequently a deposit of urate of ammonia, sometimes tinted pink by purpurine, falls during cooling. The specific gravity of oxalic urine varies extremely. Of 85 different specimens, Dr. G. BIRD found 9 in which it ranged from 1.009 to 1.015; in 27 from 1.016 to 1.020; in 23 from 1.021 to 1.025; and in 26 from 1.025 to 1.030. Generally the heaviest specimens contained most of the oxalate. The quantity passed seldom exceeded the average, instances of positive diuresis being rare. Irritability of bladder was sometimes complained of. Acidity of the urine was well marked, even more so than in health, and always present. An increase in the quantity of urea was frequently found. Mr. STALLARD discovered in oxalic urine a great increase of the indeterminate organic matters (§ 21), often as much as double the average proportion in twenty-four hours.

68. *c. The complications of oxalate of lime with*

other deposits are of some importance. Dr. G. BIRD found the oxalate of lime unmixed with any other saline deposits in more than one half of the specimens of oxalic urine. "In a very few, crystals of uric acid were found from the first, mixed with the octahedra of oxalate of lime; and in nearly all the successful cases this acid appeared in the course of treatment, and ultimately replaced the oxalate altogether," at a period generally contemporary with convalescence. "Much more rarely, prisms and stellæ of the ammoniaco-magnesian phosphate were found mixed with the oxalate, and occasionally replacing it in the course of treatment; and still less frequently, the phosphate was observed in the urine some time before the appearance of the oxalate." Very few well-marked instances of a complication of the oxalic-acid urine with granular degeneration of the kidneys were observed. Of the 85 cases referred to above (§ 67), 43 were unmixed cases of oxalate; 15 were cases of oxalate mixed with urate of ammonia; 15 were mixed with uric acid; 4 were mixed with triple phosphate; and 8 with phosphate deposited by heat. Dr. G. BIRD constantly found a very large quantity of epithelial cells and scales in oxalic urine, indeed so constantly, that a white deposit of epithelium led to the suspicion of the presence of oxalate of lime.

69. *d. The pathological source of oxalate of lime in the urine is of great interest.* It is well known that a physiological connexion exists between sugar and oxalic acid; that the former substance is a common constituent of our aliments; and that most of the farinacea are partially converted into this substance during digestion. Under certain circumstances the sugar thus formed is carried into the blood, and is eliminated by the kidneys. In certain morbid states, a large proportion of the food may be converted into sugar in the stomach, which passes rapidly into the circulation, and is excreted by the kidneys as diabetic urine.\* Recollecting the facility with which sugar and its chemical allies are, under the influence of oxidizing agents, converted into oxalic acid, it might be inferred that the existence of oxaluria is due to the presence of sugar in the blood. Dr. G. BIRD, however, argues against any connexion or relation subsisting between oxaluria and diabetic urine, inasmuch as sugar very rarely exists in the former; and as the latter rarely contains, in a given quantity, an

excess of urea, uric acid, or urates, and is remarkably free from saline deposits, the high specific gravity depending upon the large proportion of sugar. In oxaluria, on the other hand, a large excess of urea, of uric acid, and urates is present, and is as characteristic of this state of urine as the oxalate of lime itself. Hence he infers that there is no relation between oxalic acid and saccharine urine. From the symptoms present in cases where oxaluria is observed, there can be no doubt that the primary cause of this state of urine must, as Dr. PROUT has shown, be imputed to an unhealthy condition of the digestive and assimilating functions. That the oxalic acid is formed from its elements, either in the digestive canal or in its course to and in the blood, must be inferred, since Dr. GARROD detected, beyond any doubt, octahedral crystals of oxalate of lime in the serum of blood from a patient affected with albuminuria. "It is difficult to explain the presence of so insoluble a salt in solution in the blood; but it is probable that the opinion of Dr. SCHMIDT, of Dorpat, may be correct. He has assumed that there exists in the animal economy a tendency to the formation of a soluble triple compound of oxalic acid, lime, and albumen, which, by its decomposition, allows oxalate of lime to crystallize." Probably such a compound exists in the blood in disease; and when the acetic acid is added, as in Dr. GARROD's process, the albumen is separated and the oxalate set free.

70. The chemical relation existing between uric acid, urea, and oxalic acid, and the readiness with which the former of these substances is convertible into the latter, suggest the idea that oxaluria may be regarded as a form of what has been termed by Dr. WILLIS *azoturia*, of which an excess of urea is the prevalent indication, part of the urea, or of its elements, having been converted into oxalic acid. It may be inquired, Whence are the elements which form oxalic acid? Are they derived from the metamorphic changes of the structures, like healthy urea and uric acid? Dr. G. BIRD infers that they are "Hence oxalate of lime must be regarded as one of the common results of metamorphosis of tissue." (*Op. cit.*, p. 210.) I am more disposed to agree with the opinion he has subsequently stated, viz., that although it is probable that such may be the origin of oxaluria (in the waste of the tissues), yet, the quantity of oxalate of lime being greatest after a full meal, and often absent in the urine passed in the morning, frequently disappearing when the diet is regulated, and reappearing on the use of unwholesome food, it is equally probable that this salt is derived from the mal-assimilated elements of food. It is sufficiently obvious, from the nature of the complaints in which oxaluria occurs, that it is always the result of imperfect assimilation of the aliments, owing to impaired organic nervous power, the mal-assimilated, or rather the non-assimilated, elements forming the product in question, aided by oxidation, which product is rather eliminated than formed by the kidneys. However minute and laborious may be the researches of organic chemists in endeavouring to show the elementary combinations and the atomic affinities of these elements, in the production of urinary deposits, the vital endowment, and the states of function depending upon this endowment, more especially demand attention; the chemical constitution of the urine being generally only a sign, but an

[\* The best tests for sugar in the urine are *Frommer's*, *Capezzuoli's*, and *Moore's*. *Frommer's Test*.—Add to the suspected urine, in a large test-tube, just enough of a solution of sulphate of copper to communicate a faint blue tint; a slight deposit of phosphate of copper generally falls. Then add *liquor potassæ* in great excess; a precipitate of hydrated oxide of copper first falls, which redissolves in the excess of alkali, if sugar be present, forming a blue solution like ammoniuret of copper. On gently heating the mixture to ebullition, a deposit of red sub-oxide of copper falls, if sugar be present.

*Moore's Test*.—Place in a test-tube about two drachms of the suspected urine, and add nearly half its bulk of *liquor potassæ*. Heat the whole over a spirit-lamp, and allow actual ebullition to continue for a minute or two; the previously pale urine will become of an orange-brown, or even bistre tint, according to the proportion of sugar present.

*Capezzuoli's Test* consists in adding a few grains of hydrated oxide of copper to urine contained in a conical glass vessel, and render the whole alkaline by adding *liquor potassæ*. If sugar be present, the fluid assumes a reddish colour, and in a few hours the edge of the deposit of oxide assumes a yellow colour, which gradually extends through the mass, from a reduction of the oxide to a metallic state (sub-oxide?)]



important one, of the state of this endowment, particularly as manifested by the organic nervous system.

71. *e. The symptoms accompanying the excretion of oxalate of lime* have been minutely described by professors of the urinary specialty; and conformably with the importance they attach to an urinary deposit, they view it as the actual disease, or at least as a diathesis, instead of being merely a sign, or at most a result, of pre-existing disorder or disease, to which more especially rational medication should be directed. Oxaluria is not a sign of one, or even of two disorders merely, but of several, the chief morbid manifestations being depressed vital endowment of the digestive and assimilating organs, with lowness of spirits, irritability or nervousness, hypochondriacal feelings, impaired nutrition, anæmia, and often loss of sexual power. Pains in the loins, irritability of bladder, and high specific gravity of the urine—generally from 1.025 to 1.030—with various symptoms of impaired health, are also commonly experienced. The urine is invariably acid, often excessively so; and there is a marked tendency to eruptions of boils. Dr G. BIRD remarks that he has seldom met with phthisis in cases with oxalate of lime deposit, and that in very few instances has he seen oxaluria terminate in the formation of a calculus. He again states that the source of this deposit is to be imputed to metamorphosis of the tissues, and that this is the only way that the attending emaciation can be satisfactorily accounted for. I have already stated my belief that this deposit as well as the emaciation are the results of impaired or morbid assimilation of the food, and the consequent imperfect nutrition of the tissues (§ 70).

72. *f. Causes.*—This state of the urine is frequent in those who are subject to mental anxiety and to laborious mental occupations, more especially in men on the stock-exchange, in medical men, in barristers and solicitors, and in those who are engaged in occupations attended by much mental anxiety, and are excessively devoted to business or study. The *exciting causes* are chiefly neglect of health, chronic dyspepsia, hypochondriasis, exhaustion from disease, from syphilis or mercurial courses; venereal excesses, masturbation, involuntary seminal emissions, excessive discharges, and prolonged lactation, previous acute diseases, injuries affecting the spine, &c., &c.

73. *g. The treatment of oxalate of lime deposits* is generally successful, if the diet and the regimen of both mind and body be duly regulated. The food should be digestible, properly cooked, and the animal and vegetable in due proportion. Malt liquor ought to be avoided; and either a small quantity of brandy in much water, or a glass of dry sherry in two of water, may be taken with dinner. The medicines most appropriate are the nitric or nitro-hydrochloric acid (one part of the nitric to two of the hydrochloric) given in tonic infusions or decoctions. If anæmia or chlorosis exist, the tincture of the muriate of iron, with preparations of calumba or quassia; or the *mistura ferri composita*, or the ammonio-citrate or ammonio-tartrate of iron, should be prescribed. If the bowels be costive, the extract of taraxacum may be given with the former medicines; or the decoction of aloes be conjoined with the *mistura ferri composita*; or the *mistura*

*gentiana composita* may be given alone, or with tincture of serpentaria, &c. The sulphate of iron, or of quinine, or of zinc may be prescribed, where the foregoing fail, combined with small doses of camphor and henbane, or of conium. Dr. G. BIRD recommends recourse to colchicum for oxaluria, and states that, under the influence of this drug, copious deposits of oxalate of lime have become replaced by uric acid and the urate of ammonia, thus inducing a condition of urine much more amenable to treatment.

74. viii. *CHEMICAL PATHOLOGY OF EARTHY SALTS IN THE URINE.*—*Phosphuria*—*Phosphate of Lime, Ammonio-phosphate of Magnesia, and Carbonate of Lime.*—Phosphoric acid is excreted in considerable quantity from the blood by the kidneys, combined with soda, ammonia, lime, and magnesia; forming, most probably, ammonio-phosphate of soda, phosphate of magnesia, phosphate of lime. The first of these is soluble in water, and Dr. G. BIRD considers it to be the solvent of uric acid, and indirectly the source of the acidity of urine. The other two salts are insoluble, but the presence of a minute portion of an acid, even the carbonic, enables water to dissolve a considerable quantity. They are also soluble to some extent in hydrochlorate of ammonia. "In healthy urine, the earthy phosphates are held in solution by the acid of the super-phosphates, produced by the action of uric (or hippuric) acid on the tri-basic alkaline salts; and these salts are also, according to ENDERLIN, capable of dissolving a certain quantity of phosphate of lime." The earthy phosphates are always abundant after a meal, the reverse applying to the alkaline salts. Phosphoric acid may be excreted in large excess without forming a deposit, owing to its combination with an alkaline base; and hence, when the excretion of an excess of this acid is looked for, it is not indicated by the amount of earthy salts deposited, for there "is always three or four times more phosphoric acid in a given specimen of urine, in the form of a soluble alkaline salt, than is precipitated as an insoluble earthy compound. The presence of an excess of lime and magnesia has more to do with determining a deposition of insoluble phosphate than an excess of phosphoric acid." The circumstances under which the earthy phosphates are deposited often are of so great importance as to require a recognition of their existence, as well as of the quantities of these phosphatic deposits.

75. *A. The Diagnosis of earthy Phosphates.*—*a.* Deposits of these phosphates are white, unless coloured with blood, are soluble in dilute hydrochloric acid, and insoluble in liquor potassæ and in ammonia. On heating the urine, the deposit merely agglomerates into little masses. A small quantity of a solution of sesqui-carbonate of ammonia added to a large quantity of healthy urine causes turbidity, from a deposit of the triple phosphate mixed with some phosphate of lime. "On placing a drop of this turbid urine under the microscope, myriads of minute prisms of the triple salt, mixed with amorphous granules of the phosphate of lime, will be seen floating in the fluid; these disappear on adding a drop of any acid. As these earthy salts are insoluble in water, they must be held in solution in the urine by the free acid which generally exists. If from any cause the quantity of solvent acid falls below the necessary proportion, the earthy phosphates

appear diffused through the urine, disturbing its transparency, and subside, forming a deposit. Hence, whenever the urine is alkaline, phosphatic deposits are necessary consequences. If urine be secreted with so small a proportion of acid as barely to redden litmus paper, a deposit of triple phosphate often occurs within a few hours after emission; probably owing to the presence of mucous matter, which induces the decomposition of urea and the formation of carbonate of ammonia, which, by neutralizing the solvent acid, precipitates the phosphates. The triple phosphate, which occurs spontaneously in prismatic crystals, is a neutral salt, "and may coexist as a deposit with very sensible acidity of the supernatant urine. It by no means follows that the existence of a deposit of this salt involves the necessarily alkaline state of the urine." Another triple phosphate, differing from the former in containing an excess of base, is of frequent occurrence in the urine when in an alkaline or putrescent state. It cannot be present in urine having the slightest acid reaction on litmus paper. Its crystals are invariably stellar or foliaceous. This salt is termed the basic phosphate. "When the triple or calcareous phosphates are separately exposed to the heat of a blow-pipe flame, they fuse with great difficulty, and not until the heat has been urged to the utmost. If, however, the phosphate of lime is mixed with a triple phosphate in about equal proportions, they readily melt into a white enamel. These mixed salts constitute what is hence termed the fusible calculus, and they can readily be detected by this property in concretions; a character very available in the examination of gravel and calculi, as the two phosphates generally occur together."\*

76. *b.* The physical appearance of deposits of the earthy phosphate varies remarkably. Sometimes they appear as a white crystalline gravel, especially when the triple salt is the chief part of the deposit. But if a small quantity be present, it may readily escape detection by remaining a long time diffused in the urine. After a repose of a few hours, some of the crystals collect on the surface, forming an iridescent pellicle, "reflecting coloured bands like a soap-bubble or a thin layer of oil. If then the lower layers of the urine be placed on a watch-glass, and held obliquely over the flame of a candle or any strong light, a series of glittering points will become visible from the reflection of light from the facets of the minute prisms of the salt." (*Op. cit.*, p. 269.)

77. The phosphates often subside to the bottom of the vessel like a dense cloud of mucus, for which they may be mistaken. Sometimes they form, in very alkaline urine, dense masses, hanging in ropes, like the thickest puriform mucus, from which it is impossible to distinguish them by the unaided eye. Their disappearance on the addition of hydrochloric acid shows at once their nature. The examination of a few drops of the urine between two plates of glass, by the microscope, will detect the characteristic crystals of

the phosphates. Occasionally they are mixed in a deposit with the urate of ammonia, this latter being pale or nearly white. As phosphatic urine is usually very pale, it follows that any urate of ammonia deposited from it will be nearly white from the absence of colouring matter.

[*Microscopic Characters.*—According to BIRD, the neutral triple phosphate occurs: 1st, in well-defined colourless prisms, the angles and edges of the crystals being remarkably sharp and perfect. The triangular prism is most frequently met with, but it presents every variety of termination, sometimes merely truncated, often bevelled off, and not unfrequently the terminal edges are replaced by facets, presenting a very beautiful microscopic object of great transparency, or of an enamel-like opacity, so that they can only be viewed as opaque objects; 2d, the triple phosphate forms minute calculous concretions, composed of colourless acicular prisms, cohering at one end, so as to represent simple *stellæ*, or *rosettes*; 3d, *Penniform crystals*, resembling *striated feather-like crystals*, two being often connected, so as to cause them to resemble wings; 4th, *Stellar and foliaceous crystals*. Dr. BIRD regards this as usually a secondary product taking place out of the body, generally occurring in the form of *six-rayed stars*, each ray being serrated, or irregularly erenate, resembling a taraxacum leaf.]

78. *c.* *States of Phosphatic Urine.*—Although it may appear necessary for the urine to be alkaline for a deposit of phosphates to exist, yet generally urine which deposits the triple phosphate is acid at the time of its excretion. Some neutral salts redden litmus paper, and yet contain no free acid; and this fact may in some cases explain the occasional acid reaction where deposits of phosphates exist. Dr. O. REES has shown that hydrochlorate of ammonia may in some cases be the solvent of the earthy phosphates when in excess. Occasionally urine does not contain any visible deposit, and yet on the application of heat appears to coagulate from the deposition of earthy phosphates. The addition of a drop of nitric acid immediately dissolves this deposit, and distinguishes it from albumen. The precipitation of the earthy phosphates by heat has been ascribed by Dr. H. BRETT to the existence of carbonic acid in the urine in a free state. Dr. B. JONES has, however, shown that, if to any urine rich in phosphates, as that passed shortly after a meal, a minute portion of an alkali be added to neutralize any great excess of acid, the subsequent application of heat precipitates the earthy phosphates.

79. Generally, where phosphatic deposits, magnesian, calcareous, or both, exist for a considerable time, the urine is pale, often whey-like, passed in large quantities, and of low specific gravity—from 1.005 to 1.014. "This is especially the case where organic lesion of the kidneys exists." On the other hand, when the deposits recur and disappear in the course of a few days, the urine is generally of a deep amber colour, is of high specific gravity (from 1.020 to 1.030), often contains an excess of urea, and presents an iridescent pellicle on its surface by repose. This form of phosphatic urine is often met with in connexion with irritative or inflammatory dyspepsia and with mal-assimilation. Sometimes prisms of triple phosphate are seen entangled in the meshes of a mucous cloud for a day or two, and then disappear. Phosphatic

\* Some writers speak of calculi composed of the "acid phosphate of lime." By this is meant, not the super-phosphate, but the neutral or di-phosphate of lime. When the di-phosphate of lime *calculus* is digested with water, it is decomposed into an insoluble sub-phosphate and a soluble super-phosphate, which possesses an acid reaction; and this fact led FOURCROY into the mistake of describing these concretions as composed of a super-phosphate of lime. Di-phosphate of lime constitutes the accidental bezoar, an intestinal concretion found in the stomach of the ox, deer, &c.].



urine occasionally varies from a whey-like hue to a deep brown or greenish brown, is very fetid, generally alkaline, "and loaded with a dense ropy mucus often tinged with blood, and in which large crystals of the triple phosphate and amorphous masses of phosphate of lime are entangled. This variety is almost always met with, either under the irritation of a calculus, or even of a catheter worn in the bladder," or where actual disease of the mucous coat of this organ exists.

80. *d.* For the *microscopic characters* of earthy phosphates, I must refer to Dr. G. BIRD's work, where they are fully illustrated. I can only mention, 1st, the *prisms of neutral triple phosphates*; these are well defined, the triangular prism being the form most frequently met with, but it presents every variety in its terminations; 2d, *simple stella of the neutral salt*, the radii being more or less distinct or crowded; 3d, *peniform crystals of neutral salt*; this variety presents the appearance of striated feather-like crystals, two being generally connected, resembling a pair of wings; 4th, *stellar and foliaceous crystals of basic salt*; this variety is chiefly formed after the urine is discharged, and, when rapidly formed, it generally appears as six-rayed stars, each ray being serrated. *Phosphate of lime* generally presents no appearance of crystalline structure; it either resembling an amorphous powder, or being collected in rounded particles, often adhering to prisms of triple phosphate.

81. *B. Pathological Relations of the Phosphates.*—I have many years ago contended, and more recently, in various parts of this work, alluded to the fact, that the *secretions* are endowed, to a certain extent, with an emanation of vitality which for a time resists the changes which they are disposed to enter into, either when organic nervous influence is much depressed or when they are removed from the body. "Indeed, the vital influence modifies their physical conditions, in a more or less marked manner, as long as they continue subjected to its operation. From this source, also, they are imbued with a vital emanation, the presence of which is indicated by the continuance, for a time, of the specific characters of each. This emanation, being no longer required when they are removed from the body, is soon dissipated. The secretions, while within the sphere of the animal system, and for a short time afterward, possess this emanation of the vital influence, to an amount sufficient to give them certain characters, and to preserve them from the chemical changes to which their constituents are naturally prone; but when this influence becomes depressed, or ultimately ceases, they then undergo dissolution as unequivocal as that evinced by the textures of the body. In confirmation of this view, I need only refer to the comparative conditions of the more perfectly elaborated secretions immediately after their formation and excretion, and after periods of various duration have elapsed from the time of their discharge from the body." (*Physiol. Notes by the Author*, p. 636.)

82. The above doctrine was published by me in 1824; and both then and subsequently I have insisted upon its importance, and upon the obvious deductions which follow from it. While vital energy is perfect, or at least not materially impaired, the secreted fluids, especially while they remain undischarged from the body, are pre-

served by this emanation of vital influence from those changes to which their constituents are chemically disposed. But if these fluids are retained for an unusually lengthened period, or if vital energy, to which they owe their original natural character, be much impaired, those changes which their constituents are chemically disposed to undergo take place more rapidly after their discharge from the body, and in many instances even while they still remain in those receptacles or cavities which are provided for their reception and temporary retention. But with the various manifestations of depressed vital power, changes in the secretions are not only such as take place after these secretions are produced, but also those which occur during their production, and which depend upon the existing state of vitality throughout the body, and upon the manifestations and modifications of vitality in the organs especially destined to the formation of these secretions. When vital energy is impaired, or, in other words, when debility is manifest, whether constituting the only or chief pathological condition or associated with others, as with nervous susceptibility or irritability, or with febrile action, or with organic change, or with other alterations farther impeding or disturbing the functions of a secreting organ or organs, results, will be furnished by the secretions varying with the manner in which the general impairment of vital power affects the functions of digestion, assimilation, nutrition, and waste—the successive conditions of nutritive supply, of vital cohesion and resistance, of molecular dissolution, of vascular depuration, and of ultimate discharge.

83. This doctrine, which, as I have shown, has been published and taught by me with reference especially to the several secretions and excretions—recrementitious, excrementitious, or depurating—is altogether applicable to the urinary excretion, and to the deposits which form in it, both after and previous to its discharge from the body, and in a more particular manner to the urine which furnishes the phosphates in great or unusual excess. The deposit of earthy phosphates may be viewed as resulting more especially from depression or exhaustion of vital power, as manifested chiefly by the nervous system, and is hence most frequently met with in the aged, and in those who labour under disease of the cerebro-spinal nervous system, or have experienced injury of the spine, or have suffered much from tear and wear of mind and body. The pathological conditions giving rise to the deposits of phosphate of lime are similar to those producing the triple salt. Indeed, they often occur simultaneously, especially when the urine is alkaline. Dr. G. BIRD considers that, when the deposit has consisted chiefly of the calcareous salt, the patients have presented more marked evidence of exhaustion, and of the previous existence of some drain on the nervous system, than when the triple salt alone existed, unless its source is strictly local.

84. When the triple phosphate occurs in small quantities, nearly or quite free from the phosphate of lime, the urine being acid or neutral at the time of emission, the cases are then the slightest of this class of disorders. Nevertheless, severe dyspepsia, irritability, restlessness, impaired assimilation, and emaciation are constantly present. When there is an excessive discharge of urea, the symptoms are more severe, and the exhaustion and nervous depression greater. The urine

is then of a rich amber colour, generally depositing phosphates on the application of heat, and of a specific gravity varying from 1.025 to 1.030. In mild cases of dyspepsia, especially in the gouty diathesis, an iridescent pellicle of triple salt, the urine being rich in urea and either acid or neutral, is often observed. This state of the urine is not infrequent in dyspeptic females at or about the climacteric period. Crystals of the triple salt occur in very old persons, especially in the ill-fed; in persons recovering from acute diseases, especially from rheumatic fever.

85 Early in continued fever the urine is high-coloured, and loaded with uric acid and urates. It is then generally acid, but after the end of the second week, or earlier, in the lower types of fever, the acidity often vanishes, and the urine becomes *alkaline* and deposits the phosphates. This is, however, more frequently seen in some types and states of fever than in others, especially in the typhoid and putro-adynamic, and when comatose symptoms appear. The treatment, particularly the use of alkaline medicines, or of the salts of the vegetable acids, has some influence in favouring the change to an alkaline state of the urine. In these cases, as well as in other diseases where the nervous energy is remarkably depressed or exhausted, more especially in the low forms of insanity, in cases of debility from venereal excess, masturbation, &c., after injuries of the spine, as remarked by PROCT, BROUÉ, and others, the elements of urea become rearranged, or obedient to ordinary chemical affinities, and form carbonate of ammonia.

86 When the deposit of phosphates is copious, the two phosphates are generally mixed, either falling to the bottom of the vessel, or remaining suspended in the urine like mucus: the urine is then generally alkaline, and the odour ammoniacal or fetid. This kind of urine is most remarkable in organic disease of the urinary organs, or serious affections of the spinal cord followed by such disease. Conformably with the doctrine above insisted upon (§ 81-5), the impaired vitality of these organs depending upon depressed vitality of the frame generally, as in typhoid and putro-adynamic fevers, or of the urinary organs especially, as after injuries or diseases of the spine, its cord, &c., so affects the urinary secretion, both during the performance of this function and while the secretion is retained, as to favour the occurrence of those changes, even before it is discharged, which its ordinary chemical affinities dispose it to assume. The change thus produced in the urine may be followed by the formation of calculi in any part of the urinary apparatus, but most frequently by irritation of the urinary mucous surfaces and by the secretion of a quantity of viscid mucus, which may become puriform or changed, by the carbonate of ammonia formed in the urine, into a viscid and almost gelatinous or tenacious ropy fluid, sometimes preventing the discharge of the urine, and increasing the sufferings of the patient. Mr CURLING's view of this subject is different from that now stated. He believes that the result of the spinal lesion is the loss of the natural sensibility of the bladder. The effect of this is the secretion of unhealthy alcalescent mucus, which acts chemically upon the urine, renders it alkaline, and leads to the deposition of the earthy phosphates. He thinks that the urine may subsequently be secreted in an alkaline state by the extension of the irritation from

the bladder to the kidneys, or by the latter sympathizing with the former. It should not, however, be overlooked, that injury of the spine not only deprives the urinary apparatus of that share of nervous power reinforcing the organic or ganglionic nervous influence which endows this apparatus, but thereby also modifies the secreting function of the kidneys. Whether the result be impairment only, or a modifying action also, there can be no doubt that the chief result of these injuries is paralysis of the bladder, especially as respects its contractile powers, causing retention of the urine, which, whether it be secreted in an altered or morbid condition, or rendered such after its secretion, owing to impaired vital influence, more readily irritates the urinary mucous surface than in its healthy state, and gives rise to mucous discharge and the consecutive lesions of the urinary organs.

87 The urine may be alkaline and loaded with phosphates, owing to disease of the *Urinary Bladder* (see that article), more especially of its mucous surface. This state of the urine thus arises from three important pathological conditions: 1st, from vital depression, as manifested chiefly by nervous debility and irritability; 2d, from injuries and diseases implicating the spinal cord or its membranes; 3d, from disease of the urinary organs. But it should not be overlooked that the second condition affects the urine by first disordering the functions and subsequently the structure of these organs. It is important to be able to distinguish between these sources of alkalinity of the urine, especially between the presence of a general morbid condition and a strictly local disease. Dr BENCE JONES has established that urine is alkaline from ammonia when the cause is local, and from a fixed alkali when the ailment is general. Hence urine may be alkaline, and not ammoniacal, although when the latter it is necessarily the former. The urine is sometimes alkaline after breakfast, owing to the presence of a fixed alkaline carbonate. The urine, in such cases, turns red litmus paper blue, whatever may be the alkali present; but if it be a fixed alkali, the paper remains blue after being dried before the fire; but if it be the volatile alkali, the paper resumes its red tint when thus exposed. When the urine is alkaline from ammonia, Dr. B. JONES has farther shown, abundant crystals of triple phosphate are always found, while, when ammonia is absent, these crystals are rarely present, and are replaced by a copious and dense deposit of phosphate of lime. He has arrived at the following conclusions as to the relation borne by phosphatic salts to certain pathological states:

88. 1st. No determination of an excessive secretion of phosphatic acid can be furnished by the deposit of earthy salts, unless the quantity of lime and magnesia in the food be taken into account; 2d. No *real increase* of phosphatic salts occurs in spinal diseases, notwithstanding the existence of deposits; 3d. In fever and in most acute inflammations, the phosphatic salts are not increased; 4th. In old cases of mania, melancholy, paralysis of the insane, or in chronic diseases in which nervous tissues are influenced, no conclusions can be drawn; 5th. In fractures of the skull, the phosphatic salts increase only when any inflammatory action occurs in the brain, and in acute phrenitis an excessive increase takes place; 6th. In delirium tremens there is a marked deficiency of phosphates, unless they are introduced with



the ingesta; an excess is, however, met with in some functional affections of the brain.

89. In some instances the urine is copious, pale, and freely deposits the phosphates, the patient being emaciated, and the urinary organs free from disease. In these the formation of a calculus may be dreaded. But when this does not exist, it will often be found that *tabes dorsalis* from masturbation is the cause both of the constitutional and of the urinary disorder. Dr. GOLDING BIRD states that the deposits of phosphates, where no organic disease exists, are often absent, not only for hours but for days together; and this fact will often indicate a favourable termination of the case; and he comes to the following conclusion: "that, where the presence of a deposit of phosphates is independent of the irritation of a calculus, or of organic disease, it is most abundant in the urine passed in the evening, and absent or replaced by uric acid or urates in the morning, the urine being always of a tolerably natural colour, never below, and often above the mean density. Where the presence of phosphatic salts depends upon the irritation of a calculus, or upon organic mischief in the urinary passages, the urine is pale and whey-like, of a density below the average, often considerably so, and the earthy deposit is nearly equally abundant in the night and morning urine." (*Op. cit.*, p. 293.)

90. *C. Therapeutical Indications.*—a. When phosphatic deposits depend upon *irritative dyspepsia*, or upon *nervous or febrile disorder*, independently of affection of the spine or of the urinary organs, the treatment should be directed rather to the constitutional, digestive, and assimilative disorders, than to the state of the urine, which ought to be viewed only as a symptom. In these cases, depression of spirits, hypochondriasis, and various dyspeptic symptoms, are present; and the urine has a high specific gravity, contains an excess of urea, and deposits crystalline or amorphous phosphates. In these the urinary deposits should be viewed as the results of defective vital and nutritive powers, and as exhausting the nervous energy; and the treatment ought to be directed to the functions of the stomach and bowels, and to the improvement of the general health, by means of stomaehic or tonic aperients, by a light, digestible, and generous diet, and by bitter infusions or decoctions. To remove the more painful symptoms, the oxide of bismuth or of zinc may be given with the extract of ox-gall, and the extract of henbane or the pil. saponis composita. In these cases the means advised in the articles *DEBILITY*, *HYPOCHONDRIASIS*, *INDIGESTION*, &c., will generally be appropriate.

91. *b.* When the *phosphatic deposits* depend upon *exhaustion or injury of the spinal cord*—upon *tabes dorsalis*, &c., then the medical means require modification. In these, great emaciation, copious phosphatic deposit, the phosphate of lime predominating remarkably, pain and weight in the lumbar region, copious pale urine and low specific gravity, and dryness of the skin, require not only the restoratives and tonics already advised, but also a recourse to opiates, conjoined with aromatics, diaphoretics, &c.. When these cases proceed from a blow or other injury of the spine, or wrench of the back, then the terebinthinate liniments or embrocations along the spine (see Form. 296, 311), the cold salt-water douche on the loins, followed by frictions or liniments, the emplastrum roborans, &c., will be of great

service. In many of these (especially when caused by masturbation) the preparations of iron, the nitro-muriatic acid in tonic infusions, the tincture of sumbul or of musk, or of serpentaria, with tincture of opium, are severally productive of more or less benefit. In mild and prolonged cases of this kind, a calculus is not unfrequently insidiously formed in the pelvis of the kidney. For these, the mineral acids have been recommended, as they hold the phosphatic salts in solution: of these, nitric or nitro-muriatic acid may be preferred; but it has been doubted whether they reach the kidneys or act upon the deposit. However, when given judiciously or conjoined with bitter tonics, they improve the general health, and thereby either prevent or arrest the increase of the deposit.\*

[Believing, with Dr. PROUT, that a perfectly healthy condition of the urine is not only one of the most natural, but probably also one of the most powerful solvents for all the ingredients likely to exist in urinary calculi that we can hope to possess, and that there is scarcely any form of stone that will long bear the continued action of healthy urine without becoming more or less dissolved or disintegrated, we direct the patient to drink very largely of pure rain-water, sometimes aiding the diuretic effect by parsley-root tea, infusion of juniper, the cucurbitaceous seeds, &c., in order to a copious secretion of healthy urine. Urinary deposits are often thrown down from the amount of urine being too small to hold them in solution; increase the quantity secreted, and the urine again becomes limpid and free from sediment. Great water-drinkers, as BOUCHARDAT says, are never afflicted with urinary calculi.]

92. *c.* When *phosphatic deposits* proceed from *lesion of the urinary organs*, their connexion with a morbid secretion from the mucous membrane of the bladder is well known. The disposition of the phosphates to adhere to this surface generally increases the difficulty of treatment. For this state of phosphatic cystitis, weak acid injec-

[\* BERZELIUS believed that he had proved by his experiments that the mineral acids never reach the kidneys in a free state, and never increase the acidity of the urine. This is doubtless the case generally with the vegetable acids also, which undergo decomposition or combustion in passing through the circulation. It certainly is very difficult to acidify alkaline urine. ORFILA, however, states that he detected *nitric, sulphuric, hydrochloric, oxalic*, and perhaps *acetic* acid in the urine of dogs poisoned by these acids, but never in a free state. WOLLER concludes from his experiments that *oxalic, tartaric, and benzoic* acids (and probably, therefore, *all acids*) are never eliminated in the urine in a free state, but always in combination with a base. Dr. BENCKE JONES states that, in his experiments with *sulphuric acid*, given freely many days in the form of lemonade, it does, after a while, pass off with the urine; but 254 grs. of dry *tartaric acid*, given after eating, were not sufficient to render the urine acid. Changes, however, in the condition of the digestive and assimilative organs readily affect the urine, as in the experiment of BERZELIUS, where he gave phosphoric acid freely for a considerable time without acidifying the urine; but as soon as it purged the patient, the urine lost its alkalinity, and deposited *uric acid*. Mr. BEANDE states very truly that, when mineral acids are given to relieve phosphatic deposits, they are apt to induce *red gravel* (uric acid); that the vegetable acids are less apt to cause the deposition of red gravel in the urine than the mineral ones. We conclude that all acids are very uncertain remedies in phosphatic gravel or calculi; that, at best, they are only palliative; and that, for the most part, when they do prove beneficial, it is by a tonic influence on the digestive organs and improving the functions of assimilation. When employed, it should always be in conjunction with the bitter tonics.]

tions into the urinary bladder have been advised, in order to wash away the phosphatic formation. A few drops of the hydrochloric acid, with as many of the *vinum opii* in tepid barley-water, may be injected daily. Dr. G. BIRD advises, in almost every case where phosphatic alkaline urine exists, to wash out the bladder by injections of warm water. (See also the treatment of *muco-cystitis* in *art. URINARY BLADDER*, § 89-97.)

93. ix. DEPOSITS OF CARBONATE OF LIME.—Carbonate of lime sometimes occurs in small proportions in deposits of earthy phosphates, when the urine is decidedly alkaline, owing to the decomposition of the phosphate of lime by the carbonate of ammonia which replaces the urea. Its appearance is that of an amorphous powder; and its presence may be recognised by the addition of any dilute acid, which dissolves it with effervescence; but the deposit should be previously washed to deprive it of any adherent carbonate of ammonia.

94. x. DEPOSITS OF BLUE OR BLACK MATTERS.—Certain colouring matters, communicating to the urine a blue or black tint, the products of diseased action, are met with on rare occasions. Three blue pigments, viz., cyanurine, indigo, and peryanide of iron; and two black, melanurine and melanic acid, have been distinguished. These colours, as well as green, have been mentioned by many of the older writers noticed in the *bibliography*, and have doubtless been owing to the presence of blood or bile altered by the urine. —(a) *Cyanurine* was discovered by BRACCONNET, and noticed by several more recent observers. Urine containing it is of a deep blue colour, the colouring matter being deposited by rest, and readily separated by the filter. The origin of this substance, as well as its pathological indications, if any, are obscure, and merely furnish a subject of conjectural discussions to chemical pathologists.

95. (b) *Indigo* is sometimes prescribed empirically in some diseases, as epilepsy; and it may thus pass into the urine, and form a blue deposit. PROUT and SIMON have shown that it may be generated in the economy, the urine acquiring a dark blue colour, and depositing a substance of the same hue, which, when collected on a filter, presents all the characters of indigo. The origin and pathological indications of this substance, when not taken internally, are unknown.

96. (c) *Prussian blue*, or *sesqui-ferro-cyanide of iron*, has been found in the urine after taking the ferro-cyanide of potassium upon preparations of iron. It furnishes no pathological inferences.

97. (d) *Melanurine and melanic acid* are black pigments which have been rarely met with in the urine. It is probable that they are merely the colouring matters of the blood altered by the state of the urine. Many years ago a clergyman in London, with whom I was well acquainted, experienced a dangerous immersion in the river, and was saved with difficulty. He soon afterward began to pass black urine, for which I was requested to visit him. He complained only of a slight weight in the region of the kidneys. The urine was quite black, was passed in about the usual quantity, and was retained nearly the usual time. The lower extremities were not affected. A portion of the colouring matter was deposited, but the supernatant urine was not materially altered from its black colour. I attributed the colour to the escape of red globules of blood with

the urine, owing to congestion of the kidneys, and their alteration by the state of the urine. Conformably with this view, I directed blood to be taken from the loins by cupping. The urine soon afterward resumed its healthy appearance, and no farther complaint was made.

98. xi. ORGANIC DEPOSITS IN URINE.—The deposits in the urine which have been noticed above are recognisable by their forms and chemical properties; those which remain to be mentioned either possess or have possessed organization, and can be distinguished only by an examination by means of the microscope or of tests.

99. A. BLOOD AND ITS ELEMENTS are often seen in the urine, and suggest important pathological and therapeutical indications. The urine may contain only the serum of the blood, or liquor sanguinis; or with this a considerable proportion of red globules; or it may contain a very large proportion of blood, hardly or not at all changed from its normal characters.

100. (a) *Serous or albuminous urine* is readily indicated by heat, and by adding a drop of nitric acid, which coagulates the albumen contained in it. Urine containing much albumen is either free from, or contains but a very small amount of, colouring matter. The reddish urine in granular disease of the kidneys furnishes less albumen by heat than the straw-coloured. Nitric acid and a mixture of one part of nitric and three of hydrochloric acids are more delicate tests of the presence of albumen than heat. Several sources of fallacy have been pointed out by writers which should not be overlooked when resorting to these tests. 1st. Heat will produce a white precipitate in urine containing an excess of earthy phosphates, but this will disappear on adding a drop of nitric acid, and distinguish it from albumen. 2d. Nitric acid will produce white deposits in patients taking copaiba, cubebs, or other resinous substances; but heat has no such effect. 3d. Nitric acid will, in some instances, produce a buff-coloured amorphous deposit in the high-coloured urine in fever, but heat does not cause this change. 4th. Albumen combined with alkalies does not coagulate by heat; therefore nitric acid should be used if the urine be alkaline. 5th. Albumen in an incipient state may not be detected by heat, but readily by means of the acids.

101. Albumen is sometimes found in the urine in a coagulated state, presenting a tubular vermicular appearance, being casts of the uriniferous tubules of the kidneys, often with portions of epithelium adhering to them; and, according to Dr. G. JOHNSON, loaded with fatty globules. These casts, when recently passed, appear like large hairs, but form after a time a dirty-white sediment, which a solution of potash gelatinizes, and distinguishes from mucus. This deposit is pathognomonic of the changes which terminate in granular disorganization of the kidneys.

102. *Blood* passed in considerable quantity in the urine may either be more or less intimately mixed in the urine, or it may have coagulated in blackish masses like pieces of black currant-jelly, linear masses like leeches being passed through the urethra with great suffering. In the former case the blood generally is poured out in the kidneys or their pelvis; in the latter it is most frequently effused in the bladder. In either case the urine is always more or less coloured, often so deeply as to present a Port-wine colour; the microscope showing some entire blood-globules,



and others with their investing membrane broken down, and their coloured contents diffused in the urine. If the quantity of urine be small, the urine may appear like the washings of meat, or of a dirty or dingy hue, the red globules being still recognisable by the microscope. The coagulation of the urine by repose seldom occurs: it is owing to the presence of fibrin, which, however, is very rarely effused without an admixture of blood-globules, giving the coagulum a reddish colour, or of a fatty matter, imparting to it a whitish or opaline hue.

103. *Hæmatosin*, or the colouring matter contained within the sacs of the blood-globules, imparts to the urine a deepness of tint in proportion to the quantity of the colouring matter which has escaped from the sacs of the blood-globules, or rather to the number of these globules which are ruptured. Generally, however, the urine, when recently voided, contains some globules that remain entire; and, with the colouring matter, more or less albumen, which is affected, as shown above, by heat and nitric acid, excepting that the coagula are more or less brown, owing to the presence of hæmatosin. When, however, the urine is much loaded with *purpurine*, or *uric acid*, or with *bile*, these may be mistaken for hæmatosin. The *first* of these will not be affected in colour or transparency by a boiling heat; the *second* is not affected by heat, and is at once distinguished by the characters of the deposit; the *third* may be detected by pouring a thin layer of the urine on a white plate or sheet of writing paper, and letting a drop or two of nitric acid fall upon it, when a change of colours, in which green and pink predominate, will be produced. *Hæmatozylon*, *parceira*, *chimaphila*, and *senna*, the former especially, will impart a reddish or brownish hue to the urine; but these will be distinguished from hæmatosin by the knowledge of their having been taken, by the black precipitate produced by sulphate of iron when the first of these has produced the redness; and by the absence of albumen and hæmatosin as regards all of them.

104. The presence of blood-globules in the urine is best determined by the microscope. If the blood be recently effused, they will either be found adhering in rouleaux, or unaltered in figure. But if it have been effused for some time, or if the effusion has been slow, or the exudation of an asthenic character, the linear arrangement of the globules is lost, the investing membrane, being ruptured, is collapsed around their corpuscles or nuclei, and ultimately the globules appear irregular in their margins.

105. (b) *The pathological indications* of the presence of the elements of blood, or of blood in any form, in the urine, has always been of importance; but it has become of even greater importance to the physician since the enlightened investigation by Dr. BRIGHT of the diseases of the kidneys. When pure blood, or even the admixture of its globules in large quantity, is observed in the urine, it may be presumed that active or passive hæmorrhage from some part of the urinary passages has occurred; the more pure the blood, and the less intimately mixed with the urine, the more probable is the effusion to have taken place in the lower passages of the apparatus. If the quantity of hæmatosin be so small as only to tint the urine, it is to be presumed that both it and the albumen also present result from the congested state of the kidneys connected with

the cachectic inflammation of these organs, which terminates in the organic changes which render them incapable of eliminating the nitrogenized elements of urine and of depurating the blood, although the secreting power is so far preserved as to separate the albumen and water, this latter element being ultimately very incompletely removed. (See *art. KIDNEYS*, § 83, *et seq.*)

106. When the presence of albumen in the urine was first shown to be a proof of granular disease of the kidneys, I contended (see *art. Dropsy*, § 36, *et seq.*) that this state of urine existed in several other diseases, especially in the febrile and exanthematous maladies of children, and when congestion of the kidneys is occasioned by other affections or circumstances, although not always or continuously observed, that yet it was a contingent and occasional or temporary occurrence. Since this statement was made, from a varied observation, the truth of it has been confirmed by many subsequent observers. When blood is voided in large quantity, or when coagula are passed with the urine, breach of surface or lesion of a blood-vessel may be inferred; but the particular cause of lesion, whether congestion, rupture of a vessel, or injury, or irritation of a calculus, or malignant or fungoid disease, and the seat of either of these morbid conditions can be ascertained only from a careful examination of existing symptoms, in connexion with the changes in the urine just mentioned (§ 105, 106), and with the circumstances attending the retention and calls to void this excretion.

107 (c) *Therapeutical Intentions*.—These are varied, or even opposite, according to the conclusions at which the physician will arrive after due examination and consideration of the peculiarities of each case, respecting the seat, cause, and vital conditions of hæmaturia, as fully set forth under this head in the *article HÆMORRHAGE*. (See *Hæmorrhage from the Urinary Organs*, § 204-220.)

108 *B PURULENT MATTER IN THE URINE*.—Pus is seen in the urine consequent upon suppuration in the kidneys, or in any part of the urinary organs, or in parts communicating with the urinary apparatus. It is also contended that, in cases of abscess of internal viscera, the purulent collection is sometimes absorbed and discharged with the urine. But it is more probable that pus-globules, when absorbed, are metamorphosed, either during their passage into or during their circulation in the blood, and that they cannot be eliminated by secreting organs unless thus metamorphosed or reduced to simpler elements.

109. a. *The appearances of purulent urine* vary with the seat of the disease. This urine is generally acid or neutral. The pus falls to the bottom of the vessel by repose, and forms a dense homogeneous deposit, of a pale greenish or cream colour. It never liangs in a stringy form in the urine like mucus, unless the urine be alkaline, and it becomes uniformly diffused in the urine by agitation. If the deposited pus be agitated with an equal quantity of liquor potassæ, a dense translucent gelatinous mass, of a thick mucous appearance, is formed. When the pus is agitated with ether, fat is dissolved, and left in the form of butter-like globules, when the ether is allowed to evaporate. The urine decanted from the purulent deposit yields albumen on the application of heat or nitric acid. When purulent

urine is alkaline, the deposit is viscid, and is not readily diffused by agitation through the fluid, resembling some mucous deposits. The presence of albumen in the purulent urine, "and the conversion of the deposit into a white granular mass, destitute of its previous viscosity, by the addition of acetic acid," indicate the nature of the deposit. In females, the urine may contain a purulent matter derived from the vagina, in cases of leucorrhœa—a circumstance requiring consideration.

110. *b. Microscopic Characters.*—Pus consists of round globules, somewhat larger than blood-globules, floating in an albuminous fluid, or *liquor puris*, which differs from the *liquor sanguinis* chiefly in the absence of fibrin, and consequently in the inability of coagulating spontaneously. Under the microscope, the globules appear "white, roughly granular exteriorly, and are much more opaque than blood-globules. On the addition of a drop of acetic acid, the interior of the globule becomes visible, and is found to be filled with several transparent bodies or nuclei." Hence the pus-globule is a regularly organized body, consisting of a granular membrane enveloping transparent nuclei, being, in other words, a nucleated cell. (*See DISEASE*, § 131, 132, and the *Microscopic Characters* more fully in the *art. Pus*, and in *URINARY BLADDER*, § 48.)

111. *C. Mucus* is present in healthy urine in very small quantity. When irritation exists in any part of the urinary apparatus the mucus is greatly increased, and generally in proportion to the amount and extent of it, this secretion varying from a flocculent cloud in the urine to the production of a fluid so viscid as to form a copious ropy deposit. This condition of the urine is generally alkaline, and undergoes a putrefactive change soon after it is passed, or even before being voided if it be long retained. Although it be acid when passed, it rapidly becomes ammoniacal. Mucus contains no albumen admitting of coagulation by heat or nitric acid (§ 100), and hence mucous urine simply "can never be albuminous like pus, unless the albumen be derived from some other source. Agitated with ether, mucus gives merely traces of fat, and in this respect also differs from pus." (*For the pathological and therapeutical relations of Mucous Urine*, see the *art. URINARY BLADDER*, § 47, *et pluries*.)

112. *D. Epithelium.*—Exfoliation of the epithelial covering of the genito-urinary mucous surface is constantly taking place, but with very different rates of rapidity. This covering is sometimes partially detached, so as to appear like patches of membrane-like mucus; some of the epithelial cells being irregularly lacerated, others entire, and readily recognised by the aid of the microscope. When distended by fluid they are oval cells, which become irregularly angular and flattened when partially empty. When quite empty they present in each a central nucleus projecting above the surrounding surface. These cells are said sometimes to contain fat-globules, especially in the *Morbus Brightii*. When the exfoliation of epithelium is copious, a deposit is thereby formed in the urine, resembling mucus, but differing from it in the absence of viscosity. With *liquor potassæ* this deposit gelatinizes nearly as perfectly as when pus is present. When an abundance of epithelium is found in the urine, oxalate of lime often also is present; the irritation of the mucous surface of the urinary pas-

sages, especially in the kidneys, very probably at the same time that it detaches the epithelium, converts the uric acid and urates into the oxalate.

113. *E. SPERMATOZOA*, or what has been called spermatic animalcules, are sometimes found in urinary deposits, when the urine of the male adult has been allowed to repose for a time.—*a.* The only means of distinctly determining the presence of semen in the urine is by ascertaining the existence of spermatozoa by the aid of the microscope. "These minute bodies never occur living in urine, unless protected by the presence of a deposit of pus, in which they retain their power of moving a long time after emission." In the microscope, "the spermatozoa will be observed as minute ovate bodies, provided with a delicate bristle-like tail, which becomes more distinct on allowing a drop of urine to dry on the glass. Mixed with these are generally found round granular bodies, rather larger than the body of a spermatozoon, and nearly opaque from the numerous asperities on the surface of the investing membrane. These appear to be identical with the seminal granules described by WAGNER and others" (*Op. cit.*, p. 359.)

114. *b.* The presence of spermatozoa in the urine furnishes certain *pathological indications* of much importance. They may be present owing to the discharge of urine immediately or soon after seminal emission, the urine washing away the portion of semen which may remain in the urethra; or owing to a costive motion having pressed upon the spermatic receptacles, so as to press out a portion of their contents. However the presence of these bodies in the urine may be accounted for, the fact that they are commonly observed in persons who have weakened their sexual organs, either by excessive female intercourse, or by the unnatural vice of masturbation, is indisputable; and in such persons chiefly or only spermatozoa, and the much-discussed affection of spermatorrhœa, is observed. The pathological and therapeutical indications furnished by this condition of the urine are considered under the head of *IMPOTENCE*, and more fully under that of *POLLUTION, voluntary and involuntary*.

115. *F. FATTY OR OILY MATTER* has not unfrequently been found in the urine, generally, however, in minute traces only, and very rarely in any considerable quantity. It is most probable that some of the instances in which oil has been said to have existed in the urine have been those in which the oil-like pellicles of the earthy phosphates have formed on the surface of the urine. The genuine states of fatty urine have generally resembled milk in colour and opacity, and have gelatinized on cooling. The term chylous urine has been applied to these states by Dr. PROUT. Dr. EICHHOLZ and Dr. G. JOHNSON contended that oil or fat existed in the urine in granular disease of the kidneys, owing to the superabundance of fat in the epithelial cells of the tubular structure of the kidneys, and to the escape of these cells from the tubuli and admixture with the urine. But the quantity of fatty matter thus mingled with the urine is rarely such as to give rise to appearances indicative of its existence, unless the deposit be examined under the microscope, when the cells containing oil, sometimes presenting casts of the tubes from which they have been detached, may be observed.

116. In most cases of chylous urine, albumen is present in very varying quantity, and forms



with the fat an intimate admixture or emulsion. The fat may be obtained by agitating the urine with an equal quantity of ether in a tube. The presence of fat in albuminous urine may be viewed as a strong indication of organic disease of the kidneys; but the combination rarely exists in such a manner as to give rise to the chylous appearance of the urine. It should not be overlooked that instances sometimes occur in which hysterical females, to create interest in their cases, or to obtain other ends, have imparted a morbid appearance to their urine, by adding to it milk, or small quantities of blood or other matters, by which the medical attendant has been deceived. Such instances have come before me and other physicians with whom I am acquainted. I have rarely seen cases of chylous urine. The most remarkable instance of it which I have observed was in a mulatto young man from the West Indies. Dr. G. BIRD states that, in the chylous urine he has examined, he has failed in detecting under the microscope the slightest appearance of oil-globules, blood-disks, or pus-granules; the opacity appearing to depend upon the presence of particles so minute as to present no defined form. M. L'HERITIER has, however, remarked that oily globules can always be detected in fatty urine; and Dr. SIMON, of Berlin, has made the same remark, and has stated that he has met with three varieties of fatty urine: one in which the fat is merely diffused through it, and collects on its surface by repose, as in cases recorded by Dr. ELLIOTSON; the other in which the fat is combined with albumen; and a third, in which the fatty matter existed with casein as an emulsion, forming the true milky or chylous urine. Dr. BENGE JONES has investigated this state of the urine, and has arrived at the following conclusions respecting it:

1st. The fat on which the milky aspect of the urine depends appears after the absorption of chyle, but the albumen, fibrin, blood, and alkaline salts may be found even when no food has been taken, and consequently no chyle formed. 2d. During absolute rest, albumen disappears from the urine, and does not reappear in any quantity, even after taking food, unless active exercise is employed. A short time before rising early, the urine gelatinizes by repose, but is free from fat. 3d. This state of urine does not depend upon the presence of an excess of fat in the blood, as proved by actual analysis. 4th. The seat of this disease is probably some slight alteration in the structure of the kidneys, by which, when the circulation through these organs is most active, one or more of the constituents of the blood exude from the capillaries and escape into the urine.

Dr. G. R. BOUYUN, of Demerara (Dr. G. BIRD states), has observed cases of chylous urine so frequent in creoles and negroes as to be often epidemic in that country. This state of the urine appears to be attended by irritative fever and emaciation, as in diabetes. He attributes the disease to lesion of the assimilative functions; and he treats it by the free administration of a decoction of the mangrove bark (*Rhizophora racemosa*). This medicine acts freely on the skin, increases the secretion and alters the character of the urine, and improves the general health.\*

\* *Kiesteine*.—In 1831, NAUCHÉ, of Paris, described a peculiar gelatino-albuminous ingredient, found, as he supposed, only in the urine of pregnancy. When the urine of a pregnant female was allowed to stand in a

117. *G. CONFEROID GROWTHS*.—*Torula Cerevisia*—*Fungoid Growths*—*Vibrios*, &c., have been described as existing in the urine, in certain states of the frame, chiefly characterized by remarkable depression of vital power. The existence of these may be imputed to the presence of albuminous, fibrinous, saccharine, or other matters in the urine, and to changes which have taken place in these after the urine has been discharged, although they may possibly be formed in the bladder, when the urine is long retained in these morbid states in this viscous, especially when the vital energies are very much depressed, and the other circumstances favourable to these productions, already adverted to (§ 82), are present.

118. *H. HYDATIDS* have been passed in the urine; but cases in which they thus have been observed are extremely rare. Instances have, however, been recorded in the Philosophical Transactions (No. 273), and in the Medical Observations and Inquiries by Mr. RUSSEL (vol. iii.). A case came before me many years ago, in which a number, varying in size from a small pea to that of a large bean, were passed in the course of two or three days. Soon afterward the case passed from under my observation, without being able to ascertain its issue.

119. xii. *FOREIGN BODIES*.—*Worms*, &c., have been often found in the urine, in some cases in consequence of having been introduced into the bladder, in others from having been put into the urine with the intention of deception; and in more instances owing to their passage by ulceration, penetration, or otherwise, through the parietes of some portion of the digestive canal, or

glass vessel, a cotton-like, cloudy deposit first appeared, afterward oblong points or specks, which, increasing in number and agglomerating, covered the surface of the fluid and the sides of the vessel, in the form of a firm, tenebrous pellicle. EQUISIER followed, sustaining the same positions. In 1840, Dr. G. BIRD published the results of his observations on the urine of thirty pregnant females, and came to the conclusion that the pellicle noticed by NAUCHÉ was composed of the triple phosphates, with some granular and oily matter; and though furnishing a strong corroborative test of pregnancy, is not, however, an entirely reliable one. Our distinguished countryman, the late ELISHA H. KANE, in his inaugural dissertation (*Am. Journ. of Med. Science*, N. S., vol. iv., 1842), from a great number of experiments and observations, came to the following conclusions:

"1st. That the *kiesteine* is not peculiar to pregnancy, but may occur whenever the lacteal elements are secreted without a free discharge at the mammae.

"2d. That though sometimes obscurely developed, and occasionally simulated by other pellicles, it is generally distinguishable from all others.

"3d. That where pregnancy is possible, the exhibition of a clearly-defined *kiesteine* pellicle is one of the least equivocal proofs of that condition; and,

"4th. That when this pellicle is not found in the more advanced stages of supposed pregnancy, the probabilities, if the female be otherwise healthy, are as 20 to 1 (\$1 to 4), that the prognosis is incorrect."

More recently, Dr. G. T. ELLIOT, Jun., of New York (*N. Y. Journal of Med.*, Sept., 1853), has published the results of his experiments on the urine of 160 pregnant females, and concludes that there are no recognisable peculiarities in the urine of pregnancy, that there is nothing positive in the indications furnished by *kiesteine*, and that its appearances can scarcely ever be called "corroborative" of pregnancy (*Loc. cit.*, p. 181). On the whole, the opinion of LEHMANN seems most probable, viz., that "*kiesteine* is nothing else but the formation of crystals of triple phosphate, and fungoid and confervoid growths, which take place when the urine becomes alkaline" (*Phys. Chemistry*, Philad., 1856). According to Professor DRAPER, *kiesteine* is composed of casein, butyric fat, and the phosphate of magnesia, and is a normal ingredient in the blood, especially of pregnancy, being generated from its albumenoid compounds at the rate of about 30 grs. per hour (*Human Phys.*, N. Y., 1856, p. 231.)

abdominal parietes. Whoever may be desirous of perusing cases of this description will find a number of them related in the *Ephemerides of Natural Curiosities*, and in the *Memoirs of the French Academies*, and various other works enumerated by PLOUQUET and REUSS.

120. IV. GRAVEL.—*Urinary deposits*, such as are above described, are formed on the cooling of urine, and are, as described, either loose and pulverulent, or more concrete, crystalline, or sand-like. These deposits, although associated with, or symptomatic of, various diseases, may occasion, as respects their effects upon the urinary organs, but little disorder. But when deposits are formed in the warm urine within the urinary apparatus, owing either to the quantity of these matters contained in the urine, or to changes in the states of their constituents, or of temperature, vital endowment, &c., and are discharged with the urine in the form of a fine powder, or of crystalline, sand-like particles, or of small masses, then the disease is termed *gravel*, and the symptoms are sometimes very severe.

121. The discharge of such gritty matters as these with the urine is usually attended by symptoms of irritation, and pain in the region of the kidneys, ureters, bladder, and in the urethra, thereby constituting while characterizing the complaint commonly denominated gravel. The signs of irritation may be slight, or they may be severe in one or other of the situations just named, or even in two or more of them. But the signs, as well as the causes which produce this condition of the urine, are the same as those which attend the formation of calculi in the urinary apparatus, although they are very frequently much less severe. The chemical constitution of the gravel discharged is generally the same as that of urinary calculi; the difference consisting chiefly in the constituents precipitated from the urine being detached or incoherent, or forming numerous minute crystals, instead of large concretions, of many concentric layers. In the former case, the deposits within the urinary organs are washed away by the urine before they have been sufficiently long retained to concrete into a nucleus, or to become a large calculus—or to assume the characters now to be described.—CALCULI. The *treatment of gravel* is manifestly the same as that recommended for urinary deposits and *urinary calculi*. (See § 179, *et seq.*)

122. V. URINARY CONCRETIONS OR CALCULI.—Correct views as to the composition and formation of urinary concretions or calculi are of comparatively recent date. Previously to VAN HELMONT these concretions were believed to be derived from matters contained in the food and drink; but he contended that they are not formed from these sources. HALES confirmed the opinions of VAN HELMONT as to the differences between urinary concretions and common stones, and first directed attention to the discovery of a solvent for these concretions. BOYLE, WHYTT, ALSTON, SLARE, and others, subsequently speculated on the subject of solvents for calculi. WHYTT proposed lime-water for this purpose; and ALSTON contended that, although lime-water is of some service in urinary affections, it is not a solvent of calculi. At the commencement of the last century the Leyden School of Medicine taught more correct doctrines of the formation of urinary concretions than had previously been entertained, and showed that these nuclei were de-

rived from the kidneys or from the bladder. VAN SWIETEN contended that the elements of calculi exist in the urine of men the most healthy, and that if the urine be evacuated before these elements concur in the formation of a concretion, no such production takes place. He considered that the concurrence of the elements in the formation of calculi is exerted more or less slowly in different persons; and that according to the rapidity or slowness of such formation, the concretions are formed either in the kidneys or in the bladder. In 1776 SCHEELÉ discovered uric acid, and found it in all the calculi he examined, as well as in all the urine. BERGMANN soon afterward discovered lime in certain concretions. In 1797 WOLLASTON published his discovery of three calculi in addition to those described by SCHEELÉ—viz, the fusible, mulberry, and the bone-earth—and demonstrated the chemical composition of these calculi. A few years afterward, FOURCROY and VAUQUELIN announced the presence of urate of ammonia and silica in urinary concretions. Dr. WOLLASTON, in 1810, discovered cystic oxide as an urinary calculus. Dr. MARCET published an able work on urinary concretions in 1817; and Dr PROUT furnished, in 1821, more extended and exact views as to their formation in his treatise on this subject. Since this period the works of Mr. WILSON, of Sir B. C. BRODIE, of Mr. CROSSE, of Norwich, of Dr. T. THOMSON, of Dr. CUMIN, of Dr. OWEN REES, of Dr. BENCE JONES, of Mr. COULSON, and the more recent publications of Dr. PROUT, have carried the pathology and treatment of urinary concretions to their present very high position in practical medicine and surgery.

123. A. The *form of urinary concretions* is generally more or less globular or ovoid, especially after remaining long in the bladder. Renal calculi are, however, often of an irregular form, owing to their being moulded in the pelvis of the kidney, &c., or are branched like a coralline. Sometimes those found in the ureter are cylindrical. When two or more calculi exist in the bladder they often present a polyhedral or an irregular shape, from one or more of their sides being flattened, either by attrition or by diminished concentric deposition on these sides. When the calculi formed in the kidneys and passed into the bladder are irregular or branched, the shape of the nuclei which they constitute is not altogether removed by the successive deposits formed around them in the bladder. When a portion of a calculus is embraced by a fold of the mucous membrane, or sacculated between the muscular fasciculi or coats of the bladder, the part exposed to the urine increases by successive deposits, so that the sacculated portion ultimately appears to form a pedicle to the entire calculus. (COULSON.)

124. B. The *size and weight of urinary concretions* are most various—ranging from a few grains to many ounces. EARLE mentions one weighing forty-four ounces; LISTER, one of fifty-one ounces; and MORAND, one weighing six pounds three ounces! The concretion described by EARLE measured sixteen inches in circumference. The *number of calculi coexisting in the bladder or in the kidneys* is often very various. Most frequently vesical calculi are solitary; but two or even more are not uncommon. They are often numerous in one or both kidneys, but generally not equally so in both. From ten to twenty or even thirty in both are not uncommon. An



equally great number are very rarely found in the bladder, although it is stated that fifty-nine small calculi were found in the bladder of BUFFON.

125. *C* The *surface* of calculi also varies in its colour and characters. The colour passes from "white through pale yellow to brown, brownish-green, and even almost to black. Phosphatic calculi are often white; those of uric acid vary from yellow to brown; those of xanthic oxide have a cinnamon brown tint; while calculi of oxalate of lime vary from yellow to yellowish-brown, brownish-green, or even blackish-green." The surface is either smooth, and even polished, or covered with minute crystals, or more or less rough, and even tuberculated, as in the mulberry calculus.

126. *D*. The *internal structure* or section of a calculus is either uniform, or formed of concentric layers surrounding the nucleus; and, in addition to the concentric lines indicating the separation of the layers, other lines, radiating from the nucleus to the periphery, are observed in many of the concretions. In some the concentric layers are easily separable, in others very firmly adherent, especially when the layers are indicated only by very faint lines, as in the oxalate of lime calculus.

127. *E*. The *chemical composition* of the nu-

cleus, and of the concentric layers or deposits, may be the same; or that of the superimposed strata may differ from the nucleus, or each of the strata may be different. The *constituents* are, *first*, those which form entire calculi or layers, in a nearly pure state, and, *secondly*, those which contain, associated with these constituents, small quantities of other substances.

128. *First Class*.—1. Uric acid. 2. Uric or xanthic oxide. 3. Urates of ammonia. 4. Cystic oxide, or cystine. 5. Ammoniaco-magnesian phosphate. 6. Oxalate of lime. 7. Phosphate of lime. 8. Carbonate of lime. 9. Mixed phosphate of lime, and phosphate of magnesia and ammonia.

129. *Second Class*.—Those concretions which, with the foregoing, contain the following in small quantities: 1. Urates of potass. 2. Urates of soda. 3. Urates of lime. 4. Urates of magnesia. 5. Carbonate of magnesia. 6. Silica. 7. Organic matter, fat, extractive, albumen, vesical mucus, blood. In addition to these, oxide of iron, benzoate of ammonia, phosphate of iron, urea, oxalate of ammonia, hydrochlorate of ammonia, in very minute quantities, are said to have been formed.

130. The following TABLE, drawn up by Dr. BENCE JONES, shows the readiest means of ascertaining the composition of urinary calculi:

1. By Heat.	2. By Acids.	3. By Alkalies.	Nature of Calculus.	Additional Tests.
Destroyed by heat.	With nitric acid, red.	Soluble in carbonate of potash, evolving ammonia. Soluble in carbonate of potash, evolving no ammonia.	Urates of ammonia. Uric acid.	Soluble in water when boiled. Not soluble in water when boiled.
	With nitric acid, not red.	In ammonia, soluble, crystallizing when evaporated.	Cystic oxide.	Soluble in strong caustic potash; the solution gives sulphuret of lead when boiled with a solution of acetate of lead.
Not destroyed by heat.		In ammonia, soluble, not crystallizing when evaporated.	Uric or xanthic acid.	Dissolves without effervescence in nitric acid, leaving a lemon-coloured residue, soluble in strong sulphuric acid, not precipitated by dilution.
	With hydrochloric acid, soluble; before heat effervesces.	In ammonia with difficulty soluble, not crystallizing.	Fibrin.	With nitric acid becomes yellow.
	With hydrochloric acid, soluble; after heat effervesces.	Solution in acid, when neutralized, gives a white precipitate with carbonated alkalies and oxalate of ammonia.	Carbonate of lime.	Soluble in dilute acetic acid, with effervescence.
		Solution in acid, when neutralized, gives a white precipitate with carbonated alkalies and oxalate of ammonia.	Oxalate of lime.	Insoluble in acetic acid. Decomposed by strong sulphuric acid, yielding carbonic acid and carbonic oxide.
	With hydrochloric acid, soluble, without effervescence, or before or after heat.	Solution in acid, with excess of ammonia, gives a white crystalline precipitate. Solution in acid, with excess of ammonia, gives an amorphous white precipitate. Solution in acid, with excess of ammonia, gives a white, partly crystalline, partly amorphous precipitate.	Phosphate of ammonia and magnesia. Phosphate of lime. Mixed phosphates.	With phosphate of lime is very fusible before the blow-pipe. With phosphate of magnesia and ammonia is very fusible before the blow-pipe. Easily fusible, without addition, before the blow-pipe.

131. *i. Uric Acid Calculus*.—Uric acid is the most frequent constituent of urinary concretions, either alone or in combination with bases, especially urates of ammonia, &c. Calculi consisting of uric acid only, or containing in addition a small quantity of colouring matter, are more common than those of any other single constituent. Mr. COULSON states the relative number of pure uric acid calculi in the Museum of the College of Surgeons to be one third of the whole collection. Dr. PROUT estimated the general average of this concretion in the several known collections to be nearly 1:6½. The relative proportions of those

composed chiefly of uric acid mixed with urates of ammonia, and of urates of ammonia with minute proportions of urate and oxalate of lime and phosphates, are estimated at 1:3½; and including the calculi in which the nuclei are formed of uric acid, the proportion is about 1:1½. The calculi into which uric acid enters in larger or smaller proportions, as one of the constituents, in the Collection of the London College of Surgeons, are as 1 to 1:36 of the whole number. Two chief varieties of this calculus consist—1st, of that in which the uric acid is deposited in more or less distinct concentric layers, the section of the calculus pre-

senting a series of concentric circles of a compact and semi-crystalline structure; 2d, of that in which the acid forms a mass of crystalline amorphous grains. These varieties, however, often are mixed, or pass into each other. The first of these have a somewhat granular or finely tuberculated, but smooth or polished surface. When broken, the fragments are angular, whose surfaces are fibrous, as if the concretion were composed of crystalline fibres radiating from the centre to the circumference. The fracture is always in the direction of these radiating fibres and of the concentric layers. The second variety, in which no concentric lamellæ are seen, consists either of a firm aggregation of crystalline grains presenting a radiated appearance, or of a porous and earthy structure, often more or less loosely cohering. These calculi are less regular than the former, "have a rough surface, a granular and unsymmetrical fracture, and are most frequent in the kidneys. The nucleus of the laminated variety frequently presents this character. This form of calculus is more liable than the compact laminated variety to spontaneous fracture in the bladder." Calculi sometimes present cracks in the direction of the radiating fibres, probably owing to an unequal density in the deposits.\*

[\* CHARACTERISTICS AND TESTS OF URINARY DEPOSITS.

I. Coloured.

(A.) *Crystalline*, which is *uric acid*, rhombic form, or square tables, soluble in nitric acid by heat in effervescence; on evaporation, leaves a beautiful pink deposit (*muroid of Liebig*), becoming purple on the addition of ammonia; soluble in a boiling solution of potash, from which hydrochloric acid precipitates it as a white, gelatinous substance, speedily becoming crystalline. Before the blow-pipe blackens and dissipates with a peculiar animal odour.

(B.) *Amorphous*, which may be,

I. *Pink, red, or yellow Urate of Ammonia*; is soluble in hot water, and again deposited on cooling; soluble in boiling solution of carbonate of potassa; boiled with solution of potassa, evolves ammonia; has all the characters of uric acid with nitric acid. Before the blow-pipe comporting itself as uric acid, except that it gives out ammonia and decrepitates strongly.

II. *Red or brown Blood*.—Urine becomes opaque by heat or nitric acid; microscope detects the blood disks, which often subside, and form a distinct layer at the bottom of the vessel. Chloride of sodium and other neutral salts heighten the colour.

III. *Green or brown Bile*.—If from the brown colouring matter (biliphoen), on addition of nitric acid, the urine becomes blue, then green, afterward violet and red, and lastly assumes a yellow or yellowish-brown colour; if in small quantity, the intermediate colours are not observed; hydrochloric acid changes the urine to green. If from *bilin*, this may be detected by *Pettinkofer's test*, as follows: (Add to the urine, by drops, two thirds of its volume of sulphuric acid, keeping the mixture below 144°; add a few drops of a solution of cane-sugar (1 to 5 of water), and shake the mixture, when, if *bilin* be present, a violet-red colour will be developed.)

II. Colourless.

(A.) *Crystalline*, which may be,

I. *Oxalate of Lime*.—Octahedral or quadrilateral crystals, insoluble in acetic acid; soluble in nitric and hydrochloric acids; boiling with carbonate of potash forms soluble oxalate of potash and insoluble carbonate of lime. The former gives characteristic reactions with chloride of calcium, sulphate of copper, and nitrate of silver; before blow-pipe becomes carbonate of lime. On continuing the heat, lime only is left, giving out heat on the addition of water, and browning turmeric paper.

II. *Phosphate of Ammonia and Magnesia* (triple phosphate).—Right rectangular, or trilateral crystals, soluble in diluted mineral and acetic acids, from which, by an addition of ammonia, precipitated in a crystalline form; soluble in boiling solution of potassa, with evolution of ammonia. Before the blow-pipe gives off ammonia, and runs into a white enamel; addition of phosphate of lime imparts ready fusibility.

III. *Cystine*, in simple or compound tables, insoluble in boiling water, soluble in ammonia (with odour of sweet-briar) and alkalies, and precipitated by acetic acid;

132. A third variety of uric acid calculus is known as the pisiform, and is very common. It is seldom solitary; many may exist at the same time in the bladder, and some may be voided by the urethra. They are chiefly formed in the kidneys, and are rarely larger than a common bean or large pea. They have irregular angular shapes caused by attrition against each other, are crystalline, laminated near the surface, and often coated with a thin layer of urate of ammonia.

133. The specific gravity of uric acid calculus varies with the density, and is usually from 1.5 to 1.786; but it has been observed in rare instances as low as 1.276. The colour of this calculus varies from pure white to a deep brownish-red, the colouring matter being of the same nature as that of the urine. (§ 18.) Uric acid is insoluble in alcohol and ether, but is soluble in solutions of potash and soda when heated, and in phosphate and bichlorate of soda, and is precipitated from these by acids. Solutions of the alkaline bicarbonates do not dissolve it. Nitric acid dissolves and decomposes it, equal volumes of carbonic acid and nitrogen being evolved. "Sulphuric and hydrochloric acids do not affect it. Uric acid is a feeble acid, but combines with bases, and forms salts with them. The alkaline urates are sparingly soluble, but very much more so than the pure acid."

134. ii. *Urate of ammonia calculus*, unmixed, is rare. In the collection of the College of Surgeons it exists in the proportion only of one in 500, although this substance forms the nucleus of nearly one third of the whole collection.—(Coulson.) Dr. Prover, in 1823, first fully demonstrated the nature of this concretion, which seldom exceeds an inch in diameter, and is almost peculiar to childhood. It very rarely occurs in an unmixed state after puberty, and its formation is attended by much constitutional irritation. It is flattened, ovoid, smooth, of a brownish-grey or clay colour, often with a greenish tinge. It is usually compact in structure, earthy and brittle, consisting of thin concentric layers, so closely applied to each other as to appear homogeneous. The laminae are, however, easily separated. Urate of ammonia is a common deposit from urine, having an alkaline reaction, carrying with it more or less colouring matter, which gives it a yellow or brown hue. In its pure state it is white, and much more soluble in water than uric acid.

135. This salt is often associated with oxalate of lime in calculi, the formation of this latter being preceded by a condition of the urine which favours the deposit of urate of ammonia, so that the nucleus may be formed of urate of ammonia, while the surrounding layers are a mixture of these salts. These calculi sometimes also con-

insoluble in alcohol, tartaric and oxalic acids, and bichlorate of ammonia.

(B.) *Amorphous*, may be,

I. *Phosphate of Lime*, readily soluble in dilute hydrochloric and nitric acids, sparingly in acetic; precipitated by ammonia in an amorphous condition, forming, when collected on a filter, a horny mass; oxalate of ammonia in these solutions gives a white precipitate. Before the blow-pipe, first black, then white, leaving an ash which is neutral.

II. *Urate of Ammonia*.—Characters as above. (Coloured B.)

*Pus*.—The microscope detects pus globules. The urine coagulates more or less by heat; soluble in a solution of potassa, forming a tenacious, glairy fluid.

*Mucus*.—Insoluble in potassa; imparts little or no albumen to the urine; therefore slight or no coagulability by heat, &c.]



tain a small quantity of urate of lime. Urate of ammonia is also frequently associated with the earthy phosphates, either as a nucleus or in alternate layers, or mixed in various proportions with the other constituents.

136. iii. *Xanthic or uric oxide calculus* is so very rare as hardly to deserve notice, only four specimens of it having been found. It may be distinguished by the means stated in the Table given above (§ 130).

137. iv. *Cystic oxide calculus* is also rare. It is a product of the kidneys only, and hence should be differently named. Dr. PROUT found it only in four out of seven museums. That of the College of Surgeons contains one or two specimens. It is small, round, and yellowish, with a smooth semi-transparent and glistening surface. This substance is generally free from admixture with others; "but uric acid sometimes forms the nucleus, and a layer of uric acid has been found surrounding a nucleus of cystic oxide. It is also occasionally associated with ammoniaco-magnesian phosphate and carbonate of magnesia."

138. v. *Oxalate of lime calculus*, in an unmixed state, exists in the Museum of the College of Surgeons in the proportion of 1:20; in that of Saint Bartholomew, as 1:15; and in that of Guy's Hospital, as 1:14½. When oxalate of lime calculi having nuclei of urate of ammonia are included, the proportion in the Museum of the College of Surgeons is 1 in 3½. If all the calculi be taken in which the oxalate of lime exists in any amount, then the proportion is, according to Dr. PROUT, in St. Bartholomew's Hospital, 1:4½; in Guy's, 1:4; in Norwich, 1:7½; in Manchester, 1:6½; in Bristol, 1:3½; in Swabia, 1:27; and in Copenhagen, 1:2½, the average proportion being 1:4½. Oxalate of lime calculus is rarely pure, being associated with urate of ammonia, uric acid, urate and carbonate of lime, colouring matter, and blood. This calculus, long known by the name of Mulberry Calculus from its tuberculated surface and its resemblance to that fruit, has usually a rounded shape, its surface being dark-brown, or nearly black. Its internal structure is compact and hard, imperfectly lamellated, the layers forming waving lines, the colour of which is such as to give the surface of its section a resemblance to a section of a piece of gnarled oak, varying from white or yellow to yellowish-brown, or dark brownish-green. The tubercles of the surface appear to consist of stellate crystals. A second variety of the oxalate of lime calculus is crystalline throughout, its surface being studded with crystals of the oxalate in acutely-angled octahedra, these being nearly pure oxalate of lime. A third variety consists of small rounded masses, with a smooth, polished surface, known as the hemp-seed calculi. It is occasionally crystalline at the centre and laminated toward the surface, but the laminae are so fine as to give the section almost a compact appearance. It is composed of mixed oxalate and phosphate of lime in variable proportions.

139. vi. *Phosphate of lime calculus* is rare, especially in a state of purity. Two varieties have been described, "one evidently of renal, the other of vesical origin. Although entire calculi of pure phosphate of lime are uncommon, this substance is often found nearly pure in the laminae of alternating calculi." Dr. PROUT states that calculi of phosphate of lime are in the ratio of 1:32½ in St. Bartholomew's Hospital; of 1:29 in Guy's;

of 1:132 in Norwich; and of 1:155 in the Bristol hospital. The general proportion of these calculi to others is 1:117. No specimen exists in the Museum of the College of Surgeons, and in some other collections. The calculi considered renal are composed of the neutral phosphate of lime; those considered vesical are more common than the former. Concretions of neutral phosphate of lime are usually pale-brown, with a polished surface, regularly laminated, and the laminae so slightly adherent as to be easily separable into concentric crusts. In some, radiating lines are seen perpendicular to the laminae. Those calculi contain animal matter which is precipitated from the alkaline urine with the phosphate of lime.

140. vii. *Ammoniaco-magnesian phosphate calculus* is commonly known as the "triple phosphate." This double salt rarely forms an entire calculus, but is a very common constituent of other calculi, either mixed with phosphate of lime, as in the fusible calculus, or forming layers in alternating calculi. The proportion of calculi consisting of pure phosphate of magnesia and ammonia, in the collection of St. Bartholomew, is as 1:129; in Guy's, as 1:43½; in the Bristol hospital, 1:218; in Copenhagen, 1:19½; in the Museum of the College of Surgeons, 1:200; while the other collections mentioned by Dr. PROUT contain no specimen. The general ratio is 1:126½. Ammoniaco-magnesian phosphate is a frequent deposit from alkaliescent urine, but usually mixed with more or less phosphate of lime. Calculi of this double salt "are generally white, uneven, and roughened by the projecting summits of the crystals, which are transparent in the recent state, but opaque and without lustre after being kept for some time. These calculi are either not laminated or imperfectly so, are friable and easily reduced to powder. But occasionally they are hard, compact, and laminated; exhibiting a semi-transparent crystalline fracture, which gives them the aspect of alabaster." (COULSON, *Op. cit.*, p. 291.)

141. viii. *Fusible Calculus*.—Calculi known by this name consist of a mixture of phosphate of magnesia and ammonia, with phosphate of lime in very variable proportions; and they form a considerable portion of all collections. In the College of Surgeons they are as 1:13½; in St. Bartholomew's as 1:12½; in Guy's, 1:3½; in Norwich, as 1:19; in Manchester, 1:8½; in Bristol, 1:12; in Swabia, 1:11½; and in Copenhagen, as 1:19½, according to PROUT, the average proportion being 1:12½. Fusible calculi are white, gray, or dull yellow, and more friable than any others, "being sometimes so soft as to whiten the fingers like chalk when handled: these are not laminated. Others have distinct lamellae, with sparkling crystals of triple phosphate between them, which are so slightly adherent as to be readily separated; others, again, are composed of crystals aggregated into a confused mass." These calculi are usually globular or ovoid, but sometimes very irregular in shape, being occasionally moulded by the cavity in which they are formed. "They often attain a large size, and sometimes fill the whole cavity of the bladder; in this case impressions of the folds of the mucous membrane are visible on the surface, and when two or more in the bladder, they take a cubic or tetrahedral form." Excrescences composed of triple phosphate are sometimes found, resembling pearls. The ammoniaco-magnesian

phosphate is most abundant in those which have a shining crystalline texture, the phosphate of lime in the earthy and amorphous variety. The fusible calculus is found in all parts of the urinary organs, and in large cysts, or in cavities in the prostate gland. According to Mr. TAYLOR, the earthy phosphates are rarely succeeded by any other deposit; the only exceptions being one in the College of Surgeons, in which layers of mixed phosphates exist in an oxalate of lime calculus, and one in St. Bartholomew's Hospital, in which a fusible calculus is surrounded by a layer of uric acid. The two ingredients of fusible calculi seem to have a distinct origin, the ammoniaco-magnesian phosphate being derived from the urine, while the phosphate, with a small proportion of carbonate of lime, is secreted together with mucus by the irritated mucous membrane. This is shown in calculi formed around a foreign body introduced into the bladder. This body is first incrustated with phosphate and carbonate of lime, derived, it is believed, chiefly from the mucous surface of the bladder; and subsequently, the irritation being extended to the kidneys, the urine becomes alkaline, and ammoniaco-magnesian phosphate is deposited, the layers near the nucleus containing more phosphate of lime than those near the surface of the calculus. As a secondary deposit the mixed phosphates are very common, few calculi remaining for a long period in the bladder without being incrustated by them. The uric acid calculus is least subject to this incrustation. These calculi commonly contain urate of ammonia and animal matter in considerable proportion, together with carbonate and urate of lime and uric acid.

142. ix. *Carbonate of lime calculus*, associated only with a little animal matter, is very rare in the human subject, but common in herbivorous animals, usually mixed in these with carbonate of magnesia. Carbonate of lime is, however, often found in variable proportion in the oxalate of lime and phosphatic calculi. BRUGNATELLI, PROUT, and SMITH have described the carbonate of lime calculi. They are always small, the largest not exceeding the size of a large almond; are white or gray, but sometimes yellow, brown, or reddish, and the surface is dusted over with a white powder. They show no concentric laminae, but irregular waved lines similar to those in the mulberry calculus. They are sometimes remarkably hard, and capable of receiving a high polish. Others passed by the urethra of a rounded and flattened form are compact, lamellar, and light brown. "No specimens of this calculus exist in the museums enumerated by Dr. PROUT, nor in that of the College of Surgeons." "Mr. SMITH describes eighteen removed from the bladder of a young man; and BRUGNATELLI forty-eight from a similar source, and sixteen, the size of a nut, from a woman."

143. x. *Alternating calculi* form a very large proportion of those formed in the human urinary apparatus. This alternation of the constituents in the layers of the same calculus is manifestly owing to successive changes in the urinary secretion, depending upon varying states of the constitution and vital and assimilative power. Alternating calculi consist of a series of alternating layers, differing in chemical composition. Some are composed of two layers, a nucleus of uric acid being covered by a deposit of urate of ammonia, or of oxalate of lime, or phosphate of lime,

or mixed phosphates. The nucleus may be oxalate of lime, followed by uric acid, or urate of ammonia, phosphate of lime, or mixed phosphates. "Other calculi have three differently-constituted layers; thus, a nucleus of uric acid may have deposits of oxalate of lime and mixed phosphates, or oxalate of lime and uric acid; or a nucleus of oxalate of lime, covered by uric acid and urate of ammonia; or a nucleus of mixed phosphates followed by phosphate of lime and mixed phosphates. Others, again, consist of four or even more layers: thus, a nucleus of uric acid incrustated by urate of ammonia, uric acid, and urate of ammonia; or oxalate of lime, followed by uric acid, oxalate of lime, phosphate of lime," &c. (*Op. cit.*, 296.)

144. The proportion of *alternating calculi*, of two layers differing in chemical constitution, appears from several sources to average 1 : 2½. The proportion of calculi consisting of three alternations are 1 : 8½; and of those of four alternations in the Norwich collection are 1 : 26½. The order in which different deposits succeed each other in calculi has been examined by Dr. PROUT, with the view of elucidating the changes in the economy upon which this order depends. He found that the frequency of alternation of uric acid and oxalate of lime is nearly equal; that oxalate of lime follows urate of ammonia more frequently than uric acid; that the general ratio in which phosphates succeed other deposits in all the collections is 1 : 4½; and that a decided deposition of the mixed phosphates in calculi is not followed by other deposits.

145. xi. *Fibrinous calculus* was first described by Dr. MARCET. It is stated by Dr. PROUT to be usually of an amber colour and waxy consistence, with more or less of a fibrous texture. As to the chemical tests for this and the other calculi described above, I must refer the reader to the *Table* given above from Dr. BENGE JONES (§ 130); and to the chapter on "The Chemistry of Urinary Concretions," in Mr. COULSON's able work already referred to.

[*Chemical Composition of Calculi in the United States.*—It is to be regretted that so little attention has been paid to the chemical analysis of our calculi. So far as they have yet been ascertained, they are as follows:

Of the 15 calculi, removed from as many patients, by Dr. J. MASON WARREN, of Boston, 2 were of pure lithic acid; 1 lithic acid with layers of phosphates; 3 phosphate of lime; 3 oxalate of lime; 2 oxalate of lime, with phosphates; 1 cystic oxide; 2 triple phosphates.

Of the 22 calculi, in the Museum of the Boston Society for Medical Improvement, from various parts of New England, 5 consist of uric acid, surrounded in one by thin layers of oxalate of lime and the mixed phosphates; 3 of uric acid and the urates; 1 of urate of ammonia; 2 of uric acid and mixed phosphates; 1 of urate of ammonia and mixed phosphates; 1 of uric acid and urate of ammonia, inclosed by mixed phosphates; 1 of uric acid and mixed phosphates, with urates of potash and ammonia; 1 of urate of ammonia and oxalate of lime; 2 of phosphate of lime; 2 of mixed phosphates; 2 of oxalate of lime; and 1 of oxalate of lime and mixed phosphates.

Of 5 operations for stone, performed by Professor F. H. HAMILTON, of Buffalo, 1 was a fusible calculus, with oxalate of lime as a nucleus; 1 urate of ammonia; 1 fusible calculus with carbon-



ate of lime; 1 fusible calculus with traces of lithrates.

Of 22 calculi removed by Professor VAN BUREN, of New York, 2 were pure lithic acid; the rest were compound in their character, principally triple phosphates.

Of 14 cases of lithotomy performed by Dr. J. DICKSON, of Alleghany, Pennsylvania, in 13 the stone was lithic acid; in 1 phosphate of lime. Of the cases of urinary disease occurring in Western Pennsylvania and Ohio, the same surgeon states that the great majority labour under the lithic acid diathesis, about ten per cent. under the phosphatic, and about five per cent. under the oxalic.

Dr. CHARLES FRICK, of Baltimore, states that the great majority of urinary concretions in that city are composed either of uric acid or oxalate of lime, the phosphatic being very rare; of 32 separate specimens of calculi removed by Professor N. R. SMITH, of Baltimore, the same chemist found, on analysis, 4 of pure uric acid; 4 of pure urate of ammonia; 10 of pure oxalate of lime; 6 of phosphates; 2 of urate of lime; 1 of pure cystine; 15 contained uric acid, either alone or combined. The patients came from different parts of the Middle and Southern States.

Of 4 cases of calculi removed by Dr. OGIER, of Charleston, South Carolina, 2 were mulberry, and 1 principally phosphate of ammonia and magnesia.

Of 71 separate specimens of calculi removed by Dr. DUDLEY, of Kentucky, the results of analysis by Professor PETER, arranged with reference to the nuclei and bodies of the calculi, are as follows:

1.	Predominance of the uric acid in the nucleus in	36	6
2.	" of urate of ammonia	"	41
3.	" of oxalate of lime	"	14
4.	" of earthy phosphates	"	8
5.	" of cystine	"	3
6.	" of foreign substance	"	4
			<u>71</u>

*Simple Calculi*; whole number, 31.

1.	Predominance of uric acid in the concretion	5
2.	" of urate of ammonia	9
3.	" of oxalate of lime	9
4.	" of earthy phosphates	6
5.	" of cystine	2
		<u>31</u>

*Compound Calculi*; whole number, 40.

II. Number of specimens in which uric acid predominated:

Number of calculi having a nucleus of uric acid, 1.

A. Nucleus of urate of ammonia:

1.	Bodies principally oxalate of lime	10
2.	" urate of ammonia	7
3.	" uric acid	3
4.	" fusible	9
		<u>29</u>

III. Number of specimens in which oxalate of lime predominated:

A. Nucleus of oxalate of lime:

1.	Bodies principally phosphates	2
2.	" uric acid	2
3.	" urate of ammonia	1
		<u>5</u>

IV. Number in which earthy phosphates predominated:

A. Nucleus of earthy phosphates:

1.	Bodies principally phosphate of lime	1
2.	" fusible	1
		<u>2</u>

V. Number in which fusible phosphates predominated:

A. Nucleus of foreign substances:

1.	Bodies, triple phosphates, phosphate of lime, and urate of ammonia	1
2.	Bodies fusible, trace of uric acid and urate of ammonia	1
3.	Bodies fusible	1
		<u>3</u>

Total..... 40

The conclusions arrived at by Dr. PETER are, first, that calculous diseases are more frequent in the limestone than in the freestone regions of Kentucky; and, secondly, that there is a larger proportion of phosphatic and oxalate of lime deposits, with a greater number of nuclei of urate of ammonia, and fewer of pure uric acid in the limestone than in the freestone districts of the State, or where the water is free from calculous matter.

Dr. E. B. HASKINS has analyzed 176 Tennessee calculi, of which 107 were duplicates, the weight of the concretions ranging from 2 grains to 1027, the average being 91 grains, and the aggregate 16,038; the lowest specific gravity 1.198, the highest 1.812; average, 1.509. Of this number there were of

Earthy phosphates, 9,	with an average spec. gr. of	1.338
Urates, 5,	"	1.694
Oxalate of lime, 1,	"	1.689
Mixed, 30,	"	1.533

*Chemical Results.*—The whole number of calculi analyzed was, as already stated, 176, 107 being duplicates, leaving thus 69 separate specimens. The results are arranged with reference to the nuclei and bodies of the concretions:

1.	Predominance of the urates in the nuclei, 43 (3 duplicates)	45
2.	Predominance of oxalate of lime in the nuclei, 20 (6 duplicates)	14
3.	Predominance of triple phosphate in the nuclei, 101 (95 duplicates)	6
4.	Predominance of phosphate of lime in the nuclei	9
5.	Predominance of uric acid in the nuclei, 4 (3 duplicates)	1
6.	Predominance of foreign matter	69

The number of *simple calculi*, or nuclei without bodies, was 44. The number of compound concretions, or those having a body upon a nucleus, was 132, of which 78 were duplicates, leaving 54 separate specimens.

1.	Predominance of urates in the bodies	8
2.	" of triple phosphates in the bodies, 93 (75 duplicates)	18
3.	Predominance of oxalate of lime in the bodies	15
4.	" of phosphate of lime in the bodies, 15 (3 duplicates)	12
5.	Predominance of uric acid in the bodies	1
		<u>54</u>

The *compound calculi*, or those having both a body and nucleus, may be arranged as follows:

I. Number of specimens in which urates predominated:

1. Number of calculi having nuclei of urates 8

II. Number of triple phosphate bodies, 93 (75 duplicates):

1.	Number having nuclei of triple phosphate, 76 (75 duplicates)	1
2.	Number having nuclei of urates	12
3.	" of oxalate of lime	5
		<u>18</u>

III. Number of phosphate of lime bodies, 14 (2 duplicates):

1.	Number having nuclei of urates	7
2.	" of triple phosphate, 4 (2 duplicates)	2
3.	Number having nuclei of oxalate of lime	3
		<u>12</u>

IV. Number of oxalate of lime bodies:

1.	Number having nuclei of oxalate of lime	2
2.	" of urates	12
3.	" of foreign matter	1
		<u>15</u>

V. Number of uric acid bodies:

Number having nuclei of urates 1

Total..... 54

[\* Dr. HASKINS uses the term "urates" instead of "urate" of ammonia, because he has never found this substance to exist in any other form than in combination with urate of lime, or of soda, or both.]

These results are very similar to those of the Kentucky calculi. Excluding duplicates, we have 71 Kentucky specimens, and 69 Tennessee. Of the former, the nuclei in 6 were composed nearly entirely of uric acid, and in 8 of earthy phosphates; in the latter, of uric acid in 1, and of earthy phosphates in 8.

*Bases of the Urates*.—Dr. HASKINS analyzed 84 specimens of the urates, with a view to determine their bases, and the results arrived at were as follows: Ammonia was found in all; lime with ammonia in 83; soda with ammonia and lime in 55; and soda with ammonia alone in 1. For magnesia and potash no search was made. The ammonia largely predominated over both of the other constituents. Urate of lime, which has generally been regarded as a rare ingredient of urinary calculi, was present in 83 of the examinations, and usually existed in larger quantities than the soda.\*]

146. VI. CAUSES OF URINARY CALCULI.—The causes of urinary concretions may be inferred from what I have stated above with reference to the pathological conditions occasioning the several forms of urinary deposit, the concretions taking place in different parts of the urinary apparatus being merely early deposits in those situations of the same constituents as are precipitated by the urine after being discharged from the body. Whether the concretions are formed within the body, or the deposits take place after the urine is evacuated from the body, many, indeed most of their causes, are the same; the states of the urine which produce them arising chiefly from, (a), age and habits of life; (b), from climate, locality, and race; (c), from diet and regimen; (d), from morbid digestion and assimilation; (e), from pathological states of the kidneys, and from the metamorphosis of tissues and of blood-globules, in connexion, (f), with constitutional and vital conditions. But it may be asked, Wherefore should concretions form within the urinary organs, consisting of the same or nearly the same constituents as are deposited from the evacuated and cold urine? To this question the chief answer must be that which I have stated above (see § 80-4), namely, that low states of vital power favour the more rapid evolution of that portion of vital emanation which all secretions (the urine as well) possess for a shorter or longer period after secretion, according to the amount of vitality endowing the secreting organs, in connexion with the extent of change in the constitution of the secretions, with their accumulation and retention, and with the amount of vital influence and animal heat retained by them, or furnished to them during their retention. Although these causes of urinary deposit and concretion have been above considered with reference to the deposits found after the urine is evacuated, certain topics connected with them, more especially with the formation of calculi, require a more particular notice than they have yet received.

147. Deposits from the urine, more or less abundant, after evacuation may proceed for a very long time without any deposit taking place within any part of the urinary apparatus. This immunity from the formation of calculi may arise either from the circumstance of the urine having not been saturated with the substance or sub-

stances which usually pass into calculus, or from the states of vital power being unfavourable to the formation of renal or vesical concretions, or from the absence of other causes which favour such formation.

148. i. *Age and Sex*.—The liability of children to calculi has been remarked from the days of HIPPOCRATES; and Mr. COULSON quotes the "*Methode of Physick*," in which the author, PHILIP BARROUGH, remarks that "stones in the bladder do engender oftener in children than in older folk."—(*Lib. iii., c. 41, editio quinta*, 1617.) Although the liability of strong and well-fed children may not be greater than that of any other class of subjects, yet there is no doubt of weakly, unhealthy, and ill-fed infants and children being more frequently affected with gravel and calculi than older persons. Of 478 operations for stone in the Norwich hospital during a period of forty-four years, 227 were in children under fourteen years. According to Dr. PROUT, the following is the relative frequency of urinary calculi at different ages: Under 10 years of age, 500; from 10 to 20, 192; from 20 to 30, 104; from 30 to 40, 94; from 40 to 60, 112; from 60 to 70, 97; and from 70 to 80, 12. Taking into consideration the numbers of those living at the most advanced ages, urinary concretions are more frequent at these ages than in the prime of life.\*

149. Females, notwithstanding their more sedentary habits, and their liability to retain their urine for long periods, are less frequently subject to calculus than males. This is partly owing to their temperate and abstemious habits, and partly to the facility with which a small calculus may escape from the female bladder soon after its descent from the kidneys, and before its retention in the bladder has enabled it to acquire a great size by successive depositions around it. The female urethra, admitting of greater dilatation, and being less complex than the male urethra, and otherwise differently connected and circumstanced, allows the spontaneous passage of calculi which would be retained in the male bladder, and could be removed only by an operation.

150. ii. *Habits of Living*.—Sedentary habits and luxurious feeding are more or less influential, according as they may be associated with other causes, in occasioning urinary concretions. The former impairs very remarkably the functions of the skin, and prevents that amount of blood-depuration which these functions effect; the latter furnishes the pabulum or source from which urinary concretions are in great part derived. When these habits exist in, or are conjoined with, a gouty diathesis, the occurrence of gravel or calculi is often observed; and much more remarkably when a meat diet and malt liquors are very liberally indulged in; for this diet, especially the more nitrogenized kinds, forms urea and the urates in great abundance, and generates either gout, or gravel, or calculi, or both, and subjects the kidneys to a much greater amount of depurating function by increasing the

\* M. CIVIALE in his "*Treatise on Calculous Affections*," states that of 5376 cases, 2416 were children, 2167 adults, and 793 old persons. He says that 1946 occurred before the age of ten, 943 from ten to twenty, 460 from twenty to thirty, 830 from thirty to forty, 391 from forty to fifty, 513 from fifty to sixty, 577 from sixty to seventy, 199 from seventy to eighty, and 17 after eighty. Instances of calculus have been recorded from birth, and very soon after birth. Mr. COULSON operated for stone on a child of eighteen months, and upon a man of eighty years of age.

[\* For the above details we are indebted to the able work of Professor GROSS on "Diseases of Urinary Organs."]



quantity of morbid materials which require removal from the blood.

151. When the skin ceases to discharge its share of this process of blood-depuration, an increased demand is made upon the kidneys, and an increased supply of the constituents of urinary deposit is furnished to these organs. It will thus appear very manifest that, as the same causes as are more or less concerned in the production of gravel and calculi are also productive of gout, these two diseases must be frequently associated in the same person. The association of calculi with rheumatism is much less frequent than with gout; but when it occurs it may be imputed in great measure to a similar combination of causes.

152. iii. *Climate, locality, and race* very considerably influence the occurrence of urinary concretions. It is very difficult in many instances to explain the operation of these; but there is no doubt of these maladies being more frequent in humid, temperate, and changeable climates, than in very warm or very cold countries; in some localities than in others even of the same country; and in the white than the dark races. Holland, France, England, Germany, have been regarded as furnishing the greatest number of calculous cases; but other countries are by no means exempt from them. Within the tropics, urinary concretions are more rarely observed than in temperate countries, and chiefly or only in the very young and ill fed. The marked infrequency of these concretions in the dark races is chiefly to be imputed to the very small proportion of animal food constituting the diet of these races, especially within the tropics, and to the greater activity of their cutaneous functions.\*

\* Dr. GROSS (on the *Diseases and Injuries of the Urinary Bladder*, &c., 8vo. Philad., 1851) confirms the rare occurrence of urinary calculi in the coloured races. In ten years he never met with an instance of gravel or of stone in a coloured person. Dr. DUMLEY, in Kentucky, who has the largest practice there, never operated for stone on more than two or three persons, who are constantly exposed to hard labour, and fare often upon the coarsest food. Dr. GROSS states that urinary calculi are rare in Canada, in Texas, Mexico, and California; that in the United States a larger number of children are subject to calculi in Kentucky, Ohio, Tennessee, and Alabama than in any other part; and that the inhabitants of Missouri, Iowa, Wisconsin, Michigan, Indiana, New York, and New Jersey are comparatively exempt.

It is proper, in this connexion, to give a more detailed account of the results of Professor GROSS's researches in regard to the prevalence of stone in the bladder and calculous disorders in the United States. From these it appears that the great stone regions of this country are, as far as is at present known, Kentucky, Tennessee, Virginia, Ohio, North Alabama, and perhaps Missouri, the disease being comparatively infrequent in all other sections of the country. The causes of these differences are as yet not satisfactorily known. They cannot be satisfactorily explained, on the ground of difference of climate, geological formation, or habits of life, nor in the food, drinks, and occupations of the inhabitants; for in these respects, for example, there is but little difference between Kentucky and Indiana, yet calculous affections are very common in the former and very rare in the latter. Corn-bread and pork constitute the staple articles of food throughout the Southern and Western States, with unleavened biscuit of wheat, potatoes, hominy, cabbage, turnips, and tomatoes, with coffee, tea, and milk at breakfast and supper. Eggs, poultry, and milk are also freely used. In the calculous districts lime-water generally prevails, and is used freely by nearly all the inhabitants; but the same is true also of some parts of New England and Canada, Indiana, Illinois, &c., where stone in the bladder is rarely met with. The Germans are remarkably exempt from calculous affections, and they consume large quantities of malt liquors. The climate is essentially the same in the calculous and some of the non-calculous districts. The prevalent diseases in the calculous regions are intermitting and remitting

The imputed infrequency of calculi in very cold countries is accounted for with much difficulty, especially as animal food is generally freely used. The active employments followed by the natives of these countries, a fish diet adopted by many, and other unascertained influences, may combine to produce this partial immunity. The greater prevalence of calculous diseases in Norfolk than in any other county in England is fully admitted. Mr. CROSSE, the eminent surgeon of Norwich, considered this prevalence to be owing to a combination of causes—to the variability of the climate of Norfolk, to the prevalence of northeast winds, and more especially to the frequency of dyspepsia and acidity in the stomach, and to the consequent superabundance of uric acid in the urine. SOEMMERING states that calculous and gouty affections are unknown, or most rare, in some situations bordering on the Rhine. LIEBIG imputes this immunity to the Rhenish wines, which contain a considerable quantity of the bitartrate of potash. This salt, he contends, changes in the progress of digestion to the carbonate of potash, and acts the part of an alkali.

153. It was formerly believed that the waters of a locality had some influence in producing urinary concretions. This opinion has, however, been controverted by several modern writers, and it is undetermined whether or no the waters which abound in calcareous or other mineral substances have any effect in occasioning urinary

fevers, neuralgia, pneumonia, dysentery, rheumatism, and dyspepsia; and urinary deposits of all kinds, especially the lithic acid and urates, are common. The causes, then, which favour the formation of stone in the bladder remain, for the most part, undetermined, though there can be no doubt that such affections must be influenced to a greater or less degree by climate, food, and drinks, occupation, &c. We believe it will yet be made to appear that the hygrometric state of the air (*a high dew-point*) is one of the most efficient predisposing causes. In all the New England States calculous affections are very uncommon, although much of the drinking-water is strongly impregnated with lime. The number of lithotomy cases that fell to the charge of Professor J. C. WARREN, during a period of forty years, was only 25; and he is said to have been the only surgeon in Boston who performed that operation during that whole time. Only three of these cases were natives of Boston; the others came from different parts of New England. Dr. NATHAN SMITH was of opinion that more cases of the disease originated in Vermont and Maine than any of the other New England States, and these States abound in limestone more than any of the others. Up to 1855, Dr. J. M. WARREN, of Boston, had operated for stone 13 times; Dr. V. MOTT, of New York, 163 times; Dr. F. H. HAMILTON, of Buffalo, 5 times; Dr. A. TROWBRIDGE, of Watertown, N. Y., 18 times; A. MARCH, of Albany, 16 times; W. PARKER, of New York, 24 times; Professor VAN BUREN, of New York, 20 times (besides several operations by Drs. CARNOCHAN, POST, BUCK, WOOD, HOFFMAN, WATSON, &c.). During 17 years and a half (1837 to 1855) only 14 cases of stone in the bladder were treated in the New York Hospital, which receives annually about 3500 patients. In the Pennsylvania Hospital at Philadelphia, from the time it was opened for the admission of patients, in 1772, till May, 1848, 100 years, only 83 patients were cut for this disease, of which few originated in Philadelphia or vicinity. Up to 1842, Professor GIBSON, of Philadelphia, had operated for stone 50 times; Dr. J. RHEA BARTON, 36; GEORGE MCCLILLAN, 30 (and before his death, 50). Dr. PANCOAST has had (1856) 41 cases; Dr. J. DICKSON, of Alleghany, Pennsylvania, has operated on 14 cases in the last seven years.

Dr. METTAUER, of Virginia, has performed the operation for stone 91 times; Dr. P. C. SPENSER, of Petersburg, Va., 24 times; Dr. DUDLEY, of Kentucky, 207 times; Dr. GROSS, 40, &c. These constitute the vast majority of operations of this kind performed in the United States during the last 30 years.

With regard to age, American statistics are extremely deficient. Of Dr. DUDLEY's patients, three fourths were under 15 years; and of 27 Kentucky cases of Dr. GROSS, 14 were under this age.]

calculi. The subject has not been investigated with precision, and the arguments on both sides are loose, and indeterminate as to facts.

154. It has been contended by Mr. COPLAND HUTCHINSON and Sir G. BALLINGALL that sailors and soldiers are almost exempt from urinary concretions. But when it is considered that both sailors and soldiers are of those ages in which these concretions are seldom observed, the extent of this exemption cannot be great. Whatever it may be, the activity of the digestive, assimilating, and depurating functions in these classes and at their periods of life evidently constitutes its chief cause.\*

155. iv. *Diet and regimen* has more influence on the frequency of calculous diseases than is generally believed. The evil produced by animal food used in excess—and many use it in excess relatively to the amount of exercise taken—has been already adverted to (§ 150). Highly nitrogenized animal diet furnishes a rich and an abundant chyle, which, during its circulation in the blood through the several viscera, becomes oxidized and otherwise changed, and, in various states of metamorphosis, under the influence of vitality, originates the most important parts of those materials which require a continued elimination from the blood; and if this end be not attained by the active discharge of the several depurating functions—by the kidneys, skin, mucous surfaces, &c.; and if it be not promoted by exercise sufficient for its fulfilment, an accumulation of these materials in the blood takes place, and, becoming more and more highly animalized and morbid, and irritating by their retention and accumulation, occasions serious diseases, among which Gout (as shown in that article, § 33-42) and urinary concretions are the most common.†

156. v. *Metamorphosis and waste of tissues*, &c.—It will be seen, from what has been stated above (§ 41-5), that Baron LIEBIG and Dr. GOLDING BIRD have attributed the solid materials dissolved in the urine, with their deposits and concretions, to the chemical combinations of the elements resulting from the metamorphosis and waste of the tissues in the course of the regeneration and nutrition of these tissues. But if we take into consideration the great amount of these materials discharged into the urine, and refer them only to the sources from which these writers derive them, it must follow that these tissues ought to be renewed several times every successive year of existence! It must be admitted that the metamorphosis and waste of the tissues—to which I would add similar changes in the red globules of the blood also—furnish some part of these materials; but a much greater share is supplied by the food, by the chyle conveyed into and

circulating with the blood, and by the successive changes therein produced, under the influence of vitality; the regeneration and nutrition of the tissues requiring only a small but appropriate portion of the constituents thus supplied, the less appropriate materials being eliminated from the circulation by the kidneys, skin, and other depurating organs.

157. vi. *Indigestion, fermentation, and mal-assimilation* are causes of urinary deposit and concretion intimately connected with a too full, rich, or unwholesome diet. Numerous articles of food are indigestible in their nature, more especially if not sparingly partaken of, and are liable to become rancid in the stomach, and to occasion rancid eructations; while others are more disposed to fermentation, and to generate acidity in the stomach and bowels; both rancidity and acidity sometimes occurring simultaneously, according to the nature of the food, to the quantity taken, and to the powers of digestion and assimilation. Owing to undue and superabundant quantity, or to improper quality, or to both, an imperfectly digested and assimilated chyle is formed and carried into the circulation, furnishing the material elements of disease, and more especially of urinary concretions. But it is not only to full diet, much animal food, or to unwholesome aliment, that these concretions may be remotely imputed, but also to insufficient food, especially in early life. In this latter case the powers of life are so reduced by the insufficient nourishment as to imperfectly digest and assimilate what is taken, and the blood is thereby diminished in quantity and impaired in quality.

158. vii. *Constitutional and vital conditions* manifestly combine with the preceding causes in occasioning concretions in the urinary apparatus. These conditions I have viewed above (§ 45, 157) as consisting of more or less manifest impairment, not only of the digestive, and assimilating, and depurating functions, but also of the vital endowment throughout the frame. This general impairment of vital power accounts for the prevalence of urinary excretions in delicate and in imperfectly or improperly fed children, or previously to puberty, and in the aged, and for the comparative rarity of these concretions in persons during the prime of life, or during the period of sexual activity, and in those who are neither over-fed or under-fed, and who are not exposed to the remote causes above mentioned.

159. viii. *Bodies or substances introduced or passed into any portion of the urinary apparatus* are liable to become the nuclei around which urinary concretions may form and increase by successive deposits. Numerous instances of bodies having passed into the bladder, and become the nuclei of large calculi, are recorded by medical writers. To these it is unnecessary to refer, as they are sufficiently known; but they satisfactorily prove that these bodies give rise to the first act of deposition or crystalline formation by the urine, when more or less loaded or saturated with the constituents of urinary deposit and concretion.

160. ix. *Morbid states of some part of the urinary passages* may be attended by an extravasation of a minute quantity of blood, or by a purulent or mucous discharge, which, either in the uriniferous tubes, or in the pelvis of the kidney, or in the bladder, may become the cause of deposit, by attracting the uric acid, the urates, or

[\* There is good reason to believe that the use of *sorrel* and the footstalks of the *rhubarb* plant favour the production of *oxalate of lime* deposits, as they both contain oxalic acid, combined in excess with potash. The free use of *sugar* may also act as a powerful predisposing or exciting cause.]

[† Dr. W. P. C. BARTON, formerly at the head of the Medical and Surgical Bureau at Washington, expresses the opinion that sailors are entirely exempt from calculous diseases. The same opinion substantially is expressed by Surgeons FOLTZ, LICHTENBERGER, GREEN, HORN, CORNICK, and others of the United States navy. Urinary deposits occur among landmen and marines, but rarely, if ever, among those who have been brought up at sea. The same singular immunity exists among the seafaring people of all nations. The cause assigned by our author, viz., the activity of the digestive, assimilating, and depurative functions, is doubtless the principal one.]



other saline constituents of the urine, and form the nucleus of successive deposits. It is not improbable that a change, such as I have just stated, may take place in some portion of the kidney, or even in some other part of the urinary apparatus, owing either to external injury, or to other causes, and, by favouring the concretion of the superabundant saline constituents, or uric acid in the urine, thus form the nucleus of a renal calculus, which may either remain long in the kidney, and increase slowly, or pass into the bladder, and become, as in the case of a foreign body, the centre around which successive and large deposits collect. Most calculous concretions are thus formed, their nuclei and earlier deposits being formed in the kidneys, their chief increase taking place in the bladder.

161. *Inferences.*—The efficient causes of urinary calculi may doubtless operate differently in different diatheses and constitutions, and in different circumstances, more especially in determining the *nature of the deposit*; but there is some reason for concluding, 1st. That a diet composed chiefly, or of a large proportion of animal food, tends to increase the quantity of the uric acid and urates, and to favour their deposition, and to lessen the generation and deposition of the phosphates; 2d. That rancid and accescent ingesta, and rich sauces, exert nearly similar influences to the foregoing; 3d. That whatever promotes the functions of the skin tends to prevent the deposition of uric acid, and to favour that of the phosphates; and, 4th. That indolence and indigestion tend to increase the deposition of uric acid and to lessen that of the phosphates, both by producing acidity of the *prima via*, and by impairing the functions of the skin and liver.

162. x. *The origin and growth of urinary calculi* was first clearly stated by VAN SWIETEN (*Comm. in Aph. Boerh.*, 1414). He remarks, that "stones proceed from elementary principles, which, in a state of solution, previously existed in the humours, and when these meet with an indissoluble basis, they fix themselves thereto, and form a calculus, which continually increases in bulk from the application of fresh calculous matter." This statement is probably correct as far as it goes, but various topics connected with the original nature and primary formation of urinary concretions are not comprised in it. Dr. GOLDING BIRD and others contended for an oxaluric diathesis, which gives rise to the secretion of oxalic acid and oxalates from the uric acid and urates existing in the blood. Dr. OWEN REES has opposed this doctrine, and has argued that the oxalic acid and its compounds are not produced from uric acid or from urates already existing in the blood, but that the change is effected in the urine, after its secretion by the kidney. "In this latter case the *uric acid* in combination will be secreted as such into the urine, but by after processes, occurring either in the urinary passages, bladder, or chamber vessels, it will present itself converted into a compound of the oxalic acid." If this be really the case, then we must admit that the state of system in which we observe a tendency to the formation of oxalate of lime in the urine must be considered identical with that accompanying the uric acid diathesis, and as requiring the same treatment, and the same precautionary measures.

163. Dr. ALDRIDGE, of Dublin, has shown the manner in which uric acid and its compounds

become decomposed into an oxalic salt. "He has proved that uric acid may be theoretically considered as representing the elements of oxalate and carbonate of ammonia, hydrocyanic and formic acids, if we merely add to its atoms the elements of water in varying proportions. He has demonstrated that this really occurs; for, by heating urine, and in some cases by evaporating it, he has succeeded in causing a deposit of oxalate of lime, while evidence of the presence of hydrocyanic and formic acids could be obtained from the fluid." (O. REES, *on Calc. Dis.*, &c., p. 5.)

164. a. The chemical reasoning, Dr. O. REES remarks, which shows how unlikely it is that oxalate of lime should exist in the blood, is quite borne out by pathological conditions. He therefore concludes, in opposition to Drs. GARRUD and G. BIRD, that, whenever oxalate of lime is found in the urine, it should be regarded as *produced after secretion*, and that there is no such thing existing as an oxalic diathesis. LENMANN, who has also opposed the opinions of the late Dr. BIRD, has stated that morning urine, left to stand some hours, often contains oxalate of lime in quantity, when the fresh urine did not contain any trace of it. WOHLER and FRERICHs found that the urates when injected into the blood produced oxalate of lime in the urine. Dr. O. REES thus "regards oxalate of lime merely as uric acid, or urate altered after secretion," and that the lists of calculi contained in museums will show that the uric acid diathesis produces nearly the whole of the calculous diseases observed, especially by forming the nuclei of most of those which are formed of other constituents.

165. The greatly increased quantity, and the insolubility of uric acid, are quite sufficient causes of the deposit of it in the kidneys, especially when in excess, and in the circumstances about to be noticed (§ 167, 169), without calling in the aid of any other agency. If the deposition of the uric acid in the calculous form in the kidneys, where it originally takes place in the great majority of cases, if not in all, and if the calculus, having passed into the bladder, "fail to produce any great irritation of the vesical mucous membrane, then it will be enlarged by the continued deposition of uric acid layers; but if, as is generally the case, this calculus irritate the surfaces, then the bladder becomes inflamed, and the mucous membrane throws out an alkaline fluid, which now decomposes the ammoniacal salts contained in the urine and liberates the ammonia. This may unite to a portion of uric acid, forming urate of ammonia, so that the next layers of the calculus may consist either entirely of urate of ammonia, or of that salt in admixture with uric acid. The changes may cease here, and the calculus, though it increase under these conditions, be thus compounded merely of two constituents. The next change may, however, occur, and may determine the formation of a more compound form of concretion; and this will consist in the pouring out of an *excessive* quantity of alkaline secretion by the inflamed mucous surface. This will not only completely neutralize the acidity of the urine, but cause, like all alkaline solutions, a precipitation of the earthy phosphates." (*Op. cit.*, p. 28.) These will coat the calculus, intermixing or not with the urate of ammonia, or uric acid, according to the amount of secretion and its alkaline character.

166. b. In respect of the *phosphatic deposits*

and *concretions*, Dr. O. REES farther contends for their production uniformly from irritation or disease of the urinary mucous surfaces, and for the presence of uric acid or some other form of concretion being a sufficient cause for the formation of phosphatic layers on a calculus. In answer to the questions as to how phosphatic calculi are formed when *no* other calculous matter can be detected as a nucleus, and what were the conditions antecedent to the phosphatic deposit in such cases, he states that these calculi are rarely met with, and when present are the consequences of disease of the mucous membrane of the bladder, and where, of necessity, the alkaline secretion consequent upon irritation of this membrane is poured out from it in quantity. "This state of things often follows upon enlargement of the prostate with stricture, so that the bladder is not easily emptied." The retained portions of urine will have their earthy phosphates precipitated by the alkaline secretion of the diseased mucous membrane, and the formation of a calculus result. Hence it follows, 1st, that the presence of other calculous matters, by irritating the bladder, causes a deposition of the earthy phosphates, these matters forming the nuclei around which the phosphates are deposited; 2d, that the alkaline secretion from the irritated urinary mucous membrane occasions a concretion, independently of such nuclei, by precipitating the phosphates. It was long ago remarked by Dr. PROUT, that these salts, when present, were always found covering other deposits, and rarely alternating with them; so that, if the nucleus were phosphatic, the crust would be the same, and no covering be found of any other form of calculous matter.

167. Since uric acid is the nucleus of the great majority of calculi, the conditions under which this deposit occurs should be considered. In persons subject to the continued excretion of uric acid and the urates, the quantities discharged may be very great, without showing any tendency in these substances to concreate into the calculous form. These materials may even give rise, from their abundance, to attacks of "gravel," without any considerable calculus being formed, and very common means may give relief. In other cases, the deposits in evacuated urine may be in far less proportion, and yet the tendency to concreate into calculi be very early shown. These facts, as Dr. O REES contends, seem to prove that, in order to produce a calculus, some condition must be present besides that which we recognise in a tendency to the deposit of solid matter from the urine. It is necessary to bear in mind what has been said above (§ 166) respecting the chemical effect of the alkaline secretion from the inflamed urinary mucous membrane, upon which he places more stress than the proofs may be supposed to warrant. But besides possessing the imputed chemical qualities, Dr. O. REES infers that the secretion from the inflamed membrane evinces mechanical conditions which must influence the result where a tendency exists to deposit solid matters from the urine, and that the secretion from the inflamed mucous surface, being of a tenacious character, and containing fragments of epithelium and mucous corpuscles, will cause the particles constituting the deposit to unite and form a nucleus or concretion of successive deposits.

168. Instead, therefore, of viewing the earthy

phosphates as secreted by the mucous membrane, Dr. O. REES believes that this membrane acts merely through its alkaline secretion, which precipitates the earthy phosphates from the urine; and he farther infers, that the same conditions noticed with regard to the bladder are present also in the kidneys, and that it is to these conditions in these latter organs, rather than to what exists in the bladder, that we ought to look for the chief cause of the formation of nuclei, and the very general origination of calculi in the kidneys. "At any rate, this would appear to apply so far as the production of a nucleus is concerned." The mechanical conditions presented by the pelvis and urinary tubules certainly are far more favourable to the agglutination of deposits than those observed in the bladder; for these are smaller conduits and cavities, and in the immediate vicinity of the tubules the first deposited matters are brought in intimate contact with the spheroidal epithelium, which under irritation rapidly desquamates and is more especially liable to entangle floating particles of deposit, and so to favour the formation of calculus. "The reasoning," Dr. O. REES adds, "I have used with respect to the bladder applies with full force to the formation and growth of calculi in the kidney. From what I have now adduced, I would submit, that if we except cases in which are formed the four following rare substances, viz., cystine, carbonate of lime, silicic acid, and uric oxide, we may consider all calculous disease as originating in the gouty or uric acid diathesis." (*Op. cit.*, p. 38.)

169. A nucleus may form in any part of the urinary canals; but the tubules are by far the most frequent seat of the original deposit. Small particles are sometimes found in the secreting structure; and if these do not pass onward to the tubular structure, they may increase by deposit of successive layers until a calculus of considerable size is produced. In this case a portion of the organ, corresponding to the development of the concretion, may be destroyed, and symptoms varying with circumstances be produced. The first deposit may, however, pass lower down into the tubular structure, or thence into the pelvis of the kidney, and either remain in either of these situations or pass along the ureter into the bladder, causing more or less distress, in some cases extreme suffering, during its passage; and having reached the bladder, it may be expelled through the urethra by the stream of water, or remain in the bladder and become the nucleus of a large concretion.

170. VII. SYMPTOMS OF URINARY CALCULI.—i. *In the Kidneys*.—The symptoms produced by a calculus or calculi in the kidney vary with the size, form, or smoothness of the stone, its situation in the organ, and the constitution, temperament, and diathesis of the patient. The calculus may remain in the kidney, or even several may remain, or pass thence into the bladder. If it remain, either relief of more or less severe symptoms may take place after a time, owing to a cystic covering forming over it, or disorganization of the kidney sooner or later supervenes and destroys the patient. If the calculus remain in the kidney and become encysted, more or less severe pains in the loins or in one or both sides, often extending down the thigh or thighs, and sometimes upward under the shoulder blades, colicky pains in the abdomen, nausea, vomiting,



hæmaturia, and frequent calls to pass the urine, are complained of. These symptoms may gradually subside, and they may recur oftener than once, after indefinite periods and with various degrees of severity, especially after sudden or severe exertion, particularly when the trunk of the body has experienced a shock or concussion. The pain often becomes dull or aching, or is seated chiefly on one side of the abdomen, or extends to the groin, or a sympathetic pain, resembling neuralgia, is experienced at a distance from the region of the kidney, and not unfrequently extends to the testicle of the affected side. After a lengthened period, and after frequent recurrences of the symptoms in slighter grades, the patient either experiences an immunity from farther suffering, or complains only of slight and wandering or recurring pains, which often may be traced to one or other kidney.

171. In less favourable cases of retention of the calculus or calculi in the kidney, the symptoms assume the features described when treating of *Inflammation of the Kidney* (§ 48, 49, 59, *et pluries*), and of *Pyelitis* (*art* KIDNEY, § 174–183, 192–198, *et pluries*), and are fully described, with the several relations of this subject, in the article, and more especially at the places now referred to. I may, however, remark at this place the difficulty of diagnosis between a calculus in the right kidney and the passage of gall-stones. At the commencement of the irritation produced by a calculus in the right kidney, and when the symptoms are very severe, or when a calculus has entered the ureter from the pelvis, the complaint may readily be mistaken for gall-stones, especially when the vomitings, pain, and spasm are very urgent, and if all the symptoms be not carefully examined. I have found it even recently very difficult to determine at first as to the seat of disease; and this difficulty is increased if there be, as there frequently is, pre-existing disorder of the biliary functions, more especially interruptions of the biliary secretion, or some degree of jaundice. As the symptoms of renal calculi proceed, and especially as the calculi pass into or along the ureter, the nature of the complaint becomes more manifest, and indeed is most frequently so from the commencement, especially when the symptoms attending the secretion and excretion of urine are well marked, and blood-globules are observed in the urine. When the hæmaturia is very considerable, especially after exertion or sudden movement of the trunk, in connexion with the other symptoms of *calculous nephritis* (see KIDNEY, § 48, *et seq.*), the nature of the case is evident; and if the draining of blood continue for a considerable time, and the local symptoms are very acute, the oxalate of lime calculus is not unfrequently its cause.

172. ii. The *diagnosis* of renal calculus is rendered most difficult in the gouty and rheumatic diathesis, and in cases of chronic disease of the urinary bladder and prostate gland; for the pain in one or both sides of the lumbar region may be rheumatic or gouty, or may proceed from cachectic nephritis, or BRIGHT'S disease, or from pyelitis or abscess of the kidney, occurring either primarily, or caused by calculi, or following chronic uro-cystitis or stone in the bladder, or even from inflammation or abscess of the lumbar muscles. If any tumour or swelling be detected in the region of the kidneys, the antecedent symptoms should be duly estimated, and the examination

directed to the existence of collections of matter in the pelvis and calices of the organ, or to their distention by urine from obstruction of the ureter, or to the presence of malignant disease of the kidney. Of these several states of disease, as well as of the passage of a calculus along the ureter, no correct diagnosis can be formed until the urine be tested, and the results considered with due reference to the quantity, specific gravity, appearances, deposits, and quality of this secretion; to the ability of retaining it, to the frequency of the calls to void it, and to the particular alterations of sensibility complained of in the regions of the kidneys, ureters, bladder, and urethra, as well as in the testes, abdomen, and lower extremities, and to the states of constitution and of vital power. In the course of renal disease associated with calculi, the symptoms are so varied, and manifest so numerous combinations, with the seat, duration, extension, and associations of morbid action, that descriptions applicable to all cases would be hopeless; but, by recollecting that irritation existing in one part of the urinary apparatus will extend to, and more or less affect the whole; that although the symptoms will be present chiefly in the situations just indicated, they may extend still farther; and that a correct examination of the urine will indicate with more or less accuracy the nature of the affection, especially when viewed in connexion with the local and constitutional symptoms, the difficulty of forming a diagnosis between the disorders which result from renal calculi and those which most nearly resemble them will altogether disappear. In this subject I must refer the reader to what I have stated respecting the inflammatory and organic diseases of KIDNEYS and URINARY BLADDER, and the complications which they present in practice.

173. iii. The *symptoms* indicating the *passage of a calculus from the kidney to the bladder* may be so slight, especially when the calculus is small and smooth, as to occasion but little inconvenience, and to excite no anxiety or even the attention; and it may remain long afterward in the bladder without the patient being aware of its presence. But if the renal calculus be large, or rough, more especially if it be an oxalate, its passage along the ureter is attended by the most excruciating suffering. The pain is seated more especially in the loins, generally of one side, extends from the course of the ureter and down the thigh, the cord to the testes; and is attended by retching, vomitings, and by intermitting colicky or abdominal pains. The patient is bent double, or to one side, rolls about, and is in the greatest agony. In the less severe cases there are rigors, nausea, restlessness, pain in the back, stretching in the course of the ureter to the bladder, thigh, and testicle, often with its retraction, coldness of the extremities, and prostration. The descent of the calculus commonly occupies from 12 to 24 or 36 hours. "The calculus may become impacted in the vesical orifice of the ureter; the flow of urine from the corresponding kidney may then be prevented; dilatation of the ureter, and distention of the tubular structure of the kidney will ensue, terminating in absorption of its secreting surface; but most of the usual symptoms of stone in the bladder will be absent."<sup>\*</sup>

\* M. CIVIALE classifies *uric acid gravel* under three varieties: 1. The passage of gravel spontaneously and without pain; 2. Nephritic colic with emissions of gravel;

174. iv. *The symptoms of a calculus in the bladder* are well known, and require at this place but few remarks. But in tracing back the history of these cases, and when inquiring into their existing states, the facts should not be overlooked, 1st, that stone in the bladder originates, in the great majority of cases, in a calculus formed in the kidney, which, having passed into the bladder, forms the nucleus of farther deposit and concretion in this organ; 2d, that the formation of the calculus in the kidney, and its passage thence along the ureter into the bladder, must have been attended by more or less ailment referable to these situations; 3d, that a calculus very rarely or never originates in the bladder without previous disease either of this viscus, or of the prostate gland, or of the urethra.

175. *The symptoms* chiefly characterizing the existence of a *concretion in the bladder* are frequent calls to micturate, pain at the end of the penis, hæmaturia, especially after exertion, and pain with or without hæmaturia on a jolting motion or succussion of the trunk. If these, however, be alone recognised, they may mislead the physician; for they may all be present, and yet a calculus may not be present in the bladder. Hence the necessity of inquiring into the history of the case, and of duly estimating the early symptoms. For some malignant growth may exist in the bladder and occasion all the symptoms just mentioned. A calculus in the vesical cavity generally falls behind the prostate, but it shifts according to the posture of the patient. In the earlier stages of vesical calculus, the viscus being yet healthy, a dull pain, with a sense of weight about the neck of the bladder, or uneasiness, extends to the hypogastric region, perineum, groins, or thighs. If the stone be smooth, the symptoms commence and advance so slightly and slowly as to excite but little attention and no anxiety; but sooner or later, either from the size of the calculus or the irritation produced by it, the features of the affection become manifest. The bladder is irritable and cannot contain its contents; the calls to micturate are more frequent; and the expulsion of the last drops is attended by pain, shooting along the perineum and penis, and centring in the glans. Sometimes when the urine is flowing in a full stream, it is suddenly stopped, as if by some body falling into and obstructing the orifice of the urethra. Exercise, sudden movements, and the jolting of a carriage occasion great suffering, and even a discharge of bloody urine, which in plethoric or other habits of body may be of considerable extent or continuance; as the disease continues, and the bladder becomes more affected, micturition becomes more and more frequent and distressing. Patients oft-

en grind their teeth with agony; and the last drops of urine are expelled with spasm of the bladder, which endures for some time. The urine and contents of the vesiculæ seminales are sometimes passed involuntarily, and increase the distress and exhaustion of the patient. There is occasionally priapism, with or without sexual desire.

176. I need not farther describe the symptoms of vesical calculus, but merely briefly advert to the importance of recognising some of the *complications* of this malady, and which may either precede it or follow it, more especially the latter. Of these the most important is disease of the kidney or kidneys. This may have preceded the vesical calculus, and been associated with, or caused by, the formation of the renal calculus which formed the nucleus for farther deposit and concretion when it passed into the bladder. But in this state of complication the renal disorder is generally slight, or even hardly exists when the calculus has reached the bladder. If, however, it be arrested in its course, more particularly at the vesical extremity of the ureter, the renal complication may be most severe and dangerous. After the calculus has been long in the bladder and superinduced much disease in this viscus, the interruptions in the way of urinary excretion, the extension of irritation along the ureters, and other circumstances, often develop serious disease, and even extensive disorganization of the kidneys. In some cases, also, the irritation of the bladder by a calculus may superinduce prolapsus ani in children, or even in older subjects, and hæmorrhoids in the latter class.

177. v. *Diagnosis*.—The symptoms described above (§ 174-6) generally lead to the important measure of ascertaining beyond a doubt the existence of a stone in the bladder, viz., to *sound-ing*. The circumstance of malignant disease of the bladder being often attended by most of the symptoms characterizing vesical calculus; and the fact of this operation, which is so requisite in the latter malady, being often most injurious in the former, should lead us to pause before it is resorted to, and the states and appearances of the urine very minutely examined. In cases of vesical calculus the urine generally contains more or less of the ordinary sedimentary and organic matter, and the blood discharged with the urine is generally in smaller quantity than in malignant growths in the kidneys or bladder.

178. In calculus, hæmaturia generally follows upon some unwonted exertion. In malignant growths in the bladder or kidneys, the tendency to nausea and vomitings is greater, and there are more marked appearances of cachexia and of anæmia than in calculus. In some cases, also, a careful examination of the abdomen will lead to the detection of tumours, if there be malignant disease of the kidneys, especially after the bowels have been freely evacuated. Malignant disease of the kidneys or bladder, or fungoid growths in the latter, especially when far advanced, is characterized by discharges of urine with much blood, intermixed with which the cells constituting malignant disease may be detected by the aid of the microscope. Dr. OWEN REES reposes much confidence in the evidence furnished by these cells of the existence of such disease. He describes them to be "of variable size, the smaller being about four times the diameter of a blood-corpuscle, the larger twice that size, or even of

3. Nephritic colics without expulsion of gravel. The disease in those, as well as phosphatic gravel, cystine, and oxalate of lime, may go on in spite of medical treatment, when the difficulty may arise from some morbid state, which paralyzes the efforts of nature and art. For example, the gravel may not be able to make its escape, because it is retained in the kidneys or ureters, or in the bladder, where it may be retained, 1st. By a spasmodic contraction of the urethra or neck of the bladder; or, 2d. By one or more contractions in the deep-seated portion of the urethra; or, 3d. By a tumefaction or other disease of the prostate; or, lastly, by a paralysis of the bladder. M. CIVALE rejects entirely the prevailing doctrines respecting the influence of *nitrogenized* food in the production of gravel and stone, and repudiates all attempts at cure by *chemical remedies*, either internal or external, and especially by *alkaline remedies*. He, however, attaches great importance to the influence of age, sex, climate, and food, in the production of calculous affections.]



greater diameter. They are colourless and more transparent than the white corpuscles of the blood, and contain within them nuclei of varying size. These nuclei differ in number in each cell. Sometimes only one is present; sometimes four or five. Though there would appear a general tendency on the part of these bodies to assume the circular form, they are for the most part of irregular outline. Sometimes a mass of them may be seen agglutinated together, and then they are more or less square, or they may approach to the hexagonal form." Dr. O. REES states that he has never seen corpuscles like these in the urine, except in cases of malignant disease. Where these are found, he contends that the sound should never be introduced into the bladder, as it may be followed by excessive, or even fatal hæmorrhage, a case of this latter issue having fallen under his observation.

179. VIII. TREATMENT OF URINARY CONCRETIONS.—i. *Of Calculi in the Kidneys.*—When the symptoms indicating the existence of calculi in the kidney are severe, and the patient is strong or plethoric, or not reduced by hæmorrhages from these organs, then cupping over the loins, followed by warm baths and fomentations, will afford relief. The preparations of soap and extract of henbane, or of belladonna, may be prescribed internally, while mucilaginous or demulcent fluids, containing the carbonates of the alkalies with narcotics, should be freely administered. The bowels ought to be kept open by means of olive oil in frequent doses, or by the citrate of potash taken freely, in a state of effervescence, and with the alkali in excess. If hæmaturia be excessive, the acetate of lead with opium, or the spirits of turpentine, cautiously exhibited in small doses, epithems of the same being applied to the loins, will be found of service; or the gallic or tannic acids, &c., may be prescribed. In cases where it might be injurious to abstract blood, dry-cupping over the loins may be employed.

180. Having removed the more severe symptoms by these or similar means, a course of medicines calculated to prevent the formation of uric acid and urates, and to lessen their irritating effects, should be entered upon. But such a course will prove ineffective if the diet and regimen of the patient be neglected. The citrate and bicarbonate of potash, the citrate or carbonate of magnesia, and other antacids, conjoined with tonics, will generally be of service, both in preventing acidity and promoting digestion, and in depurating the blood. A vegetable and farinaceous diet should be adopted, the quantity of flesh-meats much diminished, and the white kinds of fish, boiled only, and with no other sauce than a squeeze of lemon, should replace a large portion of the other articles of animal food usually taken. The beverage of the patient may consist of any of the mineral waters in which the alkalies most abound; or distilled water may be drunk, when effervescing with the bicarbonate of potash and citric acid or lemon juice, or with the addition of either the citrate of potash or citrate of magnesia, according to the state of the bowels. When the bladder is irritable, the several kinds of soap, with henbane or with opium, may be taken at bedtime. In all these cases, I have seen much benefit result from the use of distilled\* water, as the

vehicle for depurants of the blood, and for the important domestic purposes of making tea, coffee, &c. The due promotion of the functions of the skin, in this class of patients, and the use of the warm bath, of flannels next to the skin, should not be overlooked.

181. ii. *The treatment of the passage of renal calculi* is often of urgent importance, owing rather to the agony produced than to the danger incurred. The sufferings of the patient are generally increased in these cases by constant or frequent retchings, which also require to be assuaged. A warm bath should be immediately ordered, and before it is ready, or while it is being prepared, from 40 to 50 minims of laudanum, or a lesser dose of BATTLEY'S solution of opium, may be given. If the symptoms be still severe, and the vomitings continue after the patient's removal from the warm bath, creasote may be prescribed with demulcents, or other substances; or hydrocyanic acid, or chloroform, may also be added to these. The warm bath may be repeated, or warm fomentations be employed, and emollient and mucilaginous fluids, containing alkaline carbonates and anodynes, be freely taken. If the patient's sufferings be not very considerably relieved by these, the extract or tincture of belladonna may be added to the pills or mixtures already advised, and to the fomentations, which should be continued until complete relief is obtained.

182. During the passage of calculi from the kidneys, the state of the urine should be carefully ascertained, and the bowels satisfactorily evacuated, either by magnesia or the citrate of magnesia taken in demulcent vehicles, or by oleaginous enemata, administered in large quantity, and repeated as they may be required. After relief is obtained, the medical treatment advised for renal calculi should be persisted in for some time, conformably with the indications furnished by the appearances and deposits of the urine. The diet and regimen recommended above (§ 180) should be continued throughout, or modified according as the state of the patient and the alterations in the urine may suggest, due care being taken not to reduce the digestive and the assimilative functions, not to lower vital or constitutional power, and not to impair the secreting and depurating actions.

183 *The treatment of vesical calculi* differs but little from that advised. The avoidance of exertion or of sudden movements, &c., as advised for renal disease, strict attention to diet, and the adoption of the medical treatment recommended for the several kinds of urinary deposit, conformably with the kind existing in the urine, and for renal concretions, are also required for vesical calculi. In many cases, however, the irritation produced in the bladder, the consequent inflammation, hæmaturia, &c., and the complication of disease of the kidneys, of the prostate, &c., render the treatment most difficult, and its benefits often doubtful, however rationally conducted. It is unnecessary to add at this place to what I have already stated when describing the treatment of diseases of the URINARY BLADDER and of the KIDNEYS, and when noticing the indications of cure furnished by URINARY DEPOSITS. When a stone exists in the bladder and produces irritation of more or less manifest severity, the probability of that irritation being followed by the consequences just named, however judicious the medical treat-

\* Pure rain-water will answer equally well. We have often known great relief afforded by merely substituting this for the water usually drunk.]

ment may be, is very great; and hence the necessity of removing the stone by a surgical operation, unless the consecutive diseases or lesions—the superinduced complications, forbid its performance. As to this and other topics connected with the surgical treatment of vesical concretions, I must refer the reader to the very able surgical works enumerated in the subjoined BIBLIOGRAPHY and REFERENCES.

[We should, however, in this connexion, remember the remark of PROUT, that as healthy urine contains no free uncombined alkaline or acid ingredient, lithic agents, or, more properly, *lithon-lithics*, are to be sought for among a class of harmless and unirritating compounds, the elements of which are so associated as to act at the same time, with respect to calculous ingredients, both as alkalies and acids. The substances which approach the nearest to such are the solutions of the supercarbonated alkalies, containing a great excess of carbonic acid, and which may be used in two forms—1st, as natural mineral waters, as those of Saratoga, &c.; or, 2d, artificial soda or potash waters. If the calculus is of the *lithic acid* variety, from half a drachm to one drachm of bicarbonate of potash and as much tartarized soda may be dissolved in a pint bottle and taken twice a day with an equal quantity of soft or rain water; while, if the urine is alkaline and the concretions are of the phosphatic variety, the alkali may be omitted altogether, and the compound consist either of pure water impregnated with carbonic acid gas, or occasionally some acid, as the *nitric*, may be substituted for the alkali. *Lime-water* has been recommended for the *urates* by CHEVALLIER, on the ground of its forming a very soluble salt, *urate of lime*, with uric acid; and he also thinks it useful for phosphatic calculi, either by depriving them of a portion of the uric acid they contain, and thus rendering them less dense; by decomposing the ammoniacal salt which enters into the composition of some; or by acting on the animal matter which holds the molecules of these calculi together. The phosphate of soda and borax are also employed, on chemical grounds, as good solvents for lithic acid. On the whole, we have no good reason for believing that any of the agents recommended as true solvents for calculi exert any such effect in any considerable degree, but many of them, especially the alkalies, relieve the pain and irritation of the urinary organs, from their sedative influence upon the mucous surfaces, or from their effect on the digestive organs. Perhaps, also, the benefit which often results from their use may be in part owing to the fact that they are accompanied generally with the copious use of aqueous fluids. With regard to the reputed influence of lithonlithics when injected into the bladder, we must refer to the surgical works of BODIE, CHELIUS, VELPEAU, and GROSS.]

184. IX. DISEASED EXCRETION AND SUPPRESSION OF URINE.—The urine may be voided not only in the very different degrees of quantity, and in the states of chemical constitution described above as indications and important parts of disordered vital function and of local disease, but it also may be discharged with more or less effort and suffering on the part of the patient. It may, moreover, be retained in the bladder, owing either to paralysis and over-distention of the organ, or to mechanical obstacles at the neck or outlet of the viscus, or in some part of the urethra. The urine is also often either secreted in remarkably

small quantity, or suppressed altogether, owing to disease of the kidneys, the blood and nervous masses becoming poisoned by the arrest of the important depurating function of these organs, and by the resulting excrementitious plethora of the vascular system, and accumulation of urea, &c., which these organs eliminate from the blood as long as these functions continue. An altered or poisoned state of the blood may also arrest the functions of the kidneys.

185. i. *Difficult excretion of urine, urina difficilis excretio*, or *Dysuria* (from *δύς*, difficult, and *ουρον*, urine), is entirely symptomatic of disease affecting some part of the urinary apparatus, or some organ or part in the vicinity. It is generally characterized by heat and pain, as well as difficulty and delay, in procuring the discharge. *Dysuria* may depend upon the properties or chemical constitution of the urine, especially in irritable states of the urinary bladder and urethra; and in such cases, as well as in others where these properties are not present, it may be symptomatic of disease of the kidneys, especially of inflammatory and organic diseases. Most frequently, however, it is a symptom of the diseases of the urinary bladder and of the urethra, and of gravel and urinary concretions. It is not unfrequently present in diseases of the neck and body of the uterus, in the severe cases of dysmenorrhœa and leucorrhœa; in dysentery and inflammation of the rectum, and in cases of inflammatory hæmorrhoids.

186. ii. *Strangury, stranguria* (from *σπράγγειν*, to squeeze, and *ουρον*, urine), is a more severe degree of the preceding complaint, and is most frequently a symptom of diseases of the urinary organs, more particularly of over-distention of the bladder, of lesions of the neck of the organ and prostate gland, and of the urethra, and of urinary calculi and gravel. In dysuria the urine may flow in a full stream; but in strangury it is much interrupted, or passes in small quantities, or in drops, after great effort.

187. iii. *Ischuria* (from *ἰσχω*, I arrest, and *ουρον*, the urine) has usually implied an arrested discharge of urine; the arrest taking place either in the kidneys—*ischuria renalis*; *anuria* (WILLIS), renal ischuria; or in the bladder, from paralysis of the organ, or from some obstruction at its outlet—*ischuria vesicalis*, *I. vera*, *I. retentivis*, vesical ischuria; or in the urethra—*ischuria urethralis*, from stricture, phymosis, &c. Besides those symptomatic states of ischuria, or of retention and suppression of urine, other forms of retention arising from calculi, and from disease of, or tumours in, the uterus or vagina, &c., may be enumerated. This subject is more fully discussed in the article SYMPTOMATOLOGY (sec § 210–218); but there is one part of it, and that of the highest importance, which requires a more particular consideration, namely, *Ischuria Renalis*, *Anuria*, of Dr. WILLIS, or *Suppression of Urine*, the excretion not being eliminated by the kidneys, urine not being secreted.

188. iv. *Suppression of urine* is always a symptom of pre-existing disease, but of so many, and of so dangerous maladies, as to require a short notice at this place. It is very doubtful whether or no it ever is a primary or idiopathic malady, in the strict acceptation of the word; although it occasionally deserves this rank as much as some others which have been so denominated. It is often observed in the course of pestilential mala-



dies, more especially in the severer grades and advanced stage of *pestilential cholera*. It is also not infrequent in the *hæmagastic pestilence*. It sometimes occurs as a fatal, or at least a most dangerous symptom of exanthematous fevers, more particularly of *scarlet fever*. In these, and in other continued fevers, in which it is occasionally observed, suppression of urine has been either too often overlooked, or not viewed with due consideration. In all these maladies it may be either *partial* or *complete*. In either case, the consequences, as respects the blood, nervous system, and structures generally, may be readily inferred. It also frequently supervenes, either partially or completely, in cases of inflammation, acute or chronic, of the kidneys, and of organic lesions of those organs, most frequently of *granular disease*, or cachectic inflammation of the Malpighian bodies, but most generally in a partial or incomplete form. *Suppression* of urine is a more complete or rapidly dangerous or fatal form; often follows injuries and diseases of the spinal cord or its membranes, although *retention* is a more common result; and it is not an infrequent consequence of various modes of poisoning, owing either to inflammatory action or congestion thereby induced in the secreting structure of the kidneys, or to a paralysis of the ganglia and nerves supplying these organs.

189. *A. The symptoms* caused by *suppression of urine* vary with the circumstances of the case, and more especially with the slowness or rapidity with which suppression takes place, and with the disease of which it is a consequence.—*A.* When this condition proceeds from granular lesions, atrophy, or other organic change in the kidneys, it is generally slow in its progress, and it is often not observed, or rather the diminished excretion of urine has been of considerable continuance, before it has attracted notice; the urine being not only very scanty, but also very much altered from the healthy state, as shown in the articles on *DROPSY* and *diseases of the kidneys*, and in the preceding sections. In these cases, with the slow progress of diminution of urine and of the solid constituents of this excretion, the cutaneous and pulmonary exhalations are sometimes increased, and their odour is most offensive; effusion often gradually supervenes in the cellular tissue and in the shut cavities, sometimes with evidence of a chronic inflammatory irritation of the serous membranes investing these cavities; and ultimately the dangerous and commonly fatal phenomena rapidly supervening upon the acute form of suppression, or of that occurring in the advanced stage of malignant maladies, make their appearance.

190. *B. When suppression of urine* takes place more rapidly, the disease is then characterized by many of the symptoms of continued fever. There are pains in the back, but chiefly in the loins and in the lower extremities, with nausea and vomiting, and often with a sense of weight or of uneasiness if actual pain or severe aching in these situations be not felt. In some cases vomitings are urgent, and the fluid thrown up is generally watery, and in a few instances has an urinous odour. The pulse is rapid, full, and distended; perspiration, at first scanty, becomes more copious, in some instances abundantly so, and ultimately it has often an offensive urinous odour. After a time varying from three to five days, or occasionally longer, effusion takes place in the

cellular tissue and shut cavities, with a tumid or bloated state of the countenance, especially about the eyes. In cases of somewhat longer duration, œdema of the face and extremities comes on and advances more slowly; but as these changes advance, sopor supervenes and passes into profound coma, and sometimes into coma terminating in convulsions, especially in children. Generally long before these symptoms appear, either the extreme diminution of the quantity of urine, or its entire suppression, has been recognised by the physician, if he have been consulted so early; and when the catheter is introduced to determine correctly the existence of urine in the bladder—the presence or absence of which, however, is generally evinced by the state of the hypogastric region—nothing beyond a very minute portion of a thick, muddy, or mucous and offensive urine is withdrawn. This form of suppression of urine, whether occurring primarily, as I believe I have seen it in a very few instances, or in the early progress of other diseases, or in the gouty diathesis, or as a consequence of misplaced or suppressed gout, may be ascribed to a state of congestive inflammation of the secreting structure of the kidneys, in which the organic nervous or vital influence of these organs is rapidly exhausted or suppressed.

191. *C. When suppression of urine, or anuria*, occurs in the advanced progress of malignant or pestilential maladies, the duration of the symptoms more especially appertaining to it is much shorter, and the course of the malady in which it appears is very much hastened by it to a fatal issue. The changes usually consequent upon the anuria often do not take place until shortly before death; the earlier effects of the lost function of the kidneys being chiefly an aggravation of all the symptoms and diagnostic characters of the malady in which it occurs. It is very remarkable in the case of malignant scarlet fever and pestilential cholera and yellow fever. Very soon, however, generally in a day or two, and often after a few hours, as in pestilential cholera, sinking, sopor, convulsions or coma, &c., occur and terminate life; œdema of the face and extremities, effusion within the cranium, &c., also taking place shortly before death in scarlet fever, and sometimes in the hæmagastic pestilence. In pestilential cholera, the watery discharges from the stomach and bowels prevent the excrementitial plethora of the vascular system from taking place, that occasions the coma, effusion, &c., which are usually the results of anuria; when it supervenes in the course of other acute maladies.

192. *D. Drs. WILLIS and SCHÖNLIN* described a form of anuria which sometimes occurs in weak and cachectic children, and which I have observed also in the children of the poor living in cold, damp, or low situations. In these the digestive mucous surface is much disordered; the secretions and excretions are acid and offensive, and the cutaneous surface is affected by various eruptions, chiefly erythematous, vesicular, and pustular. The urine is scanty, is sometimes more or less albuminous, is voided in drops after short intervals, with pain and difficulty, and is ultimately quite suppressed. The pulse is at first quick and weak, but it gradually becomes slower, as sopor, coma, or convulsions supervene. These symptoms are usually preceded by constipation, by œdema of the face and extremities, by vomitings and retchings, and are ultimately followed by

death. In some cases, especially when perspirations are abundant towards the close of the disease, this excretion has a urinous or an acid and offensive odour. The breath also often has a similar odour.

193. *E. In fatal cases of rapid or sudden suppression of urine, and when this event occurs in exanthematous and malignant diseases, the kidneys are found of a very dark colour, from the congestion of dark blood, or they present a livid or bluish-brown tint; or they are flabby, enlarged, and friable. These changes are most remarkable in the secreting structure, the tubuli being often filled with epithelial débris. In malignant scarlatina, suppression of urine presents appearances in the kidneys described when treating of SCARLET FEVER (see § 66). In the slower or more chronic cases, the appearances are altogether the same as those stated when treating of granular or cachectic inflammation of the KIDNEYS (§ 99, *et seq.*). The changes in the cases of suppression of urine in children, which I have had an opportunity of observing, were similar to those which I have mentioned under the head of scarlet fever. Indeed, in some of these cases I had viewed the disease as an abortion or latent state of scarlet fever, in which the affection of the throat and skin had not appeared, as I have described it in that article. (See § 26, *et seq.*)*

194. It is manifest that the fatal result, in cases of suppression of urine, arises from two pathological conditions: 1st, from the excrementitious plethora of the vascular system, the superabundance of the watery element causing effusion on the brain, its membranes, cellular tissues, and shut cavities; and, 2d, from the accumulation of urea, uric acid, &c., in the blood, which poisons the nervous masses and vital structures, thereby aiding the destructive effects of effusion, or even proving fatal independently of these effects.

195. *F. The treatment of suppression of urine is rarely encouraging, owing to its want of success, and the fatal results which surely follow the very general failure of it. Yet treatment should not be neglected, as it may succeed in a few or rare cases. Besides, hopes of success may be reasonably entertained, if the suppression be incomplete. In cases occurring in acute, exanthematous, malignant, or pestilential maladies, the small quantity of urine passed before complete suppression takes place may or may not be albuminous, and of diminished specific gravity; it is sometimes thus altered in scarlet fever, but it is not, as far as I have seen, in other malignant diseases. In these, if the state of the pulse and other circumstances allow, the patient should be cupped on the loins, and the operation repeated, to an extent according to the features of the case and the effect produced. If the loss of blood cannot be hazarded, dry-cupping should be adopted; and the patient, under all circumstances, should be placed in a warm bath, rendered more or less alkaline by the addition of the carbonate of potash or soda. After leaving the bath, a turpentine epithem or embrocation may be placed over the loins, or an embrocation consisting of equal parts of the compound turpentine and camphor liniments should be applied in the same situation, or over the abdomen. The bowels must be kept freely open by the more diuretic purgatives, and by terebinthinate or other enemata; and diuretics should be taken, variously combined, or conjoined with sedatives or anodynes, according*

to circumstances, more especially the preparations of taraxacum, of digitalis, of scoparium, &c.; the carbonates, the nitrates, the acetates, the tartrates, the bitartrates, and the biborates of the fixed alkalis, in large doses, or in as large as the stomach will tolerate. If these fail, the following may be tried as a *dernier ressort*:

No. 364. R Olei Terebinthinae, ʒij.; Spirit. Ætheris Nitrici, ʒss.; Spirit. Juniperi Comp., ʒss.; Olei Cajuputi, ℥xx.; Potassæ Nitratis, ʒi.; Pulv. Tragacanth. Comp., ʒiij.; Pulv. Glycyrrhæ, ʒss.; tere bene et adde Syrupi Rosæ, Syrupi Tolutani, aa, ʒss.; Aquæ destillatæ ad ʒviij. Misce bene. Sit mist. cuius capiat Cochle. ij. larga, 3tiss, 4tis, vel 6tis horis, prius agitata phiala.

If the vomiting preclude the retention of these medicines, a very small quantity ( $\frac{1}{2}$  or i minim) of creasote may be added, or from three to six drops of tinctura opii, to each dose, or both may be given in addition, and the terebinthinated embrocation applied over the epigastrium. When suppression of urine follows chronic disease of the kidneys, complicated with dropsy, and more especially when it is associated also with organic disease of the heart, then little or no permanent benefit will be derived from any means of treatment; those just mentioned being the most appropriate, and sometimes affording temporary benefit.

BIBLIOG. AND REFER. — *Hippocrates*, Opera, p. 422. — *Celsus*, lib. vii., n. 57. — *Galen*, De Loc. Affect., lib. vi., c. 3. — *Aræteus*, Chronicæ, lib. i., c. 7. — *Orbitasius*, Synopsis, lib. vi., c. 4. — *Actuarius*, De Urinis, &c., 8vo. Basil., 1529; et Methodus Med., lib. i., c. 10. — *Avicenna*, Canon., lib. i., fin. 2, doct. 3; lib. iii., fin. 19, tr. 2. — *Gordon*, Lib. de Urinis, fol. Ferrara, 1489. — *Ætoidius*, Carmina de Urinis et Pulsibus, 4to. Venet., 1494. — *J. de Ketam*, Fascic. Medicinæ de Judiciis Urinarum, folio. Venet., 1495. — *Gentilis de Fugino*, De Urinis, 8vo. Venet., 1498. — *U. Binder*, Speculum Videndi Urinas Hominum, 4to., 1566. in *Haller's* Biblioth. Med. Pract., vol. i., p. 492. — *Ann.*, The Judicium of Urines, &c., fol. Lond., 1512. — *J. Vassæus*, De Judiciis Urinarum, 12mo. Angl., 1533. — *R. Recorde*, The Crynal of Physic and the Judicial of Urines, 4to. Lond., 1548. — *E. Cordus*, De Urinis, 8vo. Franc., 1543; et de Abusu Uroscopie, Conclusiones adversus Medicatos, 8vo. Marp., 1546. — *J. Vassæ*, his Judgment of Urines, translated by H. Lhuyd, 8vo. Lond., 1551. — *Emerici*, De Urinarum et Pulsorum Notis, 4to. Vien., 1552. — *W.C.* The Booke of the Properties of Herbes, &c., and with it a Booke of seeing of Vrynes, of all Colours that Vrynes be of, with the Medecynes annexed to every Vryue; and every Urine his Urinal, 8vo. Lond., 1552; by *W. Copland*. See Med. Bibliog., by *J. Forbes*. — *J. Colin*, Miroir des Urines, 8vo. Poitiers, 1558. — *L. Thurneisen*, Erfindung und Beschreibung des Harns, &c., fol. Berl., 1576. — *Forestus*, De Incerto et Fallaci Urinarum Judicio, lib. ii., c. 3; lib. iii. — *J. F. Ulmus*, De Certa Ratione Judicandi ex Urinis, 8vo. Venet., 1578. — *F. Lallæus*, De Urinibus, Pulsibus, ac Febribus, 8vo. Aug. Taur., 1588. — *H. A. Lopes*, El Origen y Nocimiento de las Orinas. Mexico, 1595. — *M. de Oddis*, De Urinarum Causis, Differentiis, et Judiciis, fol. Patav., 1591. — *F. Perrelli*, Observ. de Urinis, 8vo. Paris, 1597. — *J. Bordinus*, Uroscopia seu de Urinis, 8vo. Rost., 1605. — *J. Hart*, The Anatomie of Urines, containing the Conviction and Condemnation of them, 4to. London, 1615. — *Guerin*, Daturæ certum graviditatis Indicium ex Urinâ? Paris, 1616. — *N. Bertand*, Nova philosophandi ratio de Urinis, 8vo. Rhed., 1630. — *T. Brian*, The Iisse-prophet, or certaine Pisse-pot Lectures, discovering the Fallacies and Juggling of the Pisse-pot Science, 4to. Lond., 1637. — *J. Hart*, Anatomy of Urines. Lond., 1652. — *H. Hammond*, Urography, or Speculations on the Excrement of the Urine, 12mo. Lond., 1656. — *Willis*, Opera, i., p. 523. — *C. de Font*, Collectio Operum de Urinis, 8vo. Ultraj., 1670. — *T. Alvey*, De Urinæ Materia, 4to. London, 1680. — *Argentarius*, De Urinis Liber, 8vo. Lips., 1682. — *L. Bellinus*, De Urinis et Pulsibus, 4to. Lips., 1685. — *C. Merret*, Some Observations concerning the Ordering of Urines, 8vo. Lond., 1692. — *Fernelius*, Pathologia, lib. iii. — *T. H.*, Compleat Treatises of Urines, with the Right Method of Urinal Prognostication, 12mo. Lond., 1703. — *T. Hicks*, a Treatise of Urines, 8vo. Lond., 1703. — *S. Steuring*, Relationes Curiosæ Medicæ von den Signis vom Urin, 8vo. Gotha, 1703. — *Laghi*, De Prax. Med., lib. i., c. 9. — *R. Fladd*, Uromantia v. Ej. Medic. Catholica, vol. i. — *T. Guidotius*, De Urinis Libellus, 12mo.



Lugd. Osat. 1731.—*Petit*, Traité des Maladies Chirurgicales, t. iii., p. 37.—*W. Ratty*, a Treatise on the Urinary Passages, with the principal Distempers that affect them, &c., Svo. Lond., 1736.—*J. H. Pott*, Physico-Chemische Abhandlung von Urin-älze, 4to. Berl., 1761.—*J. J. Rega*, Tract. duo de Urinis, Svo. Franck., 1761.—*Dickson*, in Med. Observat. and Inquiries, vol. ii., n. 27, 35; vol. iii., n. 11, 15. (*Blistering the Sacrum in Incontinent Urine*).—*Anon.*, The New Method of Curing Diseases by Inspecting the Urine, Svo. Lond., 1776.—*J. C. Lettsom*, Observations on Dr. Mayerbach's Medicines, on the Impossibility of acquiring the Knowledge of Diseases by Urine, &c., Svo. Lond., 1776.—*Russel*, in Med. Observations and Inquiries, vol. iii., No. 16. (*Hydatids pressed in the Urine*).—*J. C. Lettsom*, in Memoirs of the Med. Society of London, vol. ii., No. 3.—*Milford*, in Ibid., vol. iii., No. 36.—*Johnstone*, in Ibid., vol. iii., No. 15.—*Wright*, in Ibid., vol. iii.—*K. A. Kortum*, Vom Urin als einem Zeichen in Krankheiten, Svo. Diuss., 1793.—*K. P. Gaertner*, Observaciones quodam circa Urinam Naturam, 4to. Tib., 1796.—*Fouquier* et *Vauquelin*, Mém. Chimique et Médicale sur l'Urine, in Mém. de l'Inst. tit., 4to. Paris, 1799.—*J. Loew*, Ueber den Urin als diagnostisches und prognostisches Zeichen, Svo. Landr., 1803.—*Anon.*, Le véritable Médecin des Urines, &c. Paris, 18 5.—*A. Portal*, Cours d'Anatomie Médicale, t. v., p. 573.—*Krimer*, in Lond. Med. and Phys. Journ., vol. xviii., p. 23.—*Osborne*, in Medico-Chirurg. Review, vol. ii., p. 41.—*J. P. Frank*, De Curand. Hom. Morb., lib. v., 2, p. 18.—*A. Denis*, Recherches Chimiques et Médicales sur l'Uroscopie, ou l'Art de juger par l'Inspection de l'Urine, Svo. Paris, 18 6.—*W. Heury*, in Trans. of Royal Medical and Chirurgial Society of London, vol. ii., p. 124. (*On the Urea and Saccharine Matter in Urine*).—*W. Prout*, in Ibid., vol. viii., p. 520. (*Chemical Properties and Comp. of Urine*).—Also in Ibid., vol. viii., p. 537. (*Treatment of disordered*).—*G. Wetzlar*, Beyträge zur Kenntniss des Menschlichen Harnes, &c., Svo. Fr., 1821.—*J. Berzelius*, in Transact. of Med. and Chirurg. Soc. of London, vol. iii., p. 257.—*J. Bostock*, in Ibid., vol. v., p. 8.—*W. Prout*, in Ibid., vol. ix., p. 472.—*H. Benze Jones*, in Ibid., vol. xxvii., p. 102 and 143.—*B. C. Brodie*, in Ibid., vol. xx., p. 142. (*Changes from Injuries of Spinal Cord*).—*Bostock*, Cyclop. of Practical Med., vol. iv., p. 350.—*A. Macvet* and *W. Prout*, in Trans. of Royal Med. and Chirurg. Society of London, vol. xii., p. 37. (*Anal. of Black Urine*).—*J. Elliotson*, in Ibid., vol. xviii., p. 80. (*Discharge of Fat in Urine*).—*G. Robinson*, in Ibid., vol. xxvi., p. 51.—*A. B. Garrod*, in Ibid., vol. xxxi., p. 84. (*Uric Acid and Urates in*).—*H. B. Jones*, in Ibid., vol. xxxiii., p. 313. (*Albuminous and Fatty Urine*).—In Ibid., vol. xxx., p. 21. (*On Phosphoric Acid, &c. in the*).—*T. B. Curling*, in Ibid., vol. xx., p. 370. (*Phosph. of Lime in Urine in Mollities Ossium*).—*S. Solly*, in Ibid., vol. xxvii., p. 443. (*Phosphate of Lime Calc. in Kidney in Mol. Ossium*).—*W. Macintyre*, in Ibid., vol. xxxiii., p. 211. (*Urine in Fragilitas and Mol. Ossium*).—*Woehl*, in Journ. des Progrès des Sciences Méd., t. i., p. 41.—*Bostock*, in Lond. Med. Gazette, May 13th, 1837, p. 244.—*P. Rayer*, L'Expérience, &c., t. i., 1837, p. 657; et Traité des Maladies des Reins et des Altérations de la Sécrétion Urinaire, &c., t. i., 1839, p. 57, 147.—*A. Donné*, Tableau des Dépôts dans les Urines. Paris, 1833.—*Le Camu*, in Mém. de l'Acad. Roy. de Méd., t. viii., p. 6 6.—*W. Coulson*, on the Diseases of the Bladder and Prostate Gland; on Normal and Anormal States of the Urine, p. 1-81.—*G. Owen Rees*, on the Analysis of the Blood and Urine in Health and Disease, with Directions for the Analysis of Urinary Calculi, Svo. Lond., 1836.—*R. Willis*, Urinary Diseases and their Treatment, Svo. Lond., 1838, p. 1-196. (*Morbid Urine*).—*G. O. Rees*, in Guy's Hospital Reports, vol. i., p. 402.—*W. Prout*, Nature and Treatment of Stomach and Urinary Affections, 3d ed., Svo. London, 1840.—*Liebig*, Animal Chemistry, &c., translated by *Dr. Gregory*, Svo. Lond., 1842, p. 103.—*A. Becquerel*, Séméiotique des Urines, Svo. Paris, 1844.—*L'Heritier*, Traité de Chimie Pathologique, Svo. Paris, 1842.—*J. F. Simon*, Animal Chemistry, with reference to the Physiology and Pathology of Man, translated by *G. E. Day*, 2 vols. Lond., 1846, vol. ii., p. 113-342. (*The Analysis of the Urine in Health and in many Diseases*).—*G. Bird*, Urinary Deposits, their Diagnosis, Pathology, and Therapeutical Indications, 4th ed., Svo. London, 1853.—*J. Copland*, in London Medical Gazette, vol. xx, Lond., 1836, p. 361, 2. (*Reasserts the opinions contained in various parts of his Dictionary on the Depurating Functions of the Kidneys, &c.*).—*A. Hassall*, on the Development of Tubules in the Urine, &c., in Transact. of Royal Medico-Chirurg. Society, vol. xxvii., p. 25.—*R. MacGregor*, in Lond. Med. Gazette, vol. xx., p. 224, 268.—*Guerard*, in Dict. de Médecine, art. Urine.—*Martin Solon*, in Dict. de Méd. et Chirurg. Prat., art. Urine.

URINARY CALCULI.—*H. Bra*, Medicamenta ad Calculum, 12mo. Franc., 1510.—*G. H. Ruff*, Cur des Steins, Gries und Nierenblasensteins, 4to. Strasb., 1543.—*H.*

*Eugenius*, De Medendis Calculosis et Exulceratis Renibus, 4to. Camer., 1575.—*W. Carpe*, Die Harnnier für the Stone, 16mo. Lond., 1533.—*L. L. de Avilla*, De quatuor Morbis, &c., Arthritis, Calculo, Podagra, et Bubonibus, Svo. Venet., 1558.—*R. L. Fon-seca*, De Calculorum Remediis, 4to. Roma, 1586.—*G. Bartholin*, De Lapide Nephritico Opusculum, Svo. Hafn., 1627.—*Doering*, Epi-t. de Calculo Renum, ejusque Sectione, 4to. Ulm., 1628.—*H. de Alpherio*, Præservatio à Calculis atque Nephorum Renalium Melcla, 4to. Neap., 1632.—*A. Clutius*, Lapidis Nephritici Natura, &c., 12mo. Rost., 1627.—*L. Olivier*, Traité des Maladies des Reins, Svo. Rouen, 1631.—*J. Van Beverwick*, De Calculo Renum et Vesicæ, 12mo. Leyd., 1638.—*J. F. Bilger*, De Lithiasi Renum et Vesicæ. Altd., 1645.—*T. Shartley*, a Philosophical Essay on the Causes whence Stones are produced, &c., Svo. Lond., 1672.—*J. Boscius*, De Lapidibus qui nascuntur in Corpore humano præcipue Renibus ac Vesicæ, et ipsorum Curatione, 4to. Ingol., 1630.—*H. Liberti*, Regimen in den Steinbeschwerden, Svo. Arnst., 1651.—*G. Rofink*, De Genuini Calculorum in Corpore Humano, præcipue Renibus et Vesicæ, Generatione, Signis, Remediis, &c., 4to. Genæ., 1663.—*W. Russel*, De Calculo Vesicæ, or a Discourse concerning Stone, 12mo. Lond., 1691.—*A. Hoffmann*, De Renum et Vesicæ Calculo, 4to. Custr., 1703.—*J. Greenfield*, a Complete Treatise of the Stone and Gravel, Svo. Lond., 1712.—*J. Camu*, Essay on Rheumatism, Gout, and Stone, Svo. London, 1722.—*W. Ratty*, Treatise on the Urinary Passages, &c., 4to. Lond., 1726.—*R. Blackmore*, Dissertations on a Dropsy, the Stone, &c., Svo. London, 1727.—*P. Hoffmann*, De Dolore ex Calculo Renum, 4to. Hall., 1731.—*J. Denys*, Observat. de Cal. Renum, &c., Svo. Leyd., 1731.—*N. Robinson*, a Complete Treatise of the Gravel and Stone, &c., and a Dissertation on Nephrotomy, Svo. Lond., 1734.—*P. Dessault*, Dissert. de Médecine, &c., Sur la Pierre des Reins et de la Vessie, t. iii., 12mo. Paris, 1736.—*P. Shaw*, Inquiries on the Nature of Mrs. Stephens's Medicaments, &c., Svo. Lond., 1739; and Examination of the Reasons for and against the Subscription for a Medicament for the Stone, Svo. Lond., 1739.—*Mrs. Stephens*, Receipt for, and Gravel, &c., Svo. Lond., 1739.—*H. Bracken*, Lithiasis Anglicana, an Inquiry into the Nature and Origin of Stone, &c., Svo. Lond., 1739.—*D. Coetlogon*, Treatise on the Stone, and Analysis of Mrs. Stephens's Medicine, Svo. Lond., 1739.—*D. Hartley*, a View of the Evidence for and against Mrs. Stephens's Medicine, Svo. Lond., 1739.—*T. Lobb*, a Treatise on Dissolvents of the Stone, and on Curing the Stone and Gout by Aliment, Svo. Lond., 1739.—*T. Lobb*, an Address to the Faculty on Mrs. Stephens's Medicaments, Svo. Lond., 1739.—*O. Pitcairne*, The Truth Unveiled, or a Treatise on the Stone, Svo. Lond., 1739.—*W. Schae*, a Dissert. on Stone in the Bladder, 4to. Lond., 1739.—*H. Eoerhave*, Praelectiones de Calculo, Svo. London, 1740.—*R. Gem*, an Account of the Remedy for Stone, recently published, Svo. Lond., 1741.—*S. Hales*, an Account of some Experiments on Mrs. Stephens's Medicines, Svo. Lond., 1741.—*R. Ratty*, Account of Experiments on Mrs. Stephens's Medicines, Svo. Lond., 1742.—*J. Parsons*, a Description of the Human Urinary Bladder, with Animadversions on Lithontriptics, Svo. London, 1742.—*J. Jurin*, an Account of the Effects of Soap-lye taken for the Stone, 12mo. Lond., 1745.—*B. Lawrith*, Physical Experiments on Brutes to discover a Method of Dissolving the Stone by Injections, Svo. Lond., 1746.—*J. Jurin*, an Abstract of his Cases of Stone and Gravel, Svo. Lond., 1752.—*R. Whytt*, an Essay on the Virtues of Lime-water and Soap in the Cure of the Stone, 12mo. Edin., 1752.—*D. Deschery*, Treatise on the Causes and Symptoms of the Stone, &c., Svo. Lond., 1753.—*W. Butler*, Method of Cure for the Stone by Injections, 12mo. Edin., 1754.—*C. Alston*, Dissertation on Quick-lime and Lime-water, Svo. Edinb., 1757.—*H. B. de la Touche*, a Short Account of the Disease of the Stone, 4to. Lond., 1764.—*G. A. Bilan*, De Calculo Renum, 4to. Wittemb., 1759.—*Cheston*, Pathological Inquiries in Surgery, 4to. Gloucest., 1766, p. 432.—*J. Auster*, a Treatise on the Stone and Gravel, Svo. London, 1766.—*A. Blækie*, a Disquisition on the Medicines that Dissolve the Stone, in which *Dr. Chittick's* Secret is considered and discovered, Svo. Lond., 1771.—*J. A. Murray*, De Arbutu Uvæ Ursi contra Calculos. Goett., 1765.—*W. M. Adams*, a Disquisition of the Stone, Gravel, &c., Svo. Lond., 1773.—*J. Douglas*, of Stones in the Kidneys, with Remarks on Nephrotomy, in Medical Museum, vol. ii., p. 368.—*M. K. Cohen*, Abhandlung vom Stein, &c., Svo. Hal., 1774.—*C. Perry*, Disquisitions on the Stone and Gravel, &c., Svo. Lond., 1777.—*N. Hulme*, Safe and Easy Remedy for the Stone, &c., 4to. Lond., 1778.—*R. Home*, The Efficacy of Solvents candidly examined, Svo. London, 1783.—*P. Camper*, Observaciones circa Mutationes Calculosis in Vesica, 4to. Pest., 1784.—*J. Rymer*, Chemical Reflections relating to some Diseases, Svo. London, 1784.—*Anon.*, Treatise upon Gravel and Gout and their

- Sources, 8vo. Lond., 1787. — *W. Falconer*, on Account of the Efficacy of the Aqua Mephitica Alcalina in Calculous Disorders, 8vo. Lond., 1781. — *J. O. Haystrom*, Genesis Calculi, in *Amœnit. Acad. Linn.*, &c., t. ii., 1787. — *H. F. Link*, De Analysi Urinæ et Origine Calculi, 4to. Goett., 1788. — *W. Higgins*, a Comparative View of the Philogistic and Autophilogistic Theories, with an Appendix on the Origin of Calculus, 8vo. Lond., 1759. — *W. Austri*, a Treatise on the Origin and Component Parts of the Stone in the Urinary Bladder, 8vo. Lond., 1791. — *T. Beddoes*, Observations on the Nature and Cure of Calculus, &c., 8vo. Lond., 1792. — *P. Copland*, Account of the Lithotropic Power observed in the Muriatic Acid, in *Mem. of Med. Society of London*, vol. v., p. 71; et vol. vi., p. 601. — *A. P. W. Philp*, an Inquiry into the Cause of Urinary Gravel, 8vo. Edinb., 1792. — *M. Forbes*, a Treatise on Gravel and Gout, 8vo. Lond., 1793. — *W. H. Wollaston*, on Gouty and Urinary Concretions, in *Philosophical Transact.* for 1797. — *J. Earle*, Practical Observations on the Stone, 8vo. Lond., 1793. — *T. Egan*, an Experimental Inquiry into Gravelly and Calculous Concretions, and the effects of Acids and Alkaline Substances on them, &c., 4to. Dublin, 1805. — *H. Johnson*, *Pract. Observat.* on Urinary Gravel and Stone, 12mo. Edinb., 1805. — *W. Brande*, Letter on Calculi, in *Philos. Trans.* Lond., 1808. — *E. Home*, Observations on Mr. Brande's Paper on Calculi, in *Nicholson's Journ.* Lond., 1809. — *H. U. Onderdonk*, Dissert. on Stone in the Bladder, 8vo. New York, 1810. — *Lietz et Cadet de Gassicourt*, art. Calcul in *Dict. des Sciences Médicales*, t. iii. — *H. W. Anderson*, a Dissertation on Stone in the Bladder, 8vo. New York, 1810. — *Marie de St. Ursin*, *Etiologie et Thérapeutique de l'Arthritide et du Calcul*, 8vo. Paris, 1816. — *J. Horsburgh*, *Pract. Observations on Diseases of the Urinary Organs*, 8vo. Lond., 1816, p. 4, et *pluribus*. — *A. Marcet*, an Essay on the Chemical History and Medical Treatment of Calculous Disorders, 8vo. Lond., 1817. — *A. C. Hutchison*, on Calculus in Scamen, in *Med. and Chirurg. Transact.*, vol. ix. Lond., 1818. — *F. Macculi*, *Recherches sur les Calculs*, &c., de la Gravelle, 8vo. Paris, 1818. — *L. V. Brugnatelli*, *Litologia Umana*, ossia *Ricerche sulle Sostanze Petrose che si formano*, 4to. Pav., 1819. — *W. Prout*, an Inquiry into the Nature and Treatment of Gravel, Calculus, &c., 8vo. Lond., 1819. — *C. W. Fenner*, Ueber Harnsteinkrankheiten, &c., 8vo. Eisen., 1819. — *R. Smith*, Statistical Inquiry into the Frequency of Calculus, in *Medico-Chirurgical Transactions*, vol. xi., 1821. — *G. Wetzlar*, Beiträge zur Kenntniss des Menschlichen Harnes, &c., 8vo. Frankf., 1821. — *Breschet*, art. Calcul in *Dict. de Méd.*, t. iv. Paris, 1822. — *K. Caspari*, Der Stein der Nieren, Harnblase, &c., 8vo. Leipzig, 1823. — *J. L. Prout*, *Essai sur une des Causes des Calculs*, 8vo. Paris, 1824. — *J. Leroy d'Etiolle*, *Exposé des divers Procédés pour Guérir de la Pierre sans avoir recours à l'Opération de la Taille*, 8vo. Paris, 1825. — *Ciriale*, *Nov. Consider.* sur la Retention d'Urine, suivie d'un Traité sur les Calculs Urinaires, sur la Manière d'en connaître la Nature dans l'Intérieur de la Vessie et la Possibilité d'en opérer la Destruction sans l'Opération de la Taille, 8vo. Paris, 1823. — *M. Holland*, in *Journ. des Progrès des Sciences Médicales*, t. viii., p. 126. (*Pathologia et Cura*). — *W. Prout*, in *Transact. of Medical and Chir. Soc. of London*, vol. viii., p. 537. (*On the Treatment of*). — *A. Copland Hutchison*, in *Ibid.*, vol. ix., p. 443, and vol. xvi., p. 94. (*Infrequency of Calc. among Scamen*). — *W. Henry*, in *Ibid.*, vol. x., p. 15. (*Experimental Examination of 187 Specimens*). — *A. Cooper*, in *Ibid.*, vol. viii., p. 45; et vol. xi., p. 349; vol. xii., p. 331. — *H. Bence Jones*, in *Ibid.*, vol. xxvii., p. 109. (*Examination of Calculi*, &c.). — *T. Paget*, in *Ibid.*, vol. xxxiii., p. 293. — *M. Robinet*, *Report. Génér. d'Anatom. et Phys.*, t. i., p. 535. — *R. N. Barnard*, *Trans. of Med. and Phys. Society of Calcutta*, vol. v., p. 249. (*On Urinary Calculi in the Natives of Bengal*). — *J. G. Crosse*, a Treatise on the Formation, Constituents, and Extraction of the Urinary Calculus, &c., 4to. Lond., 1835. (*Cipously illustrated by Plates, with a most extensive Bibliography*). — *J. Yelloly*, in *Philosophical Transactions*, Lond., 1839. — *A. Campana*, *Ricerche sulle Concrezioni Urinarie Umane*, 8vo. Venet., 1830. — *Jolly*, art. Calcul in *Dict. de Méd. et Chir. Prat.*, t. iv. Paris, 1831. — *Thomson and Cummin*, in *Cyclop. of Pract. Med.*, vol. i., p. 334. — *Amussat*, *Concrections Urinaires de l'Espèce humaine, classées dans le double Rapport de leur Volume et de leur Forme*, Par. 1832. — *B. C. Brodie*, *Lectures on Diseases of the Urinary Organs*, 8vo. Lond., 1832; and *Lectures on Calculous Diseases*, in *Lond. Med. Gazette*, vol. viii. — *W. Enland*, *Observat.* on the Functional Disorders of the Kidneys, which give rise to the Formation of Urinary Calculi, with Remarks on their Frequency in the County of Norfolk, 8vo. Lond., 1830. — *W. Lawrence*, *Lectures on Urinary Calculi*, &c., in *Lond. Med. Gazette*, vol. vi. — *R. Willis*, *Urinary Dis. and their Treatment*, 8vo. Lond., 1838, p. 246-249. (*Renal and Vesical Calculi*). — *Von Walthmann*, *Statistics of Calculus in Austria, and Chemical*
- Constitution of Calculi in Vienna Collections, in *British and Foreign Medical Review*, &c., vol. iii., p. 254. — *M. Drantz*, in *Ibid.*, vol. v., p. 206. (*Blue Urine*). — *Rayer*, in *Ibid.*, vol. viii., p. 147. (*On Milky Urine*). — *L'Heritier*, in *Ibid.*, vol. xvii., p. 437. — *Graves*, in *Ibid.*, vol. xvi., p. 243. See also most of the volumes of this able work, more especially vols. vii., ix., xii., xiv., xvi., xvii., &c. — *G. Owen Rees*, on Calculous Disease and its Consequences, being the Croonian Lectures for 1853, delivered before the Royal Coll. of Phys., 8vo. Lond., 1853. — *Liebig*, on Ailments connected with Uraturia, in *Edin. Monthly Journal of Medicine*, August, 1849. — *S. Cooper*, *Dict. of Pract. Surgery*, 8vo. Lond., 7th ed., 1833. — *J. G. Crosse*, *Treatise on the Formation, Constituents, and Extraction of the Urinary Calculus*, *Plates*, 4to. Lond., 1835. — *M. J. Chelius*, *System of Surgery*, transl., with Notes and Observat., by *J. F. South*, 2 vols., 8vo. Lond., 1845. — *W. Coulson*, on the Symptoms and Causes of, and Operations for, Stone in the Bladder, in *Dis. of the Bladder and Prostate Gland*, 4th ed., 8vo. 1852; and on Lithotripsy and Lithotomy, 8vo. Lond., 1853. — *R. Druiitt*, *The Surgeon's Vade Mecum*, 6th ed., 12mo. Lond., 1844. — *J. Miller*, *The Practice of Surgery*, 2d ed., 8vo. Edin., 1852. — *J. Erichsen*, *The Science and Art of Surgery*, being a Treatise on Surgical Injuries, Diseases, and Operations, 8vo. Lond., 1853. — *W. Ferguson*, *System of Practical Surgery*, 3d ed., 12mo. Lond., 1851. — *B. C. Brodie*, *Notes on Lithot. with Account of Results of the Operation in Author's Practice*, in *Trans. of Royal Medico-Chir. Society of London*, vol. xxxiii., p. 170.
- THE BIBLIOGRAPHY OF URINE, URINARY DISPOSITS, AND CONCRETIONS, especially of the Causes, Symptoms, and Treatment of Urinary Concretions, is the most extensive of any branch of Medical Literature. I have mentioned only a few of the best works and memoirs on these subjects; but those who desire to be farther informed will find numerous other references in *LOCQUET'S Literatura Medica Digesta*, articles *Calculus Urinarius* and *Urina*; in the *Repertorium* of *J. D. REUSS*, arts. *Calculus Urinarius*, vol. xii., p. 178-217, and *Urina*, vol. xv., p. 124-174; and in the *Appendix* to Mr. CROSSE's able and laborious work, referred to above. Most of the References I have adduced are, however, not contained in these works.
- [AM. BIBLIOG. AND RIEUR.—But very few monographs on the disorders of the urine and its deposits have yet appeared from the pens of American practitioners. The special works of *Prout*, *Bird*, *Marckwick*, *Willis*, *Rees*, *Griffith*, and other British writers on these subjects, are familiar to American practitioners; and in no part of the world, it is believed, are these affections treated more judiciously and scientifically than by the physicians of the United States, especially those more recently educated. All the recent improvements, both of a medical and surgical kind, have been here introduced; and lithotripsy has been practised more generally, it is believed, than in any other country, except France. In no other nation has the operation of lithotomy been generally more successful than in this, and in no other can any surgeon boast of a greater number of successful cases than our own *Dudley*.† Without any disparagement to other authors, it will be conceded that the work of Professor *S. D. Gross*, already referred to, on "*The Diseases, Injuries, and Malformations of the Urinary Bladder*," &c., is not surpassed by any other on the same subject in any language, as it embodies all that is positively known on these affections up to the present time. We take pride in referring American practitioners to this most enlightened work.—*S. D. Gross*, Elements of Path. Anat., 8vo. Phil., 1845; a Pract. Treatise on Diseases, Injuries, and Malformations of the Urin. Bladder, the Prostate Gland, and the Urethra, 8vo. Phil., 1855.—*J. S. Dorsey*, on the Lithotropic Virtues of the Gastric Liquor, Philad., 1892.—*T. D. Mutter*, Am. ed. of Liston's Surgery.—*Wm. Gibson*, a Sketch of Lithotripsy, Am. Journ. Med. Sci.—*A. H. Stevens*, Notes to Cooper's First Lines of Surgery, 8vo. New York; and Lectures on Lithotomy, N. Y., 1838.—*Valentine Mott*, Am. edit. of Velpeau's Surgery, transl. by Townsend, 3 vols., 8vo. New York, 1854.—*A. S. Doane*, Am. ed. of Good's Study of Medicine, 2 vols., 8vo. N. Y., 1848.—*D. M. Reese*, Amer. edit. of Cooper's Surgical Dictionary.—*G. Busk*, Description of the Perineal Fascia, Trans. Amer. Med. Assoc., vol. i., p. 267.—*Charles Frick*, on the Urine, 8vo. Balt., 1850.—*E. K. Kane*, on Kyesticine, Amer. Journ. of Med. Science, vol. iv., p. 13, N. S.—On Crushing Stone in the Bladder, see *Randolph*, *N. R. Smith*, and *Gibson*, in *Am. Journal of Med. Science*, vols. xv., xviii., and xix, and Amer. edit. of *Chelius's Surgery*, edited by *South*, 3 vols., 8vo. Phil., 1847; also *Gross* on Urinary Organs.—*B. H. Dudley*, on Nature and Treatment of Calculous Diseases, 8vo. Lex-

[\* Out of 267 cases, 201 were cured; 1 in 34 fatal.]

[† An analysis of 354 cases of lithotomy performed in Great Britain gives one death in 4.]



ington, Kentucky, 1836; and in Boston Med. and Surg. Journal, vol. xv.—*J. H. Bush*, Observations on the Operation of Lithotomy, illustrated by cases from the practice of Professor Dudley, Transylvania Journ. of Med., 1837.—*Dickson*, on Urethrotomy. N. Y. Journ. of Med. and Surg., No. 7.—*P. Parker*, Notes of Surgical Practice among the Chinese, Cormack's Monthly Journal. Ed., 1841.—*John W. Draper*, Human Physiology, Statical and Dynamical, or the Conditions and Course of the Life of Man, 300 engravings. 8vo. New York, 1856.—*W. M. Babington*, Am. Journal of Med. Science, July, 1844. (*Case of Incontinence of Urine*.)—*John Kelly*, in *Ibid.*, Jan., 1847. (*Lithotomy, in which 225 Calculi were removed from the Bladder*.)—*Calvin Conant*, Medical Repository, new series, vol. iv., p. 184. N. Y., 1818. (*Removal of a small Calculus by a silver Wire passed through a Catheter*.)—*Depeyre*, on Lithotripsy, N. Y. Journ. of Med., 1831.—*D. D. Slade*, on Incontinence of Urine in Children, Am. Journ. of Medical Science, vol. lix., 1855.—*Charles Frick*, Report on Chemistry and Pathology of Urine, Trans. of Med. and Chirurg. Faculty of Maryland, 1855.—*W. G. Meacham*, Case of Vesical Retention cured by persistent Catheterism, Buffalo Med. Journal, vol. xii., p. 619.—*C. M. Hewitt*, Case of Renal Calculus, in *Ibid.*, vol. xii., 1857.—*G. E. E. Weber*, on the various Operations for removing Calculi from the Bladder of the Female, New York Journ. of Med., July, 1856.—*J. M. Sims*, Two Cases of Vesico-vaginal Fistula cured, N. Y. Med. Gazette, vol. v., 1854; Am. Med. Monthly, Feb., 1854.—*W. H. Van Buren*, Cases of Lithotomy, New York Med. Times, 1854, and New York Journ. of Med.—*R. Coates*, Statistical Account of the Cases of Urinary Calculi admitted into the Penn. Hospital from May, 1756, to May, 1835—total, 61 cases.—*P. F. Eve*, on the Bilateral Operation of Lithotomy, Am. Journ. of Med. Science, 1845, and Southern Med. and Surg. Journal, 1846.—*A. Baker, Jun.*, Lithotomy in the Female, with Remarks, Trans. of New York State Med. Soc., vol. vi., p. 133.—*J. V. P. Quackenbush*, on Protrusion of the Bladder, in *Ibid.*, vol. x., p. 67.—*G. Hayward*, Case of Vesico-vaginal Fistula successfully treated, Boston Med. and Surg. Journ., vol. xxi., p. 15.—*T. Sewall*, Extraordinary Tendency to the Formation of Urinary Calculi, in *Ibid.*, vol. xx., p. 245.

AM. BIBLIOG. OF URINE AND URINARY DEPOSITS.—*G. T. Elliot*, Kiesteine and the Urine of Pregnancy, New York Journ. of Med., Sept., 1853.—*W. A. Hammond*, Urological Contributions, Amer. Journ. of Med. Science, April, 1856.—*Charles Frick*, Report on the Chemistry and Pathology of the Urine, Trans. of Med. and Chirurg. Faculty of Maryland, 1855; also Renal Affections, their Diagnosis and Pathology, 12mo. Phil., 1857.—*John D. Fisher*, Essay on Paruria Erratica, or Erratic Urine, N. England Journal of Med. and Surg., July, 1825.—*H. G. Jameson*, Case of Lithotomy, Amer. Medical Recorder, 1825.—*S. A. Arnold*, Case of Misplaced Secretion of Urine, New England Journ. of Med. and Surg., October, 1825.—*Dr. Leuter*, on Vicarious Urinary Discharge, in Trans. of Coll. of Phys. of Philadelphia, 1828.—*R. D. Muesey*, Remarkable Urinary Calculus, Am. Journal of Med. Science, vol. iv., 1829.—*J. Young*, Incontinence of Urine successfully treated by Nitrate of Potash, in *Ibid.*, vol. v., N. S., 1843.—*M. Morison*, Urinary Calculus, Am. Journ. of Med. Science, vol. xxi.—*Benjamin H. Dudley*, Observations on the Nature and Treatment of Calculous Diseases, 8vo. Kentucky, 1836.—*J. Campbell*, Case of Worms in the Urinary Bladder, Am. Journ. of Medical Science, vol. xxi., N. S.—*T. D. Mutter*, Urinary Calculus in a Girl successfully treated, in *Ibid.*, vol. xxi., p. 260.—*Berzelius*, The Kidneys and Urine, translated from the German by *W. H. Bojé* and *P. Leaning*, 8vo. Philad., 1843, p. 173.—*P. H. Hurd*, Operation for the Stone on a Female, in *Ibid.*, vol. xviii., p. 110.—*O. Partridge*, on the Pedate Violet, in Calculous and Nephritic Diseases, in *Ibid.*, vol. xix., p. 893.—*L. V. Bell*, on Urin. Calculi, in *Ibid.*, vol. xiii., p. 405.—*J. P. Mettauer*, a Case of Lithotomy, &c., in *Ibid.*, vol. xii., p. 283.—*L. P. Conles*, Case of Calculus, in *Ibid.*, vol. xiv., p. 120.—*A. V. Leslie*, Case of Phosphatic Deposits terminating in Deposition of Lithic Acid and Lithate of Ammonia, Amer. Journ. of Medical Science, Jan., 1848. (Dr. L. thinks that the shortest method of putting an end to the deposition of the triple phosphates is to cut off at once the supply of material in the food, and build up the system by tonics, and especially animal food to the exclusion of vegetables.)—*C. A. Lee*, Albumen in Urine, Ohio Medical and Surgical Journal, Nov., 1853.—*A. Goldsmith*, Case of Lithotripsy, New York Journ. of Med. and Col. Science, vol. xi., p. 53.—*A. C. Post*, New Mode of Operating for Stone in the Bladder, in *Ibid.*, vol. ii., p. 186.—*J. L. Le Conte*, on a New Species of Urinary Concretion, in *Ibid.*, vol. vii., p. 172.—*J. Thacher*, Case of Preternatural Retention of Urine in consequence of Injury, Com. of Mass. Med. Society, vol. i., p. 35.—*James Jackson*, on a Variety of Paruria Retentiva peculiar to Females, Com. of Mass. Med. Society, vol. v., p. 25.—*Josiah Bartlett*, Case

of Calculi, in Com. of Massachusetts Medical Society, vol. i., p. 53.]

URTICARIA.—SYNON.—*Urticaria* (from *Urtea*, a Nettle, the eruption resembling that caused by it), *Swediaur*, *Vogel*, *Willan*. *Febris Urticata*, *Vogel*. *Exanthema Urticatum*, *Borsieri*. *Scalatina Urticata*, *Sauvages*. *Purpura Urticata*, *Juncker*. *Uredo*, *Linnaeus*. *Essera*, *Heberden*. *Erysipelas Urticatum*, *Exanthesis Urticaria*, *Young*. *Epinyetis pruriginosa*, *Aspretudo*, *Auct.* *Exanthesis Urticaria*, *Good*. *Nesselsieber*, *Nesselsucht*, *Nesselausschlag*, *Germ.* *Fièvre Orliée*, *Fr.* *Ortiearia*, *Ital.* *Nettle-rash*.

CLASSIF.—ORDER GENUS (*Willan*), III.

CLASS, I. ORDER (*Author*).

1. DEFINIT.—*A febrile, non-infectious exanthema, characterized by an eruption of prominent wheals or spots, paler or redder, or even both, than the surrounding surface, rarely of long continuance, often recurring or becoming aggravated in fits, and always attended by a burning and stinging sensation.*

2. I. DESCRIPTION.—*Dr. Willan* has enumerated six species of *Urticaria*: 1st. *Urticaria febrilis*; 2d. *Urt. exanida*; 3d. *Urt. perstans*; 4th. *Urt. Conferta*, 5th. *Urt. Subcutanea*; and, 6th. *Urt. tuberosa*. These have been arranged by *M. Rayer* under two heads, according as their course is *acute* or *chronic*.

3. i. URTICARIA ACUTA.—The first variety under this head is the *Urt. febrilis*, which is generally caused by the ingestion of various articles, and frequently by shell-fish (see § 427, *et seq.*), and is to be imputed rather to a peculiar susceptibility or idiosyncrasy of the individual than to any noxious or poisonous quality in the article occasioning the eruption. Commonly in an hour or two after the ingestion of the article causing this affection the patient complains of a weight at the epigastrium, of nausea, sinking, or giddiness. These are followed by febrile symptoms, by heat of skin, and by the appearance of an eruption on the shoulders, breast, the loins, the inner sides of the arms, thighs, &c., generally consisting of reddish or whitish elevated spots, surrounded by bright crimson areolæ. The spots are generally irregular, but sometimes circular, varying in size, and elevated above the surrounding surface. When numerous in any part they are often confluent, the skin presenting a red tint, and being stiff and swollen (*Urt. Conferta*). The eruption is attended by distressing itching, pricking, or stinging, especially during the night; and sometimes the confluent variety is associated with erythematous blotches. When this form of the disease is caused by shell-fish, or by poisonous ingesta (§ 427, 434), the eruption is sometimes preceded or attended by vomiting or purging, or by both; and spasms, sensations of choking or suffocation, convulsions, sinkings, &c., have even supervened, and in rare instances terminated fatally. In the slighter cases of urticaria, caused by the ingesta, the white itching elevations of the skin are not observed, a simple efflorescence, resembling scarlatina, and belonging rather to erythema than to urticaria, being the characteristic symptom. After twenty-four, thirty-six, or forty hours the eruption usually declines, and soon afterward leaves only slight traces on the skin, which are effaced in a few days.

4. Febrile urticaria sometimes appears without any appreciable cause, except teething in chil-

dren, and intense moral emotions in adults. The symptoms are nearly the same as those caused by the ingesta, excepting that vomiting and purging are not observed, that the febrile symptoms continue longer, usually a week or longer, and that the eruption is less general, but appears and disappears in almost all parts of the surface, preceded by slight febrile symptoms. The patient can often excite spots of urticaria by friction, but these generally disappear in a few hours. In some instances the rash continues for two or three weeks (*Urticaria perstans*, WILLAN), and is attended by anorexia, functional disorders of the digestive organs, febrile symptoms, general depression, malaise, &c. The eruption usually declines imperceptibly, but it often returns with itching in different parts, and at last disappears. When urticaria has been severe, or has continued long, a slight desquamation generally follows.

5. URTICARIA CHRONICA.—Chronic urticaria often lasts for months. M. RAYER states that he has known it to continue for several years. This form of the disease is most frequent in females, and in persons with a delicate or sensitive skin. Although most common in those who complain of disorder of the digestive functions, yet it sometimes occurs in persons who are otherwise in good health. The eruption appears at irregular intervals, sometimes in one place, at other times in another (*Urt. crumida*, WILLAN), without fever, and often for a few hours only. The patches are generally irregular, and closely resemble the wheals produced by flagellation. They have no erythematous areolæ, and are attended only by severe pruritus. In some cases, instead of itching, a stinging or pricking sensation under the eruption is experienced (*Urt. Subcutanea*, WILLAN). In these the eruption is scanty, consisting of a few red points, but little elevated above the surface, and a small number of spots, that appear at very remote intervals. M. RAYER considers this form of urticaria to be very uncommon, and to be caused by violent moral emotions.

6. A severer variety of nettle-rash sometimes appears (*Urt. tuberosa*, WILLAN). It consists not merely in slightly prominent elevations, but in true tuberosities of various sizes, which are hard, deep-seated, extending to the subjacent cellular tissue, attended by slight ecchymosis, and by a tense and sore state of the limbs. These tuberosities generally appear in the evening or at night, with itching and stinging, and disappear before morning, leaving the patient weak, restless, and depressed. They occur more particularly on the loins and extremities, but they may come out over the whole of the body, causing swelling of the neck, limbs, and even the face; and are attended by various symptoms, as dyspnoea, irregular action of the heart, &c. They are usually developed with febrile action, and subside with the remission of the fever, reappearing with its accession (*Febris intermittens Urticata*, FRANK).

7. The varieties of chronic urticaria are very irregular in their courses. They sometimes disappear for several days, and reappear with or without an appreciable cause, after uncertain intervals. They often are not entirely removed for many months, in rare instances, not for some years; and either spontaneously or by a methodical plan of cure. TURNER, HEBERDEN, RAYER, and others, mention cases which continued many

years. I have recently attended a case with Mr. PETTIGREW, which resisted for above a year the most active treatment. When the eruption of these chronic forms of the disease is very severe, it is followed by a bran-like desquamation, constitutional symptoms of varied characters and severity being present, or recurring irregularly.

8. The associations of urticaria are common, and often important. With constitutional disturbance and disorder of the digestive organs, often depending upon an improper regimen and diet, urticaria is very generally associated. J. FRANK saw it complicated with quotidian and tertian agues, at Pavia, in May and June, 1794, and at Wilna, in March and April, 1812, in so many cases as to appear epidemical. In acute rheumatism the wheals of urticaria may appear, although not so frequently as the efflorescence of erythema or roseola. Nettle-rash is uncommon in connexion with diseases of the respiratory organs and passages. It is sometimes observed during various chronic visceral diseases, or cancerous and organic maladies, and after miscarriages occurring in nervous females. Urticaria may be complicated with other cutaneous eruptions, especially with erythema, or with roseola, or with lichen, and occasionally with impetigo. WICHMANN saw it associated with variola; HUFELAND with measles; RAYER with prurigo; and I have seen it in a case of jaundice, and in another of senile prurigo.

9. ii. THE CAUSES of urticaria are most frequently articles of diet, which, owing to their unwholesome or indigestible natures, or to idiosyncrasy or peculiarity of susceptibility, disorder the digestive and assimilating organs, and which, by passing into the circulation, excite more or less febrile action, and affect the capillary vessels of the skin. The ingestion of numerous articles is liable to induce urticaria, one article being more certain to occasion it than another, in those predisposed to it. Mussels, cockles, lobsters, crabs, shrimps; the roe of a fish; dried, smoked, and salt fish; dried, smoked, and preserved meats; mushrooms, nuts, and kernels of fruits (see art. POISONS, § 434, *et seq.*); cucumbers, and unripe or stale fruits; some kinds of honey, preserves; oatmeal, especially when long kept; certain medicines, as the balsams, resins, &c., and many other articles, according to particular idiosyncrasies, often occasion this eruption. I have seen it caused by fresh pork. Some persons are so susceptible as to become affected by it after slight friction. J. FRANK states that it is rare in Italy and frequent in Russia. This is to be attributed chiefly to the general use of olive oil in the former, and of animal oils and rancid substances, and dried meats and fish in the latter country. Nettle-rash is most common in summer, especially in women and persons of a nervous and sanguineous temperament; and is much more frequent in children, the young, and adults, than in the aged. Cold, or rather exposure to the air, appears to have considerable influence on the development of the wheals of urticaria, especially in respect of certain parts of the surface which are usually covered.

10. iii. DIAGNOSIS.—It should not be overlooked that the leaves of the *urtica urens*, *urtica dioica*, and *rhys toxicodendron*, the bite of the common bug, of the gnat, of the flea, and the hairs of certain caterpillars, may occasion an eruption of wheals, which, although evanescent, may at first,



if the cause be not inquired after, be mistaken for urticaria. The white and raised wheals surrounded by arcolæ, characterizing *urticaria*, differ from patches of *erythema* in these respects, and in stinging, pricking, and itching. *Erythema nodosum* is distinguished from *urticaria tuberosa* by the persistent nature of the former, and the intermitting course of the latter. *Roseola* cannot be confounded with the wheals of urticaria, as it presents red spots and patches, and not the dull white spots of urticaria, and is not attended by pruritus, and the pricking or stinging of this latter. The history and all the phenomena of the case will prevent the eruption from being, at any time during its course, mistaken for either *measles* or *scarlatina*. The papulæ of *Lichen Urticatus* are much more likely to be mistaken for urticaria, but they are less extensive and less prominent than the spots of urticaria; their colour is deeper, they are harder, and they never disappear spontaneously. The bites of insects already mentioned, although causing wheals and itchings, cannot be mistaken for any form of urticaria.

11. iv. PROGNOSIS.—This eruption has appeared as a salutary crisis in some instances of internal inflammatory disease, as remarked by Koch, Rayer, and others. While, on the other hand, the sudden disappearance of urticaria has been followed by the development or the increased activity of some internal disease. This has very probably been owing to the occurrence or progress of the latter causing the subsidence of the urticaria, rather than to the suppression of this eruption. No one of the forms of urticaria is attended by any danger, although the chronic states are often accompanied with much distress, and frequently resist the most appropriate treatment for a long time. The acute forms following the ingestion of poisonous articles, however severe, or even when fatal, cannot have the unfavourable results imputed to the eruption, inasmuch as these results proceed from other changes produced by these causes, the eruption being the least important of their effects.

12. v. TREATMENT.—When acute urticaria is produced by the ingestion of poisonous substances, or by articles which are injurious from the idiosyncrasy of the patient, emetics and the other means advised when treating of those poisonous articles which usually cause this eruption, are required (see *art. Poisons*, § 443, 450). After the stomach and bowels have been evacuated, liquor ammoniæ acetatis and nitrate of potash may be given in the camphor mixture, or in any demulcent infusion or decoction; or the hydrochlorate of ammonia in similar vehicles. Subsequently a warm bath may be resorted to and repeated, and the bowels kept open by means of cooling aperients. I have found olive oil, taken in frequent doses on the surface of mint water, and the application of this oil to the surface, either before or after a warm bath, of very great service. In full and robust habits of body, or in the young and strong, especially if visceral congestion be present, vascular depletions, in form and amount according to the circumstances of the case, should be early prescribed, a strict diet and regimen enforced, and in all cases a free state of the bowels, by means of cooling aperients, and emollient and demulcent decoctions, be preserved. The insomnia and restlessness so generally observed in the severer cases of this eruption require opiates, but they should

be conjoined with cooling diaphoretics and alkalies. I have found James's powder, or the antimonial powder, with the compound soap-pill, or the compound ipecacuanha powder, or a full dose of the carbonates of the fixed alkalies, or of magnesia, in a demulcent infusion, very successful in mitigating these symptoms, especially when either of these means has been resorted to after due evacuation of the bowels, and when taken early in the night, or rather in the evening. If febrile action be present, saline aperients, the acetate or citrate of potash or soda, with nitrate of potash, and spirits of nitric ether, in mint water, or in camphor mixture; or the citrate of magnesia, in doses sufficient to act on the bowels, will be found of great service.

13. The chronic states of urticaria are often most difficult to remove; and more especially as they are generally caused by errors in diet, and perpetuated by the use of articles which either disorder the digestive organs, or impair the depurating functions, or otherwise affect the circulating fluids, so as to irritate the capillary vessels of the skin. In these cases patients should adopt a restricted diet and regimen, and avoid spirituous, vinous, and fermented liquors, all kinds of shell-fish, and live entirely on farinaceous and vegetable food. I have seen the most obstinate cases, which had been treated by the too generally prescribed preparations of arsenic, iodine, &c., in large and improperly combined doses, yield to the use, chiefly or entirely, of farinaceous and vegetable diet, and distilled water; the secretions, excretions, and depurating functions generally being duly promoted by gentle cooling aperients, such as those mentioned above.

14. When the chronic states of urticaria assume a remittent or intermittent form, and if they do not readily yield to the means already advised, then the preparations of cinchona may be given with the carbonates of the fixed alkalies, or with the solution of the acetate of ammonia, or with the addition of the nitrate of potash; and warm alkaline baths, or vapour baths, be resorted to. External applications, especially those which are oily or greasy, should be avoided, excepting the olive and almond oils, to which the hydrocyanic acid may be added when the stinging and pricking are distressing. But even these should be washed off in a few hours, before they are made rancid by the air and the cutaneous exhalation.

BIBLIOG. AND REFER.—Celsus, *De Re Medica*, l. i., cap. 28, sec. 15.—Alberti, *De Purpura Urticata*. Hale, 1719.—Chenniz, *De Essera Arabum*. Hafn., 1707.—Cleghorn, on the Epidemic Diseases of Minorca. Lond., 1768.—Winterbottom, in *Med. Facts and Observat.*, vol. v., No. 6. (Caused by Almonds.)—Godart, *Journ. de Méd.*, t. x., 1759.—Planchon, in *Ibid.*, t. x., vii., 1762.—Juncker, *Conspect. Med. Pract.*, tab. 64.—J. P. Frank, *Interp. Clinie*, vol. i., p. 411. (Intermittent, &c.)—Heberden, in *Med. Transact. of Royal Coll. of Phys.*, vol. ii., p. 133.—Koch, *Progr. de Febre Urticata*. Lips., 1792.—Zolner, *Hufeland's Journ. der Prakt. Heilkunde*, b. xxvj., p. 12.—Michaelis, in *Hufeland u. Hilmly's Journ. der Prakt. Heilk.*, Jan., 1820, p. 29, et Fabr., 1812, p. 54. (Shows the Injurious Consequences of the Suppression of Urticaria.)—J. P. Frank, *De Cur. Hom. Morb.*, l. iij., p. 112. (States that Metastasis to the Brain has followed the Suppression of Urticaria by Cold.)—Saalmann, *Descript. febris urticatæ*. Lips., 1790.—Bateman, *Synopsis of Cut. Dis.*, p. 132. Ed., 18'9.—Wichmann, *Ideen zur D'agnostik*, th. iij., p. 123.—Bricheteau, in *Journ. Compl. des Scien. Med.*, t. xxxvij., p. 266. (Cases of Intermittent Urticaria.)—Schiedemantell, *Fränkische Beyträge*, No. 35. (Caused by Fresh Pork.)—P. Rayer, *Theoretical and Practical Treatise on Diseases of the Skin*. Lond., 8vo, 1835, p. 201.—Macintosh, *Practice of Physic*, vol. i., p. 153. (States that dangerous Fever followed the Suppres-

sion of Urticaria by Cold Application.)—J. Houghton, in Cyclop. of Pract. Med., vol. iv., p. 371.—(See also Bibliog. and Refer. to art. SKIN, Diseases of, and art. POISONS, &c.)

UTERUS.—Some of the diseases of the uterine organs have been considered in the articles on the OVARIA and their diseases, on MENSTRUATION and its disorders, on DROPSIES of the ovarium, uterus, and Fallopian tubes, on LEUCORRHEEA, and on the diseases of the VAGINA and VULVA. Certain uterine maladies have also been fully described with reference to the puerperal states, when treating of PUERPERAL DISEASES. It now remains for me to view those morbid conditions of the uterus which are not noticed under other heads, and which appear to be of such importance as to require attention.

I. MORBID SENSIBILITY OF THE UTERUS.—SYNON.—*Hysteralgia* (from *ὑστέρα*, the womb, and *ἄλγος*, pain); *Metralgia*; *Uteralgia*; *Hysteradymia*. *Ὑστεραλγίης*, Hippocrates. *Neuralgie de l'Uterus*, *Métalgie*, Fr. *Der Gebärmutter-schmerz*, Ger. *Neuralgia of the uterus*. *Irritable uterus*.

CLASSIF.—I. CLASS, V. ORDER. (See Preface)

1. DEFIN.—Pain of the uterus, generally very severe, sometimes continued, at other times remittent or intermittent, particularly of the neck of the organ; occurring generally at a mature age, but seldom after the cessation of the catamenia; and not necessarily depending upon very manifest organic disease, although more or less inflammation and alteration of structure frequently exists.

2. Morbid sensibility of the uterus occurs, according to my observation, in two forms: 1st, in that which has been denominated *irritable uterus*, when indications of a slow, chronic, and often most protracted state of irritation, amounting in some cases to inflammation and its usual consequences, are present in the os and cervix uteri; and, 2d, in that which is more *neuralgic*, where these indications are not manifest, and where the nervous characters of intermission, &c., are most evident. An approximation of the characters of the one affection to those of the other may, however, be remarked in some instances.

3. i. IRRITABLE UTERUS, or *irritability of the uterus*, was first fully described by Dr. GOOCH. The notices taken of it in the works of RIEDLIN, POUTEAU, RIVIERUS, STOLL, and some others, are extremely unsatisfactory, and even calculated to mislead, it having generally been referred by them to rheumatism or gout affecting the womb.\* Since the publication of Dr. GOOCH's observations on this affection, Prof. DEWEES has directed attention to it; and the more recent writers on

the complaints of females have farther illustrated this subject, and shown its connexion with chronic inflammatory irritation.

4. Irritable uterus is seldom met with before twenty-three years of age, and as seldom after the menstrual epoch has ceased. Dr. GOOCH says that it is not attended by change of structure, and that it does not tend to such change, while Dr. DEWEES states that he has usually found some change about the neck of the uterus. In the cases of this affection for which I have been consulted, some have been unattended by any manifest alteration of structure, and others have been accompanied by indications of chronic inflammation of the cervix and os uteri. (§ 21, *et seq.*) In a case in my own family, no alteration could be detected for a very long time, but a change of structure subsequently became manifest, and assumed a malignant form.

5. ii. SYMPTOMS.—A. The constitutional symptoms are increased frequency of pulse on the slightest emotion or exertion; sometimes flushes, alternating with chilliness, previously to the exacerbations; pain in the lowest part of the abdomen along the brim of the pelvis, and often also in the loins, exacerbated by exercise, while it is diminished, although not removed, by perfect quietude in the horizontal posture; the pain sometimes recurs in paroxysms, even when the patient reclines, or is quite still, and is generally increased for a few days either before or immediately after menstruation; emaciation, paleness, weakness, and increased sensibility and irritability of the whole frame; an irregular state of the bowels, with difficult or painful micturition, and a pale, white tongue, particularly in the morning. Sometimes the pulse is soft, at other times firmer than usual; and although generally somewhat quickened, it is occasionally not above the usual frequency. The skin is commonly dry, and its temperature sometimes augmented, while the hands, legs, and feet, particularly the latter, are cold. The febrile exacerbations seldom terminate in perspiration. The patient occasionally complains of headache, which is often increased toward night. The appetite is usually impaired or capricious; and the bowels either are confined or much relaxed—most frequently the former, the latter more particularly when acted on by purgatives, which generally excite a paroxysm of pain. The urine is either sparing, high-coloured, and depositing a copious sediment; or it is pale, copious, and limpid, particularly when the affection is complicated with hysteria or neuralgic pains in other parts of the body: it is generally voided with difficulty and pain referred to the urethra; sometimes it is retained for a long period, and passed with great suffering.

6. B. The local Symptoms.—If the uterus be examined, it will be found exquisitely tender, particularly its orifice and neck, the former generally being neither misshapen nor indurated, although frequently somewhat swollen—a state in which the cervix often also participates. When the pain is excited by an examination, or by coitus, which is also very painful, it does not readily subside; and it is often induced by the patient seating herself suddenly upon a hard chair or bench, and usually by the sexual congress. In addition to these she frequently complains of a throbbing or fluttering sensation in the pelvic cavity and vagina. Walking, riding, or any exercise increases the symptoms, and causes severe

[\* Professor C. D. MEIGS expresses the opinion ("Females and their Diseases," Phil., 1843, p. 418) that what goes under the name of dysmenorrhœa is, for the most part, "rheumatic disorder." "The uterus becomes sensible on pressure with the finger; a pessary in contact with it produces heat and pain, while the touch reveals no change in the form, dimensions, or resistance of the cervix." Dr. M. thinks it "identical with what has been called irritable or neuralgic uterus;" states that it may continue for a long time without inducing any cognizable change in the parts. The *volatile tinct. guaiac*, so much extolled by DEWEES in dysmenorrhœa, proves efficacious, according to Professor M., "in virtue of its anti-rheumatic therapeutical force." The same able writer and teacher states that the gravid uterus is also the frequent subject of rheumatic attacks (*Loc. cit.*). Dr. M. also admits that "the womb, like any of the other tissues, may be the seat of a pure neuralgia or preternatural sensibility of the nerves of the tissues" (p. 437), which would be likely to be aggravated at the menstrual period.]



lancinating pains through the pelvic cavity, particularly in the course of the urethra, and about the centre of the sacrum: as these subside, a dull, diffused pain is felt in the same direction. Leucorrhœa frequently accompanies this affection, and often becomes abundant, the discharge varying from a thin, transparent, and inodorous matter to a thick, muco-purulent, and offensive fluid. There is often increased heat of the vagina. The uterus is occasionally found lower in the vagina than natural, and its neck is generally shortened and enlarged, and sensible to the touch. Pain is felt immediately behind the mons veneris and anterior part of the brim of the pelvis. The catamenia are at first but little affected in this complaint, but they ultimately become more and more scanty, while the sufferings of the patient are generally increased at their accession. They often prematurely cease, the patient being reduced by the protracted disease and by the confinement.

7. ii. *NEURALGIA UTERI*, or *uterine neuralgia*, has been considered a distinct disorder by some writers, and a modification of irritable uterus by others. (See *NEURALGIC DISORDERS*, § 43.) In this form of altered sensibility of the uterus, the pain is most exquisite, is generally referred to the body of the organ, does not continue for a very long time, and subsides entirely, or nearly entirely. It is altogether paroxysmal, and sometimes almost periodic. The general or constitutional symptoms are less evident, or altogether absent in this affection; but the debility and exhaustion may be greater. Examination per vaginam does not excite the pain in the intervals, although it may aggravate it in the paroxysm; and neither heat, nor leucorrhœal discharge, is usually present. This form of complaint is not commonly—or it is rarely—induced or aggravated by the causes which occasion or increase the sufferings in irritable uterus. The chief features of the neuralgic disorder are the extreme violence of pain during the paroxysm, and the complete or nearly complete subsidence of it during the intervals. Cases, however, occur in which the symptoms of the one form of disorder appear to lapse into those of the other.

8. *C.* The *diagnosis* of morbid sensibility of the uterus is manifest in the severity of the pain, and in the localization of it in the *cervix* and *os uteri*, especially of the *irritable form* of disorder, these parts evincing the utmost tenderness on examination, and the existence of great irritation, and ultimately of chronic inflammation and its consequences; namely, excoriation, leucorrhœal discharge, &c. The *neuralgic form* of disorder, as well as the irritable form, is unattended by any manifest change of the body of the womb, the symptoms of metritis or inflammation of the body of the uterus (§ 53, *et seq.*) also being absent. Although both affections are independent of displacement of the uterus, yet they may be accompanied with displacements in one or other form. They cannot be mistaken for dysmenorrhœa or painful menstruation, for they may be present during the intervals between the menstrual periods, although they may be aggravated by the accession of these periods. On vaginal examination of cases of these complaints, the uterus is usually found in its natural position, excepting that it is sometimes situated lower down in the pelvis, or otherwise more or less displaced. In recent cases it is free from organic change, be-

yond slight tumefaction or fulness, and occasionally softness of its mouth and neck; but in protracted cases, the changes produced by continued irritation and consecutive chronic inflammation usually supervene.

9. *D.* The *prognosis* of the above states of morbid sensibility of the uterus is favourable as regards the life of the patient, although it is not so favourable as respects a quick recovery. It may, if the causes continue to operate, be followed, after some years, by organic change, or even by malignant disease of the os and cervix uteri. While most of these cases will recover, if judiciously treated, some can only be relieved, and others may continue to suffer for many years, especially if the secret habits or vices in which the malady has originated be persisted in. The issue of these cases will depend much on the causes inducing them, on their recurrence, and on the physical and moral conditions of the patient.

[*Idiopathie uterine neuralgia* is, no doubt, often mistaken for what has been called by VALLEIX, *utero-lumbar neuralgia*. MALGAIGNE has also called attention to this affection, as well as MITCHELL, BEAU, and others. The former writer regards it as a variety of the *lumbo-abdominal neuralgia*, consisting essentially in an irritation of the lumbar nerves, the irritation usually concentrating itself on the cervix uteri. If the neuralgia is confined to one side of the lumbar region, the pain in the neck of the uterus is also confined to one side, and when it exists on both sides of the vertebræ, the pain in the cervix is more strongly marked on the side in which the neuralgia is most intense. This affection has been called by some *hystericalgia*, *rheumatism of the womb*, &c.; but it is simply utero-lumbar neuralgia. It is generally accompanied with leucorrhœa, or a discharge of mucus from the vagina. The prominent local symptoms of this disease, then, are pain in the uterus and over the lumbar region, increased by pressure; uterine sensibility, sensibly augmented by a digital examination, sexual intercourse, or the introduction of a speculum; also a discharge of mucus, &c. The diagnostic signs are sufficiently clear, viz., pain on pressing the lumbar vertebræ and the cervix uteri. The prognosis is favourable, provided the disease be recognised and the proper treatment carried out. The treatment consists mainly in powerful revulsives to the spine and cauterization of the cervix uteri. VALLEIX recommends a succession of blisters over the lumbar and sacral region, and also the actual cautery to the cervix. MALGAIGNE prefers scarifications of the neck of the uterus. MITCHELL, of Dublin, relies on the red-hot iron to the spine. A nitric acid issue on the side of the lumbar vertebræ has been found also very successful, and it is not likely to cause strangury, so often the result of the application of blisters to this region. If this affection is characterized by periodicity, quinine and other anti-periodics will be useful, and indeed will often effect a cure without local remedies.]

10. *E. Causes.*—*a.* The *predisposing causes* of these states of morbid sensibility of the uterus are constitutional sensibility and irritability, the nervous and irritable temperaments, the impulsive and susceptible disposition, a spare habit of body, previous liability to painful, difficult, or scanty menstruation, repeated abortions, and masturbation.—*b.* The *exciting causes* are not accu-

rately ascertained; but they appear to consist chiefly of fatigue, exertion, prolonged walks, or dancing or standing too long, and falls on the hips or back, or succussions of the body, particularly when the uterus is susceptible, or during the catamenia. Riding on horseback or in a carriage, especially if the road be rough, and during the menstrual period, or without duly evacuating the bladder; the use of cold or astringent lotions or injections to stop a profuse lochia or leucorrhœa; exposure to malaria, &c.; sitting on damp or cold stones, earth or iron seats, venereal excesses, and self-pollutions; neglected or protracted leucorrhœa.

11. *F.* The nature of *irritable uterus* was supposed by Dr. GOOCH to be similar to that of painful menstruation, the former being permanent, the latter recurring with the periodic discharge. He farther inferred that it is not inflammatory, because it does not terminate in change of structure; but it may, and often does, terminate in such change. He states that, after repeated examinations, nothing is discovered excepting exquisite tenderness and slight swelling, or rather tension of the cervix and os uteri. He farther supposes that the fact of many cases, after having lasted for years, terminating in entire recovery, is a sufficient proof that it is a disease of function only. Dr. DEWEES contends that it consists of a chronic inflammation, which he conceives may exist in some instances for an almost indefinite period without any very manifest derangement of structure; and he states besides that he has generally detected in this affection increased heat, and tumefaction as well as pain, which he views with justice as characteristic of chronic inflammation. M. GENEST nearly adopts the views of Dr. GOOCH, which, however, are much more applicable to the nature of neuralgia of the uterus than to the irritable form in which morbid sensibility of the os and cervix uteri most frequently occurs in practice. (See NEURALGIC AFFECTIONS, § 43, 44.)

12. My experience, derived from many cases in which my opinion has been requested in consultation, leads me to conclude that the two forms of morbid sensibility of the uterus are characterized by very different pathological conditions: 1st. that *neuralgia* of the uterus is an affection of the nerves of this organ, induced by depressing and exhausting causes, and is altogether independent of inflammatory action and organic change, although it may be associated with one or other of the several displacements and organic lesions of the womb about to be noticed; 2d, that *irritability* of the uterus is caused by irritation of the os and cervix uteri, this irritation being attended by exquisite morbid sensibility and tenderness, and by some degree of inflammatory action; that the irritation superinduces chronic inflammation of these parts, which may be protracted for a very long period, before it is followed by excoriations, by a morbid secretion and discharge from the excoriated surfaces, and from the irritated mucous glands in these situations, and ultimately by granulations, ulcerations, and even more serious organic change. According to this view, the greatest number of the cases formerly termed irritable uterus, or which had this term appropriately applied to them at an early stage only, were actually instances of irritation followed by chronic inflammation of the os and cervix uteri and its consequences. The writings

of Dr. HENRY BENNET have fully demonstrated the existence of these lesions, which, although denied by Dr. ROBERT LEE and some others, have been very often observed by Dr. SIMPSON, Dr. TYLER SMITH, Dr. West, Dr. WHITEHEAD, of Manchester, M. CHOMEL, and numerous continental writers, and by myself. The imperfect manner in which affections of the os and cervix uteri were observed when Dr. GOOCH wrote, prevented the true state of these parts from being duly recognised and estimated; and yet his admission of the existence of tenderness, fulness, tension, &c., in this situation, is a sufficient proof of the presence of inflammatory irritation, or of irritation usually passing into inflammation. (See *Inflammation of the Os and Cervix Uteri*, § 21, *et seq.*) When writing upon this subject in 1829, I remarked that, if morbid sensibility of the os and cervix uteri exist for some time, it often induces, or is attended by, an alteration of the circulation in these parts, by swelling and tension, by great tenderness, and by increased secretion from their surfaces—the augmented secretion generally tending to prevent the disorganizing effects of inflammatory irritation or action from taking place.\*

[\* We are inclined to believe that the pure "*irritable uterus*" very seldom occurs in practice; for however uncomplicated it may be in the commencement, by the time the physician is called in more or less engorgement or inflammation has ensued from the irritation set up. At least such has happened in nearly every case that has come under our observation: so that the definition of the disease by Dr. GOOCH, who first called attention to it, will not hold true, viz., "a painful and tender state of the uterus, neither attended by nor tending to produce change in its structure." Dr. DEWEES has given a very accurate account of this affection ("*A Treatise on the Diseases of Females*," p. 306. Phil., 1833), from which Dr. COPLAND has very freely drawn in his description, both of the general and local symptoms, as well as the diagnosis and treatment. According to our countryman (Dr. D.), the irritable uterus may be distinguished from a neuralgic condition of this part by the following signs: In *neuralgia of the uterus* there is an entire absence of the general or constitutional symptoms attending irritable uterus, especially the evening febrile movement; there is seldom a vaginal or leucorrhœal discharge; there is no preternatural heat in the vagina, nor is the uterus so sensible to the touch unless examined during the painful continuance of the paroxysm, and then, perhaps, it is more exquisitely sensible than it is in the pure irritable uterus. In *neuralgia*, moreover, the pain is less constant, but is more violent during the paroxysms, which generally observe periodicity. In *neuralgia*, a paroxysm may be suddenly induced by passions or emotions of the mind, which is never the case in the irritable uterus, though the latter is susceptible of great and occasional augmentation of pain, through the medium of the circulation, by errors in diet or improper exposure.

Dr. DEWEES also calls attention to the fact that irritable uterus is very apt to be confounded with prolapsus uteri, inasmuch "as the local symptoms of the latter are a miniature representation of the former," and as, in the former, the womb is certain to descend more or less, and hence is supposed to be the cause of all the difficulty. If a pessary be employed under such circumstances, the symptoms will necessarily be aggravated, and the ease rendered still more difficult.

By way of diagnosis, the mode of conducting an examination is all-important. The patient is to be placed upon her back, with the knees drawn up, the parts well lubricated; then passing the finger gently into the vagina, seek for the cervix uteri; and when found, direct the attention of the patient to the degree of sensation produced by touching it, as well as the body of the uterus and the sides of the vagina. Inquire if there be any extraordinary sensibility in either of these parts, and if so, in which part it resides. If there be tenderness, the use of a pessary or any mechanical means for supporting the uterus is out of the question.

The irritable uterus has also been confounded with dysmenorrhœa and carcinoma of this organ, but it may readily be distinguished from the former by the circumstance that in dysmenorrhœa pain is only felt during the menstrual discharge, while the irritable uterus is not nec-



13. iii. TREATMENT.—Very different means are requisite for these two forms of morbid sensibility of the uterus. It should not be overlooked that the one is unconnected with inflammatory action, is purely nervous, and is sudden in its accession and in its subsidence, while the other is more or less inflammatory either originally, or consecutively upon irritation, the morbid action, owing to the organization and sympathies of the parts affected, being more or less modified in character, and prolonged in duration. The circumstance of the os and cervix uteri being possessed of sensibility only inferior to that of the clitoris,\* their erectile organization, and their abundant supply of mucous follicles, often render them exquisitely tender and painful when inflamed, or even when they are the seats of irritation, and enable them to furnish an abundant secretion tending to resolve or to diminish inflammatory action, and to prevent the usual consequences of this action. Notwithstanding the advantages these parts derive from their organization, vital powers, and free discharge from their surfaces, when irritated, inflamed, or otherwise affected, inflammatory action, when once developed in them, is the more disposed to be protracted, but it is, from these circumstances, much less liable to consecutive alterations of structure; the chief organic lesions which occur being superficial exoriations, granulations, and ulcerations, with a more or less abundant leucorrhœal discharge. These alterations are the more likely to take place when the uterus falls low in the pelvis, when the morbid secretion accumulates, or is retained, in the vagi-

essarily attended by dysmenorrhœa, nor is the latter usually attended by this irritable condition of the uterus. A digital examination will readily distinguish irritable uterus from carcinoma uteri by attending to the marks laid down by our author.

With regard to the pathology, we are disposed to coincide with Dr. DREWES in the opinion that there is in this disease more or less inflammation of a sub-acute kind of all the tissues of the neck of the uterus, and perhaps the body also. Heat, swelling, and pain to a greater or less degree, we have always found present in this disease; and in a case now under treatment, of four years' standing, there is a swollen, tender condition of the cervix uteri, with slight ulceration. In another chronic case, which came under my care recently, there was considerable enlargement and ulceration of the neck of the womb. The pathology of Dr. DREWES appears to us, therefore, more accurate than that of GOOCH, who denies the presence of inflammation in irritable uterus. The most frequent exciting cause of this affection, according to our experience, is repeated abortions occurring in females of a highly nervous, susceptible temperament, and delicate organization; although we have met with it, but less frequently, in those of robust habit and of a sanguine temperament.

The treatment of this affection is necessarily protracted, difficult, and uncertain, and the patience of both physician and patient is likely to be exhausted before a cure is effected. Our water-cure (?) establishments abound with such cases, where they are generally treated with little discrimination and less success. Most of these cases are there treated for prolapsus; and in one institution, where such patients congregate in great number, we found it a common practice to subject the uterus daily to a pressure of some 20 lbs. of water to a square inch, introduced by a flexible tube attached to a hydrant! The treatment laid down by our author comprises all that is known, and may be summed up as follows: Absolute quiet in a recumbent posture, counter-irritants, anodyne injections and suppositories, laxatives and enemata, and tonics, with great attention to diet, &c.]

[\* M. JOHET maintains that the projecting portion of the cervix uteri is entirely deprived of nerves, and is, under all circumstances, insensible. Of course, he denies that it is ever the seat of pain. BOULLAUD goes still farther, and denies that the uterus receives any nerves whatever from the cerebro-spinal axis; this, however, is refuted by the positive observations of TIENEMANN, ROBERT LEE, MÜLLER, HERSCHFELD, BOULAN, and others.]

na, when vital or constitutional power is depressed or exhausted, and when the treatment pursued, and other circumstances, permit the air to have access to the irritated or inflamed parts. This form of altered sensibility of the uterus, however severe the pain characterizing it, being either identical with, or nearly allied to, irritation or chronic inflammation of the neck of the organ, the treatment appropriate to it will be necessarily the same as advised for that disease; the more painful symptoms being treated by such combinations or modifications of the remedies as have been found most beneficial in neuralgic affections, and in irritable and exhausted states of the system.

14. The *neuralgic affection*, or the *nervous form* of morbid sensibility of the womb, will, therefore, be chiefly considered at this place; the means, however, to be recommended for it will often be also required in the inflammatory states, and their consequences hereafter to be noticed, either conjointly with other constitutional and local remedies, or after recourse has been had to them. The indications of cure in this affection are, 1st, to subdue the sufferings of the patient; and, 2d, to prevent their recurrence, by restoring the constitutional powers, and healthy state of the uterus. Certain of the means calculated to fulfil the first will often aid the accomplishment of the second intention. The means to be employed with these views are the same as have been fully considered when discussing the *Treatment of NEURALGIC AFFECTIONS* (*see* § 80, *et seq.*); and they may be used as there recommended and prescribed.

15. In the more violent cases, the more energetic sedatives and narcotics may be applied *locally*, in the form either of suppositories, or of injections thrown into the vagina, or of enemata, the bulk of which should not exceed three or four ounces; sufficient care being taken not to prescribe too large a dose of the more sedative substances, especially in the injections, as the effects produced by them when thus exhibited may be as violent as when taken by the mouth. In a case which I attended with the late Dr. MOORE, very marked relief was procured by carrying, by means of a small piece of sponge, about half a drachm of the tincture of belladonna, in a female syringe, and pressing it out when it reached the os or cervix uteri. The paroxysm generally subsided after a very few minutes, and the more restorative means recommended in the article now referred to were afterward taken. These should be adapted to the peculiarities of the case, and more especially with due regard to the states of the vascular system, and to the causes and associations of the complaint. These last it is most important to recognise; for not only may the disorder be the result of depressing or exhausting causes, but it may be complicated with one or other of the several forms of displacement of the uterus, and even with tumours or other organic changes of the organ.

16. Besides the means now mentioned for the removal of the paroxysm, others may be tried; *chloroform* taken in doses of from twenty to thirty drops, by the mouth, or injected into the vagina, in the same or somewhat larger quantity; or suppositories, in which the extract of *belladonna* forms an ingredient, may be introduced; or other narcotics may be similarly employed. In the most severe cases vomitings or retchings may occur

and add to the patient's distress; for these the *oxalate of cerium* has been prescribed by my friend Dr. PANTON, conformably with the opinion entertained of the salts of cerium. In a case which I attended with Dr. PANTON, the oxalate of cerium was suggested by him, in doses of two grains, thrice daily, and gave great relief. Besides these, various means have been recommended to be applied either above the pubis or over the sacrum. Embrocations of turpentine containing opium, or warm epithems of turpentine, have often succeeded in giving relief in a short time when thus employed. Aconite or veratrum applied over the sacrum, has been resorted to; a small quantity of the extract or of the tincture of either of these being mixed in an ointment or liniment, but the use of these powerful sedatives requires caution, although externally applied. In some instances warm narcotic injections, repeated and varied according to circumstances, will be of service.

17. If this complaint be dependent upon chronic inflammatory irritation or action, or upon some other lesion of the uterus (§ 21, *et seq.*), the means required by such lesion should be adopted in addition to that which may appear most appropriate of the remedies now advised; and the *diet* and *regimen* of the patient ought to be regulated with due reference to such associations and to other peculiarities of the case. In the great majority the recumbent posture, varied as may be required, rest, and ease of body and mind, are necessary, and in all strict avoidance of the predisposing and exciting causes, both ascertained and inferred, should be insisted upon. A reference to these causes will show (§ 10, 22) that certain of them, when once indulged in, are not readily relinquished, and that persistence in them will render the most judicious treatment of no avail.\*

18. The means which are most suitable for the fulfilling of the *second* intention, viz., the restoration of the general health, and of the healthy state of the sexual organs more especially, are the same for this complaint as for accomplishing the second indication of treatment advised for the several forms of inflammatory irritation or action of the uterus (§ 108, *et seq.*). In some instances, in which I viewed neuralgic or very painful affections of the uterus as the result of the influence of malaria, I have during the intervals between the paroxysms, and with the view of restoring the healthy functions, prescribed either the arsenical solution in the usual doses, or the preparations of iron with quinine and camphor.

## II. INFLAMMATIONS OF THE UTERUS AND APPENDAGES.

[\* If the *uterine neuralgia* be secondary or sympathetic, our therapeutic measures should be directed to the removal of the primary cause, be it engorgement, ulceration, or displacement. If it be primary, we have generally found *cauterization*, with nitrate of silver, or the red-hot iron, successful in accomplishing a cure. In some cases it has been necessary, in addition, to insert an issue on the sides of the lumbar vertebrae or in the hypogastric region. If the pain be periodical, it should be met, as in case of other forms of neuralgia, by quinine, arsenic, &c. Temporary relief is afforded by suppositories of belladonna, hyoscyamine, and opium. In some cases relief will be afforded by the introduction of the uterine sound into the cavity of the uterus, as MALGAIGNER has advised, on the principle that it modifies the nervous sensibility of the mucous membrane. In some cases, where the pain has been very severe, we have found a combination of tinct. aconite and chloroform act very promptly in relieving it. They should also be used externally over the hypogastric and lumbar regions by friction.]

## CLASSIF.—III. CLASS, V. ORDER (Author in Preface).

19.—DEFINIT.—*Pain and weight or uneasiness in the hypogastric region, and behind the pubis, often with pain in the lumbar and sacral regions and in the regions of the ovaria, extending to the groins and tops of the thighs, with more or less symptomatic fever, increased towards evening.*

20. Inflammations of the uterus present very different phenomena and occasion very different results, according as the morbid action is seated chiefly or entirely in the neck of the organ, or in the body, or in the internal surface, of the uterus, or as it may implicate the peritoneal surface of the fundus. The symptoms vary also with the degree in which the adjoining viscera are affected either coetaneously or consecutively—with the nature and extent of the complications, so often presented by inflammation of this viscus; and they vary with the grade of morbid action, and with the manner in which the sensibility and sympathies of the uterus are excited.

21. i. INFLAMMATION OF THE NECK AND MOUTH OF THE UTERUS AND ITS CONSEQUENCES.—Inflammation of the cervix and os uteri is generally *chronic* and often very protracted. It is rarely acute unless it be caused by the gonorrhœal virus, several instances of this form of disease having come before me, one of them at the commencement of my practice, when the possibility of the occurrence was generally denied by the physicians of this country. But this specific form of the disease will be noticed hereafter. When inflammation attacks this part of the uterus it is often slight and insidious in its accession, and, being frequently attended by more or less discharge, is too commonly viewed as a form of leucorrhœa, and considered of comparatively slight importance. This circumstance often tends to its neglect at a period when a judicious treatment might have removed the disorder without any difficulty. But, being overlooked or neglected, and perpetuated or aggravated by persistence in the causes which occasioned it, the disease becomes most obstinate and protracted, and is followed by changes of structure which generally render the treatment more or less difficult. In all cases where the local and constitutional symptoms suggest even the idea of disorder or disease of the uterus, the advice given by a most eminent and able physician, M. CUOMEL, should be followed: "La fréquence et la diversité des affections de l'utérus, la forme latente de beaucoup d'entre elles, l'éloignement qu'éprouvent la plupart des femmes à parler des sensations et des dérangements dont cet organe est le siège, sont autant de motifs pour le médecin de porter de lui-même son attention de ce côté, d'adresser aux femmes les questions relatives à ce sujet, et enfin de ne négliger aucun des moyens d'exploration, toutes les fois que quelque circonstance en indique la nécessité. L'oubli de ce précepte deviendrait la cause d'erreurs de diagnostic aussi graves que fréquentes." Unfortunately the worst features of our common nature—the most bitter manifestations of the "*odium medicum*," which is generally the most bitter and unjust against those by whom success is achieved—have been displayed respecting a recourse to those means which are requisite to "exploration," and the existence of those lesions which are to be ascertained chiefly by the exploration in question—namely, by examinations *per vaginam*, by means



of the senses of touch and sight. On this subject it is quite unnecessary to remark farther, than that the abuse of any particular mode of investigation, or an improper recourse to and employment of it, cannot invalidate the proofs of the great advantages which are derived from its proper and judicious use; and that the evidence and practice of men of character, position, and experience, are not to be impugned or disparaged by others who are not entitled in any point of view to become the censors of their professional brethren.

22. *A. The causes of chronic inflammation of the neck of the uterus and its consequences* are those which have been enumerated as producing the two chief forms of altered sensibility of the organ (§ 10), more especially difficult or disordered or arrested menstruation, excessive sexual indulgences, and masturbation; falls on the back or hips, or injuries in the vicinity of the pelvis or peritonæum; difficult and instrumental labours and abortions; the extension of inflammatory irritation to the neck of the uterus from the vulva and vagina; gonorrhœal infection; the foul air ascending open privies; the use of pessaries; displacements of the womb; cachectic habits of body, and neglect of cleanliness. In many cases the cause of disorder is either not manifest or can only be inferred. The disease seldom occurs before puberty, or long after the cessation of the menses. It is most frequently observed from twenty to fifty years of age.

23. *B. Symptoms.*—The existence of inflammation of the neck and mouth of the uterus is evinced by the appearances of the part, by the local signs and symptoms, and by the sympathetic or constitutional phenomena. The appearances of the cervix and os uteri, it might be supposed, could not fail of evincing the existence of inflammation of them, more especially since those appearances have been disclosed by the use of the speculum. Even previously to the use of this instrument, this disease might have been detected by the sense of touch and the phenomena resulting from examinations by this sense, and by the secretions and alterations of sensibility attending it. If the appearances constituting inflammation of these parts admitted of doubt, and consequently of discussion—although discussion has not in this instance been always the consequence of either doubt or unbelief—surely the several results of inflammation, more especially tumefaction, excoriation, granulations, ulcerations, &c., need not have been misunderstood nor misrepresented. When treating of LEUCORRHEA in 1841 (published in 1842), I referred the two most important states of this complaint to “inflammatory irritation of the mucous glands of the os and cervix uteri,” and to chronic inflammation of the internal surface of the uterus, and contended that these forms of leucorrhœa, especially the latter, are not unfrequently of a specific inflammatory nature, or gonorrhœal. Of this specific form I have seen several cases, the first of which occurred at the very commencement of my practice (in 1821); the last very recently, the inflammation having extended to the Fallopian tubes. (See *art. LEUCORRHEA*, § 19, *et seq.*)

24. *a. The appearances of the cervix and os uteri* vary with the severity and character of the inflammation—with the amount of irritation and congestion preceding and attending it; with the intensity of the morbid action; with its duration

and the amount of exudation and secretions accompanying it; with its extension to the internal surface of the cervix; and with alterations of structure which may have already taken place. The earliest appearances are not always observed, for congestion or irritation, of a more or less inflammatory character, may have existed for a longer or shorter time before the complaint had advanced so far as to induce the patient to have medical advice. When the mucous surface of the cervix is simply congested or inflamed, it usually presents a red or livid hue, instead of the pink or pale rose colour of health; it is often dotted with florid papulæ, or with whitish pustulæ, according as its mucous glands are inflamed or distended with a muco-puriform matter. Frequently the surface of the cervix is covered with this matter so as to prevent its exact state to be observed until this secretion is removed. At first the cervix is somewhat swollen or enlarged, but still soft; but with the persistence of the inflammatory action, and with the exudation into the structure of the cervix, more or less induration is superadded. At this early period the os and cervix uteri are hotter and more tender or even painful to the touch than in the healthy state; but the amount of tenderness and of pain appears to depend more upon the temperament and susceptibility of the patient than upon the severity of the inflammatory action—or rather upon the irritable character of this action; the pain being in some cases, both in this stage and throughout the disease, such as to constitute the irritable uterus of several writers, as noticed above (§ 3, *et seq.*).

25. *b. As the disease becomes more chronic or protracted*, the cervix becomes somewhat elongated, and approaches nearer or almost lies upon the posterior part of the vagina. At the same time the os uteri is more open than natural, owing, in some cases, to the congestion, inflammation or enlargement of the muciparous glands at the orifice and internal canal of the neck, externally to the os internum of the uterus, and in others to congestion of its internal mucous surface and subjacent tissues. This inflammatory state of the mouth and canal of the cervix was shown, when treating of LEUCORRHEA (in 1841), to be a frequent cause and form of that complaint, as it is an associated condition of chronic inflammation of the cervix; and it usually presents a dark reddish or livid hue. The muco-puriform matter secreted by the inflamed mucous surfaces of the cervix varies much in appearance and quantity in different cases; but the chief part of this secretion, as I have stated in the article just referred to (§ 19, *et seq.*), manifestly proceeds from the cervical canal. The state and character of this secretion, especially upon its discharge, depend much upon the time of its retention in the vagina and upon the exclusion or access of air.

26. *c. Inflammation in the neck of the uterus* may continue a long time without giving rise to its usual results. This may be owing to the partial resolution it may experience from the exudation or secretion from its surface and from the mucous glands, or from the menstrual flux. But after an indefinite time, the mucous membrane of the cervix and os uteri, more especially that portion immediately surrounding the mouth of the cervical canal, undergoes farther change, generally commencing with excoriations or abrasions of the surface and passing on to ulcerations, but very rarely with loss of substance. These may

present minute red granulations, or vegetations of a livid hue. When an abrasion or excoriation is alone present, the surface is generally of a vivid red, and the granulations on its surface are very minute; this state of the lesion occurs chiefly within the mouth and canal of the cervix, and most frequently in single females. In a more decided form of ulceration, the granulations of the ulcerated surface may be firm, of a vivid red hue, scarcely bleeding on pressure, or they may be large, fungous, livid, and bleeding readily on a slight touch. Sometimes the granulations or vegetations on the inflammatory sore rise above the level of the surrounding parts, bleed profusely when they are touched, or even separate partially. Inflammatory ulceration of the cervix is rarely or never excavated; it is always on a level with or above the non-ulcerated tissues, and its margin never presents any abrupt induration. Hence the difficulty of determining its existence and limits by the touch, and the source of differences of opinion as to the existence of ulceration of this part. The cervix very seldom presents more than one ulceration situated around the mouth, dipping into its cavity, and extending more or less on the outer surface. If the ulcerated state consist of several patches, it may be referred to aphthous or ulcerated mucous follicles.

27. The form of the os uteri is generally changed, owing to the existence of the ulcerated state now described both within and around this part. The lips of the os swell, enlarge, expand, and open the cervical canal. This opening varies with the amount of inflammation and of the changes above described, but it is generally greatest in females who have had several children. When with these changes the lips of the os uteri are much hypertrophied and indurated, the opening may admit the first phalanx of one or even of two fingers, and it may then assume the form of two segments of a sphere, separated by a deep fissure, within which the ulcerated surface is situated.

28. Ulceration, or the changes now described as constituting the ulcerative state of the cervix and os uteri, gives to the surface of these parts a soft, velvety character, when examined by the touch. This sensation and the open state of the os uteri are the chief indications which this sense can furnish of the existence of this lesion; but, as inflammation alone will open the cervical canal, and as the velvety sensation cannot be depended upon, the existence of ulceration can only be determined by an instrumental examination. The state of the parts detected by touch, and the symptoms about to be noticed, warrant a resource to this examination. "In nearly all the cases in which ulceration occupies the exterior of the cervix, it will also be found, on examination, to penetrate more or less deeply into its cavity. The entire canal of the cervix, as far as the os internum, may be ulcerated. Even when the cervical canal is free from ulceration, if ulceration exists externally, it is generally inflamed to a greater or less depth." The natural coarctation of the os internum appears generally to constitute a barrier to the extension of ulceration into the cavity of the uterus. But to this rule there are exceptions, as respects the inflammatory state, which obviously extends in many instances.

29. *d. The discharges from the vagina* caused by chronic inflammation of the cervix uteri are identical with those which are described under

the head of *LEUCORRŒA*. For, as I described these in that article as resulting from inflammatory action, as evinced by the local and general symptoms (see § 19, *et seq.*), their connexion with the changes above described and disclosed by the speculum is obvious. The discharge generally consists of various proportions of mucus and pus, it is rarely the latter only or chiefly, unless the inflammation be specific or gonorrhœal. It is not unfrequently tinged with blood, especially after violent exertion or sexual intercourse. In these circumstances, the blood is exuded from the ulcerated or granular surface, and is seldom in considerable quantity—when in quantity it may be unmixed with the muco-puriform discharge.

30. *e. Hypertrophy* of the neck of the uterus is generally a consequence of chronic inflammatory action, congestion and swelling of this part being an early result. It may, however, remain long without farther change, its structure retaining its softness and elasticity. After a time, the exudation of plastic lymph in the interstices of its structure either is considerable, or becomes partially organized, and renders it both hypertrophied and indurated. At first the inflammatory action is often acute, as indicated by increased heat, vivid redness, and tenderness on pressure; but these signs subside, the hypertrophy advancing with more chronic indications; and sometimes so far as to very greatly increase the size of the cervix. In virgins and women who have not had children, the cervix seldom enlarges to any great extent. It may be indurated and yet not increased in size; but when it is enlarged in this class of patients it seldom is more than two or three times the natural size. In women who have borne children the hypertrophy of the cervix with induration may, according to Dr. J. HENRY BENNET, in extreme cases reach the size of the fist. Some French writers ascribe the ulcerations existing in these cases to the hypertrophy; but he justly contends that the ulceration may commence as early as the hypertrophy and advance with it; and he has seen ulceration confined to one lip, accompanied with induration and hypertrophy of that lip only. When the chronic inflammation causing these changes in the cervix has followed a miscarriage or delivery, the hypertrophy is generally the more remarkable. Hypertrophy and induration are commonly confined to the cervix, but sometimes they extend to the body of the uterus, indicating that it is also the seat of chronic inflammation.

31. As the indurated cervix enlarges, the external opening expands and assumes a transverse form; so that instead of a nearly circular orifice, there is a deep fissure with well-defined lips. This occurs more especially when the induration is attended by ulceration. Sometimes one of these lips may be many times larger than the other. When the superior lip is much enlarged it covers the os uteri, which is underneath it; when the inferior one is thus changed the os is above it. Dr. H. BENNET says that he has seen both the superior and the inferior lips separately enlarged to such an extent as to form a kind of tumour projecting a couple of inches beyond the non-hypertrophied lip. He states that the hypertrophied cervix is sometimes divided into separate lobes, owing to antecedent laceration of the cervix during an abortion or instrumental labour. The laceration not healing, the ulceration in the



course of time is followed by hypertrophy of the segments into which the cervix is divided. These segments sometimes assume a stony hardness; and they may be mistaken for scirrhus, but may be distinguished from that malady as follows: "When the lobular, knotty irregular condition of the cervix is the result of laceration, and is simply inflammatory, the fissures which separate the lobes radiate round the cavity of the os as a centre—which is not the case in a cancerous tumour—each separate lobe being perfectly smooth in itself, and free from tubercles, or superficial irregularities. Not only is this lobular form of induration erroneously considered cancerous, but even the hard inflammatory hypertrophy is still more erroneously considered to be frequently malignant."

32. *f. Displacement* is often consequent upon inflammatory hypertrophy of the cervix; the entire organ generally descends, and the cervix is thus brought nearer the vulva, and at the same time directed backward. The retroversion of the neck of the uterus is commonly met with in married females suffering from inflammatory induration. With them it is chiefly owing to intercourse, and generally becomes permanent. Enlargement and induration, when very considerable, often occasion more or less prolapsus, unless the vagina be very contractile. In women who have had many children, and in whom the vagina is lax, and offers an insufficient support to the uterus, the prolapse may be so great, especially when standing, as to reach the vulva, or even to appear externally. When the cervix thus lies low in the vagina, a sensation of weight, dragging, and bearing down is experienced, especially when erect. This sensation is caused by the traction of the organ on its ligaments and organs with which it is connected, and by the pressure of the cervix on the vagina and vulva. The hypertrophied cervix may be directed anteriorly, or behind the pubis, and be more or less high. This position is generally owing to some enlargement of the body of the uterus, causing the organ to fall back into the cavity of the sacrum, thus throwing up the cervix. The enlarged cervix occasionally lies diagonally, or to either side, but this position seldom amounts to a diseased condition.

33. *g. Pain* is not always experienced in chronic inflammation of the neck of the uterus, and when it is felt, the situation of it is very often such as not to designate the seat of disease. In some cases pain is almost or entirely absent, although there may be leucorrhœal discharge, and considerable constitutional disturbance, even with slight feverish symptoms towards evening. My experience enables me to vouch for the accuracy of Dr. J. H. BENNETT's remarks respecting the seat of pain; for in several cases to which I have been called, an examination has confirmed the connexion of the pain with the local affection. The pain is dull, aching, constant, and generally circumscribed, usually felt in one or both the ovarian regions, but much more frequently in the left than in the right; pain of a similar character is also often experienced in the back, and even still more frequently, according to my experience, in the lower region of the sacrum, just above the os coccygis. When it is felt in this situation the neck of the uterus will be found low in, and pressing upon the posterior walls of, the vagina. Sometimes the pain in the

back is scarcely perceptible, or is described only as a "weakness," excepting after fatigue, when it is usually more severe. The patient says that her back is broken, and that she can neither stand, sit, nor walk with comfort. "When there is pain in the region of the uterine neck, it is experienced behind and above the pubis. It is seldom circumscribed, like the ovarian pain, but radiates all over the lower hypogastric region. These three pains—the lumbo-sacral, the ovarian, and the lower hypogastric (I name them in the order of their relative frequency)—may exist conjointly or separately. They are produced alike by inflammation without ulceration, and by inflammation with ulceration. They are, however, much more marked when there is ulceration, more frequently severe, and much more constant."

34. These pains are not to be mistaken for *neuralgia* of the uterus, which is much more acute, comes on suddenly after intervals, and ceases as suddenly, and is seated in the uterus itself (§ 14, *et seq.*). The neuralgic pain is sometimes present only for an hour or two, and rarely longer than ten or twelve hours, the intervals being characterized by freedom from pain. It is sometimes symptomatic of organic disease of the womb, as fibrous tumours in the structure of the organ. But it is often felt independently of any evident lesion, the os and cervix uteri being healthy and free from any morbid sensibility.

35. In addition to the pains described, the patient sometimes complains of pain in the hip, round the crista of the ilium, in the groin, and down the thigh; posteriorly along the course of the sciatic nerve and its divisions, and anteriorly and internally along the course of the anterior crural and obturator nerves. These pains I have referred rather to chronic inflammation of the inner surface of the uterus and enlargement of the organ than to chronic inflammation of the cervix. In the former case they may be caused by deficient support of the vagina, partial prolapse and pressure; in the latter case they may be sympathetic. The pains caused by diseases of the uterus are always increased by standing, sitting, walking, and exertion, but relieved by reclining and the horizontal posture.

36. *h. The functions of the uterus* are often interfered with during the continuance of chronic inflammation of the cervix. As respects *menstruation*, it may be stated, that it may for a time go on without any marked change. But it usually becomes more painful, very scanty, or excessively abundant, and irregular as to the interval, the duration, and the quantity. The pains, especially on its accession of this period, are greatly increased in the situations above described, and are often attended by retchings and vomiting, by recurring uterine tormina, and by marked tenderness of the hypogastric region. The irritation, congestion, enlargement, and other lesions of the cervix become aggravated during this period.

37. This disease must necessarily be a cause of sterility in many instances, the morbid states of the cervix and os, and the discharges from them, interfering more or less with impregnation, not only in recently-married females, but also in women who have borne children. Some females, however, become pregnant, notwithstanding the existence of extensive disease of these parts; but when it takes place under these circumstances it is generally painful, and apt to termi-

nate in abortion. Sterility proceeding from this disease may be removed by curing its cause. Dr. BENNET states that he is continually seeing patients who have ceased child-bearing for years, owing to inflammatory disease of the cervix, recover the power of conception when the local affection is cured. Sometimes they become pregnant even before they are quite well, in which case they seldom miscarry, even if the treatment is suspended, although the pregnancy is often laborious.

38. *i. Uterine inactivity*, or exhaustion, is often a symptom of chronic inflammation of the os and cervix uteri, especially when attended by profuse leucorrhœa and ulceration or granulations, or when the disease is severe. Dr. J. H. BENNET remarks that this absence of natural sensations, or sexual desire, sometimes exists independently of any physical pain, and occasions great unhappiness in married life. He attributes this change to the modified vitality of the diseased uterine organs and impaired general health. The cases of this description which I have met with have been chiefly those in which there was reason to believe that the complaint had been caused by self-pollutions, and where the tenderness of the os uteri and adjoining parts rendered sexual congress more or less painful; for instances are not rare of masturbation being persisted in, although marital congress is resisted or evaded. When the cervix is so tender from this disease as to render congress painful, the sensation is experienced at the time and for some hours afterward, or even longer. It may be felt either behind the pubis or in its usual situations. But although the disease may be severe, the cervix being ulcerated and enlarged, congress may not be painful. Whether painful or not painful—the former especially—this act may be followed by a discharge of a little blood, or even by considerable hæmorrhage. That the evasion of marital congress is owing rather to the circumstance just adverted to than to the disease of the cervix, is evinced by the fact that such evasion is not manifested in other diseases of the uterus, or very rarely.

39. *k. Constitutional and general symptoms* are always present when the cervix uteri is diseased. It should not be overlooked that this part of the uterus possesses marked sensibility and intimate relations with all parts of the economy, through the medium chiefly of the ganglial and sympathetic system. Hence the digestive functions are more or less disordered according to the duration and severity of the local complaint; and there are frequently both nausea and vomiting on the accession of the catamenia. The disorder of the stomach and digestive organs is often somewhat similar to that consequent on early pregnancy, and is the consequence of the inflammation. The leucorrhœa so generally present has been too often imputed to this disorder of the digestive organs, instead of these complaints being regarded as results of the inflammation of the cervix. The urinary function is often more or less disturbed, in respect both of the saline constituents of the urine, and of the frequency of the calls to discharge this secretion, and the sensations attending the act. Dysuria is sometimes complained of, and a portion of the secretion from the inflamed cervix often passes from the vagina at the time of micturition.

40. The *pulse* is sometimes very materially affected, and becomes more or less accelerated to-

wards evening; and, as debility increases, it is generally weak, or small and irregular, and readily accelerated on any mental or physical excitement. A protracted state of the disease, especially when characterized by granulation, ulceration, and abundant leucorrhœal discharge, ultimately occasions anæmia, pallor, a sickly or sallow appearance of the countenance, loss of flesh, and a flabby state of the muscular structure. Contingent upon the course of the disease, various sympathetic affections often appear, especially nervous headache, depression of mind, a sense of weight or pressure at the summit of the head or on the forehead, pain and tenderness in the course of the spine, and numerous hysterical symptoms. These phenomena are generally exacerbated during the catamenial period, especially when this period is disordered in any way. Most of the symptoms described in the articles HYSTERIA and SPINAL IRRITATION originate in this disease of the cervix and os uteri.

41. Dr. J. HENRY BENNET was the first who gave full accounts of the diseases of the cervix of the uterus; and he was followed by Dr. WHITEHEAD of Manchester, Professor SIMPSON of Edinburgh, and Professor MILLER of Louisville, U. S. Various other writers on uterine diseases have coquetted with the subject, and, after having endeavoured to controvert the statements of these physicians, have at last fallen in with their views. From these and other sources of information, furnished not only in this country, but even much more abundantly on the continent, as will be seen in the BIBLIOGRAPHY, the great importance of inflammatory disease of the cervix uteri is made apparent. Dr. WHITEHEAD has given an enumeration of the lesions of this part of the uterus; and, although I do not profess this or any other specialty, but endeavour to practise as a physician in all medical cases, yet I am sometimes consulted respecting uterine diseases, and I am thus enabled, from some experience, to say that the statements and descriptions furnished by the physicians whom I have mentioned are unassailable.

42. "1st. Inflammation and superficial erosion, implicating one or both lips of the os uteri, and more or less of the external and internal cervix; 2d. Varicose ulceration, commonly occupying the back part of the anterior lip, sometimes confined to the posterior, and occasionally implicating both. It gives rise to hæmorrhages obeying, more or less perfectly, the menstrual periods, and to purulent discharges in the intervals; 3d. Edema of the cervix; 4th. Fissured ulceration of one or both commissures, of the anterior or posterior lip, or implicating all these parts at the same time; 5th. Induration of the cervix, with or without abrasion of surface; 6th. Endo-uteritis, or inflammation of the lining membrane of the uterus, affecting the body as well as the neck, and sometimes accompanied with induration of the cervix, or erosion of one or both lips of the os uteri; 7th. Follicular ulceration; 8th. Gonorrhœal inflammation, affecting the lips and adjacent cervix, and especially liable to spread to the lining membrane of the entire organ; 9th. Syphilitic disease in its primary, secondary, and tertiary stages; 10th. Prolapsus uteri, which owes most commonly its existence to disease of the lower part of the uterus, as the primary exciting condition."

43. To this enumeration of lesions, given by



Dr. WHITEHEAD, may be added *hypertrophy*, with or without ulceration, or granulation, or dilatation of the cervical canal. This, in one or other of these states, is a frequent consequence of chronic inflammation of the cervix. *Gonorrhæal inflammation* of the cervix and its canal is of greater importance than is usually considered. I have seen several instances of this form of disease, and in nearly all it extended to the lining membrane of the uterus, and was accompanied with great suffering. In three cases of married ladies, not only did this extension occur, but the *ovaria* also became remarkably enlarged. Recovery ultimately took place, but the *ovaria* remained more or less enlarged in all.

44. *C. In the virgin and unmarried female*, inflammation and its consequences noticed above are by no means infrequent; and, although partially described by me in the article *LEUCORRHEA* in the section on "*Leucorrhæa from inflammatory irritation of the mucous glands of the os and cervix uteri*" (§ 19, *et seq*) before the appearance of Dr. HENRY BENNET's work, yet to him the distinction is justly due of having first fully described and elucidated this subject in respect of this class of patients; and I can fully corroborate his statement that inflammation and ulceration of the cervix uteri in the virgin is not an uncommon disease, and that to it may be referred most of the severe forms of dysmenorrhœa and leucorrhœa which resist the ordinary modes of treatment. Even within these few months I have been called to several cases, under the care of other practitioners, where this disease existed, from ages varying from nineteen to thirty. Scanty, excessive, and irregular menstruation, as well as the complaints just mentioned, not unfrequently proceed from inflammatory states of the cervix, and internal surface of the uterus, as shown in the article on *MENSTRUATION*. (See more especially § 85-129.)

45. The causes of inflammation of the cervix uteri in unmarried females have been already noticed. (§ 10, 22.) The symptoms in them are not materially different from those already described: the permanency of a leucorrhœal discharge; the local pains; dysmenorrhœa, and otherwise disordered menstruation; spinal irritation; sympathetic pains in the hips, thighs, spine, and under the left mamma; bearing down, weight in the pelvis, debility, pallor, anæmia, emaciation, &c. In addition to these, *partial prolapse* of the uterus, and other deviations of its position, are not infrequent in this class of patients.

46. *D. During pregnancy* inflammation and ulceration of the os and cervix uteri may be present, having existed previously, or supervened subsequently to impregnation. MM. BOYS DE LOURY and COSTILHES first noticed this state of the disease; and soon afterward Dr. HENRY BENNET, in 1846, and Dr. WHITEHEAD, in 1847, fully illustrated this association of inflammation of the cervix uteri. Dr. BENNET remarks that he formerly believed that the disease mostly originated subsequently to conception. This opinion, however, his later experience on a wider field has shown to be erroneous. Although it sometimes thus originates, the cervix is diseased in the majority of cases previous to conception. He adds that the disease generally produces sterility when it attacks young married females at the onset of their married life, but not so generally arrests

conception when they have had children before they are attacked. The indications furnished by tactile and ocular examinations in this state of the disease are the same as already described. The disease is attended by pains in the back, sacrum, above and behind the pubes, and by a sense of weight and bearing down, and mucopurulent discharge. As pregnancy advances the pains increase; the sickness and vomitings attending this state become severe; and the mucopuriform discharge is often accompanied with more or less hæmorrhage. Dr. H. BENNET has very satisfactorily shown that this disease in the pregnant state is often a cause of the various disorders complained of in this state, or hæmorrhage, obstinate sickness, death of the fœtus, abortion, moles, &c.; and Dr. WHITEHEAD has fully corroborated this statement. These are most important practical facts; and, however sneered at by some, doubted by others, and disbelieved by a few, I have had occasions, since the date above mentioned, to be convinced of the truth of the statements made by these physicians. I may here adduce a summary of Dr. WHITEHEAD's researches on the influence of the lesions under consideration in producing abortions; and in this he confirms what had been previously adduced by Dr. H. BENNET. Inflammatory ulceration was the cause of abortion in 26 in every 100 cases; and this event occurred between the middle of the sixth and the middle of the ninth month of pregnancy. Varicose ulceration induced abortion in 6 or 8 out of every 100, and it operated during the latter two or three months. Œdema of the cervix, acting likewise in advanced pregnancy, was observed in about 1 in 25 or 30 cases. Fissured ulceration was found to exist in 20 to 24 out of every 100 cases, and may cause abortion from the fourth to the middle of the seventh month.

47. *E. During and after abortion and parturition*, inflammation, ulceration, and induration of the neck of the uterus are often productive of much and serious disorder. Induration, enlargement, and rigidity of the os and cervix uteri, in abortion or in labour at the natural period, render these acts both difficult, painful, and prolonged; and these lesions of this portion of the uterus, as well as ulceration, often occasion hæmorrhage after abortions and parturition, and this hæmorrhage is frequently followed by profuse, purulent, or muco-purulent discharge. "When the patient first attempts to rise and walk, she feels a sensation of weight and bearing down, which gradually increases, instead of diminishing. If the hæmorrhage and purulent discharge are continued and abundant, and the uterine pains are very severe, several weeks often elapse before she is able to leave her bed; and when she does, she remains weak, languid, and is unable to make the slightest exertion." Inflammatory ulceration, during the first stage of the puerperal period, powerfully predisposes to puerperal fevers, and to abscess of the ligaments. It is so commonly developed after abortion, Dr. BENNET remarks, that he always looks for it when the patient does not rally, but presents the symptoms already described.

48. *F. In advanced life, and after the cessation of the menses*, inflammation and ulceration of the neck of the uterus are sometimes met with. At this period, especially when the menstrual epoch has long ceased, ulceration is the form which in-

flammation of this portion of the uterus generally assumes. The most prominent symptoms at this epoch are severe and constant pain in the sacrum and lower part of the back, less severe and less constant pains in the ovarian regions, and in the hypogastrium, leucorrhœal discharge in some cases only, and bearing down and prolapse of the uterus much less frequent and more slight than in younger females. Ulceration of the neck of the uterus, in advanced age, seems to be oftener the remains of inflammatory disease present at the time when the menses ceased, than an affection which had commenced subsequently to that period.

49. ii. INFLAMMATION OF THE BODY OF THE UTERUS IN THE NON-PUERPERAL STATE.—SYNON.—*Metritis*; *Hysteritis*; *Inflammatio Uteri*.—Inflammation of the womb may assume various forms or states. It may be *acute*, *sub-acute*, or *chronic*; it may be *sthenic*, or *asthenic*, or *septic*; it may be *common* or *specific*; and it may affect either the *internal surface*, or the *whole body* of the organ. In the article on PUERPERAL DISEASES I discussed *Inflammations of the Uterus, its Appendages, and Vcins* (see § 176, *et seq.*) with reference to the several puerperal conditions; and I now proceed to consider those forms of inflammation of this organ which I have now mentioned, and as they commonly occur in the non-puerperal state.

50. A. INTERNAL METRITIS.—*Endo-Metritis*.—*Non-puerperal Inflammation of the internal surface of the womb*, in its most frequent forms, has been partially considered under the head LEUCORRHEA (§ 25, *et seq.*) and MENSTRUATION (§ 78-129). I have there shown that inflammatory states of the internal surface of the uterus may occasion certain forms either of leucorrhœa, or of menstruation, varying with the modified states of vascular action, not only in the uterus, but also in the cervical canal; the morbid action being rarely limited to the former, but generally extending to the latter, and often also to the substance of the uterus. Dr. H. BENNET considers that a *sero-sanguinolent* discharge is as characteristic of endo-metritis as the rust-coloured expectoration is of pneumonia. The internal cavity of the uterus in health is not much larger than that of the neck; but it is not improbable that, during the period of menstruation, or when congestion or inflammatory action exists in this part, this cavity may be somewhat enlarged, as, indeed, the whole organ frequently is in these circumstances. If in addition to the discharge just noticed, there be a dull, deep-seated pain behind and slightly above the pubis, and more or less general febrile reaction, endo-metritis may be confidently inferred. Since, in the introduction of the uterine sound, and its improvement by Professor SIMPSON, a recourse to it has been considered as a means of diagnosis in endo-metritis; for, if the os internum of the cervix be so completely open as to allow the uterine sound to pass freely into the uterine cavity, and if this cavity be increased in size, and be more sensitive, the above symptoms being also present, this complaint is certainly present. But endo-metritis may exist and not be attended by the sero-sanguinolent discharge alluded to. It is only when the inflammation is most severe that it is present. In the less severe and congestive states, it is characterized by the discharges and the symptoms described in the sections on LEUCORRHEA above

referred to, and, during the menstrual periods, by the painful, difficult, inflammatory, or hamorrhagic symptoms described in the article MENSTRUATION. (See § 78-129.)

51. As endo-metritis is commonly attended by chronic inflammation of the cervix and os uteri, the symptoms of the latter are generally present. Nevertheless, the former gives rise to nearly the same symptoms; yet the deep-seated and constant pain behind and partly above the pubis, the sensation of weight and bearing down, the swollen, sensitive, and enlarged conditions of the organ evinced on examination, the states of the discharge and of menstruation already noticed, and the accompanying febrile action, although often slight, but always increased towards night, sufficiently indicate the nature of the disease.

52. The progress and termination of endo-metritis depend much upon its causes and the circumstances in which it originated. It is often attended by more or less inflammatory action in the cervical canal, and in the substance of the organ; and, according to the extent of this association, to the occurrence of the disease after difficult or instrumental labours or after abortions, and to the domestic, moral, and hygienic conditions of the patient, the course, duration, and termination of the complaint should be imputed. A *chronic form* of the disease is apt to supervene, especially in the circumstances now alluded to; and even in favourable cases the acute form generally passes into the chronic, the constant discharges from the internal surface and neck of the uterus, whether sanguinolent, serous, mucopuriform, or purulent, and the catamenial discharges, whether difficult, scanty, or excessive, or attended by coagula, or by plastic exudations, ultimately tend to reduce the acute into a chronic state of the disease. *Ulceration* of the internal surface of the uterus has been rarely noticed as a consequence of endo-metritis. When this occurs, the cavity of the uterus is considerably enlarged, and contains pus, mucus, and a bloody matter, which are discharged more or less freely, and often at intervals. Dr. HALL DAVIS examined the uterus of a woman which exhibited these appearances, with several large ulcerations in the internal surface.

53. B. ACUTE METRITIS, in the non-puerperal state, is a rare disease. At the commencement of my practice (in 1822), having described an undoubted instance of it, at a meeting of a medical society in this city, the case was considered apocryphal. Since then, I have been requested to see other cases, both simple, specific, and complicated, but in most of them the inflammation had commenced in the neck and internal surface of the uterus, or had extended to these parts, and thence to the body of the organ, and in some instances to the uterine appendages. On referring to the notes which I took of the more remarkable cases—since the one in 1822—which I have seen, I find that the disease occurred in seven married females who had never been pregnant, and in three unmarried females. In four cases it was referred to gonorrhœa communicated by their husbands, and in three of those the disease extended to the uterine appendages, the ovaria becoming acutely inflamed and ultimately remarkably enlarged. These four females had never been pregnant. I have notes of the disease as I observed it in six married females who had had



children, but who had not been pregnant for a very considerable time previously to their attacks. In two of these last, the cause and course of the disease were so singular as to require a more particular notice in the sequel. Within these few years other cases have been seen by me; and I am at this time seeing in consultation a very acute case of the disease in a single woman. In none of these instances could any doubt be entertained as to the seat of the malady.

54. *a.* The seat of metritis is the whole body of the uterus; but the disease may commence in different ways. It may attack the whole organ primarily, or extend to it from the internal surface of the neck. These parts may themselves be affected consecutively upon inflammation of the vulva and vagina, especially when they are inflamed by specific, or asthenic, or contaminating causes. Inflammation of the body of the uterus, in the non-puerperal state, seldom extends to the peritoneal surface so as to give occasion to either partial or general peritonitis, as so generally observed in puerperal metritis. An instance, however, occurred, to which I was called towards its close, of a lady who had been treated by very astringent injections for the removal of profuse discharge from the internal uterine and cervical surfaces. With the suppression of the discharge, acute metritis supervened, and was very rapidly followed by inflammation of the peritoneum covering the pelvic viscera, and ultimately by death; the progress of the disease being manifested by examination after death. Metritis, in very rare cases, may occur in the non-puerperal state from the extension of inflammation from the rectum or bladder. Many years ago I attended, with Dr ROBERT LEE, a married lady, who was attacked at first with dysenteric tenesmus, manifestly owing to inflammatory action which had commenced in the rectum and sigmoid flexure of the colon. Soon afterward unmistakable evidence of acute metritis appeared. This lady had not conceived for several years. Soon after the full development of the metritis, which was attended by intense suffering, phlegmasia alba dolens of the left thigh began to appear, and when the subsidence of it commenced, the right thigh became similarly affected. She ultimately recovered. But disease may commence almost simultaneously in the rectum and vulva from certain septic emanations, especially in females who have had children. I was called to two families living in the opposite outskirts of London, during a very warm autumn, after a hot summer. The privies of both houses were open, very full, and offensive. Several younger members of these families were attacked by dysentery, with distressing tenesmus, and their mothers became the subjects of both the dysenteric affection and asthenic inflammation of the vulva, rapidly extending to the vagina, and to the neck and body of the uterus. In both these cases the symptoms of acute metritis were unmistakable and most violent, and were, with the dysenteric affection, manifestly caused by the state of the privies, to which, indeed, the patients themselves referred them. I have, both in this and in foreign countries, had frequent reason to impute the occurrence of DYSENTERY (see § 24) to open privies, &c.; but these two are the only instances I recollect of both dysentery and acute metritis having appeared coetaneously in the same female.

55. *b.* *Symptoms.*—The patient complains of

severe and constant pain deeply seated in the hypogastric region, chiefly behind and above the pubis, darting into the ovarian regions, around the hips, and sometimes down the thighs, with a sensation of weight and uneasiness in the pelvis, and of severe pain of the lower lumbar, lumbodorsal, and sacral regions. Pain, on firm pressure, is felt just above the pubis, in the median line, and equally to the right and left of that line. On examination, the vagina is generally hot and dry; the cervix and os uteri are swollen and sensitive to the touch or to pressure. The body of the uterus is enlarged, and attempts to ascertain its size are attended by extreme pain, and often by nausea or retchings. The symptoms are always aggravated by sitting down on a hard seat, or by an examination per vaginam, and the patient is unable to walk or stand, or to sit up in bed. She generally lies on her back with her knees drawn partially upward. Calls to pass urine are frequent, and attended by dysuria. The bowels are usually constipated, and costive motions are passed with extreme pain and difficulty, the hardened faeces being surrounded by much mucus. In many cases violent paroxysms of pain occur after intervals of comparative ease.

56. This acute state of the disease is not often preceded by chills or rigors, and it is at first not attended by any vaginal discharge, unless it have supervened upon vaginitis, or endo-metritis, as in some cases of asthenic or diffusive inflammation of the vagina and vulva. However, when the inflammation has commenced in, or extended to, the inner surface of the uterus (§ 50), a sero-sanguinolent, or purulent discharge takes place. As the disease subsides, a copious discharge, of various appearances, occurs. In addition to the usual febrile or constitutional symptoms, especially thirst, restlessness, scanty, high-coloured urine, constipation, headache, want of sleep, &c., there are constant nausea; a white or furred tongue; pain and swelling of the mammae, and sometimes hysterical symptoms, but chiefly in nervous and hysterical females. In less severe cases the symptoms are milder, and the nature of the complaint is evinced chiefly by a careful digital examination.

57. *c. Terminations.*—In from seven to fourteen days the disease subsides, generally without either suppuration or inflammation of the uterine veins, in the non-puerperal state; but this latter result may occur in this state, as shown in the case attended by Dr. R. LEE and myself (§ 54), and in two other cases for which I was consulted, and which terminated fatally, the uterine phlebitis having been followed by secondary purulent formations, as shown by examination after death. It is chiefly in the cachectic habit of body in females addicted to intoxicating liquors, as in one of the two cases just now alluded to; and when the causes are of a septic or infecting nature, and the disease assumes an asthenic character, that either the veins become implicated on the one hand, or the peritoneum on the other.

58. Acute metritis may degenerate into the chronic state, and occasion the inflammatory forms of *leucorrhœa* and of disordered *menstruation* (see those articles), or various consecutive lesions; and it may give rise to purulent collections, either near to, or even in the cavity of the uterus. In either case the collection, as it becomes increased, is evacuated sometimes more or less suddenly, and after a greater or less increase

of suffering, per vaginam. When matter is formed near the outer surface, it most frequently extends to the cellular tissue between the lateral ligaments, and finds its way, as in cases of suppuration occurring in those ligaments.

59. *d. The prognosis* of acute non-puerperal metritis is generally favourable when the constitution of the patient is sound; when the disease is treated promptly and judiciously, and the causes are not of a contaminating or specific nature, as in the cases above alluded to (§ 54). In drunken females, in the cachectic, and when the disease has been produced by infectious or contaminating agents, the extension of inflammation to the ovaria, to the veins, or to the peritoneum, should be dreaded; and in either case the patient's life may be placed in the utmost jeopardy. Even if the acute should lapse into the chronic state, or give rise to chronic inflammation of the lateral ligaments, much and prolonged suffering will result.

60. *e. Diagnosis.*—Acute metritis may be mistaken for acute cystitis, or the latter for the former. But a careful examination of the hypogastric region, of the state of parts per vaginam, and of the condition of the urine and the phenomena attending the discharge of it, will readily disclose the organ affected. When the lateral ligaments are inflamed, the pain and tenderness on pressure are experienced on one side of the median line, or in one side of the pelvis; "and the finger passed up towards the uterus, detects the inflammatory tumour lying on one side of the uterus."

61. *f. Examinations after death* from acute metritis in the non-puerperal state are rare, unless death has been caused by uterine phlebitis or by peritonitis, as in the cases alluded to above which occurred in my practice. In these cases the uterus was considerably enlarged, and very much softened, especially towards its internal surface. The substance of the organ was infiltrated with a dark ichorous fluid in one case, and with a greenish brown fluid in the other. The cavity of the uterus was much enlarged in both, but much more so in one than in the other, and its surface was covered with a chocolate-coloured or rusty exudation in the one, and by a rusty purulent exudation in the other; this latter containing a little of a softer matter of the same appearance and of an offensive odour. The spermatic veins were inflamed, and contained coagulated blood, phlebitis extending throughout the uterine and spermatic veins to the vena cava, with coagula mixed with an ichorous or sanious purulent matter. In one case purulent collections, more or less of a sanious appearance, and offensive odour, existed in the liver; and in another, matter was formed in one of the eyes, which had burst shortly before death. In a third case above alluded to (§ 57) peritonitis supervened, the uterus presenting but slight alterations of structure, but the *peritoneum* exhibited the lesions described in the article on this membrane. (See § 80, *et seq.*)

62. *C. SUB-ACUTE AND CHRONIC METRITIS.*—*Sub-acute metritis* is merely a less severe form of the acute, most of the symptoms described above (§ 53, *et seq.*) being present, but in a slighter degree. The *chronic* form of the disease may, like the acute, vary much in severity; but, unlike it as respects frequency, is a common form in its simple and complicated states. It gener-

ally is seated in a part of the body of the uterus; and, in the opinion of Dr. H. BENNET, in nine cases out of ten in the posterior wall of the organ, in its inferior region, adjoining to the base of the cervix. It is commonly the result of extension of ehronic inflammation of the cervix, and in some instances of the acute or sub-acute state of the disease. In these instances it may exist either in the anterior wall, or in one of the lateral walls, of the uterus.

63. *a. The symptoms* vary much with the exact seat of the disease, and with the periods during or near menses. In the intervals between these periods the patients are comparatively easy; the local symptoms are either much mitigated, or but little complained of; and fever is either slight, or experienced chiefly in the evening or night. In many cases, however, the functions of digestion, assimilation, and nutrition are impaired, and various nervous symptoms are experienced. When the vascular determination preceding menstruation supervenes, then all the symptoms characterizing the disease are developed. A constant, dull, aching pain is felt in the lower hypogastric region, behind and a little above the pubis, and in the left or right ovarian regions, most frequently the left. A dull aching pain is also present under the left mamma or in the left hypochondrium, in the lumbar-sacral region, extending around the hips, and down the insides of the thighs, and is often more complained of than the deep-seated pain in the pelvis. Walking, descending a stair, or riding in a carriage, and every kind of motion, are extremely painful, more especially before, during, and after menstruation; and in some cases are then agonizing. On the accession of this period, the patient's sufferings are sometimes aggravated by sickness and vomiting.

64. On examination per vaginam, in addition to co-existing disease of the cervix, the seat of disease is easily detected. The finger, when passed to the base of the cervix, and around it, meets with an exceedingly sensitive elevation, in some cases regular, in others irregular, but spherical. Pressure on the tumefied part is very painful. Occasionally there is hardly any perceptible swelling, but exquisite tenderness, pressure giving rise to sickness. The womb is generally movable, but the attempt to move it is attended by pain and nausea. Owing to its mobility, inflammation and enlargement of a portion of the uterus is generally attended by more or less displacement of the organ, which falls more or less in the direction of its enlargement. If the posterior wall be the seat of enlargement, as is most commonly the case, the organ falls backward towards the cavity of the sacrum, and the cervix is turned upward and towards the pubis, producing *retroversion*; but never in such a manner as to press upon the urethra, as sometimes occurs in retroversion during pregnancy. The cervix, however, may remain in its usual position, and not be anteverted, it forming an angle with the body of the uterus, which is said to be *retroflexed*. If it be the anterior wall which is tumefied, the uterus may fall forward, especially in married females, and occasion *anteversion*. When retroversion is connected with much enlargement, the uterus presses upon the rectum, and becomes a mechanical obstruction to the process of defæcation. In both forms also of displacement, especially when very marked, considerable disorder



of the functions of the urinary bladder results, the calls to urinate being often, difficult, or otherwise affected. Chronic metritis affecting chiefly one of the sides of the uterus, or associated with disease of the appendages of that side, may likewise occasion more or less displacement in that direction; but this is comparatively rare. Chronic metritis may not be necessarily attended by any vaginal discharge; but such discharge is most frequent, owing to the co-existence of inflammation of the cervix and vagina, and is either mucopurulent, or purulent with a more or less sanguineous tinge.

65. *b. The constitutional symptoms* of this disease, especially when protracted, are well marked, and are, according to my observation, well described by Professor SIMPSON and Dr. H. BENNET. The countenance is generally pale and sallow, and offers an expression of languor and pain; the "*facies uterina*" being more especially manifested by this malady, and particularly during or near the period of menstruation. Emaciation is a frequent sign, although not always recognised or recognisable at first. Nausea is generally present; in the most severe cases it is almost constant; in the less severe, only at the accession or during menstruation. Nausea, or sickness with loathing of food, but without vomiting, is so characteristic a symptom of metritis that, when it is present in chronic inflammation of the cervix, the extension of the disease to the body of the uterus may be inferred. Besides the intimate sympathy existing between the stomach and uterus, numerous other sympathetic derangements occur in the course of the disease, more especially palpitations, heartburn, headache, feverishness, want of sleep, restlessness, morbid states of the urine, constipation, dysuria, painful defæcation, &c.

66. *c. The progress and terminations* of chronic metritis are very variable. It is generally present for some time before the symptoms mentioned above are developed. It is at first attended by slight or obscure symptoms, which become more severe about the period of menstruation, and more and more constant with the advance of time, until the patient is prostrated by their severity and continuance. While recurring menstruation, by the vascular determination and congestion characterizing it, tends to exacerbate the disease, the vascular discharge, especially when considerable, reduces the severity of it, favouring a partial resolution, and perpetuating the chronic condition, when unaided by judicious treatment. When, with the periodical exacerbations, other causes of developing uterine inflammation are conjoined, the chronic may pass on to the acute form, and, in either form, may be extended to the uterine appendages, or even to the peritoneal surface. Cancerous degeneration of this state can rarely or never occur, unless in the cancerous diathesis. The most common consequences of chronic metritis are those already noticed, namely, displacements, enlargements, and the extension of the disease to adjoining organs or parts.

67. *d. Diagnosis.*—Patients affected with chronic metritis, existing either simply or with chronic inflammation and ulceration of the cervix, but a few years ago, were generally considered as subject only to functional dysmenorrhœa, or to displacements of the uterus. Dr. HENRY BENNET referred these latter to chronic metritis,

and viewed them when present as consequences of metritis, which, however, might exist without having as yet been followed by these consequences. Whether or no displacements of the womb ever occur without previous inflammation and its consequences, enlargement, &c., becomes a question, and one which requires solution; but there appears no reason to doubt the fact of the latter often producing and frequently being associated with the former. However, it should not be overlooked that, when an enlargement of the uterus is great, when it is not attended by any considerable pain or tenderness on pressure, it very probably arises from the formation of a fibrous tumour in the uterine walls. In these cases, there is generally displacement in the direction of the uterine tumour. When the tumour is large, it is often attended by more or less inflammatory action; and when this obtains, then both pain and tenderness may be expected. "An inflammatory tumour also of the broad ligaments may be mistaken for chronic metritis, occupying the lateral region of the womb, especially if the tumour be lying on the uterus, as is often the case." The symptoms characterizing the latter affection will be noticed in the sequel; but both affections are sometimes associated.

68. It may be difficult to distinguish *cancer* of the womb from chronic metritis. If the uterine swelling presents nodosities or irregularities of surface; if the pains are lancinating; if the general health is very much impaired; if the patient is sallow, cachectic, emaciated, anæmied, and weak, well-founded suspicions of cancer may be entertained. It is chiefly from the history of the case, and from the consideration of a variety of circumstances, that a correct diagnosis can be formed. Cancer most frequently commences in the cervix, and extends to the body of the organ. But in both situations it is either latent, or it does not come before the physician until it has made considerable progress. It is then, or it soon becomes, immovable, owing to adhesions between the uterus and surrounding tissues. "In chronic metritis there may be adhesions, but they are not of the perfectly immovable nature of those observed in the malignant affection. In cancer, the nodosities and inequalities are sharp, knife-backed, irregular; in chronic metritis, they are spherical and regular in their irregularity. Cancerous tissues are seldom very sensitive to the touch, whereas it is the reverse with the inflamed uterus. Cancer has a tendency to progress and to pass through its periods in the course of a limited space of time, say one, two, or three years. The symptoms indicating the existence of chronic metritis, on the contrary, may generally be traced back for several years, and when recognised, the disease appears to remain nearly stationary, if left to itself. The consideration of these differences will also prevent cancer being mistaken for chronic metritis. If cancer of the uterus has become ulcerated, the distinction is still plainer." (*Op. cit.*, p. 44.)

69. *D. ENLARGEMENT OF THE BODY OF THE UTERUS.*—Hypertrophy, or overgrowth of the uterus, more especially of its body, may in many cases be traced back for weeks or months to an abortion, or a severe labour, or to disease after delivery. It may, however, originate independently of any of the puerperal states. But in most circumstances it commences without marked severity, generally with slight ailment only, and

even when supervening upon abortion or delivery, it manifests merely a state of incomplete convalescence. When inflammation in any form follows either abortion or delivery, the process by which the womb is restored in a few weeks to its condition previously to conception—the *process of Involution*, as termed by ROKITSKY and WEST—is checked. This process takes place in the structure of the uterus, which, having performed its grand function, undergoes a state of degeneration, and a partial conversion into a fatty matter, rendering it more susceptible of being either absorbed or eliminated in the lochia. During the second week after parturition this process is most active; but it proceeds also during the third and even fourth week. The process of reconstruction soon follows, and, according to the German microscopists, cells, nuclei, caudate cells, and the elements of new fibres are formed, and the organ is built up anew. The manner of this reconstruction has not been satisfactorily explained by histologists; but it appears most probable that this renewal goes on *pari passu* with the removal of the old materials. The interior of the uterus undergoes similar changes to those which take place in its substance. "It is not until its lining membrane, with the exception of that of the cervix, has been several times reproduced and then cast off in a state of fatty degeneration, that it resumes the same condition as before impregnation. The occurrence of inflammation appears to interrupt these processes, for, though fatty degeneration of the tissues takes place, yet the removal of the useless material is but imperfectly accomplished, while the elements of the new uterus are themselves, as soon as produced, subjected to the same alteration; and the organ remains, long after the mischief has passed away, increased in size, and, at the same time, composed of a tissue inapt for all the physiological processes of conception, pregnancy, and child-bearing." (WEST, *Lect.*, p. 92.) This result will follow not only the mild, or chronic, or sub-acute states of inflammatory action developed in the organ during the process of involution, but even any excitement of the sexual organs occasioning determination of blood to the organ, more especially sexual intercourse too soon after delivery or abortion.

70. *Symptoms, &c.*—Enlargement of the uterus consequent upon *deficient involution* may continue a considerable time without causing more at first than protracted convalescence, and a feeling of local and general ailment; but generally farther disorder ensues, often with increased organic lesion. A sense of weight and bearing down; pains deep in the pelvis, back, and sacrum, often extending to the hips and thighs, numbness or pains in the limbs; difficult and painful defæcation, frequent micturition, &c., are usually complained of. After a time various complications of this lesion occur, more especially prolapsus, retroversion, congestion or chronic inflammation, frequent, or difficult, or excessive menstruation, &c.

71 *True hypertrophy*, or enlargement of the uterus independently of defective involution, occurs in both married and unmarried females. Dr. WEST considers that it is met with in the former chiefly, and remarks that "excessive or immoderate sexual intercourse does not produce it, though that leads to its own train of evils; but there has in many instances seemed good reason for associating the condition with the imperfect

performance of that function, and sometimes the evidences of that being the case have been conclusive." There can be no doubt of this being a not infrequent cause, although it is not the only organic lesion consequent upon this cause, ovarian disease being perhaps an equally frequent result. Although true or primary hypertrophy of the uterus may be most frequent in married females, it is by no means rare in the unmarried, especially after twenty-six or twenty-eight years of age, where there is reason to infer that the vice of masturbation has been long practised. It is in this class, as well as in widows, and in married women who have either impotent or nearly impotent husbands, a consequence of frequently-excited and imperfectly-gratified desire. Sexual intercourse is imperfectly performed, and although frequently attempted, never duly consummated; and thus congestion of, or active vascular determination to, the uterus is maintained, without conception and its successive changes taking place, whereby the mischief resulting from reiterated and inefficient sexual efforts is prevented. Hypertrophy of the *neck* of the uterus has already been noticed (§ 30, 31). Enlargements which result from the development of tumours in the organ are more appropriately considered in the sequel.\*

72. iii. INFLAMMATION AND ABSCESS OF THE FALLOPIAN TUBES AND CELLULAR TISSUE.—Inflammation and abscess of the uterine appendages were, until recently, described only as a disease of the puerperal state. Under the head *OVARIA*, I have considered inflammation and other diseases of these organs, independently of the puerperal state; and in the article on *PUERPERAL DISEASES*, "*Puerperal Inflammations of the Uterine Appendages*" have received due attention (§ 187, *et seq.*). It now only remains for me to describe *inflammation and abscess of the Fallopiian Tubes and Cellular Tissues, independently of the puerperal conditions*. This disease has been noticed by MM. GENDRIN, VELPEAU, MARÉCHAL DE CALVI, and by Dr. DOHERTY, CHURCHILL, and LEVER; but it was not fully discussed until Dr.

\* Inasmuch as both hypertrophy and atrophy of the uterus are, in part, normal at the periods of puberty and involution, there is some danger of confounding morbid with the healthy conditions of the organ. Like other organs, the weight and dimensions of the adult, healthy uterus fluctuate considerably. The following measurements will be found sufficiently accurate: Entire length, from 24 to 26 lines; greatest breadth, 18 lines; thickness, 9 lines; cervix, from 10 to 12 lines long; its breadth, from 6 to 8; its thickness, from 5 to 6 lines; length of uterine cavity, 12 lines; its breadth, 9 lines; greatest thickness of the fundus, 5 lines; of the sides, 4 lines; of the cervix, 3 lines. After one or more births, all these measurements increase from one fifth to one quarter. The weight of the uterus varies from 8 to 12 drachms, and may, after several pregnancies, amount to two ounces. Hypertrophy or atrophy may involve the whole or only a part of the organ. An atrophic condition is probably a frequent source of sterility; the organ, and especially the cervix, is small and anæmic, its tissue dense, and the ovaries in an equally undeveloped condition. After the climacteric period the cervix often disappears entirely, and nothing but an indurated ring remains at the summit of the vagina. We meet with hypertrophy of the uterus as a morbid state more frequently than atrophy, partly the result of irritation set up by other morbid processes, and partly as an exaggerated expression of the normal condition. The former may consist in fibrous or other tumours, involving the substance or cavity of the uterus, which may give rise eventually to expulsive efforts, or blenorrhagic affections of the mucous surfaces. Disease of the ovaries may also give rise to it by the consensual irritation thus set up. Where hypertrophy is confined to the cervix, the anterior lip is more frequently enlarged than the posterior.]



HENRY BENNET directed due attention to it in his work on *Inflammation of the Uterus and Appendages*. This malady in the puerperal states is always severe and generally dangerous; but in the non-puerperal conditions it is commonly much more mild, and is often either not recognised or confounded with other diseases. Indeed, inflammation of the uterine appendages occurring after parturition presents as great difference from the same disease in the ordinary state of the system as puerperal metritis offers to non-puerperal metritis. In the puerperal states of these maladies, as I have shown, inflammations of the womb, ovaries, Fallopian tubes, cellular tissues, &c., have a tendency to extend to the peritoneum, or to diffuse themselves, and produce most important and often fatal consecutive changes. But in the non-puerperal form, there is a tendency to assume the sthenic instead of the asthenic diathesis, and to limit itself to the tissues primarily attacked; peritonitis and other consecutive or fatal alterations rarely occurring.

73. *a.* The causes of non-puerperal inflammation of the Fallopian tubes are the same as those which more commonly produce metritis (§ 10, 22) and ovaritis (§ 6, *et seq.*); especially arrested menstruation, disordered states of this function, and abortive impregnation.

74. The inflammation may originate either in the cellular tissue, in the ovaries, in the tubes, or in the uterus, the disease of the one structure often extending more or less to the others. This extension of inflammatory action from the one part to the rest and to the peritoneum is most remarkable in the puerperal states (*see* OVARIA, § 6, *et seq.*, art. PUERPERAL DISEASE, § 181, *et seq.*), but it is much less so in the non-puerperal condition, the disease being generally limited to the cellular tissue, and to the organs contained between the folds of the peritoneum, this surface seldom being implicated in this condition. Dr. H. BENNET states that he has repeatedly seen inflammation of the Fallopian tubes supervene in females labouring under chronic inflammation or ulceration of the cervix uteri, this latter being the point of departure of the inflammatory action.

75. *b.* The symptoms of non-puerperal inflammation of the uterine appendages are nearly the same as those of acute metritis (§ 53). These are the usual febrile phenomena: severe pains in the lower hypogastric region, increased on stretching the body to the erect posture, or on walking; a sense of weight and tenderness deep in the pelvis; difficult or painful micturition and defæcation, &c. These symptoms are also present in metritis; but the pain is greatest in the ovarian region, to the right or left of the median line, where, if the ovarium be much affected, some degree of swelling may be perceived. So nearly, as may be expected, does the one disease approach to the other in characters and course, that, unless there be from the first a deep-seated tumour of an inflammatory nature perceptible in one or both ovarian regions on external pressure, it is most difficult to distinguish the one malady from the other by any other means than by a careful digital examination. The bladder having been emptied, the patient placed on her back, and the knees flexed, the finger should be passed into the vagina, and carried underneath and round the cervix, the left hand being firmly applied over the hypogastric region, above the pubis. By pushing the vaginal cul de sac by the finger in the several

directions around the cervix, especially while external pressure is being made, the presence of inflammation of the cellular tissue, ovaries, and Fallopian tubes, or of its consequences, is evinced by an unusual resistance on the side or sides of the uterus. "The vaginal cul de sac has disappeared, and resting on the side of the cervix and body of the uterus, there is an indurated swelling, very different from the normal condition, and from what obtains on the other or healthy side, supposing disease to exist on one side only, as is most frequently the case. Pressure on the indurated parts is attended by very great pain, and there is a marked increase of the natural heat." By directing the finger around the inflammatory tumour, while the left hand is pressed downward, the tumour is found to be movable and distinct from the parietes of the pelvis. This tumour being generally situated close to the side of the uterus, seems to form one mass with this organ. Hence inflammation of the lateral ligaments may be confounded with metritis even when a vaginal examination is resorted to, and an inflammatory swelling recognised. If this examination should not be satisfactory, the uterus and appendages may be farther examined per anum. Dr. H. BENNET believes that a tumour formed by an inflamed lateral ligament is more intimately connected with the uterus when it is purely phlegmonous, or the result of inflammation of the cellular tissue, than when it is formed by the inflamed ovary. It is, however, very difficult to distinguish between these and acute or chronic metritis.

76. *c. Progress and Terminations* — In the acute stage, inflammation of the lateral ligaments is attended by the usual train of febrile symptoms. As it passes into a chronic state, it occasions numerous morbid phenomena, which have been noticed as characterizing other chronic uterine diseases, especially dyspepsia, cephalalgia, constipation, palpitation, insomnia, debility, emaciation, evening exacerbations of fever, &c. It may terminate in resolution in the first stage, when promptly and judiciously treated; but, unlike metritis, which very rarely, in the non-puerperal state, terminates in suppuration, inflammation of the Fallopian tubes, especially when seated chiefly in the cellular tissue, generally ends in suppuration—it being purely phlegmonous inflammation.

77. *d. Suppuration* may be expected in the course of a few days from the commencement of the inflammation, unless checked by early and energetic treatment. The occurrence of rigors, followed by sweats, and a temporary abatement of the more acute symptoms, and sometimes a deep-seated fluctuation perceptible to the touch through the vagina, or even through the abdominal parietes, indicate the presence of suppuration. The purulent collection in this part is rarely absorbed; but it generally finds an exit, before the acute inflammatory symptoms have subsided. Adhesive inflammation connects the abscess with either the vagina, rectum, abdominal parietes, or bladder, the contained pus making its way after a variable period in one or other of these directions, most frequently in the upper part of the vagina, or in the rectum. It very rarely opens into the bladder or abdominal parietes. It sometimes opens in more than one situation successively. The abscess may, however, ulcerate through the peritoneal folds of the lateral ligament, and be evacuated into the peritoneum, causing acute peritonitis; or "the purulent mat-

ter may pass along the round ligament and appear in the labia externa, or, escaping from the pelvis along with the large femoral vessels, follow their course, and point in the thigh. These, however, are quite exceptional cases, and are very rarely met with, especially in the non-puerperal form of the disease."

78 *e.* The abscess generally opens into the vagina or rectum, or into both. The perforation commonly occurs during exertion, or when coughing, or in the act of defæcation; and the purulent discharge is very frequently either mistaken for an increased flow of the whites, or overlooked when it is passed from the rectum with the stools. This usually obtains when the disease is either not recognised, or viewed as metritis. In some cases, the perforation is attended by a sense of bursting. The discharge may take place a few days after the development of the inflammation, or not until after several weeks. The quantity of pus discharged varies from a few drachms to half a pint. The opening of the abscess into the vagina is the most favourable issue that can occur. The pus occasions some irritation of the vagina, but this is seldom considerable. The opening of the abscess into the rectum is the next most favourable termination, but it generally causes considerable irritation of this bowel, with dysenteric stools or tenesmus. The perforation of the bladder or of the abdominal parietes by the abscess is so rare, and the occurrence so manifest, that the phenomena attending it require no remark, farther than that, as in the case of the rectum, the urine does not pass through the opening, owing to the pressure of the abdominal organs keeping the opening closed.

79. When the pus is discharged, a decided lull is observed in all the symptoms. The deep-seated pains, the tenderness and swelling, and the febrile disturbance rapidly subside. When the abscess has opened into the vagina, the improvement is often rapid, and the patient is believed to be convalescent. But, as Dr. H. BENNET justly observes, this improvement is often deceptive, with reference to the future. On making a careful examination, the tumour on the side of the uterus is diminished in size, and is much less sensitive to the touch; but, although less in size and less inflamed, it is nearly always still perceptible; and the symptoms indicating chronic uterine inflammation generally exist; pain, heaviness, bearing down, tenderness, often swelling in one or both ovarian regions; pain in the back, inability to stand erect, or to walk for any time, or to go up and down stairs, being complained of. The orifice by which the pus was discharged may remain open, or it may close. In the former case the pus escapes as it is formed, and after some time it becomes closed, and the tumour is resolved, the disease being brought to a close in the course of a few weeks, or of a month or two. This, however, occurs only in some cases; for in others the closing of the orifice is followed by a re-formation of the abscess; and before it again escapes, by the former or another opening, the acute inflammatory symptoms previously experienced are reproduced, generally in a mitigated form. The vascular determination attending menstruation favours the reappearance of acute symptoms, and thereby perpetuates the disease. These returns of the malady become less and less frequent as the inflammatory swelling of the uterine appendages diminishes, and as the struc-

turés return to their natural condition. "A female who has suffered inflammation and suppuration of the lateral ligaments, even in its mildest form, may be from several months to one or more years before all trace of local inflammation has disappeared, and before she can be said to be radically well." During this period she is never quite free from symptoms of uterine irritation, or of slight exacerbations of her former malady, especially at the menstrual periods, which are often delayed or irregular; the quantity of discharge being generally scanty, seldom excessive. A leucorrhæal discharge is always present, in various quantity. (*See Puerperal Diseases*, § 181, *et seq.*)

80. *f.* The Prognosis of this disease in the non-puerperal state is not serious as regards the life of the patient: in the puerperal state it is much more serious (*see Puerperal Diseases*, § 183, and 256, *et seq.*), and often most unfavourable. Apart from this state, this disease seldom terminates fatally, although it entails suffering for months or even for years. Acute metritis generally terminates by resolution, under judicious treatment (§ 111, *et seq.*), without suppuration, and without consecutive lesion; but inflammation of the lateral ligaments, although apparently not a more severe disease at its commencement, and period of full development, occasions lesions which time only can remove, or which are never completely removed.

81. *iv.* ASSOCIATIONS OR COMPLICATIONS OF INFLAMMATIONS OF THE UTERUS, &c.—Inflammation of the vagina and vulva may be associated with inflammation of the neck of the uterus, or even with internal or endo-metritis also; and the inflammation may commence either in the vulva or vagina, and extend to the neck of the womb, or in this latter, and extend to the former. In cases of *gonorrhæal inflammation* of the neck of the womb, it may be inferred that the inflammation commences most frequently in the vulva and vagina; but such may not always be the case; for it is not improbable that the neck of the uterus is sometimes primarily affected. In the cases, fortunately rare, in which septic or contaminating causes produce an asthenic or diffusive form of vaginitis, as well as in gonorrhæal inflammation, the disease is always prone to extend from the neck to the internal surface of the womb, and even also to the uterine appendages.

82. Various derangements of the uterus, formerly considered as functional, are in most cases merely symptoms or associations of inflammation of the cervix and internal surface of the uterus, as Dr. H. BENNET has fully succeeded in demonstrating, and as I have stated to be the case in several forms of LEUCORRŒA, and of disordered MENSTRUATION. The leucorrhæal discharge varies with the tissue affected and the nature of the affection. It may consist of natural mucus from the mucous follicles of the vulva, vagina, and cervix uteri; of a white creamy mucus secreted by the mucous membrane of the cervix and vagina, from congestion of this membrane, such congestion not always amounting to disease; and of a puriform mucus, or a white or ropy transparent mucus mixed with pus, which is always the product of inflammatory action and of its consequences. These three forms of vaginal discharge may be combined in chronic inflammation of the cervix. But this disease may exist without any leucorrhæal discharge whatever, the morbid se-



cretions being absorbed in the vagina. (See *art. LEUCORRŒA*, § 19, *et seq.*)

83. Amenorrhœa and other menstrual disorders are often consequences or complications of uterine inflammations. Dysmenorrhœa is very frequently a result of inflammation of the cervix uteri; and when thus associated, other disorders are often superinduced, more especially the several states of, hysteria, convulsive affections, spinal irritation, &c. The changes which take place in the cervix and its canal, in consequence of inflammation or ulceration of them, are often such as occasion difficult menstruation as the consequence of contraction of the os internum, or of the canal which forms the cavity of the cervix. The swelling and hypertrophy of the cervix are frequently associated with this contraction, when the cervical canal itself is not the chief seat of inflammation. Dr. SIMPSON believes that, unless the uterine sound pass, without effort, into the uterine cavity, there is contraction of the os internum; while Dr. HENRY BENNET contends that there exists, at the os internum, a kind of muscular sphincter, formed by a strong band of the circular muscular fibres of the cervix, and destined to close the uterus during pregnancy; and that this sphincter in the healthy state prevents the uterine sound from passing into the uterus without considerable pressure be made; and he adds, that when the inflammation of the cervix ascends as far as the os internum, or when endo-metritis exists, or the organ is enlarged by the formation of tumours in its body, then the sound passes readily into the uterine cavity, thereby furnishing a sign of the presence of these diseases.

84. It has been considered that *menorrhagia* and *uterine hæmorrhage* generally are results of active or passive congestion, or of tumours or polypi, or of malignant disease, of the womb. Dr. HENRY BENNET, however, contends, and with apparently much truth as well as talent, that, in the absence of malignant disease and of uterine tumours, the quantity of blood lost during menstruation is seldom increased, for a continuance, so as to constitute menorrhagia, and that the menstrual periods are seldom morbidly approximated, unless there exist some degree of chronic inflammatory disease of the cervix, or unless menstruation be finally disappearing. Congestion of the uterus he admits to exist in menorrhagia, but it is generally the result of inflammation of the cervix; and it assumes an active or passive character, according to the constitution of the patient, and to the amount of reaction produced by the disease on the system. If the inflammation is active and has not debilitated the patient, the hæmorrhage is also active or sthenic. If the disease of the cervix has existed long, and has produced anæmia or debility, the hæmorrhage is passive or asthenic. It is difficult to explain the reason why inflammation, granulation, or ulceration of the cervix should, in some cases, render menstruation scanty, too rare, or difficult, and in others profuse or too frequent. But the fact is proved by observation, and it may be referred to the states of innervation of the uterine organs in different persons, and to the sympathies exerted between this very sensitive part of the uterine organs, in connexion with the vascular conditions of these organs, and of the system generally. Dr. BENNET, however, believes that, where the inflammation extends to the body of the womb, menstruation is generally scanty or retarded;

whereas, when it is limited to the cervix, it is often profuse or more frequent than usual. Although this association of inflammation of the cervix uteri with disordered menstruation is so common, as now stated, still cases occur in which this latter must be referred to other pathological sources. Indeed profuse menstruation is occasionally produced by mere congestion or determination of blood to the uterus, independently of the existence of inflammation of the cervix, especially when the catamenia are finally disappearing. The association of inflammatory ulceration of the cervix uteri with hæmorrhage during pregnancy, in the opinion of Dr. H. BENNET, very frequently exists; the former being the source of the latter, and thus furnishing a natural explanation of the presumed menstruation of pregnant females.

85. That chronic inflammation of the neck and of the body of the uterus should occasion, and be associated with, *sterility*, with *abortion*, with *hysteria*, in its several forms; with *spinal irritation*, with *chlorosis*, and with various anomalous *neuralgic* and other *affections*, in different cases, according to the circumstances peculiar to the individual, cannot be doubted, although the relation between it and these ailments was overlooked until Dr. H. BENNET and some contemporary physicians, British and continental, insisted upon the fact of its frequent existence. Besides the complications of this disease with these complaints, the former is often associated with other lesions of the uterus itself and its appendages, as with *enlargements*, *polypi*, and *fibrous tumours* of the womb; with the various forms of *displacement* of the organ, with *lesions* of the *ovaria*, and with *uterine phlebitis*.

86. Besides the above associations, others affecting the adjoining organs or parts are not infrequent, and are to be viewed as being much more frequently consequent upon chronic inflammation of the cervix and body of the uterus, than existing as the primary affections. Inflammation of the urinary bladder, or of the rectum and sigmoid flexure of the colon, more especially of their mucous surfaces; hæmorrhoids, and prolapsus or fissures of the anus, and syphilitic disease of the cervix uteri, severally occur as complications of one or other of the forms of metritis. Of these the diseases of the rectum and urinary bladder are chiefly consequences of the extension of severe or protracted inflammation of the cervix and body of the womb, sometimes extending also to the uterine appendages, these latter, in a few instances, being the medium of morbid connexion between the different maladies. It is comparatively more rare for disease of the large bowels, or of the bladder, to occasion any of the forms of metritis, than for this last to cause, by the extension of inflammatory action, one or other of the former. Yet I have seen instances, in the non-puerperal states, of metritis which had supervened on dysentery, and even of asthenic inflammation, that had extended to most of the pelvic viscera, consequent upon a dysenteric attack. Such complications as these are, however, much more frequent and fatal in the puerperal states; and in these the veins are also very commonly implicated. This complication of metritis with uterine phlebitis may occur even in the non-puerperal state, as I have seen in a few instances. In a very remarkable case of this kind, which was seen in consultation with me by Dr. R. LEE,

metritis supervened upon dysentery in a married lady, aged about 35 years, and who had not been pregnant for several years. Uterine phlebitis also took place, and was followed by phlegmasia dolens. Inflammation of the cæcum and pericæcal tissues may extend to the uterus and uterine appendages; but this is a very rare occurrence.

87. III. TREATMENT OF INFLAMMATIONS OF THE UTERUS AND APPENDAGES.—Much of what I have stated above respecting the treatment of the nervous and irritable states of the womb (see § 13, *et seq.*) is applicable to inflammatory action in either the cervix or body of the organ. It is manifest that, as the several inflammatory states of the uterus, whatever may be their precise seats, occur in the nervous, the debilitated, the anæmied, as well as in the plethoric and the robust, the treatment, especially the general or constitutional, must depend in great measure on the knowledge, acumen, and experience of the physician, by which he is enabled to ascertain the precise peculiarities of each case. A most important part, however, of the treatment is entirely local or surgical; but, in the management of female diseases, no division should be made into medical and surgical means, for here, as in all other departments of practice, surgery, although ancillary to, is also a part of, medicine.

88. I. OF INFLAMMATION OF THE NECK OF THE WOMB, AND ITS CONSEQUENCES.—There are few complaints more prone to relapse, and in its severer states more difficult to remove, than the one now under consideration. But these are not the only evils; the difficulty often of conducting the treatment conformably with the requirements of the case and the prepossessions of the patient, is also a positive obstacle to success, particularly in females whose circumstances of life require exertion, or prevent them from enjoying the requisite comfort and ease, and in unmarried females. The treatment must necessarily depend upon the peculiarities of the case, with what is known or inferred as to its causes, upon the duration of the disease, and upon the alterations which have taken place in the part. But in this, as well as in all other inflammations of the uterus, the *indications of cure* consist, *first*, in subduing inflammatory action and painful symptoms; and, *second*, in restoring the constitutional energies, and thereby the healthy state of the uterus. It often becomes a great difficulty to know when to discontinue the first indication, and when to aim at the second; for a too early adoption of means calculated to restore the health may occasion a relapse of inflammatory action and its attendants.

89. A. *The treatment before any organic lesions have taken place*, and while inflammatory action is unassociated, comprises the two *intentions of cure* just stated (§ 83). The means which are found most successful in fulfilling the *first* intention are the horizontal posture, and quietude of mind and body; injections of an emollient, refrigerant, or anodyne kind; cooling diaphoretics, with or without narcotics, warm or tepid hip-baths, local depletions, alterants, and sometimes derivatives. This state of the disease, especially at its commencement, is so often unattended by severe symptoms, unless when it is associated with the neuralgic and irritable conditions described above (see § 5, *et seq.*), that it seldom comes under medical care; and it is not, commonly, until either excoriations, granulations, or superficial ulcerations, very frequently associated

with *leucorrhæa*, *disordered menstruations*, and *deviations* from the natural position of the womb, that medical aid is resorted to. In all cases, due care should be taken to ascertain the admitted and probable *causes* of the complaint. It will be seen, on referring to these causes (see § 10), that certain of them can hardly be fully ascertained, although they may be inferred with a near approach to certainty; and in some cases they will be admitted by the patient, if inquiries be made with due address. The state of general health should also receive attention, and the treatment be regulated accordingly, and with strict reference to the condition and periods of the uterine functions.

In the *mild cases*, if they have not been of long duration, and if the cause have been only temporary in its operation, and not a persistent or habitual vice, means directed to the improvement of the general health, to the regulation and promotion of the secretions and excretions, more particularly to the prevention of fecal and urinous accumulations, aided by rest, the avoidance of sexual excitement, and by emollient and astringent or refrigerant injections, according to the peculiarities of the case, will be sufficient to restore the health, even without strict reference to the succession of indications of cure mentioned above (§ 88).

90. In *severe cases*, especially in those of long duration, and in those where the above means fail of affording satisfactory relief, the indications of cure stated above should be adopted, more particularly if thickening or enlargement of the cervix or any other of the lesions described as consequences of chronic inflammation be present. For these the means enumerated for fulfilling the *first* indication should be prescribed. For this purpose, constant repose on a couch or sofa, avoiding very warm beds, and the upright or even the sitting posture, vaginal injections, hip-baths, local vascular depletions, and a recourse to caustics, are the means of cure now in general use. But, although the chief remedies, they are not the only ones; and in all cases they should be aided by constitutional and moral treatment, by a proper diet and regimen, if, indeed, the local remedies be not considered as being aids only to the constitutional means. These latter require to be so diversified, according to the temperament, habit of body, strength, and other peculiarities of the case, that a selection of them appropriately to these peculiarities must depend upon the judgment of the physician.

91. a. *Vaginal injections* are often of great service, whether *simple* or *medicated*. They wash away the secretion from the inflamed cervix, and prevent the stagnation of it in the vagina and around the cervix; an occurrence tending to increase irritation and morbid sensibility of the parts. The frequent injection of *cold water* only has not only a cleansing, but also a tonic and healing effect. In some cases the temperature of the water may be heightened somewhat above fifty degrees of Fahrenheit. But in most cases the temperature of spring water is best, the quantity injected, or the duration of the injection, being regulated by the physician.

92. *Medicated injections* are either emollient, astringent, or anodyne. Various emollient injections are of service in slighter cases, and when pain or irritation is experienced; and they may be made vehicles for anodynes. Milk and wa-



ter, decoction of marsh-mallows, linsced tea, &c., may be used, cold or tepid. When irritation is considerable, a small quantity of the bi-borate of soda, or of any of the anodynes, especially vinum opii, tincture of henbane, or tincture of belladonna, may then be added to the above. Injections also of the decoction of poppy-heads, either alone or with chamomile flowers, may be prescribed. Astringent injections are very commonly resorted to in this complaint, especially when the discharge is abundant. In this and the above cases, the means advised for the treatment of *LEUCORRHEA* (see § 16, 17), and of that state of the disease especially which I have ascribed to "*inflammatory action of the mucous glands of the cervix and os uteri*" (§ 23, 24), are quite appropriate. Of the several astringent injections in common use, viz., sulphate of alumina, sulphate of zinc, acetate of lead, solution of nitrate of silver, decoction of oak bark, and solution of tannin, Dr. H. BENNET states that he prefers the first and the solution of nitrate of silver. The first three he uses in the proportion of a drachm to a pint of water, increasing or diminishing the strength according to circumstances. He, however, considers that injections are serviceable chiefly for cleansing the vagina, for diminishing uterine irritation, and for removing vaginal and vulvar inflammation; but that they are generally powerless to subdue confirmed inflammation of the substance of the cervix, or even of the membrane lining its cavity; for he believes that their inefficacy in inflammation of the cervical canal is partly owing to the fluid not reaching the region affected; and that in inflammation of the cervix, a remedy which is only applied to the surface can scarcely be expected to subdue the deep-seated disease. When injections are prescribed, due care should be taken that they are properly administered. The patient should be on her back, with the pelvis raised, and means be used for their retention for a time in the upper part of the vagina.

93. When marked irritability and acute sensibility characterize inflammatory action of the cervix, Dr. DEWEES recommends lukewarm flaxseed tea, to be thrown up by a female syringe of sufficient size three or four times a day, and to be retained there for some time by applying a cloth to the vulva. I have more frequently prescribed, especially for unmarried females, in order to remove the more painful symptoms, injections into the rectum, containing either the extract or the sirup of poppies, or compound tincture of camphor, or vinum opii, or tincture of henbane. In a case of remarkable severity which I attended with the late Dr. MOORE, a small quantity of tincture of belladonna was pressed from a piece of sponge contained in a syringe, when introduced as far as the cervix uteri, and always afforded immediate relief.

94 *b Baths*.—Warm *hip-baths* at the temperature of 90° are occasionally of service. Dr. J. H. BENNET advises them at a temperature of 63° to 85° Fahrenheit, according to the season of the year and feelings of the patient. At this temperature they have a sedative effect, while at higher degrees he believes that they determine the circulation to the pelvis. In painful or difficult menstruation, a temperature of 94° to 98° is often decidedly beneficial. Dr. GOOCH states that he has found a partial steam-bath, used by drawing the flannel sack up to the præcordia, so as to enclose

the abdomen and extremities, these being exposed to the action of the steam for half an hour every day, preferable to the warm hip-bath. Entire warm baths are useful in winter, when only occasionally resorted to, and when they can be had in the patient's house or apartment. During summer a tepid bath at 65° or 70° is of service every second, or third, or fourth day. Cold and shower baths should be reserved for advanced convalescence, and are important means for fulfilling the second intention of cure.

95. *c. Vascular Depletions*.—These should be chiefly local; and, with all respect for those who cultivate this specialty, I cannot agree with them in the choice of situation from which the blood should be abstracted. The situation preferred by the more recent writers on diseases of the uterus is the inflamed cervix itself; but the several difficulties in the way of the general physician, if he be averse to the manipulation which this practice involves, and if he have due regard to the feelings of the patient, and even in some cases to sentiments of virgin purity, will induce him to choose other situations than this one from which blood may, in this disease, be abstracted with advantage, and to have recourse to other and various means by which the end in view may be accomplished. I know that in all cases where this and other appliances to the neck of the womb are resorted to by physicians who practise in this especial department the utmost attentions are paid by them to the modest feelings of the patient, and to all decent, and even delicate observances; but I should prefer having recourse, in the first place, to such means as cannot be objected to by the sensitive mind, or even by the captious; and leave such measures as may become matters of reproach to both the patient and physician, although most unjustly, to the necessities of the case—as a *dernier ressort* in practice. I may write under prejudice in favour of older modes of practice, for I have employed these and seen the benefits they afford, when judiciously employed and combined; but I nevertheless admit that the measures more recently had recourse to are often more quickly successful, and sometimes succeed after the others have failed.

96. Local abstractions of blood should be directed as near as possible to the seat of pain. Cupping is more serviceable than leeches, particularly when the pulse is full or firm, and the patient not reduced. In these cases, or when the patient is young and plethoric, or when the menstrual discharge has been scanty for some time previously, a general depletion will be advantageously premised, and more especially when the blood is taken from the feet when immersed in warm water. When pain is referred to the sacrum, cupping may be directed on this part. Leeches are generally most beneficial when applied to the vicinity of the anus, or the labia pudendæ, or to the inner parts of the tops of the thighs just below the vulva or groins. The quantity of blood that may be taken away should depend upon the habit of body, the state of the circulation, and on the severity and duration of the complaint. My objections to the application of leeches to the cervix uteri are, 1st, those already hinted at above, and particularly in respect of unmarried females; and, 2d, the risk of the application of them to this part being followed by an excessive determination of blood to the organ, or by ulceration of their bites, and consequently

increased irritation. It will, however, be admitted that these are contingencies which may seldom occur; nevertheless, they should not be hazarded.

97. The repetition of local depletion should necessarily depend upon the effect of the previous operation, and upon the circumstances just mentioned. In cases of long continuance, when the constitution is much enfeebled, even local depletion is but ill borne, and should seldom exceed from four to six ounces. In these its repetition is rarely attended with much advantage. But when the repetition seems required and gives relief, it should generally be to a smaller amount than the first, and be performed at a time when the return or increase of pain is anticipated. In this way it may be repeated thrice, or even more frequently, to the small amount now named. There are, however, instances where even a small local depletion aggravates the symptoms. These occur chiefly in weak, nervous, or anæmied females, and in cases of long standing, or where the leucorrhœal discharge has been long profuse. In this class of patients the *second indication* of cure (§ 88) should be immediately adopted.

98. Dr. HENRY BENNET remarks that the application of leeches to the cervix uteri, when often repeated, is more frequently injurious than beneficial, and that the consequences mentioned above then frequently result from them. I must, however, refer the reader to his work for many judicious observations respecting the local employment of leeches in this disease. Dr. WEST states that, "so long as acute symptoms are present, or whenever they reappear in the chronic stage of the disorder, local leeching generally affords more speedy and more decided relief than other remedial means. The leeches should be applied to the uterus itself; not above four in number at a time; nor is it in general expedient to repeat their application above once in a week or ten days. Another precaution consists in never leeching the womb within four or five days of a menstrual period; lest the regularity of that function be disturbed, either by being brought on prematurely or (which is much less frequent) by its occurrence being postponed for several days. The pain which is left behind after menstruation in some of these cases—in those especially in which the discharge is scanty—is, however, often very greatly relieved by the application of a few leeches as the period passes off." (*Lect.*, p. 140.)

99. *d. Cooling aperients* are generally required both at the commencement and during the course of treatment, owing to the state of the bowels and to the effects of narcotics taken from time to time. Those aperients which will operate copiously once, or twice at most, and without irritating the lower bowels, are the most eligible. Castor oil, the elctuary or confection of senna, either alone or with sulphur and bi-tartrate of potash, will prove the most certain. In very chronic cases, or when the digestive organs and the system generally are much weakened, rhubarb and magnesia; or the compound infusions of gentian and senna, in equal parts, with tartrate of potash, tincture of henbane, and tincture of cardamoms, will be found of service.

100. *e. Narcotics or sedatives* are often required, not only in the injections, as advised above, but also in the medicines taken by the mouth, or ad-

ministered in enemata. They are most serviceable after a gentle action on the bowels has been produced. Camphor, in the dose of one or two grains, with the nitrate of potash and the extract either of henbane, or of hemlock, or of poppy, given in the form of pill twice or thrice daily, or about ten grains of either of these extracts, dissolved in water gruel and injected up the rectum, immediately after the bowels have acted, will frequently afford relief when much pain is experienced. Subsequently the bitter infusions may be prescribed with tincture of henbane, and small doses of nitrate of potash and bicarbonate of potash or of soda. These means also serve to diminish irritability of the bladder by which uterine inflammation is often attended. If deposits of the phosphates exist in the urine, small doses of hydrochloric acid, with tincture of henbane and extract of pareira, prescribed in the infusion of calumba, or of orange peel, generally are of service.

101. *f. External applications* of various kinds have been recommended, as the croton-oil liniment (one part of the oil to ten of simple camphor liniment), by Dr. WEST, to be applied over the sacrum by means of a sponge twice a day; in order to relieve the back-ache, plasters of opium or of belladonna, to the same situation, and with the same intention; and a small blister, or an anodyne liniment, applied over the part, when pain is urgent in either iliac region. Dr. OLDHAM advises the following in this latter situation:

No. 365. R Extracti Belladonnæ, ʒss.; Tinct. Aconiti (Fleming's), ʒiv.; Linimenti Saponis Comp., ʒjss. Misce. Fiat Linimentum.

In cases where pain either in the back, sacrum, or iliac regions is most severe, I have found more relief procured from an embrocation, frequently recommended in this work, consisting of equal parts of the compound camphor liniment, of the turpentine liniment, with variable proportions of sweet oil and cajuput oil, applied over the part on folds of flannel or spongiopiline, than from any other application. Warm turpentine stupes are also very beneficial.

102. *B. When inflammation of the uterus is attended by granulations, excoriations, ulceration, and hypertrophy of the cervix*, additional means to those already mentioned are recommended, especially by recent writers on uterine diseases. Dr. HENRY BENNET states, that the solid nitrate of silver, or a strong solution, should be applied every three or four days to the inflamed mucous membrane covering the cervix, where there is neither ulceration nor hypertrophy of this part; and this treatment should be the first resorted to when the cavity of the cervix is inflamed, "carrying the caustic into the cervical cavity as far as it will pass." When ulceration and hypertrophy of the neck of the uterus are present, he adds that the means already advised seldom succeed in effecting a cure, unless the ulceration be recent, although they mitigate the severer symptoms; a relapse occurring in a short time. Repeated relapses, and a perpetuation of ulceration of the cervix and cervical canal, are the consequences of palliation merely, owing to the repeated determination of blood to the uterus during the menstrual periods. Should the disease not yield (and it seldom does) to the antiphlogistic means directed as above, the most efficacious treatment, he remarks, "indeed the only one that can be depended upon, is by direct stimulation of the dis-



ceased and ulcerated surface, and to modify its vitality in such a manner as to induce a healthy action, and, finally, cicatrization. This end is obtained by the use of caustics of varied strength, according to the nature and extent of the disease, its chronicity, and the effects produced." "We must first subdue sub-acute inflammatory action by emollients, depletion, and astringents; and then modify, by direct stimulation, the diseased surface, so as to substitute healthy reparative inflammation for morbid ulcerative inflammation."

103. The last part to heal in an ulceration of the neck of the uterus is that which dips into the cervical cavity. Dr. BENNET therefore insists upon the necessity of separating the lips of the os with a bivalve speculum, in a good light, and of thus carefully exploring the state of the cervical canal before the disease is pronounced to be cured. Unless this precaution be used, the ulceration may be only partially cured, and the disease will return and extend over the cervix in a few months. The agents recommended for the cure of disease of the cervix—for chronic inflammation, excoriations, granulations, ulcerations, with or without enlargement, induration and deviations—are chiefly the more energetic caustics, which he enumerates in the order of their powers of cauterization: The solution of, and the solid nitrate of silver, the mineral acids, the acid nitrate of mercury, potassa fusa, potassa cum calce, and the actual cautery. It is obvious that a recourse to either of these requires both address and careful appliances. The nitrate of silver, acid nitrate of mercury, and potassa cum calce, are chiefly recommended by British writers on uterine diseases; these and the actual cautery also being much employed by French physicians. For very full directions for the use of these caustics, I must recommend the reader to the works of Dr. J. HENRY BENNET, Dr. SIMPSON, and of the other writers mentioned above; but as the directions given for the use of these means by Dr. WEST are more succinct, I shall give them nearly in his words; premising, however, that the able and experienced physicians now named generally have recourse to the more energetic of these caustics in the most severe and protracted cases, and when more or less hypertrophy of the cervix is associated with other lesions.

104. When the granulations on the os and cervix uteri become large, soft, very vascular, and bleed easily, the surface furnishing a copious glairy discharge, sexual intercourse being painful and often followed by bleeding, Dr. WEST then recommends "extensive scarifications, which may be followed by the daily application of powdered alum on a piece of cotton-wool, or by the introduction of a piece of cotton-wool soaked in a strong solution of alum. By means of a piece of thread tied to the cotton-wool, it can be removed by the patient herself in the course of a few hours, though it must always be introduced through the speculum. In the greater number of instances the state of the os uteri becomes so much improved in four or five days, that this mode of treatment may then be dispensed with, and the sedulous employment of strong astringent injections will usually suffice to complete the patient's cure. When this is not the case, but the morbid condition still continues, more powerful applications may be needed. The nitrate of silver is not in general suitable in these cases, for its application

is often followed by pain and also by bleeding. The acid nitrate of mercury, both in this instance and also whenever a strong caustic is required, has seemed the most useful application; and with moderate care its employment is unattended by risk. When it is used, however, the patient must lie on her back, and one of COXETER's bivalve speculums being introduced so as thoroughly to expose the os uteri and include the cervix, a little cotton-wool must be carefully disposed all round the edge of the speculum, so as to absorb any of the superfluous acid, and to prevent it from running down outside the speculum, and thus injuring the vagina. A brush can easily be extemporized by trimming a little piece of cotton-wool after it is placed in the holder, and the whole diseased surface may then be painted over with the caustic, which immediately forms upon it a white eschar. A piece of dry cotton-wool now pressed against the part will absorb any superfluous caustic; the little strips placed around the edges of the speculum may then be removed, and the speculum withdrawn." As an additional precaution, a piece of moistened cotton-wool may be introduced up to the os uteri, before the withdrawal of the speculum, whence it may be removed in the course of a few hours, by the patient. "It is seldom that either pain or bleeding follows this application; and at the end of a week the eschar will usually be separated; the surface will be found to have lost its fungous character, and cicatrization to be commencing at its edges. A zinc lotion of about five grains to the ounce, or the black wash employed as a vaginal injection twice a day, will now generally be sufficient; but sometimes the surface puts on an indolent character again, and it may then be expedient to touch it once or twice with the nitrate of silver, and I have occasionally found it necessary to repeat the application of the acid nitrate of mercury." (*Lect.* p. 146.) Dr. HENRY BENNET employs, as escharotics, either the acid nitrate of mercury, or the potassa cum calce, fused in sticks of three different sizes, according to the peculiarities of the local lesion; and gives ample directions for the use of these and other caustics, appropriately to the circumstances of the disease. He, however, admits that cauterization of the cervix is an operation not without danger, and must, therefore, be either injudiciously resorted to or carelessly carried out. Although his own "practice has been hitherto free, or all but free, from serious accidents, the same immunity cannot always be expected. Indeed, I recently learned from M. GENDRIN that within the last few years he has had several cases of acute metritis and of abscess in the lateral ligaments, the evident and immediate result of deep cauterization. But he also tells me that he has seen the same results follow the use of the nitrate of silver and of injections; and I may mention that the two most severe instances of acute metritis that I have myself witnessed for some time in the unimpregnated womb occurred after the use of weak astringent vaginal injections." (*Op. cit.*, p. 426.) I believe, however, when vaginal injections are followed by those severe results, that the inflammation of the cervix, or the leucorrhœa, for which these means were used, was only a part of the existing lesion; and that endo-metritis, or a chronic metritis, had also existed at the same time, and was developed into the acute state by the injections.

105. *C. Treatment of Hypertrophy and Induration of the Cervix Uteri.*—These changes are the results of repeated congestion, or of inflammatory congestion and of nutritive hypertrophy. The continued existence, or repeated recurrence of inflammatory congestion, gives rise to increased development of the vessels, to the exudation of plastic lymph, and to the partial organization of this lymph, and to greatly increased size and density of this part of the uterus, often extending partially to the substance of the uterus itself, and associated with *chronic metritis* (§ 62, *et seq.*). This lesion is commonly attended by more or less prolapsi, and often with deviations. The enlarged cervix may, moreover, be excoriated, ulcerated, or covered by granular formations, owing to the alterations of its follicles. The *local means* of cure are those already recommended, aided by the constitutional treatment hereafter to be noticed (§ 106, *et seq.*). Dr. H. BENNET states that, "if hypertrophy resists the ordinary antiphlogistic means of treatment, it never withstands the melting influence of deep cauterization with potassa, or the actual cautery." Of the two he prefers the potassa, or potassa eum calee; Dr. WEST the acid nitrate of mercury. The actual cautery may therefore be dismissed. It should be clearly understood that these means are not intended to destroy the hypertrophied cervix, "but merely to set up an artificial eliminatory inflammation, by means of an eschar or issue, of limited extent, established in the centre of the hypertrophied region. I do not calculate in the remotest degree on the destruction of tissue to which the caustic or cautery gives rise, for diminishing the size of the hypertrophied cervix, but solely and entirely on the *inflammation subsequently set up.*" An eschar of the size of a shilling will answer the purpose of reducing the hypertrophy. It may be necessary to apply the caustic several times. "The ulcerations occasioned by the deep application of potassa heal very rapidly, even when left to themselves. It is better, however, to touch them at intervals with the nitrate of silver, to prevent the granulations from becoming too luxuriant, and to favour the cicatrization, which usually takes place in from four to six weeks."

106. *D. Constitutional and general Treatment.*—The constitutional treatment of chronic inflammation of the cervix and os uteri, and its usual consequences, should not be overlooked, even while local means are being applied. Indeed, in many cases, this treatment should precede a recourse to local measures, these latter only following the failure of the former. In some of the more recent works upon this and other diseases of the uterus, too little importance is attached to the recognition of the causes of the existing malady, and upon the prevention and removal of these causes, which, when removed, the salutary efforts of nature would then of themselves often effect a cure. In this disease especially, as well as in the displacements and deviations of the uterus, sexual excitement and self-pollution are the most frequent causes, and these are usually allowed to continue, owing to the difficulty and delicacy of the subject, to ignorance of medical men of the great frequency of this vice, and to an equal ignorance of the immorality and injurious consequences of it on the part of those who indulge in it.

107. The constitutional treatment which I have adopted for many years, when uterine irritation, as it was then termed, or when chronic inflamma-

tory irritation, as more recently shown, was present, always was much modified, according to the features of the case. If *leucorrhœa* was its prominent character, the means advised when treating of this complaint were prescribed. If the *menstrual function* was disordered, the treatment recommended for the various forms of such disorder was had recourse to; and, whenever inflammatory irritation of the uterus was inferred, then means more or less antiphlogistic were advised, often conjoined with tonics, and with other remedies adapted to the peculiarities of the case. In a very large proportion of the cases of this complaint, the causes which have produced it, and the discharges which characterize it, as well as its exhausting nature and duration, have produced so much debility and irritability, and so extensive a range of sympathetic disorders—nervous, neuralgic, hysterical, cerebro-spinal, vascular, and anæmic—as to imperatively require constitutional treatment, however much the local means above described may be required or confided in. What this treatment should be, or how conjoined with regimen and local measures, must depend upon the acumen of the physician, and upon the appropriate use of each or of all in particular cases and circumstances. But in most cases the patient should recline on a cool hair couch, should sleep, if married, apart from her husband, on a hair mattress, and avoid very warm feather or down beds, all sources of sexual excitement, and whatever appears to aggravate her complaints. She should preserve an open state of the bowels by means of cooling aperients, or of these conjoined with tonics. The bicarbonates of the fixed alkalies may be taken with the nitrate of potash in bitter infusions, or the liquor ammoniæ acetatis with nitrate of potash, in similar vehicles. The terebinthinate embrocation already advised (§ 101) may be employed externally, and a cooling, and yet tonic or restorative, regimen and diet adopted, avoiding much animal food, and all heating and stimulating beverages, as well as coffee and strong tea. In a severe and tedious case, for which I was consulted by Mr. BARNWELL, the following pills proved of very great service:

No. 366. R Camphoræ rasæ, ℥j.; Potassæ Nitratis, ʒj.; Sodæ Sub-carb. exsic., ʒss.; Extr. Hyoscyami, ℥ij.; Syrupi papaveris, q. s. Misce. Fiat massa æqualis, quam divide in Pilulas xxx., quarum binas, ter in die capiat.

After these were taken for some time, they were replaced by the infusion of calumba, bicarbonate of soda, tincture of calumba, and tincture of hyoscyamus.

108. In the above manner, the *second indication* of cure may be initiated, and may thus advance to a more tonic and restorative or nutritious treatment, so as to restore the constitutional energies, and thereby the healthy state and functions of the uterus. This end can be attained only by medicinal and regiminal means, both of which, however, should be commenced with caution. In a few instances I have prescribed, with marked benefit, the *cod-liver oil*, on the surface of a tonic infusion, with one of the mineral acids, as the compound infusion of orange peel with sulphuric acid; or the compound infusion of roses, or the infusion of cinchona with hydrochloric ether or hydrochloric acid, or with both. In other cases, the tonic or bitter infusions or decoctions may be ordered with the alkaline carbonates, nitrate of potash, and tincture either of henbane or of some other anodyne. In cases which have been of long



duration, or have been caused by self-pollutions, or which are characterized by shattered health, by pallor of the countenance, cold extremities, and more or less anæmia, the milder preparations of iron, as the tincture of the muriate or of the acetate of iron, may be prescribed with the preparations of calumba or quassia. Dr. DAVIES states that he has given, in these cases, the phosphate of iron with much benefit. In some cases, especially where there is hypertrophy of the cervix uteri, the iodide of iron may be tried in the sirup of sarzæ; or the iodide of potash may be taken with either the bicarbonate of potash or the solution of potash in a tonic infusion, &c.

109. The *mineral waters*, natural or artificial, may likewise be resorted to, according to the peculiarities of the case. The Bath and Tunbridge waters, the Harrogate waters, the waters of Seltzer, Geilnau, of Ems, of Vichy, of Pymont, &c., have been severally recommended, and found of some service. The *regimen and diet* of the patient are of much importance. If married, she should sleep apart from her husband; and whether married or unmarried, she ought to avoid all causes of excitement and irritation. She should enjoy the advantages of a cool and pure air. The *diet* ought, while febrile and inflammatory symptoms are present, to be light, cooling, and chiefly farinaceous; and animal food should be given in very small quantity, until convalescence is advanced, when it may be taken more liberally. The beverages may consist of toast-water, barley-water, or of lemonade, or of the imperial drink. Afterward, when recovery is far advancing, the Rhénish wines, or claret, or claret and water, &c., may be allowed. In most cases, coffee and tea are inappropriate. Cocoa, or cocoa-nibs, prepared in a simple manner, and dry-toast with little butter, should be preferred. Patients who have caused this complaint by self-pollutions have generally great appetites; and their indulgences in food and in their unnatural vice tend to perpetuate the disease, and to frustrate the treatment. For them, the diet should chiefly consist in a large proportion of vegetable and farinaceous substances, whereby the stomach may be filled, with as little excitement of the circulation as possible. The mind should always be occupied by useful pursuits, and, as much as may be, by agreeable employments.

110. *E. Treatment of Inflammation of the Cervix Uteri in the unmarried, during and after Pregnancy, and in advanced Life.*—A well-informed practitioner may apply what has been already adduced to these circumstances of life, but with due care and precaution. In *unmarried females*, the great difficulty of treatment is in the local or instrumental part; but a recourse to it will depend much upon the severity and other peculiarities of the case, and upon the results of constitutional treatment, which should be previously employed, the causes of the disease having been ascertained, and removed as far as possible. "The existence of *pregnancy*," Dr. H. BENNET states, "so far from being an obstacle to the local treatment of inflammatory and ulcerative disease of the uterine neck, is a strong reason why it should be adopted and carried out without delay, unless the patient have reached the latter period of her pregnancy. If so, as the child is viable, and it is rather difficult to bring the cervix fully into view, it is as well, unless the symptoms be urgent, merely to resort to astringent injections, and to reserve all instru-

mental treatment until after the confinement." In the early or first six months, the local treatment, Dr. B. states, must consist in astringent injections, and cauterization with the nitrate of silver or the acid nitrate of mercury, the potassa cum calce being much too powerful in these cases. If ulcerative disease of the cervix exist after an *abortion or confinement*, he never interferes until four or five weeks have elapsed, and he then cauterizes the diseased surface with the nitrate of silver. If blood be poured out from the ulcerated surface, the cauterization invariably stops it; and the case then falls into the general category. But it should be recollected that, during lactation, the mucous surface of the cervix and vagina presents a vivid red or congested hue, from sympathy with the mammae and nipples; hence this condition should not be mistaken for inflammation, and ought not to be interfered with by treatment. The disease of the cervix in females *past the menstruating age* is generally intractable, and requires the most powerful caustics, but having been removed, the cure is permanent.

111. ii. *TREATMENT OF ACUTE INFLAMMATION OF THE INTERNAL SURFACE AND BODY OF THE UTERUS.*—Although the treatment of *endo-metritis*, by local means, is supposed, especially by some French writers, to be appropriate to this state and seat of the disease, yet such means, however cautiously resorted to, cannot fail of being more or less dangerous. As this form of metritis frequently commences in the cervix or its cavity, extending to the cavity, and to some extent, in most instances, to the substance or body of the organ, and in some cases also to the broad ligaments, these circumstances should always be considered, and the treatment should be prompt and decided. If the patient be young, or strong, or plethoric, especially if the disease has followed the suppression of the catamenia, or of other evacuation or excretion, blood should be taken from the arm, or from a vein in the feet immersed in warm water, and cooling diaphoretics and aperients exhibited. The warm or tepid bath, or hip-bath, may follow the depletion; and, if the pain be severe, camphor, nitrate of potash, and extract of henbane, or extract of belladonna, or a minute dose of aconite, may be prescribed every four or five hours, or after longer intervals, if the belladonna or aconite be given. In the cases just described, local depletions—by leeches applied over the ovarian regions, or below the groins, or by cupping on the loins or sacrum—may be directed after the *blood-letting*, especially if this latter has not produced the desired amount of benefit; indeed, in most cases the local depletions will also be required. In milder cases, and in less robust or plethoric females, the local depletions, when resorted to with decision, will generally be sufficient, especially when the internal or general treatment is judicious. Their repetition may, in some cases, be required, but this, as well as the quantity of blood which should be taken, should depend upon the severity and other features of the case. After the local depletions a tepid bath, and subsequently the terebinthinated epithems and embrocations already advised, may be placed over the hypogastric region, the flannel on which the embrocation is sprinkled having been either warmed or wrung out of hot water.

112. These measures having been employed, time should be allowed for their operation, and for the subsidence of the disease. This latter ob-

ject will, however, be promoted by rest in the horizontal posture; by the avoidance of sexual excitement; by recourse to cooling diaphoretic medicines, especially the liquor ammoniæ acetatis, with small doses of the vinum or liquor antimonii tartarizati, and some anodyne or narcotic. The only aperients allowed should be cooling, and such as may not irritate the rectum: as the citrate or carbonate of magnesia; the phosphate of soda; the acetate or tartrate of potash, prescribed in emollient vehicles, or with either of the preparations of senna or rhubarb. Calomel, or calomel with opium, should not be given in metritis, as it is apt to aggravate the complaint by irritating the rectum; and medicines containing aloes should also be avoided.

113. The *regimen* and *diet* of the patient should be strictly antiphlogistic, and the beverages allowed ought to be demulcent, emollient, and slightly alkaline. As convalescence advances, the alkaline mineral waters of Vichy or Ems may be allowed. When the disease is neglected, or improperly treated, it may extend to the broad ligaments and ovaria, as shown above (§ 72, *et seq.*), or it may lapse into a chronic state; which state, however, may be primary, although it is much more frequently a consequence of chronic inflammation of the cervix, or of the cavity of this part, or of the body of the organ, and is most frequently partial or limited in its seat, as shown above (§ 64).

114. iii. THE TREATMENT OF CHRONIC METRITIS.—Chronic metritis, often commencing in the cervix, is also frequently kept up by the inflammation of this part and its consequences. In most cases, therefore, the disease of the cervix should be first and chiefly attacked, by the means already advised for the several morbid conditions of this part (§ 102, *et seq.*). The chief local means are, rest in the horizontal posture, emollient or astringent vaginal injections, the occasional application of leeches to the cervix, before or after menstruation, according to the period at which they appear most serviceable, and a recourse to anodynes when the sufferings of the patient are severe. These latter, or the narcotics already mentioned (§ 93); a recourse to belladonna, both locally and internally, or to chloroform, or to the hydrochloric ether, or hydrocyanic acid, &c.; the introduction of opiate or other anodyne injections or suppositories into the rectum or vagina; and the external embrocations and epithems already advised (§ 101), are the chief means by which we may hope to remedy this state of disease. In obstinate and protracted cases, M. GENDRIN and Dr. H. BENNET have had recourse to an issue formed above the pubes, keeping it open for some months. In a severe and prolonged case, which I attended with Mr. FLOCKTON, many years before the appearance of this recommendation, I directed an issue to be made below both groins, with the most complete success.

115. The enlargement, partial or general, of the cervix and body of the uterus, in protracted chronic metritis, suggests not merely the local measures noticed above for reducing this enlargement, and the other evils which usually attend it, but also such other general or constitutional means as are sometimes found of service in removing other states of enlargement, morbid deposition or growth. These means may not be of much avail in the disease now under consideration; but the most important of them may be so

employed and combined as to very considerably improve the general health, which is usually injured by the local malady, and to alleviate the sufferings of the patient. These means are, the bichloride of mercury, the preparations of iodine, the iodide of arsenic and mercury, the fixed alkalies and their salts, and the preparations of sarza, severally but separately conjoined with tonics, anodynes, or narcotics, &c. On these principal medicines I proceed to offer a few remarks, in respect to the treatment of chronic metritis and its complications, especially when characterized by enlargement of any part of the uterus.

116. The *bichloride of mercury* is beneficial or injurious, according to the manner of prescribing it. It may be of service even when the constitution has been very remarkably injured by this protracted malady. But it should in most instances, and in these especially, be prescribed either in the fluid extract of sarza, or in the compound tincture of cinchona, or in the decoction or in mixtures, consisting chiefly of all these, with or without some narcotic, as the tincture of conium, or of henbane, &c., or with a few drops of the tincture of opium, or with the compound tincture of camphor, if the medicine should have too relaxing an effect on the bowels. This substance, thus taken, in doses varying from the sixteenth to the eighth of a grain, has a very salutary tonic and alterative effect, even although the hypertrophy of the uterus may not be much, or even at all, reduced by it.

117. The preparations of *iodine* are of service only when given in small doses, and continued for a considerable time. The *iodide of potassium* I have, in these cases, prescribed in doses of one to two grains, thrice daily, with the bicarbonate of potash, or liquor potassæ, or BRANDISH'S alkaline solution, in a tonic infusion or decoction, or as I have prescribed the bichloride of mercury (§ 116). The *iodide of mercury and arsenic* is sometimes of service when extemporaneously prescribed in the compound fluid of sarsaparilla, or in any better infusion. The *iodide of iron* may also be given in the form of pill (see *Form.* 535), or in the sirup of sarsaparilla, but in moderate doses, and in cases evincing more or less anæmia, and when there is reason to suspect that the disease has been caused or prolonged by self-pollutions. In these cases, also, the carbonates of the *fixed alkalies*, the tartrates, the nitrates, &c., are of service, when taken in tonic or bitter infusions, and conjoined with *anodynes or narcotics*. I have had reason to believe that the combination of the *bicarbonate of soda* with these, in doses sufficient to preserve the bowels in an open state, without offending the stomach, has been of more service in reducing hypertrophy of the uterus, whether partial or general, than any other means.

118. Dr. H. BENNET states that, when all ordinary therapeutic agents fail to remove chronic inflammation and induration of the uterus, he has established, as a counter-irritant, an artificial ulceration or issue in the neck of the uterus itself, with potassa fusa, or potassa cum calce, independently of any disease of that region, and with very great benefit to the patient.

119. As the chronically inflamed and enlarged uterus often falls back upon the rectum, thereby causing constipation and painful defæcation, especially when the fæces are more or less solid, care should be taken to preserve the bowels in an open state. The means which I have usually



preferred are electuaries, composed of the bi-tartrate of potash, the bi-borate of soda, and the confection of senna, sometimes with sulphur, and with any suitable sirup; which may be taken every night. They have a deobstruent effect upon the uterus, while they preserve a lax state of the bowels. In cases where emaciation or anæmia are prominent, in addition to nutrients, restoratives, or tonics, as circumstances have suggested, I have prescribed the cod-liver oil, and more recently this oil containing some of the preparations of iron, of iodine, or of mercury, &c.

120. iv. THE TREATMENT OF ENLARGED UTERUS hardly differs from that recommended for *chronic metritis* (§ 114, *et seq.*). Rest, attention to the secretions and excretions; cooling saline aperients and diaphoretics, local depletions, in moderate quantity, at intervals of about a fortnight; the preparations of iodine in small doses, with alkaline solutions or the bicarbonates; the bichloride of mercury in minute quantity, either alone or with the preparations of cinchona; the liquor potassæ with sarsaparilla; and more especially the avoidance of sexual excitement, and of all heating or stimulating beverages, and the recumbent posture, on a cool sofa, and on a hair mattress at night, are the means which will alone be of any service, if they be perseveringly adopted.

121. v. TREATMENT OF INFLAMMATION AND ABSCESS OF THE UTERINE APPENDAGES.—At an early stage the treatment of inflammation of the uterine appendages is the same as that advised for acute metritis (§ 111). But in order to prevent suppuration, which is very much more liable to occur in the former than in the latter, more prompt and more decidedly antiphlogistic measures are required, especially general and local blood-letting. If, however, these means fail in preventing the formation of *pus*, or in procuring the absorption of whatever may have already formed, the purulent collection will find its way to the exterior by the vagina, rectum, abdominal parietes, or bladder. In these circumstances we can only endeavour to control the symptoms, by means suitable for this purpose, to assist nature in throwing off the morbid formation, in the direction to which she points, to support the constitutional powers of the patient, in order that this end may be attained, and to palliate the more distressing symptoms which present themselves. The treatment advised for chronic metritis is suitable for this stage of the disease. If the abscess open into the urinary bladder, the means required will be suggested by the state of the urine. If this excretion continue acid, the carbonates of the alkalies, with demulcents, opiates, or other anodynes, will be most serviceable; and tonics, restoratives, the preparations of buchu, or pereira, &c., be also required. If the urine become ammoniacal, or even neutral, the mineral acids, with cinchona, quinine, or other tonics, opiates, &c., should be exhibited. If the abscess open in the rectum, or flexure of the colon, the consequent tenesmus, and other dysenteric symptoms, will subside after a short time, if, with restorative and anodyne medicines, amylaceous or mucilaginous injections, with opiates, be administered. The bursting of the abscess into the vagina terminates favourably if the constitutional powers be supported, and the unpleasant symptoms palliated, the vagina being occasionally washed by a lotion of tepid or of cold water. If the abscess point externally, tonics, with alkalies, and attention to

the excretions, are necessary; and as soon as fluctuation and redness of the tumid surface appear, an opening, made by the lancet, should not be delayed. Afterward, the powers of life should be duly supported; and the ingress of air into the cavity of the abscess carefully prevented, while the reaccumulations of matter should be prevented or moderated by gentle pressure; and whenever any collects, it should be discharged.

122. IV. INFLAMMATIONS OF THE UTERUS AND APPENDAGES OF A SPECIFIC NATURE.—Inflammation of the uterus may be caused by gonorrhœa or by syphilis—by gonorrhœa more frequently than is generally supposed, by syphilis very rarely.—i. I have seen several cases of GONORRHOEAL INFLAMMATION OF THE WOMB AND APPENDAGES, and in every case the disease was most severe; and whether extending to the os and cervix uteri from the vagina, or by possibility commencing in the former, owing to the direct contact of the morbid matter with that part, the inflammation had advanced along the canal of the cervix to the internal cavity of the uterus, and in three cases to the broad ligaments and ovaria—in one to both ovaria, and in another to the ovarium of the left side and pelvic peritoneum. Mr. Acton, in his excellent work on "*Diseases of the Urinary and Generative Organs in both Sexes*," has treated this subject in a chapter on "Blennorrhagia of the vulva, urethra, vagina, uterus, and ovary," but he views the disease as in all respects the same as inflammation of those parts, occurring independently of a specific contagion. That it is the same as respects the inflammatory condition—that it is an acute form of inflammation, there can be no doubt; but that it is more severe, more disposed to extend to the uterine cavity and appendages, than common inflammation, whether acute or chronic, commencing in the cervix uteri and produced by other causes, would appear from the cases I have treated. All these cases were of married women, the gonorrhœal infection having been communicated by their husbands, and in all the infection was most manifest, the patients not being previously subject to any leucorrhœal discharge, and was followed by most severe symptoms of inflammation of the womb, and by the extension of the inflammation still farther, as stated above. On this subject Mr. Acton remarks that, "a female suffering under uterine blennorrhagia may be seized with shivering and a feverish state of the system; vomiting may come on, together with pain referred to the iliac fossa, where more or less tension may be present (in no way resembling the superficial pain produced by peritonitis); but if the finger be carried up the *cul de sac* of the vagina, and the patient desired to turn upon the opposite side, pain of a most acute kind will be felt. The blennorrhagia may cease for the moment, one ovary may be attacked only, or both simultaneously, as in epididymitis; revulsion will explain the partial cessation of the discharge. Lastly, we believe that a great number of ovarian dropsies may result from a chronic inflammation of that organ, the consequence of such complications." (*Op. cit.*, p. 308.) I can fully confirm the correctness of this last remark by a recent case of ovarian dropsy, which occurred in the wife of a very eminent man, and was the ultimate lesion which followed gonorrhœa communicated by her husband. She was from the commencement, and is still, under my professional care.

123. i. SYPHILITIC ULCERATION OF THE CERVIX UTERI.—Both Dr. HENRY BENNET and Mr. ACROX agree in considering syphilitic ulceration of the cervix as a rare occurrence. The latter remarks that, in the vagina and os uteri, the circumstances favouring contagion do not often occur, for if the contagious pus of chancre reaches as far, it is generally deposited on a layer of mucus, which protects the membrane beneath. He concludes that "ulcerations of the neck of the uterus are, in ninety-nine times out of a hundred, merely simple affections, the result of acute or chronic inflammation, very intractable in ordinary treatment, and will persist an almost indefinite time, unless we employ local applications." True syphilitic ulcers of the cervix uteri are described by Mr. ACROX as differing from all other ulcers of this part. "They are small, covered with a chamois leather secretion, which it is difficult to remove; their edges are distinct; they look as if a portion of mucous membrane had been punched out of the os uteri, and inoculation has shown that they were true chancres, situated on this unusual position." (*Op. cit.*, p. 292)

124. ii. *The treatment of these specific diseases of the uterus is not different from that advised for the affections above described.*—A. As respects gonorrhæal inflammation of the womb and its appendages, the means are the same as those advised for the more acute inflammations of these parts; the chief modifications consisting in a more prompt and decided use of these means, especially when the symptoms are very severe. In many cases, the inflammation of the vagina is so severe, and the swelling of both it and the vulva so great, as to prevent a recourse to many of the means already advised, especially at an early stage, injections of an emollient and anodyne kind being first prescribed, and sedatives, demulcents, refrigerants, and narcotics internally. In other respects, and as the disease continues or is prolonged, the remedies already recommended for inflammation of the uterus and its appendages, should be administered appropriately to the peculiarities and complications of individual cases.

125. B. *The treatment of syphilitic ulceration of the cervix consists in the use of the acid nitrate of mercury locally, as directed above (§ 104), and in the employment of the constitutional means indicated by the existing state of the case, and by the appearance of any signs of VENEREAL CACHEXIA (see that article)*

126 V. DISPLACEMENTS OF THE UTERUS.—The womb being suspended in a cavity more or less capacious, but liable to alterations in the extent of its capacity; its supports being not only yielding, but also admitting of considerable mobility; its manifest changes in size and position during pregnancy; and its movements during coition, and the venereal orgasm, are circumstances requiring consideration while endeavouring to describe and explain displacements of the uterus, as well as to remedy these evils. The causes of these disorders are often manifest, but in some cases they can only be inferred from insufficiently conclusive evidence.\* It is not to be disputed

that an enlargement of the organ will favour its descent; that muscular efforts, especially lifting heavy weights, will have the same effect, even independently of enlargement, and particularly when the vagina and ligaments are relaxed by child-bearing, leucorrhœa, &c.; and that partial or general enlargement, the pressure of loaded adjoining viscera, too severe or prolonged exertion, especially during the menstrual period, falls on the back, hips, concussions of the trunk of the body, &c., will occasion either that or other forms of displacement.

127. It should not be overlooked that, in the great majority of instances of displacement of the womb, other lesions of the organ, either inflammatory or structural, are associated with the displacement. This circumstance is of no mean importance both in recognising the cause, conditions, and relations of displacement, and in regulating the treatment and regimen of the patient.

128. i. DESCENT OR PROLAPSE OF THE WOMB IS the most common form of displacement, and proceeds from increased weight of the organ, or from impaired tone of its supports.—A. Dr. WEST has considered this lesion with reference to its grades, and divided it into the *first*, *second*, and *third* degrees of prolapse. "In the *first* degree the organ is merely lower than natural, but still preserves its proper direction, its axis corresponding with that of the pelvic brim, and this, even though it should be so low that its cervix rests upon the floor of the vagina. In prolapsus of the *second* degree, the uterus is situated with its fundus directed backward, its orifice forward, so that its long axis corresponds with the axis of the pelvic outlet. In prolapse of the *third* degree, or, as it is often termed, *procedentia* of the uterus, the organ lies more or less completely externally, hanging down beyond the vulva, though it generally admits of being replaced within the vagina, if not of being altogether restored to its natural position." It is obvious that a due recognition of the circumstances, both physical and pathological, favouring and causing this displacement, is of the greatest importance in preventing and removing the different grades and complications of it observed in practice. The womb is not merely suspended by the duplicatures of the peritoneum within which it is contained, but it is also poised upon the vagina, which, in the healthy virgin state especially, furnishes it very considerable support. The curved direction of the vagina, the connexion of the organ, appendages, and vagina with the adjoining viscera, with the pelvic and perineal fasciæ, &c., also aid in supporting the uterus in its situation.

129. These combined supports, however, may prolapse." ("A Practical Treatise on Inflammatory Ulceration and Induration of the Neck of the Uterus." Lond., 8vo, p. 212, 1845.) When we consider, however, that the weight of a non-gravid womb seldom exceeds two ounces, and of that the vaginal cervix constitutes not more than one fifth part; and, moreover, that the gravid uterus at three or four months of gestation rarely descends, we may well doubt whether much can be justly attributed to this cause. Ninety per cent., at least, of these cases occur in females who have had children, and probably a still larger proportion, so that we must look to gestation and labour, and accidents connected with them, as the principal causes. Professor BEDFORD has very properly called attention to the fact, that both prolapsus and procedentia of the womb are often owing to mismanagement of the placenta, as pulling upon the cord before it is detached ("Clinical Lectures on the Diseases of Women and Children." N. Y., 8vo, 1855, p. 46, &c.), and some of the worst cases we have ever treated could be traced to this cause.]

\* Dr. J. H. BENNET, of London, was the first writer who attributed descent of the womb to an increase in its weight. "The uterus," he remarks, "is so slightly poised or suspended in the cavity of the pelvis, that the slightest modification in its volume gives rise to a change in its position. The inflammatory hypertrophy of the cervix increasing considerably the specific gravity of the inferior portion of the uterus, the entire organ descends,



severally be relaxed or overcome during the epochs of life following puberty. In the virgin and unmarried state, leucorrhœa, menorrhagia, anæmia, exhausting discharges, and frequent excitement of the venereal orgasm by masturbation, severally tend to relax the tone of the parts which support the womb in its natural position. During the sexual orgasm its mobility is manifested to the greatest natural extent, its descent often occurring in various degrees, without becoming greater than is consistent with the healthy function; but it is obvious that, when unnaturally produced, the healthy condition is at last exceeded, and that more or less displacement is apt to occur, especially as the same cause practised to excess tends remarkably to relax the tone of the parts upon which the healthy position of the organ depends. In the married state, as well as sometimes in the unmarried, although more remarkably and much more frequently in the former, enlargement and greater weight of the womb, and the stretching, relaxation, and other changes of the supporting parts consequent upon abortions, child-bearing, difficult labours, and puerperal diseases, very materially predispose to the descent and other displacements of this organ. If, in these circumstances, the erect posture be too early resumed after delivery or abortion, if falls or contusions of the trunk of the body be experienced, or if violent muscular efforts be made, as in lifting or carrying heavy weights, a greater or less descent, or hernia of the uterus is apt to take place. Aged and emaciated females, married or unmarried, are most frequently liable to this displacement, sometimes to its utmost extent, owing to the absorption of the adipose tissue adjoining the vagina and vulva, especially when the exciting causes just mentioned have occurred.

130. Descent of the uterus, even in its first and second degrees, is very commonly attended by some degree of retroversion; and this state is often, as well as the descent, increased by constipation of the bowels; the hardened fæces, in the efforts at defæcation, augmenting the extent of both states of displacement, by pressing upon the fundus of the uterus. Dr. West justly remarks that "the close connexion between the cervix uteri and the neck of the bladder is a temporary obstacle to the complete descent of the womb, while at the same time it favours the retroversion of the organ; but if at length this yields, the urine accumulating in the bladder distends its fundus and the vaginal anterior wall into a pouch which drags down the uterus in front just as the prolapse of the rectum drags it down behind; and the organ now soon comes to lie beyond the external parts; the ease being thus converted into one of procidentia uteri, or of prolapse in the third degree." (*Lect.*, p. 156.)

131. This displacement of the uterus is, in the course of time, followed by still farther changes. The neck of the womb, being the first part protruded, and the most exposed to irritation, becomes more and more hypertrophied, and often excoriated; the enlargement being both in length and thickness. The protrusion of this part of the organ is partly due to inordinate growth, its thickness being sometimes equal to, or even greater than that of the wrist. The lips of the os uteri become enlarged with the rest of the organ, and the transverse opening formed in women who have had children is converted into a wide opening situated deeply between projecting lips, whose

surface is irritated, excoriated, vividly red or granulated, and covered by an albuminous secretion. The prolapse beyond the vulva may continue only in a partial state for years, the fundus and a portion of the organ remaining within the pelvis, while the neck and the lower part are external. In this state, the organ may still be replaced without difficulty, especially when the prolapse has followed soon after delivery at the full period, the pelvic floor being sufficiently yielding in most instances. In the course of a variable duration of time, a partial descent is often followed by a complete protrusion of the organ, "the vagina becoming inverted, and forming the outer walls of a tumour, at the lower part of which the womb is situated. So long as the procidentia is incomplete, this tumour is somewhat pyriform in shape, its base being directed upward; but afterward, as it increases in size, it assumes an oval form, owing to more or less of the bladder being drawn down into it in front, and of the rectum also, in many cases, behind. Its bulk is also farther swelled, in numerous instances, by the small intestines sinking down into the sac, and thus adding to its size until it equals or exceeds that of the adult head."

132. In these cases, the uterus itself forms only a comparatively small portion of the large external tumour. The susceptibility of the organ, and the disposition to hypertrophy, are much diminished by constant and complete prolapsus from the pelvic cavity. "The bulk of the tumour, and the difficulty of its replacement, depend chiefly upon two causes. Of these, the one consists in the enormous hypertrophy which the vaginal walls undergo. Not only does their mucous membrane lose its ordinary character and become covered by a layer of cuticle like that of the skin, to protect it from the various sources of irritation to which it now becomes exposed, but the walls themselves attain a thickness of as much as half an inch, and present a dense muscular structure. The other cause of the bulk of the tumour, and of the difficulty of replacing it, arises from the presence of the intestines in the sac, which seldom reside there long without inflammation of their peritoneal covering being set up; not of so acute a character, indeed, as to produce formidable symptoms, nor even as always to call for treatment, but matting their different coils to each other, and tying them firmly to the interior of the sac." This latter cause of difficulty in attempting to return a long procident uterus should not be overlooked, for, even though no intestines have descended into the external tumour itself, chronic peritoneal inflammation may agglutinate them to each other, or to the walls of the pelvic cavity, and thus oppose the replacement of the womb.

133. *B. The Symptoms of Prolapse of the Uterus.*—The symptoms may be severe in some cases, and hardly experienced in others. In the unmarried, and when occurring suddenly or rapidly, prolapse of the uterus is attended by much more severe or acute symptoms than when it occurs in married females after miscarriage or delivery, or when it takes place slowly. When it is caused in single females after prolonged dancing or riding on horseback, the symptoms are generally rapid and severe; and even in married females who have borne children, and have subjected themselves to these causes, the descent is usually rapid, and the symptoms are also severe, but the prolapse is generally greater than

in the single. The sensation most frequently experienced is that termed "bearing down," or of falling down of the pelvic viscera. This feeling is augmented by lifting weights, or by bodily exertion, and then it is often attended by a sharp pain. Defæcation is difficult and painful, and is followed by some degree of tenesmus. Pain in the direction of the vagina, when sitting down, especially on a hard seat, pain in the back and low in the sacrum, and a very frequent desire to pass water, are always experienced. Leucorrhœa is often complained of, and the catamenia are either profuse, prolonged, or too frequent. The digestive organs are soon after more or less disordered, the bowels are constipated, and the general health suffers; and as the prolapse becomes chronic or prolonged, the cervix and even the body of the uterus become hypertrophied.

134. External prolapse, or procidentia uteri, generally follows the internal prolapse, or that in which the uterus and cervix still remain within the external parts, and usually takes place gradually. It is favoured by emaciation or the absorption of the adipose substance in the vicinity of the vulva; and it occurs most frequently after a too early change of position after parturition or miscarriage, or too early exertion, or walking about, after these occurrences. In these circumstances especially, sudden, unusual, or great exertion, or straining at stool, or lifting weights, may occasion procidentia suddenly; and the symptoms may then be severe. As the cervix, the lower part, and the body of the organ, successively protrude—the former parts only occasionally at first—the pains, inconvenience, and distress increase, and ultimately the whole organ lies nearly always or constantly without the external parts. After the protrusion, the sensibilities of the uterus become blunted by the exposure, and the vaginal leucorrhœa subsides. But, as the procidentia increases, the relations of the uterus with the adjoining organs and parts are changed. The urinary bladder and urethra are more particularly implicated, occasioning dysuria, a frequent desire to empty the bladder, or incontinence of urine. The rectum is also affected so as to render defæcation difficult or painful; while the descent of the small intestines into the pelvic cavity, and the excoriations, thickening, irritation and ulcerations of the exposed parts, owing to exposure to the air, and to the dribbling of urine, and to other contingent occurrences, increase the sufferings of the patient. With the complete prolapsus, hypertrophy of the organ increases, more especially its cervix and the lips of the os tincæ, which, moreover, become ulcerated to a considerable extent, the cavity of the cervix being drawn apart, so as to become open or gaping, the ulcerations extending into it. In many cases of internal prolapse, pregnancy takes place; but this period is often one of considerable suffering. If the prolapse be slight, pregnancy generally cures it, as the uterus rises in the pelvis with the advance of gestation, especially if care be taken, and the patient remains in a recumbent position long after delivery. When the uterus is either *partly* or *altogether* external, impregnation rarely takes place. In the former case, the sufferings of the patient are greatly increased by impregnation; and miscarriage usually takes place, the organ being unable to rise into the pelvic and abdominal cavities. "In some few instances, however, pregnancy runs its course undisturbed, in

spite of a great degree of prolapsus; and cases are on record in which the uterus has descended farther and farther, until a great portion of it hung down between the thighs; but the development of the fœtus has, nevertheless, gone on in this unnatural position; and others still stranger, in which coitus has been practised immediately through the os uteri, and impregnation and undisturbed gestation have followed in spite of the existence of irreducible procidentia." (WEST, *Lect.*, p. 172.)

135. *C. Treatment.*—The causes which tend to oppose the return of any long-existing procidentia of the uterus have been explained above (§ 132); and the same causes, although operating in a less degree in simple or internal prolapsus, often prevent the complete restoration of the womb to its normal position. The first object, in respect of treatment is, to ascertain the causes of prolapse, and the circumstances connected with its occurrence and progress; for the means of cure or of palliation must be directed accordingly. Carefully avoiding the causes of prolapse (§ 126, *et seq.*), the patient should strictly observe rest and the recumbent posture; preserve a gently open state of the bowels, and have recourse to astringent injections, and the cold hip-bath. When the womb is much enlarged, as well as prolapsed, the measures advised above for the enlargement (§ 115–120) should be adapted to the peculiarities of the case. It should be recollected that there is always a tendency to a return of the descent, even when the womb has regained its proper position, upon the recurrence of the menstrual period. If, therefore, due care and proper precautions be not taken on the accession and during the course of this period, the descent may return, and each return will be attended by an aggravation not only of the extent of the prolapse, but also of the enlargement of the organ, and of the profuse menstruation which generally attends it, especially if the patient be allowed to remain in an erect or sitting posture.

136. As respects a recourse to mechanical supports in order to preserve the uterus in situ, as well as regards a selection of those supports, I must refer the reader to directions contained in Dr. West's very able and instructive lectures, and be contented with a reference to the more general principles and directions he has there adduced: 1st. In cases of slight descent of the uterus, resulting from a general loss of tone in the parts, or from some temporary or accidental cause, as excessive fatigue, over-exertion; 2d. In cases where the descent of the womb is still comparatively recent, and is due to the persistence of puerperal hypertrophy, owing to imperfect involution of the organ (§ 69) after abortion or labour; 3d. In cases where uterine disease, of whatever kind, was the occasion of displacement of the organ, such disease being still in a stage requiring treatment. In these several circumstances, mechanical support of the uterus is not necessary or suitable. On the other hand, mechanical means of some kind or other are required, 1st. In all cases of external prolapse or procidentia; 2d. In cases of long-standing prolapse of the second degree, associated with much relaxation of the vagina, and consequent weakening of the uterine supports; 3d. In all cases of extensive laceration of the perineum, and for a similar reason in cases of prolapsus in the aged; 4th. In cases of less degrees of prolapse attended by extreme suffer-



the uterus which consist of *versions* and *flexions*, or, strictly speaking, of *deviations of the body and neck of the organ* from their normal position, have only recently received due attention; and, although descent of the womb, in its several degrees, has been duly considered, owing to the prominent manner in which it is brought before those who have professed the study of the extensive class of female diseases, yet other deviations of the womb from its natural position have been, until lately, but imperfectly investigated by them, in the married and child-bearing states, and entirely neglected in unmarried females. This neglect has in great measure originated in imperfect knowledge or entire ignorance, 1st. Of the probability of the displacement being congenital; and, 2d. Of certain of the causes of these deviations, especially those causes which more frequently occur in unmarried than in married females, and to which I have sufficiently adverted already (see § 10, 22).

140. A Dr. W. HUNTER first directed attention to *retroversion* of the uterus as sometimes taking place in the early months of pregnancy; but it was not recognised as occurring in the unimpregnated womb until cases of it in this state were published by Professor OSIANDER in 1808, and Professors SCHWEIGHAUSER, in 1817, and SCHMITT, in 1820, farther illustrated the history and symptoms of this displacement. More recently, Professor SIMPSON, of Edinburgh, and M. VELPEAU, have fully investigated the nature and signs of the several deviations of the unimpregnated uterus from the normal state. Not only may the fundus of the womb fall backward into the hollow of the sacrum or forward against the symphysis pubis, but it may also incline towards either side. Its body may, moreover, be bent upon the cervix, forming a new class of deviations, called *flexions*; and Dr. WEST states that there is reason for believing that *retroflexion* and *anteflexion* are of more frequent occurrence than the corresponding alterations in position of the whole of the organ, which are known as *retroversion* and *anteversion*. The tendency of the womb when at all enlarged, either in the early period of pregnancy, or by disease, is not only to sink below its natural position, but at the same time to fall back with its fundus towards the hollow of the sacrum; besides, enlargement of the organ, either from imperfect involution, or from disease, is generally most considerable at its posterior parietes, thereby causing a tendency to fall towards the heavier side. The distention of the bladder also, so frequently continued for a prolonged period, and a loaded and constipated state of the bowels, aid in producing this form of deviation, whether in the gravid or in the non-gravid uterus; while sudden efforts or violent exertions, falls, concussions of the trunk, will concur with these and other causes or circumstances, as with the catamenial period in the non-gravid, in producing this form of deviation, namely, *retroversion*. Previous delivery, miscarriages, difficult menstruation, congestion of the uterus, intemperate sexual indulgence, and increased determination of blood to the organ, will also predispose to, or even cause, this occurrence, as well as some other conditions hereafter to be noticed (§ 142, *et seq.*).

141. B. *Anteversion* of the non-impregnated uterus was, only a few years ago, considered to be a rare occurrence. I find in the notes of a

case which I saw, with Mr. HOYLAND, in 1843, that I remarked that one to have been only the fourth that I had seen, and that this case was most probably owing to adhesions of the fundus of the uterus, as the lady had been some considerable time previously the subject of pelvic peritonitis. Madame BOVIN had, however, many years previously pointed out attacks of circumscribed peritonitis as a not infrequent cause of abortion. Without such adhesions it is difficult to account for the occurrence of anteversion, owing to the relative position of parts; and there is much reason for inferring, with Dr. WEST, that many of the cases believed to be those of *anteversion* were actually cases of *anteflexion*, the fundus of the organ having been bent forward on its cervix. But even in this case the explanation of its occurrence is not easy. In married females, however, some allowance should be made for the mechanical effects of sexual intercourse in connexion with the venereal orgasm in the female.

142. C. As respects the deviations usually termed *version* and *flexion*, Dr. WEST remarks "that in the greater number of cases of alleged version of the womb, either forward or backward, the organ is really flexed or bent upon itself; and farther, that not unfrequently the two conditions coexist, the whole womb being thrown more forward or more backward than natural, while in addition the body of the organ is bent upon its cervix." As far as the symptoms are concerned to which they give rise, these varieties of deviation present but little difference.

143. As to the point of *flexion of the uterus*, whether backward or forward, Dr. WEST agrees with Professor VIRCHOW, of Berlin, in considering it to be the junction between the body and neck of the womb, or, in other words, the spot corresponding to the internal os uteri; and that the flexion is owing to the anatomical fact that, while the neck of the womb is firmly connected with the posterior and lower part of the bladder, its body is perfectly moveable. As to the comparative frequency of the two forms of deviation, Dr. WEST states that his notes furnish the particulars of twenty-six cases of retroversion and retroflexion, and of nine of anteversion and anteflexion. M. VALLEIX, however, gives thirty-five deviations of the uterus forward, and thirty-three backward; and Dr. MAYER, of Berlin, sixty-three cases of the former, and sixty-four of the latter. The frequency of adhesions, and of other indications of previous inflammation, as a cause of deviations of the uterus, is shown by the statement of Dr. WEST, that he met with these lesions of the womb, its appendages, and the vicinity, in twenty-two out of sixty-six cases, in which he examined the uteri of women who had died of some other than uterine disease.

144. Protracted flexion of the uterus may be expected to be followed by farther lesions. These are narrowing of its cavity, at the point of flexion especially, and atrophy of the parietes of the womb on the side towards which the flexion occurs, thereby rendering it permanent.

145. The cervix is very generally more or less diseased in all the forms of deviation of the uterus, presenting the several states of lesion described above as being seated in the cervix externally and internally—these being chiefly indicative of inflammatory irritation or action, granulations, excoriations, ulcerations, enlargement of the cervix,

the uterus which consist of *versions* and *flexions*, or, strictly speaking, of *deviations of the body and neck of the organ* from their normal position, have only recently received due attention; and, although descent of the womb, in its several degrees, has been duly considered, owing to the prominent manner in which it is brought before those who have professed the study of the extensive class of female diseases, yet other deviations of the womb from its natural position have been, until lately, but imperfectly investigated by them, in the married and child-bearing states, and entirely neglected in unmarried females. This neglect has in great measure originated in imperfect knowledge or entire ignorance, 1st. Of the probability of the displacement being congenital; and, 2d. Of certain of the causes of these deviations, especially those causes which more frequently occur in unmarried than in married females, and to which I have sufficiently adverted already (see § 10, 22).

140. A. Dr. W. HUNTER first directed attention to *retroversion* of the uterus as sometimes taking place in the early months of pregnancy; but it was not recognised as occurring in the unimpregnated womb until cases of it in this state were published by Professor OSIANDER in 1808, and Professors SCHWEIGHAUSER, in 1817, and SCHMITT, in 1820, farther illustrated the history and symptoms of this displacement. More recently, Professor SIMPSON, of Edinburgh, and M. VELPEAU, have fully investigated the nature and signs of the several deviations of the unimpregnated uterus from the normal state. Not only may the fundus of the womb fall backward into the hollow of the sacrum or forward against the symphysis pubis, but it may also incline towards either side. Its body may, moreover, be bent upon the cervix, forming a new class of deviations, called *flexions*; and Dr. WEST states that there is reason for believing that *retroflexion* and *anteflexion* are of more frequent occurrence than the corresponding alterations in position of the whole of the organ, which are known as *retroversion* and *anteversion*. The tendency of the womb when at all enlarged, either in the early period of pregnancy, or by disease, is not only to sink below its natural position, but at the same time to fall back with its fundus towards the hollow of the sacrum; besides, enlargement of the organ, either from imperfect involution, or from disease, is generally most considerable at its posterior parietes, thereby causing a tendency to fall towards the heavier side. The distention of the bladder also, so frequently continued for a prolonged period, and a loaded and constipated state of the bowels, aid in producing this form of deviation, whether in the gravid or in the non-gravid uterus; while sudden efforts or violent exertions, falls, concussions of the trunk, will concur with these and other causes or circumstances, as with the catamenial period in the non-gravid, in producing this form of deviation, namely, *retroversion*. Previous delivery, miscarriages, difficult menstruation, congestion of the uterus, intemperate sexual indulgence, and increased determination of blood to the organ, will also predispose to, or even cause, this occurrence, as well as some other conditions hereafter to be noticed (§ 142, *et seq.*).

141. B. *Anteversion* of the non-impregnated uterus was, only a few years ago, considered to be a rare occurrence. I find in the notes of a

case which I saw, with Mr. HOYLAND, in 1843, that I remarked that one to have been only the fourth that I had seen, and that this case was most probably owing to adhesions of the fundus of the uterus, as the lady had been some considerable time previously the subject of pelvic peritonitis. Madame BOVIN had, however, many years previously pointed out attacks of circumscribed peritonitis as a not infrequent cause of abortion. Without such adhesions it is difficult to account for the occurrence of anteversion, owing to the relative position of parts; and there is much reason for inferring, with Dr. WEST, that many of the cases believed to be those of *anteversion* were actually cases of *anteflexion*, the fundus of the organ having been bent forward on its cervix. But even in this case the explanation of its occurrence is not easy. In married females, however, some allowance should be made for the mechanical effects of sexual intercourse in connexion with the venereal orgasm in the female.

142. C. As respects the deviations usually termed *version* and *flexion*, Dr. WEST remarks "that in the greater number of cases of alleged version of the womb, either forward or backward, the organ is really flexed or bent upon itself; and farther, that not unfrequently the two conditions coexist, the whole womb being thrown more forward or more backward than natural, while in addition the body of the organ is bent upon its cervix." As far as the symptoms are concerned to which they give rise, these varieties of deviation present but little difference.

143. As to the point of *flexion of the uterus*, whether backward or forward, Dr. WEST agrees with Professor VIRCHOW, of Berlin, in considering it to be the junction between the body and neck of the womb, or, in other words, the spot corresponding to the internal os uteri; and that the flexion is owing to the anatomical fact that, while the neck of the womb is firmly connected with the posterior and lower part of the bladder, its body is perfectly moveable. As to the comparative frequency of the two forms of deviation, Dr. WEST states that his notes furnish the particulars of twenty-six cases of retroversion and retroflexion, and of nine of anteversion and anteflexion. M. VALLEIX, however, gives thirty-five deviations of the uterus forward, and thirty-three backward; and Dr. MAYER, of Berlin, sixty-three cases of the former, and sixty-four of the latter. The frequency of adhesions, and of other indications of previous inflammation, as a cause of deviations of the uterus, is shown by the statement of Dr. WEST, that he met with these lesions of the womb, its appendages, and the vicinity, in twenty-two out of sixty-six cases, in which he examined the uteri of women who had died of some other than uterine disease.

144. Protracted flexion of the uterus may be expected to be followed by farther lesions. These are narrowing of its cavity, at the point of flexion especially, and atrophy of the parietes of the womb on the side towards which the flexion occurs, thereby rendering it permanent.

145. The cervix is very generally more or less diseased in all the forms of deviation of the uterus, presenting the several states of lesion described above as being seated in the cervix externally and internally—these being chiefly indicative of inflammatory irritation or action, granulations, excoriations, ulcerations, enlargement of the cervix,



and an open or gaping state of the os and cervical cavity, enlargement of the posterior lip of the cervix, &c. (see § 27, *et seq.*); these severally, or two or more of them jointly, being very frequent complications of deviations of the uterus from the normal state. That these lesions of the cervix are not always consequences of the deviations, my experience induces me to believe, and to infer that Dr. H. BENNET more correctly attributes the deviations to pre-existing disease of the cervix. It appears to me that those alterations of sensibility of the cervix associated with more or less irritation or chronic inflammatory action, and with the several consequences of sexual excitement, leucorrhœal discharges, disordered menstruation, and their numerous and ever-varying sympathetic affections, are more likely to give rise to deviations of the position of the uterus, and not only to the deviations already noticed, but also to others, consisting of obliquity of position, or to lateral deviations (which I believe to be the most frequent of any, and to be generally of temporary duration), when unconnected with disease of the ovaria and the broad ligaments, than that these deviations of the womb from its natural position should occasion disease of the cervix. It may be readily allowed that any pre-existing disease in this part may be aggravated by lesions of position; but that the former is a consequence of the latter, requires farther proof; and the positive evidence furnished of a different succession of lesions would require to be previously disproved.

146. *D. The symptoms of deviations of the uterus* have been subjects of contention even with those who have taken female diseases under their special protection. How, therefore, shall those who get only occasional glimpses of uterine diseases decide, when so very opposite views are entertained by the professors of this specialty? The former are, however, the judges in the cause; the latter are the partisans or advocates of their respective doctrines. Thus it is stated, by a very recent and able writer on these diseases, that "the symptoms are by some described as being both numerous and characteristic, and the appropriate treatment is by them alleged to be both simple, safe, and successful, while others deny that the mal-positions, taken by themselves, produce any symptoms, and assert that the proposed treatment, while attended by very considerable risk, is wholly inadequate to the removal of the evil which it is intended to cure. Each of these opinions, too, is maintained by men equal in the eminence of their position, in their practical experience, and in their good faith." (*Op. cit.*, p. 206.) This statement is borne out by the discussion on this subject reported in the "*Bulletin de l'Académie de Médecine*" for 1853-4 (vol. xix., p. 778-976), and is there fully and remarkably illustrated.

147. It is very obvious to the student of human nature, that, however well-informed individuals may be in their especial department, and however eminent in popular estimation, as long as occurrences, morbid actions, and their consequences, vary so as to give rise to modified or different signs, phenomena, or symptoms, and to develop modified or altered features or aspects, so long will the observers of these see and believe certain of them in preference to, or to the neglect of, the rest, and thus form one-sided views, which the very majesty of their position, in either professional or popular opinion, or both, will not admit of being impugned, and for which they will con-

tend with biased judgments, even in opposition to the most obvious truths. Now, as one of the professed judges in such matters, and having no preconceived opinions as regards them, I venture to state that the symptoms vary, in severity and number, with the causes—predisposing and exciting—with the sensibility and irritability of the sexual organs themselves, and of the constitution, with the existing deviation and its extent, with its several associations with disease of the cervix and its consequences, with the states of the natural and morbid uterine discharges, and with the several complications which deviations of the uterus present with the adjoining viscera. Hence it may be inferred that the slighter deviations which have taken place slowly or gradually in females evincing but little susceptibility or irritability, and which are not associated with marked disease of any part of the uterus, or of structures connected with it, may not occasion any disorder calculated to excite anxiety in the patient, or to require medical advice, and yet may exist for a long period, or may disappear altogether, from the efforts of nature or from changes in the female economy or in the constitution. But deviations of the uterus to a considerable extent, especially when occurring suddenly from well-recognised causes, and when associated with other uterine lesions, or with diseases of adjoining parts—and even when existing simply in susceptible, sensitive, or irritable females, married or unmarried, more especially in the latter when masturbation is suspected—then will very generally occasion symptoms which, if they do not prove, should at least induce the physician to ascertain its existence or non-existence by an examination. That the symptoms are often, however, more or less equivocal, or that they may frequently accompany other lesions of the womb, must be admitted, but a vaginal examination readily solves the difficulty, and evinces the true nature of the complaint. The symptoms usually present in uterine displacements or deviations are, excessive, painful, or difficult menstruation, leucorrhœal discharge, pain in the pelvis generally, and most severe in that part of the pelvis towards which the fundus uteri is turned or flexed, pain and difficulty in defæcation and micturition, constipation, frequent calls to pass urine, or sometimes retention of it, and sterility. According to the temperament and habit of body of the patient, various sympathetic disorders may be induced by uterine deviations, chiefly affections of the digestive organs, as nausea or retchings on the accession of the catamenia, hysterical symptoms, pain under or in the mammæ or in the spine, neuralgic pains in the limbs, &c.

[The above remarks of our author explain very satisfactorily the differences of opinion on this question between Dr. BENNET on the one hand, and Drs. TYLER SMITH, WEST, and R. LEE on the other. Because we meet with some cases in which inflammatory lesions of the neck of the uterus, including ulceration, exist, without creating constitutional disturbance or any particular suffering, it by no means follows that it is so in all cases. In some women, as Dr. BENNET has remarked, the organic sensibility of the womb and its sympathetic connexion with the rest of the economy are so slight, that severe uterine disease, inflammatory or other, may exist for months or years, as in other organs, without producing much local discomfort or much general disturbance; but then these must be regarded as

exceptional cases. It would be wrong to infer from these that inflammatory lesions are of no pathological importance. The same remark will apply to uterine displacements, and indeed all affections of the uterine organs, and it is in accordance with what we observe in all other parts of the body. On one point we must, however, express a doubt, and that is, whether the slight increase of weight attending hypertrophy of the neck, or even body of the womb, is the principal cause of prolapsus, or any other displacement. It may co-operate with other causes, possibly, but in itself alone it can have no important influence.]

148. As respects this disputed question, Dr. West justly remarks that, although cases prove, on the one hand, that flexions of the womb do not of necessity give rise to any distress, and, on the other, that the removal of a flexion of the organ may not be followed by relief of the patient's sufferings, the fact still remains that displacement of the womb is in very many instances attended by various uterine ailments not experienced before its occurrence. Here, however, the question suggests itself, Are the sufferings of the patient due simply to the displacement, or to the morbid condition with which the displacement is associated, or to the two causes conjoined? Dr. West answers this question by stating that "there are circumstances which appear to favour the opinion that, in the majority of instances, the symptoms are due not to displacement alone, but to displacement accompanied by some other morbid state of the womb." This opinion is confirmatory of that previously given by Dr. H. BENNET, that the deviation is nearly always a consequence of chronic inflammation of the cervix, is associated with the cervical disease to which the sufferings of the patient are mainly due, unless in extreme cases of displacement. For some remarks on the diagnosis of versions and flexions of the uterus, and on the use of Dr. SIMPSON'S uterine sound for this purpose, I must refer the reader to Dr. West's lectures, and to the other recent works on uterine disease. There can, however, be but little difficulty in the diagnosis between such deviations and tumours in the uterus, for which they can hardly be mistaken.

149. *E. The treatment of deviations of the uterus* has been a matter of dispute among modern authorities on uterine diseases. Certain of these contend that the lesions of the uterus to which the deviations are due, and to which the symptoms are chiefly owing, should be made the objects of treatment, while others attempt to restore the uterus to its right position, and to maintain it there by mechanical contrivances. SCHWEIGHAUSER, SCHMITT, OLDHAM, and others, have supported the former treatment, while Dr. SIMPSON, VELLEPEAU, KIWISCH, and VALLEIX have resorted to the latter. These contrivances have undergone various alterations in the hands of the several authorities who have had recourse to them. From what I have seen of cases in which they were employed,\* and from the opinions of M. DUBOIS

and Professor SCANZONI, as stated by Dr. WEST, I believe that, although they may be successful in some cases, under the care of able and careful practitioners, they are attended by no small risk, as respects the uterus, its appendages, and peritoneum, and that the return of the displacement is very frequent after the mechanical contrivance is removed. At a recent discussion in the Academy of Medicine at Paris, "M. DUBOIS stated that he had himself treated upward of twenty cases by means of the uterine supporter, which in some instances was worn for several months, but that the displacement reproduced itself within a very short time after the removal of the instrument; and that he had made a similar observation in the case of many patients who, having been thus treated by M. VALLEIX and Dr. SIMPSON, had been dismissed by those gentlemen as cured."\* Professor SCANZONI remarks that "the observation of fifty-six cases of flexion of the uterus during the past four years compels me to express my decided conviction that the mechanical treatment of this affection is either useless or positively mischievous." He concludes that, having quite discontinued the use of these mechanical contrivances, and contented himself with a recourse to cold vaginal injections, with the antiphlogistic treatment of any chronic uterine inflammation, and the application of caustic to any ulceration of the os uteri, and with the endeavour to remove the chlorotic symptoms which are seldom absent, he has been much better satisfied with the results of treatment than he was when he was seduced into the application of a variety of mechanical contrivances. (*Lect.*, &c., p. 225.)

150. It is obvious from the foregoing, as well as from my own limited experience, that attention to the improvement of the general health, to the removal of the local lesions of the uterus with which displacement is often associated, as they admit of removal by local and constitutional treatment, to alleviation of the more painful or distressing symptoms, and to the improvement of the secretions and excretions, are the true principles which should guide the physician in the management of these complaints. The means which are chiefly required are such as have already been recommended. If the catamenia be excessive, the sulphuric acid and sulphate of magnesia, or the supertartrate of potash, if the bowels be constipated; the sulphate of alum if this state do not exist, or the gallic acid, tannin, or the infusion of matico, may be prescribed internally, and conjoined with henbane, or with conium, or with the extract or tincture of belladonna, or of the Indian hemp, if pain be urgent. After the second or third day, if the discharge be excessive, cold enemata. The patients themselves were in favour of the treatment, but their general health appeared much impaired since they were my patients. I stated to the parents that I could not approve of the means employed for single females, that the contrivances could not be always applied, and that the complaint would return when they were relinquished. I therefore refused any farther interference in these cases.

[\* In 1849 I had an opportunity, through the politeness of Professor SIMPSON, of observing, for some time, his treatment of uterine affections, especially of deviations of the uterus, by means of his *stem-pessary*; and it is due to him to state that, although I examined several cases in which this instrument had been worn, some for a period of a year or longer, there was no instance in which the wearer complained of its causing irritation, pain, or serious inconvenience. These results, so different from what I had been led to expect, satisfied me that the dangers from the use of this instrument have been greatly exaggerated.]

\* In two of unmarried females who had previously consulted me for hysteria with leucorrhœa, the mechanical contrivance in question was resorted to by the physicians to whom they had subsequently confided their treatment. I was requested by the parents of these two young females to see them in consultation with the physicians then attending them, their parents having been dissatisfied with this treatment. The contrivances in use for them were shown me; their appliance and object were



mata may be administered twice daily; and in order to remove the anæmia and debility generally characterizing these cases, chalybeate preparations, variously combined, according to the circumstances of the case, should be given, and the diet and regimen strictly enforced.

[When we consider that the uterus has no fixed position in the pelvis, but is liable to be altered, both in its position and axis, by a variety of extraneous agencies—the state of the urinary bladder in front, the rectum behind, the intestine above, and the colon on either side, and consequently from a variety of morbid states incidental to these organs, it is liable to be deposed from its natural position, and to have its axis altered from its normal state—we shall be led to doubt the pathological importance and significance which are assigned by some to its displacement. Doubtless the same causes which give rise to abnormal states of the chylopoietic or abdominal viscera, simultaneously disturb the functions of the uterine and pelvic. We often discover uterine displacement where no uterine or constitutional disturbance is present; and we treat cases of retroversion, for example, and even prolapsus, successfully, by constitutional remedies, when there is considerable uterine and constitutional derangement. We are, therefore, disposed to believe that the uterine organs, in these cases, suffer in a secondary, rather than in a primary manner; and that, retroversion being a consequence of the more general derangement referred to, any treatment, to be successful, must be founded on the various antecedent conditions which gave rise to the uterine malady. If these remarks are founded in truth, then such mechanical remedies as the stem-pessary will be likely to do more harm than good; for the idea that the uterus is to maintain a fixed and undeviating position is opposed, as we have seen, to all correct physiological principles. We agree, then, with Dr. BENNET, that displacements of the uterus are constantly met with, but, except in extreme cases, they are in reality of secondary importance. They often exist in the healthy without being recognised or complained of; and they often remain after the removal of disease, without distress or inconvenience being experienced; while in those who suffer from uterine ailment, they generally coexist with decidedly inflammatory lesions. Their presence may generally be explained by these lesions; and they generally disappear by degrees, as the inflammatory lesions are cured and removed.]

Prof. HODGE, of the University of Pennsylvania, has introduced a pessary for uterine displacements, which is regarded by some as superior to all others, on the ground that it restores and maintains the vagina in its normal proportions. This instrument consists of two lateral bars, curved to correspond with the walls of the vagina, united at the top by a triangular bar. This instrument is said to maintain the vagina in its original shape, and thus keeps the uterus *in situ*, pressing away from rather than against the womb. It has the advantage of not being liable to derangement, and readily permits the natural functions of all the pelvic organs to be performed without obstruction, while it is worn without annoyance, and can be introduced and removed with great facility. It is also believed to be well calculated to replace the womb when displaced in any way, although it seems more particularly adapted to cases of retroversion. Here

the posterior wall of the vagina is kept so distended by the back part of the pessary, that, instead of yielding, as before, it bears the fundus uteri upward and forward, throwing the cervix downward in the vagina, and keeping it there. Its advocates allege that its mere introduction alters the position of the uterus from retroversion to that of simple prolapsus in the first degree, and that it is by the distention of the posterior roof of the vagina to its normal dimensions that the organ is kept *in situ*, and not by any force exerted against it; thus avoiding the danger of local injury, while it corrects the displacement. When well adapted to the dimensions of the pelvis and vagina, it is said, it may be worn without annoyance for months, or even years. There is one inconvenience, however, attending its use in some cases, which may, nevertheless, probably be guarded against, viz., the fundus so pressing on the posterior bar of the pessary as to bear up the two lateral bars, and thus their anterior ends excite irritation under the pubic arch. If the fundus uteri be well thrown forward, this objection may be obviated. Perfect rest in bed for a few days, after the reposition of the organ by means of the uterine sound, is all that will generally be necessary to secure this result. The same instrument will serve also for prolapsus, flexions, and anteversions of the uterus—for the latter, made with the addition of a front bar, uniting the anterior ends of the lateral bars, thus forming a parallelogram—although it would seem best adapted to cases of retroversion. Proper perineal support will be necessary in addition, in bad cases. One great advantage this instrument undoubtedly possesses, viz., it allows the free application of injections, &c., to impart strength to the relaxed vaginal walls. This instrument is generally made of silver, and afterward gilded.

Dr. WEST, who has had great experience in the treatment of uterine diseases, remarks (*"Lectures on the Diseases of Women,"* 8vo, p. 413. Lond., 1856. Part I.), in regard to displacements and flexions of the womb, as follows: "Though I have tried the uterine supporter" (SIMPSON'S) "in a few cases, I have now for some time quite given up its employment, and content myself with a mode of treatment which, though it seems to promise less, yet almost always affords great relief—which, in a large number of cases, quite removes the patient's sufferings, and is not unfrequently followed by the complete rectification of the position of the womb. The principle, indeed, on which I act in the management of these cases amounts pretty much to this: that, to the best of my power, I take care of the general symptoms, and leave the misplacement to take care of itself." We are satisfied that, as a general rule, this is the proper course to take; at the same time, it must be conceded that there are exceptional cases in which a suitable pessary may be used with advantage, especially in retroversion, on the principle of supporting or distending the vagina upward behind the uterine neck.]

151. VI. INVERSION OF THE UTERUS—*(the turning of the organ inside out)*—is clearly impossible in the unimpregnated healthy womb. It is one of the most grievous and fatal accidents which can befall a female. My late friend, Dr. CROSS, of Norwich, in his elaborate essay on Inversion of the Uterus, states that of 400 cases of inversion of which he had found mention, 350 were consequences of parturition. Of the remaining

50 cases, 40 were said to have occurred from the presence of a polypus in the interior of the womb, the accident taking place either spontaneously or from traction in attempting to remove the growth. Enlargement of the uterine cavity, associated with some cause exciting contraction of its fibres, are the conditions essential to inversion of the organ.

152. *A.* The symptoms of inversion of the uterus are sudden collapse or sinking, with abundant hæmorrhage, with disappearance of the tumour formed by the uterus in the abdomen, and the presence of a large spherical body either just within the vagina, or projecting beyond the external parts. My friend Dr. RADFORD has, however, shown that, except in cases where the placenta still partially adheres to the uterus, the hæmorrhage is not so formidable as might be anticipated; and that the shock to the system is in great degree independent of the loss of blood.

153. *B.* Inversion of the uterus is caused chiefly by the detachment of the placenta after delivery, owing to undue force or want of care; and, in rarer cases, by a spontaneous and unequal or irregular contraction of the uterus, either while throwing off the placenta, or even soon after, or upon the detachment of it, while the cervix and os uteri are at the same time comparatively relaxed. This explanation of spontaneous inversion of the womb was ably given by Dr. RADFORD, and confirmed by Dr. SIMPSON. The pressure of the bowels on the fundus caused by the action of the abdominal muscles during the detachment of the placenta may also favour this occurrence. A polypus or tumour firmly attached to the interior of the fundus uteri, having descended through the os uteri, may likewise excite irregular action and drag the fundus with it, thereby producing, with varying degrees of rapidity, inversion of the organ.

154. In most instances the inverted uterus becomes speedily firmly contracted; but in a few cases the uterus remains soft and flaccid, and even capable of replacement. The hæmorrhage often continues at short and uncertain intervals, and in very variable quantity from the period of the accident, but to this there are occasional exceptions. The consequences of inverted uterus tend with varying degrees of rapidity to the destruction of life—at least in the great majority of instances. Dr. CROSSE states "that in 72 out of 109 fatal cases, death took place in a few hours, in 8 within a week, and in 6 more within four weeks. The immediate danger, however, being surmounted, there follows during lactation an interval of comparative safety and of cessation of serious symptoms, which reappear when suckling is over. It appears that of the remaining twenty-three patients only one died at the fifth month, and then as the result of an operation which had an unsuccessful issue; one died at eight months, three at nine months, and the others at various periods of from one to twenty years."

155. *C.* The diagnosis of inversion may be overlooked or mistaken. The inverted uterus has even been torn away by ignorant persons who had believed it to be the placenta. Dr. CROSSE considered that the womb may be partially inverted spontaneously a short time after the detachment of the placenta, or depressed at its fundus. This may increase to *introversion*; but the partial inversion, although attended by much vital depression and hæmorrhage, will not occasion

any tumour in the vagina, nor a complete disappearance of that formed by the uterus in the abdomen. Introversion of the uterus may, however, soon pass into *complete inversion*. An inverted uterus may be mistaken for polypus, and a fatal issue result, as indeed it has resulted, from this error. The history of the case generally will assist the diagnosis, but polypus may complicate pregnancy, and may occasion both a tumour after delivery and hæmorrhage. The firm constriction of the os uteri upon the cervix of an inverted womb causes the part to assume the form of a pedicle, thereby rendering the diagnosis more difficult, unless an examination be made *per rectum*, when the uterus, if inverted, will not be found in its place, while, if the vaginal tumour be a polypus, it will be found in its proper place, and probably also somewhat enlarged. The uterine sound, as improved by Dr. SIMPSON, will also aid the diagnosis, if properly used.

156. *D.* The treatment of inverted uterus is attended by great difficulty. If the accident occur before the detachment of the placenta, the removal of this body should be effected before the replacement of the uterus be attempted. Dr. SIMPSON's accurate views as to the source of hæmorrhage in parturition show that fears of serious bleeding in consequence of the removal of the placenta in these cases need not be entertained. Two modes of returning the uterus when inverted after labour have been recommended. The one by pushing back or indenting the inverted fundus with the finger; the other by grasping the womb between the fingers, compressing it, and by pushing it upward into its proper situation. Either of these modes may succeed in recent cases occurring after delivery, while the organ is soft or flaccid, or as long after as it may remain in this lax state. In these cases, as well as in others, in which the replacement is attempted either when the organ is more firmly contracted, or when some time has elapsed from the occurrence of the accident, chloroform may be found of use in facilitating the operation, although in some cases where this substance has been employed no advantage was procured from it.

If the inverted womb cannot be replaced, immediately after the recurrence of the inversion, it will remain irreducible, and entail on the patient all the miseries and perils incidental to this state. The only means of averting these are by operations, which are attended by very serious hazards. The chief reasons which can be urged for such operations—the removal of the inverted organ by the knife or by ligature—are profuse hæmorrhages or discharges endangering the patient's life. Dr. WEST has given the following table of the results in 50 cases of inversion of the uterus after delivery, in which extirpation of the organ was performed.

	Cases.	Recovered.	Died.	Operation Abandoned.
Uterus removed by ligature.....	33	28	5	2
Uterus removed by the knife.....	4	3	1	
Uterus removed by knife and ligature	8	5	3	
	50	36	12	2

157. It is of importance to know the results of extirpation at different periods from the time at which the inversion occurred. If the operation be performed soon after the occurrence of the accident, it cannot be expected to be as successful



as at a remote period from the occurrence, as the organ will diminish in size, vascularity, and sensibility by the lapse of time. Accordingly we find that, of 21 cases thus operated upon within twelve months from the occurrence of the accident, 9 died, and 12 recovered; while of 25 cases in which the operation was not performed until one year, or much longer periods, had elapsed, 23 recovered, and only 2 died. Of the occurrence of inversion from a polypus, and of the various modes and appliances for extirpating the uterus, I must refer the reader to works on surgery, and to those enumerated in the BIBLIOGRAPHY and REFERENCES to this article.

158. VII. OF POLYPI OF THE UTERUS.—Polypi and tumours of the womb generally occur during the period of sexual activity, or, if they be developed at a somewhat later period, or soon after the climacteric period, they have generally originated some time previous to it. It is often very difficult to ascertain the *causes* which either *pre-dispose* to or *excite* their formation; but there is reason to infer that inordinate excitement or determination of blood to the uterus, with a disposition to hypertrophy of one or more of the tissues of the organ, are the chief causes of these lesions.

159. i. *Mucous polypi*, or excreescences from the folds of the *arbor vitæ*, are often met with, varying from a third of an inch to nearly an inch in length to about three or four lines in thickness: they are connected with the mucous or villous membrane of the canal of the cervix by a very slender and short pedicle. They are usually of a bright rose tint, are supplied with a delicate network of vessels, and consist of mucous membrane, with a small admixture of cellular tissue internally. They may spring from any part of the cervical canal; but they more frequently arise nearer to the external than to the internal os uteri. Although generally pediculated, they are sometimes sessile, and in rare cases they seem as hypertrophied folds of the *arbor vitæ*. These productions are either single or multiple, two or three existing in the same patient; and having been removed, they may be reproduced in a few months afterward. They may even coexist with fibrous tumours of the uterus. Dr. MONTGOMERY, of Dublin, believes them to be sometimes precursors of malignant disease; and this was observed in one case which was, under my care. In rarer instances these polypi are much larger than now stated, and consist of a cellular or fibro-cellular tissue invested by mucous membrane; sometimes they reach the size of a fig, are flattened, and hang down beyond the os uteri into the vagina.

160. ii. *Follicular polypi*, or polypi from enlargement of the follicles of the cervix, are not unfrequently observed. They appear as *cysts*, of the size of a pea, imbedded between the folds of the *arbor vitæ*, and hardly projecting beyond the level of the canal. They are, however, sometimes much larger, are more or less numerous, and are distended by albuminous matter. When large and numerous, they cause the absorption of the cervical structure, and even occasion the bulging outward of the structure of the cervix.

161. iii. *Complex polypi*, consisting of mucous follicles, the mucous or villous surface, and fibro-cellular tissue of the cervical canal, are more frequently seen than either of the foregoing. These polypi are either pediculated, the pedicles being

sometimes of considerable length, more rarely very short, or appear as continuous tumours or growths from the inner surface of one or other of the lips of the os. When divided they are found to contain a tenacious, transparent, albuminous matter, identical with that secreted by the Nabothian glands. When small they consist chiefly of cysts filled with this matter. When they are much larger, and reach the size of the first joint of the thumb, these cysts or vesicles are not so distinct, but exist in the form of canals, arranged longitudinally, between which a fibro-cellular tissue enters more or less abundantly. Their surface often presents an uneven or tubulated appearance, is generally not very vascular, and is composed, according to VIRCHOW, of a dense cellular tissue, covered by a thick layer of tassellated epithelium.

162. iv. The *symptoms* indicating the existence of polypi generally appear gradually, and may with increasing severity continue months or even years before medical aid is required. There are usually at first leucorrhæal discharge, hæmorrhage, or both, followed by bearing down pains in most cases. When the polypi are very small, they may produce either very slight symptoms or no symptoms at all. Hæmorrhage is, however, very generally experienced, especially when the polypi occasion enlargement of the neck of the womb. The size of the polypus may not influence the hæmorrhage, a small one often causing more than a large one. Dr. WEST considers that the structure of the polypus influences the symptoms, and that those polypi which present the compound structure due to the enlargement of the Nabothian glands are always productive of profuse leucorrhæa; and their vascularity of surface being less, they are less frequently the occasion of hæmorrhage. The much rarer occurrence of follicular polypi is attended by a profuse albuminous discharge, and is not associated with profuse menorrhagia, unless in rare instances. The symptoms now mentioned should always suggest digital examinations, and if no polypus can be felt, examination by the speculum becomes requisite.

163. v. The *treatment* of polypi is thus described by Dr. WEST: "The smallest may be removed by laying hold of them with a pair of long forceps and twisting them off, while those which are somewhat larger, after being twisted to check the risk of bleeding, may be cut off by a pair of scissors. The bi-valve speculum should always be employed in doing this, and both forceps and seissors are made for the purpose, so constructed as to be readily worked within the speculum." For the sessile growths or tumours, noticed above (§ 159), he applies the acid nitrate of mercury, which destroys them, and arrests the bleeding. As respects the removal of larger polypi and the several means of accomplishing it, I must refer the reader to the work just quoted, or to the surgical works where this operation is fully described.

164. VIII. FIBROUS POLYPI OR TUMOURS WITHIN THE UTERUS are among the most serious organic diseases of the uterus, and the least amenable to treatment. They are uncertain in their rates of progress, being in some cases rapid and in others slow, and in rarer instances almost altogether cured by the efforts of nature, which either throws off the morbid structure from the organ in which it is seated, or stops its growth. These tumours vary much in structure and in their seat. When they arise from the internal surface of the uterus, or underneath the internal membrane, they are

generally considered as a form of polypus, and described as such—as *fibrous polypus* of the uterus. Dr. West considers them to be fibrous tumours, growing from the inner surface of the womb, or less frequently from either lip of the os uteri.

165. *A. Fibrous polypus of the uterus* is nearly identical with other fibrous tumours of the organ, and differs chiefly either in being developed immediately underneath the internal membrane, or in having more or less of the fibrous structure of the womb interwoven with or covering it. Fibrous polypus of the uterus is pediculated, and, growing from the interior of the womb, is more vascular than other tumours of the organ. The pedicle is composed of uterine fibres mingled with more or less dense cellular tissue. A layer of uterine substance is continued a short distance from the pedicle along the tumour, in some cases, or invests it in part or altogether in others. In addition, the polypus is always covered by the internal membrane of the uterus, which becomes firmer and denser than natural, both it and the fibres of the womb being developed with the growth of the tumour. These tumours are generally single, but they are sometimes double, very rarely more numerous. They are of very different sizes, and occasionally remarkably large. They may, in some instances, be enucleated from their coverings; in others their substance is intimately connected with their envelopes. The vascular supply of these tumours through their pedicles is generally small in proportion to their size and to the quantity of blood in their substance. This comparatively small supply of blood, the profuse hæmorrhages they occasion, and the arrest of the hæmorrhage by ligatures around their pedicles, have rendered it very difficult to determine the actual source of hæmorrhage. Dr. West seems to believe that it is rather from the irritated mucous membrane of the uterus than from the surface of the tumour itself that the bleeding flows; and a variety of considerations confirm this opinion.

166. These polypi being generally formed within the uterus, influence the organ in some respects, according to the situation whence they spring. If they arise low down, or in the cervical canal, the tumour soon grows beyond these limits, and, passing down into the vagina, may acquire a considerable size without disturbing the uterine functions. If they arise from some part high up, or near the fundus of the uterus, they often remain until they have acquired a great size, occasioning enlargement of the organ and thickening of its walls, as in pregnancy. But in many cases, before or soon after the tumour has reached the size of an orange, the os uteri gradually dilates, allows its passage through it, and embraces its pedicle. In some cases this result takes place without much suffering; but in others violent uterine action is excited by the tumour, which recurs at intervals, and resembles the pains of labour. The tumour, or polypus, is thereby extruded from the uterus into the vagina; and the irregular contractions of the uterus, especially when the polypus is firmly attached near the fundus, may drag down or invert the organs, as stated above (§ 151). Generally the polypus is detected soon after it has passed into the vagina; but if not detected, and when allowed to remain in this situation, it acquires a large size. I believe, however, that the largest tumours of this kind reach their full size within the uterus. In

a case which came before me, and in which Dr. LEE was consulted, two tumours were thrown off of the size of between two and three pounds each, immediately after passing the os uteri.

167. Fibrous polypi may present œdema of their substance, extravasation of blood into their structure; and having passed into the vagina, they may undergo ulceration, especially if air come in contact with them, or even sloughing. When they are detached spontaneously, or by means which produce firm contractions of the uterus, as in two cases where this was effected by the treatment which I adopted, their pedicles give way, and the whole mass (fibrous structure and envelopes) is thrown off.

168. *B. The symptoms* of fibrous polypi are nearly the same as mentioned above (§ 162)—leucorrhœa, hæmorrhage, and bearing down, [to which may be added enlargement of the uterus, and sympathetic irritations in bladder, rectum, and distant organs.] The hæmorrhage is at first experienced chiefly at the menstrual periods, which are prolonged, or return at shorter intervals, or are more abundant, approaching to flooding, leucorrhœa being present in the intervals. Bearing down is almost constant in some cases, or recurrent in others, with expulsive pains or efforts, when the tumour has far advanced. When these symptoms are present, a vaginal examination should not be delayed. If the polypus have not passed the os uteri, the *diagnosis* becomes very difficult. In these circumstances the uterine sound, as advised by Professor SIMPSON, or dilatation of the os uteri by the sponge tent, as recommended by the same eminent authority, becomes necessary.

169. *C. The treatment* of fibrous polypi has always hitherto been considered as entirely instrumental or surgical. In two cases which I treated, the means employed were strictly medical, and proved in both, within a few hours, successful, the tumours having been extruded through the os uteri by the action of the uterus, and entirely thrown off. In one of these cases the hæmorrhage was excessive. I prescribed immediately the bi-borate of soda in solution, and directed the dose, about six grains, to be repeated every hour or two. A tumour, about the size of a child's head, was soon after thrown off, six or seven doses of the borax having been taken, when vomiting was occasioned; but the hæmorrhage had very much abated a short time before the tumour came away. A day or two afterward hæmorrhage returned, a vaginal examination was made, the os uteri was found somewhat dilated, and another tumour was felt pressing upon the opening. I then requested Dr. LEE to see the patient with me, when the same medicine was given as before, and the second tumour was expelled in a few hours by the contractions of the uterus. The only other case of fibrous polypus of the womb which I have had an opportunity of treating was one of a single tumour of large size; much hæmorrhage had taken place, and I prescribed the infusion of secale cornutum, with as much of the bi-borate of soda as it would dissolve, to be given every hour or two, until eight ounces were taken. Soon after the whole was given the tumour was expelled.\*

\* *Galvanism* may often be employed with success to stimulate the uterus to expel the polypus, or moderate the attendant hæmorrhage, as suggested by Dr. RAIFORD. Experiments made upon the gravid uteri of some of the



170. The operations advised for removing fibrous polypi are by ligature and by incision. Dr. R. LEE records 27 cases of the removal of fibrous polypi of the uterus; nine terminated fatally (WEST). Excision of the polypus has been dreaded in these cases, the risk of dangerous hæmorrhage from the operation having been considered great. VELPEAU, LISFRANC, DUPUYTREN, WEST, [SIMPSON,] and ARNOTT, however, greatly prefer excision to the ligature. VELPEAU found the hæmorrhage troublesome only in two of twenty cases on which he thus operated. "LISFRANC states that he met with but two out of 165 cases, and DUPUYTREN also but two out of nearly 200; while they all refer to instances of phlebitis, or of peritoneal inflammation leading to a fatal issue after the operation by ligature." Torsion and strangulation of the pedicle by compression have likewise been advised for removing fibrous polypi; but they are liable to the same objections as have been urged against the use of the ligature. It is unnecessary to refer farther to the mode of operating by excision, inasmuch as whoever is capable of undertaking the operation requires no directions respecting it, or, if he should, he will find them in Dr. WEST's work now quoted, or in any systematic work on surgery.

[If phlebitis and puerperal fever are liable to result from the use of the ligature in these cases, from consequent sloughing and suppuration, the same results are likely to happen from an empty or exsanguine state of the blood-vessels. We have not the necessary data for an exact calculation of the comparative dangers of each, but such as we have lead us to coincide in opinion with Professor SIMPSON, and prefer excision. It has been suggested that some modification of the *electric cautery* might be substituted for the knife, and thus avoid the risk of consecutive hæmorrhage; but whether it be practicable or not, we have no means of judging.]

171. I may here mention that fibrous polypi may coexist with *pregnancy*, and that, although remarkably small previously to impregnation, they may participate in the development of the uterus during this period. They do not, however, generally produce marked symptoms during pregnancy, nor interfere with its natural course. After the commencement of labour their injurious influence becomes manifest, either presenting a mechanical obstacle to the passage of the child, or giving rise to very serious consequences subsequently, by occasioning dangerous hæmorrhage, or other difficulties. They may also at this time lead to very serious mistakes as respects their diagnosis. The question as to their *treatment* at this time is of no small importance; for excision, however great the hæmorrhage, may be followed by phlebitis, or metritis, or pelvic peritonitis. Therefore, if the hæmorrhage cannot be controlled by opiates and astringents, the ergot or borax may be exhibited, at first singly, and, if they fail, afterward in combination.

172. IX. TUMOURS IN THE WALLS AND EXTERNAL SURFACE OF THE UTERUS.—i. *Description*.—a. These morbid growths are more or less intimately connected with the parietes of the womb, and are in many instances identified with the structure of

the organ. Several tumours are more frequently formed in the same case than one merely; but when thus multiple, "one or two generally outstrip the others in the rapidity of their development, the rate of which, as well as the nature of the symptoms, is greatly influenced by the situation that they occupy." However situated, or however large, uterine tumours are commonly firm, spherical in form, with nodulated surfaces, and their structure is sometimes interrupted by cavities containing fluid, and varies in density, elasticity, and succulency. They are thus well described by Dr. WEST: "On a section being made of any of these tumours, they present great similarity to each other, being composed of a dense grayish structure, intersected by numerous dead white bands and lines, which are almost invariably arranged according to a definite type or plan. In some instances these fibres have a concentric arrangement, while in others they have a wavy distribution, or are disposed around several different centres. Tumours of the first kind are usually remarkable for their hardness, and their small degree of vascularity; they are also contained within a remarkably distinct fibro-cellular investment, are imbedded in the uterine substance, and seldom attain a size exceeding that of a shelled walnut. The other varieties are more vascular, less firm, have a less complete capsule, may occupy all parts of the exterior or interior of the womb, and may grow to a very large size, so as to weigh twenty, forty, or even seventy pounds. Moreover, it happens sometimes that, in the course of their development, two or more tumours coalesce, at least apparently, so as to form a large growth, though on a section it will be seen that the different growths remain distinct from each other, separated by fibro-cellular septa, the remains of the more complete investment by which, when smaller, each was surrounded." (WEST's *Lectures*, &c., p. 267.) When these tumours are seated near to the internal surface of the uterus, or under the internal membrane, the fibres of the womb either passing over the surface of the tumour in some parts, or actually passing into it, they form the fibrous polypi, or internal tumours of the uterus already described (§ 164, *et seq.*). The vascularity of these tumours varies in different cases, and, like the tissues with which they are connected, they are resolved into gelatin by boiling.\*

\* The *microscopic* characters of fibrous tumours are somewhat various. In all we find a large portion of the mass consisting of tissue resembling the tendinous or fibrous, being composed of exceedingly slender, uniform, pellucid filaments, undulating or crooked, more or less perfectly developed, and variously arranged; and this occurs in all parts of the tumour, both in the more homogeneous basis-substance, as well as in the intersecting bands, the microscopic difference consisting only in the less or more regular arrangement of the fibrous structure or appearance of the tissue. But in different specimens, or even in different parts of the same, the tissue appears more or less perfectly formed: so that, while in some distinct filaments or undulating fasciculi may be dissected out, in others there is rather a fibrous appearance than a fibrous structure. Nuclei or cytoblasts are also commonly strewn through the substance of the tumour, the less abundantly in proportion to the fibrous character of the tissue. There are also other elementary tissues mingled in fibrous tumours, as smooth or organic muscular fibres, and these are sometimes so abundant as to justify the name of muscular tumours, as described by VOGEL; and the mingling of the muscular fibres in imitation of the uterus is usual, if not constant. In some specimens *elastic* fibres may be found intermingled with the more abundant fibrous tissue, thus imitating the structure of fascia. As a general rule, the characters of fibrous tumours are modified towards an imitation of tissues in or

lower animals prove very conclusively the power of this agent in producing uterine contraction. These experiments also prove that the influence is greater when one pole is applied to the upper part of the spine, and the other to the uterus, than when both poles are applied to the uterus itself.]

173. These growths may be developed in any part of the walls of the uterus. Sometimes they are formed "immediately beneath the peritoneum covering the uterus, or the first half inch or inch of the ovarian ligament or Fallopian tubes," and are limited to the fundus, or upper part of the body of the uterus, more frequently on its posterior than on its anterior surface. They there generally remain of a small size, and hardly exceed that of a pea or bean; seldom projecting farther than one half of their bulk. In other cases they either grow outward or inward, from the thickness of the uterine parietes, being apparently only attached to them by a thick pedicle, into which some uterine fibres enter. The tumours which grow outward from the uterine walls sometimes attain the size of a large orange, or even a greater bulk; they, unlike the tumours which grow into the cavity of the womb, receive no investment of fibres from the substance of the organ, and are often present in considerable number. Dr. WEST mentions as many as twelve projecting from the external surface, the interior of the organ being free from disease. Wherever may be their origins, these growths tend as they increase in size, with few exceptions, to become pediculated; these exceptions being the firm, slightly vascular tumour, with concentric arrangement of fibres, which remains imbedded in the uterine walls, without projecting either externally or internally. In rare cases, also, the more vascular, elastic, and succulent fibrous tumour is developed in the uterine walls, attaining the size of the foetal head, producing very great enlargement of the organ, and retaining a spherical form. It may be imbedded in the substance of the womb, without projecting more in one direction than in another.

[There is good reason to believe, from the investigations of Dr. BRISTOWE ("Report of the London Path. Soc." for 1853), that all so-called fibrous tumours of the uterus, at least in their earlier stages, before degeneration has taken place in them, are essentially *muscular* tumours—not simply fibrous tumours with a greater or less quantity of muscular fibre mixed up with them, but developments of true and undoubted muscular tissue. Their most usual position, according to Dr. R. LEE's analysis of 74 cases, is the submucous, viz., those projecting into the cavity of the womb; and the pedicles of these are generally situated just below the openings of the Fallopian tubes. The next position in which they are most abundant is the posterior wall and fundus of the uterus; they are rarely situated in the anterior wall, and still more rarely in the cervix uteri.

If we examine fibroid tumours of the uterus under the *microscope*, we discover elongated nuclei imbedded in an amorphous stroma, while the fibrous appearance is scarcely perceptible; in fact, from the analogy they present to the genuine uterine tissue, in the unimpregnated state, they would seem to be homologous rather than heterologous productions. We have already stated that Dr. BRISTOWE regards them as *true muscular tissue*. They are generally but scantily supplied with blood-vessels, and the hæmorrhage to which they give rise is not owing to a laceration of their vessels, but to the irritation and congestion they induce in the superincumbent mucous membrane, which, from the same cause, may ulcerate and slough. In pregnancy, they cause hæmorrhage by preventing the normal development of the organ; hence they are apt to cause miscarriages. As a general rule, however, they produce sterility. Fibrous tumours have not been observed before puberty. Dr. R. LEE states that they are most frequent in virgins, and that they exist in 20 out of 100 middle-aged women.]

174. The influence exerted by these tumours on the womb depends more upon their situation than upon their bulk. When they are seated externally to the womb, and grow into the peritoneal cavity, they often acquire an enormous size, and the womb is much elongated, and even drawn upward into the pelvis, but seldom increased in bulk. If, however, a small tumour be developed in the walls, or within the organ, more or less increase of size will be observed. These tumours reach the greatest size when they are single and attached to the external surface of the uterus. WALTER has described one which weighed seventy-four pounds.

175. *b.* The *ultimate changes* which uterine tumours undergo are interesting, and often tend, under the influence of vital resistance, to a more or less salutary issue. 1st. When the tumour is externally attached to the uterus, its pedicle may become ultimately so attenuated as to be detached nearly or altogether from the womb, especially if it had formed previously adhesions to the adjoining peritoneum; such cases are, however, very rare. 2d. When the tumour is developed internally, or passes into the cavity of the organ, it undergoes the changes and their results already described (§ 166, *et seq.*). 3d. The tumour is sometimes softened, the more liquid parts are absorbed, and either a calcareous substance is deposited, or remains after the other elements are removed; that the former or actual deposit of calcareous matter takes place is evinced by the quantity of the calcareous matter or deposit. This change takes place both in small and in large tumours, and most frequently in those attached to the outer surface of the uterus; but it may also, but rarely, occur in those which are developed internally. Fibrous tumours of the womb were formerly believed to sometimes degenerate into cancer. This change is now considered never to occur. That a tumour, developed in the walls, or attached to either surface of the uterus, may coexist with cancer of the cervix, is possible, and the coincidence has been observed in rare cases.

[Fibrous tumours not unfrequently contain *cysts*, especially those whose texture is not dense; and this may be owing to softening and liquefaction of part of the tumour, with effusion of fluid in the affected part, or to an accumulation of fluid in the interspaces of the intersecting bands. In other cases, where the cysts are of smaller size, and have smooth and polished internal surfaces, it is more probable that their production depends, as PAGET states, on a process of cyst-formation, as in the breast and other organs. Some fibrous tumours are thickly beset with numerous well-defined and lined cysts; in others there is only one large cyst, or one vastly predominating in size over all the others, when it may and has been mistaken for *ovarian cyst*, and the contents discharged by tapping (*Lond. Med. Gaz.*, vol. 37, p. 1022). Sometimes fibrous tumours undergo a *calcareous degeneration*, consisting in an amorphous and disorderly deposit of salts of lime and other bases,



in combination with, or in the place of the fibrous tissue, denoting a loss of formative power in the tumour. Fibrous tumours also undergo sometimes a softening process, with increased vascularity and congestion, and become œdematous; and then, as their tissue loosens, become very soft, or even diffuent, or else break up, and appear shreddy and flocculent. In this state the outer and less softened part of the tumour may burst, or they may separate or slough. BAYLE states that fibrous tumours exist in 20 per cent. of women who die after 35 years of age.]

176 c. The frequency of tumours of the uterus has been very differently stated by writers; but they seem to be, with the probable exception of cancer, the most common of organic diseases of this organ. Mr POLLOCK states that of 583 cases in which the uterus was examined at St. George's Hospital, 265 were diseased, and in 39 of them fibrous tumours existed, and in 38 cancer was found. The statistics of the malady are very unsatisfactory. In 70 cases, in which Dr. WEST examined the uterus of women who died after puberty of other than uterine diseases, 7 presented fibrous tumours of the organ. From these and other observations made by MALGAIGNE, BRAUN, CHARI, and others, tumours of the uterus are observed chiefly between the ages of twenty-four and sixty; and most frequently from thirty to fifty.

177. ii. *The Symptoms.*—Tumours of the uterus are very often not manifested until they reach a large size; and they exist even many years without producing any inconvenience, or being suspected until they are detected after death. The growths from the exterior surface of the womb frequently occasion no symptoms but those produced by them when they reach a great bulk, or when they disorder the sensibility or functions of adjoining parts. But those which are imbedded in the walls of the organ, disturb either the functions or the sympathetic relations of the womb, although their size may be small. It has been already shown that the growths or polypi which occupy the cavity of the uterus, occasion abundant hæmorrhage and other phenomena. (§ 162, 168.) When these tumours are formed after the cessation of the catamenia, the severity of the symptoms they occasion is much less than at an earlier epoch; and when they are developed in single women, the symptoms generally become much more severe after marriage, and they often either occasion sterility, or, if impregnation takes place, abortion. If pregnancy take place in these cases, the puerperal states, as well as abortions, are attended by much greater danger than in the healthy state of the uterus. The symptoms of uterine tumours are most commonly slight at their commencement, and slowly increase in severity. They sometimes, however, are sudden, more especially the uterine hæmorrhages, which recur after intervals, and are more and more severe; but, unless when caused by internal growths, are not followed by leucorrhœa or any offensive discharge. Dysuria, or retention of urine, sometimes suddenly occurs. As the tumour enlarges, pain in the region of the uterus, bearing down, and sense of discomfort in the pelvis, are felt, with frequent calls to pass urine. The character of the pain is somewhat peculiar; it is rather a dull, aching, or gnawing, but constant pain, seldom preventing sexual intercourse; yet sometimes attended by throbbings, or a sense of heat or burn-

ing, or with intense neuralgic pains such as have been already described (§ 7, *et seq.*). When these symptoms are present, the abdomen, especially towards the pelvis, should be carefully examined; and if any tumour be detected, the diagnosis between a uterine and an ovarian tumour should be made.

178. iii. This diagnosis is extremely difficult, and cannot be attempted without a careful examination, first of the abdomen, and next per vaginam, and in both situations. Tumour of the uterus, when so large as to be felt on examining the abdomen, is always firm, frequently nodulated or uneven, seldom mesial, and generally inclining to either side. On examining per vaginam, the tumour, if uterine, rarely draws the uterus upward, unless it be attached near the fundus. It is most frequently seated in the posterior parietes, and is, more especially in these cases, accessible to examination. It is then found to be firm, sometimes uneven, carrying the cervix towards the symphysis pubis, and often more or less retroverting the organ, and often displacing it somewhat from the mesial line. The os uteri is generally small, circular, and healthy; or somewhat hard, or enlarged, or turgid. If the tumour be intra-uterine, or be imbedded in the walls, the uterus will be found larger, heavier, and less moveable than natural, and if it be seated low in the womb, the cervix uteri will not be unlike the form assumed in pregnancy, not unfrequently disappearing, and its lips being thinned. Dr. WEST remarks that an enlarged, heavy, and somewhat hard uterus, coupled with causeless recurrence and frequent return of uterine hæmorrhage, while the os and cervix uteri are healthy, and I might add absence of pain; or but slight pain during coition, are almost always pathognomonic of fibrous deposit in the uterine substance.

179. Tumour of the uterus must be large to be mistaken for tumour of the ovarium. The former is always slowly developed, and rarely rises out of the pelvic cavity; the latter much more rapidly increases in bulk, and when large rises out of the pelvis. The one is hard, and non-fluctuating; the other is softer, and obscurely, if not more manifestly, fluctuating. The ovarian tumour generally attains a much greater bulk than the uterine, is at first more inclined to either side, and is seldom attended by hæmorrhage during its growth; or by retention of urine when largely developed. The cervix uteri is sometimes drawn upward, but is seldom altered; while large uterine tumours are uneven, nodulated, solid, are attended by alteration of the lower segment of the uterus, and by the absence of, or difficulty of finding, the cervix and os uteri, and not unfrequently by retention of urine.

180. The hæmorrhage attending tumours of the uterus may be mistaken for abortion. The patient not unfrequently encourages the opinion of pregnancy from a desire of being in this state, and care should be had not to be thus misled; but to question the patient as to the history of the case, and to examine locally with care and with reference to contingent diseases of the uterus and of its appendages. The frequent recurrence of hæmorrhage, the absence or character of pain, and the state of the cervix and os uteri, will generally guide the diagnosis in these cases.

181. Fibrous tumour of the posterior uterine wall may be mistaken for retroverted uterus, with which, however, it is often associated. It is, nev-

ertheless, of importance to ascertain the nature of the lesion, although but little may be done as regards its treatment. In these cases, a recourse to the uterine sound, when it can be introduced, may aid the diagnosis; but in most cases a diagnosis is most difficult, and sometimes impossible. It is also very difficult to distinguish between cancer of the body of the womb and fibrous tumour of the organ, but this will be noticed hereafter (§ 199, *et seq.*)

182 The occurrence of hæmorrhages, the non-development of the lips of the uterus, and the history of the case, will prevent uterine tumours from being mistaken for pregnancy; for which the expansion of the lower segment of the uterus, and sometimes a sound resembling the uterine souffle, attending the former, may render the diagnosis between it and pregnancy difficult, more especially as the latter may take place during the existence of an uterine tumour. In these, and many other cases of tumour of the uterus, difficulties of diagnosis which need not be more particularly noticed will occur, and which the acumen of the physician will readily overcome.

[We have found the *uterine sound* of Dr. Simpson of very great value in forming a diagnosis in cases of fibrous tumours of the uterus. By it we readily learn if the cavity of the uterus be elongated; and if this be so, and the uterus be found enlarged, heavy, and somewhat hard, connected with the causeless occurrence and frequent return of uterine hæmorrhage, while the os and cervix are healthy, we may very safely conclude that there is a fibrous deposit in the uterine substance. *Reasoning by exclusion* is here of the highest importance, where the question is between uterine and ovarian enlargements—between fibrous tumours and pregnancy, or fibrous tumours complicated with pregnancy; and the use of the sound is often indispensable in order to furnish us the necessary data. Much may be learned from the previous history of the case, and from the equal or unequal density of the tumour. In one case of Prof. Simpson's, which we were requested to examine for the purpose of forming a diagnosis, and which had baffled several physicians, the employment of the uterine sound led at once to the detection of an immense fibrous tumour in the walls of the uterus, which had elongated its cavity to an extent of 8 or 10 inches.]

183. iv. The *prognosis* of uterine tumours is not very unfavourable to the duration of life, at least for several, if not for many years, unless they are very large, or are productive of very serious symptoms, or are associated with pregnancy. In this latter state the abortion they generally occasion, or parturition at a natural period, is often attended by more or less danger. When the tumour is intra-uterine, constituting the fibrous polypus above described (§ 164, *et seq.*), a cure is then generally accomplished. But the other states of the malady do not admit of cure, and not always of palliation, although this latter should always be attempted, inasmuch as it is often to be attained, and nature, in rare cases, seems to effect a cure in such circumstances, especially when the disease occurs at an advanced period of life—the cessation of the menses tending to favour this result. The prognosis may also be somewhat more favourable when these lesions occur in an unmarried female, or in a widow, than when they affect a married female during the epoch of sexual activity.

184. v. *Treatment.*—Although the treatment of tumours of the uterus is chiefly palliative, yet more active means should not be neglected, with the view of promoting the gradual absorption of the morbid deposit. The patient should avoid sexual excitement; if married, she ought to sleep apart from her husband, and be as physically and mentally tranquil as circumstances may permit her to be. Walking much, or standing long, more especially riding on horseback, or even in a carriage, should be altogether avoided; and the recumbent posture adopted as long as possible, and without any intermissions during the existence of uterine hæmorrhage. The bowels ought to be kept gently open by cooling laxatives, and more particularly by such as neither irritate the larger bowels, nor sympathetically excite the uterus. With this intention the carbonates, the tartrates, or the acetates, or the phosphates of the fixed alkalies may be prescribed, either alone or with the infusion of senna or rhubarb, or with the extract of taraxacum. Hæmorrhages are among the more urgent symptoms for which palliation is requisite. These generally at first occur as an excessive menstruation, and recur with each period; and ultimately they often appear intercurrently, or between each period. The means which I have advised above (§ 169) for arresting the hæmorrhage and expelling the tumour when seated within the womb, might prove of doubtful benefit, or even injurious, if prescribed when the tumour is not thus situated, or when seated as described in this chapter. Therefore the recumbent posture, undeviatingly observed, and astringents and refrigerants taken from the commencement of the hæmorrhage, are indispensable.

185. Where there is either pain or tenderness in the lower part of the abdomen on the accession of this discharge, a few leeches may be applied on this part; or a small cupping over the sacrum be ordered; or dry-cupping on this situation may be substituted for it, when the abstraction of blood appears injudicious; but in these cases the modern fashion of applying leeches to the uterus itself should not be followed. The turpentine embrocation may be afterward applied over the hypogastrium. Sedatives and refrigerants should be given with astringents; and if the pain be urgent, narcotics and the other means advised for neuralgia of the uterus (§ 14–17) may be added. The nitrate of potass may be thus prescribed with the liquor ammoniæ acetatis, with the acid in excess, and with the spirit of nitric ether and tincture of henbane; or the hydrochlorate of ammonia with hydrochloric acid, and hydrochloric ether, may be taken in the infusion of cinchona, or simple infusion of roses, in different circumstances of the disease. If the hæmorrhage be excessive, the more energetic anti-hæmorrhagic remedies, as the infusion or tincture of matric, gallic acid, tannin, the spirits of turpentine, the extract of logwood, &c., may be had recourse to. When the patient is anæmic, or when there is a more continued draining of blood, the muriated tincture of iron, with an additional quantity of the acid, will be given with benefit, with the compound tincture of camphor, or with the infusions of calumba or quassia.

186. I have had reason to believe that a judicious recourse to the iodides has not unfrequently been productive of some benefit. The iodide of potassium should generally be preferred, and be conjoined with the solution of potass, or with



Brandish's alkaline solution, or with either of the carbonates; but it ought always to be prescribed in small doses, and be long persisted in. In other, or in anæmic cases, the iodide of iron may be given in sirup of sarza. The bromides of magnesium and of potassium have been considered as being equal, if not superior, to the iodides, but chiefly from the circumstance of their presence in certain mineral springs, as those of Kreuznach, which have been much employed, both internally and as baths and hip-baths daily, in cases of uterine enlargements and tumours, and with apparent benefit in many cases. These waters may be had in this country. M. VELPEAU suggested an operation consisting of the enucleation of fibrous tumours of the uterine parietes by an incision through the os uteri or the lower segment of the womb. M. AMUSSAT performed this operation in 1840, and it has been subsequently resorted to by others—by BÉRARD, BOYER, SIMPSON, and others; and with success by my friend Dr. PANCOAST of Philadelphia, by Mr. TEALE of Leeds, M. AMUSSAT, in two cases, and by M. MAISONNEUVE; but as the number of unsuccessful cases is much greater than that of the successful, and as their details are by no means encouraging, the hæmorrhage and other consequences being alarming, this operation should not be recommended.

187. X. TUBERCULAR DEGENERATION of the *internal surface of the uterus* is sometimes met with, in the form of a dirty yellow matter, closely resembling the substance of a tubercular bronchial gland at an early stage of softening. This matter is about an eighth of an inch in thickness, extends over the whole internal surface, but rarely into the cavity of the cervix, and more frequently into the Fallopian tubes, which it more or less distends, and is sometimes associated with tubercular degeneration of the ovaries. I observed this association in a young lady who died of consumption at nineteen years of age, and who had never menstruated. ROKITSKY thinks that it never occurs primarily in the cervical canal. Upon scraping off this deposit from the internal uterine surface, it is found that the whole of the internal membrane is removed and replaced by it, and that it is closely applied to the proper structure of the organ, which, with its cavity, is more or less enlarged. At an earlier stage the internal membrane is seen to be opaque, more vascular than natural, and to present small yellow spots, which are found to be distinct tubercular deposits when examined by the microscope. This subject has been investigated by LOUIS, KIWISCH, and GEL, the last of whom has furnished Dr. WEST with a table, according to which it appears that in 68 cases this lesion has been observed at all ages, from 10 years to 80; but most frequently from 20 to 50 years of age; and, according to the appearances in 45 cases, the uterus alone was affected only in 1 case; the uterus and tubes in 12; the uterus, tubes, and peritoneum in 19 cases; and the tubes alone in 8 cases.\*

188. The *symptoms* of uterine tuberculosis are amenorrhœa, or dysmenorrhœa, often associated with leucorrhœa—very common phenomena of tubercular phthisis, of which this uterine lesion is

generally secondary, or, if not secondary in very young subjects, at least coexistent with tubercular deposits in the lungs and other organs or parts.

189. XI. FATTY FORMATIONS have been deposited in the cavity of the uterus in very rare instances, and have been thrown off by the contractions of the organ when they had reached a large size. Dr. WEST refers to two instances, recorded by Drs. BUSCH and SEEGER, where this product was expelled from females of the ages of fifty and fifty-three. In one the tumour was the size of the fist, and was composed of fatty matter closely resembling cholesteroline. In the other case the tumour was the size of a child's head, was connected by a broad pedicle with the whole margin of the os uteri. It was removed by ligature; and the patient, who had suffered from menorrhagia for a year previously, recovered. The tumour weighed three pounds and a half, was said to have been an ordinary fatty tumour, having an investment of dense cellular tissue, septa of which dipped into its substance.

190. XII. CANCER OF THE WOMB.—Of CANCER and of SCIRRHUS and other TUMOURS, as well as FUNGO-HÆMATOID, and of other malignant diseases, full notice has been taken under their respective heads. I shall now only briefly notice the malignant lesions which are found in the uterus, and the treatment which has been advised for them. Before the chronic inflammatory states of the cervix uteri were investigated and their consequences shown, more especially by the writings of Dr. HENRY BENNET, several of these consequences were viewed as incipient cancer of this part of the organ; and the mistake was the more readily made as cancer uteri in most cases commences in this part, and often resembles the changes, more especially hypertrophy, hardening, pain, &c., which result from protracted inflammatory irritation. The profession is much indebted to the writings of Dr. H. BENNET, and more recently of Dr. WEST, for the researches they contain into the diagnosis of malignant diseases of the womb by the former, and into the pathology and treatment of them by the latter physician; and I would advise the reader not to be content with the brief view I shall now take of these maladies, but to peruse the more copious details, furnished by these able writers, not only of these but also of other diseases of the uterus.

191. I have defined CANCER, when treating of this malady generally; but much confusion has existed in consequence of the want of precision in the use of this term; for some pathologists have employed it as representing the *genus* of malignant alterations of structure, commencing or manifesting themselves locally; while others have limited it to the carcinomatous state or variety of the genus. The generic definition of cancer given by MÜLLER is as follows: "Those growths may be termed cancerous which destroy the natural structure of all tissues, which are constitutional from the very commencement, or become so in the natural process of their development, and which, when once they have infected the constitution, if extirpated, invariably return, and conduct the person who is affected by them to inevitable destruction." To this definition no objection can be offered, inasmuch as it comprises all the varieties of morbid structure usually denominated malignant or cancerous. Much confusion, however, has arisen from the different terms by which these have severally been denominated, the

\* That this is a rare affection appears from the fact that, among 200 phthisical females, LOUIS only met with three who furnished examples of tuberculous disease of the uterus. When the affection has been accompanied by a discharge, the vagina often presents spots of ulceration, exhibiting a relation analogous to that of the trachea in pulmonary phthisis.]

desire of originating a name, rather than of conveying a precise idea of the thing named, and of adopting foreign terms, being among the *ludibria* to which modern medical writers expose themselves. Cancerous diseases of the uterus, notwithstanding the microscopic researches of those anatomists who have dignified themselves by the name of Histologists, have not as yet been distinguished by any determinate character, by which they can be undoubtedly known under the microscope, as far as the describers of these characters or appearances have furnished us with the means; and this failure of microscopic diagnosis is most remarkably manifest in respect of those lesions of structure which have been viewed as cancerous by some, and which have been as stoutly denied to be such by others, and which are considered by the latter as separate and specific forms of disease, especially epithelial cancer, melanosis, lupus, &c.\*

192. i. FORMS.—Although no form of cancer is peculiar to the uterus, yet they do not all occur with any thing approaching to the same frequency. On this subject Dr. West remarks: "Fungoid or medullary carcinoma is by far the most common; next in frequency may be classed the epithelial varieties of the disease, if indeed it be not more correct, as some men of high authority

believe, to refer them to a separate category distinct from genuine cancer. Next to them, but divided by an interval which widens in exact proportion as fresh evidence is brought to bear on the subject, may be classed scirrhus or hard cancer; while almost as rare, or perhaps even more uncommon, stands the colloid or alveolar variety of the disease." (*Op. cit.*, p. 336.) ROKITSKY says also that fibrous or scirrhus cancer of the uterus is of extreme rarity, while medullary carcinoma occurs with the greatest frequency. This opinion accords with those of Mr. PAGET and Dr. WEST. But Professor KIWISCH states that scirrhus or hard cancer occurs in about three in every ten cases of cancer of the womb; and he remarks, that with the softening of fibrous or scirrhus cancer the characters of this growth gradually disappear, and, becoming more vascular, the mass is more easily broken down, and contains a brainlike substance, the ulcer which forms presenting the same character as those which are observed in medullary cancer. Dr. West states, that of 120 cases of uterine cancer, the disease appeared, from an examination during life, to be medullary in 108, epithelial in ten, and colloid in two; and of 120 cases, the disease occupied the *body of the uterus* only in two.

193. A. It is fully shown that the cervix, or the part of the womb which projects into the vagina, is that in which cancerous disease commences, and that the exceptions to this are very few. The mode of its commencement, however, varies in the different forms. The *medullary* form begins with a morbid deposit in the substance of the cervix, enlarging or thickening it more than elongating. The lips of the os are enlarged, hard, and tense, and, at the same time, irregular, nodulated, and wide or gaping. When the cervix is incised, the structure is occupied by a white, firm, and semi-transparent matter, which seems infiltrated in parts, and has displaced the structure in others. This deposit is more abundant near the internal or mucous surface than near the external. Softening of the diseased part soon takes place, death of the mucous covering follows, and an ulcer, with ragged and uneven surface, and with raised, irregular, hard edges, supervenes, and is covered by a dirty sanies. As the disease proceeds, the lips and cervix are altogether destroyed, and the eroded parts are covered by a soft, dirty white, and often offensive substance. The carcinomatous ulceration may commence either in the softening of the morbid deposit, extending externally or superficially, or in erosion of the surface, the consequent ulceration proceeding more deeply; but the formation of the open sore takes place sooner or later, and advances with very different degrees of celerity; foul granulations and fungous growths spring forth; a fetid pus, mixed with a fetid, greenish-brown, or sanguineous fluid, or bloody débris, or with more or less abundant hæmorrhages, marking the progress and destruction of the lower segment and upper portion of the vagina. In the more retarded cases, cancerous deposits take place in the substance, in the cavity, or on the external surface, and even in the close vicinity, of the organ; and ultimately the disease invades more or less the whole body of the uterus, often extending to the ligaments and ovaries, and sometimes forming malignant polypi within the cavity. Cancerous tumours also form on the uterine peritoneal surface.

[\* Under the article "*Scirrhus and other Tumours*" will be found the histological characters of true cancer, as laid down by BENNET, and to that article the reader is particularly referred. Before referring to the views of PAGET, it may be well to recall the following opinions of VOGEL, as contained in his "*Pathological Anatomy*" (Am. ed., p. 166): "Carcinomatous structures are distinguished from the preceding class, the slightly organized epigeneses" (t. phus and serofulous deposits and tubercle), "by a higher degree of organization; they not only show a more highly developed cellular structure, but frequently also fibres, vessels, and granulations enter into their composition. They are not, however, strictly limited from the former class; for, although the tumour, as a whole, can be easily distinguished from one of the former class, it frequently contains particular portions which cannot be distinguished with certainty from tubercular deposition. *Neither is there any strict limit between these and certain forms of non-malignant tumour, namely, fibrous tumour; and cases frequently occur in which it cannot with certainty be determined whether a tumour belongs to the carcinomatous or fibrous group, i. e., whether it be malignant or non-malignant.* The malignancy depends here, as in the former class, on softening and a disintegration of the elements, commencing with the cellular structures, but gradually proceeding to the fibrous parts, and the elemental tissues of the affected organ. The anatomical and histological relations of carcinomatous tumour exhibit the greatest variety; indeed, even in the same tumour, different parts often present very different characters. Their characters farther vary with their stage of development. These tumours are sometimes soft, resembling cerebral substance; sometimes firm, like lard; and sometimes hard, like cartilage. Sometimes they are highly vascular, and of a reddish tint; sometimes pale; sometimes they are distinctly separated from the adjacent parts, while in other cases there is no line of demarcation between them and the surrounding tissues" (p. 266). We are indebted to Mr. PAGET for a very full and accurate description of the various forms of the true cancer-cell ("Surg. Pathol.," Amer. ed.), and he very truly observes that "the experienced microscopist will very rarely fail in the diagnosis of a cancer by its minute structures; but he only discriminates them as specific modifications of the nucleus, nucleated cell, endogenous cells, and other forms, of which the types are in natural parts" (excretory gland-cells and epidermal cells). He finds among them no new type-forms. Still, this pathologist admits (*Loc. cit.*, p. 354) that there are cancerous tumours which are not composed of the true cancer structures, and remarks that we should do right "to choose modes of life rather than structures for determining the affinities of morbid products, and for arranging them under generic names. As of all tumours, so especially of cancers, the true nature is to be apprehended only by studying them as living things."]



194. *B. The scirrhus variety of cancer uteri* is described by ROKITANSKY as very rarely affecting the uterus, the most common form being the medullary, either by itself or complicated with the former. Fibrous or scirrhus cancer always commences in the cervix, its primary occurrence in the body of the uterus being extremely rare. When closely examined, it appears to consist of dense, whitish, retiform fibres, differing from the healthy texture, and in their minute meshes a pale reddish yellow or grayish translucent substance is deposited. This morbid growth invades the uterine structure, and furnishes no marked boundaries. It is various in extent, and accumulating at certain points, gives rise to irregular, nodulated elevations and indurations, and enlargement of the cervix, or portio vaginalis uteri.

195. Cancerous degeneration of the uterus in either of these forms is generally confined for a considerable time to the vaginal portion; but the disorganization often extends with more or less activity not only to the body and fundus of the organ, but also downward involving the vagina, thus associating with it vaginal cancer. It may even extend in other directions, and thus invade the rectum, the bladder, the cellular and adipose tissues of the pelvis, and at last the ovaries and the peritoneum, cancerous growths either forming upon it, or perforating it chiefly in the state of medullary masses. The destructive process, when extending to the vagina, predominates on either the anterior or on the posterior wall; sometimes to both equally, and occasionally almost to the external orifice. In these cases it often involves the parietes of the bladder and rectum, producing in the most advanced states communications between their cavities, and the most distressing conditions, consisting of a large fungoid cavity, occupying the vagina, the uterine cavity, opening into the cavities of the bladder and rectum, and closed superiorly by the parts agglutinated around the fundus, by the medium of adhesions between the peritoneum covering the adjoining viscera. The formation of these adhesions increases the distressing symptoms of the last stage of the malady.

196. Cancer of the uterus is generally a primary malady, and continues for a long time, if not throughout, the only cancerous affection of the body. It is, however, sometimes developed concurrently with, or consecutively upon mammary or ovarian cancer; or it may be accompanied with or followed by degeneration of the structures just mentioned and of the lymphatic glands. It more rarely becomes associated with cancer of the stomach, or liver; more frequently with that of the mammae and peritoneum, and occasionally with a universal cancerous deposit, or with mollities ossium. Uterine cancer seldom terminates fatally without extending to the upper portion of the vagina. It is commonly allowed that cancer uteri is confined to the part it commences in for a considerable period, and for a longer time than cancer of any other organ. M. LEBERT states that secondary deposits in other parts occurred only in a third of forty-five cases of uterine cancer. Professor KIWISCH found the disease present in the bladder in 42 per cent. of his cases of uterine cancer. But in this, as well as in other diseases, statistics cannot be depended upon, and for reasons I have stated in other places.

197. *C. Epithelial cancer, or Cauliflower excrescence of the os uteri*, and which is doubted by some

to be cancerous, is of very rare occurrence.\* It presents a cauliform appearance, or, according to ROKITANSKY, the appearance of a confervoid growth, consisting of lenticular, pale-red, transparent, and tolerably hard bodies, strung together like the beads of a rosary, projecting on the orifice of the uterus into the vagina, and bleeding on the slightest touch. The only case in which I have seen it came only once before me in consultation, and it then seemed to me as a fungoid form of cancer; and, from the local changes, the bleeding upon examination, and the cachectic and anæmic appearance of the patient, as undoubtedly a variety of carcinoma or cancer. The case observed by ROKITANSKY is stated by him to have grown from an evidently cancerous base of the medullary variety. Dr. J. CLARKE and Sir C. M. CLARKE, who first described this malady, have viewed it as less formidable, and have stated that it is sometimes curable. It is not improbable that the medullary form of cancer of the cervix may present fungoid or confervoid growths, of a cauliflower appearance; and that an intractable but non-cancerous ulcer of the os uteri may give rise to large fungoid granulations, bleeding on the slightest touch, and both lesions may be thus confounded, the former, however, not admitting of cure, the latter in rare cases. Both these lesions are attended by frequent, exhausting, and dangerous hæmorrhages. These morbid growths

[\* According to PAGET only a part of the cases to which the name of "*Cauliflower Excrescence*" has been ascribed have been epithelial cancers; of the rest, some were medullary cancers, and some, perhaps, simple, non-cancerous, warty, or papillary growths. VISCNOW, LEBERT, and PAGET, agree in opinion that there are three different kinds of papillary tumours at the os uteri—the *simple*, the *caneroid*, and the *cancerous* (that is, the epithelial cancerous and the medullary cancerous); the first two forms together constitute the cauliflower growth. This begins as a simple papillary tumour, and at a later period passes into caneroid (epithelial cancer). At first, one sees only on the surface papillary or villous growths, which consist of very thick layers of peripheral flat, and interior cylindrical, epithelial cells, and a very fine interior cylinder, formed of an extremely little connective tissue with large vessels. The outer layer contains cells of all sizes and stages of development, some of them forming great parent structures with endogenous corpuscles. The vessels are, for the most part, colossal, very thin-walled capillaries, which form either simple loops at the apices of the villi, between the epithelial layers, or towards the surface develop new loops in constantly increasing number, or, lastly, present a reticulate branching. At the beginning of the disease, the villi are simple and close-pressed, so that the surface appears only granulated; it becomes cauliflower-like by the branching of the papillæ, which at last grow out to fringes an inch long, and may present almost the appearance of an hydatid mole. After the process has existed for some time on the surface, the caneroid alveoli begin to form deep between the layers of the muscular and the connective tissues of the organ. In the early stages of the disease, the cavities may be simply filled with epithelial structures; there may be, however, alveoli on whose walls new, papillary, branching growths may be seated—a kind of proliferous, arborescent formation. Such is the description of the cauliflower excrescence by VISCNOW, endorsed by LEBERT and PAGET; and, as the last writer remarks, illustrates the usual history of the most exuberant epithelial cancers, the "*simple, papillary tumour*" being an excessive papillary outgrowth of epithelial cancer; the later stage of the same, when it passes into caneroid, being the usual extension of such a cancer into deeper parts—a continuous growth of the same thing in a new direction, inasmuch as papillary structures, composed of epithelial cells with blood-vessels, and a little connective tissue, are the essential characters of the epithelial cancerous outgrowths. Dr. PAGET, indeed, remarks that he believes the same composition has never been seen in any papillary or warty growths that did not, if time were allowed, proceed to the formation of epithelial structures in the deeper parts, and thence through the usual progress of malignant disease.]

consist, microscopically, of "hypertrophied papillæ, composed of epithelial cells, richly supplied in their interior with large and delicate vessels, and covered by a thickened layer of epithelium. The enormous looped capillaries of the cauliflower excrescence explain the abundant hæmorrhages, and the profuse serous discharges which attend it; while the absence of that solid structure which is found in other forms of epithelial cancer accounts for the favourable results that have followed its extirpation.\*"

198. *D. Corroding ulcer of the os and cervix uteri*, first described by Dr. J. CLARKE, begins in the mucous membrane, and involves the whole circumference of the os, utterly destroying both it and the subjacent parts. It differs from cancer in the absence of thickening, hardness, or deposit of heterologous matter, and in its prolonged existence—sometimes for several years without being attended by any dangerous symptoms. It appears to be analogous to lupus, and is more strictly a rodent form of ulcer than a variety of cancer.

[The corroding ulcer of the uterus is a very rare, as well as dangerous form of uterine disease. According to ASHWELL, for one case of it, we meet with 90 or 100 of cancer of the organ. It generally attacks women of spare and lymphatic temperament, and rarely before the age of forty. It may go on from one to five years before it prove fatal; but its progress may be greatly retarded by the use of caustics. The fatal result is at length brought on by repeated hæmorrhage, or by the prostrating effects of the disease. The speculum will usually be necessary to form an accurate diagnosis between it and cancer. Its progress is slower than that of the latter disease, while the pain, discharge, and other inconveniences are generally less. Occasionally, the discharge is very offensive and acrid. The pain and weakness in the back and loins are usually constant and distressing, though sometimes no pain is experienced. The patient gradually emaciates, the discharge increases, with gastric derangement, diarrhœa, or constipation, and in some instances fatal peritonitis results. The disease, in the present state of our knowledge, must be regarded as the result of inflammation of a specific kind. The leading marks of distinction between it and cancer are briefly pointed out by our author. But besides the absence of carcinomatous or other deposit, when examined through the speculum, the surface of the ulcer will be seen to be red, rough, and granular, with a distinct line marking its extent. In cancer, the new deposits and carcinomatous growths tend to fill up the pelvic cavity; in this disease, corrosive action tends to enlarge the cavity. The prognosis in this affection is, in nearly all cases, unfavourable. The general principles of treatment are the same as in cancer uteri.

\* It is the opinion of Professor SIMPSON that cauliflower excrescence, in the earlier part of its progress, is a morbid tissue, but not necessarily of a malignant or carcinomatous character. His chief reasons for this opinion are, its appearing sometimes before the twentieth year; its occasional shrinking and almost total disappearance upon the application of a ligature, or after death; the apparent absence of diseased deposits in the neighbouring tissues and parts upon the dead body; the frequent slowness of its general progress during life; and, lastly, the alleged restriction, and even complete removal of the tumour, in some instances, by the use of astringent applications and other means. Mr. PAGET, however, has conclusively shown that this affection, in every stage of its progress, is generally but a form of epithelial cancer, and consequently malignant, especially in its later stages.]

The nitrate of silver acts very beneficially, by relieving and lessening the quantity and fetor of the discharge. As palliatives, the narcotic sedatives are to be used freely, both locally and generally. The excision of the cervix has been recommended as the most appropriate remedy, especially in the early stage of the disease; but, however much it may promise, there are few patients who will be found willing to submit to it. In some cases, doubtless, it would be justifiable. (For a very full and accurate account of the *Rodent Ulcer*, see "*Lectures on Surgical Pathology*," p. 588. By JAMES PAGET, Philadelphia; 8vo, 1854.) It will suffice to state it is of irregular shape, generally tending towards oval and circular; the base deeply and unequally excavated, not warty, nodular, nor granulated; in these respects, contrasting with cancerous growths. It is also comparatively dry and glossy, yielding, for its extent, little ichor or other discharge, and has commonly a dull reddish-yellow tint. Its border is slightly, if at all, elevated; the adjacent skin appears quite healthy; the base and border feel alike tough and hard, as if bounded by a layer of indurated tissue about a line in thickness. In corroding ulcer, we see more destruction; in cancerous, we see destruction with more than commensurate growth; with the microscope we see no structure resembling epithelial or any other form of cancer.]

199. ii. SYMPTOMS OF CANCER UTERI.—The symptoms which are most constantly observed in cancer uteri—namely, pain, hæmorrhage, and vaginal discharge—may attend other lesions of the organ; but in all cases where they, or even any two of them, are present, a careful vaginal examination ought to be made.—*a. Pain*, accompanied with hæmorrhage or leucorrhœa, is a very frequent, but not a constant, symptom. It varies much in character and intensity, both at the commencement and in the course of the malady; and very often, when the hæmorrhage is profuse, but little pain, or merely a backache, is felt. At an early stage the pain is generally not severe, nor is it always referred to the uterus, but more commonly to the loins. The organ is seldom tender to the touch, and sexual intercourse is not often productive of suffering. The pain, as the disease advances, is referred to one or other of the iliac regions, and either comes on, or is exacerbated in paroxysms, and a lancinating pain referred to the uterus occurs suddenly and at intervals. Menorrhagia may be either attended, or not attended, by pain. In many cases it is, when very profuse, followed by severe pain. With the progress of the malady the pain generally becomes more severe; but towards the close, when the cachexia and anæmia are most remarkable, the sufferings of the patient generally abate more or less. But before this ultimate stage appears, pain in the uterus is added to that in the back and hypogastrium, and to the other distressing symptoms experienced. The pain is, in some cases, described as burning, darting, cutting, &c.; and it is generally aggravated into intolerable paroxysms, especially towards or during the night, stabbing or lancinating pains recurring after short but irregular intervals. When an attack of hæmorrhage supervenes on severe pain, some degree of relief is sometimes afforded for a short period. As the disorganization extends to the bladder, the vagina, or rectum, or even to them all more or less, the sufferings of the patient are accordingly in-



creased; and when utero-vesical fistula is formed, the distress is farther aggravated, and rendered still more harassing. In a very few cases, however, the disease runs its course entirely, or almost entirely, without pain. But it is not so rare for pain to be absent through a great part of the course of the malady, and appear only at a far-advanced period. The absence of pain throughout the disease, or until an advanced stage, occurs chiefly in the epithelial and medullary forms of cancer uteri.

200. *b. Hæmorrhage* is the next symptom in importance, but is not always a sign of the commencement of the ulcerative stage of cancer uteri; for it is, in a very large proportion of the cases, the earliest sign, preceding, and unattended by, either pain or watery, offensive leucorrhœa, for a longer or shorter time. The occurrence of hæmorrhage, whether with or without pain, without any sufficient cause, should always induce to a vaginal examination. The bleeding may not be profuse, but continuous and prolonged, or resemble the ordinary menstrual period, excepting only its non-occurrence at the proper period, or its frequent recurrence. It sometimes assumes this character in females past the catamenial epoch of life, and in whom the menses had ceased for a longer or shorter time. When it thus appears, the existence of the malady should be suspected. When cancer uteri commences at an early period of life, the hæmorrhage most frequently occurs at the menstrual periods, or a day or two after their cessation; but menstruation is generally irregular during the course of the disease, being either too early, or passing over a period, the next being excessive. With the progress of the malady, pain is generally added to hæmorrhage. The source of this discharge appears to be chiefly the internal surface of the cervix and body of the womb; for the hæmorrhage may be excessive before ulceration has taken place, and even when this has undoubtedly supervened, the bleeding may still proceed from the surface of these parts, rather than the ulcerated part; for in many cases this discharge has been the least where the ulceration has been the greatest, and proceeded the farthest. The paroxysmal expulsive pains often attending the hæmorrhage are usually due to the efforts of the womb to expel coagula formed within it.

201. *c. The leucorrhœal discharges* differ in the forms and stages of cancer uteri. A mucous or mucopuriform discharge is frequent at an early period, and is then generally not offensive. But as the malady advances, it is commonly more or less offensive, and it becomes more watery, or appears as a dirty and very offensive sanies. An offensive discharge may accompany any of the chief organic lesions of the uterus; but, although it may exist in these, it seldom occurs in so marked a manner as in cancer. The continuance, the quantity, offensiveness, and other conditions of the discharge depend upon a variety of circumstances—upon the stage and form of the malady, upon the extent to which ulceration has advanced, upon the retention or non-retention of the morbid fluid, upon the frequency of its removal by injections, hæmorrhages, &c. In a few instances, an offensive discharge has preceded either the pain, or the hæmorrhage, or both, although much more rarely; and, still more rarely, this has existed for so long a period, and has given rise to so little suffering or cause of com-

plaint otherwise, that when at last recourse to medical aid has been had, the cervix uteri has been destroyed, and the finger has passed into the cavity of the organ.

202. These symptoms, the most severe which attend cancer uteri—the pain, the hæmorrhage, and the offensive leucorrhœa—cannot undoubtedly prove the existence of the malady. They may individually, or even conjointly, attend other organic lesions of the uterus. But viewing them severally and in connexion with the evidence furnished by a vaginal examination, and with the constitutional symptoms characterizing the course and the advanced stage of the malady (see *art. CANCER*, § 20, *et seq.*), especially the cancerous cachexia, the existence of cancer uteri cannot be mistaken. The remarkable disorder of the digestive organs, the impaired assimilation, and the waste of the red globules of the blood, and even also of the tissues, and the consequent cachectic or cancerous anæmia; the frequent recurrence of disorder of the bowels, more especially of diarrhœa, with both abdominal and hypogastric pains; the distress often caused by defæcation, and more particularly by the state of the urinary organs, and by the urinary discharges, are all indicative of the nature of the malady.

203. Cancer uteri does not prevent a female from becoming pregnant at an early stage of the malady; but the process of parturition, and the changes in the uterine organs and in the female economy that follow, generally accelerate, often with great rapidity, its course. Parturition, owing to the effect of this act upon the diseased parts, especially the cervix, often is accompanied by dangerous hæmorrhage, or followed by severe or fatal inflammation. In some of these cases, both mother and child have died before delivery has been accomplished; generally the process is difficult and prolonged. In some cases, gestation is also prolonged beyond the natural period, and, in rare instances, death has occurred without the efforts of the uterus having been sufficient to expel the fœtus.

204. Dr WEST has given, in his interesting lectures, a table of the result of seventy-four cases of cancer of the cervix uteri *complicating labour*; and of these 41 died soon after labour, and 33 recovered for a time from the effects of this process. Of 72 children, it is stated that 47 were dead-born, and 25 born alive. He found that the average duration of 17 cases of cancer uteri, which he carefully observed, was 15 months; and that of 39 cases, as given by LEBERT, was 16 months. It is thus apparent that cancer uteri is more rapid in its progress than cancer in other organs. The average duration of all forms of cancer is stated by this writer to be 18 months, and of cancer of the mamma and of the testis, the most prolonged, not to exceed three years and a half.

205. *iii. THE PROGNOSIS* of cancer uteri may be inferred from what I have stated above, and in the article CANCER (§ 20–22). ROKITSKY remarks that “cases of spontaneous recovery from uterine cancer are of extreme rarity, but they do occur; the carcinoma and the cancerous ulceration are then limited to the cervix, the internal orifice forming the boundary. The loss of substance heals with a funnel-shaped cicatrix” (*Op. cit.*, p. 303.) In a case, the progress of which was constantly observed by me, recovery took place while a diet and regimen, hereafter to be no-

ticed, was strictly observed. The cicatrix, which was formed low in the vagina, was shaped as ROKITSKY has described it—not more than half an inch of the vagina above the urethra having been left uncontracted.\*

206. iv. CAUSES OF CANCER UTERI.—These are the same as have been stated respecting cancer in general. But there are certain particulars which require notice with reference to this malady, when originating, as it commonly does, in the neck of the womb. The mortality of cancer in females is nearly three times greater in London than in males, and more than double the number of the deaths from cancer in males throughout England; the excess in females being evidently due to the frequency of cancer of the womb and of the breast among them. According to TANCHOU, the deaths from cancer of the womb, stated in the Mortuary Registers of Paris, as compared with those from cancer of the breast, were as 2½ of the former to 1 of the latter.

207. Age manifestly predisposes to cancer; but this disease appears to occur at an earlier period in the uterus than in the mamma; for in the latter it is rare at the age of thirty, whereas it is not so rare at this age in the former situation. Cancer uteri increases in frequency with the advance in life, as Dr. WALSH has shown: but in order to render the increase more manifest, the number of cases at a given age should be calculated with reference to the number of females supposed to exist at the same progressive periods of life. The inference deducible from this fact is, that the occurrence of cancer is in some degree favoured by the depression or exhaustion of vital power taking place from the progress of age, as well as from other causes of vital depression.

\* Mrs. C.—, at the age of 36, first complained of symptoms indicating an early stage of cancer uteri. The disease advanced, and several medical men were consulted at her own or my suggestion. The cervix had become much affected, and the disease extended far down the vagina with distressing irritability of the bladder. At this time she found Dr. LAMBE's work on "*A peculiar Regimen, &c., in the Treatment of Cancer, &c.*," in my library. He was consulted in her case, and he recommended her to remove to a dry and healthy locality in the vicinity of London, to strictly observe a vegetable diet, to drink only distilled water, and use only distilled water in cooking and for infusing tea or other substances. These injunctions were observed without any deviation, and under his supervision. In the course of a few weeks amendment was very apparent, and in somewhat less than twelve months a cicatrix, as situated and described above, was formed. The patient continued this regimen for nine or ten years, and enjoyed excellent health. After this period she began to partake of fish, the flesh of chickens or rabbits, &c. She afterward ventured farther upon animal food, and occasionally took a glass of old wine. Five or six years more elapsed, when she complained of the right mamma, and when examined the disease was commencing in it; but no complaint was made of the parts in the vicinity of the first disease. The diet was now altered, but the malady proceeded slowly; and having been unusually prolonged, extended inward, affected the pleura; and ultimately the vaginal cicatrix was attacked, and she ultimately sunk, more than twenty years from the commencement of the malady in the cervix, and after an interval of nearly fifteen years of good health.

[In the *American edition* of Dr. LAMBE's work, on "*Water and Vegetable Diet in Chronic Diseases*" (12mo. New York, 1855), there is the history of another remarkable case of cancer uteri, attended with an acrimonious and offensive discharge, where the pain, discharge, &c., were subdued, and the general health and comfort of the patient greatly improved by the use of a strictly vegetable diet, without medicine, except opium. The disease, at the time of the report, had been controlled for the space of twenty-five months, without making any perceptible progress, while the ulcerative process had been wholly superseded.]

Dr. WEST has given a table of the ages of 426 cases of cancer uteri, collected from various sources:

	Actual Number.	In the proportion of 1 to 10,000 of the whole population existing at the respective ages.
Between 25 and 30 years	25 or	1 in 134
" 30 " 40 "	112 "	1 " 21
" 40 " 50 "	178 "	1 " 9.7
" 50 " 60 "	71 "	1 " 16.6
" 60 " 70 "	35 "	1 " 23.6
Above 70 "	5 "	1 " 108.

From these data it would appear that, although cancer uteri becomes more frequent as life advances up to fifty or sixty, it diminishes considerably in frequency from these ages; and from this table, as well as from other sources of information, it cannot be inferred that the actual cessation of the catamenia has any influence in favouring the occurrence of this malady in the uterus. Dr. WEST justly remarks that the state of the uterine functions previously to the appearance of cancer is not without interest; and he adds that, in 108 cases, this matter was made the subject of special inquiry. In 94 cases these functions were in all respects natural from their complete establishment to the commencement of the disease; and in 14 they were either habitually or frequently unnatural, being painful, postponing, or irregular. Out of 116 married women affected with cancer uteri, only 7 were sterile. The hereditary predisposition to cancer has been well established, as shown in the article on CANCER (§ 23). Mr. PAGET found that this malady in all situations was hereditary in the proportion of one to 6.1; Mr. LEBERT, in the ratio of one to 7.2; and Dr. WEST in 1 to 6.2. The proportion of hereditary cases is very probably higher than here stated, as it is difficult to ascertain from the patients the nature of the disease which caused the death of either, or of both parents.\*

208. v. TREATMENT OF CANCER UTERI is necessarily confined to palliating the suffering of the patient, and to attempts at delaying the approach of death. The symptoms which more especially require mitigation are *hemorrhage*, *pain*, and the *offensive discharge*. The means which should be resorted to for the first and second of these have been fully described in the articles HÆMORRHAGE, NEURALGIA, and CANCER; but there are a few topics connected with the treatment of cancer affecting the uterus, and of the effects of this malady, which require farther consideration.

209. a. *Hæmorrhage* is among the earliest and most alarming symptoms of cancer uteri. The obvious intention is to abate it when severe or too frequent, and to prevent its recurrence altogether, or before the catamenial period. The various means usually employed for *hemorrhage from the uterus* have been detailed (see art. HÆMORRHAGE, § 263-273); but there are a few of these which require a more particular notice at this place. The *gallic acid*, in doses of six to eight grains of every four or five hours, have been often found of decided service in arresting the hæmorrhage. The infusion of *matico*, used as an

\* I have noticed the question "Is Cancer contagious?" when treating of SCIRRHUS AND OTHER TUMOURS (§ 79, 80), and have referred to cancer, one of which was under the care of the late Mr. MAYO and myself, in which cancer of the glans penis in the husband communicated the disease to the cervix of the uterus. I have there stated my reasons for inferring that the disease may thus be communicated to the wife by the husband.



injection into the vagina, is also very efficacious. Dr. WEST states that, in some cases of medullary and of epithelial cancer, when the hæmorrhage is excessive, or prolonged, the morbid tissue may be broken down with the finger, and the tincture of the *sesquichloride of iron* injected into the midst of it. The extravasated blood is thereby coagulated, and the vessels destroyed, the whole mass thus treated sloughing away. KIRWISCH, who first resorted to this practice, remarks that it is not attended by much pain or serious constitutional disturbance. He also advises a recourse to the actual cautery, where the surface is too firm to be broken down. In one case, after other means had failed, I recommended the injection of the spirits of turpentine, in the manner in which the tincture of the muriate of iron has just been advised, the same medicine being given frequently by the mouth in small doses; and the hæmorrhage was for the time arrested. It is obvious that sexual intercourse is liable to occasion an attack of hæmorrhage, and that it should therefore be strictly forbidden whenever cancer uteri is suspected.

210. *b.* Pain is often so excessive as to require energetic means of relief; but, as long as it is not acute, the gentler remedies only should be employed. The pain is sometimes brought on, or aggravated by an irritable state of the bladder, or by the condition of the urine, and not unfrequently by neglect of the functions of the bowels. Therefore the states of both the urinary and fecal evacuations should receive due attention. The former may be corrected, and the irritable condition of the bladder mitigated by the exhibition of the solution or the bi-carbonate of potash with tincture of henbane, or by the mineral waters of Ems or of Vichy. If the urine abound in the phosphates, the means I have advised for this condition, when treating of the morbid states of the URINE (§ 90, *et seq.*), especially the hydrochloric acid taken in the decoction of pareira, or in the infusion of buchu, may be prescribed. The bowels may be regulated by means of the gentle cooling aperients ordered above (§ 184).

211. When the pain becomes so severe as to require anodynes, then plasters of opium or belladonna may be applied over the sacrum or above the pubes; and chloroform may be tried as an epithem, by means of spongio-piline. Internally the pilula saponis cum opio, or tincture of opium, may be given at night; and if these occasion neither headache nor sickness in the morning, they may be continued without increasing the dose. The preparations of morphia, unless conjoined with aromatic stimulants, often cause unpleasant depression. The black drop and Battley's sedative solution are often preferred to other opiates, but they are efficacious chiefly in their more powerful narcotic effects, the subsequent distressing sickness, &c., being not less complained of. Henbane and conium are often employed. The former, without alleviating pain, or with slight alleviation only, often affects the head, occasioning restlessness and headache. I have, however, found the two conjoined with camphor—three grains each of camphor and of the extracts of henbane and conium, being more or less of service. Dr. WEST says that after henbane he generally makes trial of the Indian hemp; for, although it is an uncertain remedy, it does not disorder the stomach, or occasion headache. But I have not always found it so pleasant in its ul-

mate effects. In severe paroxysms of pain, the inspiration of the vapour of chloroform has been resorted to; but the relief has been only very temporary. I have in a few cases directed the application of the tincture of belladonna to the diseased part, in the manner advised and resorted to by the late Dr. MOORE (§ 15), with very marked relief. Taken internally, belladonna seldom affords much relief, unless in large doses, which are usually followed by much depression, unless they are conjoined with aromatic stimulants; and these latter often fail in correcting the evil.

212. *c.* The *discharges*, owing to their great excess, or their very offensive odour, require, besides the usual attention to cleanliness, the means which have been advised for the more severe cases of LEUCORRŒA, more especially the infusion of matico, or tannin; the decoctions of oak-bark, of buchu, of cedar-bark, or of pomegranate-bark, &c. Weak acid lotions, and various other astringents, have also been recommended. Dr. WEST mentions the use of an injection of ʒj. of sulphate of iron, and ʒij. of the extract of conium to a pint of water; and he adds that a solution of ʒj. \* to ʒss of nitrate of silver to an ʒj. of water, injected immediately into the diseased structure, has the effect of hastening the separation of the slough and of destroying the bad odour. I have most frequently employed, for these purposes, the chloride of lime, or creasote, or both, in injections, consisting chiefly of mucilaginous fluids, in quantity and frequency according to the progress and urgency of the case. When the disease was very far advanced, and the use of these appeared likely to occasion inflammation of the peritoneum or adjoining parts, I have preferred to have recourse to powdered carbon, with tincture of belladonna, or extract of henbane, mixed in any mucilaginous fluid, as a vaginal injection. It has generally the effect of deodorizing the discharge and soothing the pain.

213. *d.* The *complication of pregnancy* with cancer uteri must be treated according to the peculiarities of each case, but its treatment cannot be entered upon at this place. It is fully considered in Dr. WEST's work, already referred to, where the reader will also find the results of extirpation of the uterus and of its cervix very sat-

[\* Dr. ASHWELL strongly recommends a strong solution of *nitrate of silver* (80 grs. to ʒj. of water), applied through a speculum, with a hair pencil, or tow fastened to the end of a piece of cane, smearing carefully the affected parts. It rarely produces much pain, being quickly decomposed by contact with the fleshy cervix. The eschar is usually detached about the third or fourth day, being thrown off in shaggy films, when the abraded surface will have acquired a redder and healthier aspect. The caustic should be early repeated, and if, after the fresh eschar, there is still further topical improvement, the treatment should be persevered in; and Dr. A. thinks that a "hopeful prognosis may be given," as often after these renewed applications, extending over many weeks, and aided by the *black wash* or *oxide of zinc*, he has "healed abrasions and commencing ulcerations of the os and cervix." We think it very doubtful, however, whether these were cases of true cancerous disease. From considerable experience in the treatment of this disease, we prefer very much the nitrate of silver to any other local application. The other caustics, as *corrosive sublimate*, *chloride of zinc*, *arsenic*, *nitrate of mercury*, &c., are apt to cause heat, pain, tension, and inflammation, and some of them cause dangerous constitutional effects from absorption. However beneficial the actual cautery may have proved in such affections, the prejudice against it in this country will effectually preclude its employment. The practitioner need not be cautioned in regard to the danger of a hasty diagnosis, few ulcerations or hardenings of the cervix uteri being malignant, although attended with hæmorrhage and other doubtful symptoms.]

isfactorily discussed. To this work, and to surgical writings on this subject, I must refer the reader.

214. *e.* The constitutional treatment of cancer uteri, or the means most appropriate to the existing cancerous cachexia, is not different from what I have advised in the articles on CANCER (see § 27, 44), and on SCIRRHUS GROWTHS (§ 113, *et seq.*). The chief objects proposed are to promote the digestive and assimilating processes, and to support constitutional power, and vital resistance to the progress of the malady. Subordinately to, and forming a part of these, may be mentioned, due attention to the secreting and excreting functions, and the alleviation of the more distressing symptoms. The anæmia attending the advanced stages of the malady should also claim our attention; and chalybeate preparations, and ehalybeate mineral waters, ought to be conjoined with such other means as the circumstances of each case will suggest.

215. *f.* In respect of *diet* and *regimen*, little need be added to what has been already stated in the places just now referred to. A digestible and nourishing food, in moderate quantity, and a temperate and dry air, are generally beneficial. It has been questioned whether much, or even any, animal food be of service, or rather, whether it be not detrimental in this malady. This matter has been fully and ably discussed by my late friend, Dr. LAMBE, a very learned physician, and an original thinker and observer. He imputed this malady, as well as scrofula, gout, consumption, and some other chronic diseases, to the use of animal food and to impure water; and advised vegetable food of all kinds in sufficient abundance, and distilled water for all purposes of internal use, and exercise in a dry and open air, to be resorted to for the cure of this as well as of those diseases. He did not believe that, when cancer was far advanced, this diet could then effect a cure, but he recommended it to be tried; and, at the same time, all fermented and distilled liquors, or other beverages than distilled water, to be relinquished. This diet and regimen were employed with apparent success, as long as it was strictly adhered to, by a married female, whose case I have briefly noticed in a note at p. 1407, § 205.

[Some farther remarks in regard to *cancer uteri* may not be out of place. Although it is generally conceded that confirmed carcinoma of the uterus is incurable either by surgical or medical remedies, yet we agree with ASHWELL, BOUILLAUD, and BRESCHET, that much may be done by a very early, well-sustained, and persevering prophylactic management. It is undoubtedly true, as stated by ASHWELL, that scirrhus or hard tumours of the womb are sometimes cured or become innocuous by altered nutrition, the indurated masses being deprived of their softer cellular tissue, and being converted into cartilaginous, cretaceous, or calcareous concretions. It may, however, be objected that such cases were not true carcinoma; and those who take the ground that cancer is never cured will, of course, assume that such was the fact. But this is a point which yet remains to be established by farther observations. Admitting that in these instances the disease was true carcinoma, it yet remains to be proved how far remedial measures had any thing to do in the cure or recovery. Our views on these points will be in accordance with

our pathology. If, with BOUILLAUD, we regard cancer merely as the result of inflammatory induration, or, with BRESCHET and BICHAT, as resulting from some error in the "organic sensibility," we shall, *a priori*, come to the conclusion that it is a curable disease; and this opinion will not be abandoned until multiplied and uniformly unfortunate experience brings us to a contrary conclusion. We are, however, unwilling, from other considerations, to admit that cancer is always an incurable disease. Facts do not warrant such a conclusion. It has been truly remarked, that no malady can be cured by those who are determined to regard it as incurable. Diseases so regarded must be left, as cancer generally is, to quacks and quackery—to those who promise any thing and every thing for money. It is not long since tubercular disease of the lungs was regarded as incurable, and this class of patients were assigned to the tender mercies of empirics. Cancer is sometimes said to be hereditary, but in all cases it is a declaration of the impression of long-standing and injurious influences. Some of the secretory or excretory organs are at fault. There have been some serious errors in diet and general hygienic measures. The treatment is to be based on a most careful investigation of all the functions of animal and organic life, and the influence exerted upon them by the previous habits, mode of life, food and drinks, &c., of the patient. The late Dr. TWITCHELL, of New Hampshire, was cured of an epithelial cancer of the face by confining himself strictly to a diet of bread and milk. We have seen true carcinoma of the breast remain dormant for years by allaying the fears of the patient, and by a course of strict dieting and attention to the excretory organs. A tumour having all the characters of true carcinoma will, under such management, not unfrequently become absorbed, and its elements, doubtless, eliminated from the system. At first, we see the tumour become loosened as to its subjacent connexions, a tucked-in nipple resumes its natural appearance; it loses its characteristic stony hardness by a process of gradual absorption, until at length no vestige of the disease remains. We have witnessed a case in point recently in a near relative. PAGET has truly observed that a cancer adds a new element of disease to those that were already in progress, and that if we assume a constant process of nutrition in cancers, it cannot but be that the blood will be affected both by what they take from it and by what it derives from them in the process of nutritive absorption. What returns to the blood must necessarily be morbid, and exert a very injurious influence upon it, even if incapable of being developed into cancer. Hence the importance of its early and thorough elimination by an active condition of the liver, kidneys, and skin, together with the alimentary canal, the greatest and most important emunctory of the whole body. Here we have the secondary poisoning of the blood superadded to the original cancerous cachexia; and no wonder that, with the cancerous material circulating in the blood of every organ, the disease returns after the original tumour has been removed. After the disease has progressed to the stage of ulceration, with pain, hæmorrhage, discharge, hectic, with a poisoned condition of all the circulating fluids, and a general cachectic state, with a despairing state of the mind, the situation of the



patient may well be regarded as hopeless, although the local disease be removed. But even here the case is by no means to be abandoned. Here come in the palliatives described by our author, which are of great service in alleviating the sufferings of the patient. But many facts go to show, as PAGET remarks, that "not only the progress of the peculiar constitutional part of the disease is nearly independent of the local part, but also that the constitutional part generally contributes most to the fatal issue" (p. 667). And again (p. 525), "The removal of the local disease makes no material difference in the average duration of life." If so, then our remedies must be general, and not merely local. ROKITANSKY has observed that spontaneous natural processes of healing often occur in even medullary cancer, one of the most fatal of all cancerous affections; and PAGET admits that "a medullary cancer may gradually decrease, becoming harder, as if by shriveling and condensing, and at length may completely disappear. I have seen," he remarks, "the same happen after partial removal of cancers." He also speaks at length of the degeneration of cancers, so as to be incapable of increase, or, to use a term of ROKITANSKY, applied to the same structures, "obsolete." WALSH states that "we need not wholly despair, after the removal of encephaloid;" and that "M. VELPEAU has excised well-marked specimens of this species, and seen the patients in perfect health two, four, six, and in one case ten years afterward." Sir ASTLEY COOPER thinks that scirrhus does not return in one fourth of the cases of removal; Dr. J. C. WARREN, that one case in three is cured; and Mr. TRAVERS states that "recovery generally ensues when the disease is removed before the supervision of pain." Professor MEIGS remarks ("Females and their Diseases." Phil., 1848, p. 274) that he has seen "a cancerous mamma as hard as cartilage ulcerated, and firmly adherent, that was totally removed by absorption in a long paraplegia." The results of Dr. GROSS's investigations in regard to the curability of cancer are, however, more unfavourable (*Trans. of Am. Medical Association*, 1854).

But in considering the question of the curability of cancer, whether of the uterus or any other organ, we are to remember that "it is an organ," as SIMON expresses it, "for excretory purposes" (*General Pathology*, 8vo. Phil., 1852), and that this eliminative effort has its root in some peculiar condition of the general system, called cancerous cachexia, the essence of which we by no means understand. Why it is that the blood sets about constructing an organ, so to speak, for the appropriation and discharge of its own blastema; why the secretory and excretory organs are not adequate for the elimination of those products which result from the disintegration of the tissues, and, indeed, whether, by the influence of secretory and excretory stimulants, alteratives, and a regular diet, such products may be wholly eliminated, are questions which, for the present, must remain undecided, and probably will remain so until we fully understand the chemistry of cancerous bodies and of the whole body, together with those natural changes which take place in the progressive and regressive metamorphoses of the blastema of the blood. We believe, with SIMON (*Loc. cit.*), that the more the nucleated fibrous material abounds in a cancerous tumour, the less

malignant it may be regarded, and the less likely to return if removed by the knife; for all pathologists agree in the opinion that fibrous transformation, so far as it extends, illustrates the operation of common, not of specific developmental influences in the part, just as, on the other hand, the compound granular corpuscles constituting the yellow softening material in cancerous growth represent, as VIRCHOW maintains, the degeneration of cells, and, consequently, a retrogressive tendency in the effusion where they occur. If we assume that the unknown albuminiform material of cancer requires a special cell-growth for its elimination, and cannot avail itself of any known cells for its removal, then our prognosis must necessarily be unfavourable as regards a cure; but as cancer-cells have their analogues in the normal cells of other tissues (as the excretory gland cells and epidermal cells), we may reasonably conclude that, under the influence of special stimulants and proper ingesta, the latter may perform the function vicariously assumed by the former.

If cancer, then, is to be treated successfully, the treatment must be founded on the pathology above indicated, viz., that the disease is a local manifestation of certain specific morbid states of the blood; that it is both a constitutional and local disease, specific in the sense that it depends on some peculiar material in the blood, different from all others, normal or abnormal, and presenting structures, to some extent at least, specific and peculiar, both in form and mode of life; and the cancerous diathesis or cachexia, as consisting in the accumulation of such materials in the blood, while accidental circumstances determine its localization.

SIMON has truly remarked that all cancerous diseases have a chronic period of latency, during which their cachexia acquires intensity from accumulation, till at length it suffices to establish the local vent; and we may argue farther, that the disease can be again reduced to this state of latency and to the accompanying difficulties of evolution, if all such local conditions be removed as favoured the first localization of its products. We have no rule by which to measure the intensity of the constitutional cachexia, but after the disease has reached a certain point, there are signs which speak infallibly to the experienced eye—the pale and anxious countenance, with a slightly leaden hue; the pinched features, with slightly livid lips and nostrils, the constant hectic, increasing emaciation, frequent pulse, acrid and offensive discharge, and severe pains. All these speak a language not to be mistaken, and if to them be added nausea and weakness of digestion, a tickling cough, stitches in the side, a faltering pulse, cadaverous and anxious expression, we may safely predict a speedily fatal result.

Cancer of the uterus is, as a general rule, very slow in its development, and the symptoms of the incipient stage are not strongly marked, indeed, they are so slight as scarcely to call attention. Were the physician called at this period, he would probably find the muciparous glands in the interior of the cervix hard, and of the size of small shot, and somewhat painful on pressure; the os may be hard and fissured, and the cervix enlarged and indurated, and of a deep flesh colour, both within and externally. At this period we have found the whole uterus enlarged, and

having a more solid feel. At a still later period, a careful examination will disclose, probably, a knotted and indurated state of the vagina, and the mucous membrane thickened where it is attached to the cervix; the uterus may be more fixed, as if consolidated with the neighbouring organs; and there may be softening, abrasion, or commencing ulceration. But a long time may elapse before the disease has reached this stage. If the female be married, she will have for some time previously complained of pain in sexual intercourse, followed, perhaps, by a discharge of blood, while she labours under irritability of bladder, uneasiness in the central pelvic region, and a failure of general health. The *prophylactic* treatment of cancer uteri is the same as for all other chronic affections—attention to all those hygienic measures which tend to invigorate the general health. ASHLEIGH, however, recommends rest in a recumbent posture as absolutely indispensable to a cure; but it is evident there are many cases where the enforcement of such a rule would be very inexpedient, as it would tend to impair digestion, lessen secretory and excretory action, and increase general irritability.

The diet should be very simple and unstimulating; for the most part, milk and vegetables. MACILWAIN (*"The General Nature and Treatment of Tumours,"* 8vo. London, 1845) thinks the diminution of carbon, in the interdiction of grease, sugar, and alcohol, very important. The same writer recommends *aperients* combined with *narcotics*, as blue-pill and colocynth, with opium or henbane. Dr. MONTGOMERY recommends an *alterative course of mercury* in the early stage.\* Our countryman, Professor DEWEES, recommends the occasional abstraction of a few ounces of blood, especially if the catamenia have ceased; and if there is severe throbbing pain just above the sacrum, he enjoins losing six or eight ounces of blood by cups or leeches. *Purging*, Dr. D. thinks, is never to be omitted; "for there is no one remedy," he remarks, "that is of such decided efficacy in this disease." The salines are preferable, as *sulph. mag., tart. pot. and soda, sup. tart. pot., phosph. soda, &c.*; or equal parts of *sulphur and magnesia, or crem. tartar and sul-*

*phur, or rhubarb and aloes, castor oil, or magnesia.* The use of purging in this affection, according to Dr. D., is to solicit large serous discharges from the intestines, with a view to relieve the engorged state of the pelvic viscera, and at the same time not to weaken the system too much by its excess. Care must also be taken not to cause mucous discharges, and to observe closely the effects produced. Great attention, too, according to Professor DEWEES, is to be paid to *diet*, the blandest food, as milk and vegetables, only to be allowed, as bread, rice, Indian or rye mush, or unbolted wheat-flour mush; the fruits of the season; tapioca, oatmeal gruel, sago, arrow-root, &c. "The influence of this course of diet," says Dr. D., "is much more efficient than we might at first be willing to admit; but the fact is unquestionable, that it almost immediately relieves pain after it has been adopted." All kinds of alcoholic drinks are to be forbidden, as well as spices and other condiments. Great care is to be observed in regard to *cleanliness*; the acid and offensive discharges are to be regularly removed by injections of tepid water, flax-seed tea, or the hip-bath; and *carbonic acid gas, lime, pyroligneous acid, or chloride of lime or soda*, are to be employed for the correction of the fetor by their chemical effects. The use of carbonic acid gas, which has been recently recommended as a new remedy for the relief of neuralgia and other painful affections of the uterus, was introduced by Dr. DEWEES in the same cases, and especially for carcinomatous affections of this organ. "We have enabled several patients," he remarks, "to derive much comfort, as well as temporary relief, from the extrication of this gas within the cavity of the vagina, by means of a flexible tube of a sufficient length and size, attached to the mouth of a bottle, in which there is mixed diluted sulphuric acid and the carbonate of lime. This may be introduced into the vagina several times in the twenty-four hours. In two or three instances this substance has relieved the severity of pain whenever it was employed, as well as diminished the offensiveness of the discharge." (*"A Treatise on the Diseases of Females,"* 8vo. Phil., 1833, p. 264.) Dr. D. also regards *rest*, i. e., a horizontal position, without intervening exercise, as a sine qua non in the cure of this disease. The pain is to be relieved by "morphia or denarcotized laudanum;" and when rejected by the stomach, it must be given by enema. If vegetable food disagrees, or is not sufficiently nutritive, it is to be exchanged for animal, and the gastric acids are to be neutralized by the alkalies. Sometimes the sulphuric or nitro-muriatic acid fulfils this indication best. We refer to the work above mentioned for the details of the treatment advised by Dr. D., as we are satisfied that little, if any, improvement has been made upon it since.

[Dr. MACKENZIE (*London Lancet*, 1856) has published an able paper, in which he traces uterine to *hepatic disease*, in three ways: 1st, through the medium of the direct sympathy subsisting between the uterus and liver; 2d, through the derangement of the assimilative processes which invariably results from chronic hepatic disturbance; and 3d, through the debility of the nervous system which sooner or later inevitably follows upon long-continued derangement of any important organ of the body. To the first of this series of causes he attributes many uterine affections of a variable and casual character, such as *hystericalgia, leucorrhœa, and menstrual irregularity*; to the second, many functional and structural lesions of the uterus, of a more fixed and persistent character, such as congestive and inflammatory conditions, indurations, hypertrophies, fibrous growths, certain forms of *leucorrhœa*, and *rheumatic hysteria*, to which cancer might be added; to the third, a predisposition to uterine disease generally, the precise character and nature of which would vary with the nature of the exciting and other occasional causes. The treatment of these cases, admitting this pathology to be correct, he says, should be conducted with reference to three indications: 1st, to restore the tone and functional activity of the liver by the persevering employment of small, under-militating doses of mercury, keeping strictly within the tonic and stimulating range of the remedy; 2d, to improve the assimilative functions generally by careful attention to dietetic and hygienic measures, together with various therapeutical means; 3d, to restore the tone and vigour of the nervous system, which has been impaired by the long continuance of hepatic derangement. These views are well worthy of consideration.]

In the early stages of cancer uteri, we think we have observed good effects from the topical use of *iodine* to the cervix by the speculum, in the form of the compound ointment, as follows: *R Iodine, 3ss.; iodide of potassium, ʒj.; alcohol, ʒj.; lard, ʒij.* The friction should be persevered in for several minutes; or the *comp. tinct. of iodine* may be applied by means of a sponge. By the persevering use of this means such indurations have, in several instances, been entirely removed. The *nitrate of silver*, in the form of the saturated solution, will be preferable to the iodine in cases



where the lining membrane of the os, or around its margin, is tender and red, or where the same parts are softened or ulcerated, or where ulceration is dreaded, or the discharges are copious and fetid. It not only changes the unhealthy condition of the parts, but affords marked relief to the pain. If the case be beyond the reach of art, life may be prolonged and comparative comfort afforded by the frequent employment of these local applications, in connexion with anodyne and demulcent injections, and the proper regulation of hygienic means. We have in some instances seen the best effects from a pill of rhubarb, iron, and quinine; and in two cases, FOWLER'S solution of arsenic seemed to arrest the disease. It is better, however, to treat the disease on general principles than to trust to any supposed specifics. It must, however, be acknowledged that, as yet, cancer of the uterus must be ranked among the *opprobria medicorum*.

*Excision of the neck of the uterus* has been repeatedly practised, both in this country and Europe, for cancer of this organ; and Dr SIMPSON is an advocate for the operation under the following circumstances: 1st, great morbid hypertrophy, by elongation of the vaginal portion of the cervix uteri; 2d, corroding ulcer, when limited to the lips of the cervix, and pathologically identical with the form of lupus or malignant ulcer, so well known on the face; 3d, circumscribed and local forms of carcinomatous disease, or excrescence of the lips and lower segment of the cervix uteri. Few, however, will coincide in the opinion that simple hypertrophy of the cervix either justifies or requires so severe an operation, and the generally insidious and irregular progress of corroding ulcer seldom renders it amenable to operative treatment. We would rather say that excision of the cervix should be confined to cases of epithelial cancer, in which we know that a removal of the entire diseased part often effects a permanent cure; for it is of these that M. PAGER remarks that, "among all the cancers, they present the general or constitutional features of malignant disease in the least intense form. They commence at the latest average period of life; they appear to be most dependent on local conditions; they are least prone to multiplication in internal organs and they are associated with the least evident diathesis or cachexia." In one case, Dr SIMPSON has operated successfully, conception having taken place within ten days after the operation. The conclusions of ASHWELL are doubtless correct, viz., 1st, that the operation is an easy one; 2d, that excessive and dangerous bleeding is not a necessary accompaniment; 3d, that in some instances, for the time over which subsequent observation has extended, cancerous ulceration of the cervix uteri has been cured by it. The dangers are, hæmorrhage, uterine or peritoneal inflammation, malignant ulceration of the excised surface, or of any portion of the diseased structure which may have been left behind. We can scarcely conceive of any circumstances which would justify the extirpation of the entire uterus for a cancerous affection of the organ.]

**BIBLIOG. AND REFER.**—The *Bibliography and References* which I have appended to this article are almost entirely modern; for it is only within a recent period that the diseases of the Uterus have been fully investigated. —*Schævus*, De Morbis Mulierum, lib. iv., cap. ii.—*J. G. Prennel*, Novo Artificio Curandi proclidentium Uteri, in Halleri Disput. Chirurg., t. iii.—*P. C. Fabricius*, De Fœtus vivi Extractione ex Utero prolapsu, in Halleri

Disp. Chirurg., t. iii.—*J. E. Reitnick*, De Uteri delapsu, &c., in Ibid., t. iii.—*F. B. Wachter*, De prolapsu et inversione Uteri, &c., in Ibid., t. iii.—*A. Leveit*, Observ. sur la Cure radicale de plusieurs Polypes de la Matrice, 3d ed. Paris, 1771, plates.—*J. Lynam*, in Med. Observ. and Inq., vol. iv., p. 388.—*W. Cockell*, an Essay on the Retroversion of the Uterus, with cases and illustrations, 4to. Lond., 1785.—*R. Cleyghorn*, Inversion of the Uterus, in Med. Communicat., &c., vol. ii., p. 226.—*J. G. Schmidt*, De Concrementis Uteri. Bâle, 1750, in Haller's Disp. Med. Pract., t. iv.—*J. G. Rœderer*, in Ibid., t. iv.—*Herviniaux*, Traité sur divers Accouchem. Labor. et sur les Polypes de la Matrice, 8vo, 2 vols. Brux., 1782, 1793.—*E. Sandifort*, De Tumoribus Utero Annexis, in Observ. Anat. Pathol., l. i., cap. 8.—*A. Louis*, Mém. sur les Concretions Calculeuses de la Matrice, dans Mém. de l'Acad. Royale de Chirurg., 4to, t. ii., p. 151.—*G. L. Bayle*, Remarques sur les Ulcères de la Matrice, in Journ. de Méd. de Leroux, Corvisart, &c., An. xi., t. v., p. 238; et Ibid., p. 62; et in Dict. des Sciences Méd., t. vii., 1513, p. 69.—*S. Merriman*, on Retroversion of the Womb, 8vo. Lond., 1810.—*J. F. Olander*, in Med. Chirurg. Zeitung, B. iv., 1808, p. 170.—*Richter*, Synopsis Praxis Medico-Obstetricæ, 4to. Mosq., 1810. (*Uterine Sound first recommended for Displacement of Uterus by Olander and Richter*).—*G. Rees*, Observations on the Diseases of the Uterus, 8vo. London, 1805.—*W. Lambie*, Inquiry into Constitutional Diseases, particularly Scrofula, Consumption, Cancer, and Gout, 8vo. London, 1845, *pluries*; Additional Reports on the Effects of a Peculiar Regimen in Cancer, Scrofula, Consumption, &c., 8vo. Lond., 1815. (*Treatment of Cancer Uteri by Vegetable Diet and Distilled Water*, &c.)—*Paletta*, Excretionibus Pathologicæ, &c., t. ii.; et in Journ. des Progrès des Sc. Méd., t. viii., p. 264.—*J. Windsor*, on Inversion of the Uterus, in Transact. of Med. and Chirurg. Society, vol. x., p. 358.—*J. Nauche*, Des Maladies de l'Uterus, 8vo. Paris, 1816; et des Maladies propres aux Femmes, 2 vols., 8vo. Paris, 1819.—*P. J. Roux*, Sur les Polypes Uterins, dans Mélanges de Chirurg., 8vo. Paris, 1800.—*Johnson*, in Dublin Hospital Reports, vol. iii.—*F. L. Meisner*, Ueber die Polypen, &c. Leipz., 8vo, fig., 1810.—*C. M. Clarke*, Observations on the Diseases of Females attended by Discharges, 2 vols., plates, 8vo. Lond., 1821.—*Schmitt*, Bemerkungen ueber Zurückbungung der Gebärmutter bei Nichtschwangeren, 8vo. Wien, 1820.—*C. Hensel*, Ueber die Krankheiten der Uterus. Mayence, fol., 1816, with plates.—*E. G. Fabriz*, Traité sur le Cancer de la Matrice et sur les Mal. de Voies Uterines, 8vo. Paris, 1818, plates.—*F. G. Kunner*, De Uteri Statu Annot. quædam, insignis ejusmodi Tumoris Observat. Illust., 4to. Leipz., 1819.—*J. C. Y. Joerg*, Aphorismen ueber die Krankheiten des Uterus, 8vo. Leipz., 1819.—*E. E. v. Siebold*, Ueber den Gebärmutterkrebs, dessen Entstehung und Verhütung, &c., 8vo. Berl., 1823.—*J. B. Paletta*, Mulierbia, in Exeritationes Pathologicæ, p. ii., 4to. Milan, 1826.—*Schwighäuser*, Das Gebärn nach der beobachteten Natur, 8vo. Strassb., 1825, p. 234.—*W. F. Montgomery*, Cases of Cancer Uteri, &c., in Dublin Hosp. Reports, vol. v., p. 412; and in Dublin Journal of Medical Sciences, Jan. 1842.—*Schmitt*, Ueber die Zurückbungung der Gebärmutter, 8vo. Wien, 1820.—*Lallemand*, in Revue Méd., t. ii., p. 191, 1824.—*Moreau*, in Ibid., t. ii., p. 463.—*Bellanger*, in Ibid., t. i., p. 229, 1824.—*J. M. Arnott*, in Med. Gazette, June 11, 1836. (*On Extirpation of Polypus*).—*F. W. Lippich*, Observata de Metritide Septica in Puerperis Grassante, 8vo. Vien., 1824.—*S. Merriman*, Synopsis of Difficult Parturition, 4th ed., 8vo. London, 1826, p. 306. (*Extirpation of Inverted Uterus*).—*W. P. Dewees*, on the Diseases of Females, 8vo. Lond., 1826.—*E. G. J. v. Siebold*, De Scirrho et Carcinomate Uteri adjunctis tribus totius Uteri Extirpationis Observationibus, 4to, 1826, with plates.—*J. B. Dance*, Observ. sur plusieurs Affect. de l'Uterus, dans Archives Génér. de Méd., Paris, 1829, t. xx., et xxi.—*Lair*, Nouv. Méthode du Traitement des Ulcères, &c., de l'Uterus, 8vo. Paris, 1828. (*Advices the use of a Uterine Sound*).—*J. C. A. Recamier*, in Journ. Génér. de Médecine, t. cix., p. 91, Paris, 1829.—*A. Y. Gendrin*, in Ibid., t. cix. (*On Extirpation of the Uterus*).—*R. Gooch*, on the more important Diseases of Women, 2d ed., 8vo. London, 1831, p. 332.—*Dance*, in Archives Génér. de Médecine, t. xviii., p. 286, 473; t. xix., p. 161.—*Cassan*, in Ibid., t. xiii., p. 80.—*Palin*, in Ibid., t. xviii., p. 217.—*Dance*, in Ibid., t. xx., p. 521; t. xxi., p. 196.—*Recamier*, in Ibid., t. xxi., p. 78, 258. (*On Extirpation of Ut.*).—*Louis*, in Ibid., t. x., p. 337.—*Luroth*, in Ibid., t. xvii., p. 403. (*On Softening of Ut.*).—*Sec* also Ibid., t. xx., p. 281.—*M. Boivin* et *A. Duges*, Traité pratique des Maladies de l'Uterin et de ses Annexes, 2 vols., 8vo. Paris, 1833, with atl. of plates.—*Hierrez de Chagnon*, Do quelques Déplacements de la Matrice, &c., in Mém. de l'Acad. Roy. de Méd., t. ii., 1833, p. 319.—*J. Robertson*, in Edinb. Med. and Surg. Journ., vol. xiv., p. 373.—*F. Churchill*, Dublin Journ. of Med. Science, July, 1836, p. 442 (*on Corroding Ulcer of Ut.*), and Outlines

- of the principal Diseases of Females, 8vo. Dubl., 1858; and on the Diseases of Women, &c., 3d ed., 12mo. Dublin, 1850.—*Essays on the Puerperal Fever and other Diseases peculiar to Women*, selected from British Authors previous to the 18th century; Sydenham Society, &c., 8vo. Lond., 1849.—*T. Radford*, in *Dublin Journal of Medical Science*, No. 34, p. 7; No. 35, p. 215, 1837 (*on the Manner in which Inversion of the Uterus is produced*); also, Galvanism applied to the Treatment of Uterine Hemorrhage, 4to. Worcester, 1844; also, Successful Case of (Caesarean Section, with Remarks, 12mo. Worcester, 1849.—*M. J. M. Liégeois*, *Considérations Pratiques sur le Traitement des Mal. de la Matrice*, in *Mém. de l'Acad. Roy. de Méd.*, t. ii., 1833, p. 330.—*P. Ricord*, in *Ibid.*, ii., 1833, p. 159.—*M. Boivin et Dugès*, *Traité Pratique des Maladies de l'Uterus et de ses Annexes*, &c., 8vo. Paris, 1833. Atlas in fol.—*Pauly*, *Maladies de l'Uterus*, &c., 8vo. Paris, 1836.—*E. Hooper*, *The Morbid Anatomy of the Human Uterus and its Appendages*, 4to. London, 1834.—*J. C. Zimmermann*, *Erläuterungen und Mittheilungen*, &c., ueber *Uterus* und *Carcinoma Uteri*, &c., fol. Leipzig, 1834, plates.—*Teulier*, *Du Cancer de la Matrice*, de ses Causes, de son Diagnostic et de son Traitement, 8vo. Paris, 1836.—*C. M. Gilbert*, *Remarques prat. sur les Ulcérations du Col de la Matrice*, in *Revue Médicale*, t. iv., 1837, p. 395; et *Mém. sur l'Erosion granuleuse du Col de l'Uterus*, in *Ibid.*—*S. Ashwell*, in *Guy's Hosp. Reports*, vol. iii., 1838, p. 157. (*On Tumours of the Uterus*, &c.)—*Duparcque*, *British and For. Med. Review*, Oct., 1836, p. 511; see also *Ibid.*, July, 1838, p. 71.—*J. Fowell*, *Transactions of Med. and Chirurg. Society*, vol. xii., p. 557.—*J. Windsor*, in *Ibid.*, vol. x., p. 358.—*P. N. Scott*, in *Ibid.*, vol. xi., p. 392.—*Hunt*, in *Ibid.*, vol. xxi., p. 277.—*Graham*, in *Ibid.*, vol. vi., p. 601. (*Inflammation of Uterus terminating in Gangrene*).—*J. Browne*, *Contributions to the Pathology of the Uterus*, in *Dubl. Jour. of Medical Science*, vol. xii., p. 348.—*Salemi*, in *Journ. des Progrès des Sc. Méd.*, 2d ser., t. ii., p. 264.—*J. Mackintosh*, *Practice of Physic*, 4th ed., 8vo. Lond., 1836, vol. ii., p. 422, et seq.—*Pauly*, *Maladies de l'Uterus*, &c., 8vo. Paris, 1836, p. 473.—*J. Dalbarnie*, *The Speculum applied to the Diagnostic and Treatment of the Organic Diseases of the Womb*, &c., 8vo. Lond., 1835.—*M. Treille*, *Mém. sur les Maladies dites Cancéreuses de la Matrice*, 8vo. Paris, 1838.—*Ottenberg*, *Lettres sur les Ulcérations de la Matrice et leur Traitement*, 8vo. Par., 1839.—*Duparcque*, *Traité sur les Altérations Organiques de la Matrice*, 8vo. Paris, 1839; et *Traité Théor. et Prat. sur les Altérations Simples et Cancéreuses de la Matrice*, 2d ed., 2 vols., 8vo. Paris, 1839.—*A. Vidal*, *Essai sur le Traitement Mochodique de quelques Maladies de l'Uterus*, 8vo. Paris, 1841. (*Advices chiefly Intra-vaginal and Intra-uterine Injections*).—*C. Waller*, *A Practical Treatise on the Functions and Diseases of the unimpregnated Womb*, 8vo. London, 1840.—*R. Lee*, *Clinical Reports of Uterine and Ovarian Diseases*, p. 176; and on Fibro-calcareous Tumours and Polypi of the Uterus, in *Trans. of Roy. Med. and Chirurg. Society of London*, vol. xix., p. 94; in *Ibid.*, vol. xxxiii., p. 261 (*on the Speculum Uteri*); et in *Ibid.*, vol. xxxiii., p. 279; et in *Ibid.*, vol. xxxiii., p. 274. (*On Ulceration of the Neck of Uterus*).—*J. C. W. Lever*, in *Ibid.*, vol. xxii., p. 167 (*Statistical Notices of 120 Cases of Carcinoma Uteri*); and on Diseases of the Uterus, 8vo. London, 1843.—*H. Hunt*, in *Ibid.*, vol. xxi., p. 277. (*On the use of Arsenic in some Diseases of Uterus*).—*Gosselin*, in *Archives Génér. de Méd.*, t. ii., 1844, p. 129. (*On Ulceration of Neck of Uterus*).—*Busch*, *Sur les Polypes Uterins*, in *Ibid.*, 1833, t. ii., p. 355.—*E. Kennedy*, in *Dubl. Jour. of Med. Sci.*, for 1838. (*Hypertrophy of Cervix Uteri*).—*Tanchou*, *Observat. de Polypes de l'Uterus*, in *Gaz. Médicale de Paris*, 1842, p. 714.—*Lisfranc*, *Clinique Chirurgicale de la Pitié*, 8vo. Paris, 1842, t. ii., p. 182, et seq.—*M. Langenbeck*, *De Totius Uteri Extirpatione*, 4to. Gött., 1842.—*J. C. W. Lever*, *A Practical Treatise on Organic Diseases of the Uterus*, 8vo. Lond., 1843.—*N. Amussat*, *Sur l'Anat. Pathol. des Tumeurs Fibreuses de l'Uterus*, &c., 8vo. Paris, 1843.—*E. Perreira*, in *Gaz. Méd. de Paris*, 1845, p. 71.—*Meissner*, *Frauenkrankheiten*, 8vo. Leip., 2 vols., 1845.—*J. Y. Simpson*, in *Lond. and Edin. Monthly Journ. of Medical Sciences* for 1843. (*Advices the only useful and practical Uterine Sound*).—*Warden*, in *Ibid.*, Dec., 1844.—*Cambernion*, in *Gaz. Méd. de Paris*, 1844, p. 65. (*Of the Causes of Polypi and Tumours of the Uterus*).—*Colombat*, on Diseases of Females, transl. by *Meigs*, 8vo. Phil., 1845.—*H. Oldham*, in *Guy's Hospital Reports*, 2d ser., vols. vi. and xi.—*E. Lacroix*, *De l'Anteversion et de la Rétroversion de l'Uterus*, in *Annal. de la Chirurg. Franc. et Etrang.*, t. xiii., p. 420. Paris, 1845.—*J. Whitehead*, *Treatise on Abortion and Sterility*, 8vo. London, 1847, p. 47; and *Diseases of the Uterine System*, 2d edit. of the work. Lond., 1854.—*C. Rokitsky*, *A Manual of Pathological Anatomy*, Sydenham Soc. Transl., vol. ii., p. 264, et seq.—*Marchal de Calvi*, in *Annales de la Chir. Ang.*, 1843. (*24 Cases of Fibrous Polypus of Uterus*).—*Menzies*, in *Glasgow Med. Journal*, vol. i., p. 129, 1853. (*Cases of Cancer Uteri and Pregnancy*).—*T. S. Lee*, on Tumours of the Uterus, 8vo. Lond., 1847.—*Pancost*, *Boston Medical Journal*, Oct., 1844.—*J. G. Crosse*, *Essay, Literary and Practical, on Inversio Uteri*, 2 parts, 8vo. Lond., plates, 1845 and 1847.—*Smart*, in *Amer. Journal of Medical Sciences*, vol. xvi., p. 81.—*G. Forbes*, on Inversion of the Uterus, in *Transact. of Med. and Chirurg. Society*, vol. xxxv., p. 127. (*Account of numerous Cases of*).—*W. F. Montgomery*, on Polypus of the Uterus, in *Dublin Journal of Med. Sciences*, Aug., 1846.—*Huguiere*, in *Mém. de la Soc. de Chirurg. de Paris*, t. i., 1847, p. 35.—*R. Lee*, *Pract. Observations on Diseases of the Uterus*, 2 parts, fol. London, 1849.—*Lair*, *Des Abus de la Castration*, &c., dans les Maladies de la Matrice, 8vo. Paris, 1846.—*Miller*, in *Edin. Monthly Journal of Med.*, Dec., 1851. (*Inversion of Uterus, a Case of*).—*Walter*, *Ueber Fibrose Körper der Gebärmutter*, 4to. Dorpat, 1852.—*J. Paget*, *Lectures on Surgical Pathology*, 2 vols., 8vo. Lond., 1853, vol. i., p. 173; vol. ii., p. 131.—*Larrier*, in *Archives Générales de Médecine*, May, 1852, p. 110. (*Inversion of Uterus reduced under the Influence of Chloroform*).—*Brain and Chiari*, *Klinik der Geburts-hülfe und Gynäkologie*, 2 parts. Erlang., 1833, p. 397.—*J. Y. Simpson*, on the Detection, &c., of Intra-uterine Polypi, &c., in *Edin. Monthly Journal of Medicine*, Jan., 1850; and in *Obstetric Memoirs*, &c., vol. i., p. 122 (*Dilatation by the Sponge-tenet*); also in *Dublin Journal of Medical Sciences* for 1848. (*Displacements of Uterus*).—*Forget*, *Etude Pratique et Philosophique du Col de la Matrice*, 8vo. Par., 1849.—*S. L. Hardy* and *M. Clincklock*, *Practical Observat. in Midwifery*, p. 223. (*Inversion of Uterus*).—*Sommer*, *Zur Lehre der Infractionen und Flexionen der Gebärmutter*, 8vo. Giessen, 1850.—*F. A. Küwisch*, *Klinische Vorträge ueber Specielle Pathologie und Therapie der Krankheiten des Weiblichen Geschlechtes*, 2 vols., 8vo. Prag, 1846, '48. Dritte Auflage, nach dessen Tode fortgesetzt von *F. W. Scanzoni*, 3 b., 8vo. Prag, 1851, '55. (*A Work of the highest Merit*).—*Vallée*, *Des Déviations Uterines*, 8vo. Paris, 1852.—*Lee*, *Bulletin de l'Académie de Médecine*, t. xix., p. 778, et seq. Paris, 1853, '54. (*Opposite opinions as to Displacements of Uterus stated*).—*Virchow*, *Ueber die Kriekungen der Gebärmutter*, in *Verhandlungen der Gesellschaft für Geburtshülfe*, b. iv., 1851, p. 80.—*F. H. R. Mbsobham*, *Principles and Practice of Obstetric Medicine as it Surveys*, &c., 8vo. Lond., plates, 1851, p. 720. (*On Inversion of Uterus*).—*J. Henry Bennet*, *Treatise on Inflammation of the Uterus*, &c., 3d ed., 8vo. Lond., 1853. (*An original and able Work*).—*A Review of the Present State of Uterine Pathology*, 8vo. Lond., 1856. (*Able and temperately exposed*).—*Lebert*, *Traité des Maladies Cancéreuses*, 8vo. Par., 1851, p. 217.—*Genuat*, *Nouv. Procédé pour opérer les Polypes de la Matrice*, 8vo. Lyons, 1851.—*W. Busch*, in *Müller's Archiv.*, 1851, p. 258.—*R. J. Till*, on the Diseases of Women, 8vo, 2d ed. London, 1856; and on the Change of Life in Health and Disease, &c., 8vo. London, 1856, chap. vi., p. 132, 160.—*F. W. Mackenzie*, *Lond. Journal of Medicine*, vols. lii. and iv., 8vo. Lond., 1851, '52.—*C. West*, on the Pathological Importance of Ulceration of the Os Uteri, &c., 8vo. Lond., 1854; and *Lectures on the Diseases of Women*, part I. Diseases of the Uterus, 8vo. Lond., 1856. (*Able and interesting Lectures*).—*J. B. Brown*, on some Diseases of Women admitting of Surgical Treatment, 8vo. Lond., 1854. (*Practical and excellent*).—*Velpau*, *Maladies de l'Uterus*, 8vo. Paris, 1854.—*H. Müller*, *Lectures in Reply to the Croonian Lectures, for 1854, of C. West*, of London, on the Pathological Importance of Ulceration of the Os Uteri, 8vo. Louisville, U. S., 1855.—*W. T. Smith*, *The Pathology and Treatm. of Leucorrhœa*, 8vo. Lond., 1855, *pluries*.—*J. Y. Simpson*, *Obstetric Memoirs and Contributions*, edit. by *W. O. Priestley and H. R. Storer*, 8vo. Edin., 1855, *pluries*.—*T. F. Grimsdale*, *Case of Artificial Enucleation of a large Fibroid Tumour of the Uterus*, with Remarks on the Surgical Treatment of these Tumours, in *Liverpool Medico-Chirurg. Journal*, No. 1, p. 54. (*A very successful and interesting Case, with able practical Remarks*). For references of older dates than those of the foregoing, see the works of *Flouquet* and *Reuss*.
- [AM. BIBLIOG. AND REFER.—There are but few monographs by American physicians on the subject of the Uterus and its diseases, but numerous essays and cases relating to this subject are scattered throughout our numerous medical journals. Were the facts which they contain properly collected and digested, they would form the basis of a very valuable work. The principal authors on this branch of medical science are DEWEES, MEIGS, MILLER, and BEDFORD. But the American practitioner has access, through the medium of reprints, to the best foreign works on Diseases of Females, such as ASHWELL, GOOCH, WEST, CHURCHILL, SIMPSON, TYLER SMITH, MONTGOMERY, COLOMBAT DE L'ISÈRE, BENNET, &c., &c., &c. The following are but a small portion of the references



which might easily be made to works or papers connected with the subject of this article.—*C. D. Meigs*, a Treat. on Acute and Chronic Diseases of the Neck of the Uterus, Svo, Phila.: also, Report on same subject, with col'd plates, in Trans. of Amer. Med. Assoc., vol. vi., p. 365, 1855; also, "Woman and her Diseases," "System of Midwifery," and Translat. of *Colombat de l'Isère* on Diseases of Females, &c., Svo, p. 719. Philad., 1845. (*One of the ablest Works extant on this subject; more than 1000 writers on the subject are quoted or referred to in its pages.*)—*Samuel Annin*, on a New Method of Relieving Persons affected with Prolapsus Uteri, in Am. Journ. of Medical Science, vol. xviii., p. 334.—*W. L. Sutton*, Two Cases of Inversion of the Uterus, in Ibid., vol. iv., N. S., p. 83.—*A. D. Chaloner*, Fibrous Tumour of the Uterus, in Ibid., vol. x., N. S., p. 75.—*J. E. Taylor*, on Rheumatism of the Uterus and Ovaries, in Ibid., vol. x., p. 45; also, Cases of Engorgement of the Uterus, Irritable Uterus, and Prolapsus, in N. Y. Journ. of Medicine, vol. iv., p. 70.—*J. C. Beales*, Remarks on Engorgement or Congestion of the Cervix Uteri, in Ibid., vol. iv., p. 10.—*Edward Rigby*, on the Constitutional Treatment of Female Diseases, 12mo, p. 255. Phil., 1857. Uterine affections of every kind are regarded by this author as secondary, not primary, idiopathic diseases, and requiring chiefly constitutional treatment, especially purgatives, inasmuch as torpid liver and constipated bowels are generally in fault. Leeches and caustic applications to the cervix are not, however, wholly proscribed, as "solid lunar caustic" in ulceration. In cancer uteri, sulphate of iron and iodide of arsenic are recommended. This writer also describes *Prolapsus of the Ovary*, it descending into the recto-vaginal pouch—a rare affection, we imagine.—*Charles West*, an Inquiry into the Pathological Importance of Ulceration of the Os Uteri, Am. ed., Svo. Phil., 1857.—*W. P. Dewees*, a Treat. on Diseases of Females, 10th ed., Svo, p. 632, with plates. Phil., 1857.—*Fleetwood Churchill*, on the Diseases of Women, &c., Amer. ed., by *D. Francis Condie*, Svo, p. 684. Philad., 1857.—*Samuel Ashwell*, a Pract. Treatise on Diseases peculiar to Women, 3d Am. ed., Svo, p. 500. Phil., 1857.—*Henry Bennet*, a Pract. Treatise on Inflammation of the Uterus, its Cervix, and Appendages, and on its connexion with Uterine Disease, 4th Am. ed., Svo, p. 450, with wood-cuts. Phil., 1857.—*J. B. Brown*, on some Diseases of Women admitting of Surgical Treatment, with cuts, Am. ed., Svo. Philad., 1857.—*J. Leconte*, on Carcinoma, in New York Lancet, p. 284, 299.—*J. B. Strachan*, Case of successful Excision of the Cervix Uteri in a Scirrhus State, in Am. Journal of Medical Science, vol. v., p. 307.—*Edward John Tilt*, Dis. of Menstruation and Ovarian Inflammation in connexion with Sterility, Pelvic Tumours, and Affections of the Womb, Svo, N. York, 1855.—*Gunning S. Bedford*, The Diseases of Women and Children, 4th ed., Svo, p. 692. N. Y., 1857.—*H. V. Wooten*, a Case of Prolapsus Uteri permanently cured by Excision of the Vaginal Fold, with Remarks, in South. Med. and Surg. Journ., Augusta, vol. i., p. 310.—*G. G. Smith*, a Case of Uterine Hydatids, in Ibid., vol. i., p. 253.—*J. M. B. Harden*, Case of Prolapsus Uteri during Labour, in which artificial means were necessary to effect delivery, &c., in Ibid., vol. i., p. 248.—*J. Painchaud*, a Remarkable Uterine Tumour, in Bost. Med. and Surg. Journ., vol. xix., p. 265.—*James McKeen*, Case of Retroversion of the Uterus, in Ibid., vol. xii., p. 261.—*J. C. Warren*, Extirpation of half the Body of the Uterus and a portion of the Vagina for Cancer, in Ibid., 1829.—*J. B. Toby*, Case of Prolapsus Uteri, in Am. Journ. of Med. Science, vol. iv., p. 532.—*B. Smart*, Case of Inverted Uterus, in Ibid., vol. xvi., p. 81.—*W. L. Atlee*, Case of successful Extirpation of a Fibrous Tumour of the Uterus by the large Peritoneal Section, in Ibid., N. S., vol. ix.—*E. Fisher*, Inversion of Uterus, in Illinois Med. and Surg. Journ., Dec., 1845.—*D. P. Condie*, Review of *J. H. Bennet* on Dis. of Uterus, in Am. Journal of Med. Science, vol. ii., N. S., 1846.—*W. P. Buel*, Report of Dis. of Females, treated at New York Dispensary, in Ibid., vol. vii., N. S., p. 96.—*T. J. Garden*, Polypus of Uterus expelled by Ergot, in Ibid., vol. vii., p. 363.—*E. Warren*, Inflammation of the Uterus, in Bost. Med. and Surg. Journ., vol. xxxiii., 1845.—*T. Chadbourne*, Polypos and Malignant Tumours, in Ibid., vol. xxxii.—*L. Perkins*, Uterine Tumour, in Ibid., vol. xxxii., p. 370.—*S. Sargent*, on Operation for Uterine Tumour, in Ibid.—*D. Gilbert*, Removal of Uterine Tumour, in Bost. Medical and Surgical Journ., vol. xxxi., p. 249.—*J. Pancoast*, Successful Removal of a large Fibrous Tumour from the Uterus, in Ibid., vol. xxxi., p. 189.—*Jas. Deane*, Polypus in Utero, in Bost. Med. and Surg. Journ., vol. xxx., p. 449.—*J. F. Gray*, on Prolapsus Uteri with reference to the Modus Operandi of Dr. Hull's Utero-Abdominal Supporter, in Trans. of Med. Soc., State of New York, vol. iv., p. 31.—*J. Chapman*, Retroversion of Uterus relieved by Percussion, in Maryland Med. and Surg. Journ., 1842.—*Drs. Hermann and Werneburg*, Case of Extirpation of Uterus for Cancer, in Bost. Med. and Surg. Journ., vol. xxvii.,

p. 307.—*C. Waller*, Treatment of Cancer of the Womb, in Ibid., vol. xxiii., p. 10.—*D. V. Folts*, Osteo-Sarcomatous and Fibrous Tumours of the Uterus, in Ibid., vol. xxii., p. 325. (*A very interesting Case of true Osteo-Sarcomatous Tumour of the Uterus.*)—*B. Carpenter*, Cases of Uterine Inflammation, in Ibid., vol. xvii., p. 233.—*Jos. Warrington*, Translation of *Dupuyroux* on Diseases of the Uterus, with Notes, Svo, p. 455. Philadelphia, 1837. (*An excellent Work.*)—*J. Ward*, Congenital Retroversion of the Uterus, in Boston Med. and Surg. Journ., vol. xviii., p. 270.—*M. Hibbard*, Case of Uterine Tumour removed by Operation, in Boston Med. and Surg. Journ., vol. viii., p. 68.—*Jos. Condoek*, Case of Inverted Uterus, in Ibid., vol. viii., p. 245. (*Caused by pulling on the Cord; no restoration took place, but regular Menstruation occurred afterward.*)—*J. Cotton*, Case of Cartilaginous Cervix Uteri, requiring an Operation to accomplish Delivery, in Ibid., vol. iii., p. 23.—*J. F. Peblee*, on Displacements of the Non-gravid Uterus, their Local and Constitutional Effects, and their best modes of Treatment, Fiske Fund Prize Dissertation, in Am. Journ. of Med. Sciences, July, 1853. (*A very comprehensive and valuable Essay.*)—*O. C. Gibbs*, on Polypus Uteri, in Am. Medical Monthly, April, 1854.—*W. C. Roberts*, on the Isolated Tumour of the Uterus, commonest on the posterior wall, in N. Y. Journal of Med., vol. iii., p. 190.—*C. R. Gilman*, on some Diseases of the Os Uteri, and the mode of investigating them, in Ibid., vol. iii., p. 181; also, Case of Corroding Ulcer of the Uterus, with complete Destruction of all the Internal Organs of Generation, in Am. Journ. of Med. Sciences, vol. ii., N. S., 1841.—*J. V. P. Quackenbush*, Case of Removal of Uterine Polypus, in Ibid., vol. ii., p. 13.—*W. H. Han-litt*, Case of Hydatids of the Uterus, in Ibid., vol. ix., p. 49.—*A. R. Davis*, an Essay on the Nature and Curability of Heterologous Tumours, in Ibid., vol. x., p. 382.—*John H. Griscom*, a Case of Abstraction of the Uterus after Delivery, in N. York Journ. of Med., vol. i., p. 74.—*John A. Srett*, an Essay on Cancer of the Uterus, in Ibid., vol. i., p. 34. (*A very valuable Contribution to the Pathology of this subject.*)—*A. C. Post*, Case of Retroflexion of the Uterus, in Trans. of the Am. Med. Trans., vol. ii., 1849, p. 253.—*B. W. McCready*, Case of Retroflexion of the Uterus, in Ibid., p. 155.—*Washington L. Atlee*, Prize Essay, The Surgical Treatment of certain Fibrous Tumours of the Uterus heretofore considered beyond the resources of Art, in Trans. of Am. Med. Assoc., vol. vi., p. 547, 1853.—*J. K. Mitchell*, Case of Racciferous Hydatids of the Uterus, in Med. Exam., vol. i., p. 73, 1845.—*E. A. Haycock*, The History of a Retroverted Uterus, in Com. of Mass. Med. Soc., vol. i., p. 13.—*George O'good*, a Remarkable Uterine Case, in Med. Com. of Mass. Med. Soc., vol. i., p. 30.—*William Moore*, Uterine Hydatids, in N. Y. Med. and Phys. Journ., vol. i., p. 151, 1822.—*J. C. Hat h*, Case of Inverted Uterus, in Boston Medical and Surgical Journal, vol. xl., p. 277.]

**VACCINATION.**—**SYNON.**—*Vaccinia* (from Vacca, a cow), *Variola vaccina*; *Variole vaccina*; *Vaccine*, vaccination, Fr. *Kuhpocken*, *Schutzblattern*, Germ. *Vaccina*, *Vaccinazione*, Ital. *Vaccine*, *Cow-pox*

**CLASSIF.**—III. CLASS, III. ORDER (Author in Preface, &c.)

1. **DEFIN.**—*Variola vaccina*—a vesicular disease developed in the human subject by inoculation of cow-pox, or of the lymph from the variolous vesicles affecting the cow

2. **I. HISTORY OF.**—It would appear from ancient Sanscrit writings, that vaccine inoculation had been practised in India from the earliest ages, and that the preservative influence of vaccination was known, and had recourse to, in different parts of the East. Mr BRUCE, Consul at Bushire, states that vaccination was well known in Persia for many ages. HUMBOLDT found among the inhabitants of the Cordilleras of the Andes the belief that the eruption on the udder of the cow preserved them from small-pox. These indications of the practice of vaccinations were, however, unknown at the time when EDWARD JENNER, a general practitioner in Berkeley, observed the protective influence of the vaccine disease from the natural and inoculated small-pox, and when he submitted this influence to the tests of experiment and practical observation. In 1775

Dr. JENNER remarked, that a number of persons in Gloucestershire could not be inoculated with small-pox; and, having become aware that there was a popular belief that persons who had caught the cow-pox, from milking the cows, were not subject to small-pox, he was induced to investigate the grounds for this belief. In the course of his researches, and after encountering numerous difficulties and opposing opinions, which would have discouraged all but those who possessed a determined will and powerful genius, he found that the cow was subject to a variety of eruptions on the teats, all of which had received indiscriminately the name of cow-pox. He learned to distinguish between these, and ascertained that one only was possessed of a specific protective power over the human body. This he called the *true* cow-pox, the others the *spurious*. He next ascertained that the true cow-pox underwent progressive changes; and that it was only at one period of its progress, or in the acme of eruption, when it was endowed with specific or preventive, or anti-variola properties. During the investigation of this branch of the subject, Dr. JENNER was struck with the brilliant idea that it might be practicable to propagate the disease by inoculation, first from the cow, and successively from one human being to another. It was not, however, until 1796 that he was enabled to take the decisive step of inoculating for the cow-pox, upon the success of which his grand scheme mainly rested. An opportunity of testing his ideas by satisfactory experiments was not afforded him until that year, when cow-pock matter in an active state was found, and parents were met with possessing sufficient confidence to submit their children to the important trial. On the 14th of May, 1796, James Phipps was vaccinated with matter taken from the hands of Sarah Nelmes. He passed through the disorder in a satisfactory manner, and was tested by variolous inoculation on the first of July following. The small-pox inoculation took no effect. JENNER now prepared to communicate the result of his long investigations concerning cow-pox, but delayed his work in the hope of furnishing additional proofs of the success of vaccination. These he was enabled to procure; and in June, 1798, he published, in London, his original essay, entitled, "An Enquiry into the Causes and Effects of the Variolæ Vaccinæ; a Disease discovered in some of the Western Counties of England, particularly Gloucestershire, and known by the name of the Cow-pox." This work deserves a particular notice. In it Dr. JENNER states his belief that this disorder does not originate in the cow, but is communicated to this animal from the horse, where it appears on the heels, and is known by the name of the *grease*; the hands of farm-servants and milkers being the medium of communication. He next suggests that the small-pox itself may have been originally morbid matter of the same kind, which circumstances had changed and aggravated into a contagious and malignant form. He afterward states his conviction that cow-pox inoculation leaves the constitution forever after secure from the infection of small-pox; and he concludes by enumerating four classes of persons to whom cow-pox inoculation holds out the prospect of great benefit: 1st. Those who, from family predisposition, may be presumed likely to take small-pox unfavourably; 2d. Persons of a scrofulous diathesis; 3d. Those who, from idiosyncrasy,

resist small-pox inoculation in early life; and, 4th. Those who are labouring under chronic forms of disease, in which counter-irritation is desirable.\*

3. At the end of July, Mr. CLINE made the first experiment with cow-pox in London, which succeeded perfectly; and soon afterward recourse was had to vaccination in many places. In his second publication, dated April, 1799, Dr. JENNER judiciously recommended calmness and mod-

[\* Some vaccine virus was forwarded by GLO. PEABSON, of London, to Dr. DAVID HOSACK, of New York, in the year 1797; but the discovery was not announced in the United States till 1799, in the Medical Repository of New York. In July, 1800, Dr. B. WATERHOUSE, of Cambridge, Massachusetts, first successfully practised vaccination in this country on four of his own children. Dr. VALENTINE SEAMAN was conspicuously active in introducing the practice into the city of New York. He obtained the virus from Dr. WATERHOUSE, and with it vaccinated his own son and many others. From this time forward the practice became general.

An act was passed in Massachusetts, in 1810, providing that "it shall be the duty of every town to choose persons to superintend the inoculation of the inhabitants with the cow-pox." This law was repealed in 1836, and the Revised Statutes provide "that each town may make provision for the inoculation of the inhabitants." This change, as Mr. SNATTUCK states ("Report of the Sanitary Commission of Massachusetts," Boston, 1850, p. 180), leaving it optional with the towns to do or not to do it, has probably caused the loss of many lives. Under the operation of the old law, many towns were accustomed, once in five or more years, to have a general vaccination of the inhabitants; but this custom, it is stated, has been generally discontinued, and the inhabitants are left liable to the disease from every fresh exposure. The same remark will apply to most of the States, and even large cities that have independent boards of health. Boston has provided that no child shall be admitted into the public schools without a certificate from some physician that it has been vaccinated. It also, as well as New York and most of our cities, provided for the gratuitous vaccination of the poor; but the means provided are very inadequate to the end proposed. It is not yet safe exactly to presume on the intelligence of the lower classes in our large cities; and as long as this is the case, compulsory measures will be necessary. Not only cities, but all towns and villages, however scattered the population, should have local boards of health, acting under a general State law, empowered, among other things, to provide for and enforce, if necessary, a general vaccination of the inhabitants as often, at least, as once in five years.

Strange, indeed, it is, that no police or sanitary regulations exist regarding the spread of small-pox in many, if not all our large cities. In New York city, a small-pox hospital has been provided on Blackwell's Island for the poor who may be attacked with small-pox; but removal thither is not made compulsory, nor are the sick from this disease placed under any quarantine whatever. So in Boston. Since the laws relating to small-pox in Massachusetts were repealed in 1837, no more restraint has been laid upon persons sick with this than any other disease, and the consequence is, it is rarely, if ever, absent from the large cities. During more than 40 years prior to 1837, the disease caused but 37 deaths in Boston only, and most of these were at Rainsford's Island; very few cases ever occurred in the city. But during the 12 years ending Dec. 31, 1849, since the repeal, it caused the deaths of 533 persons; and in the first six months of 1850, 146 died with it. There can be no doubt whatever that the prevalence of this disease in our large cities might be nearly, if not altogether, prevented. They should be divided into small districts, a health-warden appointed for each, who is a medical man, whose duty it should be to visit every family, whether invited or not, and to vaccinate or revaccinate every person, if necessary or expedient. By this plan the disease would soon disappear. If a case of small-pox should occur, means should be taken for its isolation, or removal to a small-pox hospital, or to a safe position out of the city. The 600 lives which are annually lost in New York city by this disease might in this way be saved, as well as the expense imposed on the city for the support of small-pox widows and orphans. In the present state of our knowledge on this subject, it is safe to say that every State, city, or town, which does not interpose its legal authority to exterminate the disease, incurs the responsibility of permitting the destruction of the lives and health of its citizens.]



eration in researches into the efficacy of cow-pox inoculation; but in 1800 he expressed his conviction that the cow-pox is capable of extirpating small-pox from the earth; and in his fourth publication, May, 1801, he again expressed the same sanguine opinion. The commencement of this century was remarkable for the progress of vaccination. In 1801 upward of six thousand persons had been vaccinated, and the greater part had been tested with small-pox. In 1800, 1801, and 1802, vaccination was introduced into France, Germany, Italy, Spain, and the East Indies. In 1802, Parliament voted Dr. JENNER a reward of £10,000 for the discovery, and in 1807, the additional sum of £20,000; and in 1808 vaccination was taken under the protection of Government.

4. In 1809, Mr. BROWN, of Musselburgh, published the opinion that the prophylactic virtue of cow-pox diminished as the time from vaccination increased. In 1818 and '19, an epidemic small-pox pervaded Scotland, and many vaccinated persons passed through a mild form of variola. The term "modified small-pox" was now adopted. Dr. MONRO, in 1818, published a volume on "*the different kinds of small-pox, and especially on that which sometimes follows vaccination*;" and in 1820, "*An Account of the Varioloid Epidemic*" was published by Mr. THOMSON, of Edinburgh. Between this date and 1823, when I wrote on the subject, as well as subsequently to the latter year, some very remarkable cases came before me in both public and private practice, occurring in the same and in different families, proving the impairment of the protective influence of vaccination with the growth of the body, and the lapse of time, until it entirely ceased, at least in many cases, after puberty, when vaccination was performed in infancy.

5. In 1825 the Bills of Mortality announced 1300 deaths by small-pox, among whom were several persons who had been vaccinated. Small-pox was epidemic in France in 1826 and '27, and in the northern parts of Italy in 1829; and in consequence of the numbers of the vaccinated who had been attacked by small-pox more or less modified or unmodified, the practice of revaccination commenced in Prussia and the German States, and was subsequently encouraged by their governments. This practice has more recently been voluntarily adopted by many in this country.

In 1833-4, small-pox prevailed epidemically in Ceylon, when a considerable number of the vaccinated died; and it made great devastations in Hindostan on several occasions, both prior and subsequent to this date, and many of the vaccinated have been carried off by it. Dr. GREGORY states that the admissions into the Small-Pox Hospital, in 1838, more than doubled the average number received annually, prior to the discovery of vaccination, and that two fifths of the admissions consisted of persons who had been vaccinated. Many had the disease severely, and more than twenty of the number died. Recently Parliament has legislated on vaccination and small-pox, but in a way which is neither satisfactory to our profession nor beneficial to the community.

6. Having now stated, from the history and certain of the results of vaccination, what has been urged against it, and having, when treating of small-pox and variolous inoculation, noticed what appeared in favour of the latter (*see* SMALL-POX, § 104-114), it now becomes a duty to ad-

vert to the evidence which opposes what has been advanced both at this place and in that referred to. The facts evincing the failure of vaccination in many cases, and of the impairment of the protective influence of it with the growth of the body, and with the course of time, are here stated, with no disfavour to the practice of vaccination, but with a due regard to what appeared to be the truth as respects the results of this practice. When treating of variolous inoculation, I took occasion to compare the results of it with vaccination more especially as observed in Eastern and inter-tropical countries. Much of the difference and of the difficulty in this matter must be attributed to imperfect, careless, or abortive vaccination, and to the influence of small-pox, when prevailing as a severe or malignant epidemic, on persons thus imperfectly protected.

7. Among the more recent evidence in favour of the protective influence of vaccination, there is none which seems to deserve more attention than that which has been furnished by Dr. BALFOUR. His deductions have been founded on the returns of the Army, the Navy, and the Royal Military Asylum. But although these appear very favourable, they are actually not so much so as a mere glance at the tables he has given might evince; for he adds up the aggregate numbers of the several years to which he refers, and places these numbers opposite to the number of cases of small-pox. It should be premised that soldiers are all protected by vaccination, or by small-pox. Thus, from the returns forwarded annually to the Army Medical Board, during eight years, from the 1st of April, 1844, to the 31st of March, 1851, inclusive, he constructs the following table of cases of, and deaths from, small-pox, out of the aggregate strength, or rather the strength multiplied by the years:

Among troops serving in	Aggregate strength.	Cases of Small-pox.	Deaths by Small-pox.	Annual ratio per 100 of strength	
				Cases	Deaths.
The United Kingdom.....	251,537	557	56	2.188	.220
Temperate Colonies.....	557,112	160	29	.287	.052
Tropical Colonies.....	314,131	28	8	.083	.025
Total.....	1,125,840	745	93	.662	.083

8. This table is, however, fallacious, as the aggregate here given is not the actual number of different individuals, for the much larger proportion, if not the great majority, of the average number of troops in these eight years (140,730), are actually the same individuals enumerated again and again, or even for several years, unless the discharges and deaths have been remarkably great; while the number of cases and of deaths are the total amount furnished during the eight years from among the individuals actually serving; for it cannot be shown that during these eight years the army was formed of 1,125,840 different persons.

9. The fallacy now pointed out exists in the other tables, more especially in that giving the results as respects the Navy, and from it no correct inference can be drawn. His Report, however, of vaccination of the boys of the Royal Military Asylum is a much more important document, and this I adduce. "Of 5774 boys taken on the strength of the establishment from its opening in August, 1803, to the 31st of December last

(1851), 1950 are recorded as having marks of small-pox, 3636 marks of vaccination, and 188 no satisfactory mark of either. The last having been all vaccinated on admission, there were 1950 protected by previous small-pox, and 3824 by vaccination."

	Number over whom observa- tion extend.	Of whom subsequently		Ratio per 1000.	
		Had Small-pox.	Died of Small-pox.	Cases.	Deaths.
Boys with marks of small-pox.....	1950	12	4	6.15	2.05
Boys with marks of vaccination.....	3824	27	..	7.06	0.00

It must be presumed that the boys leave the asylum when they reach puberty or manhood, or before this latter epoch. The results subsequently are not known, and cannot well be ascertained; and let it be remembered, that the liability to small-pox, modified or otherwise, then becomes greatest. Nor should it be overlooked that exposure to the infection of small-pox cannot be as great in garrisons and in an asylum as in the general community. Besides, when a case of small-pox occurs in either garrisons or in an asylum, it is removed to the infirmary, or other places of seclusion; whereas among the public, with few exceptions, a case, whenever it occurs, becomes a focus of infection, from which the disease spreads in all directions among the unprotected.\*

10. There can be no doubt that vaccination, satisfactorily performed, with recent lymph of a proper description—the vesicles having regularly matured, without hindrance or accident, and with a sufficient number of punctures—is a most valuable protection from small-pox; and if this protection be not afforded during the whole life of the individual vaccinated, in some cases; it at least, in all, is a protection for many years, the variolous disease, when caught subsequently, notwithstanding this protection, being, with few exceptions, a comparatively mild disease—these exceptions, especially when they are fatal, still admitting of doubts as to the proper performance of vaccination, and as to the efficacy of the lymph or matter employed. It cannot, however, be denied that the protection from small-pox furnished by vaccination to persons who have been vaccinated in infancy, and have grown up, is not so fully manifested when small-pox is epidemic, as at other times; nor does it appear to be as com-

plete when vaccinated persons migrate to warm climates, and are there exposed to small-pox infection, as when they remain in temperate countries; but this requires farther inquiry.\*

11. II. OF THE COW-POX IN THE COW.—This disease is not of frequent occurrence. It appears as an epidemic, and rarely or never unless where cattle are collected together in herds. It then breaks out at irregular periods, and from causes unknown. Dr. JENNER's experiments concerning it were often interrupted by its complete disappearance. Dr. JENNER at first considered that cow-pox in the cow was generally a local disorder confined to the udder; and such it has appeared to be in some, if not in many instances. Subsequent observations, however, have shown that it is really a febrile constitutional disease, accompanied with eruption, although the febrile symptoms are often not very manifest. True cow-pox shows itself on the nipple of the cow, in the form of irregular pustules, or more strictly as vesicles passing into a pustular state. At their first appearance they are commonly of a pale-blue colour, or rather of a hue approaching to livid, and surrounded by an erythematous or crysipelatous inflammation. They sometimes degenerate into phagedenic ulcers. The animal appears indisposed, and the secretion of milk is much lessened. The cow is subject to other pustular sores on the nipples, which are of the nature of common inflammatory sores, and possess no specific quality. They do not present any bluish or livid tint, or any crysipelatous redness around them. They desiccate quickly, and create no apparent constitutional disorder in the animal. Such a complaint is frequent among cows in the spring, when the calf is suckling. It was called by Dr. JENNER the spurious cow-pox.

12. *Casual cow-pox in man* is caught by milkers of affected cows, and appears on the hands and wrists in the form of inflamed spots, which go on to suppuration, forming pustules of a circular form, having elevated edges and depressed centres, and are of a colour inclining to blue. After a time absorption takes place, and swellings appear in the axilla. Fever succeeds with headache, sometimes with vomiting, and in some cases with delirium. The febrile symptoms decline in three or four days; but the sores on the hands often remain, very painful and difficult to heal for a considerable time. No eruption on the skin follows the decline of the febrile symptoms.

13. III. INOCULATED COW-POX.—i. *Regular Cow-pox*.—When vaccination has been successfully performed on a healthy child, the puncture may be felt slightly elevated on the second day; and on the third, and even on the second, a slight efflorescence may be distinctly seen, by the aid of the microscope, surrounding the inflamed

\* The above admissions cover about the whole ground claimed by the strongest advocates for vaccination. During a dispensary practice of several years among the poor of New York city, where 500 deaths annually occur from small-pox, I rarely met the disease among those unprotected by vaccination, while it was very common among others; and where it did occur among the former, it was rarely, if ever, attended with any danger. I might also appeal to my own personal experience to prove that the influence of the vaccine disease is not wholly lost at puberty; for having been vaccinated in early childhood, I took the varioloid at the age of 26, from attending a small-pox patient, and had the disease in its very mildest form, not more than half a dozen pustules appearing, and the constitutional symptoms very light. As our author concedes that the vaccine disease "is a protection for many years;" and as all concede that it protects till about the age of puberty, and that vaccination at that period restores to the constitution that exemption from small-pox which it previously enjoyed, while we have a powerful argument in favour of revaccination, we lose none of our admiration and appreciation of that great discovery, whose unspeakable value and importance time and experience only tend to confirm and establish.]

[\* In the 26th volume of the *American Journal of Medical Sciences* I have described an epidemic varioloid disease, which occurred in the town of Gorham, New York, which, from the great variety in the character of the eruptions, gave rise to a warm and angry controversy among the neighbouring practitioners, some contending that the disease was small-pox, others that it was vari-cella. A majority of those attacked had been vaccinated in early infancy, and, in general, the disease assumed a milder form in proportion to the recency of the vaccination. The eruption, in different cases, had all the specific characters of *variella*, *varioloid*, *confuent* and *distinct* small-pox, *pemphigus*, *purpura*, *crisipel* s, and even other forms of cutaneous disease. (See additions to art. "Small-pox," p. 898.)]



point. On the fifth day a distinct vesicle is formed, having an elevated edge and a depressed centre. On the eighth day it appears distended, with a clear lymph. The vesicle on this, its day of greatest perfection, is circular, and either pearl-coloured or slightly yellow. In its form and structure it resembles the pustule of small-pox. Its margin is turgid, firm, shining and wheel-shaped. It is composed of a number of cells, by the walls and floors of which the specific matter of the disease is secreted. On the evening of the eighth day, an inflamed ring begins to form around the base of the vesicle, which continues to increase during the two following days. This areola, or ring, is circular, its diameter extending from one to three inches. When at its height, on the tenth day, there is considerable hardness and swelling of the subjacent cellular tissue. On the eleventh day the areola begins to subside, leaving, as it fades, two or three concentric circles of a bluish tint. The vesicle has previously burst, and its surface acquired a brown colour. The lymph which remains becomes opaque and gradually concretes; so that about the end of the second week the vesicle is converted into a hard, round scab, of a reddish-brown colour. This scab contracts, dries, blackens, and about the twenty-first day falls off, leaving a cicatrix, which is permanent in after life, is circular, somewhat depressed, striated, and indented with six, eight, or ten minute pits, corresponding to the number of cells of which the vesicle has been composed.

14. Slight constitutional disturbance is observed about the seventh or eighth day, or sometimes a little earlier. The child is hot, restless, or feverish, and the bowels slightly disordered; but this subsides in two or three days. A few children, however, present no sign of constitutional disorder, which is not by any means essential to the success of the vaccine process. About the tenth day a papulous eruption, of a lichenous character, sometimes appears on the extremities, occasionally extending to the trunk of the body. It continues for about a week, or even lasts after the scab has fallen off. This vaccine lichen is met with chiefly in children of a full habit, where numerous vesicles had been raised on the arm, which discharge freely. It is an accidental occurrence, which, like the constitutional irritation, indicates a full effect of vaccination on the system; neither the one nor the other, however, being deemed requisite to ensure such effect.

15. In adults, vaccination exhibits the same succession of phenomena as in infants. The vesicles, however, are thinner and more easily ruptured. The lymph is usually of a yellowish tinge, and the areola is more extensive. The glands of the axilla frequently swell, which is rarely observed in children; and constitutional irritation is more frequent and greater. Secondary lichen is less frequent and less marked. Dr. HEM, of Ludwigsburg, considers that the adult lymph is more energetic than infantile lymph, but this requires farther investigation.

16. ii. *The irregular or anomalous Vaccine Vesicle.*—The above normal course of the vaccine vesicle is liable to be disturbed in various ways, and by various causes. Imperfect vaccination presents no uniform sign, but exhibits different appearances in different cases, such as pustules, ulcerations, scabs, and irregular vesicles. The

*irregular vesicle* is attended at its commencement by urgent itching; provoking scratching or rubbing, to which the subsequent appearances are unjustly attributed. The vesicle throws out a premature efflorescence, and advances too rapidly; so that on the fifth day it has attained its height, when it will be found raised on a hard inflamed base. "It is acuminate, or conoidal, and gives the appearance of a common festering sore produced by a thorn." It is generally of a straw colour, and contains some opaque matter or pus, instead of a clear transparent lymph. The scab produced by it is small, of an amber colour, and drops off by the tenth day.

[We believe that too little attention is paid to these irregularities and anomalies. Where the vesicle has been broken, so that the characteristic marks of the disease are wanting, where the local inflammation is very severe and results in the formation of pus, where there is a papular eruption over the body of the child, where, especially the operation is followed immediately, or, in a day or two, by a pustule, without a previous vesicle, irregular in shape, yellow in colour, acuminate, easily broken, and terminating in a soft, yellowish, ragged-looking crust, falling off on the fifth, sixth, or seventh day, no confidence should be placed in the genuineness of the disease, and revaccination should be performed at an early period. Too much caution cannot be observed in this regard. We believe that the spurious forms of cow-pox are by no means uncommon in this country, and that to this cause must chiefly be attributed the loss of confidence in this prophylactic, and the still-lurking preference of some for inoculation over vaccination. These irregular forms, it is true, are very common in cases of revaccination; but this only proves that the influence of the former vaccination is still experienced, and that the system is still protected from small-pox. There are *two kinds* of spurious vesicles; the *first* bears a strong resemblance to the true in many respects; its edges are commonly elevated, its contents nearly limpid, and it continues the usual time; but it commences with a creeping scab of a pale-brown or amber colour, making a long, slow progress, sometimes unattended by any efflorescence; the vesicle is more transparent, and the pellicle is generally thinner and easily torn. The *second kind* appears early and increases rapidly; is elevated in the centre, and globular, with more or less the appearance of a common phlegmon, and when punctured, there issues opaque fluid, resembling what is produced in any other festering sore. It is more easily ruptured; at the sixth or seventh day, it generally runs into a perfectly purulent state. The areola is irregular or notched, resembling a large blotch; has a fiery or livid aspect; is not shaded off into the surrounding skin; seems rather to be under than upon its surface, while, at the same time, it is less extensive, nor is the hardness around it so evident; a ragged scab prematurely covers the vesicle, or, when the black crust should form, a yellowish sore appears, drying and breaking out again, with an oozing from under it.

Imperfect vesicles are, in general, smaller and more globular than the true kine-pock; they have not the turgid, convex margin, but a somewhat punctured base appearing to slope off into the surrounding skin; they have not a cellular structure; the contents are not a clear transparent

lymph, but a straw-coloured, opaque, or purulent fluid; the areola not defined, nor of so vivid a rose tint, but ragged and diffuse, appearing about the seventh or eighth day, or earlier; on the fifth or sixth, of a dark red colour, with less hardness than the true areola, and disappearing sooner; the succeeding crust is smaller, of a light-brown or amber colour, irregular and friable, forms earlier, separates sooner, and leaves an indistinct and not pitted cicatrix.\*]

17. The causes of this abortive or irregular vesicle are not well ascertained. Sometimes the bad quality of the lymph employed may occasion the irregular vesicle, three or four children, or more, vaccinated from the same source, exhibiting the same irregular appearances. Dr. GREGORY supposed that it might arise from the influence of weather or season, as he observed it in many more cases on the approach of winter than in the spring or summer. Some believe that this irregularity arises from the use of lymph taken at too late a period of the disease. But although lymph taken after the tenth day will often fail to reproduce vaccinia, yet when it does succeed, the vesicle goes regularly through its course, and is perfectly effective in preserving from small-pox. Besides, the scabs of cow-pox, moistened with a little lukewarm water, will often produce the disease in all its purity.

18. Irregularity of the vaccine vesicle is sometimes attributable to a bad habit of body. "The proof is, that one child only out of many vaccinated with the same lymph, shall show the anomalous form of cow-pox. It is a singular but very important fact, that an imperfect vesicle, the offspring of a perfect one, degenerated by some peculiarity of habit in the individual vaccinated, shall sometimes reappear in all its original purity and perfection, when transplanted into a healthy, well-disposed subject."

19. In some instances the specific inflammation, or areola, is very severe, extends from the shoulder to the elbow, or even invades the trunk, requiring recourse to cold lotions, active purgatives, and febrifuges. The vesicle, instead of scabbing in the natural way, is converted into an ulcer, discharging freely. The inflammation thus arising is, however, only temporary; and, if it have commenced at its proper period, it does not appear to weaken, or in any degree to interfere with the protective virtue of the vaccination. The vesicle about the fifth or sixth day occasionally becomes sealy; a species of psoriasis taking the place of the areola. In a few other cases true erysipelas supervenes. These anomalies deprive the cow-pox operation of all claim to protective influence. A much more frequent and successful anomaly is retarded cow-pox; the advance of the vesicle being without any apparent cause suspended. The areola does not form before the tenth or twelfth, but ultimately the process is completed, the success of the vaccination being in no degree prejudiced.

20. iii. *Complications of Cow-pox.*—A child is sometimes vaccinated after having been infected by *measles* or *scarlatina*, and before their respective eruptions have appeared. In such cases the cow-pox is generally retarded. In a case recorded by Dr. GREGORY, it was retarded sixteen days while the measles ran their course. Genuine *chicken-pox* (*varicella lymphatica*) will run its course along with cow-pox, without interfering

with any of its phenomena. The modifications which cow-pox undergoes when *small-pox* invades the system about the same time, are interesting. When vaccination is performed during the incubative stage of casual small-pox, this latter being yet latent, the vaccine vesicle either does not advance, or advances tardily and imperfectly. Sometimes, however, cow-pox and casual small-pox may be seen running their full course in the same person at the same time. In no case, however, does the cow-pox so inserted modify the course of the small-pox. When the variolous and vaccine fluids are inoculated on the same day each disease occasionally proceeds, preserving its original character. In some cases, however, they mutually restrain and modify each other. The vaccine vesicle in these is smaller than usual and irregular in its progress, while the variolous pustules which follow are of the kind termed *variola verrucosa*, or commonly swine-pock, stone-pock, or horn-pock (see *art. CHICKEN-POX*, § 2, *et seq.*); are hard and shining, surrounded by little inflammation, and suppurate imperfectly; the little matter they contain being absorbed, leaving the cuticle hard and elevated for some days afterward. The eruption on the extremities does not pustulate, but is papulous, minute, and terminates by desquamation. Although the eruption be modified in most cases, there is generally considerable disturbance of the constitution under the joint influence of the variolous and vaccine poisons.

21. When vaccination precedes variolous inoculation by a period not exceeding four days, both diseases advance locally. "Sometimes an eruption of small-pox papule follows. At other times the variolous fever is slight, and unaccompanied by eruption. Under these circumstances, matter taken from the primary vesicles shall sometimes communicate cow-pock and small-pox respectively; but more commonly the variolous poison predominates, and contaminates the lymph of the vaccine vesicle." Variolous inoculation at any period not exceeding a week from the date of vaccination will take effect and be followed by a pustule: after that time no effect is produced. Dr. WOODVILLE on several occasions inoculated with a mixture of variolous and vaccine matter. The result was not to be depended upon, but in general pure small-pox succeeded. When small-pox inoculation precedes by three or four days the insertion of vaccine lymph, the vaccination advances, but after the tenth day the fluid in the vaccine vesicle becomes purulent, and in that state will communicate small-pox. Those who have undergone variolous inoculation in early life are generally unsusceptible of cow-pox. Vaccination, however, in such circumstances produces a certain degree of effect, the disorder manifesting itself in an imperfect and modified form. The fluid in the resulting vesicles cannot be trusted to for producing the genuine cow-pox.

22. iv. *Recurrent Cow-pox.*—When cow-pox has completed its regular course, the constitution is left, for a very considerable time at least, unsusceptible of the same disorder. But this law does not obtain if the revaccination is performed at very short or at very distant intervals: (a) At a very *short interval*, or on the fourth, fifth, or sixth day after a regular primary vaccination, the vesicles of the second vaccination are accelerated in their course, so as to overtake the first crop, and the whole mature and scab together. The

\* See Labatt on Cow-pox, p. 90.



second crop of vesicles, however, is not more than one fourth the normal size, and the areola is equally contracted. Mr. BRYCE (*On Cow-pox*, Edin., 1802) ingeniously availed himself of this circumstance, and, by testing by revaccination on the fifth day, he endeavoured to ascertain the full influence and actual security of vaccination. The plan, well known as BRYCE's *test*, has been extensively adopted. To obtain this test in greatest perfection, he advises the revaccination to be performed at the end of the fifth or beginning of the sixth day; and if no acceleration of the second crop of vesicles be observed, it is to be concluded that no constitutional effect has resulted from the first vaccination. The second is then to be regarded as the primary affection, which, in its turn, is to be tested by a third vaccination, and so on until we are satisfied that the constitutional effect has been fully produced. Dr. GREGORY adds, that "some persons have claimed for this suggestion the highest honour, and have even considered Dr. JENNER's discovery as incomplete without it. Dr. JENNER, however, never laid much stress upon it. In doubtful cases it is a prudent practice, but it has been extolled far beyond its real merits. It shows whether or not constitutional influence has been exerted by the primary vesicle, but it does not determine what has been the degree of such influence—in other words, it does not show whether the constitutional effect has been *complete* or otherwise."

23. (b) Revaccination at *distant intervals* from the date of primary vaccination, is deserving of notice. Dr. JENNER, in his original essays, stated that the human body, after a time, had the susceptibility of cow-pox renewed. Dr. GREGORY describes four different effects of revaccination at distant intervals: 1st. In many cases, especially if the interval from the primary to the secondary vaccination has not exceeded five years, the skin appears completely insensible to the vaccine matter; 2d. At intervals exceeding ten years, the virus irritates locally. In three, or at farthest four days from insertion, an areola of irregular shape appears around a minute, itching, acuminated, and angry vesicle. The glands of the axilla frequently swell; and in particular habits of body, especially in adult females, irritative fever is superinduced. A scab forms on the eighth day, which soon falls off, leaving no permanent cicatrix; 3d. In other cases, a vesicle forms more gradually, without either local or constitutional irritation; a slight areola succeeds, and the vesicle yields, on the seventh day, a considerable quantity of thin lymph; but this lymph is incapable of propagating the disease; 4th. In this set of cases, the second vaccination runs a perfectly regular course. A circular areola forms on the eighth day, and the lymph propagates a genuine cow-pox.

24. IV. NATURE OF VACCINIA.—*The Identity of Vaccine and Variolous Disease.*—When Dr. JENNER announced vaccination as an antidote to small-pox, he was strongly impressed with the idea of the common origin of human and epizootic maladies; and, conformably with this idea, he viewed small-pox as the most remarkable malady which equally affects man and the higher animals; and that this malady, in its less malignant forms, assumes the form of cow-pox, chicken-pox, and swine-pox. This, however, had been long a vulgar opinion, and is somewhat analogous to the view I stated when treating of scarlet

fever, which, I remarked, had appeared within the last three hundred years, and was derived from a similar disease in the horse. JENNER believed not only that small-pox and cow-pox were essentially the same disease, but that the former was a malignant variety of the latter, the parental malady being the cow-pox. This opinion was expressed by the term *variola vaccina*, the name he gave cow-pox, when first introduced to the notice of the scientific community. The researches of Mr. CEELY have more recently confirmed the intimate connexion Dr. JENNER contended for between cow-pox and small-pox; inasmuch as he has shown that the inoculation of the cow with variolous matter produces in that animal the true vaccine or cow-pox; and that inoculation of the human subject with the vaccine matter thus generated in the cow from variolous inoculation propagates genuine cow-pox in man. He has farther adduced some facts, which, however, require farther investigation, but which appear to prove the origin of the cow-pox, or vaccinia, in the infection of the cow by small-pox when occurring epidemically or sporadically in human subjects. Among other observations, Mr. CEELY states that he went to examine some cows affected with cow-pox; and that their proprietor, Mr. POLLARD, "at the same time, expressed his conviction that *his cows had been infected from human small-pox effluvia*, to which he considered they had been exposed."

25. The above facts, although scanty as they are, go to prove the following: 1st. That cow-pox originates in small-pox infection or contagion caught by the cow; 2d. That the infection of the cow by small-pox gives rise to vaccinia—an eruption which resembles the pustule of small-pox, but which cannot communicate small-pox, although it propagates itself as true vaccinia; 3d. That, unlike, or differing from, variola or small-pox, vaccinia is not communicated, at least from the cow to man, or from one human subject to another, by an effluvium or emanation proceeding from the affected at any stage of its course; 4th. That, like variolous inoculation, vaccination is capable, when properly conducted, of protecting from small-pox, with few exceptions, and at least for a considerable time; 5th. That the amount of evidence favours the opinion that vaccinia is a modification of variola, the modification proceeding from the virus of the latter having infected the cow, and occasioned the vaccine eruption; 6th. That the amount of evidence also favours the inference that vaccination protects, at least in many instances, from small-pox only for an indefinite time, and that the length of that time is indeterminate or indeterminable; 7th. That the duration of the protection may depend upon climate and various unascertained circumstances, and that there is reason to infer that, in such cases and circumstances where the protection fails after several or many years, the impairment of the protective influence is gradual, and progressive with the duration of time.

26. From the foregoing it will be seen that, while I believe, with Dr. JENNER, in the intimate connexion of variola with vaccinia, and with chicken-pox and swine-pox, yet we have no proof that variola has sprung from cow-pox; the evidence being in favour rather of cow-pox, and the other kinds of pox being varieties or species of small-pox, arising out of the passage of this latter malady through the higher of the lower animals—more conclusively of the passage of the variolous

morbid poison through the cow, as respects vaccinia.

27. Such appears to be the relation subsisting between cow-pox in the human subject and in the cow and small-pox; it may next be inquired what connexion exists between *vaccinia in the cow* and the *grease in horses*. Dr. JENNER believed that they were both identical, and that cow-pox never occurs in dairy districts, except where there is access to horses; he thereby denied the spontaneous origin of the disease in the cow. Later observations have, however, proved not only the identity of cow-pox and grease, but have shown, at the same time, first, that cow-pox does originate in the cow without access to horses; and, secondly, that cow-pox is communicable to man from the horse without the intervention of the cow, and with nearly equal facility as from the cow itself. Dr. GREGORY states that this branch of the theory of vaccination has been investigated with great diligence by Dr. LOV, of Whitby, Dr. SACCO, of Milan, and Dr. DE CARRO, of Vienna. The last-named author states, "that the matter in use at Vienna from 1799 to 1825 was partly British vaccine, and partly originated from the grease of a horse at Milan without the intervention of the cow. The effect was so similar in every respect that they were soon mixed; that is to say, that after several generations, and in the hands of innumerable practitioners, it was impossible to distinguish what was vaccine, and what was equine." "The whole British settlements," he adds, "were *equinated*; for the first liquid drop sent thither was the second generation of Milanese equine, or greasy matter, transplanted at Vienna." It cannot be inferred that the grease in horses was the origin of variola; and there is as little evidence of the grease having caused vaccinia in the cow, as there is of the latter having produced the former. It is, therefore, by no means improbable that both vaccinia and grease, being capable of communicating and propagating an identical affection, viz., that commonly called cow-pox, to human subjects in endless succession, are variola modified in its manifestations and properties by its passage through these two species of animals. The grease of horses, being proved, or admitted, conformably with the above evidence, to communicate and propagate an affection in every respect identical with vaccinia, the same inferences which I have deduced respecting this latter, apply also to it, if, indeed, this branch of the subject of vaccination be not viewed as still requiring farther investigation, more especially as respects the protective influence of the affection propagated from the grease in horses.

[If the researches of Dr. GEORGE GREGORY ("Med. Chir. Trans.," vol. iv., N. S.) are to be relied on, the morbid secretions of the cow, which possess the power of protecting the human system against the assaults of small-pox, may be produced in that animal in *four different modes*. 1st They are generated spontaneously in the cow, under certain circumstances of soil, season, and locality, and are often met with in cows soon after parturition, in the spring season, and when feeding upon young grass; but they arise also spontaneously from other and less known causes, and the disorder spreads like other epizootic maladies. It was this form of vaccine disease JENNER chiefly studied.

2d. The very same malady, developing the very

same morbid secretion, is often observed to spread *by contagion*, that is, by the application of the diseased secretion, thus generated, to the teats of healthy cows, differently circumstanced, by the hands of the milker.

3d. The same morbid secretion, possessed of the same qualities, is often generated in the teats of the cow by the application to them of the matter formed by the heel of the horse, when affected with the disorder called "*the grease*." This *greasy matter* may also be transplanted to man directly, without the intervention of the cow, proving that the anti-variola property does not depend on any peculiar change which the virus undergoes in passing through that animal.

4th. The same morbid secretion may be excited artificially in the cow by applying to the teats, or the mucous surfaces of the vagina, vaccine lymph from the arm of a child, even though twenty years had elapsed since that lymph had been humanized or assimilated to the human constitution.

5th. To these four modes of exciting a morbid secretion in the cow, called *vaccinia*, Mr. CERLY has added a *fifth*, by showing that the same object may be attained by applying to the mucous surfaces of the cow the matter of human small-pox. The vessels of the part are excited to the production of a fluid or humour, identical in all its properties with that which arises from a constitutional and febrile disturbance of the cow's system from contagion, from the matter of *grease*, or the long-humanized vaccine virus.

Dr. GREGORY supposes that other modes of exciting this morbid secretion in the cow exist, which may yet be discovered. and that we are not justified in concluding that the last mode mentioned is the most important, or as affording the true clue to the mystery of vaccine protection. This writer also contends that, as *vaccinia* is non-contagious, and febrile disturbance is not essential to its perfect development, the *vaccine* is probably a poison *sui generis*, and its relation to variola still hypothetical; that the real and intimate nature of the protection it affords is still unknown to us; and that a thorough knowledge of its anti-variola powers must be derived not from analogy, but from an extended and careful observation of facts, continued through a long series of years.]

28. V. PROTECTIVE INFLUENCE OF COW-POX.—This subject has occasioned much discussion during the last quarter of a century, and more especially during the last few years; and the amount of protection which cow-pox affords against small-pox has been often entertained, but as yet by no means satisfactorily ascertained.—a. There are various circumstances which render it most difficult to determine this question; for the idiosyncrasy of some individuals seems to oppose infection by the vaccine virus, either for a time or through life; and, if such an insusceptibility of the disease be admitted, it may be farther inferred that in others, the insusceptibility being less, the vaccine infection may be incomplete, and the protection afforded be proportionately imperfect. It may be conceded that, where the disposition in the constitution to receive the vaccine infection is either wanting or incomplete, the protection must be equally deficient; and hence, to estimate the protective influence of vaccination, it must be considered that the process has not been duly completed, and that no protective influence can be claimed from it, unless the vaccine vesicles and the local phenomena proceed regularly, and leave



a cicatrix, as described above. But, independently of the indisposition of the constitution to receive the vaccine disease, or of the disposition to receive it imperfectly, the health of the individual, and the state of the season or weather, may render vaccine infection either abortive or incomplete. It has been proved that attempts to vaccinate have often failed in hot countries, and in the warm localities of temperate climates, during hot and dry states of the atmosphere; and a similar temporary insusceptibility to small-pox inoculation, during the same state of atmosphere, has been observed. The impaired health of a person also may render him insusceptible of vaccination, until his health is restored; and various unascertained circumstances may have the same effect, either permanently or for a time. It may be inferred, all things being considered, that, where an insusceptibility to vaccination exists, an equal indisposition to small-pox may be expected; but, as a rule, there may be many exceptions to this, and it would be unwise to confide in it.

29. *b.* Besides circumstances more immediately connected with the individual, there are others depending upon the virus itself. The vaccine lymph may be deteriorated by long-keeping, or by a warm and humid, or a very warm and dry atmosphere, if it be even for a short time exposed to these states of the air. It may also be either inert, or imperfect in its operation and constitutional as well as local effects, owing to its having been taken from the vaccine vesicles at a too early, or a too late stage of the process of maturation, as already noticed (§ 17); or even to its having been too long kept, or to its insufficient protection from the action of the atmosphere. The manner in which the inoculation of cow-pox is performed—or the efficient or imperfect operation of inoculation—may in some way also affect the results. The number of the incisions or punctures, and the actual deposit of the virus within the sphere of the action of the absorbents or veins, may not merely produce either a full and satisfactory effect, or no effect at all, but also an imperfect or an insufficiently protective effect.

30. *c.* *Imperfect vaccination* has been referred to a variety of causes. It has been very generally supposed that the vaccine virus becomes deteriorated by its passage through numerous human bodies, or that the protective influence is weakened by the length of time, and the long succession of subjects through whom it has been perpetuated, from its direct inoculation from the cow. Of this, however, there appears to be insufficient proof. It has been remarked, that persons who have been vaccinated by Dr. JENNER himself, before deterioration could possibly have commenced, have nevertheless been attacked by small-pox in after-life. A recent writer remarks, that, "so far from believing in any deterioration of virus from successive inoculation, there is reason to believe that, by a careful selection of well-predisposed children, the pock may even be restored from an imperfect to a perfect state, and by proper care, therefore, may be retained indefinitely in that condition. If children are successively vaccinated from each other, all of whom are from various causes ill disposed to take on the perfect disease, the virus may unquestionably degenerate, and at length wear out altogether. In tropical countries, and in confined localities, such an occurrence certainly takes place, but this is very different from

the notion of a virus deteriorated by the mere influence of time."

31. *d.* *Imperfect vaccination*, as a cause of failure of protection from small-pox, was much insisted on by Dr. JENNER. Vaccination is said to be imperfect when any considerable deviation from the ordinary course of the vaccine vesicles takes place. The deviations from perfect vaccination are imputed to one or more of the following causes: 1st. To spurious matter, or matter taken from the arm at an improper period of the process; 2d. To an insufficient number of vaccine vesicles; 3d. To preoccupation of the skin by some disease, in which a fluid is exuded capable of conversion into a scab, such as tetter, scald-head, ringworm, erysipelas, &c.; 4th. To robbing the vesicle incautiously of its contents, particularly when one only has come to maturity; 5th. External violence done to the vesicle, as rubbing or scratching it, especially during its early stages. That causes may, and often do, interfere with the success of the vaccine process, cannot be doubted; but the influence imputed to them cannot be determined; for it has been proved, by very few instances, it should be admitted, that vaccination, which, according to all indications, should have been considered perfect, has afforded only imperfect or only temporary security; while, on the other hand, cases in which one or other of the above causes has interrupted the regular process, have notwithstanding afforded perfect security. The instances in which single vesicles have preserved from small-pox, both casually and by inoculation, Dr. GREGORY states to be so numerous that no reliance can be placed on the notion which would connect the security of the individual with the number of maturing vesicles. A case of small-pox after vaccination will sometimes occur in a member of a family, all of whom have been vaccinated in the same manner, by the same practitioner, and having similar marks on the arm, and equally exposed to contagion, that one alone having become infected. It should also be recollected that vaccination under the same circumstances, especially of the members of the same family, may, upon exposure to small-pox infection, be followed by this malady, in its various grades of modification, according to the time that has elapsed from vaccination. It has even been ascertained that persons have caught small-pox after having been subjected to BRUCE's test of the perfect constitutional affection of the original vaccination. It should, however, be recollected that these are merely exceptions to the general rule of protection; and as exceptions have attracted greater attention than those which prove the rule.

32. *c.* *The presumed decadence of vaccine influence and protection* has been believed by many from an early period of the history of vaccination. Dr. JENNER, in his third publication, in 1800, remarked that there were some "who suppose that the security from small-pox, obtained through cow-pox, will be of a temporary nature only. This supposition is refuted not only by analogy with the habits of diseases of a similar nature, but by incontrovertible facts, which appear in great numbers against it." That analogy may be considered opposed to this supposition may be allowed, although the analogy is neither very close nor very conclusive; but the facts opposed to it were certainly neither strong nor very manifest, inasmuch as time, the necessary element of

their manifestation, had not then elapsed. That Dr. JENNER was, however, convinced, or at least most sanguine in this matter, is shown in his petition to Parliament, where he states that his discovery had the "beneficial effect of rendering, *through life*, the person inoculated with it perfectly secure from the infection of small-pox." He rested his arguments as to the permanency of the protection of vaccination upon his belief, which subsequent researches have proved to be well founded, in the identity of vaccinia and variola; but, even granting the identity, a very marked modification of the former from the latter, by the passage of the poison through the body of the cow, must be admitted, the result being a conversion of a frequently malignant and generally severe malady, into a mild disorder. Are we, therefore, from the mere admission of identity thus modified, to infer protection by means of the milder form of disorder? May it not be as justly inferred, that whatever protection is actually afforded by the milder form of the disease may possibly be sometimes overcome by the contagion of the more severe malady? and that the protection of the former, being weaker or milder than that furnished by the latter, may not be so endurable, especially in some constitutions and circumstances, and more particularly if the process of vaccination has not been perfect or complete in all respects.\*

33. It was admitted by Dr. JENNER, Dr. WILKINSON, and others, who believed in the permanency of vaccine protection, that, when the vaccine process has been *imperfectly* gone through, and when, from some peculiarity of constitution, the system receives only a portion of, or is insufficiently imbued with, that protective influence which cow-pox is capable of imparting, then "small-pox would recur, and thus the degree in which its phenomena were modified was proportioned to the degree of perfection which the vaccine vesicle assumed during its development."†

34. This partial protection from small-pox, admitted in the circumstances just stated, has, however, been extended by many to the more perfect processes of vaccination; and there are many medical men and others who believe that the protection is complete only for seven, or ten, or fourteen, or twenty-one years; but that the small-pox caught after vaccination is modified in proportion to the shortness of the time which has elapsed from vaccination; and that, after the longest of these periods, little or no modification is observed. This opinion has manifestly been pushed too far; for it cannot be correctly inferred that these facts,

which have undoubtedly been often observed, especially in certain families and persons, in whom peculiarity of constitution, irregularities or imperfections in the vaccine process and other circumstances, tending to account for the imperfect or non-permanent protection, by any means prove that such imperfect protection exists in all cases, or even in a very large minority of cases. The circumstances which secure the desired protection, or which weaken it, or even destroy it altogether, are as yet not known with sufficient precision, and are such as admit of very different opinions, being undetermined on this very important matter. It need only be inferred that the vaccine process should be studied, so as to secure its perfection as far as possible, and in this state that it should be generally practised with the belief that, although not an undoubted, or an universal, or always a permanent protection from small-pox, it nevertheless proves a permanent protection in the great majority of instances, and that, where the protection fails, it renders in the vast majority the small-pox a comparatively mild disease.

35. It has been attempted to calculate the proportion of the vaccinated who take small-pox. On this topic it is impossible to arrive at any approximation to the true result. The degree of severity of a small-pox epidemic, occurring in a community containing many vaccinated persons, may be expected to influence the result. Dr. CROSSE, in his account of the variolous epidemic of Norwich, in 1819, stated "that of the vaccinated, not more than one in twenty will be in any way affected by the most intimate exposure to small-pox contagion; and less than one in fifty will have the disease in a form answering to the generally received descriptions of modified small-pox." These calculations may have been justified by the epidemic in 1819; but they cannot be viewed as applicable to other circumstances, and more especially to later periods in the history of vaccination and of small-pox prevalence. This is one of the many instances in which statistics cannot be confided in when applied to disease.

[Owing to the large number of unvaccinated immigrants into the city of New-York, and perhaps other causes, the number of deaths from small-pox in this city has been for several years gradually on the increase. The following are the number of fatal cases of this disease for the corresponding years, taken from the city inspector's reports:

Year.	No. of Deaths.	Year.	No. of Deaths.	Year.	No. of Deaths.	Year.	No. of Deaths.	Year.	No. of Deaths.
1804 16	813	2	1822	00	1831 224	1839 68	1847 53		
1805 6	184	2	1813 18	1832 8	1840 252	1848 544			
1806 48	18 5	94	1824 394	1833 25	1841 200	1849 326			
1807 59	1816	97	18 5	40	1834 233	1842 181	1850 231		
1808 6	1817	14	1826 58	1835 358	1843 117	1851 562			
1809 66	18 8	1	18 7	149	1836 173	1844 21	1852 47		
1810 4	1819	00	18 8	93	1837 164	1845 425	1853 636		
1811 117	1820	00	18 9	16	1838 91	1846 146	1854		
1812 21	1821	00	1830 176						

Perhaps this increase in the number of deaths by small-pox out of proportion to the increase of population may be owing more to some general epidemic or atmospheric, or other cause, than the failure in the protective powers of vaccinia, inasmuch as we find also a great and corresponding increase in the number of deaths from scarlet fever in the same city, as follows:

\* For this reason, laws against inoculation exist in most of the New England and Middle States, and ought to exist in all.]

† When we consider the numerous causes which modify the kine-pock, and may cause a failure in the vaccinating process, we shall not be surprised at the frequent occurrence of small-pox, or varioloid, among the vaccinated. Among the causes which modify the protective powers of vaccinia, Dr. GREGORY enumerates *puberty, change of climate, a severe attack of fever, and an epidemic constitution of the season*. Among the former may be reckoned, as most common, the employment of virus before it has undergone sufficient elaboration, the absence of constitutional affection from rupture of the vesicle, and certain individual idiosyncrasies. There is no reason whatever for supposing that vaccine virus deteriorates by passing through numerous human bodies; for the vaccine vesicle of JENNER is the true vaccine vesicle of to-day, and the distinctive signs by which its incubation and progress are marked are the same now as they were then.]



Year.	No. of Deaths.	Year.	No. of Deaths.	Year.	No. of Deaths.	Year.	No. of Deaths.	Year.	No. of Deaths.	Year.	No. of Deaths.	Year.	No. of Deaths.
1827	4	1832	221	1837	57	1842	4	1847	142	1852	613	1857	4
18	8	1833	179	83	25	18	3	1848	98	1853	454		
1829	183	1834	418	1839	158	1844	227	1849	266	851			
1830	246	1835	174	1840	3	1845	63	1850	311	1855			
1831	238	1836	202	1841	36	1846	114	1851	627	1856			

36. VI. SMALL-POX AFTER VACCINATION.—I have adverted to this topic when treating of SMALL-POX (§ 38), but I may make a few remarks respecting it which were then omitted. Variola, as it occurs after vaccination, is generally a mild disease. The pustules are usually small, hard, and tuberculated, few of them maturing perfectly. Yet the small quantity of matter they do contain commonly produces small-pox in others; and the exhalation from the affected also communicates the disease.\* This modified state of variola is not usually followed by pits or scars. Cases of much greater severity do, however, occur, and even assume the worst of confluent forms, or terminate fatally, as I have observed on several occasions. In some instances, a fatal termination may be imputed to the accompanying or secondary fever of small-pox attacking a delicate or scrofulous frame—or persons advanced in life, of a plethoric habit, or affected by some visceral disease—or those predisposed to, or actually labouring under, pulmonary or other maladies. In such case the physician perceives the true source of the fatal result, while the friends of the patient impute the event to small-pox. Soon after vaccination was introduced, cases of failure were imputed to imperfections in the vaccine process in these cases; and not unfrequently the varioloid disease which followed was so slight as to induce doubts of its nature; and very probably there were sometimes grounds for entertaining the skepticism. But with the lapse of time, facts, proving the failure of the protective influence, became more numerous, and were observed most frequently among adults. Dr. GREGORY, who was for many years physician to the small-pox hospital, states that “very few children have been received into the hospital under such circumstances (after vaccination); and those few have invariably had a mild disease, more allied to chicken-pox

than to small-pox: whereas all the severe cases, and the greater proportion of the mild ones, have occurred in adults, in whom an interval varying from 10 to 30 years (the average eighteen) had elapsed since the date of vaccination.”

[Dr. STEWART (*Ed Med. and Surg Jour.*, 1840) maintains, 1st. That vaccination affords an imperfect protection from small-pox at all periods of life; 2d. That the protection becomes more imperfect as the individual advances in life; 3d. That at the age of puberty the influence of vaccination (provided it has been had recourse to in infancy) nearly ceases—at any rate, in the majority of cases, at the age of 20, vaccination, he thinks, ceases to exert any protective influence whatever. These conclusions, it is stated, are confirmed by Dr. GREGORY, of the London small-pox hospital, in a letter to the author.

The benefits, however, of vaccination in protecting against attacks of small-pox will be very manifest when we look at the record of orphan asylums, and other institutions for the receptancy of children, where the greatest care is bestowed on vaccination. In the orphan asylum of Charleston, S. C., which in 1829 contained 150 children, not a single case of small-pox or varioloid occurred during the prevalence of that disease, though no additional restriction was imposed upon their intercourse with the citizens. (*Am. Jour. Med. Sci.*, Nov, 1831)

Over one thousand children were received into the different orphan asylums of Philadelphia up to 1841, and of the whole one only died of small-pox, although 65 cases of the disease occurred. Ten of these had no cicatrix, including the one that died, and probably had never been vaccinated.

Of several thousand children received in the different orphan asylums of New York since their foundation, no deaths have occurred from small-pox, although the varioloid has broken out at different times, in a light form, in several of them. The same is true of the New York House of Refuge, which had received 2657 children up to the year 1845.

Baltimore presents the like return, out of 3500 children that have been inmates of the Almshouse and different orphan asylums of that city. Thus we have an aggregate of over 11,000 children under 14 in these different institutions, and but one death from small-pox. Thus 5856 children were received into the New York Almshouse, from Nov. 1st, 1834, to May 1st, 1843, and though the varioloid prevailed extensively in that institution during that period, there were but eight deaths from it among the whole number; total, 16,000 children vaccinated, 8 deaths. Compare this with the mortuary statistics of Glasgow in former times. From Sept., 1671, to April, 1672, there were 800 deaths from small-pox in that city, with a population of 13,000. At the present time, with a population of over 250,000, the cases of this disease which prove mortal do not amount annually to one sixteenth part of the number which then occurred in one third of the time, among a population about one twentieth as large as at present.

During the prevalence of a most malignant and fatal small-pox in Philadelphia, in 1827, but one well-ascertained death from that disease was discovered to have occurred among 80,000 vaccinated persons. According to Drs. MITCHELL and BELL (“*Report to Med. Soc. of Phil.*”), of 248 cases of variola and varioloid treated at the small-pox hospital of that city, 155 were unprotected, of

\* The late Dr. FORAY found a higher ratio of successful vaccinations among those who had previously had small-pox than among those who had been simply vaccinated. Thus, of those who had been vaccinated, there were 141 successful, and 364 unsuccessful cases; 55 imperfect. Of 74 who had had small-pox previously, 29 were successful vaccinations, and 45 failures. Of 52 who had not been vaccinated, 25 were successful, and 27 failures. Total, 686. Thus he found that the successful vaccinations among those who had had small-pox amounted to 1 in every 2.1, while in the revaccinations this ratio is only 1 in 4. So, also, Dr. JOHN DAVY (“*Malta Statistics*”) shows that, although the influence of vaccination in preventing small-pox was less than that of small-pox itself in preventing a second attack, yet of those attacked by small-pox after having been vaccinated, the mortality was only 4.2 per cent., while the cases of recurrent small-pox gave a mortality as high as 9.3 per cent. So, also, at the small-pox hospital of Philadelphia, in 1823, ‘24, Drs. MITCHELL and BELL report but a single death out of 64 vaccinated; 3 died out of 9 who had been inoculated with variola; 3 died out of 7 who had had small-pox before; and of 155 wholly unprotected, 85 died. So of 14,470 persons who were attacked with small-pox while it prevailed as an epidemic in France, in 1840, 1688 died; out of 24 cases of recurrent small-pox, 3 died; while out of 403 persons attacked subsequent to vaccination, but 6 cases proved fatal! proving that, while small-pox has a mortality among the unprotected of 1 in 8, the varioloid affection is generally mild, seldom destroying more than 1 in 100.]

whom 85 died; 64 were vaccinated, of whom only one died; 9 were inoculated, of whom 3 died; 7 who had had small-pox before, of whom 3 died; and of the 13 whose condition was unknown, none died.]

37. VII. OPERATIVE MEASURES.—*A. The performance of vaccination*, although a simple, is a nice operation, requiring much attention to several circumstances. Care should be taken to avoid a failure, as it often causes a delay, or a neglect of the repetition of the operation. Failures arise chiefly, 1st. From the selection of the lymph; 2d. From the mode of operating; and, 3d. From the constitution or state of health of the individual operated upon.—*a.* The vaccine lymph should be recent, if it can be obtained in this state. It should be perfectly clear and limpid, and the earlier it is taken from the vesicle the better. Lymph may be taken with every prospect of success after the fifth day, and up to the eighth and ninth days. That taken on the tenth day should not be confided in. When vesicles are too often or too roughly opened, on the seventh or eighth day, the serum of the blood may commingle with the lymph, and impair, or even altogether destroy, the efficacy of the latter. A vesicle should always be treated gently.—*b.* The lancet used in the operation ought to be clean and sharp. A vaccinating lancet should have a broad shoulder, as well as a sharp point, to enable it to retain an adequate portion of virus. The skin should be kept tense during the operation, and six or eight punctures be made at convenient distances from each other, and to a slight depth. Provided that a genuine lymph of due intensity comes in contact with the absorbing surface of the cutis vera, it matters not whether much or little blood flows from the punctures. The quantity of blood that escapes depends more upon the child's habit of body than on the operator. A plethoric child generally bleeds freely when vaccinated, but generally exhibits the most perfect appearances as to the effect.—*c.* The child operated upon should be in perfect health. Vaccination ought to be delayed during the existence of any disease—at the period of dentition—when the skin is affected by any eruption—or when the digestive canal is disordered—unless some pressing occasion should require it. The best age for vaccinating is between the third and fifth month after birth, before dentition has commenced.

38. *B. Preservation of Vaccine Lymph*—Fresh lymph should always be preferred when it can be obtained; but there is often no other resource than preserved lymph. Being liable to spontaneous decomposition, as well as to other changes too slight or delicate to admit of demonstration, unless in its effects after inoculation, and either impairing or destroying its efficiency, great difficulty has been experienced in preserving it, and more especially in transmitting it to tropical climates in an active state. Dr. C. GREGORY states the following to be modes of preserving lymph which are now adopted: 1. It may be preserved fluid for several days between two pieces of glass, about an inch square, which fit each other accurately. When dry, the lymph will often, if carefully moistened by the breath, propagate the disease. 2. Vaccine lymph may be preserved on ivory points, shaped like the teeth of a comb. These should be twice dipped in the fluid of the vesicle, and allowed to dry slowly. They should be retained, when used, in the wound or puncture

for about half a minute. They are considered very effectual. 3. The lymph may be kept in a fluid state in capillary tubes, having a bulb at one end. They admit of being hermetically sealed. But to prevent spontaneous decomposition the lymph should be collected in minute quantities only. 4. Mr. BRYCE, in 1802, stated that vaccine scabs may be used for communicating the disease, and it has been ascertained that this is the most certain mode of transmitting cow-pox to warm climates. When about to be used they ought to be rubbed to a powder, and moistened with a little tepid water. When thus reduced to the consistence of thin mucilage, they form an artificial lymph. Punctures should be numerous where the lymph is employed. 5. Dr. JENNER occasionally used dossils of lint, saturated with the fluid of an eighth-day vesicle. These he placed between glasses, one surface of which had a small central cavity; the glasses being tied together, their edges sealed, and the whole covered with sheet lead. Preserved in this manner vaccine lymph will retain its fluidity and efficiency for a considerable time.

39. VIII. REVACCINATION.—The phenomena presented by revaccination after comparatively short intervals have been noticed (§ 23). It, however, becomes necessary to take a brief survey of the practice of this measure after long intervals, with the view of affording a complete protection against small-pox. It having been believed by many medical men, and it having become the popular belief, in several countries, that vaccination, however completely performed, is weakened in its protective influence by the lapse of time, or growth of the frame, a recourse to revaccination has been had, in some countries to a great extent. Dr. GOLDSON, in 1804, first announced this doctrine, but assigned the remarkably short period of three or four years for the decadence of protection. In France, MM. CAILLOT, BOULU, BERLAN, GENOUL, and others both in this and in other countries, supported this opinion, but assigned much longer periods for this occurrence, the time assigned by them varying in the opinions of each from ten to twenty-four years, but they all agreed in believing that the loss of protective power was gradual and progressive. M. P. DUBOIS endeavoured, in 1825, to refute this doctrine as a general inference, although he admitted the facts upon which the opinions of these physicians were founded. The epidemic prevalence of small-pox soon afterward in France, Germany, and Denmark, confirmed, by the numbers of vaccinated attacked, the opinion that vaccination lost, after the lapse of a number of years, its powers of protection from that malady. From this period—about 1829—revaccination began to be practised on the Continent, and on great numbers in Germany, Sweden, Denmark, Prussia, and in France. In 1833, it was adopted in the Prussian army, and was performed on 48,047 persons, and was successful in 15,269. In 1834, 16,673 successful cases were obtained in 44,454 operations. In 1835, 15,315 were successful in 39,192 revaccinations. In 1836, in 42,124 revaccinations, 18,136 fully succeeded, and 9040 presented an irregular form of the eruption. Of 14,048 persons, in whom revaccination failed, 1569 were successful on the repetition of the operation for the second time. In 1839, 41,481 soldiers of the Prussian army were revaccinated; of this number, the cicatrices of the first vaccination were distinct in 33,225,



imperfectly distinct in 5889, and not detected in 2367. Revaccination succeeded in 19,249, and was imperfect in 5354. Similar results have been obtained from revaccination in several of the German states, in Hanover, &c., between the years 1835 and 1842. In France, revaccination has not been much practised, and in England still less.\* During the reign of Louis PHILIPPE, the Royal Academy of Medicine of Paris was consulted respecting the propriety of having recourse to revaccination. This body were opposed to this measure, as they believed that it would weaken confidence in vaccination. M. DEZEIMERIS protested against this decision, and was successively followed by MM. FIARD, HARDY, PRESSAT, and others, who published memoirs on the subject in the French journals. M. VILLARET, in 1843, practised revaccination in 401 soldiers of the 7th regiment of dragoons; it was successful in 307; and in 153, who had formerly had *small-pox*, the operation fully succeeded in 97. In a second series of 447 persons, who presented perfect vaccine cicatrices, 402 had cow-pox a second time; and of 123 persons marked by *small-pox*, 89 presented a successful vaccination. MM. BOSQUET, FIARD, GUERSANT, and BLACHE, who, in 1828, expressed their belief in the permanent security furnished by cow-pox inoculation, have subsequently altered their opinions, and have practised revaccination in numerous cases; and have strenuously advised this measure as the only certain means of preventing *small-pox*, by sustaining the prophylactic influence of vaccinia.

[Dr. WENDT, in Copenhagen, revaccinated 3964 persons, of which 2756 were successful, and 1208 failures. Dr. AGGEUS, of Silesia, revaccinated 962, of which 822 were successful, 72 failures, and 68 spurious or imperfect. The Vaccine Committee of France, in 1839, revaccinated 6652, of which 718 were successful, and 1283 spurious or non-successful. In 1840, the same committee found 270 successful out of 2214 cases of revaccination, 1717 failures, 227 spurious or imperfect. M. VILLENEUVE, the same year, found 223 successful out of 2199 cases of revaccination, and 1976 failures. The late Dr. FERRY, of New York, vaccinated 569 soldiers at Fort Wood, in 1840, of which 141 were successful, 364 failures, 55 spurious or imperfect. Dr. KIRKBRIDE, of Philadelphia, revaccinated 209 in 1840; 44 successful, 165 failures. We copy the following Tables from Dr. FERRY's "*Prize Essay on the Protective Powers of Vaccinia*" (*N. Y. Jour. Med.*, Sept., 1844).

These statistics contain the results of revaccination in the Prussian army, the Vaccine Committee of France, and all other known authentic sources,

[\* M. VILLENEUVE, chairman of the committee on vaccination of the Royal Academy of Medicine, Paris, after examining the reports of 41 departments of France in relation to vaccination and revaccination, deduced from them the following conclusions in 1840: The whole number vaccinated for the first time was 30,413; in 560 of these it was unsuccessful. The number of revaccinations was 2199; of these, 1976 were unsuccessful. Of those who had been already vaccinated, 365 had the varioloid, and 6 died. Thus it appears that the proportion of cases in which vaccination does not succeed is only one in 54½, while others who have investigated the subject place it as high as ¼ or 1-10. Of the 2199 revaccinations performed in persons of different ages and sexes, who had been successfully vaccinated at some previous time, 223 were successful. So the proportion of successful cases was as 1-13 or 1-14. In 365 cases of varioloid occurring after well-established vaccination, the proportion of deaths was only 1-45 or 1-46, while the sporadic *small-pox* kills 1 to 1-10; and when the disease is epidemic, 1, or even more, perish. (*Annales d'Hygiène*.)]

Year.	Number Vaccinated.	CICATRICES IN THOSE REVACCINATED.			
		Of these had perfect cicatrices.	Imperfect cicatrices.	No cicatrices.	Revaccination successful in
1834	44,454	33,634	7,134	3,686	18,156
1836	42,124	32,635	6,143	2,946	15,315
1837	47,253	37,199	6,903	3,056	21,308
1838	42,041	33,819	5,645	2,577	19,117
1841	41,941	36,182	6,193	2,567	13,523
Total.	220,818	173,569	32,418	24,832	87,399

RESULTS OF A SERIES OF REVACCINATIONS.

Year.	Failures in first revaccinations.	Second revaccination.	Successful.	Total successful first and second revaccination.
1834	15,448	4,530	876	19,002
1836	14,049	14,043	1569	16,884
1837	15,093	15,343	2,443	23,511
1838	14,252	14,252	2306	21,423
1841	13,523	13,523	2,54	15,777
Totals	72,704	61,746	9238	96,637

and it is believed that they afford conclusive evidence of the necessity and importance of revaccination, under all possible circumstances. It is worthy of note that, prior to the order for revaccination in the Prussian army, it was not unusual for the different barracks to be a prey to varioloid disease; but now the whole army, notwithstanding its repeated exposure to similar causes productive of the disease, enjoys an almost entire immunity.]

40. In 1845 the Academy of Sciences of Paris published a Report, containing the following conclusions: 1. The protective influence of vaccination is complete as regards the great majority of the vaccinated, and temporary as respects a small number only; and in these latter it is almost absolute up to the period of puberty. 2. *Small-pox* rarely attacks the vaccinated before the age of ten or twelve; and it is from this age to thirty or thirty-five that they are chiefly exposed. 3. That in addition to its preservative influence, vaccination endows the constitution with an influence which renders the symptoms of *small-pox* much milder and of shorter duration. 4. Cow-pox, directly or recently derived from the cow, is attended by a much more intense local phenomenon, and by a more certain and permanent effect than that which has passed through a great number of human subjects, this intensity of local action subsiding after many successive vaccinations. 5. The preservative influence of vaccination appears not to be intimately connected with the intensity of its local effects; nevertheless, in order to preserve the properties of vaccinia unimpaired, it is prudent to renew it as frequently as possible from the cow. 6. Revaccination is the only means we possess of distinguishing the complete success of vaccinia from the less complete grades of protection. 7. Revaccination, however, is not certain evidence that the vaccinated in whom it had succeeded would have been destined to contract *small-pox*, but merely that it was probably among those that this latter malady was most likely to appear, if they became exposed to its infection. In ordinary times revaccination may be practised after fourteen years; during epidemic *small-pox* it may be practised after a shorter period.

41. It would appear from the circumstance of so many persons having presented the regular vaccinia after *small-pox* (§ 39), as stated above, that the complete development of the local action after revaccination cannot justly be viewed as a certain proof that the successfully vaccinated could have been infected with *small-pox*, although they might have been infected if they had been exposed

to the more concentrated sources of infection. Nor can successful revaccination, nor its failure, be viewed as absolutely indicating a state of constitution which shall resist the infection of small-pox on all occasions, more especially when this malady is present in an epidemic form, although it may resist this infection on nearly all occasions, or with very few exceptions; these exceptions, however, being a mild or modified small-pox, in the great majority of instances.

BIBLIOG. AND REFER.—*E. Jenner*, an Inquiry into the Causes and Effects of the Variolæ Vaccinæ, 4to. Lond., 1798.—*G. Pearson*, an Inquiry concerning the History of the Cow-pox, &c., Svo. Lond., 1798.—*W. Simmons*, Experiments on the supposed Origin of the Cow-pox, Svo. Lond., 1798.—*E. Jenner*, Farther Observations on the Variolæ Vaccinæ, Svo. Lond., 1799.—*W. Woodville*, Reports of a Series of Inoculations for the Variolæ Vaccinæ, Svo. London, 1799.—*E. Jenner*, Continuation of Facts and Observations on the Cow-pox, 4to. London, 1800.—*A. Aubert*, Rapport sur la Vaccine, &c., Svo. Paris, 1800.—*F. Colon*, Essai sur l'Inoculation de la Vaccine, Svo. Par., 1800.—*R. Dunning*, Some Observations on Vaccination and the Inoculated Cow-pox, Svo, 1800.—*A. H. Macdonald*, Familiar Observations on the Inoculation of the Cow-pox, Svo. Hamb., 1800.—*W. Woodville* and *E. Jenner*, a Comparative Statement of Facts and Observations relative to the Cow-pox, Svo. Lond., 1800.—*W. Woodville*, Observations on the Cow-pox, Svo. London, 1800.—*C. A. Aikin*, a Concise View of all the most Important Facts which have hitherto appeared concerning the Cow-pox, Svo. Lond., 1801.—*V. L. Brera*, Avviso al Popolo sulla Necessità di adattare l'Innocente e non Pericoloso Innesto del Vajuolo Vaccino, Svo. Cremona, 1801.—*F. Colon*, Recueil d'Observations et de Faits relatifs à la Vaccine, Svo. Paris, 1801.—*J. G. Loy*, an Account of some Experiments on the Origin of Cow-pox, 4to. Whitby, 1801.—*P. J. Moutet*, Recherches sur les Préjugés et les Systèmes en Médecine, et Doutes sur la Vaccine, substitué à l'Inoculation de la Petite Vérole, Svo. Paris, 1801.—*J. L. Moreau de la Sarthe*, Traité Historique et Pratique de la Vaccine, Svo. Paris, 1801.—*L. Odier*, Mémoire sur l'Inoculation de la Vaccine, Svo. Genève, 1801.—*H. Ranque*, Théorie et Pratique de l'Inoculation de la Vaccine, Svo. Par., 1801.—*H. M. Husson*, Recherches Historiques et Médicales sur la Vaccine, Svo. Paris, 1801.—*J. M. J. Vigarons*, Rapport sur l'Inoculation de la Vaccine, Svo. Montpel., 1801.—*L. Sacco*, Osservazioni Pratiche sull' uso del Vajuolo Vaccino, come Preservativo del Vajuolo Umano, Svo. Milan, 1801.—*J. Ring*, a Treatise of Cow-pox, containing the History of Vaccine Inoculation, &c., 2 vols. Svo. Lond., 1801–1803.—*D. de Lances*, Tratado de la Vacuna, Svo. Madrid, 1802.—*J. R. Coze*, Practical Observat. on Vaccination, or Inoculation for the Cow-pox, Svo. Philad., 1802.—*P. Chappon*, Traité Historique des Dangers de la Vaccine, Svo. Paris, 1803.—*J. N. Halle*, Rapport de la Méthode de préserver de la Petite Vérole par l'Inoculation de la Vaccine, 4to. Par., 1803.—*L. Sacco*, Memoria sulla Vaccine, Unico Mezzo per estirpare radicalmente il Vajuolo Umano, Svo. Milan, 1803.—*R. Dunning*, Minutes of some Experiments to ascertain the Permanent Security of Vaccination, Svo. Lond., 1804.—*J. de Carro*, Observ. et Exper. sur la Vaccination, Svo. Vien., 1802.—*Historie de la Vaccinat. en Turquie, en Grèce, et aux Indes Orientales*, Svo. Vien., 1804.—*R. Hernandez*, Observaciones Historicas del Origen, Progreso y Estado Actual de la Vacuna en Minorca, 4to. Mahon, 1804.—*W. Goldson*, Some Recent Cases of Small-pox subsequent to Vaccination, Svo. London, 1805.—*J. Adams*, Answer to all the Objections hitherto made against the Cow-pox, Svo. Lond., 1805.—*J. Ring*, an Answer to Dr. Goldson, proving that Vaccination is a Permanent Security against the Small-pox, Svo. London, 1805; and an Answer to Dr. Mosely containing a Defence of Vaccination, Svo. Lond., 1805.—*E. E. Duillard*, Analyse et Tableaux de l'Influence de la Petite Vérole sur la Mortalité, &c. Paris, 1806.—*R. Willou*, on Vaccine Inoculation, 4to. London, 1806.—*C. L. Schweikhard*, Beiträge zur Literatur über die Kuhpocken und ihre Impfung, von 1795, 1807, Svo. Carlsr., 1809.—*L. Biagini*, Rapporto Storico-Medico delle Inoculazioni Jenneriane eseguite in Pistoja, Svo. Firenze, 1809.—*T. Brown*, Inquiry into the Antivariolous Powers of Vaccination, Svo. Edinb., 1809.—*J. Lryce*, Pract. Observations on the Inoculation of Cow-pox, Svo. Edinb., 1809.—*F. Bruni*, Riflessioni sopra i Vantaggi della Vaccine il Vajuolo Peccorino, Svo. Firenze, 1809.—*L. Sacco*, Trattato di Vaccinazione, con Osservazioni sul Gavardo e Vajuolo Peccorino, 4to. Milan, 1809.—*O. W. Bartley*, an Attempt to vindicate the Practice of Inoculation, &c., Svo. Lond., 1810.—*T. Brown*, a Correspond-

ence with the Board of the National Vaccine Establishment, Svo. Musselburgh, 1810.—*Segand*, Précis Historique de la Vaccination Pratique à Marseille depuis son Introduction en France jusqu'à ce Jour, Svo. Mars., 1812.—*J. N. Hallé*, Exposition des Faits recueillis jusqu'à présent, concernant les Effets de la Vaccination, &c., Svo. Par., 1812.—*E. Leese*, an Explanation of the Causes why Vaccination has sometimes failed to prevent Small-pox, Svo. Lond., 1812.—*J. Ring*, a Caution against Vaccine Swindlers and Impositors, Svo. Lond., 1816.—*F. Mohl*, De Varioloidibus et Varicellis, Svo. Copen., 1817.—*J. Moore*, The History and Practice of Vaccination, Svo. Lond., 1817.—*A. Monro*, Observations on the different kinds of Small-pox, especially on that which follows Vaccination, Svo. Lond., 1818.—*E. Jenner*, on the Varieties and Modifications of the Vaccine Pustule occasioned by an Imperfect State of the Skin, Svo. Cheltenham, 1819.—*G. Blanc*, a Statement of Facts tending to establish an Estimate of the True Value and Present State of Vaccination, Svo. Lond., 1820.—*J. Crosse*, a History of the Variolous Epidemic of Norwich in 1819, with an Estimate of the Protection afforded by Vaccination, Svo. Lond., 1820.—*J. P. Hulbert*, Observations on Variolous Inoculation and Vaccination, Svo. London, 1820.—*N. Chambon de Montaux*, Comparaison des Effets de la Vaccine avec ceux de la Petite Vérole inoculée par la Méthode des Incisions, Svo. Par., 1821.—*V. Leman*, a Discourse on Vaccination, Svo. Lond., 1822.—*J. Thomson*, an Account of the Varioloid Epidemic in Edinburgh, &c., Svo. Lond., 1822; and Historical Sketch of Opinions on the Varieties of Small-pox, &c., Svo. London, 1822.—*J. J. Cribb*, Small-pox and Cow-pox, Svo. Camb., 1825.—*W. Ferguson*, Letter to Sir H. Hallford on Inoculation, Svo. London, 1825.—*T. Greenhow*, an Estimate of the True Value of Vaccination as a Security against the Small-pox, Svo. Lond., 1825.—*J. Baron*, The Life of Edward Jenner, Svo. Lond., 1827.—*J. Marshall*, Treatise on Vaccination, Svo. London, 1830.—*Anon.*, Report and Evidence of the Select Committee on the Vaccine Board, fol. Lond., 1833.—*G. Gregory*, in *Cyclop. of Pract. Med.*, vol. iv., p. 402.—*Rayer*, in *Dict. de Méd. et de Chir. Pratiques*, t. xv., p. 592.—*J. B. Bouviquet*, Traité de Vaccine, Svo. Paris, 1833.—*G. G. Macpherson*, Account of some Experiments relative to Vaccination, in *Transact. of Med. and Phys. Society of Calcutta* for 1833, vol. vi., p. 169.—*W. Cameron*, of Vaccination in Bengal, in *Ibid.*, vol. v., p. 385.—*H. S. Mercer*, Effects of Vaccination in India, in *Ibid.*, vol. vi., p. 265.—*Guersant* et *Blache*, in *Dict. de Méd.*, 2d ed., art. *Vaccination*.—*Rillet* et *Barthez*, Traité Pratique des Maladies des Enfants, t. ii., p. 543.—*Legendre*, in *Archives Génér. de Méd.*, 4th ser., t. vi., p. 38.—*Dezémerts*, De la Revaccination dans l'Expérience, 1838, t. ii., p. 335, 5, 9.—*Tiard*, Nécéssité de la Revaccination, in *Ibid.*, 1838, t. ii., p. 472.—*Gautier de Claubry*, De l'Altération du Virus Vaccine et de l'Opportunité des Revaccinations, Svo. Paris, 1838; et dans *Archives Génér. de Méd.*, 3d ser., t. lit., p. 372.—*R. Ceely*, Observations on the Variolæ Vaccinæ as they occasionally appear in the Vale of Aylesbury, with an Account of some Recent Experiments in the Vaccination, Retrovaccination, and Variolation of Cows, in the *Trans. of the Provincial Medical and Surgical Association*, vol. viii., Svo. London, 1840, p. 287; and Farther Observations on the Variolæ Vaccinæ, in *Ibid.*, vol. x., p. 209, with coloured plates. (*Very interesting Papers.*)—*J. Sedillot*, Mémoire sur les Revaccinations, dans *Mém. de l'Acad. Roy. de Méd.*, 1840, t. viii., p. 568.—*T. G. Laflour*, on the Protection against Small-pox afforded by Vaccination, illustrated by the Returns of the Army, the Navy, and the Royal Military Asylum, in *Royal Medico-Chir. Society's Transactions*, vol. xxxv., p. 403. See also the British and Foreign Medical Review, vol. i., p. 609; vol. ii., p. 250, 251; vol. iv., p. 223, 392, 547; vol. v., p. 207; vol. vi., p. 247; vol. vii., p. 189, 527; and in many places in most of the vols. of this work. See the copious Index forming its xxvth volume.

[AMER. BIBLIOG. AND REFER.—*Cazenave* and *Schedel*, Manual of Diseases of the Skin, Am. ed., by H. D. Buckley, 12mo, p. 341. N. Y., 1846.—*Fleetwood Churchill*, on the Diseases of Infants and Children, Am. ed., by Wm. V. Keating, Svo, p. 725. Phil., 1856.—*S. H. Dickson*, Elements of Medicine, Svo, p. 750. Philad., 1856.—*R. Dunsinon*, The Practice of Medicine, 3d ed., 2 vols, Svo, p. 15 0. Phil., 1856.—*J. Netivan Moore*, a Prat. Treat. on Dis. of the Skin, 12mo, p. 334, with an Atlas of 100 plates. Phil., 1856.—*Thomas Watson*, Lectures on Principles and Practice of Physic, 3d Am. ed., Svo, p. 1100. Phil., 1856.—*Charles West*, Lectures on the Diseases of Infancy and Childhood, Am. ed., Svo, p. 590. Philad., 1856.—*James Stewart*, a Pract. Treatise on Diseases of Children, Svo. N. Y., 1845.—*J. Forsyth Meigs*, a Pract. Treatise on the Diseases of Children, 2d ed., Svo, p. 711. Phil., 1833.—*John Eliotson*, The Principles and Practice of Medicine, Am. ed., by T. Stewardson, Svo. Philad., 1844.—*Erasmus Wilson*, on Dis. of Skin, 3d Amer. ed.,



8vo, p. 590. Phil., 1856.—*W. P. Dewees*, a Treat. on the Phys. and Med. Treatment of Children, 10th ed., 8vo, p. 543. Phil., 1855.—*D. F. Condie*, a Pract. Treat. on the Diseases of Children, 4th ed., 8vo, p. 750. Phil., 1857.—*John S. Rohrer*, on the Identity of Variola, Varioloid, and Variola Vaccina, and on the Prophylactic Power of the Vaccine Disease, in *Med. Examiner*, Phil., 1846.—*H. T. Child*, Report on Vaccination, in *Ibid.*, Feb., 1846.—*J. M. Newman*, Cases illustrating the Protective Influence of Vaccination against the Contagion of Small-pox, in *Buffalo Med. Journ.*, vol. x., p. 458.—*T. D. Mitchell*, a Candid Inquiry into the Present State of Vaccination, in *Am. Med. Recorder*, 1822.—*Horatio G. Jameson*, Some Account of the Small-pox which prevailed at Baltimore during the Winter of 1821, '22, in *Ibid.*, 1822.—*J. Davis*, Observations on the Vaccine and Varioloid Diseases, in *Ibid.*, 1822.—*Benjamin Waterhouse*, History of the Progress of the New Inoculation in America. Cambridge, 1802; and in *Amer. Medical Recorder*, 1823.—*E. Jenner*, *Case*, *D. F. Condie*, *C. D. Meigs*, Report on Small-pox, in *Phil. American Medical Recorder*, 1828.—*J. R. Coze*, on Cow-pox, 8vo. Philad., 1802.—*D. B. Slack*, on the Propriety of superadding Inoculation with Small-pox Matter to Vaccination, in *Bost. Med. and Surgical Journal*, vol. xxix., p. 478.—*A. H. Wright*, Vaccination introduced into Persia, in *Ibid.*, vol. xxix., p. 352.—*D. P. Bissell*, on Vaccination, in *Trans. of the Med. Soc. of the State of New York*, 1857.—*J. McCall*, *J. Elights*, *Wm. Day*, *T. Ronney Beck*, Report of a Committee on Varioloid, and the Means of Counteracting its Progress, in *Ibid.*, vol. iii., p. 13, 40.—*D. B. Bradley*, Vaccination in Siam, in *Boston Med. and Surg. Journal*, vol. xxiii., p. 153.—*C. W. Spafford*, Anomalous Vaccination, in *Ibid.*, vol. xxii., p. 138.—*Silas Brown*, Facts in relation to Vaccination, in *Ibid.*, vol. xxii., p. 283.—*Luther V. Bell*, an Attempt to Investigate some Obscure and Undecided Doctrines in relation to Small-pox, Varioloid, and Vaccination, 8vo. Bost., 1836.—*B. B. Appleton*, The Influence of the Vaccine Virus on Scrofula, in *Ibid.*, vol. xv., p. 176.—*Variella* and Varioloid, editorial, in *Ibid.*, vol. xv., p. 125.—*T. Wallace*, Several Cases of Small-pox in one Family, in *Ibid.*, vol. xi., p. 252.—*S. Brown*, Prize Dissertation on Small-pox, Varioloid, and Vaccination. New York, 1829. (Dr. B. maintains that the dry scabs only should be used for vaccination, as laceration of the vesicle proves detrimental to the virus. Great care is to be taken lest it be lacerated. Vaccination should not be practised during the summer months. Dr. B. also recommends that all children of phlegmatic parents, and all persons of phlegmatic habit, should be revaccinated, or have a second insertion, and repeated till a full impression be made on the system.)—*George Haynard*, Remarks on Vaccination, in *Bost. Med. and Surg. Journal*, vol. i., p. 177, 305, 496 (1828).—*W. Channing*, on Revaccination, in *Ibid.*, vol. i., p. 279.—*Thomas Henderson*, on Revaccination, in *Ibid.*, vol. i., p. 401.—*Chandler Robbins*, on Vaccination as a Preventive of Varioloid, in *Ibid.*, vol. i., p. 21; and on Revaccination, in *Ibid.*, p. 225, 267, 330, 385, 449.—*J. Southworth*, Hooping-cough and Vaccination, in *Boston Med. and Surg. Journ.*, vol. xxvi., p. 61.—*N. Williams*, The Method of Practice in the Small-pox, with Observations on the Way of Inoculation, 8vo, p. 16. Bost., 1752.—*J. H. Flint*, on Small-pox, *Bost. Journ.*, vol. xxi., p. 354. (Dr. F. maintains that the small-pox of the present day is as distinct from the small-pox described by SYDENHAM and the earlier writers as chicken-pox is from varioloid; that it corresponds to the anomalous small-pox of SYDENHAM.)—*J. H. Coggeshall*, in *Ibid.*, vol. xxi., p. 324. (From considerable experience as vaccinator at the Health Office, Boston, Dr. C. derives the following conclusions: 1st, that every individual is susceptible of the kine-pox; 2d, that revaccination is not necessary before puberty; 3d, that the system undergoes a change at puberty, and that revaccination is then necessary; 4th, that vaccination is a sure preventive of small-pox; 5th, that revaccination is a sure preventive of the varioloid; 6th, that the third vaccination is inert; 7th, that the system is susceptible of varioloid after puberty, whenever the individual is exposed to small-pox without revaccination; 8th, that revaccination is not necessary if the first operation was performed since puberty; 9th, that those who disregard vaccination are always liable to small-pox whenever exposed to that disease; 10th, that if every individual were vaccinated before puberty, and revaccinated after that period, there would be no such disease existing as small-pox or varioloid.)—*John D. Fisher*, Description of the Distinct, Confident, and Inoculated Small-pox, Varioloid Disease, Cow-pox, and Chicken-pox, fol., p. 73: 13 cold plates. Boston, 1821; and *Trans. of Am. Medical Association*, vol. iii.—*William Brown*, on the Influence of Vaccination in Counteracting the Effects of Small-pox Contagion, in *Am. Journ. of Med. Sciences*, vol. xv., 1834.—*S. Forry*, Essay on the Protective Powers of Vaccinia (Boylston Prize Essay for 1844); also, in *N. York Journ. of Medicine*, vol. iii., p. 151; and in *Am. Journ. of Med. Sciences*, April, 1842. (See Report of the Committee of Vaccination made to the Academy of Sciences of France, Feb., 1845, in *Am. Journ. of Med. Sciences*, vol. x., 1845; and Vaccination in France, in *Ibid.*, vol. iv., N. S., 1842).—*S. A. Cook*, Nature of Vaccinia, in *Boston Medical and Surgical Journal*, vol. xxxiii.; and Origin of Vaccinia, in *Ibid.*, vol. xxxii., p. 49, 73.—*Dr. Gregory*, on Vaccination and Inoculation, in *Ibid.*, p. 179.—*J. C. Martin*, Experiments on the Development of Vaccine Virus, in *Ibid.*, vol. xxv., p. 266. (Dr. M. inoculated the cow with small-pox matter in 1835, and proved that the matter resulting therefrom was the true vaccine disease, by vaccinating three children with the same. The disease, though more severe, had all the characteristics of the genuine kine-pox.)—*Steph. H. Williams*, Remarks on Vaccination, in *Ibid.*, vol. xxiv., p. 152. (Dr. W. believes kine-pox to be an effectual and permanent preventive of small-pox, that the virus does not become weakened or degenerated the farther removed it is from the cow, but advises revaccination where there is the least doubt of the genuineness of the original matter.)—*C. A. Lee*, Account of the Varioloid Disease in the Town of Gorham, Ontario County, New York, in *Amer. Journ. of Med. Sciences*, July, 1853; and in *New York Journ. of Medicine*, Sept., 1853.—*F. C. Stewart*, Report of Cases of Vaccination and Revaccination in 135 Cases of Children under the age of 15 years, in *New York Journal of Med.*, vol. vi., p. 15, 1846. (Of those possessing large and evident scars, the result of previous vaccination, there were 71; of those in whom the signs of previous vaccination were undecided, or the scars doubtful, there were 13; of those in whom no trace of previous vaccination could be detected, there were 51. Total, 135. Of the 71, vaccination succeeded in 19—26½ per cent. In these cases there were some very well-marked vesicles close alongside of the old scars. Of those in whom there were doubtful traces of previous vaccination, 9 out of 13 took—70 per cent. Of the 51 in whom no trace of previous vaccination could be detected, the operation succeeded in 43—80 per cent.)—*William T. Taylor*, Variola in the Facts, in *Am. Journal of Medical Sciences*, 1853.—*Robert Cady*, Further Observations on Variola Vaccina, in *New York Lancet*.—*J. A. Houston*, in *Ibid.*, vol. ii.—*Thom. Brown*, an Investigation of the present Unsatisfactory and Defective State of Vaccination, &c., pamphlet. Lonl., 1842; in *Ibid.*, vol. ii., p. 5.—*G. Gregory*, Lect. on the Eruptive Fevers, edit. by *H. D. Bulkley*, 12mo. N. Y., 1835.—*T. Y. Simons*, Observ. on the Protective Influence of Vaccine when efficiently performed, in *Charleston Medical Journal*, vol. iii., p. 34, 1848.—*Robert Browne*, on the Influence of Vaccination in Counteracting the Effects of Small-pox Contagion, in *Am. Journ. of Med. Sciences*, vol. xv., p. 399.—Report on Vaccination, read at the Annual Meeting of the Massachusetts Med. Society, 1843, in *Com. of Mass. Med. Soc.*, vol. i., p. 83.—*James M. Pendleton* and *J. Smith Rogers*, Facts on Vaccination, in *New York Medical and Phys. Journal*, vol. i., p. 320, 1822.—Have Variola, Varioloid, and Variella a common origin? in *New England Med. Journal*, vol. i., 1813.—*Felix Puseletti*, an Attempt to Ascertain the Value of the Vaccine Virus, &c., in *N. York Med. and Phys. Journ.*, vol. iv., p. 22, 1825.—*John Bell*, a Dissertation on the Vaccine Disease, in *N. York Med. and Phys. Journal*, vol. vi., p. 441.—*C. C. Blatchly*, on Degenerated Cow-pox, in *N. Y. Med. and Phys. Journal*, vol. ii., p. 973.—*A. B. Williman*, on the Use of Original Vaccine Lymph, in *Charleston Med. Journ.*, vol. vi., p. 263.—*Wm. S. Wragg*, on the Connexion between Variella and Varioloid, with Cases tending to show their identity in Nature, in *Charleston Medical Journal and Review*, vol. iv., p. 133, 1849.—*D. F. Condie*, *T. T. Hewson*, *J. W. Moore*, Report on the Protective Powers of Vaccination, in *Med. Examiner*, vol. iii., p. 59. Phila., 1847.]

1. VAGINA AND VULVA—DISEASES OF THE.—Affections of the vagina and vulva are as frequently surgical as strictly medical. As, however, certain of them require internal or constitutional means, either altogether or chiefly, in their treatment, they may be viewed as belonging to the latter category, although I can see no just reason for separating the two departments of practice, or for assigning them more to the one than to the other.

2. I. The VAGINA is liable to several congenital alterations, or vices of conformation. The chief of these are: 1st. Its opening in an abnormal situation; 2d. Its separation by a partition into two canals; 3d. Its imperforation; 4th. Its constriction; and, 5th. Its entire absence. As to either of these, I can add nothing to what will be

found in the many excellent recent works on surgical pathology. The last of these conditions is of great importance as respects the diagnosis, and the results proceeding from it. It may become the subject of medical investigation as respects especially the retention of the catamenia, and the propriety of an operation, on this account, after due deliberation. The absence of the vagina may be only partial; but even in this case, and when the exact state is ascertained, the question as to the propriety of attempting an operation for the establishment of the canal should not be entertained, unless there be a pressing occasion for having recourse to it, as it may compromise the life of the patient. But what occasions may suggest recourse to a surgical operation in such cases? These are: 1st Excessive uterine distention from an accumulation of the menstrual fluid; 2d. The supervention of metritis, or peritonitis, or both; and, 3d. Contamination of the circulation from the absorption of a portion of the retained and altered blood from the uterus. This operation has been, therefore, performed successfully by CABARET, VENTURA, DESGRANGES, DELPECH, WILLAUME, JEFFERSON, and COSTE; but unsuccessfully by LANGENBECK, MACFARLANE, and FRETAC (VELPEAU, *Médecine Opératoire*, t. iv., p. 356). The accumulated menstrual fluid may be discharged, in the urgent circumstances just stated, by puncture either by the rectum or by the bladder.

3 The diseases and organic lesions to which the VAGINA is liable, are *inflammations, ulcers, constrictions, or contractions and obliteration, tumours of various kind, polypi, fistulae, cancer, prolapsus, wounds, laceration, herniæ, and the impaction of foreign bodies*. Several of these belong more to the province of the surgeon than to the physician, or rather require surgical, in addition to medical means.

4. i. INFLAMMATION OF THE VAGINA.—SYNON. —*Vaginitis, Vaginite*, Fr

CLASSIF. —III. CLASS, V. ORDER (*Author in Preface*)

5. DEFINIT. —*Heat, soreness, or pain, in the course of the vagina, sometimes attended by increase of pain, or by uneasiness upon sitting down on a hard seat; and always by pain and tenderness on vaginal examination, and by a whitish or a muco-purulent discharge, with slight febrile disturbance, increased or returning at night.*

6. Inflammations of the vagina rarely occur, unless in connexion with inflammation of the vulva, or with inflammation of the neck of the uterus; most commonly with both, unless it be caused by violence, by excessive sexual indulgence, by irritating injections, and by foreign bodies, as pessaries, &c., lodged in the vagina. It commonly presents an *acute or sub-acute form*, whether simple or thus complicated; but it is also often *chronic*, especially when it is associated with disease of the neck or body of the uterus, and in many cases which are commonly viewed as simply those of leucorrhœa. In these *chronic and sub-acute* cases the mucous follicles of the vagina, and often also of the cervix and vulva, are more or less implicated—either partially or chiefly

7. A. *Acute vaginitis* rarely occurs in a simple or *sthenic form*, unless when it is *specific*, or *gonorrhœal*. In rare cases, also, it is *asthenic or diffusæ*, owing to the occasions about to be mentioned. *Acute sthenic vaginitis*, and the sub-

*acute states*, are most frequently consequences of the causes just stated, or of sitting on cold or damp seats, especially during, or soon after, the menstrual period. In these circumstances, it has been termed, by some physicians, *raginal catarrh*, or catarrhal inflammation of the vagina, especially in its slighter or sub-acute state. In this state, it is not unfrequently met with in pregnancy, and, in rare instances, as a complication of hæmorrhoids. In these simpler forms, vaginitis is attended by a copious whitish, or grayish, or nearly colourless mucous discharge, which soon passes into a muco-purulent and yellowish matter, especially when retained for some time in the vagina; there are also soreness and tenderness in the course of the vagina, sometimes with frequent micturition and slight dysuria. I have met with several cases, in public and private practice, of this form of vaginitis, as a sequela of measles, but much more frequently of scarlet fever, especially in children among the lower classes.

8. B. *Acute and sub-acute vaginitis* is often mistaken for *gonorrhœal vaginitis*, or the *blennorrhagia* of French pathologists, especially of M. RICORD and his disciples; and it is generally very difficult to distinguish between the simple and specific forms of the disease. Generally, however, the latter, or gonorrhœal, is attended by characteristic signs referable to the vulva; by itching, smarting, or stinging in this situation; by frequent painful micturition, by inflammation and swelling of the labia nymphæ and urethra; pain and soreness being greatly increased when sitting. The local signs and febrile symptoms are more acute, and the swelling, tenderness, and intolerance of an examination are greater, than in the non-specific states of vaginitis, and the discharge more copious and more completely purulent. In all the cases of gonorrhœal vaginitis which I have seen the disease extended to the uterus, and in three to the ovaria. In this form of the disease, the history of the case, especially with reference to the affection of the vulva, and the probability of its being caused by an impure connexion, will much assist the diagnosis. In most of the cases which I have seen, the disease was communicated by the husbands of the females affected, the fact of this having been the cause having been acknowledged by the former. In some instances, much difficulty has occurred in the diagnosis, especially when vaginitis has been produced soon after marriage, in consequence of excessive sexual indulgence, and of the states of both the male and female organs previously, and even of the constitution and habit of body of the female. A similar difficulty is sometimes met with in the vaginitis, follicular or mucous, which occasionally appears during pregnancy. In both these circumstances, the discharge may infect the husband, in such a manner as to be distinguished with great difficulty, or not at all, from gonorrhœa in the male. The *urethritis* thus produced on rare occasions is somewhat different from the specific disease, as far as my observation of a few cases enables me to state. The earlier signs referable to the opening of the urethra, and the distressing chordee characterizing, are either wanting, or are slight in the simple urethritis; while micturition is neither so painful nor so difficult as in the specific disease. The inflammation, however, of the former is more disposed to extend to the mucous surface of the



urinary bladder, and less disposed to affect the testicles, than that of the latter malady.

9. *C. Asthenic vaginitis*, or diffusive inflammation of the vagina, has been hitherto unrecognized. I have referred to two instances of its occurrence associated with adynamic dysentery in married females, when treating of *metritis* (see art. UTERUS, § 54), the inflammation having extended from the vulva to the vagina and uterus; and having been produced by the septic and infectious exhalations evolved, during a long continuance of warm weather, from full, open privies. In these cases the vaginal discharge was muco-purulent, streaked and discoloured with blood, and rusty, at times of a brownish, or greenish brown hue, and very abundant, with remarkable swelling and tenderness of the parts, and with the symptoms accompanying acute metritis (see UTERUS, § 55, *et seq.*). The pulse was rapid, weak, small, and compressible; the vital prostration and the other symptoms of adynamia being so marked as to require powerful tonics and restoratives. Recovery ultimately took place, but after a very protracted illness. This form of vaginitis may be complicated with asthenic dysentery, as observed in the cases now referred to.

10. *D. Phlegmonous inflammation* may attack the connecting cellular tissue of the vagina, especially that between the vagina and rectum, and occasion a small abscess, which may open either into the vagina or into the rectum. Inflammation also of some portion of the pelvic cellular tissue, or of the cellular tissue connecting the uterine appendages (see UTERUS, § 122, *et seq.*), may extend in this direction, and open into the vagina, occasioning more or less inflammation of this part or of the rectum, or even a fistulous communication between the vagina and rectum. When the inflammatory action is limited to the cellular tissue of the vagina and its immediate vicinity, and occasions only a small abscess between the vagina and rectum, the opening into either part is generally followed by quick recovery, unless the constitution be in fault, and then ulceration, or a fistulous communication between the vagina and rectum, may result.

11. *E. Consequences of Vaginitis.*—*a. Contraction and obliteration* of the vaginal canal is seldom observed, the latter especially. Either of these lesions may, however, occur after inflammations caused by injuries, wounds, lacerations, ulcerations produced by pessaries, foreign bodies, and irritating injections; but contractions in various grades and extent are much more frequent than obliteration, which is a very rare occurrence. Injuries or lacerations during delivery are the most frequent causes of these lesions. The injection of irritants and stimulants to provoke abortion has in a very few instances been recorded as a cause of both contraction and obliteration of the vaginal canal. These changes may occur in any part of the canal, but most frequently in the part next to the vulva, unless when they are caused by malignant disease, and then they generally commence in the cervix uteri, and extend to the portion of the vagina adjoining, and progressively to more or less of this canal. In the article UTERUS (§ 205) I have mentioned a case where nearly the whole of the vagina was obliterated by cicatrization consequent upon a rare instance of the spontaneous cure of malignant disease of the cervix uteri and vagina. Similar occurrences have been noticed by ROKITSKY.

12. *b. Chronic inflammation*, limited or more or less extended, sometimes either follows the acute and subacute states of vaginitis, or occurs primarily, but much more frequently as a consequence of the irritation caused by morbid secretions from the cervix uteri, or from the internal surface of the cervix or body of the uterus, and it is often complicated with inflammation of the cervix. This form of the disease may occur either in the puerperal or in the non-puerperal states, and it may, moreover, be complicated with, and then be masked by, the uterine disease, or by inflammation of the vulva, or by the leucorrhœal discharge, with which it is attended, both in its simple and complicated forms. Chronic inflammatory irritation, thus originating and related, may be followed by organic changes of an important nature, especially when it more particularly affects the mucous follicles, or extends to the connecting cellular tissue. In such cases *ulcerations*, and even *perforations*, of the vagina are not very rare occurrences. The ulceration may be *common*, *scrofulous*, *syphilitic*, or *cancerous*. The first of these usually occurs in consequence of inflammation, chiefly of the phlegmonous character noticed above (§ 10, *et seq.*), and commences either in the mucous follicles or in the connecting cellular tissue. In these follicles scrofulous ulcerations may also commence, or be chiefly seated. These latter have been well described by Dr CARSWELL; and Dr. HOOPER states that these ulcerations assume the character of scrofula in other parts. "The sides of the ulcerations are tumid; solid puriform depositions are found about them in the cellular structure between the membranes; and there are perhaps fistulous communications with the urinary bladder, rectum, or psoas muscle." Common and scrofulous ulceration may be developed either primarily or consecutively in the lacunæ and glandular bodies with which the lower part of the vagina is so abundantly supplied. When these glands are primarily affected, there is generally an abundant milk or cream-like discharge from the vagina, constituting a form of leucorrhœa, and depending upon chronic irritation or inflammation of them. This state of morbid action when prolonged, especially in cachectic or scrofulous constitutions, may go on to ulceration, or even to fistulous perforations. Disease of these glands, and chronic inflammation of the vaginal surface, may also be developed or perpetuated by the morbid secretions from an inflamed or otherwise diseased cervix uteri, or internal surface of the uterus, or of its cervix. The most extensive ulcerations and perforations with fistulous communications with adjoining parts are produced by pessaries or other foreign bodies lodged in the vagina. SYPHILITIC and CANCEROUS ulceration of the vagina are noticed in the articles on Cancer of the UTERUS and on VENEREAL DISEASES.

13. *Complications of Vaginitis.*—Acute or chronic vaginitis may be associated with inflammation of the cervix uteri, or with vulvitis, or nrethritis, or even with two or all of these. It is chiefly in girls under twenty that the complication with vulvitis is observed. In some instances of this complication an abscess forms in the labia majora, especially when inflammation of the vagina and vulva is severe; and when the inflammation extends to the subjacent cellular tissue of cachectic habits, phagedæna of the parts may supervene. Gonorrhœal vaginitis is generally associated with urethritis and vulvitis, and often also

with sympathetic bubo, this latter being the consequence of inflammation of the lymphatic vessels and glands. Vaginitis is, in some cases, complicated with endo-metritis, and more rarely also with inflammation of the uterine appendages, especially when it is of a specific kind, as noticed above (§ 8, 9). In this complication the inflammation may originate either in the uterus or in the vagina, and extend to the other parts. Vaginitis may also occur during pregnancy, and disappear after parturition.

14. ii. TREATMENT.—The treatment of the non-specific or common states of inflammation of the vagina is generally simple, and is locally and constitutionally antiphlogistic. In severe attacks, leeches should be applied to the upper parts of the insides of the thighs, or to the groins or perineum, and the bleeding be promoted by warm fomentations, &c. Tepid or warm baths, general or local; cold, tepid, or warm injections into the vagina; cooling aperients, and cooling diaphoretics, and an antiphlogistic regimen, are the chief means of treatment, especially in the more acute cases, and in the early stage. Aperients which irritate or excite the large bowels should be avoided; and those injections, alvine and vaginal, which produce a cooling and an emollient effect, not only on the large bowels, but also on the vagina, should be selected. The injection of cold or tepid water into the vagina washes away the morbid secretion, which by remaining even for a short time, and accumulating in this part, increases or perpetuates the inflammatory irritation. Several medicated injections, either emollient, astringent, or anodyne, may also be prescribed. When the irritation, tenderness, or pain, is considerable, milk-and-water, linseed tea, decoction of marsh-mallows, either tepid or cold, may be administered, with a little sirup of poppies, and with either a small quantity of the nitrate of potash or of the biborate of soda. If the inflammation be severe, the emollient injections may contain either these in somewhat larger quantity, or a small quantity of the hydro-chlorate of ammonia. Or instead of those the decoction of poppy-heads may be employed, with the saline substances just mentioned, or simple water with the acetate of lead and a few drops of laudanum.

15. When the more acute and severe symptoms have subsided, then the more energetic astringents may be prescribed, such as the sulphate of alumina, the sulphate of zinc, acetate of lead, solution of the nitrate of silver, decoction of oak-bark, and solution of tannin. Dr. H. BENNET states that the first three he generally uses in the proportion of a drachm to a pint of water, increasing or diminishing the strength according to circumstances; and after much experience he concludes that alum is the most efficacious of all these agents, with the exception of nitrate of silver. In order that injections may be efficacious, they should be administered abundantly, frequently, and with such appliances as may allow them to remain for some time in the vagina.

16. For *gonorrhœal vaginitis*, the antiphlogistic treatment advised for the early stage of common or simple vaginitis should be energetically prescribed, and cooling diaphoretics and aperients, with demulcents, emollients, and diluents, freely used. The irritation of the urinary bladder and urethra, and the associated vulvitis, will be most surely allayed by these means, aided by fomentations, warm local and general baths, and by the

emollient and anodyne injections advised above (§ 14). The patient should partake freely of mucilaginous diluents containing the nitrate of potash or of soda, and the carbonates of the fixed alkalies, with very small doses of camphor. After the acute symptoms have been subdued, the more astringent injections mentioned above may be resorted to. If gonorrhœal rheumatism should occur, which is seldom observed in females, the treatment for that species of rheumatism, advised in the article RHEUMATISM (§ 163), should be directed. Gonorrhœal vaginitis extending to the cervix uteri, or occasioning endo-metritis, requires the means advised for this complication in the article UTERUS (§ 124).

17. *Asthene vaginitis*, in the form which I noticed above, as having fallen under my observation, requires a frequent recourse to vaginal injections. Those which I prescribed consisted of alum, or of sulphate of zinc, with a little camphor and laudanum; the decoction of cinchona, with the compound tincture of cinchona, nitrate of potash, and bicarbonate of potash, being taken internally; and full doses of DOVER'S powder at night; lime-water, or potash-water, with milk, being the beverage generally allowed.

18. As regards *other lesions* implicating the vagina, especially *ulcers, fistula, lacerations*, or extensive *ruptures, wounds, hernia, polypi, tumours* of various kinds, *foreign bodies* lodged in the vagina, *prolapsus* of the vagina, and *cancer* of the vagina (see art. UTERUS, § 190 *et seq.*). I must refer the reader to surgical works, or to the article VAGINA, by MM. DESORMEAUX and P. DUBOIS, in the second edition of the *Dictionnaire de Médecine*, where these lesions are very ably described.

19. II. THE VULVA is liable to diseases which are either local or constitutional. The latter requires internal or constitutional treatment chiefly, and sometimes local means also; the former seldom receives permanent benefit from local appliances, without having recourse at the same time to general or internal medication. The affections of this part, as well as of several others, show that no distinction should be made respecting those which are commonly called medical and those which are usually termed surgical; although I am obliged, by the scope and limits of this work, to observe this distinction to a considerable extent. Diseases of the vulva are of frequent occurrence at all ages, and in all classes of society. They often assume serious characters, owing to concealment, neglect, or delicacy of feeling, more especially in childhood, or in early or mature age. They most frequently proceed from want of due cleanliness, from infection, from eruptive and other fevers, from diseases of the uterus and appendages, and from masturbation. The puerperal states have also some influence in causing them. They may occur primarily or consecutively; and in either case they may be simple, or complicated with whatever disorder they may induce, or be induced by.

20. i. INFLAMMATIONS OF THE VULVA.—*Vulvitis*. CLASSIF.—III. CLASS, V. ORDER. (*Author.*)

21. DEFINIT.—*Pain, soreness, and tenderness of the vulva, frequently with swelling, painful micturition, and more or less symptomatic fever.*

22. *Vulvitis* may assume every grade of severity, from the slightest pruritus and inflammatory irritation, to erythema, to phlegmonous, diffusive erysipelatous, and to ulcerative or gangrenous in-



inflammations, simple, or complicated. I shall briefly notice these, as well as other forms of disease of the vulva which fall under the category of inflammatory, either sthenic or asthenic, and offer some remarks on these varieties of vulvitis which have fallen under my observation at the Infirmary for Children and in private practice, and commence with the slightest or least inflammatory in appearance, and proceed to the more violent and dangerous.

23. *A. CATARRHAL VULVITIS.*—This form of the disease is usually slight, unless it be neglected or aggravated by neglect of cleanliness. It is not unfrequent in children; and in grown-up females it occurs as a form of leucorrhœa, or as a symptom of disease of the neck or body of the uterus. In infants and children especially, it assumes a catarrhal appearance, the discharge being at first chiefly mucous, and afterward muco-purulent; the surface of the vulva being slightly red and swollen; but neither very irritable nor excoriated, unless neglected. It is most frequently caused by cold, by sitting on cold or damp seats, by general debility, and the irritation of ascarides in the rectum, or by disorder of the digestive organs. It is sometimes a sequela of low and eruptive fevers in childhood, especially of scarlet fever; and if it be overlooked, or continue long, it may give rise, especially if aggravated by filth and an improper regimen, to one or other of the more serious forms of vulvitis about to be described.

24. *B. IRRITABLE VULVITIS.*—As observed in some states of the disease of the uterus, so in some affections of the vulva, the inflammatory appearances are either slight or not very remarkable; yet the pain and tenderness are very great, or even acute. Sensibility is so morbid as not to admit of the slightest touch; and in married females sexual intercourse cannot be endured. On examination, the parts are slightly red, or rose-colored, and covered in parts by a whitish exudation, especially about the entrance of the vagina; in some cases there is also slight swelling or fullness of the labia. The patient complains of a sense of heat, or lancinating pains of the parts, of smarting, painful micturition, and of inability of walking. This complaint is sometimes caused by the state of the menstrual discharge, and is most frequently met with in young persons about the age of puberty, or shortly before or after the first appearance of the catamenia, in females after marriage and during their first pregnancy, and in widows, but less frequently in these last. It is sometimes associated with one or other of the forms of hysteria, or with spinal irritation.

25. *C. PRURIGINOUS VULVITIS.*—*Pruritus* of the vulva is often a very distressing disorder. The itching or pruritus of the parts is sometimes such as cannot be endured without resorting to friction in some way or other to allay it. There is generally a sense of heat, but seldom much pain, tenderness, or soreness of the parts, unless what may be caused by the frictions resorted to. Nor is there much redness or swelling, unless such as may be referred to the same cause. But there is obviously more or less vascular erythsm of the parts, or of others in their vicinity, sometimes with increased secretion from the surface or interior of the labia and orifice of the vagina, or even a more copious discharge, owing to the frictions resorted to. This disorder is not unfrequent previously to or after puberty, and often is attended by inordinate sexual desire, amounting in some instances to

nymphomania, and frequently suggesting masturbation, which, although it may assuage the irritation for a time, generally tends to perpetuate or aggravate the disorder. *Pruritus vulvæ* is also a frequent consequence of pregnancy, especially of the first pregnancy, in young plethoric habits and sanguineous temperaments, of the discharges after parturition, and of morbid states of the catamenia. In both girls and married females it is often caused by the state of the secretions from the follicles of the vulva and vagina, especially when they are allowed to accumulate and irritate, owing to their alteration by the oxygen of the atmosphere, the sensitive mucous and erectile tissues of these parts. It is also at all ages sometimes symptomatic of worms, especially of ascarides in the rectum.

26. *D. ECZEMATOUS VULVITIS.*—An eruption of an eczematous character (see *art* ECZEMA, § 9) is sometimes met with on the internal or external surface of the labia vulvæ, and is either dry or humid, and occasionally extends to the adjoining parts of the thighs. It generally presents a copper-coloured redness, is liable to recur at intervals, and often continues for an indefinitely prolonged time. It is attended by a sense of heat or burning, with a stinging itching. It seldom occurs in young females, but is very common after 35 or 40 years of age, and especially after the cessation of the catamenia; and in those it may continue for years, particularly in females of a full habit of body, or who are corpulent. It is not necessarily connected with any venereal infection or with leucorrhœa, although this latter may be associated with it.

27. *E. ERYTHEMATOUS VULVITIS.*—The internal surfaces of the labia are not unfrequently slightly swollen, diffusely red, painful and smarting, and intolerant of touch. It presents no appearance of phlyctena, is smooth or shining, the surface being hot, with a sense of more or less of painful heat. It soon becomes covered by an exudation of a whitish or ichorous lymph; and in some cases which I have seen at the Infirmary for Children, the labia have become adherent, and so firmly adherent as to require surgical aid in separating them. This form of vulvitis is not uncommon in children of all ages, especially in those of a very full habit of body, and in these, as well as in corpulent females advanced in life, is owing to the acrimony of the secretions from the parts in their vicinity, to the state of the menstrual discharge, or of the lochia, and to the neglect of cleanliness. In many cases the discharges from the vagina, and cervix and os uteri, occasion or perpetuate the inflammation of the vulva. Although a comparatively slight disease, the neglect of it may be followed by more serious results; such as phlegmonous or suppurative inflammation, by inflammation of the lymphatics, or even, in rare instances, in young children, by adhesions of the labia.

28. *F. ERYSIPELATOUS VULVITIS.*—This form of vulvitis generally resembles the erythematous at its commencement; but owing to the state of the secretions producing it, or the habit of body of the patient, or to both, it is soon characterized by great swelling, and a disposition to terminate in suppuration, or sphacelation of the more superficial parts. It is attended by a quick pulse, and by more or less severe constitutional disturbance. This often becomes a serious disease, and goes on to diffuse phlegmon, or phlegmonous erysipelas. In the most unfavourable cases, particularly in

cachectic habits, it is liable to occasion gangrene of the integuments, extending even to the adjoining parts. It results most frequently from the same causes as the foregoing varieties of vulvitis acting on cachectic habits of body, and during morbid conditions of the circulating fluids.

29. *G. PELLICULAR VULVITIS*.—Since M. BRETONNEAU described inflammation of mucous surfaces with the exudation of lymph—forming a false membrane over the inflamed surface—a form of disease which he termed *diphtheritis*—inflammation of the vulva with the formation of a false membrane—*Vulvitis diphtherique*, of French pathologists, has been occasionally observed in circumstances similar to those which occasion this form of inflammation in the cavities of the mouth, pharynx, &c., or when this disease of the mucous surfaces is endemic or epidemic. This form of vulvitis differs from all others in the rapid formation of a false membrane on the inflamed, but very slightly swollen, surface. As it is observed in the mouth and pharynx, so it is found to extend to the adjoining canals, advancing up the vagina to the neck of the uterus, or into the urethra. This state of the disease is obviously the result of constitutional disorder, in which the circulating fluids are in some degree, although not always demonstratively, affected. It is most frequently observed in girls or young females, at certain seasons or localities of a cold and humid description; and the febrile disturbance attending it presents an asthenic, rather than a sthenic character.

30. *H. PILEGMONOUS VULVITIS*.—Inflammation of a phlegmonous form may commence either in the cellular tissue beneath or connecting the mucous and cutaneous structures, or in the more deep-seated mucous follicles of the vulva, or at the commencement of the vagina. It has been assigned to one or other of these seats exclusively by various pathologists; and it may very possibly originate in either, although most probably in the mucous follicles, in consequence of obstruction in their ducts. This affection generally appears with heat and tension of the parts, followed by a dull and sometimes a severe pain, and affects chiefly, or more frequently, the lower halves of the substance of the labia majora. Pain, and a sense of weight, tension, and fulness, extend to the perinæum, and more or less febrile disturbance is developed, which may, in the course of two or three days, assume a severe inflammatory character. The bowels are confined, and the urine scanty, high-coloured, and passed with pain. The whole vulva becomes hot, and one or other of the labia is thickened and swollen, the inflammation and tumefaction extending near to the perinæum. In the course of five, six, or seven days, an abscess commences in the centre of the inflamed tissues; and although it cannot be perceived externally, it may be felt by firmly grasping between the fingers of one hand the swollen labium. A tumour the size of an egg, or smaller, will then be found in the midst of the tumid structure; and if the abscess be at all advanced, fluctuation will be perceived by a finger of the other hand.

31. *Abscess of the vulva* occurs only on one side at the same time, and very rarely attacks both in succession. It is observed chiefly in young females, and especially in the recently married, and very rarely at a greater age than 40 years. M. VELPEAU met with a case in a female aged 44. I was consulted in a case of a lady who admitted

her age to be 45. This distinguished physician states that it is commonly a result of excessive coition, of disproportion between the sexual organs, or of the introduction of a foreign body into the vagina; that it may also arise from neglect of cleanliness, from irritation of any kind, whether externally and mechanically, or internally and pathologically; and that in 18 cases out of 20 it occurs in girls who have prematurely had sexual intercourse, in prostitutes, and in young females who have indulged in excessive venereal pleasures or in masturbation. It is sometimes a consequence of leucorrhœa and of gonorrhœa, and of any violence or irritation to which the vulva has been subjected.

32. The *course* of abscess of the vulva is generally rapid, but owing to the structure of the parts, and to the circumstance of females being aware of the cause of the complaint, medical advice is deferred as long as possible; and the history of the early symptoms and changes is not obtained until the abscess has either burst or is ripe for opening. When left to itself, it generally bursts from the seventh to the twelfth or thirteenth day; when it has acquired a size varying from that of a nut to that of a hen's egg. It rarely exceeds this latter size. Phlegmonous vulvitis very rarely *terminates* in resolution, and seldom in sphacelation or gangrene, and then only in cachectic habits of body. When abscess of the vulva opens spontaneously, it is generally by a perforation in the direction of the vaginal surface of the labium. In some instances more than one perforation is observed when the abscess has been large. A fistulous communication may even form, and, in rare cases, extend to the rectum, or by the side of the vagina to or around the urethra. In most cases, however, the abscess is discharged and healed in the course of a week or two. But if sexual intercourse take place during this period, the abscess may be reproduced, owing to the injury or irritation of the cicatrix, and of the tender parietes of the former abscess, and to the greater susceptibility of the parts. Hence abscess of the vulva may be reproduced several times in the same female. M. VELPEAU has seen it thus recur six, eight, or ten times in the course of a few years.

33. *I. ULCERATIVE OR ASTHENIC VULVITIS*.—*Noma, Phagedænic ulceration of the labia vulvæ, Gangrene of the vulva, Gangrenous inflammation of the vulva.* VELPEAU.—This form of vulvitis is observed chiefly in children from about the period of weaning to the ninth or tenth year of age. It was first described by Mr. KINDER WOOD, and occurs chiefly in ill or insufficiently fed children, in those who live in low, unhealthy, or crowded localities or apartments; or who are the subjects of low, adynamic, or gastric forms of fever; and in delicate, cachectic, and anæmic habits of body, especially in large manufacturing or other cities and towns. The disease may be preceded, as well as attended, by loss of appetite, nausea, thirst, and other febrile symptoms of an adynamic character. The pulse is quick, small, or weak; the countenance and general surface pale or sallow, and the tongue is pale and covered by a dirty-looking or clayey coating or fur. The patient first complains, locally, of painful or scalding micturition, or cries or struggles violently when voiding the urine. The labia vulvæ are inflamed and enlarged, and their surfaces are of a purple or livid-red tint, the inflammation extending over the clitoris, nymphæ,



and hymen, and even into the urethra. A thin exudation may at this early period be observed covering these parts, which may proceed from the irritation having extended to the lower part of the vagina. Twenty-four hours hardly elapse until a number of small vesications appear within the labia, as well as externally, and soon afterward burst, quickly spread into each other, and form large ulcers. In other cases the inflamed surface passes into the ulcerated state without any manifest vesication. The thin exudation mixes with the secretion from the ulcerations; the resulting discharge is dark-coloured, sanious or ichorous, copious, very offensive, and irritating to the tissues, and rapidly extends the disease to the perinæum and anus, and to the thighs contiguous to the labia.

34. The constitutional symptoms are now most seriously adynamic. The pulse is rapid, irritable, and compressible; the face and general surface are white or blanched; the bowels torpid, and the stools offensive. The patient lies constantly on her back, with the knees bent and wide apart; and the distressing pain caused by micturition prevents her from using any effort to void the urine. The ulcerations vary in appearance and depth. In some cases they are foul and deep, in others they are superficial, and their bottoms present small red granulations; their states varying with the severity, constitutional tendency, and the treatment of individual cases.

35. The terminations of the disease also depend much upon the circumstances just now stated. When the ulceration is fully established, the swelling of the labia vulvæ diminishes, and the redness disappears with the extension of the ulceration, which is deep, foul, and spreading, in states of the system manifestly adynamic and cachectic, and of the circulation not only anæmic, but also contaminated. The secretion from the ulcerated surface extinguishes the vitality in succession of the tissues with which it is in contact, until the external organs are progressively destroyed. As the process of destruction advances, the face becomes more blanched, the pulse remarkably rapid and small, the appetite lost, the bowels loose, the stools offensive; emaciation and anæmia being remarkable, and the discharge from the ulcerated surface most offensive; and the patient expires in the course of a few days, the duration of the disease varying much with the circumstances and treatment of individual cases.

36. If, however, this affection be seen early, and be judiciously treated, the ulcerations become clean and heal. Yet, after they heal, a yellowish discharge often continues for a considerable time from the vagina and affected parts; and causes, where due precautions are neglected, a recurrence of the malady. In most cases, owing chiefly to the extent of the constitutional disturbance—to the low grade of vitality, and to the contamination and insufficiency of the blood—the recovery of the patient is generally protracted, and is rarely of less duration than eight or nine weeks. When the ulceration is large and deep, the patient very rarely recovers, although the most decided means to arrest its progress be employed.

37. The nature and morbid relations of this most dangerous form of vulvitis are manifest from the above. It has been viewed by M. VELPEAU as a gangrenous inflammation of the vulva; but the destruction of tissues quickly following

the vesications on the inflamed, swollen, and livid parts is not altogether similar to true gangrene, but rather to that of phagedænic or rapidly destructive ulceration. It resembles in most respects *cancrum oris*, or that form of stomatitis which I have described by the name of *stomatitis phagedæmica* (see art. STOMATITIS, § 24, *et seq.*). The causes of both maladies are the same—they are both consequent, in rare instances, on low fevers, continued, remittent, and exanthematous, more especially on scarlet fever—and they are both arrested when admitting of this termination by the same or similar means.

38. K. GONORRHOICAL VULVITIS.—*Specific Vulvitis*.—This form of the disease, if not always, is generally attended by more or less irritation of the urethra. The following is nearly the description of the disease by M. RICORD, as quoted in Mr. ACTON'S able work. This complaint may affect the epithelium of the mucous surface only, or the vulvar glands also, these glands, according to M. MOULINIER, being regarded as the organ secreting the venereal virus. At first the patient complains of an unusual sensation in the vulva, with a desire for sexual intercourse. This is soon followed by itching, heat, redness, and swelling. The normal moisture of the parts is much augmented; but it soon becomes increased and irritating, and aggravates the inflammation. The discharge rapidly assumes a muco-purulent state, owing to the affection of the mucous follicles. As the inflammation extends more deeply, the swelling increases; and it may then become phlegmonous (§ 30, *et seq.*), or be attended by œdema. If the nymphæ become inflamed, they may be so enlarged as to protrude beyond the labia. Abscess may follow the swelling, or the inflammation may extend to the vulvar glands, and occasion small abscesses. Owing to the extension of the morbid action to the urethra, and to the state of parts now described, the urine is voided frequently, and produces much scalding and smarting. Patients who have been subject to leucorrhœa readily distinguish the difference between the discharge and other symptoms now experienced, and those to which they have been subject. With very exaggerated sensibility of the vulva, the scalding on passing urine becomes very severe, and in some cases retention of urine occurs. The inflammation may even extend along the urethra to the neck of the bladder, producing very painful and constant desire of micturition. The existence of urethritis in these cases may be ascertained, if the patient has not recently passed water, by introducing the finger into the vagina, and then pressing the urethra from behind forward; if muco-pus be in the urethra, it will be at once evident. *Syphilitic ulceration* of the vulva is noticed under the head of VENEREAL DISEASES.

39. L. CONSEQUENCES OF VULVITIS.—These are, as partially noticed above, œdema, abscess, ulceration, and molecular gangrene, sphacelation, extension of the inflammation to the vagina and cervix uteri, or to the urethra and neck of the bladder, or to the lymphatics and lymphatic glands. Œdema vulvæ, although sometimes caused by inflammation, is more frequently a consequence of organic disease of the heart, or of the kidneys, or of other internal organs; and it is thus generally associated with anasarca. It may also occur during the advanced stage of pregnancy, or even after parturition; in the former circumstances

often rendering delivery more serious or complicated, and in the latter increasing the amount of suffering, and delaying recovery. Inflammation of the lymphatics and their glands rarely occurs in the course of vulvitis, but chiefly of the phlegmonous, ulcerative, and specific forms. It is seldom detected until pain and swelling are experienced in the inguinal glands, and then irregular streaks of redness may be perceived in the external parts, with irregular hardness or swelling of the labia, extending superficially to the groins.

40. ii. TREATMENT.—*A. The treatment of catarrhal vulvitis* (§ 23) consists chiefly of frequent ablutions with weak solutions of alum or sulphate of zinc, or with camphor-water, or seawater, &c. If the parts present much inflammatory irritation, the local means advised for the *irritable* and *erythematous* states of the complaint may be directed, and the treatment be in other respects the same. In most cases, and especially when connected with debility, or occurring as a sequela of fevers, &c., then warm salt-water bathing, followed by tepid or cold salt-water bathing, or warm salt-water hip-baths; tonics internally, chalybeates, due attention to the digestive, assimilating, and excreting functions, and change of air, &c., will be found of very great service.

41. *B. Irritable vulvitis* (§ 24), *Pruriginous vulvitis* (§ 25), and *Erythematous vulvitis* (§ 27), are so closely allied states of inflammation, and so generally affect only or chiefly the epithelial mucous surface, as to require the same or very similar means of cure. At first emollient or demulcent lotions, containing a sedative or narcotic tincture, or solution, in small quantities; or weak solutions of the acetates of lead, or of the nitrate of potash, or hydrochlorate of ammonia, in the decoction of poppies; or a saturated solution of the bichlorate of potash, in camphor-water, or in the decoction of marsh-mallows; or cooling pomades, as cold cream, &c., may be prescribed. In the more obstinate or severe cases, pomades containing the oxyde of zinc, or the chloride of mercury, &c.; or lotions with a small quantity of the nitrate of silver, or bichloride of mercury, or of the sulphate of zinc. Or demulcent applications, containing camphor, with one or other of the substances just mentioned, may be resorted to. As these several forms of vulvitis are often symptomatic of disease of some adjoining organ, more especially of inflammatory irritation of the neck of the uterus, of leucorrhœa, of the irritation of worms in the rectum, of gravel or calculi in the bladder, &c., these morbid relations of the forms of vulvitis now being considered should not be overlooked; and the treatment ought to be directed more especially to the cure of the complaint of which they are severally a symptom merely, but a symptom which also requires removal.

42. *C. Eczematous vulvitis*, or eczema of the vulva, may be treated by similar means to those now recommended, or by the local and constitutional remedies mentioned in the article ECZEMA (see § 16, *et seq.*).

43. *D. Erysipelatous vulvitis* is often a serious disease (§ 20), and arises from the same, or nearly the same, causes as those producing the erythematous variety. In most of the cases of the former, however, the constitution is more in fault, especially the circulating fluids, than in the latter. The treatment, therefore, of this form should be more energetic, and be directed chiefly with the objects of depurating the blood, and support-

ing vital power and resistance. The former intention will be fulfilled by the exhibition of a smart emetic at an early stage, followed by a mercurial purge, and by saline aperients and depurants. After the prima via has been sufficiently evacuated, tonics should be conjoined with the alkaline carbonates, and such local means resorted to as the state of the parts may suggest. If diffusive phlegmon, or abscess, or gangrene supervene, the constitutional treatment should be energetic, and the local measures the same as advised for the phlegmonous and phagedænic forms of the disease (§ 45, 46), especially scarifications and incisions, which, when practised before suppuration or sphacelation commences, often prevent those serious consequences of the malady.

44. *E. Pellicular vulvitis* is generally most successfully treated by applying to the affected surfaces powdered alum, or calomel, or borax, with mucilage or honey, or strong solutions of the nitrate of silver, or of the chlorides, &c. Having arrested this form of the disease by these means, emollient or detersive lotions, hip-baths, and the remedies advised for the milder varieties of vulvitis may then be prescribed (§ 40, 41). The constitutional treatment should depend upon the peculiarities and circumstances of the case. But generally this form of the disease is not benefited, but it may be injured, by vascular depletions; while saline aperients, and alkaline, saline, and other depurants of the blood, conjoined with tonics, are beneficial. The treatment of this variety of the disease is in most respects the same as I have advised for *pseudo-membranous STOMATITIS* (see § 14, 15).

45. *F. Phlegmonous vulvitis* (§ 30, *et seq.*) may, when left to itself, especially in cachectic habits of body, occasion serious destruction of parts, sinuses and fistulous openings and communications with adjoining organs, or prolonged ulcerations. To prevent these consequences: 1st. The patient should be kept in bed, or on a couch, in a cool temperature, with the thighs wide apart; 2d. A considerable number of leeches should be applied between the labium and thigh, or upon the perinæum; 3d. To cover the phlegmon, twice or thrice daily, with mercurial ointment previously to applying linseed poultices; 4th. To direct a warm bath every second day, or a hip-bath every evening or night (VELPEAU). The abscess may spontaneously open, when thus treated, from the fifth to the eighteenth day; but it is generally more beneficial to open the abscess as soon as matter is formed, than to wait for a spontaneous discharge, which may take place in an undesirable situation, or after the abscess has occasioned more or less serious alterations, such results being not uncommon in unhealthy constitutions. The question as to the situation in which artificial opening of abscess of the vulva should be made has been decided by M. VELPEAU in favour of the external surface of the affected labium, and in the lower or posterior part of the swelling or abscess, for reasons he has assigned in the article referred to in the BIBLIOGRAPHY.

46. *G. Phagedænic ulceration of the vulva* (§ 33, *et seq.*) is the result of a molecular loss of vitality of the tissues poisoned by the contact of the irritating and contaminating fluid into which the dead molecules are resolved. It is identical in its nature with *phagedænic stomatitis*, as already stated; and the local as well as the constitutional treatment is in every respect the same as I have



advised for that dangerous malady. (See *art. STOMATITIS*, § 31–33.)

47. *II. Gonorrhœal vulvitis* (§ 38) is treated as follows by M. RICORD and Mr. ACTON. In the commencement a soothing plan should be employed, and separation of the surfaces attempted, followed by lotions of nitrate of silver, in the proportion of ʒj. to ʒij. of distilled water, and by warm baths. If the inflammation has gained the deeper tissues, the soothing plan should be adopted, or leeches should be applied to the groins. If a phlegmonous condition of parts occurs, depletions should be chiefly relied on; and the moment that an abscess is formed an opening should be made into it, in order to prevent the pus from burrowing through the cellular tissue. When urethritis is much complained of, cubebs and the balsams, with demulcents, are then required. Afterward, balsams and lotions of the solution of the nitrate of silver should be prescribed.

48. *I. The consequences of the several forms of vulvitis* must be treated with reference not only to their actual states, but also to the circumstances, features, and complications of individual cases. General therapeutical principles will guide the physician in respect of these as well as of other morbid conditions, recollecting, however, as respects the most of them, that strict attention to ablations by suitable means; to the digestive, assimilative, depurating, and excreting functions; and to the promotion of constitutional power, and of vital resistance to the extension of disease, are the surest principles of successful practice.

49. *III. STRUCTURAL AND OTHER LESIONS OF THE VULVA.*—These consist chiefly of *hypertrophy of the nymphæ*, of *tumours of the clitoris*, *thrombus* or effusion of blood in the labia after injuries or parturition, *fistula*, *cancer*, *herma*, *elephantiasis* of the vulva or of the nymphæ, *tumours* or *cysts*—erectile, sebaceous, follicular, or others—the growth of *hair within the vulva*, &c. These concern the surgeon rather than the physician, and require no remarks from me. The only exception may be made in regard of *hypertrophy of the nymphæ*, which may take place to so great an extent as to require their extirpation. In unmarried females, advanced in age, this change has undoubtedly proceeded from masturbation. But in very young females, to whom this vice could not be imputed, and also in children, the nymphæ are sometimes so greatly developed as to protrude far below the labia majora. Of this state of parts I have seen several instances. In one case which came before me, the very enlarged and prolonged nymphæ were extirpated. The hæmorrhage was very considerable, but recovery was complete. The clitoris may be enlarged as well as the nymphæ; and in such cases the enlargement is probably owing to masturbation. These parts have been observed by LARREY, GILBERT, CLOT-BEY, TALRICH, and others, to have been the seats of elephantiasis; the tumours which resulted having been as large as a child's head. M. VELPEAU has referred to several cases of this nature, which, however, are not rare in Egypt and other parts of Africa.

*BIBLIOG. AND REFER.—I. DISEASES OF VAGINA.*—*Ce'st.* i. vi., c. 18, 19.—*Morgan.* De sed. et Caus. Morb., ep. lxi., art. 16.—*Astruc.* Traité des Mal. des Femmes, t. iv., p. 5.—*Petit.* Traité des Mal. Chirurg., t. iii., p. 108.—*Purcell.* in Philosoph. Transact., 1774, p. 474.—*Pohl.* in Memoirs of Medical Soc. of London, vol. vi., art. 15.—*Horn.* Archiv für Practische Medicin, b. i., n. 31.—*Portal.* Cours d'Anatomie Médicale, t. v., p. 227, 488.—*Fritze.* in Horu, N. Archiv für Med. Erfahrung, b. iii., p. 35.—*Lo-*

*der.* Journ. für die Chirurgie, b. iv., p. 254. (*Gangrene of.*)—*Watson.* in Med. Commu., &c., vol. i., p. 12. (*Prolapsus from Drop y.*)—*W. Gibson.* Extraordinary Case of Lacerated Vagina, &c. Lond., 1757.—*Sandfort.* Obs. Anat. Pathol., vol. ii., p. 57.—*Alfater.* Chirurg. Biblioth., vi., p. 742.—*B. J. C. de Garunged.* M-moires sur plusieurs Hernies singulières, in Mém. de l'Acad. Roy. de Chirurg., t. i., p. 699.—*J. C. Stark.* De Herniâ Vaginali, &c., in Neuen Archiv für Geburtshilfe, t. i., p. 48.—*J. C. Loder.* De Vagine Uterique Prociditâ, 4to. Jena, 1781.—*Journ.* Complément des sciences Médicales, t. xxxvii., p. 434. (*Recto-vaginal Tumours.*)—*G. O. Fleming.* The Follicular Origin of some Vaginal Tumours, in Edinb. Med. and Surg. Journal, vol. xxxv., p. 82.—*Lallemand.* in Archives Générales de Médecine, t. vii., p. 481; in second series, t. vii., p. 474; in third series, t. ix., p. 343. (*On the Treatment of Vesi o-vaginal Fistula.*)—*Nægele.* in Répert. de l'Anat. et de l'Physiolog. Patholog., t. v., p. 147. (*Treatment of Vesico-vaginal Fistula.*)—*Kometta.* sur la Cystocèle Vaginale, &c., in Revue Médicale, t. ii., 1832, p. 394; t. iii., p. 29, 163.—*Amussat.* in Gazette Méd. de Paris, 1835, p. 785 et 817. (*On Malformations of the Vagina, and Operations for.*)—*A. J. Robert.* in Ib., 1836, p. 145; et in Mém. de l'Acad. m. Roy. de Méd., t. viii., p. 647.—*G. Jenseime.* in l'Expérience, 1898, t. i., p. 257, 464.—*S. Ashwell.* a Practical Treat. on the Diseases peculiar to Women, Svo. London, 1844, p. 617.—*Leroy d'Etiolles.* Recueil de Lettres et Mém., Svo. Paris, 1841, p. 161.—*Malvaigne.* in Journ. de Chirurgie, 1843, t. i.—*A. Deville.* l'e la Vaginite Granuleuse, in Archives Génér. de Médecine, 4th ser., t. v., p. 335, 417.—*Velpau.* Médecine Opératoire, t. iv., *pueris.*—*Desormeaux.* et *P. Dubois.* in Dict. de Méd., 2d. ed., art. Vagina.—*C. Rokittansky.* a Manual of Pathological Anatomy, transl. for Sydenham Society, vol. ii., p. 266.—*Justus.* in Journ. des Progrès des Sc. Méd., 2d ser., t. ii., p. 267.—*J. H. Dennot.* l'raet. Researches on Inflammation of the Uterus and its Appendages, Svo. Lond., 1849, p. 265.—*C. West.* Lectures on the Diseases of Women, &c., Svo. Lond., 1856, p. 150.—*R. Boyd.* in Transact. of Medical and Chirurg. Society, vol. xxiv., p. 187.—*J. C. W. Lever* and *J. Hilton* in Ib., vol. xxxi., p. 315.—*Lisfranc.* in British and For. Med. Review, vol. xviii., p. 17. (*On Pol. pi. of.*)—*W. Acton.* (p. infra cit., p. 274.—*Querin.* Ornerod, and *G. V.* in Transact. of Patholog. Society, vol. vii., p. 271–283.)

*II. DISEASES OF THE VULVA.*—*Oribasius.* Synopsis, l. ix., c. 51, 53.—*Bisemann.* Tab. Anat. Uteri Duplicis, Argent., 1752. (*Vulva Duplex.*)—*Lettsom.* in Mém. of Med. Soc. of Lond., vol. iii.—*Macbride.* in Med. Observ. and Inquiries, vol. v.—*Vallinieri.* Opera, vol. iii., p. 337.—*T. Vogl.* Medic. Chirurg. Beobachtungen, p. 15. (*Carcinoma Vulvæ.*)—*Wendelstätt.* in Loder, Journ., &c., b. iv., p. 344.—*S. Ashwell.* a Practical Treatise on Diseases peculiar to Women, Svo. London, 1844, p. 698.—*F. H. Ramsbotham.* on Diseases of the External Organs of Generation, in London Medical Gazette, vol. xvi., p. 289.—*Oldham.* on Follicular Disease of the Vulva, in London Med. Gazette, May 15, 1845.—*Tripp.* in Archives Gén. r. de Méd., Sept., 1845.—*C. Rokittansky.* Manual of Pathological Anatomy, &c., Sydenham Society ed., vol. ii., p. 264.—*Fricke.* in Rust's Magazin, b. xxxiii., p. 143.—*J. Churchill.* Outlines of the principal Diseases of Females, &c., Svo. Dublin, 1833, p. 11, 22, et *pueris.*—*W. Acton.* l'raet. Treatise on the Uis. of the Urinary and Generative Organs, &c., Svo. Lond., 1851, p. 271.—*R. Drut.* The Surgeon's Vade-Mecum, a Manual of Modern Surgery, 7th ed. Lond., 1856, p. 602. (See also the BIBLIOGRAPHY AND REFERENCES TO ART. UTERUS AND ITS APPENDAGES.)

*AMER. BIBLIOG. AND REFER.*—*N. Reizeman.* Remarks on Vesico-vaginal Fistula, with an Account of seven successful Operations, with wood-cuts, p. 23. Louisville Review, May, 1856; also Urethro-vaginal and Vesico-vaginal fistulas, Remarks upon their Peculiarities and Complications, &c. (17 wood-cuts), p. 23. North Amer. Medico-Chirurgical Review, July, 1857.—*P. M. Kollich.* The History and Treatment of Vesico-vaginal Fistula: a Report read before the Medical Society of the State of Georgia (with nine wood-cuts), p. 32. Augusta, 1857.—*H. L. Storer.* on "The Treatment of Vaginal Fistula." Am. Jour. Med. Sciences, Oct., 1857, p. 387.]

**VEINS, DISEASES OF.**—1. This order of circulating vessels has not received that share of attention and research which it deserves in several states of disease, either implicating it more especially, or affecting the frame generally, and changing more or less not merely the blood circulating in it, but the whole mass of blood supplying all the organs and tissues of the body. Hence alterations of these vessels should not be viewed with reference to themselves only, and as

local changes merely, but with a due recognition of the effects produced by them on the blood, and, through the blood, upon the whole frame. Even this apparently comprehensive view is not sufficient, it is only one aspect in which this subject should be studied—one side of the object—for another presents itself to the experienced and searching eye, viz, the many noxious agents, and the numerous local changes and structural lesions affecting primarily the several tissues and organs, frequently altering either the blood in these parts, or the veins originating in them, or even both, successively contaminating the blood and circulating systems, and ultimately altering the vital cohesion and the ultimate organization of all parts of the living body.

2 It would be impossible, even were it necessary, to consider the diseases of veins, especially in connexion with those of the blood, with that amplitude which I might desire or others expect. This subject can be viewed only in its more practical and important relations, at this place. The full consideration which I have bestowed on the several matters and topics intimately connected with diseases of the blood and circulating organs and vessels, and on the treatment of them under their respective heads, in the early parts of the work, prevents me from attempting more at this place than to notice what has not already come under discussion.

3. It is chiefly to JOHN HUNTER that we are indebted for the earliest and best information respecting diseases of the veins, and especially as to the treatment most appropriate to inflammation of them. Since his time the researches and works of BAILLIE, HODGSON, CRUVEILHIER, MECKEL, BRESCHET, DAVIS, DANCE, LEE, GENDRIN, RIBES, ARNOTT, and others, have tended most essentially to advance our knowledge of these important subjects. Diseases of the veins resemble those of the *lymphatics* and *arteries* (see those articles) in some respects, and differ from them in others, particularly as regards the constitutional symptoms. The veins never exhibit an alteration in all respects similar to aneurism, because their coats yield equally to pressure, and are not subject to the forcible impetus of the blood, besides, their inner coats are more susceptible of dilatation without rupture than those of the arteries; they are, however, more subject to inflammation and varicose dilatation than the latter vessels.

4. Ossific formations, which are so often met with in arteries, are seldom found in veins. The difference of texture is not sufficient to account for this; for, as M ANDRAL remarks, the structure of the pulmonary artery is the same as that of the aorta, and the right side of the heart is organized precisely as the left; and yet ossifications are much more frequent in the aorta and left side of the heart than in the pulmonary artery and right side. The more abundant supply of ganglial nerves to the arteries than to the veins may, perhaps, tend to create a difference as to the nature and frequency of diseases of these two orders of vessels. The constitution of the blood, and peculiarities of the circulation in each, may also contribute to diversify their maladies. The circumstance of the blood being oftener coagulated and organized in the veins than in the arteries may be chiefly imputed to this latter cause, and to the more frequent occurrence of inflammation in the former vessels. Pus is more com-

monly found in the veins than in the arteries; this is owing to three causes: 1st, to the greater frequency of inflammation of veins; 2d, to the circumstance of this morbid secretion being carried into the veins by absorption; and, 3d, to the probable metamorphosis or alteration of the pus-globules before they reach the arterial circulation. Perhaps the second and third causes are the most influential.

5 The constitutional effects of diseases of the veins, and the consequences of inflammation of them, differ very considerably from those which characterize the maladies of the other orders of vessels composing the vascular system. but the differences are chiefly apparent in acute inflammations of these vessels, as will be observed upon referring to what has been stated respecting these diseases.

6. I. INFLAMMATION OF VEINS—SYNON *Phlebitis* (from φλέψ, a vein) *Aderentzündung Blutaderentzündung*, Germ. *Phlébite*, Fr.

CLASSIF.—III. CLASS, 1. ORDER (*Author in Preface*).

7 DEFINIT.—*Tenderness, tension, acute pain, and a knotted, cord-like swelling or hardness in the course of a vein or veins, sometimes with discoloration, when the veins are superficial, extending both to and from the centre of circulation, with symptomatic fever, which often passes into an adynamic state, with indications of contamination of the blood, or purulent formations in the viscera or other parts*

8. The *pathological anatomy* of phlebitis will be more fully shown in the sequel; but it may be stated at this place that inflammation of veins occasions, 1st. The formation of coagula adhering, by means of the lymph exuded from the inflamed surface, to the internal membrane of the vessel; 2d. The secretion of pus, which may be surrounded by a false membrane, or by coagulated lymph, or be contained in coagula adhering to the internal surface of the vessel; 3d. The secretion of pus, which is not surrounded either by plastic lymph, or by a coagulum, but which has a free access to the current of circulation; and, 4th. The secretion of an ichorous or sanious fluid from the inflamed inner membrane, which rapidly mingles with and contaminates the blood, and generally produces rapid and fatal changes of the structures. Instead, therefore, of viewing phlebitis, as heretofore, to consist of only *two* principal forms, viz., the *adhesive* and the *suppurative*, the latter being either confined or free, I would add a *third*, the *ichorous* or *poisonous*.

9. *Inflammation of veins* is of the greatest importance as respects both the local lesions and the consequent contamination of the blood. It is much more frequently seen than inflammation of arteries. Its seat is the cellular tissue of the vein, and the circular fibrous coat, in as far as the latter exhibits any degree of redness or vascularity; and its products are deposited in both these, and in the non-vascular or internal lining membrane extending into the canal of the vessel. It more frequently is *acute* than *chronic*, the former being distinguished by an exudation on the inner surface of the vessel. When phlebitis—inflammation of the coats of the vessel—is the primary disease, the changes of the blood, and other alterations within the inflamed vein, are consequences of this inflammation, these changes being secondary. But when the blood in a vein is coagulated, or is otherwise remarkably altered or poi-



oned, it may, in such a state, irritate the internal membrane of the vein, inflame it, or all the coats of the vessel, the phlebitis being thus consecutive or secondary. The disease may be seated in a single vein, or extended to several, or even to many, whether it be thus primary or consecutive.

10. JOHN HUNTER first demonstrated the pathological changes and the consecutive phenomena of phlebitis. Many years afterward, SASSE, B. TRAVERS, ABERNETHY, HODGSON, and BRESCHE directed their attention to this disease; and more recently RIBES, ARNOTT, DANCE, DAVIS, R. LEE, MARÉCHAL, BOULLAUD, CRUVEILHIER, VELPEAU, BLANDIN, ROKITANSKY, and others, have contributed facts and opinions respecting it. Nevertheless the subject is by no means exhausted; for there still remain various topics connected with it, both pathologically and therapeutically, requiring farther elucidation and confirmation.

11. i. THE CAUSES OF PHLEBITIS.—Inflammations of the veins are much more frequent in the male than in the female sex, if phlebitis consequent upon parturition be excluded from the account, and in ages from fifteen years to fifty. This greater frequency in males, and in the active periods of life, is probably owing to a greater exposure to injuries and other exciting causes in this sex and age. These causes are numerous, but they chiefly consist of external injuries of various kinds, more especially punctures, lacerations, abrasions, fractures, and contusions; punctures or divisions of veins, particularly with blunt, ragged, foul or poisoned instruments; wounds, punctures or injuries in anatomical dissections or during post-mortem inspections; cuts or scratches when preparing or dressing animal food, especially game, &c.; operations, &c., when performed in foul wards of hospitals, or in low, impure, and ill-ventilated localities or apartments;\* fractures, compound or comminuted, in similar circumstances; ligatures or surgical operations on veins; the application of caustics or local irritants; the existence of ulcerated or tubercular cavities, or of abscesses or malignant formations, with which veins communicate, or into which either of these morbid matters pass; and the inhibition of morbid matters by veins or sinuses, from cavities in which morbid secretions, fluids, or deposits accumulate, as the cavities of the uterus and cervix uteri, or from ulcerated cavities in the lungs, liver, &c., or from necrosed bones or splacelated structures, or from purulent matter lodged under the flaps formed in amputations.

[\* Inflammation of veins is more common after surgical operations than is generally supposed. We have known several fatal cases, not only from venæsection in the arm, but also ligature of varicose veins in the leg and the testicle, and where every precaution was used to guard against consecutive accidents. Such cases may be found in all our medical journals and works on surgery; in some cases the fatal inflammation has resulted from incision, in others from excision or ligature. Mr. TRAVERS and Sir ASTLEY COOPER have recorded several such instances. In regard to inflammation from phlebotomy, Mr. ABERNETHY imputes it to moving the arm soon after bleeding. Dr. THOMSON, of Edinburgh, ascribes it chiefly to the dullness of the lancet. Other good authorities believe that the latter is not sufficient to cause the disease, unless there be present a peculiar irritability of constitution. Much, however, must be owing to atmospheric conditions, as we find phlebitis far more common at some seasons than at others. This is true both as regards traumatic as well as other kinds of phlebitis. Punctured wounds, if the instrument be charged with some putrid or irritating matter, are very apt to produce inflammation of deep-seated veins; and instances have occurred where such a result has followed from using a lancet previously employed for vaccination, and not thoroughly cleaned.]

These last, venæsections, and punctured or other wounds, are the most common exciting causes of phlebitis.

12. In hospitals, especially during the prevalence of hospital gangrene or erysipelas, either within them or in their vicinity; in camps or barracks, prisons or crowded vessels, especially transports; and in low, damp, crowded, and imperfectly ventilated situations, and in localities exposed to noxious exhalations, particularly in malarious states of the air, or when erysipelas is prevalent in them, and when the more common exciting causes are of frequent occurrence, phlebitis may then assume an endemic or epidemic prevalence. In these circumstances and seasons, venæsection and other operations involving veins can seldom be performed without the risk of producing the asthenic, or most dangerous form of phlebitis (§ 21, *et seq.*); and, indeed, these operations, especially venæsection, should be on such occasions avoided as much as possible.

13. Phlebitis is sometimes not only *caused* by, but often also *associated* with, organic lesions of internal organs, especially with ulcerations of the intestines, with abscesses in the liver, kidneys, lungs, brain, ears, &c.; and is occasionally detected in the mesenteric, the portal, and the pulmonary veins, and even in the veins and sinuses within the cranium, upon dissection. It is, however, most frequently associated with uterine diseases, and with inflammations and abscesses of the uterine ligaments; the iliac, spermatic, and other veins, having become consecutively inflamed, as stated in the articles on diseases of the PUERPERAL STATES, and of the UTERUS.

14. ii. SYMPTOMS.—A. The *symptoms of sthenic phlebitis* may be divided into *two stages*, namely, 1st. Those which are local, and characterize the local limitation of the malady; 2d. Those which indicate the contamination of the blood, and general infection of the frame. 1st. *The local signs* are generally very manifest when any of the more superficial veins are attacked; but they are very equivocal when the deep-seated and internal veins are implicated. Phlebitis usually commences with sharp or severe, sometimes violent, pain in a part, or in the course, of a vein. If the vessel be superficial, it will be found hard, tense, as if stretched, forming under the skin a cylindrical or knotted cord. At the same time the skin sometimes presents a reddish line or more extensive erythematous blush, or even an erysipelatous appearance. If the vessel is more deeply seated, tension and hardness may be felt in the situation or course of the pain. Congestion or engorgement of the capillaries of the cellular tissue adjoining or surrounding the inflamed vein are afterward observed; and if several veins, or a large trunk is affected, this tissue, and the parts below or distal to the seat of disease, become œdematous, or very remarkably swollen. With the local lesion, the constitution sympathizes more or less remarkably, the general symptoms varying with the severity and extent of the inflammation, and with the temperament and habit of body of the patient; but quickness of pulse, heat of skin, headache, loss of appetite, thirst, and impaired secretion and excretion, with other symptoms of inflammatory fever, are commonly observed.

15. In favourable states of the constitution, and when judiciously and early treated, the disease may not proceed farther. The coagulum

formed in the inflamed veins adheres to the parietes of their canals; a collateral circulation is established, and the inflamed veins no longer permit the circulation of blood through them. In some cases the inflammatory exudation on the internal surface of the vessel, or the coagula formed on its sides by means of this exudation, leave a central canal, allowing a partial circulation of blood along it. In other instances the inflamed veins secrete pus, which may be so abundant as to give rise to fluctuation, or other indications of its presence in the sub-cutaneous cord, which is felt when the vein is superficial; and, if an artificial issue is not given to it, the matter makes its way into the adjoining cellular tissue, and forms an abscess, which follows the usual course. When the local lesion does not terminate in either of these ways; and when the morbid exudation, or purulent matter furnished by the inflamed vessel, is carried into the blood, the system becomes generally infected, owing to the contamination of the blood thus produced, and the second period or stage of the malady is developed—or the state of *pyæmia*.

16. 2d. This stage of phlebitis, or that of *vascular infection*, may take place rapidly, or not until after a few days, the rapidity of its occurrence depending upon the nature of the exciting cause and the constitution of the patient. It usually commences with chills or rigors, followed by hot skin and other symptoms of fever, and by perspiration. These paroxysms of chills, fever, and sweats generally return at irregular intervals, assuming a remitting form; but in some instances they are periodic. With these exacerbations, anxiety, distress, or slight or occasional wandering delirium appear; and these are followed by more continued delirium, which is generally low or muttering, rarely lively or excited. The tongue, previously furred, now becomes dry or encrusted, is trembling, or imperfectly protruded; the teeth and lips are fuliginous; the countenance is sunk, dusky or pale, and lurid, and the symptoms assume a typhoid or adynamic character. The pulse is small, very frequent, and soft. These phenomena are observed in nearly all the cases at this stage; and others are less constantly present, especially retchings and vomitings; diarrhœa, the stools being dark and very offensive, the urine turbid and fetid or ammoniacal, and the surface dark or dusky, or slightly jaundiced.

17. During this stage, and often at an early period of it, secondary abscesses form in some internal organ, with indications of oppression, tenderness, or distress, referred especially to the regions in which the affected organ is seated. In some cases the larger joints become extremely painful and swollen, from the formation of pus within their capsules. Purulent deposits, without any very manifest indication of pre-existing inflammation, sometimes form not only in the internal viscera, or in the joints, but also in the intramuscular tissues, and even in the brain, occasioning profound coma. If this stage continue even for a few days, extensive bed-sores and sphacelations occur in the situations on which the weight of the body chiefly rests; and, the sensibility of the urinary bladder being in great measure lost, the urine becomes ammoniacal, or the functions of the kidneys much impaired, contamination of the circulation is farther increased, and its consequences accelerated, death generally

ensuing with a celerity according to the extent and rapidity of these changes.

18. The *extension* of the inflammation is generally in the direction of the heart, or of the current of circulation; but a fatal result often takes place before the inflammation reaches the vena cava, or even the larger venous trunks, owing to contamination of the blood by the exudation, or purulent matter, from the inflamed parts. In some cases, however, the disease pursues a different course, and extends to the smaller ramifications. Mr. ABERNETHY met with a case of phlebitis after blood-letting at the bend of the arm, in which the veins were affected down to the hand. This more unusual course is very probably occasioned by the complete obstruction of the part of the vein first affected by a coagulum or exudation of lymph. It may also be partly the result of the state of constitutional power. It is not infrequent in puerperal phlebitis, the cause of which is chiefly the imbibition of sanious matters from the internal surface of the uterus, aided by shock and vital depression, and by the predisposition produced by an impure air.

19. iii. OF THE DIFFERENT PATHOLOGICAL CONDITIONS OBSERVED IN PHLEBITIS.—The several pathological states constituting the different varieties of inflammation of veins have not been sufficiently investigated and demonstrated by pathologists; and most writers have described two varieties only, namely, 1st, the *adhesive* or common; and, 2d, the *suppurative*; and, while they have viewed the former as merely a local disease, they have considered the latter as productive of vascular contamination and general infection.—a. Of these varieties it may, however, be remarked, that, although the *adhesive* is characterized chiefly by an exudation of lymph more or less adhesive and concrete, on the internal surface of the inflamed vein, and often no farther affecting the blood than causing the formation of a clot within or near the inflamed part, yet it is attended by more or less sympathetic febrile disturbance; and that the coagulum thus formed may be productive of much consecutive disease of the vein, if the local and constitutional treatment be not judiciously managed. Even after the exudation of lymph, or the formation of a coagulum, by means of which the extension of the inflammation and contamination of the blood are prevented, if constitutional power and vital resistance be much reduced, the coagulum thus formed may irritate the internal surface of the vessel, and either perpetuate or rekindle the inflammatory action.

20. b. The *suppurative* variety of phlebitis is generally productive of contamination of the blood and of most dangerous constitutional disease. Nevertheless, instances are occasionally observed in which the purulent matter at first formed, mingling with the blood in the vessel, causes its coagulation, and the coagulum thus formed arrests the circulation and the extension of the inflammation in the direction of the heart, and either allows the morbid action to subside, or favours the extension of it to the more external coats of the vessel and to the surrounding cellular tissue, occasioning abscesses in the course of the inflamed vein, and prolonging the disease. In these cases little or no contamination of the general mass of blood takes place, unless the constitutional powers and vital resistance to the extension of the local disease be much impaired,



either by the continuance and amount of the local lesion, or by an injudicious or a too lowering treatment.

[We find the law of symmetry prevailing in the present as in the other diseases; thus in the viscera, as well as in the superficial tissues, abscesses, resulting from phlebitis, are constantly met with at points most closely corresponding with one another on the two sides of the body.]

21. *c. Asthenic, or diffusive, or poisoned phlebitis*, has not hitherto been described as a very important variety, although it is the most dangerous of any form which the disease assumes. It occurs in all the circumstances, and arises from all the causes, which occasion the other forms of phlebitis. But it more especially proceeds from causes superadded to these, more especially from those which depress the vital energies and infect the system. It is generally the result of two classes of causes: 1st, those which depress the constitutional powers, and produce more or less of general cachexia before the vein is injured or wounded; and, 2d, those which lower or exhaust the energy of the body, and either prevent the depuration, or favour the contamination of the blood during or after the infliction of the injury or the other exciting causes of the phlebitis. The first class comprises malaria of all kinds; the foul air of crowded wards; or that produced from the discharges or exuviae of the sick or of others; improper or insufficient food, &c.; the second includes those already mentioned, when they come into operation during and after the infliction of the injury, or subsequently to the other exciting causes of the disease, violent shocks to the vitality of the frame, poisoned wounds, abrasions, &c., infectious emanations from erysipelatous or gangrenous sores, or morbid discharges; the absorption of purulent, putrid, sanious, or diseased matters from sphacelated, necrosed, or otherwise altered structures, or of decomposed blood, or vitiated secretions and excretions.

22. (*a*) This variety of phlebitis is characterized by the rapidity, severity, and the fatal tendency of the local and constitutional symptoms, and the marked depression of vital power, and the contamination of the circulating fluids, by which they are attended. Organic nervous energy is remarkably impaired, and all the manifestations of life more or less lowered. The functions of the brain are early disturbed, and the pulse becomes rapid, soft, open, and compressible; the surface of the body soon losing its vital appearance, and becoming livid, dusky, and sallow, sometimes dry and harsh, and ultimately clammy and cold. Delirium occurs early, and passes into stupor or coma. Locally, œdema, cellular infiltration, great tenderness on pressure, boggy swellings, and diminished temperature of the affected limb, are often remarked; and if the injured or affected vein be exposed, as when the disease follows venæsection in the circumstances just alluded to, the wound is gaping, union of the divided tissues not having taken place, and an ichorous or a sanious fluid exudes from the part, or slight hæmorrhage occurs on examination. In addition to the above more constant phenomena, others are observed, arising out of the varying combination of the predisposing and exciting causes, and the state of the patient. These are chiefly a tympanitic state of the abdomen, retchings or vomitings, diarrhoea, the evac-

uations being offensive and unnatural; the rapid occurrence of bed-sores; offensive or ammoniacal states of the urine, severe pains and swellings in the joints or extremities; congestions or puriform infiltrations of internal viscera, with tenderness and oppression referred to the regions corresponding with the affected organ, &c.

23. When *uterine phlebitis* takes place, it may assume either of the forms above described, and owing to such forms, and to the circumstances in which they severally appear, the different varieties of puerperal fever are developed; the more malignant kinds of these fevers being the results of the ichorous and sanious fluids imbibed from the interior of the uterus by the uterine sinuses and veins, or of the morbid exudation from the asthenically inflamed veins of the uterus and its appendages, and of the consequent contamination of the blood, aided by the vital shock of parturition, and by the foul or infectious air in crowded or ill-ventilated lying-in hospitals or wards. (See *art. PUERPERAL DISEASES*.)\*

24. *iv. The appearances* observed in dissection of fatal cases of phlebitis, as respects the *veins*, are described in the sequel (§ 57, *et seq.*); those which regard the frame generally are fully given under the head *PUERPERAL DISEASES* (§ 221, *et seq.*), and are nearly the same as those observed after *putro adynamic fever* (§ 513, *et seq.*); and those which are found when phlebitis occasions *consecutive and diffusive abscess* are described in the *art. ABSCESS* (§ 27, *et seq.*)†

[\* When the inflammation has been so violent as to occasion very decided changes of structure in the coats of the vein, the usual result is its complete obliteration. In consequence of this, extensive anastomoses often form, the activity of the vasa vasorum becomes conspicuous, and continues till the venous coats are reduced to a homogeneous lardaceous tissue. By their agency, also, the product of inflammation obstructing the vein is very gradually assimilated and absorbed. Meanwhile the walls of the vessel become more and more thickened, contracting in folds or wrinkles upon the narrowing canal, until at length the whole vessel is converted into a thin cellulofibrous cord. The obliteration of the fetal vessels is brought about by an analogous process, the only difference being that in this the process is purely a physiological one, there being simply a slender plug of coagulated blood to surmount, instead of the more heterogeneous products of inflammation. The obliteration of the vein is sometimes only partial, the plastic substance only blocking up part of the venous channel. The obliteration may be permanent, or only temporary, for a plug which closes up a large venous trunk will often be resolved and melted down in the sanguineous current, and that too without exciting any constitutional symptoms from absorption.]

† In the following case, by M. LE HERISSÉ, as quoted by Mr. ARNOT, some of the most remarkable secondary effects of phlebitis are described. "Gasper Goldinger, subject for the last six weeks to epilepsy, was bled twice from the arm on the 1st of November, 1846; on the 8th, from the foot; and on the 10th and 13th, from the jugular vein. On the 16th, he was again bled from the arm (the right), which on the following day felt painful; some redness and tension were observed round the aperture; 15th, arm very painful and swollen from the shoulder to below the elbow; edges of the puncture red; face and skin of the body of a yellowish colour, pulse feeble and frequent; 19th and 20th, fever more intense; tongue, dry and coated; great pain in the arm; 21st and 22d, lies supine; prostration of strength; heat of skin; tongue dry; pain in the right side of the chest; respiration short; 23d, tension of the arm diminished, some pus flowed from the wound made in bleeding; respiration short. I died at night, seven days after the receipt of the wound in the vein.

"*Dissection.*—The wound in the cephalic open; the vein filled with pus through the whole length, *i. e.*, from where it terminates in the axillary to the bend of the elbow, where it divides into the medial cephalic and superficial radial; the latter of which contained pus for two inches below its origin. The coats of the vein were much thickened, indurated, and red. In the interfibrillar cellular tissue of the pectoral muscle of the right side was

25. v. The DURATION of phlebitis is very variable. It is often very short in the asthenic and puerperal states, and may, when accelerated or exacerbated by the foul air in lying-in wards, not exceed 48 hours, although more frequently it continues several days, or even longer. Phlebitis consequent upon venæsection is rarely of less duration than three or four days. The suppurative form of the disease generally continues from ten to twenty-one days, and the adhesive form much longer, or several weeks; but the duration of each of the varieties of the disease varies much according to the causes, the treatment, and the constitution of the patient.

26. vi. SEATS OF PHLEBITIS.—Inflammation may attack several veins, or only one vein, or small part of a vein. It generally extends to the whole circumference of a vein, and is very rarely limited to one side of the vessel. The veins most frequently inflamed are those of the extremities, after wounds and injuries; next, those of the uterine organs and appendages, especially in the puerperal states, and the pulmonary veins. The veins least frequently affected are the ramifications of the portal and hepatic veins; the sinuses and veins of the dura mater; the vena cava, and the veins of the spine, and of the spongy structure of bones. Phlebitis of the umbilical cord, or inflammation of the umbilical vein in newborn infants, is not a rare occurrence. Several recent pathologists, more especially MM. RIBES and CRUVEILHIER, have supposed that the venous capillaries may be the seats of inflammation, and have ascribed erysipelas to phlebitis of the most minute of these vessels.

27. (a) *Inflammation of the veins of the arm* is most frequently consequent upon venæsection, and especially when this operation is repeated. It may, however, occur after amputations, fractures, punctured or other wounds, &c. It commences with pain in or near the seat of incision or puncture, extending upward. If adhesion has not taken place, the margins separate, swell, suppurate, and the pus formed in the vein escapes externally, especially if pressure be made on the vein from above downward. If the incision through the integuments has closed, the margins swell, and the cicatrix opens. The inflammation may extend from the seat of injury to the axilla, to the jugular, to the superior cava, or even to the right auricle. In this case death generally soon ensues, although instances of recovery have been recorded. The disease may also extend along the veins below the seat of injury, especially when the circulation in the vein is obstructed by lymph, coagula, &c. Phlebitis in this situation may present either of the forms described above.

28. (b) *The veins of the lower extremities, and the iliac veins*, or either separately, may be inflamed; the former from the same causes as occasion phlebitis in the arm, the latter most frequently as a consequence of the puerperal state, or of the cancer of the uterus, and of tubercular

disease. Inflammation of the iliac veins is most frequently manifested in the form of *phlegmasia alba dolens* (see this Art.), although phlebitis is not the only pathological lesion of this disease. M. TOULMOUCHE contends that the much more frequent occurrence of the malady in the left thigh than in the right is owing to the accumulation of feces in the sigmoid flexure of the colon, and to the consequent pressure made on the iliac vein, to the retardation of the circulation through it, and to coagulation of blood in it. (*Gaz. Méd.*, Avril, 1844.)

29. (c) *Inflammation of the vena porta* has been observed by MM. RIBES, BOUILLAUD, DANCE, and FREY, and they, as well as others, have ascribed redness of the internal surface of the ramifications of the vena porta, and of the hepatic veins, to inflammation; but it is not improbable that this appearance is more frequently owing to cadaveric imbibition of the colouring matter of the blood. True inflammation of the vena porta is a very rare occurrence; it is attended by a sense of weight and of pain in the right hypochondrium, greatly increased on pressure; by regular or irregular rigors; by extension of pain to the right shoulder; by jaundice, more or less developed; by nausea, vomitings, and sometimes singultus; by diarrhœa, more or less bilious, and ultimately by the usual indications of purulent infection of the blood. These symptoms are, however, in most respects the same as those accompanying acute abscess of the liver.

30. (d) *The sinuses of the dura mater* are not unfrequently inflamed, consecutively on injuries to the cranium, membranes, and substance of the brain, on inflammation of these parts, on inflammation of the ear, on caries of the temporal or other bones of the cranium. They may also become inflamed in the advanced course of erysipelas of the scalp, and of other maladies and lesions, as I have fully described many years since. (See art. BRAIN, Sect., *Inflammation of Sinuses of the Dura Mater, and of the Vessels of the Brain*, § 37, et seq., vol. i., p. 208, 9.)

31. (e) *The umbilical vein* has been found inflamed in recently born children, by MM. SASSE, BRESCHET, DUPLAY, TROUSSEAU, and others; and has been referred to ligature of the cord. It has been observed associated with erysipelas, with peritonitis, and with enteritis. The veins of bones have also been noticed by M. GERDY. *Uterine phlebitis* has been considered in the article on PUERPERAL DISEASES. (See § 189–197.)

32. (f) *Inflammation of the vena cava* is met with only consecutively upon inflammation of the uterine iliac or other veins. M. BÉRARD has found inflammation of the vena cava extending as high as the confluence of the renal veins in cases of *phlegmasia dolens*: cases of inflammation of the cava have been observed and described by TRAVERS, HODGSON, DANCE, and others. The symptoms indicating extension of inflammation and of its consequences to this vessel are rather inferential than positive. These consequences are the exudation of lymph, the formation of pus, or of coagula, or of all these, and more or less obstruction of the circulation along the vena cava. If there be observed consecutively upon phlebitis of either lower extremity acute or rapidly developed œdema, or dropsy of both the extremities, especially during the puerperal state, or at an advanced stage of fever, or at an early period after the subsidence of fever; and if, after the

a quantity of thick greenish pus. Eight or ten ounces of yellowish opaque serosity were contained in the right sac of the pleura. The lung of this side was unadherent, that of the left was adherent over its whole surface by a delicate false membrane. Both lungs presented a number of hepatized portions, varying in size from that of a nut to that of a large walnut, gorged with fluid, which in some of them was puriform. The arachnoid membrane was opaque, thickened, and indurated, effusion of fluid between it and the pia mater, and into the texture of the latter. Some yellowish serum in the ventricles."



occurrence of œdema of both extremities, indications of the development, in the surface of the trunk, of a supplemental venous circulation, it may be inferred with much probability that inflammation and its consequences have extended to the vena cava.

33. *Obliteration* has been observed by HALLER, WILSON, BAILLIE, CLINE, REYNAUD, the writers already named, and by others, to follow inflammation and obstruction of the vena cava. The cases which have been recorded of this remarkable lesion have presented extensive anastomoses, not only between deep-seated veins, but also between the principal superficial veins of the trunk, these latter appearing uncommonly enlarged, and anastomosing with each other. This very great development and free anastomoses of the superficial veins of the trunk have followed gradually upon the dropsical or œdematous state of both extremities; but in some cases, especially those under consideration, and of most marked enlargement and anastomoses of the superficial veins, the œdematous state of the lower extremities gradually diminishes. The particular veins by which the supplemental circulation is carried on are in some respects different in different cases, according to the seat of obstruction or obliteration of the cava, and to the trunks of veins, from which the inflammation extended.

34. vii. *THE DIAGNOSIS.*—Phlebitis may be mistaken, at an early period of its course, for lymphangitis, or the latter may be mistaken for the former. But the large cylindrical cords, wreathing in diverse forms, appearing when the superficial veins are inflamed, and the œdema of the distal or more remote parts, cannot be readily mistaken for the reddish, painful, small, straight, and knotted lines passing in the direction of, and enlarging, the lymphatic glands, above the seat of the complaint. In neuritis and neuralgia the pain is more acute or pungent than in phlebitis, and the appearances observed in phlebitis are not present, especially the œdema of the parts below the seat of pain, &c. When the consecutive or contaminating effects of phlebitis supervene, the low fever, the dusky, sallow, and discoloured skin, the diarrhœa, the rapid weak pulse, delirium, &c., although assuming the form of adynamic fever, may be distinguished from this latter by the antecedent local symptoms, by the causes, and by the whole history of the case.

35. viii. *THE PROGNOSIS.*—The danger of phlebitis is always considerable, because, although it is by no means imminent as long as the disease is merely local, yet infection and contamination of the blood, on which great danger depends, may unexpectedly and suddenly supervene. The symptoms described above (§ 16, *et seq.*) as indicating this contamination of the blood, and more especially those which attend consecutive or diffuse abscess in the lungs, liver, or other organs, are always those of extreme danger. Cases presenting signs of internal consecutive abscess are irremediable.

36. ix. *PATHOLOGICAL INFERENCES.*—(a) The liability to phlebitis as a consequence of the operation of any of the exciting causes, or even without any other cause than that which favours this liability, is great in proportion to the amount of hæmorrhage, or of vascular depletion, which has been the result of the injury or incision of a vein.—(b) Persons addicted to the abuse of intoxicating liquors or of tobacco are more liable to this

malady than others; and the liability extends to those who are weakened or anæmied by pre-existing disease, or who are of an unhealthy or cachectic habit of body.—(c) In the circumstances now stated, and in convalescents from, and even in the advanced stages of, exanthematous and adynamic fevers; in the course of acute rheumatism, of pulmonary consumption, and of diseases of the womb and its appendages, blood may coagulate in some situations in the veins, owing either to its remora, or to its altered state, or to defective vital power in such situations, and may inflame the inner coats of the vein in which it coagulates.—(d) The passage, or imbibition of purulent, ichorous, sanious, putrid, or tubercular matter into a vein or venous capillary may either coagulate the blood as it circulates onward in a venous trunk, and in consequence of this coagulation inflame the vein; or the morbid matter may irritate, inflame, or poison the internal surface of the vein, the inflammatory exudation from the inner coats of the vein coagulating the blood in it, or, failing in this, contaminating the blood circulating through it. It must be difficult to determine the exact sequence of results, and probably either or all may supervene.—(e) The morbid alterations in the veins may extend far along the veins from the seat of injury, as that produced by blood-letting, or even to the vena cava, or to the heart itself; and they may proceed also in an opposite direction, or beyond the injured part, although rarely to any considerable distance; the fatal issue, however, is not owing to this extension, although aided by it, but is chiefly the result of the contamination of the blood, and of the effects produced by this contamination on the organs and tissues of the frame.—(f) Consecutive diffuse abscess in the viscera, suppuration of joints, &c., are not occasioned by the transmission and deposition of purulent or other morbid matters from inflamed veins, or absorbed from primary seats of suppuration, caries, or other disease, but are the consequences of acute asthenic inflammations of those viscera or joints caused by the thus poisoned or contaminated blood.—(g) The sequence of morbid phenomena, or the succession of alterations from the commencement of irritation and inflammation in the vein until the disorganization consequent upon the diffusive suppurations ultimately produced in the viscera or joints, is accelerated by means which lower vital power and diminish the amount of blood circulating in the body.\*

37. II. *TREATMENT OF PHLEBITIS.*—The concluding one of the above inferences will indicate the principles which, in my opinion, should guide our practice in phlebitis. The following circumstance may have had some influence in directing my attention and influencing my views regarding this important subject. When in London for a short time, in August, 1815, I had occasion to converse with a well-known public man of that time, who informed me that he had been, about thirty-five years previously, a patient of JOHN

\* The above inferences formed the conclusion of a paper read before the Medical Society of London in 1823, and were arrived at after an observation of many cases of phlebitis in France and Germany during 1815 and 1816, and during 1819 and 1820, and after duly considering the treatment which was there generally adopted. These inferences, as well as the treatment which I have recommended in consonance with them, have always been given in my lectures on Practical Medicine, from 1824 until 1842, when I ceased to lecture.

HUNTER, he having suffered an attack of inflammation of the veins after venæsection, which had been twice repeated, to a large amount, for pneumonia; and that the inflammation supervened on the last blood-letting. But it was not only the occurrence of the phlebitis after the last depletion which made the impression on my mind, but chiefly the treatment which he informed me had been prescribed by JOHN HUNTER in his case. This consisted, as he stated, of preparations of bark conjoined with other medicines, and of a very liberal allowance of port-wine—upward of a bottle daily—until he recovered. This treatment was altogether so different from what was generally taught in lectures and surgical works, that I continued to reflect upon it, and to contrast it with the means of cure which I afterward saw adopted on the Continent and in this country for this disease, and which are still recommended in surgical and medical works. When it is considered that a very large proportion of the diseases of the puerperal state, and most of the fatal cases of amputation, proceed from inflammation of veins, and from the imbibition of purulent or sanious matters by the veins into the blood, inflaming the veins and contaminating the circulating fluids, or, in other words, producing effects to which the term *pyæmia* has recently been applied, but with little regard to pathological accuracy, the importance of determining the true intentions and principles of cure for this malady must be apparent. Upon what rational grounds can we advise, as very generally advised, large local and general depletions, and a strictly antiphlogistic regimen for a disease which is frequently a consequence of such depletion and regimen? Upon what therapeutical principles can means be recommended for the prevention or cure of phlebitis that tend to promote the imbibition, or absorption, and the circulation of morbid or poisonous fluids in the blood, to prevent the formation of a healthy lymph whereby the extension of the disease may be arrested, and to prostrate the vital resistance opposed by the constitution to the contamination, not only of the blood, but also of the soft solids?—and to the production of all these effects the means usually advised for phlebitis most certainly tend. With what rational intention are means prescribed to arrest the extension of inflammation of the veins and the contamination of the blood that actually and incontrovertibly favour both these results, and that have a more certain tendency to accelerate, if not to cause, a fatal issue than the natural course of the disease itself? The operation of the means of cure in this disease require to be studied and ascertained with as great care as should be devoted to the pathological changes and the consecutive alterations which constitute the nature, and occasion the imminent danger of the malady. An empirical treatment of phlebitis more frequently increases than diminishes the danger; and such empiricism, whether in phlebitis or in any other disease, being the result of ignorance, increases the number of fatal cases, and generates and perpetuates in the mind of the practitioner who is

thus imperfectly informed a skepticism in which he takes refuge, and under which he attempts to conceal his ignorance and to debase his vocation. The skeptic in medicine is ignorant not only of the nature and procession of morbid phenomena, but also of the operation of remedial agents. He is incapable of forming rational views, and is quite impotent as to their accomplishment. He therefore decries what he feels himself incapable of performing, and instead of relinquishing his efforts, he endeavours to impute his failures to the imperfections, if not to the total inefficacy of the science; and by continuing his practice, and by thereby perpetuating his want of success, he persists in furnishing evidence, not only of his own incompetency, but also of the insincerity of his professions; he at once admits that he practices a lie; that he professes to perform what he has no hopes of performing; that he may delude, but that he can not cure.\* But, leaving the medical skeptic to luxuriate in his practice and in his belief, and advising him to reconcile the former with the latter, if this be possible in any other way than by relinquishing the one in favour of the other, I proceed to consider those indications and means of treating phlebitis which extensive opportunities of observation disclosed; opportunities, however, in which I was then an observer only, not an actor, and which furnished more numerous proofs of a practice which ought to have been carefully avoided, than evidence of any resulting benefit.

33. i. A VIEW OF THE TREATMENT which has been advised for phlebitis may, not without some advantages, precede the consideration of the means which I have long believed to be the most appropriate to this malady. Former writers have generally advised very opposite means for the different stages of the disease, for the local affection, and for the general infection of the frame consequent upon it. Thus we find, in one of the ablest treatises on diseases of veins (in *Dict. de Méd.*, 2d ed.) which have recently appeared, it is recommended to have recourse to general blood-letting, to the application of leeches in great numbers, and more or less frequently repeated according to the strength of the patient; to emollient fomentations; to refrigerants; to the application of ice, or to cold effusion to the seat of in-

[\* These remarks of our author furnish a very satisfactory explanation of the abandonment of rational medicine by some practitioners, and their adoption of homœopathy, hydropathy, and other forms of empiricism. Their ignorance of the true principles of medical science, and consequent want of success in the treatment of disease, gradually renders them skeptical in regard to the efficacy of the science; and they fly to visionary systems which promise greater certainty, and require no industry, no grasp of mind, or extent of knowledge to comprehend or apply. They do not seem to understand the causes of their failure, and hence attribute to the imperfections of the science what is solely due to their own ignorance and folly. There is no profession, no study, which requires such high order of intellect, such well-balanced powers of mind, such rare judgment and nice discrimination, such close observation and unerring logic as medicine, and yet every man who finds himself incompetent to gain a living in any other calling feels fully competent, without preparatory training, preliminary study, or close application, to assume the responsibilities of a practitioner of the healing art; and our free republican institutions, in their jealousy of encroachment on individual rights or pursuits, give free license to every ignoramus to experiment on the lives and health of the public. When the true objects of government shall be better understood, homœopathy and other empirics will meet no greater toleration than those who, under a less respectable garb, take a still shorter cut to reach the pockets of the community.]

\* "Les premiers accidens inflammatoires que l'on observe sur le trajet d'une veine seront immédiatement combattus par les antiphlogistiques les plus énergiques: Saignées; applications de sangsues en grand nombre, et plus ou moins répétées, suivant la force des sujets, fomentations émollientes, tels sont les moyens qu'il convient de mettre d'abord en usage." (*Art. Veine, Inflammation*, in *Dict. de Méd.*, 2d ed.)



inflammation, in the first or local period of the disease; and, in order to second the effects of this rigidly antiphlogistic treatment, the application of large quantities of mercurial ointment, so as to rapidly affect the salivary glands.\*

39. M. PASQUIER and others have had recourse to the application of narcotics locally, in the form of the decoction of poppy-heads, containing the watery extract of opium, or to similar applications, placed along the course of the inflamed veins, and frequently renewed, so as to be always wet. M. BONNET, of Lyons, has had recourse to a very opposite treatment, viz., to the application of the actual cautery to the part where the vein is wounded, in order to prevent the absorption of pus from the inflamed vein. But the cases which he has adduced in support of his practice are too few and inconclusive to found upon them so novel a plan of cure.

40. The local treatment advised by JOHN HUNTER, and advocated by ABERNETHY, REIL, VELPEAU, and others, had for its object to prevent the extension of the inflammation towards the heart, by enabling the constitution to throw out coagulable lymph at the inflamed part, by means of which the blood might be coagulated or the vein obstructed. Compression of the vein above the seat of inflammation was likewise advised with this intention. These measures often were successful, but they often also failed. The remedies prescribed, however, with this view, were not always appropriate to the period of the disease, or to the constitution and habit of body of the patient, and were often resorted to at a too advanced stage, when the blood had already become contaminated, and when means calculated to neutralize or to counteract the contamination, and to depurate the blood, were required. M. BRESNET attacked this very rational indication, or method, of arresting the extension of the inflammation, by contending that it was most difficult to obtain an adhesive form of phlebitis by medical treatment. But the supporters of JOHN HUNTER'S doctrine had more extended views than the mere development of the adhesive form of the disease by enabling the constitution to throw out coagulable lymph. They knew, or at least hoped, that the lymph effused would favour the coagulation of blood in the inflamed veins, whereby the circulation in these veins would be entirely obstructed, and the extension of the inflammation, as well as the contamination of the blood, would be either delayed or prevented, as they also knew that the best means of limiting inflammation in any surface, more especially in that of circulating vessels, were those which supported or developed constitutional power and vital resistance to the impression of injurious agents.

41. If the views as to the treatment of the local stage or changes in phlebitis were thus diverse, those proposed for the second stage, or that of vascular infection and contamination, were no less so. The young pathologists of Paris in this matter displayed their accustomed ingenuity; but beyond this quality no farther praise can be awarded them. Some, relying upon the experiments of MM. LEURET and HAMONT, who stated that the injurious effects of pus injected into the veins of animals were delayed or prevented by repeated

blood-lettings, proposed this mode of evacuating the morbid matters contaminating the blood; but they failed in showing how these matters could be removed with the blood which was taken away, without leaving the same proportion in the blood which was left in the body. The fate of those who were thus treated may be readily predicated. Then was proposed the opposite system; namely, to engorge the patient with diluents, by means of which the poisonous materials may be diluted, their action rendered less injurious, and their elimination promoted by means of the skin and kidneys. M. Piorry, the apostle of this doctrine, in his memoir on "pyohémie," or pyæmia, adduced some evidence in its support. The due promotion of all the depurating functions, not only those now named, but also those of the intestines and liver, by suitable means, and by appropriate combinations, are important remedies for the second stage of this malady, but in most cases more even than these are required.

42. Some writers have supposed that the morbid materials which have passed into the blood may be neutralized by disinfectant or similar agents, such as the chlorides; and in certain forms they may be of service, and may with some reason be resorted to. But upon what rational grounds can repeated emetics, or antimonials, or mercurials be advised, unless upon the pure empiricism which is based on imputed but very doubtful success? Other writers have dreaded the prostration of vital power, and its consequences, in the second stage of phlebitis, and have had recourse to tonics, especially to the preparations of cinchona, to wine, and various restoratives. The propriety of the practice cannot be doubted, especially if adopted at a sufficiently early period, and if conjoined with means appropriate to existing pathological states and to the circumstances of individual cases.

43. ii. TREATMENT ADVISED BY THE AUTHOR.—A question, preliminary to entertaining the subject of treating phlebitis, suggests itself, namely, *Is there any plan by which the disease may be prevented?* Phlebitis is most frequently a consequence of amputations and similar operations, and of operations on the veins themselves. Of these latter venæsection is the most common efficient cause. From long and diversified observation, I am convinced that, when phlebitis follows venæsection, this operation ought not to have been performed, the states of the constitution and of the circulation actually not requiring it; and that this has more especially been the case when it has been repeated more than once, or when the vascular depletion has been carried too far. Most of the fatal cases of amputation result from phlebitis and its consequences. Now what are the circumstances which favour the occurrence of phlebitis after amputations? These are chiefly, 1st. The shock given to the constitution by the operation; 2d. The anæmied state of the system and the exhaustion of vital power in many cases at the time when the operation is performed; 3d. The collection of purulent matter under the flaps, and bathing the surface of the stump, and the mouths of divided veins; 4th. The state of the atmosphere in hospitals, wards, and places in which the operation is performed and the patient is confined; 5th. The treatment immediately after the operation; and, 6th. The means used to produce insensibility. Each of these requires a few remarks.

\* The late Prof. Physic advised the use of blisters over the vein affected, to prevent the extension of the inflammation; and the practice has been generally and very successfully adopted in this country.]

44. (a) The shock produced by the operation, especially when great or prolonged, is not only the result of reduced vital power, but also the cause of coagulation of blood in the veins and of the injurious action of the coagulated blood on the coats of the vein (see *art. SHOCK*). Hence the more severe and prolonged the shock the more likely are these effects to be produced.

45. (b) Many cases require amputation, under unfavourable circumstances, and in others it is so long delayed, owing to the fears of the patient, until these circumstances are developed. When the constitutional power and vital resistance of the patient to disease are reduced, and the blood altered by impaired depuration and imperfect sanguification—when organic nervous energy is depressed, and the blood diminished in quantity, in crasis, or in red globules, or impaired in quality—then a predisposition to phlebitis, when the veins are implicated in surgical operations, is thereby produced.

46. (c) The collection of purulent matter under the flaps, often favoured by the union of the integuments, acts most injuriously on the internal coats of the veins; and it may even be partially absorbed by the mouths of the veins in the surface of the stump, thereby producing pyæmia and its usual results. These effects are the more likely to occur in cases where vital power is greatly reduced, or where the quantity of the blood is much diminished and the quality much impaired, and where the patient breathes a close or contaminated atmosphere.

47. (d) The injurious influence of a foul air in cases where veins are implicated in surgical operations is sufficiently manifest; and the frequency of phlebitis and pyæmia in hospitals, both civil and military, from this cause, is often greater than is supposed. I witnessed this influence and its effects in numerous instances soon after the Peace of 1815, both in France and Germany; and in many more neither the cause nor the effect was recognised. The treatment also in these circumstances, and immediately after operations implicating veins, was often injurious and calculated to occasion the mischief which it was intended to prevent. At the period now alluded to, notwithstanding the writings of JOHN HUNTER, phlebitis and its consequences were but imperfectly understood. It was not until a few more years had elapsed that the pathology of the disease was fully investigated, and up to a very recent period, and even to the present time, neither the prevention nor the treatment of phlebitis has been satisfactorily illustrated. It has been a much too general practice to have recourse to a too strictly antiphlogistic treatment and regimen after amputations, thereby aiding other causes in producing phlebitis and pyæmia. The extent to which such treatment, however, should be carried, or how far its opposite should be adopted, as well as the means by which constitutional power may be promoted, and vital resistance to the invasion and extension of phlebitis be upheld, must depend upon the circumstances of individual cases and the acumen and experience of the physician.

48. (e) The means used to produce anæsthesia during surgical operations, not improbably may favour the occurrence of phlebitis and pyæmia. This topic requires careful examination. A recourse to those means has its advantages and disadvantages. The former are, the greater readi-

ness of the patient to submit to an operation at a time when it is most likely to be successful, and the feeling in the mind of the surgeon that he is not inflicting suffering. The latter are, the depressing influence of anæsthetics on vital power, the extinction of that amount of pain in operations, which, when not too long protracted, tends to develop a salutary reaction, and to favour the prevention of injurious changes after the operation; and, more especially, the alterations produced in the constitution of the blood by the passage of the anæsthetic vapour into it. These disadvantages were urged by me on several occasions immediately after the discovery of the means of producing complete anæsthesia, and subsequent observation has confirmed my opinion respecting them.\*

49. From the above it will be inferred that the avoidance, as far as may be, of the several circumstances which favour the production of phlebitis is of great importance; that all operations implicating veins should be performed in as healthy a state of the system as may be possible; that vital power and resistance should be supported, and not depressed; that all contaminating influences should be avoided; that the healthy constitution of the blood ought to be studied before and after such operations, and nothing done to alter it; and that the confidence of the patient in a successful result should be upheld, and roused or increased when depressed. Conformably with these propositions, it will be manifest that a pure, dry, and temperate atmosphere; perfect repose of a limb or a part in which a vein has been injured or wounded; protection of a wound in a vein from the access of the atmosphere; and a healthy discharge of the digestive and depurating functions, and physical and mental quietude, are among the most essential means of preventing phlebitis, and of counteracting or neutralizing many of its causes.

50. i. TREATMENT OF THE FIRST OR LOCAL PERIOD OF PHLEBITIS.—This should vary with the causes of the inflammation, with the symptoms complained of, with the habit of body of the patient, with the presumed extent to which the disease has advanced, and with the situation of the inflamed vein. The causes and seat of the inflammation equally forbid general depletion; and, unless in very plethoric or robust subjects, even local depletions are seldom required. Pain and tenderness are rarely removed by them, even in these subjects, and never in persons otherwise circumstanced. Fomentations, especially those usually applied, sometimes assuage the pain, but they favour the extension of the inflammation along the vein, and prevent or diminish the chance of procuring the occlusion of the vein by

\* The experience of surgeons in the United States does not coincide with that of Dr. COPLAND in regard to the influence of anæsthetics in favouring phlebitis. On the contrary, it is believed that the mortality from severe operations has been much diminished in consequence of their introduction and employment. The depression of the vital forces, as well as the changes produced in the blood through their influence, is but temporary; while the patient is wholly exempted from the violent effects of the shock, which of itself is far more dangerous and depressing to the vital powers than any of the anæsthetic agents. We have carefully watched the secondary effects of both chloroform and ether in every variety of subject, and under every mode of administration and quantity, and we have never yet seen an instance where we thought the reparative process was interfered with, or the cure retarded by their use. Theoretical considerations may possibly lead to such a conclusion, but it will not be confirmed by observation or experiment.]



the production of coagulable lymph in the inflamed part. The *chief objects*, as to the local affection, are, to diminish inflammation and its usual products in the part; to render these products as little injurious as possible by causing occlusion of the vein, and by these means to prevent the contamination of the blood and the superpervention of the second stage of the disease by the usual exudations which take place into an inflamed vein. The means which are most to be depended upon for the fulfilment of these intentions are generally those which also remove the more distressing local symptoms; and, while they thus act, they tend equally to promote the *three objects* now proposed. The local as well as the constitutional means may be varied to meet the exigencies of particular cases, and the circumstances just alluded to; but even while the disease is still local, internal remedies should be prescribed, as well as local applications. These latter have been, for the cases which have come under my care, since the commencement of my practice, either one or other of the *liniments* prescribed in the APPENDIX (see Form. 295, 296, 297, 300, 307, 311), applied in the form of an *embrocation* over the seat of the phlebitis, by means of two or three folds of flannel or of spongio-piline; or an epithem of spirits of turpentine, or the embrocation prescribed at p. 1257, of the third volume, applied in the way now stated, the access of air to the wounded vein being assiduously prevented.

51. While either of these embrocations is being applied, internal means should be prescribed with due reference to the state of vital power and vascular action, and to existing morbid sensibility and irritability. Care, however, should be had that the medicines prescribed are not such as may occasion vomiting or excessive action of the bowels, as either or both will promote the passage of the products of inflammation into the blood, or render these products more likely to pass into the circulation. The medicines prescribed internally during this period should have for their main objects to prevent the extension of inflammation along the veins, and to assuage pain and irritability: the former of these can be attained only by developing vital power and resistance; and the means best calculated to attain this end may be conjoined with those which affect the latter object. With these intentions I have not unfrequently prescribed the following, varying the individual substances with the varying circumstances of individual cases.

No. 367. R Quinæ Sulphatis; Ferri Sulphatis; Camphoræ, aa, gr. xij.; Pilulæ Galbani comp., ℥ij.; Extr. Opil, gr. vj. (vel Extr. Hyocyami, gr. xvij.); Pulv. Capsici, gr. xij.; Bals. Peruviani, q. s. M. Contunde bene et divide massam in Pilulas xxx., quarum binæ sumentur 4tis vel 6tis horis.

No. 368. R Ferri Sulphatis; Quinæ Sulphatis, aa, gr. xv.; Camphoræ, gr. xij.; Extr. Hyocyami, zss.; Extr. Aloë purif., gr. xij. (vel Pilulæ Aloë cum Myrrha, ℥j.); Pulv. Capsici, gr. xij.; Olei Cajuputi, q. s. Miscet et contunde bene. Divide massam in Pilulas xxx. Capiat æger ij. 4tis vel 6tis horis.

No. 369. R Liquoris Ammonie Acet., ℥j.; Spiritus Ætheris Nitrici, zss.; Ammonie Sesquicarbon., zss. (vel Spirit. Ammonie Aromat. 3jss.); Tinct. Cinchonæ comp., ʒvj.; Tinct. Serpentariæ, ʒijss.; Tinct. Capsici, zss.; Infusi Cascarillæ (vel Decocti Cinchonæ) ad ʒviij. Miscet. Cochlearia ij. vel iij. larga sumentur quartis vel sextis horis.

No. 370. R Olei Terebinthinæ, -ijss.; Spiritus Ætheris Sulphurici comp. (vel Ætheris Hydrochlorici), zss.; Tinct. Camphoræ comp., zss.; Olei Cajuputi, zss.; Pulv. Tragacanth. comp., ʒij.; Pulv. Glycyrrh., ℥ij.; Syrupi Rosæ et Syrupi Tolutani, aa, ʒij.; Infusi Cascarillæ (vel Infusi

Cinchonæ) ad ʒviij. Miscet. Capiat æger Cochlearia ij. vel iij. larga 4tis vel 6tis horis.

No. 371. R Potassæ Bicarbon., ʒij.; Ammonie Carbonatis, zss.; Tinct. Cinchonæ comp., ʒvj.; Tinct. Serpentariæ, ʒij.; Tinct. Capsici, zss. ad ʒj.; Infusi (vel Decocti) Cinchonæ ad ʒviij. Fiat mist. cuius cochlearia ij. vel iij. larga sumentur ter quaterve in die.

52. An apparently high or tumultuous vascular action, or an open, broad or even bounding state of the pulse, should not deter from a recourse to these or similar means; for these phenomena will much more readily subside under the influence of these than of those of an opposite nature; for vascular action is often the greatest and the most tumultuous when vital power is most deficient, especially when any part of the vascular system is inflamed. By developing and increasing vital power by suitable means, in these circumstances, we more readily overcome or appease morbidly increased vascular action. Although it is not desirable to produce much action on the bowels, still the depurating functions should neither be impaired nor arrested. Hence the remedies may be combined as in No. 368, in order to prevent this result; or equal parts of castor-oil and oil of turpentine may be taken on the surface of an aromatic water, or these substances, in larger quantity, may be administered in an enema.

53. During the local limitation or period of the disease the system sympathizes with the local morbid action, occasioning much febrile disorder, which, although the above means may not for some time either diminish or increase, will not pass into that adynamic condition which readily supervenes upon a lowering treatment of phlebitis, owing to the effects of such treatment upon the local morbid action and to the passage of the inflammatory products into the blood. If, however, notwithstanding the means, local and constitutional, now advised, the inflammation of the vein either extends, or produces a puriform fluid, or in cachectic habits of body an ichorous or sanious exudation, which readily passes into and commingles with, and contaminates the blood, the most strenuous efforts should be made to support vital power and resistance, to counteract or neutralize the injurious action of the contaminating materials, and to remove them from the circulation by means of the depurating organs.

54. In this, the *second or contaminating* period of the disease, the treatment will necessarily vary with the states of the several depurating functions—of those of the skin, bowels, and kidneys. The excretions from these must be frequently examined, and the means of cure prescribed appropriately to their several conditions. If the urine presents an acid reaction, the mixture No. 371, last advised, may be continued, with or without the addition of the chlorate of potass or nitrate of potass, or both. If the urine be neutral or alkaline, or contain the phosphates in excess, then the nitro-muriatic acids may be given instead of these and of the alkalies contained in that prescription. If the skin be dry, or parched, or hot, the mixture No. 369 will generally increase the cutaneous functions, especially if promoted by suitable diluents (§ 56). When it is manifest that neither the hepatic nor the intestinal functions are sufficiently discharged, then the pills already prescribed may be given; or pills containing a full dose of calomel and camphor may precede either them, or the castor-oil and turpentine draught and enema above recommended (§ 52).

If the bowels become inordinately relaxed, the tonics already mentioned or others may be conjoined with astringents, small and frequent doses of creasote, absorbents and antacids, and with tincture of opium, or with compound tincture of camphor; or with any of the several remedies advised for DIARRHŒA or DYSENTERY (*see those articles*), according to the features of the case. It should not, however, be overlooked that relaxation of the bowels is a mode of vascular depuration, especially when the hepatic functions are duly performed, and that this relaxation should not be arrested unless it increase, or reduce the patient; but be moderated only, constitutional power being duly supported by the means already prescribed, aided by suitable nourishment, and by a sufficient supply of wine, at regular intervals.

55. In these and similar cases evincing not only great depression of vital power, but also more or less deficiency in the quantity and quality of the blood, the quinine, or the decoction of cinchona, chalybeate preparations, and other restoratives, may be given in increased or more frequent doses; and wherever pain, oppression, or uneasiness may be manifested, the embrocations advised above should be applied and renewed from time to time. In these and analogous states the tonics will be advantageously conjoined with camphor, ammonia, aromatics, &c., and with opium in moderate doses.

56. The diet, regimen, and beverages prescribed for the patient ought to be restorative, and calculated to promote nervous power. Rich wines, brisk, bottled malt liquors, or bitter ales; soda-water or Seltzer-water with wine; the alkaline and chalybeate mineral waters; spruce-beer and weak tar-water; Carara or lime-water with warm milk, &c., are the beverages which will be found most beneficial. Free ventilation, and a warm, dry, and pure air, are also most important aids of medical treatment. In most respects the treatment of the second stage of phlebitis is the same as that which is most efficacious for consecutive abscesses (*see art. ABSCESS, § 62, et seq.*), for the effects of absorption of morbid matter from diseased organs and structures (*see ABSORPTION, § 15, et seq.*), for inflammation of the LYMPHATICS (*§ 17, et seq.*), and for the consequences of animal or food Poisons (*§ 427-456*).

## II. STRUCTURAL LESIONS OF VEINS.—CLASSIF.

### —IV. CLASS, III. ORDER (*Author in Preface.*)

57. *a.* Inflammation of veins occasions redness, or a reddish-brown or violet tint of their coats. But similar changes, usually however of a more uniform character, are often produced in these vessels after death, by the imbibition of the colouring matter of the blood. Indeed, this is the most frequent source of the different shades of colour observed in the veins, these shades varying with the state of the blood, and with the period after death at which the examination had been made. The redness proceeding from this source is much more frequently met with in the veins than in the arteries, evidently owing to the constant presence of blood in the former after death. This change, however, differs in pervading all the coats of the veins, whereas it is generally confined to the inner membrane of the arteries. Redness, therefore, unaccompanied with other changes, cannot be considered as a proof of disease.

57\*. The veins, like other parts of the body, present alterations arising from the secretion of coagulable lymph or albumen. This plastic and organizable matter, in which a number of morbid formations originate, is frequently found in the veins, either extended into membranes or accumulated in amorphous masses. It is always to be viewed, particularly when connected with redness or vascular injection, as a result of the inflammatory act. The experiments which M. GENDRIN instituted upon the veins, as well as upon the arteries, have illustrated this point.

58. *b.* Coagulated lymph is found, 1st, in the interior of the veins; 2d, between their coats; and, 3d, on their external surface. When this is considerable, or obliterates the canal of the vessel, it generally becomes partially organized, and is changed to cellular tissue, if the life of the patient continue for some time. When the lymph is secreted in smaller quantity, so as not to interrupt the circulation in the vessel, it generally presents the form of a firm albuminous layer, without any trace of organization; but in some instances, as pointed out by RIBES, GENDRIN, and ANDRAL, it forms a delicate membrane, and presents evident traces of organization, being traversed by minute vessels. The surface of the vessel opposed to those membranes is sometimes, most commonly in the more recent cases, of a deep red colour; but in other cases, particularly those of older date, it is perfectly colourless. The coagulated albumen thus formed in the interior of the vein may constitute small patches merely, or small circumscribed masses, or a complete continuous layer extending through the whole of one or several vessels. The polypous concretions described by REIL (*Fieberlehre*, bk. ii., p. 215-297) belong to the second of those varieties.

59. *c.* Purulent matter is frequently found in veins. M. ANDRAL states that coagulable lymph may gradually lose its physical characters, and be insensibly transformed into pus. That this may happen previously to the coagulation of the lymph, is possible; but we have no satisfactory proof of its occurrence, and least of all, after the coagulation of this fluid has taken place. Indeed, it must not be supposed that the purulent matter formed in the veins is generally, or even frequently, produced in this manner. When it is found in the veins, it evidently does not proceed from a transformation of the plastic matter already noticed, but from a modification of the morbid action of the extremities which secrete that matter, and from a change in the vital condition and cohesion of the internal membrane of the vessel; this membrane being somewhat softened, and frequently tumefied or thickened. When the purulent matter is formed from the vein itself, it is found, 1st, in the cavity of the vessel; 2d, infiltrated between its coats; and, 3d, surrounding.

60. The purulent matter formed in the interior of the veins is, however, more frequently conveyed there from some other part with the blood, than secreted by an inflamed vein. When detected in a vein, it is either pure, or mixed with the blood or with coagula. When pus is found connected with coagula, it has been, in some cases, external to them, and in others contained in them. This latter phenomenon has led to some speculation on the part of certain pathologists. M. ANDRAL believes that pus contained



within a coagulum has been formed there in consequence of some peculiar modification of the blood itself. But this is merely a supposition, and is opposed by the consideration that the blood-globule can hardly be changed to a pus-globule, either during or after the coagulation of the blood. It is much more probable that the pus, whether poured into the vessel from its inflamed internal surface, or conveyed from a distant part with the blood, but particularly when it proceeds from the former source, is first formed, the blood coagulating around it, owing to some obstruction to the circulation in the vessel, or to the effect produced by the morbid secretion on the fibrin of the blood favouring its coagulation.

61. The irritation and inflammation producing suppuration of veins arise from various causes. These are stated when treating of inflammation of these vessels (§ 6, *et seq.*), where I have shown that inflammation originating in a part of a vein may be propagated both toward the heart and in the course of the smaller branches. The connexion of redness, thickening, softening, &c., of the coats of veins, with the formation of purulent matter in them, has been fully illustrated by the researches of RIBES, DAVIS, VELPEAU, GENDRIN, LOUIS, ARNOTT, LEE, TONNELLÉ, and DANCE; and similar appearances have repeatedly come before me in the examination of fatal cases of puerperal diseases. But pus is often formed in the veins without any change of structure of their parietes, particularly in those veins which arise in parts in a state of suppuration. I have observed in several cases, in which the uterus of puerperal patients contained purulent matter either in its cavity or in its sinuses, the uterine veins, and some of the veins into which they run, nearly filled with this matter. Similar appearances have been noticed by DANCE, LOUIS, and others. ABERCROMBIE and TONNELLÉ have found pus in the sinuses of the dura mater, in cases of caries of the bones of the head, &c. Pus has often been found in the veins near diseased joints, suppurating fractures, and unhealthy stumps, by RIBES, VELPEAU, and others. BLANCHARD long ago found pus in the vena cava, in a case of abscess of the liver. M. GENDRIN found pus in the veins in the vicinity of ulcers in the intestines. M. ANDRAL has met with similar appearances. I have stated in the article DYSENTERY, that abscess of the liver sometimes complicating that disease not unfrequently proceeds from the absorption of pus from the ulcerated intestines into the veins, which, circulating into the vena porta, excites diffusive or asthenic inflammatory action, rapidly followed by the formation of purulent matter in the substance of the liver. This view is confirmed by the researches of M. RIBES, who has demonstrated that the villi of the intestines are principally composed of minute branches of veins. M. ANDRAL found, on the examination of a case of diseased intestines and liver, the vena porta and its branches lined with a false membrane. When purulent matter is formed in a part, and afterward conveyed into the veins, as in the instances now alluded to, their coats are in some cases apparently sound, and in others inflamed or softened, or their interior is lined with a false membrane, &c. In the latter cases, either the inflammatory action has extended itself to the veins from the part primarily diseased, or the morbid secretions which have passed into them have

irritated and inflamed their internal membrane, at the same time that they have induced serious changes in the blood and system generally.

62. In asthenic or cachectic states of phlebitis, or when the cause is of a poisonous or septic character, the exudation from the interior of the inflamed vein is neither plastic nor purulent, and is so entirely of an ichorous and liquid nature as to mingle readily with the current of the circulation, and to rapidly contaminate and poison the blood and the soft tissues, and to destroy life. In such cases discolouring of the inner surface, and softening and thickening of the coats of the vessel affected, with an altered appearance of the blood—a dark, semi-coagulated or uncoagulated condition of this fluid. In these cases the blood is rarely, or if at all, coagulated, or very imperfectly coagulated in the diseased vein or veins, there is no plastic exudation on the internal surface, and no trace of pus in the vessel. The injurious operation of this ichorous exudation is accelerated by the circumstance of its failing to produce coagulation of blood in the vein; for when the exudation is plastic or purulent a coagulum is generally formed by these latter exudations; and this coagulum often prevents the extension of the inflammation and contamination of the blood and its consequences, while the ichorous and more liquid exudation hastens both these most dangerous or fatal results.

62\*. Thus the morbid states of veins may originate either in themselves or in the parts in which the veins commence; but, whether they be thus primary or consecutive affections, they exercise a powerful influence on the system, and on distinct organs, both through the medium of the blood and by continuity of tissue. 1st. Purulent matter secreted from an inflamed vein, or conveyed into the veins from an adjoining part, may mix with the blood, occasion febrile symptoms of an adynamic character, generally with colligative perspirations or diarrhoea, and be thus eliminated from the circulation nearly as fast as it passes into it, by the several emunctories. 2d. This matter, when once carried into the circulation, may be secreted from it into the parenchyma of some organ, the cavity of some joint, or even into cellular or muscular parts. 3d. Purulent matter circulating in the vessels, whether the pus-globules be metamorphosed or no, during their circulation, may induce inflammatory irritation, or such a state of the capillaries of an organ or part previously disposed to disease, as will be rapidly followed by the formation of purulent matter in such part, or by disorganization. 4th. Inflammatory irritation excited in the internal membrane of a vein, more especially in the asthenic forms, may extend in every direction to other veins, especially in that of the heart, and thus implicate other organs or parts. This diffusive form of phlebitis generally occurs in debilitated or unhealthy states of the frame, or when the disease is consecutive on other maladies, or caused by septic or poisonous agents. 5th. Inflammatory disease of the internal surface of the veins will give rise to a secretion varying with the state of the vital powers of the system, and this secretion carried along, and mixing with, the circulating current, will remarkably influence those powers, and depress or otherwise modify them. 6th. Inflammation attacking all the coats of a vein is more likely to occur in a healthy body than that confined to the inner surface, and is more com-

monly productive of an effusion of coagulable lymph, which tends to limit the inflammation, to prevent the admixture of the products of inflammation with the blood, and thus to preserve the blood from contamination. 7th. This sthenic form of inflammation most frequently occasions obstruction and obliteration of veins; and, if the obliteration be seated in large veins, serious local and general effects may result, owing to the mechanical obstacle thereby presented to the circulation.

[Analogy justifies the assumption that pus is secreted by the coats of the veins. VOGEL has fully demonstrated the transition of epithelium cells into pus-globules. SCHWANN having originally shown that all organic bodies are developed out of nucleated cells, HENLE followed up the observation, and proved that from these primary cells either normal or pathological forms may spring: consequently, inflammation would give rise to pus-globules. To apply these views to the formation of purulent matter within the veins: the cells of the epithelium lining separate from the internal membrane of the vein, so as to give a dull appearance to the inner surface of the vessel, and render it more susceptible of a morbid tinge from imbibition. The passing blood-corpuscles next assume a spheroid, or a gibbous appearance, advance with a slow revolving movement, or cling to one another, parting with their serum and with their pigment. The lining membrane of the vessel generates new, imperfect epithelium cells which mingle with the altered blood, and, finally, actual pus-globules, which, when congregated in sufficient number, completely arrest the current of blood, and affect the blood-corpuscles in the manner above mentioned. The simultaneous effusion of both fibrin and albumen now serves to complete the formation of a plug, which differs in its external character according to its more or less rapid development, and to the varying proportion of its constituent parts. Supposing suppurative phlebitis has now commenced, or is commencing, the plug, thus formed, grows softer towards its centre; it assumes a grayish, yellowish-white, dotted appearance, and finally exhibits a straw colour, and a semi-fluid consistency. Its laminated structure becomes more and more indistinct, and it is finally resolved into pus, which is usually confined within a fibrinous layer more or less thin, and rarely found loose within the vein. But the contents of the veins being unceasingly propelled towards the heart, the more or less solid products of inflammation are necessarily conveyed beyond the original site of inflammation. For this reason it would be premature were we at once to conclude, in examining a body, that the part of a vein at which we might happen to find a pus-coagulum must be the true seat of the disease. That seat is frequently remote, and difficult to discover: thus between a purulent coagulum in the inferior vena cava, and a gangrenous spot or a varicose ulcer on the leg, the whole extent of the iliac and crural veins, together with their deep-seated branches, shall be found perfectly healthy, while one or more branches of the saphena vein above bear all the evidence of intense inflammation. But *si nec pus*, by mingling with the blood, causes its coagulation, a decided hinderance is thereby offered, in the majority of instances, to the product of inflammation passing along with the venous current. The pus becomes isolated by the coagulation of blood both above

and below the place of its formation, and is thus cut off from the remainder of the blood. This has been called by some pathologists the *sequestration* of veins. Under such circumstances, the pus may be gradually removed by the process of absorption, the vein in the mean time becoming obliterated; or it may make for itself an outlet through the parietes of the vein. Then abscesses, varying in size and number, according to the amount of inflammation, form beneath the skin, or between the muscles, and the patient is thus protected against the dangerous consequences of a general infection of the circulating fluid. Is not such the origin frequently of the cold, deep-seated abscesses so often met with after injuries, and in vitiated constitutions? When pus has thus formed within an inflamed vein, its coats begin to undergo a change; their colour inclines to a grayish white; they become softened and thickened; and can no longer be distinguished from each other, forming with the surrounding textures a nearly uniform membranous layer of a lardaceous character and aspect. Soon after, a turbid, puriform fluid is often found deposited at intervals in the cellular tissue; in some instances, where the suppuration is active in the vicinity of the vein, the latter traverses the purulent channel for a considerable space, denuded in its entire circumference. Here the membranes of the vein gradually soften, and at length melt down, until no farther vestige of their texture is discernible within the common centre of suppuration.

If this process of *sequestration* does not take place, or but imperfectly, and the pus, or softened fibrin, passes at once into the general circulation, then all those phenomena ensue described by our author, the disease perhaps first assuming the type of an irregular intermittent, and subsequently of a typhoid or putrid and malignant character.

The morbid condition of the blood hence resulting leads to organic changes in every part of the body; all being referrible to stagnation of the circulating fluid, and are divisible into such as occasion a stagnation and interruption of the sanguineous current in the central portions of the vascular system, and into such as have their seat in the capillary system.

According to HASSE, the first series of changes consist in the formation of pus, and in coagulation of blood within the large venous or arterial trunks—even in the heart itself. The product of inflammation, whether pus or fibrin, follows the course of the blood towards the heart, but, advancing more slowly than the uncontaminated blood, accumulates, invests itself again and again with fresh layers of coagulum, and ends by entirely closing up the cavities of individual vascular trunks, and especially where a large quantity of blood has to pass within a brief space of time, and in which, therefore, the pus-globules and the fibrinous particles accumulate the more rapidly.

The pulmonary artery and its branches are most frequently the seat of this coagulation of the blood consequent on phlebitis, the plug which forms here perfectly resembling that of the adhesive inflammation of vessels. It is of a pale-brown colour, with here and there a yellowish spot, composed of concentric layers, and attached more or less closely to the walls of the vessel. These concrete masses, which have been observed in uterine phlebitis, and phlebitis consequent on uterine carcinoma, spread to the minutest extremities of the pulmonary artery, generally of one side only, and



causing death as soon, at least, as the main trunk becomes obstructed. In other cases similar coagulation occurs in the right cavities of the heart, in the form of *polypi* of the heart, as they have been called; which are of a grayish or pale violet colour, and having a stratiform and fibrinous structure. Internally they are sometimes found considerably softened, and occasionally containing liquid pus, while externally they are attached to the columnæ carneæ, and the valves of the heart. HASSE thinks that in order to produce such coagulation, it is indispensable, not only that a certain amount of morbid matter should pass into the circulating mass, but likewise that there should exist a peculiar predisposition of the body generally.

The most important pathological result of phlebitis, however, is that which involves secondary organic changes in the capillary system, called by some pathologists "*lobular inflammations*" and "*lobular abscesses*." They occur most frequently in organs through which the greatest portion of the blood is propelled within a short space of time, viz., the *lungs* and *liver*. They seldom occur in the spleen, kidneys, external skin, or cellular tissue; more rarely still in the brain, eye, and muscles. Serous membranes are not often the seat of this puriform effusion, the synovial membranes and pleura rather more so than the others. *Puerperal peritonitis* forms an important exception, though frequently the result of concurrent metritis. Veins, also, distant from those originally diseased, appear to be obnoxious to this secondary suppuration. The above explanation applies to abscesses in the liver and other organs, consequent on injuries of the head and other parts, which for so long a time were a source of mystery to medical men. These phenomena, then, are due to a phlebitis, in which the pus formed is not isolated, but mingles with the general sanguineous mass. As to the absorption of unaltered pus through the capillaries, it is hardly admissible on physical grounds. With regard to the abscesses that form in the lungs, liver, and spleen, it is now agreed by the best pathologists that these collections are not at once purulent at the outset, but the blood stagnates at certain points, producing suppurative inflammation of the surrounding tissue; or knots form of from the size of a pea to that of a walnut, become infiltrated with firm coagulated blood, and eventually suppurate. Formerly it was supposed that the pus formed within the veins at the part originally inflamed was transmitted through the current of the circulation to the lungs, liver, &c., and thus formed the abscesses in question. If pus be injected into the veins of horses, lobular abscesses will shortly afterward be found in the lungs. The pus-globules having reached the capillaries of the lungs, are unable, from their size, to permeate them, thus becoming central points of stagnation, and finally of extravasation in the minute branches of the pulmonary artery, and inducing inflammation and suppuration. VOGEL, however, considers it not impossible for single pus-globules to pass through the capillaries of the lungs, and HASSE remarks that it may be assumed that in some cases the substances commingling with the blood pass through the capillary system of the lungs without inducing any change in the pulmonary parenchyma. Some such admission seems necessary to explain the origin of purulent collections in other organs than the lungs and liver. Perhaps, as HASSE suggests, the nuclei of rup-

tured pus-globules may pass through the capillaries of the lungs into the general circulation, as also fibrin altered by the inflammatory process into finely-divided particles.]

63. *d. Softening* of the inner membrane of veins is often observed, and is generally conjoined with redness when it is the result of inflammation. Sometimes the softening is so great that the inner surface of the vessel is readily reduced to a pulpy state by gently scraping it with the back of the scalpel.

64. *e. Thickening* of this membrane is often associated with the foregoing changes; it may be either partial or general. In the former case the inner surface of the vessel presents an uneven appearance. But softening and thickening of the inner membrane of the veins are not always connected with redness; this membrane may present either of those alterations, or both of them, accompanied with paleness or with different shades of colour.

65. *f. The valves* of the veins are subject to the same alterations as the inner membrane. They are often deprived of their transparency, thickened, or partially destroyed; presenting the appearance of irregular fringes crossing the cavity of the vessel, and having generally coagulated blood adhering to them.

66. *g. The middle coat* of veins is often softened, generally at the same time as the inner. When this is the case, the vessel is torn with great ease. This coat is also subject to *atrophy*. When this exists the vessel presents an extraordinary degree of tenuity. *Hypertrophy* of the middle coat has been minutely described by M. ANDRAL. When this change exists, the coat is more distinctly visible, and its longitudinal fibres more evident. When the hypertrophy is considerable, this coat loses its transparency, acquires a yellowish colour, and becomes, to a certain degree, elastic, so that, when cut across, the vein remains open as an artery, to which it closely approaches in appearance. On minute dissection, however, the middle hypertrophied coat never presents any trace of circular fibres, nor does it possess the same degree of elasticity as the middle coat of arteries. M. ANDRAL states that he once detected, as he believes, muscular fibres in the vena cava inferior, near the heart; the cava was greatly hypertrophied. The hypertrophy in this case developed a structure similar to the natural condition of the vessel in some of the lower animals. In the horse, the structure of the vena cava near the right auricle is evidently muscular.

67. The middle coat, however, may be much thickened without actual hypertrophy or development of its fibres. This may arise from a deposition of fibrinous lymph in its texture, which becomes solidified by the absorption of its serous portion. M. ANDRAL accounts for this change by supposing that a quantity of blood accumulates in its tissue; that the colouring particles are absorbed, and the white fibrin remains behind in a solid form, combined, molecule to molecule, with the coats of the vein, presenting the lardaceous appearance described by authors as a particular tissue; but instead of having recourse to this complex explanation, would it not be preferable to consider this alteration as a result of chronic inflammatory action in the coats of the vein?

68. *h. The external coat* of the veins is subject

to the same changes as have been observed in the external coat of ARTERIES, and which are described in that article (§ 44). These alterations of both the middle and external coats are commonly seen after chronic phlebitis.

69. *i. Ulceration and perforation of the several coats of the veins are sometimes met with.* M. ANDRAL thinks that the latter is more frequently observed than the former. Perforation has been detected in the superior cava, both within and without the pericardium; in the inferior cava; in the vena portæ, both within and without the liver; in the splenic vein; in the jugular; in the subclavianæ; in the mesenteric veins, and in the veins of the extremities. The perforation is sometimes seen without any appearance of disease in the vicinity of the coats of the vessel, rupture taking place from external violence or muscular exertion. This form of perforation, or rather *rupture*, is most frequently observed in the vena cava and veins of the internal viscera. Instances of rupture of large veins are numerous. SCHENCK, MORGAGNI, DE HAEN, DOUBLEDAY, GROQUIER, LOVADINA, &c., have recorded rupture of the vena cava. MORGAGNI also found the pulmonary vein ruptured. In the majority of these and other instances, the rupture was occasioned by exertion or external injury. It is probable, however, that the walls of the ruptured vessel had been previously diseased. In cases of perforation the vessel is commonly more or less inflamed, ulcerated, softened, atrophied, &c.; and here, as well as in the case of rupture from exertion or violence, the perforation occurs from within outward; but the perforation may also proceed in a different direction; viz., from without inward, as when the vein is seated in diseased parts, as in carcinomatous ulcers of the stomach, or is pressed upon by a tumour.

70. *k. The calibre of veins may be much altered—may be increased or diminished—especially when the coats are diseased as described, the change of diameter occurring in the parts of their parietes which are affected.—(a) Dilated or varicose veins present a variety of appearances:* 1st. The veins may be simply dilated, in respect either of a whole vein or of portions of it, without any affection of the capillaries which nourish it, but more frequently with chronic inflammation of its coats; most probably the dilatation is the consequence of inflammatory action, this state disappearing, but the dilatation continuing. 2d. They may be dilated, either uniformly or at intervals, with thinning of their parietes. 3d. They may be dilated and their coats thickened, either uniformly or at intervals, the vessel being generally also lengthened, and consequently tortuous. 4th. They may be dilated and divided into compartments by the interposition of septa or partitions, between which the blood stagnates or even coagulates. 5th. They may be dilated, divided into compartments, and the dilated portions perforated, so as to allow the blood to pass into the cellular tissue surrounding the vein. M. ANDRAL thinks that the tumours described by the name of *erectile* are in reality nothing more than a cluster of small veins communicating with one another and with the surrounding cellular tissue by the perforations situated as now described.

71. The structure of every variety of hæmorrhoidal tumour may be referred to one or other of the foregoing varieties of dilatation or varix;

but these lesions are not confined to the veins in the vicinity of the anus. M. ANDRAL once found the external jugular altered in the manner described in the last variety. In some cases the tumours occasioned by dilated veins disappear spontaneously. When this occurs, the veins are generally obliterated. Some of the above kinds of varix, according to this pathologist, depend upon increased activity, others upon diminished activity of the nutritive process. Such, however, can be rarely the case. They are generally the results of pressure on the venous trunks into which the varicose veins pour their blood, or of some other obstruction to the circulation through the former vessel. In this case the varicose veins are not only greatly dilated and elongated, but their parietes are also hypertrophied.

72. *(b) Contraction and obliteration are, according to M. ANDRAL, much more common than their dilatation.* These lesions are occasioned, 1st, by obstruction in the interior of the veins; 2d, by causes seated in their parietes; and 3d, by mechanical compression external to them, generally from tumours, &c. The most frequent cause of the obliteration of the canals of veins is the spontaneous coagulation of the blood within the veins. That the blood may coagulate, during the life of the patient, within a vein or portion of a vein, and even within the sinuses of the dura mater, has been proved by the researches of many pathologists, particularly by MECKEL, GENDRIN, BOUILLAUD, RIBES, ANDRAL, CRUVEILHIER, ARNOTT, REYNAUD, ROKITSANSKY, myself, and others. It has occurred in several which have come before me in practice, especially in the advanced stages of low fevers, of acute rheumatism, of puerperal disease, and in dysentery. It is often difficult to assign the particular cause of the coagulation. It is, in some cases, apparently owing to the low state of the vital energies and their effect on the blood. In other cases it is probably occasioned by the morbid state of the valves already noticed (§ 65), or to lesion of the internal parietes of the vessel. Most frequently, however, it proceeds from coagulable lymph or pus secreted from the internal surface of the vessel; this morbid secretion adhering to the inflamed surface producing it, entangling the fibrinous and colouring parts of the blood, and thus forming a coagulum which either partially or entirely obstructs the canal. This coagulum generally varies in colour, density, and firmness of adhesion to the sides of the vessel; and it increases in bulk until the passage is entirely obstructed by it. Occasionally the coagulum becomes, in some respects, organized. Some of the pathologists whose names I have just adduced suppose that these coagula live precisely as the veins in which they are formed, and, like every other part endowed with life, keep up a constant process of nutrition and secretion, and are also liable to become diseased.

73. The canal of a vein may be altogether obliterated, and the vessel reduced to a fibro-cellular cord. This seems to be effected in a similar way to that observed in arteries. Obliteration of large venous trunks gives rise, as observed in arteries, to a collateral circulation, kept up by means either of small veins, or of one vessel that has acquired an unusual size. The most remarkable instance of obliteration was observed by M. REYNAUD in the superior vena cava. The veins on the lateral surface of the chest were remarkably enlarged, and anastomosed freely with the



epigastric veins, which were also greatly enlarged. The circulation was carried on chiefly by the vena azygos and inferior cava. The consequences of obstruction and obliteration of veins, especially œdema and dropsy, are well known. Several instructive cases of obliteration of the cavity of the vena cava, of the iliac veins, and of the sinuses of the dura mater, are recorded by BARTHOLINUS, RHODIUS, MANTISSA, BONTIUS, ALBINUS, HALLER, MORGAGNI, HODGSON, BRESCHET, WILSON, TONNELLÉ, REYNAUD, ANDRAL, and ROKITSKY.

74. *l. Ossific or calcareous* formations are rarely met with in the coats of the veins. They have, however, been observed by MORGAGNI, WALTER, MURRAY, BAILLIE, and TILORIER, and more recently by MACARTNEY, BECLARD, and ANDRAL, in the femoral and saphena veins. Sometimes these concretions protrude into the cavity of the vessel, either bursting its internal membrane, or carrying this membrane before them. In either case they may at last escape into the cavity and lodge there, without any attachment to the sides of the vessel; for in the latter case the membrane may contract behind the concretion, forming at first a peduncle attaching it to the vessel, which at last is ruptured or absorbed.

75. These concretions have received the name of *Phlebotomes*; they vary from the size of a millet-seed to that of a pea. They have sometimes been found in the centres of coagula, which had evidently been formed around them. They have been observed by COLUMBUS, WALTER, SOEMMERING, JOHN, and LANGSTAFF. F. TIEDEMANN has described them minutely. Those which he has observed, as well as those noticed by the pathologists just now named, were formed in the uterine and hæmorrhoidal veins. TIEDEMANN and ROKITSKY state that they are formed of concentric layers of the phosphate and carbonate of lime, sometimes with magnesia, united by albuminous matter, around a minute clot or coagulum; and deny that they are formed in the way which I have just stated (§ 74); and contend that they have been produced by a sort of crystallization, or deposition, of the earthy particles contained in the blood, around a nucleus which had formed in the nearly stagnant blood in the veins. M. ANDRAL also considers it possible that they may have been formed in the blood itself. It is difficult to assign limits to the range of possibilities without relation to the faith of those for whose belief they are adduced; but the question is, whether or no these concretions have ever been actually ascertained to have been formed in this manner. I believe that no such fact has ever been adduced.\*

\* The mode of formation of these concretions, or *vein-stones* as they have been termed, is for the most part as follows: Slow inflammation occurs in pouches or dilated portions of vein, and in the prolongations of small venous twigs, suddenly dilated, which results in conglutination of the blood in distinct concentric layers. These coagula, which are mostly spherical in shape, become the nidus for the deposition of phosphate of lime and magnesia, until at length the whole clot is transformed into a *phlebotome* or ossific mass, made up of concentric layers. When the dilated portion of the vein or pouch is thus filled up, its walls commonly become atrophied; the inner surface of the vein assumes more of a cellular structure, and closes firmly around the vein-stone, sometimes making it appear to be external to the vein. At other times the conglutination of the blood extends beyond the point where a vein-stone has formed, the calibre of the vessel closes up, and an entire portion of the implicated vein is obliterated. In other cases there is good reason to believe that they occur free and movable within vessels which continue

76. *m. Fatty, suety, and atheromatous deposits* have been found in the parietes of veins, but not nearly so frequently as in the coats of *arteries*, where I have first described them (§ 59, 60). BONTIUS states that he has met with large masses of fat in the vena cava, obstructing its canal. I have sometimes found fatty and suety deposits between the coats of the vena portæ; and M. ANDRAL has noticed similar deposits in this vein.

77. *n. Tuberculosis* does not occur either in or on the coats of the veins. If any tubercular matter, or substance resembling this matter, be found within the veins, it can proceed only from imbibition or absorption. But before this matter can be imbibed it must be softened, or metamorphosed, and thus have lost the tubercular characters.

78. *o. Cancer* is met with in veins in two ways: 1st. The walls of a vein may be attacked by a cancerous or carcinomatous growth, penetrated by, involved in, and closed or altered by this growth. The portal, renal, hepatic, and other veins may be thus implicated: 2d. The cancerous matter, especially when existing in other parts of the body, may constitute in a large vein a variously-formed mass, attached to the interior of the vessel, that may either partially or entirely fill and obstruct the canal. This cancerous formation obviously arises from the imbibition or absorption of the cancerous matter or cells into the veins, where they attach themselves and collect into masses of various sizes and forms. The œdema and swellings occurring in the last stages of carcinoma are, in some cases, attributable to this formation in the veins, and in others to phlebitis, produced by the imbibition of the cancerous matters.

79. *p. Gaseous fluids* have occasionally been remarked in the veins. In some cases they have proceeded from incipient putrefaction, but in others this could not have been the case. The vapours and gaseous exhalations from blood very recently taken, or at the time of its being taken from veins, and those found in veins after death, have not been sufficiently examined. They manifestly are such as demand a much stricter investigation than they have hitherto received. In cases of surgical operations, when large veins are divided, air not infrequently enters the veins; and if it rush in suddenly, and in considerable quantity, it is soon followed by death. The experiments of MM. MAGENDIE and PIEDAGNAL have demonstrated this fact conformably with what has occurred during several operations; but the mode in which this result takes place is not so evident. The air seems to act in deranging and arresting the contractions of the heart, and affecting the actions of the lungs.

80. *q. Entozoa* have been often found in the veins of the lower animals. The strongylus and filaria have been detected in the horse. M. ANDRAL found individuals of the class Nematodea in the vessels of a porpoise. In one only case he found Acciphalocysts (hydatids) in the pulmonary veins.

BIBLIOG. and REFER.—*Areteus*, Cur. Morb. Acut., 1.

pervious to the current of the circulation. Some pathologists maintain that they form in peculiar sacs in the cellular tissue, external to the vein; others think they are deposited between the coats of the vein, and ultimately get into the interior of the vein by absorption; while OTTO, TIEDEMANN, LORSTEIN, (RUEHLER, FRIQUET, CARSWELL, and LASSÉ suppose that they form originally within the vein, in the manner above indicated.]

- ii., c. 8. (*Notices Diseases of the Vena Cava.*)—Columbus, De Re Anatomica, l. xv. Franc., 1503.—Schenck, Observat., l. iii., sect. ii., No. 51. (*Rupture of Vena Portæ.*)—Alvius, Annot. Acad., l. vii., c. 9. (*Obstruction of Vena Cava.*)—Bontius, De Medicinâ Indorum Observ., p. 251. (*The Cava obstructed by an adipose Substance.*)—Haller, De Aortæ Venæque Cavæ Gravioribus quibusdam Morbis Observationes. Goett., 1749.—Casper, in Philosoph. Transact., No. 270.—Morgagni, De Sed. et Caus. Morb., ep. lxiv., art. 9.—Waller, Anat. Mus., i., p. 172; et Observ. Anat. p. 44.—Murray, Act. Med. Succic., i., p. 3.—W. J. N. Laniusvert, Theoria de Arteriarum et Venarum Affectionibus, 4to. Prag., 1764.—E. J. Neifeld, Ratio Medendi Morbis Circuli sanguinei, Svo. Bresl., 1773.—Doubleday, in Med. Observat. and Inquiries, vol. v., No. 15.—De Haen, Ratio Med., t. x., p. 51. (*Rupture of Vena Cava.*)—J. Hunter, on Inflammation of Veins, in Edin. Med. Comment., vol. iii., p. 43, Svo. Edin., 1775.—Waller, Observat. Anatom., p. 41, 45. (*Phlebitis*); et Anat. Mus., i., p. 172.—J. Abernethy, on the Ill Consequences sometimes succeeding to Venæsection: Surgical and Physiological Essays, Svo. Edin., 1793.—M. Baillie, in Transact. of Soc. for Improvement of Med. Knowledge, &c., vol. i., p. 134.—J. Hunter, Observations on the Inflammation of the Internal Coats of Veins, in Transact. of a Society for the Improvement of Med. and Chirurg. Knowledge, Svo. Lond., 1793, vol. i., p. 18; and in *Palmer's ed.* of his Works, vol. iii.—Morgagni, De Sed. et Caus. Morb., ep. xxvi., art. 27, 28. (*Rupture of pulmonary Vein and Vena Cava*); et ep. lxiv. art. 9. (*Ossification of.*)—Simmons, in Med. Facts and Observat. vol. viii., No. 3.—J. Portal, Anatom. Médicale, t. iii., p. 355.—Bichat, Anat. Génér., t. ii., p. 415.—Aucherich, De Vulnérarum Venarum Sanatione. Tub., 1812.—Schmuck, Dissertation sistens Observationes Medicas de Vasorum Sanguiferorum Inflammatione, 4to. Heidelberg, 1794.—J. G. W. Sasse, Disertatio de Vasorum Sanguiferorum Inflammatione, Svo. Hal., 1797.—Reil, Fieberlehre, th. ii., p. 215, 257. (*Polypous Formations in Veins, in Fevers.*)—P. O. A. Le Herissé, Sur le Phlébite, Journ. de Méd. Continué, t. xii., p. 417. Par., 1806.—J. P. Frank, De Curand. Hom. Morbis, l. v., p. 2, 63.—Oslander, N. Denkwürdigkeiten, b. i., p. 53. (*Pus in Veins.*)—C. J. A. Schœnleu, Faits pour servir à l'Histoire des Inflammations Veineuses et Artérielles, Biblio. Médicale, t. xvi., Svo. Par., 1806.—J. Wilson, an Instance of the Obliteration of the Vena Cava from Inflammation, in Trans. of a Soc. for Impr. Med. and Chirurg. Knowledge, vol. iii., Svo. Lond. 1812.—Oldknow, in Edin. Med. and Surg. Journ. 1810.—Lardner, in Ibid. 1811.—J. Hodgson, Treatise on the Diseases of Arteries and Veins, Svo. Lond., 1815.—J. B. Longuet, Sur l'Inflammation de la Société Médicale d'Emulation, an. viii., Svo. Par., 1817.—R. Carmichael, Observations on Varix and Venous Inflammation, Irish College Trans., vol. ii., Svo. Dub., 1818.—F. A. B. Puchett, Der Venensystem in seinen Krankheitsverhältnissen dargestellt, Svo. Lips., 1818.—B. Travers, on Wounds and Ligature of Veins: Surgical Essays, vol. i., Svo. Lond., 1818.—J. Blundell, in Trans. of Med. and Chirurg. Soc. of Lond., vol. ix., p. 65, 90.—J. Parlow, in Ibid., vol. xvi., p. 28.—B. B. Cooper, in Ibid., vol. xvii., p. 41.—G. Breschet, De l'Inflammation des Veines, in Journ. Complément. des Sc. Méd., Fevr. Par., 1819.—Breschet et Villermé, Dict. des Sc. Méd., art. *Phlébite*, t. xli. Par., 1820.—G. B. Palletta, Exercitationes Pathologicae, c. ii., Svo. Mediol., 1820.—D. Meli, Storia d'un' Angiotie Universale, seguita da alcuni Considerazioni Generali intorno alia Inflammatione de' Vasi Sanguiferi, Svo. Milan, 1821.—A. Duncan, Jr., Cases of diffuse Inflammation from Venæsection, Trans. of Edin. Méd. and Chirurg. Soc., vol. i., p. 474, Svo. Edin., 1824.—J. Bouillaud, Recherches pour servir à l'Histoire de la Phlébite, Revue Méd., 1825, t. ii., p. 71, 413, Svo. Par., 1825.—Thorier, Journ. de Méd. Cont., t. xi., p. 224.—John, in Schweigger's Journ., &c., t. xli., p. 80.—Meckel, in Journ. Complément. des Sc. Méd., t. iii., p. 3; and Lond. Med. Repos., vol. xiv., p. 155. (*Concretions in the Vena.*)—Journ. Complément. des Sc. Méd., t. xxxvii., p. 198. (*Case of Phlebitis cured by Compression.*)—G. Langstaff, Trans. of Med. and Chirurg. Soc. of London, vol. viii., p. 272.—D. D. Davis, in Ibid., vol. xii., p. 426. (*The first to connect Phlegmasia Dolens with Phlebitis.*)—G. Southam, in Ibid., vol. xxx., p. 72.—R. Lee, in Ibid., vol. xv., p. 132, 369.—F. Tiedemann, Journ. Complément. du Dict. des Sc. Méd., t. iii., p. 38.—G. Breschet, Recherches Anat. Physiol. et Patholog. sur le Système Veineux, et spécialement sur les Canaux Veineux des Os, fol. et fig. Paris, 1823; in Journ. Complémentaire du Dict. des Sc. Méd., t. ii., et iii. 1818-19. (*On Phlebitis.*)—J. Bouillaud, in Revue Médicale, 1825, t. ii., p. 80; in Archives Génér. de Méd., t. ii., p. 188, t. v., p. 94; in Med. and Chirurg. Review, July, 1838, p. 252; in British and Foreign Med. Review, vol. vi., p. 456.—Ribes, in Revue Méd., 1825, t. iii., p. 25; t. iv., p. 5.—Gendrin, in Ibid., 1826, 2. é., p. 28. (*On the Causes of Inflamm. of the encephalic Veins.*)—Forbes, Trans. of Med. and Chirurg. Soc. London, vol. xiii., p. 293.—B. C. Brodie, in Ibid., vol. vii., p. 195.—R. Lee, in Ibid., vol. xv., p. 369.—C. Hawkins and A. C. Hutchinson, in Ibid., vol. xv., p. 432.—P. W. Holberton, in Ibid., vol. xvi., p. 63.—T. H. Silvester, in Ibid., vol. xiv., p. 36.—J. Frank, De Phlébite, Prax. Med. Univ., pt. ii., vol. viii., l. 18, Svo. Taurin, 1825.—F. Ribes, Exposé des Recherches sur la Phlébite, Revue Méd., Par., 1825; et Œuvres, t. i., p. 54.—G. Breschet, Dict. de Méd., art. *Phlébite*, t. xvi. Par., 1826.—P. H. Bernard, Dict. de Méd., art. *Cava*,—Reynaud, in Journ. Hebdomadaire de Méd., t. ii., p. 412; et Ibid., t. v., p. 178.—Dance, De la Phlébite considérée sur le rapport de Causes, &c., in Archives Génér. de Méd., t. xviii., p. 520; t. xix., p. 8.—Godin, in Ibid., 2d ser., t. xii., p. 52. 1836.—Lamborn, in Ibid., 3d ser., t. xiv., p. 127. 1842.—Vidal, in Ibid. Oct. 1845.—Frey, in Ibid. Avril, 1845. (*Inflam. of Vena Portæ.*)—Bonnet, in Ibid., 4th ser., t. i. 1839.—Tonnellet, Mémoire sur les Maladies des Sinus Veineux de la Dure-Mère, Svo. Paris, 1829.—F. A. Lallig, Zur Veneuentzündung, Svo. Würtzb., 1829.—Andral, Anat. Patholog., t. ii., p. 413.—Cruveilhier, Nouvelle Biblioth. Méd., t. ii., p. 179. 1824.—P. Blandin, Mémoire sur quelques Accidents très-communs à la suite des Amputations, Journ. Hebdom. de Méd., vol. ii., Svo. Par., 1829.—Reynaud, in Ibid., t. iv., 1832, et t. ii., p. 110; et in Arch. Génér. de Méd., t. xxi., p. 434. (*Obliteration of inferior part of Vena Cava, and part of the Vena Portæ.*)—Bouillaud, in Ibid., t. ii., p. 188, et t. v., p. 94.—J. Arnott, a Pathological Inquiry into the Secondary Effects of Inflammation of the Veins, in Med. Chir. Trans. of Lond., vol. xv., Svo. Lond., 1829.—W. Bloom, Ulceration of Internal Jugular Vein, in Ibid., vol. xxvi., p. 112.—J. Thurnam, in Ibid., vol. xxiii., p. 332.—R. Lee, in Ibid., vol. xix., p. 45. (*Case of Pulmonary Phlebitis.*)—Cruveilhier, Dict. de Méd. Prat., art. *Phlébite*, t. xii. Par., 1834.—P. B. Peacock, in Trans. of Med. and Chirurg. Soc. of Lond., vol. xxviii., p. 1. (*Obliteration of Vena Cava.*)—Blandin, in Med. Chirurg. Review, vol. xxix., p. 532.—R. Lee, Cyc. of Pract. Med., art. *Veins*, Inflammation of, t. iv. Lond., 1834.—E. Lacroix, in Archives Génér. de Méd., 2d ser., t. xii., p. 5. 1836. (*Pathology of Veins.*)—Chapaignac, in Bulletins de la Société Anatom., anno 1835, p. 67.—Tessier, De la Diathèse Purulente, l'Expérience, t. ii., p. 87.—Duplay, in Ibid., t. ii., p. 49.—J. Copland, of the Pathology and Morbid Anatomy of Veins, in London Med. Gazette, vol. xxii., p. 797, 837. Lond., 1838.—Gaubric, in Bullet. de la Soc. Anat., 1839, p. 104.—A. Bernard, in Ibid., 1840, p. 46.—Mazet, in Ibid., 1837, p. 234.—Bouchut, in Ibid., 1835, p. 8, 67, 102; et 1840, p. 17.—Raciborski, in Mém. de l'Acad. Roy. de Méd., 1841, t. ix., p. 447. (*Pathology of Veins.*)—Bouchut, in Gaz. Médicale. Avril, 1845. (*On the Congulation of Blood in Veins.*)—Trousseau, in Gaz. des Hôpitaux. Juin, 1844. (*Phlebitis of Umbilical Vein.*)—E. Crisp, a Treatise on the Structure, Diseases, and Injuries of the Blood-vessels, with Statistical Deductions, Svo. Lond., 1847.—Diseases of Veins, p. 311, et seq.—C. Rokitsky, a Manual of Pathological Anatomy, vol. iv., transl. for Sydenham Society by G. E. Day, p. 335, et seq. (*He furnishes nothing additional to that contained in my Paper above referred to.*)
- [AMER. BIBLIOG. AND REFER.—Charles F. Hasse, Anatomical Description of the Diseases of the Organs of Circulation and Respiration, translated by Swaine, Am. ed. Phil., 1848, Svo, p. 377. (This work contains, perhaps, the best account of diseases of the veins in any language.)—J. Hope, Principles and Illustrations of Pathological Anatomy, being a complete Series of coloured and Lithographic Drawings. 1st Am. ed., edited by L. M. Lawson, large Svo, p. 350. Cincinnati, 1844.—S. D. Gross, Elements of Pathological Anatomy, illustrated by coloured Engravings, &c., 2d ed., p. 821. Phil., 1845.—J. B. S. Jackson, a descriptive Catalogue of the Anatomical Museum of the Boston Society for Medical Improvement, Svo, p. 352. Boston, 1847.—Wm. P. Dewees, on Phlegmasia Dolens, in Am. Jour. Med. Sci., vol. v., p. 66. (The conclusion of Dr. D., after an elaborate discussion of the whole subject, is, 1st. "That the disease, whatever be its seat, is of a highly inflammatory character" and, 2d. "That this inflammation occupies exclusively the white lymphatic vessels of the cellular membrane of the several textures of the limb.") Also, "On Females," Svo, p. 591. Phil., 1833.—See *Medico-Chirurgical Review*, vol. iv., p. 509, for a very full analysis of the symptoms of Phlebitis, compiled from "Recherches Cliniques pour servir à l'Histoire de la Phlébite," par M. J. Bouillaud, Revue Méd., Avril et Juin, 1825; and from "Exposé succinct des Recherches faites sur la Phlébite," par M. F. Ribes, Revue Méd., Juillet, 1825. See also *Am. Jour. Med. Sciences*, vol. v., p. 177, for a very full Synopsis of the paper of J. M. Arnott, contained in the *Medico-Chirurg. Trans.*, vol. xv., part 1, 1823, on



the Secondary Effects of Inflammation of the Veins.—*T. S. Kirkbride*, Phlebitis following the operation for Varicose Veins, *Am. Jour. Med. Sci.*, vol. xv., p. 79; and case of Puerperal Phlebitis, *Ibid.*, p. 352.—*M. Bonnet*, Memoir on the Treatment of Varicose Veins of the lower extremities, translated by *A. G. Thompson, Jr., M.D.*, in *N. Y. Jour. Med. and Surgery*, vol. iii., p. 377.—*James D. Trask*, on the nature of Phlegmasia Dolens, *Am. Jour. Med. Sci.*, Jan., 1847, p. 26.—*John Watson*, Observations on Operations on Hæmorrhoids, &c., *N. Y. Jour. Med. Coll. Sciences*, July, 1844; also, An Inquiry into the Pathology and Treatment of Varices, *Am. Jour. of Med. Science*, Jan., 1843.—*W. D. Purple*, Case of Dissection Wound, followed by great constitutional disturbance, and death on the eighth day, *N. Y. Jour. Med. Sci.*, Sept., 1852, p. 209.—*Moses Gunn*, Syncope from entrance of air into the Facial Vein, *Ibid.*, May, 1852, p. 356.—*N. Chapman*, Cases of Phlebitis, with some remarks on its Pathology and Treatment. (In this article Dr. C. gives several cases of Phlebitis from diss. treated successfully by leeches, fomentations, poultices, and blisters to the part, and calomel, ipecacuanha, and opium internally. "Of all remedies," he remarks, "the one deserving of the greatest confidence is a blister. Numerous are the instances in which I have witnessed its superior efficacy; and I believe there is little division of sentiment as to its extraordinary value among the profession in this part of the country. From what I have seen and heard, I cannot entertain a doubt that it will at once arrest a large majority of cases. But though coming from the late Prof. Physic—published by him some 40 years ago, and since frequently alluded to with the highest commendation in the writings of this country—it seems to have attracted scarcely any attention in Europe, or at least I do not find it noticed in the treatises I have consulted on the subject, with a solitary exception. *Cooper*, in his *Surgical Dictionary*, appropriates a paragraph to it, without praise or censure. The manner of application is, to place a narrow strip of epispastic plaster along the course of the vein as far as it appears to be inflamed, cutting an opening in it at the orifice, over which a soft poultice is to be placed, and the blister having drawn is to be so dressed as to be kept freely discharging," &c. Dr. C. also dwells on the importance of supporting the limb, so as to secure an absolute state of rest, and for this purpose recommends a nicely adjusted case, if the vein be in the arm.)—*Stephen Smith*, Phlebitis consequent on Otitis, *Ibid.*, July, 1851, p. 83.—*George B. Wood*, a Treatise on the Practice of Medicine, 2 vols. Svo. Phil., 1847, art. "Phlebitis."—*John Leil* and *W. Stokes*, Lectures on the Theory and Practice of Physic, Svo, 2 vols. Phil., 1848.—*Iobley Dunglison*, The Practice of Medicine, &c., 2 vols. Svo. Phil., 1848, art. "Diseases of the Veins," vol. i., p. 569.—*Marym Putne*, Medical and Physiological Commentaries, 3 vols. Svo, p. 716, 815, 444, vol. ii., art. "Philosophy of Venous Congestion." (In this most elaborate Essay, embracing 343 pages, the author has fairly exhausted the whole subject of venous pathology, passing in review all that has been written on the subject from Hippocrates down to the present time. In it will be found fully and clearly set forth what is known regarding the organization and morbid anatomy of the veins, phlebitis, varix, puerperal fever, spontaneous hæmorrhage, &c., constituting one of the most learned and logical essays in the whole compass of medical literature.)—*John A. Svert*, Review of the above work, *New York Journal of Medicine*, vol. iii., p. 403. "In many points of view," says Dr. S., "it certainly surpasses every other work that has ever been issued from the American press," p. 31. To the correctness of this opinion we unhesitatingly subscribe.—*John Watson*, Review of same work, *Ibid.*, vol. iii., p. 141. "We know of but few works," says Dr. W., "and certainly none in the range of American medical literature, to compare with this for the extent and variety of professional research evinced in it." "A work that does honour to the medical character of our country," p. 172.—*Samuel Jackson*, Principles of Medicine and Animal Organism, Svo. Phil., 1852.—*Joseph A. Gallay*, Outlines of the Institutes of Medicine, founded on the Philosophy of the Human Economy in Health and Disease, in 3 parts, 2 vols., Svo. Boston, 1839; also "Sketches of Epidemic Diseases in the State of Vermont, Svo, p. 419, Boston, 1815.—*David Hosack*, Lectures on the Theory and Practice of Physic, edited by *Henry W. Ducahet*, D.D., Svo. Phil., 1838, p. 699.—*William E. Horner*, A Treatise on Path. Anatomy, Svo. Phil., 1829, p. 459; and in *Am. Jour. Med. Sci.*, Aug., 1835, p. 282.—*Valentine Mott*, New Elements of Operative Surgery, by *A. A. L. M. Velpéau*, &c., translated by *P. S. Townsend*, 3 vols., Svo. N. Y., 1845; also 1 lectures in "The New York Lancet," edited by *J. A. Houston*, 2 vols., Svo. N. Y., 1842-43.]

VENEREAL DISEASES.—GONORRHEA—  
SYPHILIS.—SYNON. *Gonorrhæa*, *Blennorrhagia*,

*Phallorrhæa virulenta*; *Luës venerea*, Fernelius, Boerhaave, Juncker, Astruc, &c. *Syphilis*, Sagar, Vogel, Cullen, Pinel, Young, Swediaur, &c. *Syphilis venerea*, Sauvages. *Luës syphilis*, Good. *Syphilis*, Sprengel. *Scabies venerea*, Locher. *Luës syphilitica*, *Morbus Neapolitanus*, *Morbus Gallicus*, *Morbus venericus*, Auct. *Lust-scuche*, *Venerische Krankheit*, Germ. *Vérole*, *Vérole commune*, *Grande Vérole*, *Maladie Vénérienne*, Fr. *Mal Francese*, *lue Venerea*, Ital. *Poz*, *French Poz*, *Veneral disease*, *Veneral cachexia*.

CLASSIF.—III. CLASS, I. ORDER (Author in Preface).

1. DEFINIT.—Specific inflammations, or ulcerations, or both, affecting primarily the organs of generation of both sexes, and very frequently the whole frame, at subsequent and sometimes at remote periods, and propagated by contact.

2. Viewing venereal diseases as consisting of two very distinct forms—distinct in their primary character and in their consecutive effects—I shall very briefly notice, first, *gonorrhæa*, or *blennorrhagia*, or, more correctly, *Blennorrhagia specialis*, or *virulenta*, and afterward *syphilis*, or *Syphilis venerea*. The relations between these two venereal diseases have been for ages much discussed by both physicians and surgeons, and are not even now entirely disposed of. They, however, possess this in common, that they are primarily seated in the sexual organs, with very few exceptions; that they generally result from impure sexual connexion, or contact; that they are primarily either inflammatory, or ulcerative, or both; and that in many instances the frame becomes affected or contaminated by them, but in very different forms and grades, and much more frequently in the one form than in the other. These constitutional effects render them of equal importance to the physician and to the surgeon; and although both may sometimes require surgical appliances and aids, still they may be both cured by the prescriptions of the physician only, which alone are appropriate in the consecutive states of these maladies.

3. I. GONORRHEA.—SYNON.—*Phallorrhæa*, *Phallorrhæa virulenta*, *Gonorrhæa virulenta*, *Blennorrhagia*, *Blennorrhagia virulenta*.

4. DEFINITION.—A specific inflammation of an acute form, affecting the mucous surface of the urinary and sexual passages in both sexes, with a copious puriform or muco-purulent discharge, propagated by contact, and in some instances occasioning severe consequences.

5. I. DESCRIPTION.—I have shown, in the article VAGINA and VULVA, that those parts are often the seats of a purulent or muco-purulent discharge, which presents the following states or forms: 1st. *Leucorrhæa*, or *Blennorrhagia*, the discharge arising from irritation or inflammatory action, of a non-specific nature; 2d. *Acute Gonorrhæa*, or *Blennorrhagia virulenta*, the discharge being the result of a specific inflammation, caused by the contact of this discharge; and, 3d. *Chronic Gonorrhæa*, or *gleet*, the discharge being more mucous or less puriform, and generally consecutive upon the acute form; and unless when thus related, being distinguished with difficulty from *leucorrhæa* in the female; its contagious property being doubtful, unless the morbid matter acts on very predisposed parts. These forms and states of discharge are also met with in males. The first variety may be communicated by the

female to the male, or by the former to the latter, owing to the fact of puriform discharges, the result of inflammatory irritation of mucous surfaces, being capable of producing a similar state of morbid action in similar surfaces when these discharges are allowed to remain in contact with them. This result follows only in a few cases, and probably only when the recipient surface is predisposed to the infection. Thus a non-specific blennorrhagia, caused by excessive sexual intercourse, or by the discharges of the female organs, may be distinguished with difficulty from gonorrhœa, or acute specific blennorrhagia, and with still greater difficulty from chronic specific blennorrhagia, more especially when the acute specific disease is not very severe, or when it is a renewed or repeated attack.

6. *A. Gonorrhœa in the female* has been described in the article VAGINA and VULVA (see § 8, 38). The *chronic states* of the disease have been noticed by Mr. HOLMES COOTE in his very able work on the treatment of syphilis. He remarks, "that *chronic gonorrhœa* is a disease from which the lower order of prostitutes is rarely free. It exists also among the better class, who live highly, and drink without scruple. In general it disappears when the patient is kept on moderate and regular diet, and confined to bed; but it returns upon the least excitement," &c., and is perpetuated by some internal ulcer or abrasion, notwithstanding the treatment, until this latter lesion is cured. The irritating discharge often causes an abundant growth of *soft vascular warts*, commencing at the lower part of the vagina, near the orifice, and extending at the junction of the mucous membrane and the skin towards the superior commissure. "The rapidity of this growth is quite striking. When removed by the knife they return within a few weeks, if the irritating discharge be allowed to continue."

7. Among other cases adduced by Mr. H. COORE, showing that a female suffering from gonorrhœa may remain for months uncured, unless a proper examination be made, and some lesion beyond the reach of ordinary inspection be detected and treated in an effective way, the following deserves an especial notice. A young woman was admitted with a large growth of vascular warts from the external organs, and a copious puriform discharge. The usual means were applied, but they increased, and were removed by excision. The discharge, however, continued, a suitable treatment was prescribed, but the warts recommenced their growth, and the patient's general health declined. The os uteri was examined by the speculum, and it was found slightly ulcerated and abraded. Caustic was applied to this part. The discharge rapidly disappeared, the general health improved, and recovery was soon complete. In another case of chronic gonorrhœa, the usual remedies were employed with temporary benefit; but a recurrence of the symptoms invariably succeeded. When examined by the speculum, a large warty growth, soft, red, and vascular, was found two inches and a half from the orifice of the vagina. This growth was two inches in length, and an inch and a quarter across the base, springing from the anterior wall. It was removed by the knife; immediate relief, and complete recovery soon afterward, ensued.

8. *B. Gonorrhœa in the Male*.—This is not only a very painful and troublesome complaint,

but, if injudiciously treated, it may induce changes—or, rather, the treatment improperly adopted may occasion lesions unconnected with the disease, which may imbecile, or even shorten the life of the patient. And during a somewhat lengthened period of observation I can assert, that numerous instances have become known to me of attempts made to effect a speedy cure having been followed by the most distressing and dangerous results. The complaint usually commences from three to ten days after morbid contact; and the shorter the period of its incubation the more severe the attack; the stronger dose of the virus hastening the effects. A slight itching is at first felt, then an irritation at the opening of the urethra, and afterward a smarting pain, more or less severe, upon micturition. The lips of the urethra become tumid; a thin discharge, at first scanty, but soon afterward more copious and puriform, flows from the passage. The corpus spongiosum urethræ becomes thickened and unyielding, owing to inflammatory exudation into it; and when erection of the penis occurs, a bending downward, or chordee, is produced. Hæmorrhage sometimes takes place during this state and affords partial relief; and occasionally irritation extends from the urethra to the glands of the groin, causing slight swelling, which very rarely goes on to suppuration, except in scrofulous subjects.

9. A form of gonorrhœa—*gonorrhœa sicca*—is occasionally met with, both in the male and female, and has been described by Mr. ACTON and Dr. DUNN, in which the mucous membrane of the female organ is red, swollen, and tender, but free from discharge. In the male there are severe scalding and pain on passing the urine, painful erections, the lips of the urethra being red and swollen. This form of the disease has been called dry clap.

10. *C. Secondary Effects and Complications or Consequences of Gonorrhœa in Females*.—Owing either to neglect, to improper treatment, or to constitutional vice, or to neglect of proper regimen, several very serious consequences ensue upon the gonorrhœal disease. Most of those which occur in the *female* have been noticed in the articles UTERUS and ITS APPENDAGES (§ 43, 53, 122, *et seq.*), and VAGINA and VULVA (§ 8, 13, 38). These consequences are, chronic gonorrhœa, suppuration or abscesses in the labia, soft vascular warts (§ 6, 7), gonorrhœal inflammations of the cervix uteri, extending to the cavity of it and of the uterus along the Fallopian tubes to the ovaries, and even to the peritoneum; and, in rare instances, even to the uterine veins. Gonorrhœal ophthalmia and gonorrhœal rheumatism occur not less frequently in the female than in the male.

11. *D. The complications of gonorrhœa* sometimes observed in males are, 1st. *Balanitis* (from *Balanos*, glans), or *gonorrhœa externa*, is an inflammation of the surface of the glans and inside of the prepuce, with profuse purulent discharge and excoriation of the cuticle. This affection may be a complication of gonorrhœa, or may exist independently of it. In the former case it is produced by the gonorrhœal virus; in the latter by the want of cleanliness, and by the excoriations caused by the secretions of the part, which have become acrid by retention. In these latter cases the excoriations may be mistaken for chancre. 2d. *Phymosis* and *paraphymosis* occasion-



ally arise, owing to the swelling of the glans and prepuce. Oedema of the prepuce presents a semi-transparent or diaphanous appearance. These states, although often complicating gonorrhœa, not unfrequently occur independently of it, especially as a consequence of self-pollution; and in some instances they lead to very serious results. They furnish additional reasons, to others which may be adduced, as to the propriety of circumcision during infancy. 3d. Irritation or inflammation of the lymphatic vessels, extending to the glands of the groin, is a common association of the disease; but the affection of the lymphatics may be so slight as to be imperceptible, although the glands may be much swollen, inflamed, or even suppurate. 4th. The mucous follicles of the urethra may be inflamed and obstructed, and may even suppurate and burst either into the urethra, or externally, or both. In these cases very serious obstruction to the discharge of urine may occur. 5th. The inflammation may extend along the urethra to the prostate gland and neck of the bladder, and even along the ureters to the kidneys; or it may give rise to acute abscess of the gland and great suffering, especially during micturition, to strictures, &c. 6th. More frequently, inflammation extends along the vas deferens, causing swelling of the epididymis, or swelled testicle.

12. Gonorrhœa is always most severe on its first occurrence, and in young and robust subjects, and in the irritable and scrofulous constitutions and habits. In these it is often attended by severe inflammatory fever and disorder of the urinary functions; and it may even prove dangerous to life, by inducing extensive inflammation and abscesses in the vicinity of the prostate and bladder. "But after repeated attacks the urethra becomes inured to the disease, and each subsequent infection is generally (although not always) attended with fewer of the symptoms of acute inflammation. In some instances, the constitutional affection is extremely anomalous, and characterized by severe and continuous rigors," or by slight remittent or intermittent rigors and paroxysms of febrile reaction.

13. These complications, and more especially those about to be noticed, are chiefly to be ascribed to the local and constitutional influence of the virus or infecting agent, an influence manifested in some cases more prominently than in others, and not observed in cases of simple urethritis. Certain of the above complications are, however, merely the local extension of the gonorrhœal inflammation, often owing to the causes above alluded to. Other complications or consequences of the disease are of a constitutional and very serious nature. Mr. HOLMES COOTE, in a work published while this was being written, corroborates the view I have taken in the article VAGINA and VULVA (§ 8, *et seq.*), as to the specific nature of gonorrhœa. This very able and rising surgeon remarks: "Is the disease the consequence of the application of a simple irritating fluid to the mucous membrane, or is there a morbid poison acting on the parts locally, and capable of being absorbed into the system? I must confess there appears to me to be a most marked difference between simple urethritis and true gonorrhœa, as we daily see it among those exposed to contagion." Gonorrhœa in some cases occasions peculiar secondary affections, which never proceed from simple urethritis; and not only is

it occasionally followed by the local complications just mentioned, but also by one of the very severest forms of inflammation of the conjunctiva (see *art. EYE, Gonorrhœal Inflammation of*, § 56, *et seq.*), by the most severe and obstinate form of rheumatism (see *art. RHEUMATISM, gonorrhœal* (§ 44, 163), and by a form of papular eruption. The occurrence of purulent ophthalmia, or of rheumatism, or the extension of inflammation from the urinary bladder along the ureters to the kidneys, is of a most serious nature, as respects both the immediate effects and the more remote consequences.

14. ii. TREATMENT.—A. *Of Gonorrhœa in the Female.*—A copious use of diluents and demulcents; a farinaceous and vegetable diet; avoidance of fermented and spirituous liquors, and of salted provisions; a recourse to alkaline and refrigerant substances in mucilaginous drinks, and repose on a cool couch or mattress, are generally sufficient to remove the severer symptoms in a few days, especially when aided by the following local treatment judiciously advised by Dr. DRUITT: "During the acute stage, rest in the recumbent posture, fomentations of decoctions of poppy-heads with chamomile flowers, frequent abluion, lubrication with lard or cold cream, and very frequent sponging with a weak solution of alum, a piece of lint dipped in which should be inserted between the labia, with laxatives and diaphoretics, are the measures until heat, pain, tenderness, subside; afterward injections of nitrate of silver, and sulphate or acetate of zinc should be used, as recommended for the other sex, and they should be continued for some time after all discharge has ceased." (DRUITT'S *Surgeon's Vade-mecum*, &c., p. 175.)

15. If the disease becomes obstinate and chronic, the vagina and cervix uteri should be examined by the aid of a speculum, as the disease may be prolonged by lesions of the cervix or of its canal; and when this is the case, the means advised for such lesions, in the article UTERUS (§ 124, 125), should be resorted to. In chronic cases, the solution of sulphate of alumina, or decoction of oak-bark, or both conjoined, may be used as a lotion. Copaiba and cubeba may be given thrice daily in a mixture with mucilage, the spirits of nitric ether, and either mint-water or camphor julep, in the chronic, as well as in the advanced progress of more acute cases. In the former, preparations of iron, especially the tincture of the sesquichloride of iron, or the tincture of the ammonio-chloride may be preferred. In irritable and sanguine temperaments, camphor conjoined with nitrate of potash, with acacia and henbane, is often of much service, and may be prescribed in the form either of pills, of a mixture or draught.

16. B. *Treatment of Gonorrhœa in the Male.*—(a) Dr. DRUITT has advised, as a prophylactic treatment, that a person exposed to the chances of infection should wash out the anterior part of the urethra with a syringeful of some astringent lotion. I much doubt the complete success of this plan, or of the more usually adopted one of micturating immediately after sexual connexion: both plans may, however, be often successful. If any fissures or excoriations are perceived they may be touched with lunar caustic, and dry lint may be applied.

17. (b) *The abortive treatment of gonorrhœa*, or an attempt to cut short the attack by means

of strong injections, has been advised by some experienced surgeons. Ten grains of nitrate of silver, or four grains of the chloride of zinc, to the ounce of distilled water, have been prescribed with this object, when the disease is only commencing, and before scalding on micturition is experienced, or when the acute symptoms have passed. Mr. ACTON employs the nitrate of silver, and has recourse to only one or two injections performed by himself with due precautions. He never prescribed this treatment in cases of a first infection; and he states that he has not observed the injurious effects which have been supposed to result from it. For the modes of using, and the precautions to be taken when using, this treatment, I must refer the reader to Mr. ACTON's able work. Mr. HOLMES COOTE considers it not quite free from danger to the urethra; and he remarks that it should be remembered that it is in cases where the structures of the urethra are damaged that stricture occurs; the usual effects of gonorrhœa, in their acutest form, pass away, if not aggravated, without leaving any structural change. "At the commencement of the disease large doses of the tinctura ferri sesquichloridi, or of the citrate of iron and quinine, have been pronounced effectual in cutting short the discharge; and such remedies possess the advantage of inflicting no damage, if they do not produce the anticipated amount of good."

18. (c) *In the first or early stage of gonorrhœa* the antiphlogistic diet and regimen should be strictly enforced; and demulcents containing alkalies and refrigerants freely allowed, with the other means already noticed (§ 14, *et seq.*). Cooling aperients ought to be taken from time to time; walking and horse-exercise should be prohibited, and the patient confined to a cool sofa or mattress. The penis and scrotum should be supported by a suspensory bandage, and be kept constantly wet with tepid or cold water. If the acute symptoms have not appeared, M. RICORD recommends, according to Dr. Druitt, the following plan, in order to arrest the course of the disease: "Let the patient inject the urethra regularly once in every four hours, with a solution of two grains of nitrate of silver in eight ounces of distilled water; let this be repeated twelve times, desisting, however, sooner if the discharge is rendered thin and bloody, which is the ordinary effect of the nitrate. Then let an injection of the sulphate of zinc be substituted, and be continued until the discharge ceases. At the same time the patient should take a mild aperient, and after it, three times daily, a dose of copaiba or cubebs." He should continue a strictly antiphlogistic regimen for a week or ten days after all trace of the discharge has disappeared. The penis should be wrapped in a piece of rag dipped in water. Dr. Druitt proceeds to remark, that the "manner of injecting is of no small consequence, as the efficacy of the lotion depends entirely on its application to the whole of the diseased surface; and, as Dr. GRAVES observes, the ordinary opinion that gonorrhœa is limited to the anterior extremity of the urethra is unfounded and mischievous. The patient should be provided with a glass syringe, with a long bulbous extremity, and having filled it, should introduce it for about an inch with his right hand. Then, having encircled the glans penis with his left forefinger and thumb, so as to compress the urethra against the syringe, and prevent any of the

fluid from escaping, he should push down the piston with his right forefinger, letting the fluid pass freely into the urethra. The syringe should now be withdrawn, but the orifice should still be compressed, and the fluid be retained for two or three minutes; after which, on removing the finger and thumb, it will be thrown out by the elasticity of the urethra. It is always worth the surgeon's while to see that the injection is properly used."

19. (c) *In the second stage* the diet and regimen already advised should be continued. The patient may drink soda-water, barley-water, linseed tea, gum-water, and other mucilaginous fluids, containing alkaline carbonates and sedatives, and the bowels should be kept freely open. If much pain or chordee be complained of, the following pills may be taken night and morning, and the mixture occasionally through the day:

No. 372. R Camphoræ, ℥j.; Potassæ Nitratis, ℥ss.; Extr. Hyoscyami, ℥j.; Mucilag. Acaciæ, q. s. Misce et divide in Pilulas, xxxvj. Capiat duas vel tres pro dosi.

No. 373. R Potassæ Bicarbon., ℥ss.; Potassæ Nitratis, ℥ss.; Spirit. Ætheris Nitrici, ℥ss.; Tinct. Hyoscyami, ℥ij.; Mucilag. Acaciæ, ℥ss.; Syrupi Tolutani, ℥ss.; Mist. Camphoræ ad ℥viij. Misce. Sumantur Coch. ij. vel iij. ampla ter in die.

No. 374. R Liq. Ammoniac Acetatis, ℥j.; Spiritus Ætheris Nitrici, ℥ss.; Potassæ Nitratis, ℥ss.; Tinct. Hyoscyami, ℥ij.; Mucilag. Acaciæ, ℥j.; Syrupi Althææ, ℥vj.; Mist. Camphoræ ad ℥viij. Misce. Capiat Coch. ij. vel iij. larga 4tis vel 6tis horis.

20. The last of these prescriptions will be found serviceable in the most acute or inflammatory cases, and when the urinary organs become affected. In these cases a number of leeches should be applied to the perinæum, or above the pubes, or near the groins. In this stage of the disease injections should not be prescribed. For first attacks, and in young, strong, plethoric, or irritable subjects, they may be injurious. Refrigerants, diluents, demulcents, alkalies, and sedatives, are then chiefly required.

21. Dr. Druitt advises that the bowels should be opened by a dose of calomel at night, and some castor-oil in the morning; and that a grain or half a grain of calomel, and one eighth of a grain of tartar emetic, and ten grains of Dover's powder, should be given every night while there is much pain and chordee. As soon as the patient is free from fever, he should take copaiba or cubebs. The former, in capsules, may be given before a meal, as it is then not likely to cause eructations. Mr. ACTON prescribes copaiba and cubebs in the following combinations:

No. 375. R Bals. Copaibæ, ℥vj.; Magnesiae Calcinat., ℥ss.; Extr. Hyoscyami, ℥ss.; Pulv. Camphoræ, ℥j.; Theriacæ, ℥ij.; Mica panis, ℥ss. Misce. Fiat Electuarium. Capiat Coch. j. minimum ter in die.

No. 376. R Pulv. Cubebæ, ℥ss.; Bals. Copaibæ, ℥ss.; Extr. Hyoscyami, ℥ss.; Magnesiae Calcinat., ℥ss.; Pulv. Camphoræ, ℥ss.; Theriacæ, ℥j. Misce. Fiat Electuarium. Capiat Coch. j. min. ter in die.

22. The last of these is altered from Mr. ACTON's prescription, and the dose of camphor reduced one half. Cubebs, when taken in very large or frequent doses, generally diminishes the discharge, and remarkably relieves the other symptoms in a short time; but when employed alone, the disorder often returns after some time, especially if it be relinquished, or the dose much diminished. Cubebs should therefore be combined with copaiba, or other substances, in mucilaginous mixtures; or the tincture of cubebs may be substituted for the powder, as in the following draught:



No. 377. *R. Copaiba*, ℥xv.; *Mucilag. Acaciæ*, ʒjss.; *Pulv. Cubebæ*, ʒj. (vel *Tinctura Cubebæ*, ʒjss.); *Spirit. Ætheris Nitrici*, ℥xxv.—*Liquoris Potassæ*, ℥xv. *Aquæ Menthæ Piperitæ*, et *Mist. Camphoræ*, aa, ʒv. *Misce. Fiat Haustus ter in die sumendus.*

23. *d.* Several unpleasant complications occasionally appear in the course of this stage. Painful erections and chordee are the most common. They may be treated with tepid or cold application, and by narcotics and refrigerants given internally. Antimonials may be prescribed with small doses of camphor, nitre, and henbane or opium; and a little extract of belladonna, or lint wet with the tincture of belladonna, may be applied over the course of the urethra at bed-time. Hemorrhage from the urethra often affords relief. If, however, it becomes excessive, it may be readily checked by cold applications, and by pressure. Inflammation of the mucous glands, or in the cellular tissue external to the urethra, may be poulticed; and if abscesses form, they should be opened early, or as soon as they obstruct the flow of urine. Swellings of the glands in the groin are generally removed by rest, and seldom require the application of leeches.

24. *If Epididymitis*, hernia humoralis, or swelled testicle, supervene, Mr. H. Coore believes "that the best plan is to strap the testicle at once, after the fashion represented in the work of Mr. Acton. A layer of collodion over the strapping is often useful. The relief thus afforded to the patient is surprising, and the swelling will often subside to one half in twenty-four hours. The application of cold, either by cold lotions or by the careful use of pounded ice and salt in a bladder, tends to relieve pain, subdue the inflammation, and reduce the swelling. When in consequence of pain this treatment cannot be carried out, we may fall back upon the practice of leeching the testicles, and of administering emetics. Nothing reduces inflammation of these organs more promptly than this, but the treatment is severe. When induration remains after the acute stage has passed, pressure is more serviceable than frictions, whether of mercury or of iodine; both may, however, be employed." (H. Coore, *Report*, &c., p. 34.) Since 1824, for the cases respecting which I have been consulted, I have ordered an emetic, afterward an aperient, and the mixture (No. 374) last prescribed; and, two or three days afterward, full doses of the iodide of potassium in the above alkaline mixture (No. 373). Iodine is rarely of use when employed externally in this disease.

25. *d.* In the third stage, or when the acute symptoms have subsided, the injections advised in the first stage may be prescribed. If these fail, or if the discharge returns, injections with weak solutions of the sulphate or acetate of zinc or of copper, or of the bichloride of mercury, and with the addition of vinum opii, may be employed. These solutions should vary in strength with the circumstances of the case; but if either of these occasion severe pain, their strength ought to be much reduced.

26. If the disease becomes chronic, and passes into gleet, a long-continued treatment is generally required to remove it, however judicious the means may be. The habits of the patient should be strictly regular and temperate, and pills made with Venice turpentine, or with tar, or with copaiba and liquorice powder, may be employed. About thirty years ago I prescribed magnesia in the preparation of pills with these substances,

but they became so hard after a short time as to be often passed from the bowels undissolved. If these fail, camphor, with sulphate of iron, or with sulphate of zinc, kino, or catechu, and small doses of creasote, may be taken in the form of pills; or the tincture of the muriate of iron, with the tincture of quassia or of calumba, may be given in any suitable vehicle. If micturition be frequent or painful, or if the urine deposits any mucus, the preparations of buchu, pareira, and uva ursi, are generally indicated. In most of these cases the cold salt-water douche, or local bath, sea-bathing, regular and generous living, suitable tonics, and chalybeate mineral waters, will be of essential service. If the disease still remain obstinate, or if involuntary emissions occur, blisters to the perinæum, the introduction of a bougie, or other means which fall within the province of the surgeon, may be employed.

27. *e.* The diet, regimen, and beverages of the patient during acute, subacute, and chronic gonorrhœa, should be strictly enforced. In the acute and subacute stages, constant repose on a cool sofa or bed, and on a hair mattress; a diet restricted to vegetable or farinaceous food in very moderate quantity; the careful avoidance of active exercise, more especially of exercise on horseback, and of heating beverages. The fluids taken should be cooling and demulcent. Weak black tea, barley-water, weak veal soup, effervescing magnesia-water, or potash or soda-water, &c., may be allowed. In the chronic stage, or state of gleet, tar-water, spruce-beer, Dantzic spruce, the infusion or decoction of the tops of the spruce-fir, camphor-water, with nitre, &c., may severally be taken. They will tend to promote the effects of the medicines prescribed for this state.

[*Blennorrhagia*.—Acute inflammation of the urethra from gonorrhœal virus is usually combated successfully by an antiphlogistic regimen and saline cathartics, followed, if necessary, by injections of zinc, lead, or silver, as in the following formula: *R. Aq. Ros.*, ʒv.; *Sulph. zinc*; *Acet. plumb.*, aa, grs. viij. The patient, if the disease does not yield, should take half an ounce of the following electuary in the course of a day: *R. Copaiba*, 1 part; *cubebæ*, 2 parts; *ess. menth. q. s.*, ft. electuary. A bolus of this, covered with unleavened bread, is easily swallowed. About four ounces is generally sufficient to effect a cure; or, the copaiba may be given combined with the sirup of Tolu and oil of spearmint, and given in as large doses as the stomach will bear. As a general rule, the antiphlogistic regimen, baths, rest, and leeches to the perinæum, will effect a cure in the course of one week; and it is safer to trust to these for that space of time, before commencing with the indirect anti-blennorrhægics, copaiba, or cubebæ. Injections should never be resorted to at once; it is safer to trust to the above remedies for a reasonable time; if they fail, then resort to the above formula of zinc and lead, using it from two to four times a day. The nitrate of silver injection, in the proportion of one grain of the salt to six ounces of water, will also answer a good purpose. If chordee supervene, leeches should be applied to the perinæum, and camphor and opium administered in the form of pill, from two to six grains of the former, with from one half to one grain of the latter, two or three times a day. Cold applications to the genital organs, with laudanum, also afford great re-

lief; likewise mercurial ointment to the track of the urethra. Strict attention to hygiene is always necessary.

*Blennorrhæa*, or *Gleet*, is governed by the same principles of treatment as *blennorrhagia* or acute urethritis. It is generally a very obstinate affection, and requires a persevering use of remedies. Injections of sulphate of zinc, acetate of lead, nitrate of silver, and cold water will be indicated, but of a greater degree of strength; alum, tannin, and iodide of iron are also recommended as injections; blisters, also, to the urethra. The injections should be of moderate strength at first, and the strength gradually increased. BENJAMIN BELL advises half an ounce of sulphate of zinc to eight ounces of distilled water, using it several times a day. VIDAL uses from 15 to 30 grains of alum to two ounces of distilled water. A bougie, coated with an ointment of nitrate of silver, one grain to one drachm of lard, may be used, or with mercurial ointment, or the mercurial cerate, or 1 part ungt. hydrarg., and 2 parts extr. belladonna, or even the naked bougie may often be used with advantage. The bougie, according to VIDAL, should be large and soft, and introduced three or four times a day, sometimes for ten or twelve weeks together, and should not be discontinued till the cure is complete. If they cause an increase of irritation or inflammation, their use is to be discontinued. VIDAL remarks that a gleet which has resisted every kind of treatment occasionally disappears in an unknown manner—that there are some cases which resist every thing, even time, and which, after having been symptomatic of a form of inflammation of the urethra, are found at length to be maintained by strictures, disease of the prostate or bladder, or are complicated with seminal emissions. The treatment then, of course, has to be modified according to the complications of the case. Great caution should be used not to pass the bougie too deeply into the urethra, inasmuch as the disease is usually seated near the glans, and confined exclusively to that part.]

## II. SYPHILIS—*Siphilis*, Sprengel and H. Mayo. *Lues venerea*, Auct.

23. i. HISTORY OF.—Medical writings furnish no precise or undoubted accounts of this distemper until the appearance of the epidemic towards the close of the 15th century in the south, and soon afterward through all of Europe. In that and the following century, venereal eruptions occurred so commonly after infection, not only by sexual congress but also by contact, that the disease was regarded as a contagious malady affecting primarily and chiefly the skin. At the present day, and for a long time past, these eruptions and the other affections which sometimes accompany or follow them are much less frequent, and appear after a longer period from the primary infection than they did formerly. This circumstance, as well as some other modifications of the characters of the distemper, as described by the earlier writers, may be referred to the long transmission of the distemper by contagion, the venereal poison having thereby lost something of its original influence, and to its having, during many ages, been almost exclusively transmitted by the intercourse of the sexes, and without general infection, or not by the emanations or secretions from the secondary affections, unless under peculiar circumstances hereafter to be noticed (§ 109, *et seq.*).

28\*. As to the long-agitated subject relative to the early history of syphilis, it is quite unnecessary to enter farther than to notice a few of the authorities who have supported opposite opinions regarding it. GALESIUS (*De Podagra et Morbo Gallico*, 4to, Bon., 1637); BECKETT (*Philosoph. Trans.*, No. 357, 365); PLENK (*Beobachtungen*, &c., ii.); HENSLEY (*Geschichte der Lustseuche*, &c., b. i., 1783); KLEIN (*De Morb. vener. curat. in India Orientali*, Ham., 1795); STOLL (*Prælect.*, p. 94); THIERRY, RICHTER (*Chirurg. Biblioth.*, v. i., p. 163); and many others, have severally contended, but with insufficient evidence, for the existence of syphilis from remote antiquity, but in a sporadic form, before the discovery of America, and before its occurrence in an epidemic form at Naples in 1495. DE BLEGNEY even believed that it was known to MOSES; F. VALESIIUS (*Ann.*, iv., p. 57), that it caused the baldness and ulcerations of the face ascribed by TACITUS to TIBERIUS; LEFEVRE (*Hufeland, N. Ann.*, b. i., p. 309), that it had existed 800 years before COLUMBUS; SCHENCK (*Observat.*, l. vi., 217), that it had been observed as far back as 1270; ALCAZAR (*Haller's Biblioth. Med. Pract.*, ii., 197), that it was an ancient disease, and that it was epidemic in 1456; SCHAUFUS, that it was brought from India into Europe by the gipsies; CLAVERO (*Storia Antica*, t. iv., 1781), that it was not imported from America; and DELIUS, that it was an ancient malady, but was sporadic, and became epidemic by its complication with camp diseases at the end of the 15th century.

29. The first author who contended that syphilis was a variety of leprosy was M. CUMANUS, in 1495. He considered it identical with the leprosy of Campania, described in the 13th century by PAPIA of Lombardy. A similar opinion was entertained by S. AQUILANUS in 1497, by CAMPERIO, LANGE, BIONDI, and DODONEUS, early in the 16th century; and was supported by ZACUTUS LUSITANUS, MAYNWARING, and MUSITANUS in the following century.

30. That the distemper was brought from America by the followers of COLUMBUS was asserted by several writers in the commencement of and early in the 16th century, especially by N. POLL, L. SCHMAUSS, et U. AB HUTTEN, and by many others. This opinion as to its origin was very ably supported by ASTRUC and GIRTANNER (*Abh. von der Lustseuche*, &c.). It was, however, denied by SANCHEZ (*Abb. Ueber der Ursprung Venussenche*, &c., Bremen, 1775), who argued that an indigenous malady could hardly be brought to Europe and there become epidemic; by SARMICUTO (*loc. cit.*, i., p. 67); and by HENSLEY (*Geschichte der Lustseuche die zu Esde dis. 15. Jahrh. in Europa Ausbrach.*, Altona, 1783). More recently DESRUELLES (*Op. cit.*) has contended for the antiquity of the disease, and denied the importation of it from America. DESPORTES (*Hist. de Malad. de St. Dominique*, t. ii., p. 61), LAGRANGE, SLOANE, and numerous others, however, have shown that a disease resembling syphilis was prevalent in Hispaniola when visited by the Spaniards, and was brought into Europe by them from 1493 to 1495. ASTRUC states that in the Neapolitan, or rather in the Spanish army, there were not a few of the soldiers who, returning from the Indies, either in the first voyage with COLUMBUS, in the month of March, 1493, or in the second with A. DE TORREZ, in the beginning of 1494, or in the third with P.



DE MARGARIT, at the end of the same year, were still infected with the venereal disease, or at least had contracted it in Spain, after it had been brought by others into Europe. And therefore it is by no means strange that many of the Neapolitans should be infected with the same distemper, as they served under the same colours, and conversed with the same females who followed the camp. Hence he concludes that the disease was communicated from the Spaniards to the Neapolitans, from both to the French, and from all three to the other European nations, and to most of the people of Asia and Africa; though he believes that, under the torrid zone, there are some countries where it seems to have been a native and an endemial disease. (*De Morbis Veneris*, vol. ii., 4to, Paris, 1740, lib. i., cap. &c.) SANCHEZ DE RIBEIRO, in 1765, contended that syphilis originated in Europe, and assumed the epidemic form in 1493. He was the first to shake the belief in the American origin of the malady, and was followed by HENSLEY, who believed it to have been intimately connected, in origin and nature, with the leprosy of antiquity, which he regarded as the precursor, in Western Europe, of syphilis at the end of the 15th century. RICHTER (*Chirurg. Biblioth.*, b. i., p. 163), however, contends that syphilis was an ancient disease, and was imported into America by the Spaniards. But there is no sufficient evidence of such importation by the Spaniards, whereas evidence is furnished by ASTRUC and others that a similar distemper was prevalent in the West Indies and America among the natives when first visited by COLUMBUS, and that they treated it with the same medicines as they found most successful subsequently by the Spaniards and other Europeans. That this distemper existed in America, in Western Africa, and probably also in other intertropical countries, before the discovery of America, appears to have been conclusively shown by numerous writers, although in more or less modified forms, according to race, modes of life, and numerous circumstances; and that it still exists in these forms, as a most prevalent and contagious distemper, in these countries, cannot be doubted. It was considered as being not improbable that the milder states of the disease prevalent in some of these countries, and in Hispaniola, when first visited by the Spaniards, assumed in the latter, as well as in other Europeans, a much more severe character, especially when they became associated with scurvy, or with leprosy, then so prevalent in Europe, or with other epidemic or endemic diseases, or when the distemper first infected different races from those in which it had first originated, using different kinds of food, adopting different modes of living, and observing very different social and domestic habits, &c. That the disease is modified by these causes, by climate and by treatment, even at the present day, cannot be disputed; and hence, most probably, it may have resulted from those distempers, which are denominated syphiloid by several writers, which are characterized by the most prominent features of constitutional syphilis, and which are different forms of syphilitic cachexia, arising out of those circumstances, in connexion with differences of race, with climate, habits of life, modes of communication, &c. (§ 84, *et seq.*).

31. In addition to these opinions as to the history of syphilis, another had been from an early

period entertained by several writers, but had received little attention until it was supported by D. C. G. GRUNER, who has inquired into the early history of syphilis with great learning and candour; and has described the symptoms of the disease, as it appeared in Italy in 1493 and 1494, and the ways by which it was propagated. From his account, or rather, according to the authorities he has adduced, it appears that syphilis was then a much more acute, rapid, severe, and complicated distemper than in modern times; and that it was communicated in its several constitutional forms, not only by sexual intercourse, but also by kissing, by sleeping in the same bed, by contact, especially with parts covered by eruptions, by shaving with the same razor, by drinking from the same vessel, by inhaling the breath of the infected, by the clothes, particularly woollen, of the diseased, and even by contact of any part of the body. The sudden appearance and rapid extension of the malady the medical men of the day were at a loss to account for. As to the opinion that diseases of the genitals were at all times an occasional or sporadic result of impure sexual connexion, GRUNER remarks, "Hoc quidem certum ac indubitatim est, homines nunquam sibi temperasse a venere vulgivaga, ideoque ab historicis stupenda narrari exempla, quin sub finem seculi xv increbrescere vitia genitalium veneris similia, sed ea fere leprosa. Ille vero, nisi de verbis disceptare volumus, ut ferri quidem et defendi possunt, ita etiam corpora fuisse apta ad recipiendam contagionem affinem satis declarant. Medici enim et chirurgi horum temporum bene versati in cognitione morborum cutaneorum, cum maximè lepræ, tantum non omnes novitatem morbi mirantur et stupent, et similitudine quorundam symptomatum opinantur eam esse lepræ proximam, vel in eam tandem transire; leprosi vero Gallico morbo correptos cane pejor ac angue fugiunt et procul abesse jubent. Ex hoc, ni omnis fallor, certissime colligitur, fœdum morbum non fuisse omnino eundem, sed paullo diversum et a causa quadam insolente productum. Quam in venere impura per se latuisse vix affirmandum est." (*Op. cit.*, xv.)

32. GRUNER contends that the opinion as to the introduction of syphilis in Europe from America cannot be sustained, inasmuch as it cannot be shown that the distemper was in 1493 endemic in America in the form in which it existed in Italy; that, if the foul ulcers and buboes observed in the latter existed in the former country, they should have been manifest in those aborigines brought to Europe; and that a malady imported into Spain by a few individuals from America, could not in the same year have been transmitted to Italy and there so rapidly spread the devastation which it was said to have produced. He therefore asserts that the evidences furnished by FULGOSUS, SABELLICUS, NAUCLERUS, LEO AFRICANUS, and others respecting the expulsion of the Moors and Jews from Spain in 1492, and in the five preceding years, and the fearful distresses and distempers consequent upon this expulsion are sufficient to account for the appearance and rapid dissemination of syphilis in Italy and in other countries. These writers state that the disease was brought from Africa into Spain, and that, when FERDINAND expelled the Moors and Jews from Spain, from 1487 to 1492, it assumed a severe and epidemic form, owing to the distresses experienced by these emigrants. It is expressly stated by NAUCLERUS, "In itinere abe-

untium Judæorum triginta millia pestis absumsit. Eodem tempore etiam Marrani (Moors) Romæ ad portam Appiam morati effleerunt, ut incontinenter pestis invaserit urbem, mortuique sunt quam plurimi ex peste et contagione dietorum Marranorum, de quibus tota urbs impleta est." GRUNER therefore infers from these and other authorities that the diseases to which the genitals were liable, owing either to impure connexion or to leprosy or other causes, were developed into a pestiferous form by the distresses and other circumstances connected with the expulsion and emigration of the Moors and Jews, that the distemper in this malignant form was disseminated throughout Italy—the French army which invaded Italy in 1493, bringing it with them on their return to France, and that it spread rapidly from thence and from Italy to other countries.\*

\* As it is manifest, in the present state of our knowledge, that syphilis is caused by a specific poison or contagious agent, originating, as far as we know, in the secretions of the sexual organs, and generally communicating the disease by sexual intercourse, but sometimes also by contact under different circumstances, and in different stages of the malady, and even to the fetus; that syphilis will not produce gonorrhœa, although both diseases are often associated; and that gonorrhœa will not give rise to syphilis, although like syphilis it is generally caused by sexual intercourse, but capable of being propagated by contact in other ways; so it follows that conclusions respecting the origin of the one disease cannot apply to that of the other. For being thus distinct, although sometimes associated, and generally propagated in the same way, it is very probable that these distempers may have originated in different epochs and in different circumstances. Admitting that syphilis was brought into Italy in 1493 by the Moors and Jews expelled from Spain, when it was developed into an epidemic and an acute distemper either by the sufferings and other circumstances of these emigrants, or by its being engrafted on or becoming associated with some other malady, as leprosy, camp fever, scurvy, &c., according to the evidence furnished by GRUNER; or that syphilis was imported in the following year into Europe from Hispaniola, where it had long existed as a specific disease, although manifesting various modifications in its primary and consecutive phenomena both there and still more remarkably in Europe, still there appears to be no sufficient evidence that gonorrhœa, also a specific disease, and known now as such, and existing most frequently unconnected with syphilis, either first appeared in connexion with this latter distemper, or existed previously to it. It is certain, however, that from an early period of the certain history of syphilis, or early in the 16th century, gonorrhœa was mentioned as a frequent complication, or prominent symptom of syphilis. It is very difficult to determine any thing conclusive as to the origin of virulent or specific gonorrhœa, as most probably a puriform discharge was not an uncommon result of impure connexion, or of sexual intercourse with unclean, leprosy, or otherwise diseased females in the early and middle ages. The descriptions of disease by most of the writers of these ages, as well as of those of the 15th and 16th centuries, are so vague as to give rise to grave doubts as to their precise application, and although some of the accounts given by authors long before the period at which this distemper was developed in Italy seem to apply to gonorrhœa, yet their accounts are not complete in some respects, and fail in mentioning the association of a copious discharge, and of certain other contingent symptoms and consequences of the disease, although other symptoms which are certainly characteristic of it are fully stated.

1. *The testimonies* which have been adduced as to the existence of SYPHILIS in Europe before the discovery of America have been considered as conclusive by BROOKER, HENSLEY, SWEDIAUR, B. BELL, DESRUELLES, and altogether insufficient by ASTROC and numerous writers in the 16th and 17th centuries. I may notice the following among the former: GULIELMUS DE SALICETO, in 1270, states (in l. i., cap. 42, *De Apostemate in inguinibus*), "Hæc ægritudo vocatur bubo vel dragonella inguinis vel apostema inguinis" \* \* \* et aliquando cum accedit homini in virgâ corruptio propter concubium cum foeda muliere, aut ob aliam causam. Itaque corruptio multiplicat et retinetur in virgâ, unde non potest natura mundificare virgam aut locum, primò propter multam plicaturam partium illarum et propter strictam viam illius loci, unde redit et regurgitat materia ad locum ingulum propter habilitatem loci illius ad recipiendam

33. The question still remains unanswered as to the origination of the syphilitic disease brought

superfluitatem quamlibet, et propter affinitatem, quam habent hæc loca ad virgam."—Cap. 48. "*De Pustulis albis vel rubris, et de Miliis et de Scissuris, et de Corruptiõibus vel hujusmodi, quæ fiunt in virgâ vel circa præputium propter coitum cum foetida muliere, aut cum meretrice, aut ab aliâ causa.*"

LANFRANC, of Milan, in 1209 (*in Artis Complete Chirurgiæ*, tract. iii., doct. ii., cap. 11), asserts: "Sæpe provenire apostema in inguine propter ulceram virgæ et pedum, propterea quod locus est descensus humorum ad illa loca, et tunc non est ita timendum, propterea quod venire tunc potest sine multâ corporis plenitudine, et absque eo quod decursus humorum maxime ibi fiat." In tract. iii., doct. iii., cap. 11, *De Ficu, et Cancero, et Ulcere in virgâ virili*, he adds: "Ficus est quedam excrecentia, quæ nascitur supra præputium virgæ, et aliquando super caput, quæ quidem aliquando est mollis, ut de phlegmatica generata materia; aliquando dura ut de Melancholici; quæ si corruptatur, transit in cancerum. Cancer fit in virgâ, sicut in aliis diximus fieri membris: ulcera veniunt ex pustulis calidis virgæ superveniuntibus, quæ postea crepantur; vel ex acutis humoribus locum ulcerantibus; vel ex commissione cum foetâ muliere, quæ cum egro talem habente morbum de novo coherat."

BERNARD GORDON, in 1300, Professor of Medicine at Montpellier, remarks (*Lib. Med.*, part vii., cap. 5, *De Passionibus Virgæ*): "Passiones virgæ sunt multæ, sicut sunt apostemata, ulcerationes, canceri, inflatio, dolor, pruritus. Causæ sunt exteriores aut interiores. Exteriores, sicut casus, percussio, et jacere cum muliere, ejus matris est immunda, plena sanie, aut virulentia, aut ventositatis et similibus corruptis. Si autem causa fuerit intrinseca, tunc sunt sicut humores corrupti, et mali descendentes ad virgam, et ad partes inferiores, inducentes prædictas passiones."

JOHN OF GADSDEN, in 1310 (*Rosa Anglica*, cap. de curâ ulcerum virgæ), states: "Ulcera virgæ virilis contingunt vel ex coitu cum juvenicula, vel ex coitu cum menstruatâ, vel ex retentione urinae et spermatis."

GUIDO DE CALIACIO, of Montpellier, in 1360 (*Chirurg. Maj.*, tr. vi., doct. ii., cap. 7), has a chapter, "*de Calefactione et Fœtitudine in virgâ propter deubitum cum muliere foetida.*"

VALESCHUS DE TARANTA, Professor of Montpellier in 1400 (*Phil.*, l. vi., cap. 6, *De Ulcibus et Pustulis virgæ*), describes these as follows: "Causæ possunt esse primitivæ, aut antecedentes, aut conjunctæ. Primitivæ, ut est vulnus, vel attritio, vel coitus cum foetida, vel immunda, vel cancerosa muliere; alia causa potest esse portasse femoralia nigra, foetida et immunda; alia causa potest esse materia spermatica vel corrupta retenta inter caput virgæ et præputium, vel mali humores ibidem retenti, qui ibi retenti et non evacuati corrumpunt locum, quem tangunt, vel ulcerant." And again towards the end: "Pustule virgæ fiunt, si quis coeat cum feminâ habente ulcus in matrice, quæ contagio sitate sua inficit virgam, et in eâ facit ulcus."

PETRUS DE ARZELATA, of Bologna, in 1470 (*Chirurg.*, l. ii., tr. xxx., cap. 3. *De Pustulis, quæ adveniunt virgæ propter conversationem cum foetâ muliere, quæ albe sunt vel rubra*) writes: "Ex materiâ venosâ, quæ retinetur inter præputium et pellem virgæ causantur istæ pustule tales per hunc modum, quoniam ex retentione illius materię, quæ remanet inter pellem et præputium, ex actione viri cum foetâ muliere, quæ non respirat pntrofit; deinde ille locus denigratur et mortificatur substantia virgæ, quæ restaurationem non recipit, nisi corruptione illâ remotâ, et loco absterso." And then after prescribing certain detergent, styptic lotions, &c., for the cure of those pustules, he thus goes on: "Unum recorder vobis, quod antequam ista balnea dicta (or lotions) ex vino illo styptico fiant, fiat purgatio, aliter illis bubo superveniret in inguine, quoniam materia quæ venit ad locum illum retroPELLITUR à balneo isto (or rather lotion) et inveniens concavitate inguinis illic moram facit; quare bubo generatur ad exitum pluries devenit. Quare purgationem universalem facias; et imperiti medici sperantes indiscretè vel incautè non faciunt purgationem, quare duplici modo luerantur, quoniam de virgâ et bubone. Iterum viri tales debentes materiam venientem ad locum resolvare, querunt illud sanare ut aliquid luerentur, et hoc non debet fieri à discreto homine et magistro."

That the above brief notices of ulcers on the penis and buboes in the groins refer to syphilis can hardly be credited, unless consecutive constitutional disease had also been described; but of this latter no evidence is furnished. However, it may be stated by the abettors of the non-mercurial treatment that these sores were actually venereal or syphilitic, no secondary symptoms appearing, owing to the strictly local or non-mercurial treatment adopted for their cure. Among the first writers who de-



by the Moors and Jews from Spain into Italy. It has been, as stated above (§ 30-32), acknowledged

scribed the venereal disease, which appeared at Naples in 1494 or 5, and became epidemic over Italy, and rapidly spread throughout Europe, were MARCELLUS CUMANUS, NICOLAUS LEONICENUS, and CORADINUS GELINUS. Their works on this disease appeared in 1496 and 1497, and were followed by other productions in this latter year, in 1498 and in 1500, and in almost every successive year down to the middle of the 16th century. The writers were chiefly Italians, who describe the symptoms and treatment of the disease, assert it to have been an unknown malady previously to 1495, and speculate variously respecting its prevalence and rapid extension.

From these descriptions it is manifest that the distemper was virulently contagious; that it was communicated not only by sexual intercourse, ulcers appearing on the genitals, and followed rapidly by the most severe constitutional symptoms, &c., but also by contact of any part of the body of those infected, and by fomites, &c. Those who are desirous of becoming acquainted with the early history of this distemper—the most important chronic malady which infects the human frame—will consult with advantage the collection of early treatises on *Lues Venerea*, formed by ALOYSIUS LUTSINUS, under the title *Aphrodisiacis sive de Lue venerea, continens omnia quæcumque de hac re sunt ab omnibus Medicis conscripta*, 2 vols. in fol., Lugd. Bat., 1723. The dates of the first appearance of these treatises are, however, not always given by LUTSINUS. A *Supplement* to this work has been added in historical order by C. G. GRUNER, entitled *Aphrodisiacis sive de Lue venerea: ejus vestigia in Veterum Auctorum monumentis, et quos A. Lutsinus Onisit Scriptores*, fol., Jenæ, 1789; and the following work, by the same author, will be perused with some interest: *De Morbo Gallico Scriptores Medici et Historici, partim inediti; aecedunt Morbi Gallici Origines Maraniceæ, Collegit, edidit, glossario et Indice Auxit.* Svo, Jenæ, 1793. DANIEL TURNER published an abridgment of the folio volumes of A. LUTSINUS, under the following title: *A Summary of the Ancient Writers on the Venereal Disease, extracted from his two Tomes, revised by BOERHAAVE, with Index of those omitted.* Svo, Lond., 1736.

II. As the identity of syphilis and gonorrhœa, formerly contended for by some and denied by others, is now satisfactorily disproved, although in the present day most commonly resulting from impure sexual intercourse, it follows that the evidence furnished respecting the period in which syphilis first appeared in Europe cannot be viewed as comprising also the time when gonorrhœa made its first appearance—or that the proofs as to the historical origination of the one could be extended to, or be considered as conclusive of, the same origination of the other, either as to time or to place. In the earlier histories, however, of cases of syphilis, gonorrhœa was often mentioned as a prominent symptom.

In the *Statutes* which JANE I., Queen of both the Sicilies, directed to be formed for the regulation of the public stews, established at Avignon in 1341, it is enacted (*Stat. iv.*) as follows: "The Queen commands that, on every *Saturday*, the women in the house be singly examined by the abbess and a surgeon appointed by the directors, and if any of them has contracted any illness by their whoring, that they be separated from the rest, and not suffered to prostitute themselves, lest the youth who converse should catch their distempers." This statute may be viewed as applicable to either venereal disease, or to neither; for it has been contended that sexual intercourse with a female during the catamenia, or suffering under leucorrhœa, with a leprosy female, during the Middle Ages, or even in more recent times, when personal cleanliness was not so much attended to as now, would produce a sexual disease capable of propagation. That the malady which the above statute was intended to abate might have been gonorrhœal is not improbable, although no sufficient proof of its existence appears.

MR. BROKET (*Philosoph. Trans.* No. 357, ann. 1715) has endeavoured to prove that a venereal gonorrhœa was known in England some ages before 1494, under the names of *Ardor*, *Arsura*, *Incidium*, &c., and in English of *Brenning*, or *burning*, and described as an *inward heat* and *excoriation of the urethra*. This affection is treated of by JOHN OF GADDESSEN in his *Pract. Med. seu Rosa Anglica*, in a chapter, "*De Infectione ex Conubitu cum leproso vel leprosa*;" and he there states: "Illum, qui concubuit cum muliere, cum quâ coluit leprosus, puncturas intra carnem et corium, hoc est inter balanum et præputium, et aliquando calcificationes in toto corpore sentire." "That this scalding might or might not arise from the cause here stated is equally probable, but it cannot be viewed as a proof of the existence of gonorrhœa, inasmuch as no mention is made of its coexistence with a copious muco-purulent discharge. That the time and the circum-

stances of the origination of gonorrhœa are not without some interest, will appear from the fact of this complaint being viewed by many recent writers as in no respect different from leucorrhœa, or blennorrhagia, according to modern nomenclature. In Africa, as I was able to learn from Moorish and other native physicians, gonorrhœa was viewed as a distinct disease, although often complicated with the yaws or syphilitic affections and with leprosy, and was viewed with syphilis, as possessing an antiquity as great as that of leprosy (see § 84, 85).

Whether gonorrhœa made its first appearance in Europe at the close of the 15th century, or previously to this period, admits not now of satisfactory proof; nor even do we now know at what time it was first viewed as a variety of the venereal disease, or at least intimately connected with syphilis. Astruc remarks that all the physicians who lived in the close of the 15th and beginning of the 16th centuries were unanimous in their opinion that the venereal disease was a new distemper; but they entertained very different notions as to its origin.

The earliest writers believed the malady to have arisen from the influence of the stars, or certain conjunctions of the planets; others that it proceeded from the state of the seasons in connexion with fortuitous circumstances; some that it was an offshoot of leprosy, or that it arose from the connexion of healthy with leprosy persons; a few that it was the result of unnatural or unclean sexual intercourse, or of bestiality; and many that it was indigenous or endemic among the natives of Africa and America; but it does not appear to what they attributed the origin of the disease in these countries. (*See the Chapter on syphilitic diseases, or affections closely allied to syphilis.*)

It has long been the practice, especially with European writers, to attribute the origin of syphilis to the American continent, and that, too, in opposition to all well-attested facts connected with its true history. The first writers in Europe who described the disease say not a word in regard to its transatlantic origin, but attribute

34. But admitting that *syphilitic diseases* (§ 32) actually prevailed both in America and in Africa

it either to a celestial influx, a malignant conjunction of Saturn and Mars in the sign Scorpio, Divine vengeance, an earthquake, or a malignity of the air caused by an overflow of the Tiber, &c. Lord BACON, following FIORAVANTI, believed it to have been generated by the use of human flesh as food at the siege of Naples. The first writer who suggested its American origin was LEONHARD SOMMATUS, a German physician who wrote in 1513, twenty-five years after the disease first appeared in Italy; and he was followed by ULRICH VAN HULTEN, OVIEDO, and others on the same side, so that in the space of fifty years the American origin of syphilis was received very generally as a well-established fact in history. They unite in the statement that the disease was imported into Europe by the crews of COLUMBUS on his first or second return home, in 1493 and 1496, "a belief," says Dr. GOOD, who seems to have investigated this point with great industry and impartiality, "which seems to be altogether without foundation; for, at the period even of the first return of this celebrated circumnavigator, in March, 1493, it seems to have preceded his return by some weeks' time. On his reaching Seville in the ensuing month of April, in order to join the Spanish army, it had already arisen, and was spread over Auvergne, Lombardy, and various parts of Italy; as in the course of the summer months it was observed in Saxony, Brandenburg, Brunswick, Mecklenburg, and especially Strasburg, as all the German writers concur in admitting; and even at Cracow, in Poland, according to STREYKOWSKY's 'Chronicle of Lithuania.' While FRACASTORIO, who was an eye-witness of the entire progress of the disease, and from his high medical reputation, and residence almost on the spot of its first appearance, more largely engaged in the cure of it than any physician of his day, asserts that it was even ravaging a considerable part of Asia and Africa, as well as of Europe." Not only this writer expresses his disbelief in the disease having been imported from America by the crews of COLUMBUS, but not a single writer who was an eye-witness of the first outbreak of syphilis ascribed to it an American origin; nor did COLUMBUS, nor his brother, who left such accurate narratives of his voyage, make the least mention of such a disease having been discovered among the natives, or prevailing among the crews of their vessels. Moreover, we have the testimony of FULGONI that it prevailed in Upper Italy in the year 1492; of SABELLICO, INFESSERA, DELPHINI, and FULGONI that it prevailed in Upper Italy in 1493; and of MASSA, CATANEO, PINETOR, BURCHARDI, and CAPELOTTI, that syphilis prevailed extensively at Rome and in Italy in 1494. Now CHRISTOPHER COLUMBUS, on his first return to Europe, landed on the 4th of March, 1493. The statement, therefore, of OVIEDO, that this disease was carried to Italy by the army of GONZALVO must fall to the ground, inasmuch as this general arrived at Calabria as late as the month of May, 1495. OVIEDO has always been the great authority on this point, but he was charged and convicted of the grossest falsehoods, contradictions, and inaccuracies, by his contemporaries FERDINANDO COLUMBUS, A. HERREIRA, DE LA CASA, and others. There is, indeed, not a shadow of evidence that syphilis existed in America till the third voyage of COLUMBUS, in 1498, when it was probably carried to St. Domingo by his crews, and five years after it had prevailed extensively in Europe. If any thing more be wanting to confirm the belief that syphilis did not even exist in the West Indies and on the continent of America at the period of their discovery by the Spaniards, it may be found in the following letter, from our distinguished countryman, WILLIAM H. PRESCOTT, the historian, to Dr. A. E. HOAG.

"Boston, Jan. 22d, 1844.

"MY DEAR SIR,—I have received your note of the last week, inquiring whether in my researches relative to the history of Mexico, I had met with any trace of the existence of the venereal disease among the aborigines previous to the coming of the Spaniards. \* \* \* In a note in the 'History of Ferdinand and Isabella,' vol. ii., p. 501, I took occasion to express my own conviction that the venereal disease did not exist among the natives of America at the time of its discovery. I had met with no allusion to it in the narratives of Columbus or his son Ferdinand, or in any other record of the Spanish adventures. I have been led into a much wider range of observation in preparing the 'History of the Conquest of Mexico,' but it has served to confirm my former opinion, since I have never met with a notice of this disease, or of any which resembles it. The ancient chronicles speak of an Indian epidemic, called the *Matlazahuatl*, which swept off great numbers of the nations both before and after the conquest, and which seems to have had some resemblance to the Yellow Fever. They also notice the introduction of the small-pox by a black, who came into the country the

for ages before the discovery of COLUMBUS, it does not follow that the disease brought by his followers from America was the cause of the epidemic syphilis of Italy and other countries in 1493, 4, and 5. Indeed this inference is completely disproved by facts; for, as SPRENGEL has contended, syphilis, according to the testimony of most reputable authors, had appeared early in 1493, and soon afterward extended to most of Europe, while, according to OVIEDO, the most credible of all witnesses on the subject, the fleet of GONSALVO, which conveyed the Spanish soldiers to Italy, arrived in Messina on the 26th of May, 1495. Thus the disease was existing two years before the arrival of the Spaniards, and spreading in the army of Charles VIII. of France. That the disease existed in Barcelona in 1494 or 5, appears in a letter published by THUENE, from NICHOLAUS SCYLLATIUS, a physician of Messina, the editor of an edition of the "*Rosa Anglica*," in 1492, and addressed to AMBROSIVS ROXATUS, physician to the Duke of Milan. From this letter it appears that SCYLLATIUS was in Barcelona in 1494, that the distemper was spreading among all ranks, and was propagated by contact only, and that it was universally believed to have proceeded from Provence, where it was named the disease of St. Ment. SCYLLATIUS thought it the *sahafathi* of AVICENNA; but while he describes its general characters, he says nothing, as may

year after the arrival of Cortez. The Spaniards would certainly not have omitted to notice so terrible a disorder as the venereal, had it been found among the natives; especially as, considering their own licentious Indulgence, it must have fallen very heavily on themselves. Their uniform silence, therefore, is evidence so strong, that it may be called positive rather than negative, and may be considered as establishing the fact that the disease was not known in the Mexican empire at the time of its discovery. Whether a disease so easily propagated among adjacent tribes, and which seems to be circumscribed by no parallel of latitude, could have existed in other parts of the continent without finding its way into Mexico, is a question which your own knowledge of the subject will enable you to determine better than I can.

"W. H. PRESCOTT.

"A. G. HOAG, Esq."

The following extract from "Ferdinand and Isabella" gives the paragraphs referred to above by Mr. PRESCOTT: "While the colonial commerce failed to produce immediately the splendid returns which were expected, it was generally believed to have introduced a physical evil into Europe, which, in the language of an eminent writer, 'more than counterbalanced all the benefits that resulted from the discovery of the New World.' I allude to the loathsome disease which Heaven has sent as the severest scourge of licentious intercourse between the sexes, and which broke out with all the virulence of an epidemic in almost every quarter of Europe, in a very short time after the discovery of America. The coincidence of the two events led to the popular belief of their connexion with each other, though it derived little support from any other circumstances. The expedition of Charles the Eighth against Naples, which brought the Spaniards, soon after, in immediate contact with the various nations of Christendom, suggested a plausible medium for the rapid communication of the disorder; and this theory of its origin and transmission, gaining credit with time, which made it more difficult to be refuted, has passed with little examination from the mouth of one historian to another to the present day.

"The extremely brief interval which elapsed between the return of Columbus and the simultaneous appearance of the disorder at the most distant parts of Europe, long since suggested a reasonable distrust of the correctness of the hypothesis; and an American, naturally desirous of relieving his own country from so melancholy a reproach, may feel satisfaction that the more searching and judicious criticism of our own day has at length established beyond a doubt that the disease, far from originating in the New World, was never known there till introduced by Europeans."—(*The N. Y. Journ. of Med. and the Collateral Sciences*. Edited by S. FORRY, M.D., vol. ii., New York, 1844, p. 150.)]



be expected from the date of his letter, of an American origin.

34\*. It is difficult if not impossible to determine accurately either the place or the date of the first appearance of syphilis in Europe. So rapidly did it manifest itself in one place after another, that it is impossible to determine the place in which it was first recognised. FULGOSUS states that it appeared in Italy as early as 1492; PETRONIUS, C. TORELLA, HASCHARD, ULRICH DE HUTTEN, and BORGARUTIUS, in 1493; JOHN DE VIGO, MASSA, CATENEUS, HOCK, SCHMAUSS, FALLOPIUS, and many others, in 1494; BRASAVOLUS, in 1495; PHISIUS, MONTESAURUS, MAINARD, BENIVENIUS, and MONTANUS, in 1496; and FRACASTORIUS as early as 1490. It should not be overlooked that these and other authors evidently assigned these dates as the times when the disease became known to them, or in the places where they wrote, or they took the dates from the testimony of others. Wherever or whenever it first appeared, it cannot be disputed that it was speedily evinced in the chief cities of Europe. That it was seen as early as 1490, according to FRACASTORIUS, or 1492, as stated by FULGOSUS, may be inferred from the circumstance of its having been mentioned in the Mansfield Chronicle, in the Leising Chronicle, the Leipsic Annals, and the Zweifalt Annals, as being general in Germany in the summer of 1493; "and it is even said to have prevailed at least four years in Misnia. It was common in Auvergne in 1493. It was known in Paris in 1494, and in Augsburg in 1495." It appeared in Memmingen, at Nürnberg, and in Edinburgh, in 1496; and it spread through Bohemia in 1499. It has been considered remarkable that the Chronicles of Barcelona, Valence, Murcia, Toledo, Seville, Burgos, Guadalajara, Valladolid, Segovia, and other cities in Spain, have made no mention of the period at which the disease first appeared, and the same is true of the cotemporaneous annals of Portugal. The opinion which I have expressed (§ 112), that this distemper is identical with the African Yaws, which is indigenous among the negro races, that it spread to the Moors and Jews in Northern Africa, and was thence conveyed by them into Spain and Portugal ages before it spread into France and Italy, and there became epidemic, will account for the first appearance of the distemper in the cities of the Iberian peninsula not having been mentioned, inasmuch as it had become there a well-known malady for ages before the end of the 15th century.

35. ii. DESCRIPTION OF PRIMARY SYPHILITIC ULCERS.—These, usually termed *chancre*s, are caused by the application of the syphilitic virus, to any part—mucous or cutaneous: to the former when entire or otherwise, to the latter also when entire, but much more readily when wounded or abraded. Their common *seat* is the genitals; in men, most frequently on the inner surface of the prepuce, or between the prepuce and corona glandis, and especially in the angle by the side of the frænum. "The time at which venereal sores appear is said to be from the third to the tenth day after infection; but it is more probable, as RICORD observes, that the syphilitic virus operates progressively from the first moment of its application, but that the ulcer is fully formed by the fifth day, although it may not be perceived till later." (DRUITT.) The average *duration* of a

syphilitic ulcer produced by inoculation is, according to WALLACE, twenty-five days.

36. Primary syphilitic ulcers present several varieties, which have been arranged by Mr. HENRY LEE under the following heads: 1st. The indurated or Hunterian chancre—a slow, torpid ulcer, encircled by adhesive inflammation; 2d. The non-indurated, or pustulous, ulcer, marked by early and free suppuration; 3d. The phagedænic or ulcerative; and, 4th. The sloughing; 5th. To these I may add, Urethral chancre.

37. 1st. *The indurated or Hunterian chancre* "is generally found on the common integument, or on the glans penis. It may begin either as a pimple, or as a patch of excoriation which heals up, leaving the centre ulcerous." When this ulcer is produced by inoculation, in order to observe accurately its progress, M. RICORD states, "that the puncture reddens during the first twenty-four hours; that in the second and third days it swells slightly, and becomes a pimple, surrounded by a red areola; from the third to the fourth day the cuticle is raised into a vesicle by a turbid fluid, with a black spot on its summit caused by the dried blood of the puncture; from the fourth to the fifth day the morbid fluid increases, and becomes purulent, the vesicle becoming a pustule with a depressed summit. The areola, which had increased, now begins to fade; but the subjacent tissue becomes infiltrated and hardened with lymph." After the sixth day, "if the cuticle and the dried pus which adheres to it be removed, there is found an ulcer, resting on a hardened base; its depth equal to the whole thickness of the true skin, its edges seeming as if cleanly cut out by a punch—its surface covered with a grayish pultaceous matter, and its margin hard, elevated, and of a reddish-brown or violet colour. The ulcer feels to the finger like a little cup of cartilage set in the flesh."

38. 2d. *The suppurating or non-indurated chancre* has been divided into four stages. It is first a small itching pimple or pustule, and displays when it bursts, secondly, a foul yellowish or tawny sore, with slight swelling and redness, and spreading circularly; it may or may not be covered at first with a dirty brown scab. "In the third stage it throws out indolent fungous granulations (and in this stage is sometimes called the *raised ulcer* of the prepuce), and is usually stationary for a little time, after it has ceased to ulcerate and before it begins to heal. In the fourth stage it slowly heals; cicatrization being preceded by a narrow vascular line. If the ulcer be seated near the frænum, it is sure to perforate it."

39. 3dly. *Phagedænic chancre*s are very painful and rapid in their progress. Their surface is yellow, and dotted with red streaks; their shape irregular, their edges undermined or irregular, and the discharge from them profuse, thin, and sanious. The surrounding margin usually appears puffy or œdematous, generally presenting a low grade of vitality, but sometimes it is firm, and vividly red. These ulcers occasionally eat deeply into the substance of the penis, or undermine the skin extensively; but they generally spread much more widely than deeply, and hence they have been called *serpiginous*. Sometimes these sores are more irritable than phagedænic, being acutely painful, discharging a thin ichor, having a raised surface of yellowish exudation, but not spreading much although obstinately refusing to heal.

40. 4th. *Sloughing chancre*s are most frequently observed in the prepuce and integuments. Other chancres, however, presenting the simple states of inflammation observed in the second variety, may be changed into a gangrenous or sloughing state by local irritation, excessive horse-exercise, by excessive debauchery, intoxication, or whatever depresses or exhausts vital force.

41. 5th. *Urethral Chancre*.—The secondary syphilitic symptoms which were formerly attributed to gonorrhœa have been satisfactorily proved by RICORD, but very long believed to proceed from a chancre in the urethra, and the distinct natures of the two venereal diseases thereby determined. The existence of chancre in the urethra may be inferred, if, with many of the symptoms of gonorrhœa, the discharge varies much, sometimes being thin, scanty, and bloody, sometimes thick and profuse; and if there be one painful and indurated spot, not far from the opening of the urethra. But the existence of urethral chancre can be certainly proved only by the ulcer being visible at the orifice, or by inoculation with the matter.

42. SYPHILITIC ULCERS IN THE FEMALE may assume the several states described above. They do not commonly cause so much distress as in the male, although there are many exceptions to this rule; but they are always slow in healing, especially when the urine passes over or comes in contact with them. When they are seated high in the vagina, the symptoms produced by them are very equivocal, the discharge not materially differing from that attending other lesions; an examination by the finger or by the speculum being requisite.

43. iii. THE DIAGNOSIS OF PRIMARY SYPHILIS.—Various affections, described under their appropriate heads, may be mistaken for chancre. These are, 1st. *Gonorrhœa externa*, or *balanitis*, consisting of inflammation of the glans and inside of the prepuce, with profuse purulent discharge and excoriation of the cuticle. It may proceed from gonorrhœal infection, or from neglect of cleanliness, and the acrid secretions of the part, or the unhealthy secretions of the female, especially in a person with a long prepuce; 2d. *Minute aphthous-looking points* surrounding the glans; 3d. *Herpes præputialis*; 4th. *Psoriasis præputii*; 5th. *Chronic eczema*, which, however, rarely affects the genitals, unless it be present in other parts; 6th. *Simple excoriations*, from friction or other non-specific causes.

44. It must, however, be admitted that the characters of primary syphilitic affections are not sufficient to enable us to distinguish them with certainty from the above or similar affections arising from ordinary causes; and that the several varieties of primary syphilis now described afford us no sure ground for practical distinctions between each other. The only circumstance in which all writers, from Astruc to the present day, agree, is that ulcers of an obstinate nature, attended or followed by induration, are those most likely to be followed by constitutional disease. That the indurated chancre alone is characteristic of genuine syphilis, according to HUNTER, CARMICHAEL, and EVANS, cannot now be credited, and would confine syphilis within very narrow primary limits; for the genuine Hunterian chancre is now extremely rare. Nevertheless, Mr. HENRY LEE and Dr. DRUITT, although they

divide primary syphilitic ulcers into four varieties (§ 36), state that it seems almost certain that it is only after the *Hunterian variety* that constitutional symptoms are to be dreaded, or preventive treatment required; and that sores of the suppurative, ulcerative, and sloughing varieties, and those attended by suppurating bubo, do not, as a general rule, affect the constitution.

45. On this fundamental subject, Dr. COLLES, a most experienced and enlightened surgeon, makes the following remarks: "Although every surgeon must admit that Mr. Hunter's description of a chancre is correct, and drawn from nature, still I believe few will confine this term, or that of primary venereal sore, to those ulcers only which answer to this description. As the result of long, attentive, and anxious observation, I should say that primary venereal ulcers present an almost endless variety of character. I would define a primary venereal ulcer to be one which is remarkably slow in yielding to ordinary, mild, local treatment; but which is curable by mercury, and which, if not so cured, is likely to be followed, in two or three months, by secondary symptoms, which again are also curable by mercury. If, then, there be, as I affirm there is, an almost endless variety in chancres, how can we decide on the nature of primary ulcers, so as to pronounce some to be syphilitic, and others to be mere common sores, or simple excoriations? I reply, that we are to be guided in our decision by observing, first, that many of these suspicious ulcerations cannot be referred to any class of common ulcers, as they strikingly differ from them; and, secondly, by attending to the course which these take, when not interfered with by any stimulant or caustic application, and when treated only with some mild ointment or cold water. If, under these circumstances, we find that, after eight or ten days, such ulcers show no disposition to heal, and if at the same time there be a total absence of any cause, such as defect in the general health, to account for this obstinate condition of the local disease, we may then pronounce them to be syphilitic." (*Op. cit.*, p. 75.)

46. *The constitutional effects* of syphilitic infection are even still more variable and uncertain in their characters than the primary. It is manifest that *bubo* has been considered by many, and more especially by M. BOYER, of too great importance, for it is certainly not a diagnostic of genuine syphilis, nor is it a secondary symptom, but merely a local consequence of the primary sore—the effect of irritation, or of the virus conveyed to the inguinal glands, by the absorbents from the local sore, no constitutional affection often supervening when it suppurates freely. When a patient has a syphilitic sore which has not been destroyed within five days, he is liable afterward to these effects which will hereafter be described as *secondary* and *tertiary syphilis*. Yet, according to Mr. HENRY LEE and Dr. DRUITT, it seems almost certain that it is chiefly after the Hunterian variety that these effects are to be dreaded, and their preventive treatment is required; and that the suppurative, ulcerative, and sloughing varieties, and those attended with suppurating buboes, do not, as a general rule, inflit secondary disease. A developed Hunterian chancre, or its cicatrix if hard or red, like the vaccine vesicle, affects the constitution, "so that if it be cut out or destroyed, the wound will assume the same character, and require the same consti-



tutional treatment, as if the malady had not been interfered with." It has also been recently shown that repeated syphilitic infection begets a protection against fresh attacks; and that the production of additional suppurating syphilitic sores not only does not confer any fresh liability to secondary symptoms, but seems to diminish that which exists already. Hence it has been proposed, as will be shown in the sequel, to inoculate syphilitic and other persons with syphilitic matter, or to *syphilize* them—in order to prevent and to cure this distemper—a subject which will be noticed in the sequel.

47. *The marked differences presented by the primary sores and the secondary symptoms of syphilis*, not only soon after the epidemic appearance of the distemper in Europe, but also during its subsequent prevalence, and in modern times, have been variously explained. Mr. CARMICHAEL believed that there were several distinct species of venereal poisons, each of which produced a specific primary sore and a specific train of secondary symptoms; that the Hunterian chancre, for example, was followed by an exaeated ulcer of the tonsils, sealy eruptions on the skin, nodes, &c. But the history of the malady, the diversified symptoms which result from either form of primary sore, and various other considerations, warrant a belief only in one specific virus or poison, which manifests itself both primarily and constitutionally in varied forms, according to the circumstances of infection—to the intensity of the primary morbid action, to the tissue with which the virus is brought in contact, and to the temperament, habit of body, diathesis, and susceptibility of the person infected. Hence arise different modifications or even varieties of the distemper, all resulting from one specific morbid poison. Thus they pass into each other in every phase or grade, without being originally or specifically distinct; and hence the one form or variety may prevail in different countries and races, and even in different ages, and under different influences, and yet give rise to another variety either as to form or intensity, when it infects different races, diatheses, and constitutions. Even in the same country and race, the circumstances and habits of the infected, especially mental and physical distress, prolonged fatigue and exhaustion, debauchery, frequent excesses and intoxication, neglect of cleanliness, &c., will occasion a much more intense and intractable disease, than in persons differently circumstanced. It was most probably owing to these influences that the disease was so severe even in its primary symptoms among our troops during the campaigns in Portugal and Spain, and so mild among the natives. Owing probably to the difference in race, it presented to my own observation in Africa different modifications or forms and grades of intensity among the negroes, from those more usually observed in the white race. As to this topic, however, I would suggest a further, and more precise and extended observation, than I was enabled to make. There can be no doubt that in this country various forms of constitutional affection may proceed from the same kind of primary sore.

47\*. III. *SYPHILITIC BUBO*.—Inflamed and enlarged lymphatic glands, consequent upon a venereal ulcer, arise from the virus contained in, or secreted by this ulcer or chancre. This affection of the inguinal glands may arise from the irritation of, or absorption from, gonorrhœal inflamma-

tion of the urethra; but it is not so frequent, nor so severe as when it is caused by chancre. Syphilitic bubo cannot be viewed as an indication of the existence, or even of the commencement, of the secondary or constitutional disease; for the affection of the glands may even, according to the more recent occurrences of the disease, be the means of preventing the constitutional contamination. This, however, was not the case in the earlier histories of the distemper, and more especially after the epidemic prevalences of the disease in the end of the 15th, and during the 16th century—a. *The forms and diagnosis of bubo* have been correctly and succinctly given as follows by Dr. DUVITT: 1st. *Bubo of the penis* is an inflammation of a lymphatic in the penis, which may be felt like a cord under the integuments, and which passes into abscess in some part of its course. 2d. *Acute bubo* in the groin generally affects one gland, and pursues the course of an acute abscess. The cellular tissue surrounding the gland is the usual seat of suppuration, but there may be also a small abscess in the centre of the gland, caused by the transmission of the poisonous matter, and the pus of this latter is alone capable of producing a chancre by inoculation. 2d. *Chronic or indolent bubo* commonly affects more than one gland. It occurs in weak or scrofulous habits, and especially in persons injured by the improper use of mercury. The glands enlarge slowly, suppuration is protracted and imperfect, and commences at several points. The skin is long in inflaming, and on becoming so a large tract assumes a dusky bluish tint; the matter extends, and at last large portions of skin perish by ulceration, leaving an extensive sore, that may be months in healing.

48. b. *The diagnosis of syphilitic bubo* requires attention. If one gland only, and that above Poupart's ligament, be affected, it is most probably caused by chancre on the penis, provided there be or has been one. "But if many glands are swollen, and they are below the level of Poupart's ligament, the swelling is probably caused by some irritation about the foot (or extremity). But the only sure diagnosis of a syphilitic bubo is that, if the matter taken from it be inoculated, it will produce a chancre; or that the sore produced by opening the bubo presents the elevated edges and copper-coloured margin of a chancre." As every bubo is attended by suppuration of the surrounding cellular tissue, the matter taken when first opened may not cause chancre by inoculation. There is no certain proof of a bubo being syphilitic unless preceded by chancre, unless a chancre can be produced by inoculation of the discharge, or unless decided secondary symptoms supervene.

49. IV. *SECONDARY SYPHILIS*.—Constitutional syphilis may occur from a fortnight to three or four months after the primary symptoms. The usual time is five or six or seven weeks. Early in the history of syphilis in Europe, the constitutional affection was much more early than the shortest time now named, and was not unfrequently the first produced, owing to the readiness with which the contagious principle was imparted and imbibed. Before the appearance of secondary symptoms, the constitution betrays its infection by a variety of *premonitory symptoms*—by a dispirited and even wan expression, by want of appetite and sleep; by heaviness of the eyes, rheumatic pains, especially during the night, and pal-

lor and loss of flesh ; and, lastly, by a slight eruptive fever usually of an inflammatory type. Upon these, after a short but variable period, the secondary symptoms supervene, sore throat generally accompanying this fever or soon following it.

50. *The symptoms premonitory* of the secondary or constitutional disease are sufficient evidence of the infection of the body by the primary disease, although those alterations usually termed secondary are not yet developed. The dull, earthy hue of the surface, the loss of bodily health and mental vigour ; the dryness of the hair, and loss of its smoothness and glossiness, and the giddiness, headache, uneasiness about the neck, or supra-orbital pain, usually on one side, and when the body is recumbent, are among the earliest indications of this infection. On these supervene pains about the joints ; lassitude of the limbs ; enlargement of the posterior cervical glands ; loss of the tone, fulness and strength of the pulse ; more or less anæmia, and falling out of the hair. The loss of hair indicates an inveterate form of disease, and is often attributed by patients to the use of mercury ; but this mineral will not cause *alopecia*, but syphilis will. These symptoms, although not generally recognised as secondary, are so nevertheless, and, if not arrested by treatment, will soon be followed by those which are more generally described as such.

51. 1. *SYPHILITIC ERUPTIONS.*—*The secondary effects of syphilis* are ultimately developed either on the skin or mucous membrane, especially of the throat, or on both.—A. The earliest of these to appear is an *exanthematous* or *erythematous eruption*, which may be either attended by fever, as stated above (§ 49), or entirely independent of fever. This eruption may occur either during the existence of the primary symptoms, or a few weeks after their disappearance. It sometimes assumes the appearance of either measles or scarlatina, and at its commencement is usually of a rose-colour, the surrounding skin being of an unhealthy or dusky hue. The redness disappears on pressure, but returns immediately when pressure is removed. The surface of the body may be covered at once, but more frequently in succession, by this eruption, which soon loses its rosy hue, and daily becomes more and more dusky, until it assumes a coppery and more permanent tint. It is generally unattended by either heat or itching. It generally fades away for a while, and then reappears ; and it may thus proceed, with interruptions, for two, six, or twelve months, but after a year or two it entirely dies away. In half the cases the eruption remains unnoticed, and it very often fades away without the patient being aware that it ever had any existence ; but some time after another and a deeper eruption makes its appearance. This state of the eruption may be mistaken for pityriasis, or this latter for syphilis ; but the history of the case, the appearance of the eruption, the absence of itching, and the impaired health of the patient, will indicate its syphilitic nature.

52. B. A more developed form of syphilitic eruption may appear as *papulae*, of various sizes, or as *psoriasis*, in which the skin is raised in copper-coloured blotches, covered by *scales* of hypertrophied cuticle. These eruptions are succeeded merely by exfoliations of the cuticle or thin superficial scabs. An aggravated state of the foregoing begins with an eruption of copper-coloured blotches, which become covered with *scales* of en-

larged cuticle, and form *syphilitic lepra*. These scales are succeeded by thin scabs, and these, on falling off, leave shallow ulcers with copper-coloured edges.

53. C. *Vesicular eruptions*, often assuming the form of *rupia*, may occur, appearing at first as large flattened bullæ, filled with serum, passing into a purulent state, and finally drying into thick scabs, under which the skin is ulcerated. The ulcers spread under the scabs, and, owing to the successive additions of the dried matter as they extend, they become remarkably thick, conical, and resemble limpet shells. The eruption may be distinctly *pustular*, constituting *syphilitic ecchyma*, the pustules being large and prominent, leading to ulcers, with a copper-coloured base.

54. D. *Tubercular eruptions*, broad, reddish, or copper-coloured, appear on the face, most frequently at the ælæ of the nose, or on the cheeks. They suppurate slowly, and are succeeded by deep irregular ulcers, terminating in puckered cicatrices. This eruption, in Dr. DUNN'S opinion, more properly belongs to the class of tertiary symptoms, in which mercury is almost inadmissible. This eruption usually appears a very considerable time from the primary symptoms in persons of weak constitution, or who have been broken down by privation, dissipation, or unavailing courses of mercury ; it is consequently an unfavourable form of the disease. "A patch of this kind of unhealthy inflammation is apt to form on the tongue, and after a time an abscess breaks, disclosing a ragged excavation, filled with orange-coloured sloughs, and exuding a copious fetid discharge. If it occur on the palate, a probe will detect bare exfoliated bone, which rapidly perishes, and leaves a hideous chasm."

55. E. *Mucous Tubercles, Condylomata*—*Tubercule muqueux, Pustule Plate*, consist of raised patches of skin, with a red and moist surface, like mucous membrane. They exude a thin, acrid, and offensive discharge. They are most frequently situated in the vicinity of the genitals, or in any other place where two surfaces of skin come in contact, presenting an excoriated appearance. They constitute a peculiar syphilitic eruption, and are undoubtedly capable of producing constitutional syphilis, generally with a similar eruption, in healthy persons. Indeed such a result may follow the tubercular or even the pustular forms of secondary syphilis in certain favourable circumstances. (*The several forms of syphilitic eruption are more fully described in the several articles devoted to diseases of the skin.*)

56. Venereal eruptions are not severally characteristic of any distinct form of syphilis, primary or constitutional. Dr. COLLES states, 1st. That he has not been able to trace back particular forms of eruption, to particular forms of primary ulcer. 2d. He has not unfrequently observed varieties of eruption existing together in the same person. 3d. After the removal of the first eruption by mercury or other means, the second crop will often prove of a different kind ; and, 4th. Any form of eruption may be converted, by injudicious treatment, as the excessive use of mercury in bad habits, into one which is most obstinate and severe. This opinion agrees with those of HENNEN, OESTERLAN, S. COOPER, BACOT, and others. Mr. BABINGTON considers the variety of venereal eruptions to be so great as to baffle description. He, however, arranges the more distinct forms under the heads of *Tubercles*,



*Lichens, Psoriasis and Lepra, and Rupia.* The most important practical point, which many writers connect with these distinctions into form of eruption, is, that rupia and ecthyma are met with in a very dangerous general depression of health, requiring the greatest care.

57. *F. The diagnosis of secondary eruptions* is of great importance—is sometimes very easy, and occasionally very difficult. In all cases the previous history of the patient should be inquired into. It is not only necessary to ascertain whether or no a chancre has existed, but also the time when it occurred, its situation, and its character. If no chancre, but gonorrhœa only, in male or female, preceded the eruptions, it should be recollected that chancre may have escaped the patient's notice, or may have existed in the urethra of the male, or in the vagina or cervix uteri. In these cases caution and farther observation are required. If sores are admitted, their characters, especially as regards induration, are of importance.\* A knowledge, likewise, of the existence of suppurating bubo may be useful, for indurated chancre is rarely attended by suppurating swelling in the groin; and, lastly, the existence of any traces of indurated chancre or bubo ought to be ascertained, the denial of the patient not being sufficient.

58. As respects the eruption, M. RICORD remarks that one of the most important characters of it is a total absence of pruritus, whereas itching is a very frequent symptom of the other kinds of eruption. When, however, the syphilitic eruption affects naturally pruriginous regions, as the anus, the genito-crural fold, there may be considerable itching, owing to the irritating nature of the secretion. Syphilitic eruptions are generally apyretic and indolent, involving in a short time the whole body, generally by successive instalments. They spread indiscriminately to all parts, and do not affect the face in preference to other parts. They emit no smell, unless there be an exudation of fluid or suppuration. "There is nothing specific in the smell, nor in the colour mentioned by SWEDIAUR, nor the ham-like hue spoken of by FALLOPIUS, which latter has been, with reason, looked upon as an important sign, and an absolute and constant character." Secondary eruptions generally present rounded and well-defined patches, the colour of which may be

more or less deep in their centres. They have very little tendency to suppuration; and when matter does form, it is generally small in quantity and unhealthy in character. The eruptions which do not suppurate, generally disappear in time by resolution or desquamation. The scales in these cases are less brilliant and thinner, dry more quickly, and more frequently furfuraceous than in non-specific affections, and the scales sometimes fall off in large shell-like pieces. The crusts sometimes accumulate in successive layers, as in rupia. When, by the falling of the crust, the ulceration underneath becomes apparent, it generally is rounded, its fundus grayish and pul-taceous, is surrounded by a darkish areola, with a certain induration in the margins. Phagedæna of these ulcerations is rare; but when it does happen, it sometimes extends rapidly. Secondary syphilitic ulcers are preceded either by some eruption, as ecthyma, rupia, papule, or tubercles: they rarely follow vesicles or psyracous pustules. RICORD agrees with HUNTER in considering the diagnosis of secondary symptoms as most difficult; for "there is hardly any disorder that has more diseases resembling it in all its forms than the venereal disease."\*

59. *G. Secondary affections of the scalp—Alopecia syphilitica*—is among the earliest constitutional disorders consequent upon syphilis. It commences with a slight itching, tenderness or soreness of the scalp, attended by rheumatic pains. On examination, no trace of eruption can be detected; but if the patient have suffered within four or eight weeks from chancre, or if any induration remain in its situation, the tenderness of the scalp will soon be followed by the loss of hair and some one of the affections of the skin, throat, &c. The alopecia commences very gradually. The hair at first becomes dry and crisp, loses its glossy appearance, breaks readily, a brush or comb causing great pain. The hair is often seen broken off close to the scalp, and patches of baldness, or approaching to it, are found here and there. At a more advanced stage the hair comes away with the bulbs in considerable quantity. Pityriasis now becomes troublesome; and various points of the scalp assume a rosy hue; the rest of the skin generally having a yellowish, unhealthy appearance. Slight febrile symptoms set in, attended often with rose-coloured spots on the abdomen. The patient now frequently complains of rheumatic pains in the joints, with loss of appetite and debility. The loss of hair requires immediate attention, especially when caused by syphilis, as it may be very considerable in a short time, and its growth very uncertain. It should, however, be remarked that if the hair does not fall out at the commencement, it is not very frequently lost in the latter stages of constitutional syphilis.

60. At a more advanced stage, a papular affection of the scalp, commencing with little rose-

\* DR. MCCARTHY says, "In 123 cases of secondary symptoms, indurated chancre had preceded the eruptions 118 times, and been recognised in the hospital, or the patient recollected having felt it. In one case only the patient could recollect that a clap only had preceded the condylomata which we observed on the patient; but this clap was attended, he told us, with a bloody discharge, which occurred seven months previous to his admission into hospital. In 4 cases we were unable to obtain accurate recollections on the subject of induration."

"The examination of these 123 cases clearly proved to us, in consequence of the frequent unexpected situation of the primary sore, the reason why we daily meet with cases which give reason to suppose that secondary symptoms may arise spontaneously. In 6 cases the sore was seated in the urethra, when inoculation enabled us to recognise it three times; in other cases the disease, at first concealed from view, ultimately appeared as a urethral chancre at the meatus. Four times at the anus, once in the nostril, once on the chin, once on the lip. Suppose we take these 123 patients, and compare those primary symptoms, for the purpose of attempting to discover some one character which appears sufficiently often to enable us to draw a deduction from it, we find that in one and all the inguinal glands have been observed enlarged, but suppuration took place only twice, and in these the buboes had a scrofulous appearance, and it was not possible by inoculation to obtain the specific pustule." (Note from Aeron's ep. cit., p. 488.)

[\* For the best description of the *syphilita, or syphilitic eruptions*, the reader may consult the American edition of VIDAL "On Venereal Diseases," with colored plates, translated by GEORGE C. BLACKMAN, M.D., 8vo, p. 499. New York: Samuel S. and William Wood, 1854. In this, the ablest work on this class of diseases hitherto published, the different varieties, including the *exanthematous, papular, squamous, vesicular, bullous, pustular, and tubercular*, are described at great length, and accurately represented by coloured engravings. We feel tempted to give a synopsis of these varieties, but the work is so accessible, and so well known to the American profession, that it is unnecessary.]

coloured elevations, attended by itching, is observed. These papulæ, or *liehens*, increase in number, slight pearly-white scales form on their apices, which fall away and are replaced by others. The hair is scurfy, and the papulæ or elevations, at first the size of millet-seeds, become large and assume the form of *lepra* or *psoriasis*. When the scales are removed, the skin looks like a recently-blistered surface, and exudes a small quantity of thin pellucid fluid; or it is quite dry. In particular situations, especially behind the ears, in the folds of the neck of stout persons, or those inattentive to cleanliness, those places instead of becoming scaly remain moist, the oozing from them excoriating the surrounding parts, and developing mucous tubercle or condyloma. As the disease of the scalp advances the papulæ or lichen pass into an impetiginous or an eczematous state. In still more advanced stages, ulcerations of a very intractable character, forming tertiary symptoms, form in the spots of impetigo or eczema; and tumours as large as horse-beans form in the scalp, at first unattended by pain or redness. Fluctuation may be detected in them after some time, and when punctured a thin, serous, straw-coloured fluid exudes. If left alone they become painful and red, ulcerate, exposure of the bone ultimately following, and even necrosis, which are now chiefly seen in pathological collections, and but rarely in practice in the present day.

61. *H. Syphilitic Onychia*.—The venereal affections of the skin or scalp may be extended to the nails. In these cases the matrix suffers, and the nail grows thick and nodulated, closely resembling the changes which take place in it from inveterate psoriasis. There is a great similarity between onychia and alopecia. They both depend upon the constitutional infection interfering with the formation or nutrition of these cuticular appendages.

62. ii. *SYPHILITIC AFFECTIONS OF MUCOUS SURFACES*.—*A. Syphilitic Affections of the Throat*.—*a. The mildest affection* of this kind is a superficial excoriation of the mucous membrane, most frequently of the tonsils, but not unfrequently also of some other parts of the fauces or mouth, corresponding to psoriasis on the skin. The affected parts are slightly swollen and sore, afterward red and raw, or covered with a whitish exudation, or with a patch of thickened epithelium. If the disease proceed it will generally be followed by superficial ulceration.

63. *b. An excavated ulcer* may follow the foregoing, or may be first to come before the physician, although it may have been a consecutive lesion of the parts. This ulcer appears as if a piece had been scooped out of the tonsil. Its surface is foul or yellow, its edges raised and ragged, and swollen. It occasions much less inconvenience than its appearance might indicate; and there is very little constitutional disturbance from it, unless it be attended by eruption. As the lesion advances, or swelling increases, the patient's speech becomes guttural, and he often complains of pain shooting to the ears, and of partial deafness.

64. *c. Sloughing ulcer* begins as a small aphthous spot which rapidly ulcerates, and is attended with great pain and fever. "The surface of the ulcer is covered with an ashy slough, and the surrounding membrane is dark, livid, and swollen. The lingual artery may be opened by the spread

of the ulceration, and the patient may die of hæmorrhage, unless the common carotid is tied." (Druitt, p. 187.) In some instances, especially when mercury has been given in large quantities for primary symptoms, the affection of the throat comes on notwithstanding, and assumes a red and sloughy appearance; a piece of the tonsil appears as if punched out, and the ulcers rapidly extend in size and depth.

65. The *situation* of the ulcerations, most frequently of the excavated, is commonly on the tonsils, on the sides of the tongue, on the upper surface, or on the under surface close to the frænum. Sometimes they are met with on the dorsum of the tongue, here assuming an elevated character, like the condylomata around the anus. They occasionally attack the palate, pharynx, and more rarely in the posterior and lower part of the pharynx, in which latter situation it occurred in a patient many years ago under my care, ulceration also having extended to the larynx and terminated fatally. Ulcers also form at the corners of the mouth, where they may form scabs, or are liable to bleed when the mouth is fully opened.

66. *B. Syphilitic ulcerations of the nose and palate* commence with inflammation and ulceration of the mucous membrane covering the parts, similar to those of the throat. The ulcerations may proceed until they denude the periosteum, and afterward produce exfoliation of the bones and profuse fetid discharge, and ultimately very marked deformity. Ulceration of the nose generally begins with ozæna, or with a sense of pain, heat, dryness, and snuffling. But the bones of the nose may become otherwise attacked, as shown in the sequel (§ 75).

67. *C. Syphilitic ulceration of the larynx* is chiefly a consequence of the extension of ulceration from the palate or pharynx. It is characterized by tenderness, slight pain or uneasiness referred to the larynx, by huskiness of voice, followed by a low whispering, or loss of voice; by suffocative cough, and by expectoration of a sanguineo-puriform matter. There is great loss of strength and flesh; and life is often terminated by suffocation.

68. *D. Secondary Affections of the Eyelids and Eyes*.—Not only may inflammation of the eye be consequent upon gonorrhœa (see *art. EYES, gonorrhœal inflammation*, § 56, *et seq.*), but eruptions and affections of the eyelids and of the eyes themselves, chiefly in the form of iritis, may appear in the course of secondary or constitutional syphilis. These eruptions often appear on the external surface and on the ciliary margins of the lids. In some instances the corners of the eyelids have a cracked, scaly appearance, resembling a similar alteration more frequently occurring at the angles of the mouth, and, as in this latter state the eruption is connected with syphilitic affections of either the skin or of the mucous membrane, of the throat, &c., or of both; and it may appear in any period of the progress of these affections. In some cases the conjunctiva is also either partially or extensively implicated. *Syphilitic iritis* is not unfrequent; and is fully considered in the article on *the diseases of the eye* (§ 132, *et seq.*), to which I must refer the reader.

69. iii. *TERTIARY SYPHILITIC DISEASES*.—Certain constitutional effects of syphilis, which more frequently are consecutive of several of those



already mentioned, than associated with them—although such associations, especially in the advanced course of the latter, are often observed—have been classed as *tertiary symptoms* of the disease. They may, however, occur after the removal of the secondary forms of the distemper, or independently of these, and at a remote period from the primary symptoms. Under the term *tertiary symptoms* have been arranged *nodes*, *inflammation of the periosteum*, *exostosis*, *caries of the bones*, *tubercles of the sub-cutaneous and sub-mucous tissues*, *disease of the testes* consequent upon primary or secondary syphilitic disease. These affections were generally classed with those secondary symptoms already noticed. JOHN HUNTER first distinguished them by designating them the “*Symptoms of the second period of constitutional syphilis*,” a designation which many will agree with me in considering as more appropriate than that imposed on them by M. RICORD.

70. Though *tertiary symptoms* generally depend upon chancre, or, in rare cases, upon infection by a secondary disease, they follow the primary symptoms after a much longer interval, and they are seated in other and more deeply-seated structures than the secondary. They affect chiefly the sub-mucous and sub-cutaneous cellular tissue; the structure of the bones; the fibrous structures, especially the periosteum; the joints; the testes, and lymphatic system. The syphilitic poison may even develop disease of the liver, lungs, brain, and heart. Tertiary affections cannot be transmitted from parent to child—are not hereditary; but they are undoubtedly capable of producing a scrofulous diathesis in the offspring.

71. *A. Course.*—In the more usual course of the disease, tertiary symptoms do not supervene until six, seven, or nine months from the primary, and in some they may be delayed for several, or even as many years. Although these symptoms may be separated with propriety from the secondary, yet it will very frequently be difficult to draw the line of demarcation between them. They may be both so associated, or the one class may pass so insensibly into the other as not to admit of an inference as to the predominance of the one set of symptoms over the other. In the natural course of syphilis the tertiary form very frequently thus appears during the existence of the secondary, in the same way as the latter may come on during that of the primary. Under other circumstances, as from treatment, careful regimen, &c., the secondary symptoms may have successfully disappeared and returned, and ultimately the tertiary have supervened; and even, although in rare instances, an indurated chancre may have existed, and been apparently cured, yet, after a very considerable lapse of time, tertiary symptoms may appear generally from the influence of causes hereafter to be noticed (§ 109, *et seq.*), at first in a slight form, but with increasing severity, notwithstanding the non-existence of secondary symptoms between the primary and tertiary. During the course of tertiary affections, various *complications* may be developed, not only by the syphilitic poison, but also aided by treatment, by pre-existing tendency to visceral or other diseases; by the causes, influences, and circumstances to which the patient may have been exposed, and by climate, race, occupation, &c.

72. *B. Syphilitic affections of the testes* are generally among the earliest of tertiary symptoms to appear, and may occur during the existence of

the secondary. They may, however, supervene in five or six months, or not until as many years, from the primary infection. They may appear either alone, or attended by pains in the bones, exostoses, or gummatæ; but they are of rare occurrence in the present state of the distemper. ASTRUC first, and HUNTER, Sir A. COOPER and DUPUYTREN, subsequently, made the distinction between diseased testicle consequent upon syphilis and that following gonorrhœa. Syphilitic disease of the testes may commence in one and extend to both, or it may begin in both at once. Excepting slight nocturnal pains in the loins in some cases, the affection often reaches a considerable height before it is noticed. When the patient's attention is attracted by it, the testes are found heavy, hard, and generally much increased in size, although not always. The disease may run its course without much uneasiness, and hence be neglected, and organic lesions may supervene which cannot be removed. The erections, however, and the venereal desire become, on the full development of the disease, less frequent, and the seminal discharge is diminished. If the disease continue, or be neglected, the testes decrease in size, and ultimately may become atrophied, and may even disappear nearly or altogether. These changes are extremely slow, and may continue for several months or even years before the organs are entirely lost. A full description of them will be found in the works of M. RICORD and Mr. ACTON.

73. *C. Small tumours* are sometimes formed in the *scrotum*, and are described as *tubercles*, or *gummatæ*, either in connexion with disease of the testes or independently of it. They occur as a tertiary symptom in the deep layers of the scrotum, and sometimes implicate the testes, or are mistaken for affections of these organs. They never appear before the fifth or sixth month from infection; but they may occur after many years. They mostly appear as small elastic tumours, and feel as if they were filled with a gummy matter. As they grow they become painful, inflamed, and the skin covering them softens and ulcerates, and a deep ulcer follows a copious puriform discharge. The edges of the sore are undermined, and the adjoining parts are involved in the destruction.\*

[\* See paper by JOHN WATSON (in *New York Journal of Medicine* for November, 1845), entitled “Further Observations on some of the more obscure and remote Effects of Syphilis;” also, in same journal for July, 1843, Dr. W. was one of the first, if not the first, in this country to show that the venereal disease in its progress through the system may affect the *brain* and its *meninges*, the *œsophagus*, the *bronchial tubes*, and the *testes*; and that it may simulate other diseases, as *pulmonary phthisis*, and diseases of the *digestive organs*, *liver*, &c. Among the cervical ganglia he shows that it may simulate *strumous adenitis*, and in the lower extremities *elephantiasis*, while it occasionally involves the *rectum* and *prostate gland*. He also offers some very original and interesting remarks on “the rarity of secondary syphilis after sloughy primary sores; on the frequent and early occurrence of superficial necrosis in connexion with nodes; on the co-existence of syphilis with other constitutional diseases; and on mercurial cachexia, as liable to be mistaken for the remote effects of syphilis.” With regard to the syphilitic affection of the testicle, from various examinations, Dr. WATSON concludes that the primary seat of the affection is in the fibrous envelope forming the proper capsule of the testis, which occasionally becomes enormously thickened, while the proper tissue of the testis remains healthy. The tubuli seminiferi, with their continuous vessels of the epididymis, were atrophied, pale, and immersed in serous effusion. In one case there was a deposit of a large yellow mass, irregular in shape, broadest in front, and apparently connected with the fibrous en-

74. *D. Syphilitic disease of the periosteum and bones* generally commences with tenderness in the situation of the more exposed and superficial bones, especially in the bones of the nose, in the tibia, ulna, cranial bones, clavicles, &c. The tenderness and pain become aggravated in the evening, last all night, but cease altogether or abate during the day. The pain is followed by oblong swellings or *nodes*, caused by the inflammation of the periosteum, and by the infiltration of lymph and serum. These swellings are tender, and the skin over them is at first pale and moveable. They present to the touch a doughy character, or an obscure sense of fluctuation. Dr. Druitt remarks that "if the disease is arrested at this stage, it causes merely a superficial deposit of rough porous bone, from the organization of the lymph effused; or else consolidation of the bone itself, through deposition of fresh osseous matter into its cancelli. If the disease proceed one step farther, a quantity of glairy serum is effused between the periosteum and bone, producing an exquisitely painful fluctuating tumour. If it advance still farther, the bone becomes carious; matter forms between it and the periosteum; extensive exfoliations ensue; the patient suffers severely from the pain and discharge;" and if the disease be seated in the cranium or os frontis—*corona Veneris*—death may ensue from extension of disease to the dura mater, or from protrusion of the brain through the eroded apertures in the skull. Such extreme cases are now very rare, but they were common enough many years ago, and when it was supposed that mercury given in excess was the only cure for the distemper.

75. *E. Disease of the bones of the nose* is often among the earliest of the tertiary symptoms, but it is of only occasional occurrence, and sometimes not until an advanced period. The nose may become diseased, as stated above (§ 66), from ulceration of the mucous membrane; but the formation of internal nodes on the palate, vomer, ethmoid, and bones forming the bridge of the nose, may cause these bones to be carious, and probably the spongy structure of these bones may contribute to this even so quickly as it is sometimes observed. In rare cases these bones are nearly destroyed before the nature of the disease becomes apparent. When caries of the os frontis near the root of the nose takes place, the disease may extend to the ethmoid bone, and produce the worst effects. The existence of a deep-seated pain in the palate, and at or near the root of the nose, with or without a fetid discharge, should always be viewed with suspicion, especially if either primary or secondary symptoms have existed at some previous period, although very remote, and apparently altogether removed. *Ozæna* may proceed from scrofula, scurvy, or even from chronic cephalic catarrh; but in 99 cases out of 100 it is the result of syphilis in the circumstances just named.

76. *F. The joints* are not frequently nor so quickly affected as the bones. Large gummy swellings sometimes, however, form around the ankle, knee, and elbow joints, owing to venereal disease; and in rare cases even the joints themselves. In two instances I was consulted

where nearly all these joints were remarkably swollen and diseased, consequently upon other serious syphilitic affections. In a third—that of a late M.P.—amputation of the leg above the knee had been performed by Mr. DALRYMPLE, of Norwich, and the case subsequently came under my care. The small bones of the extremities may also be similarly affected. In venereal diseases of the joints it is difficult to determine, as I have not seen these cases terminate fatally, although they doubtless occasionally do, whether the disease is entirely external to the joint itself, or whether the articulations or the ends of the bones are also implicated by the disease. That the cartilages are sometimes eroded, and even the ends of the bones or their epiphysis also are affected, may be inferred not only from the case for which amputation was performed, but also from what is observed to occur as regards the cartilages and bones of the nose. These local syphilitic diseases—of the bones, joints, &c.—are generally attended by a slow or *syphilitic hectic*, and with the several constitutional phenomena described hereafter as the syphilitic cachexia.

77. *IV. THE SYPHILITIC CACHEXIA.*—It may justly be asked, can syphilis so contaminate the constitution as to give rise to dangerous or even fatal results of a different kind, or in addition to those which have been described above as secondary and tertiary? To this question I cannot hesitate to answer in the affirmative. These results do not often occur in the present day; and even the most severe of the tertiary affections noticed above, although sometimes terminating fatally, have not always this issue. In their most unfavourable results, it is often difficult to say how much may be imputed to treatment. But, irrespective of the more severe and dangerous of the affections already mentioned, states of the system may be induced, attended by marked severity or imminent danger, in which none of these affections had appeared, or, if they have appeared at some previous periods, they had been removed by medical treatment or regimen. This dangerous state of constitution—this the most remote or advanced of the effects of the syphilitic poison—has not been overlooked by previous writers, more especially by Dr. COLLES and M. RICORD.

78. Syphilitic cachexia is generally a consequence of a single constitutional contamination (*such contamination not occurring twice*), and is favoured by the following circumstances: 1st, by an originally weak or bad constitution, by scrofula, scurvy, and a peculiar or vitiated diathesis, previously to the venereal infection; 2d, by the persistence of certain severe syphilitic symptoms; 3d, by an ill-timed or badly-managed treatment, and by neglect of treatment; and, 4th, by causes which tend to lower the vital powers subsequently to infection—such causes, according to my observation, being excessive sexual indulgences, masturbation, exposure to cold and moisture, to the continued influence of malaria, or to noxious exhalations, &c.

79. *The symptoms of syphilitic cachexia* are not always well defined; for they may be associated with certain of those already noticed, or they may appear as the sequelæ of some of the more severe of them, or they occur at periods so remote from them as to occasion grave doubts of their nature and origin. They may, however, be stated to consist chiefly of pallor, sallowness, and anæmia

velope of the testicle, and extending backward in the direction of the corpus Highmorianum. This mass, by pressure, produced atrophy of the tubuli seminiferi. For an excellent account of syphilitic sarcocele, see also VIDAL.]



of the surface, flabbiness of the flesh, emaciation, debility of both body and mind, various anomalous scorbutic or cutaneous appearances, hectic or continued nervous fever, night exacerbations, diarrhœa, sweats, aphonia, and ultimately death, arising from some important internal organ experiencing disorganization, to which it may, previously or subsequently to the venereal infection, have become predisposed. Thus the patient may be cut off by extreme anæmia, by diarrhœa terminating in ulceration of the intestines, by affections of the lungs, &c.

80. Sometimes, after the patient has improved, under treatment for various secondary or tertiary symptoms, in respect both of these symptoms, and of flesh, strength, and appearance, he begins to exhibit a much less favourable aspect. He appears sickly, loses flesh, presents a waxen hue, complains of loss of appetite and strength, of want of sleep, and of night sweats. If any eruptions or other syphilitic symptoms are present, they may disappear, and yet the general constitutional cachexia may long remain, or even become more marked; or, if the local symptoms continue, they may be slowly deteriorated. Thus tubercular eruptions, or pains in the joints and bones, may continue in various grades of severity for some years, while the constitution is slowly wasted, anæmied and visibly contaminated. In some cases the local symptoms, in the course of the general breaking down of the frame, are so changed as hardly to be recognised as venereal—various local or visceral changes, the consequence chiefly of this cachexia, or of the treatment, being developed, and *masking* the venereal affection and its effects. This formerly obtained more remarkably when the treatment by mercury was carried to excess. There can be no doubt, however, that, even independently of this, or of any other treatment, the venereal cachexia may terminate fatally by calling latent tendencies into action, and by developing disease in vital or other internal organs. It may, however, be most manifest in all its indications, even when the local affections are comparatively slight; or, although they have been severe, after they have entirely or almost altogether disappeared. The local affections, as well as the constitutional contamination, are often developed, hastened, delayed, or aggravated by a number of circumstances, influences, and concurring or reinforcing *causes* (§ 115, *et seq.*), to which the patient may have been exposed subsequently to the period of infection. During syphilitic hectic or cachexia, not only may the contingencies now alluded to appear, but there are several others which may also supervene; namely, paralysis, epilepsy, hypochondriasis, melancholia, monomania, and even more or less general insanity. These disorders of the mind are, however, seldom met with even in the advanced states of constitutional syphilis—the intellect being generally but little, or not at all, affected to the last.

81. v. *The diagnosis of constitutional syphilis* is often very difficult, more especially when patients deny that they have had any primary symptoms, or even any suspicious intercourse, or even any sexual intercourse whatever. These last circumstances are, however, very rare, or may even be considered next to impossible. But the rare modes of communicating the distemper, independently of sexual connexion—much more common in former times than now—should not

be forgotten. These modes will be noticed in the sequel (§ 110, *et seq.*). If, however, copper-coloured eruptions, sore throat, loss of hair, enlargement of the glands around the occiput, pains in the joints, periosteum or bones, periosteal nodes on the long and superficial bones, with night pains, a faded, pallid, or waxen and unhealthy look, loss of flesh and strength, be complained of; and more especially if these symptoms follow a somewhat similar succession, and cannot be attributed to locality, diet, regimen, &c., or to any recognised visceral disease, they may be confidently referred to constitutional syphilis. Where, however, neither the above succession of symptoms, nor many of them appear, the difficulty of diagnosis will be much greater, especially if primary symptoms be not admitted; but, if admitted, there can be no doubt of the nature of the disease, although a long period between the existence of the primary symptoms and the appearance of those which are doubtfully secondary may have intervened. It has been stated above that the period to which the supervention of secondary and tertiary symptoms upon the primary may extend may be very long—may even extend to several years; but the exact term to which this interval may be extended has not been ascertained. Its duration evidently depends upon a variety of causes and circumstances (§ 115, *et seq.*).

82. vi. SYPHILIS IN CHILDREN.—*Syphilis Infantum*.—*Hereditary syphilis* differs so far from the disease as it occurs in adults, as to induce some writers to doubt its venereal origin. It is certainly the transmission of the constitutional contamination or distemper to the fœtus, during utero-gestation, and not the infection of the fœtus during parturition. The malady may exist at birth, or may not appear for some days or even weeks after birth. It is indicated by copper-coloured spots on the cutaneous surface, especially about the arms, genitals, and mouth, which may go on to ulceration. There are also a peculiar shrill or hoarse voice, excoriations and ulcerations, or an aphthous appearance at the corners of the mouth, on the tongue, throat, and palate. In more advanced stages, emaciation and a senile appearance of the countenance; snuffling, or obstruction of the nose, enlargement of the glands, general cachexia, terminating in death, if the disease be not early detected and judiciously treated, and even in such favourable circumstances the child may be carried off by some severe complication. In most of the cases of syphilis infantum the mother has been stated to have infected the fœtus. I believe, however, that the infection has not always proceeded from the mother only. SCHENCK adduces an instance (*Observ. le vj.*, No. 21) of the infection of the fœtus from the father, the mother being unaffected. It must, however, be admitted that it is very difficult to prove the mother to have been untainted by the distemper, when the father has been affected. Upon the whole, it may be generally expected that the fœtus will manifest the disease when the pregnant mother is constitutionally affected; and it is not improbable that the child may be infected by a constitutionally syphilitic father, without the mother having manifested any symptoms of the constitutional or primary distemper. MAURICEAU, however, has adduced instances of the child having been free from syphilitic taint, although the mother was affected; and I know cases of the

children being free from syphilitic taint although their fathers were constitutionally affected; but these children presented more or less of the scrofulous diathesis, or died in infancy. "The child may be also affected after birth, by a nurse suffering under syphilitic ulceration of the nipple, or by its mother under the same circumstances, if the disease of her nipple has been derived from a strange child; but no instance is known of a child infecting its own mother, although it will immediately communicate the disease to a strange nurse." The infection of the nurse is manifested by ulceration of the throat, identical with that succeeding primary disease, by cutaneous eruptions, by the formations of excrescences about the pudenda, which are capable of affecting her husband, in whom the infection is likewise followed by constitutional symptoms. HUNTER believed that secondary symptoms could no longer infect; but this opinion is disproved by many very experienced writers, and by several instances which have come under my own observation. There can be no doubt that during the 16th and 17th centuries, the communication of the distemper, and even in more recent times, by secondary symptoms was remarkably frequent. This circumstance shows the intimate connexion, if not the identity, of syphilis with yaws, sibiens, and some other diseases, which, in this and many other characters, differ in no respects from syphilis, as will be shown in the sequel.

83. Dr. Rizzi, of Milan, has recorded the results of his extensive experience of congenital syphilis, and has confirmed the remarks of Dr. COLLES. According to Dr. Rizzi, if a woman contracts syphilitic ulcerations of the breast by sucking an infected infant, mucous tubercles frequently appear on the vulva and about the anus. The syphilis, although secondary, is transmissible by contact, so that an innocent woman may communicate the distemper to her husband. Of this fact the physician should be fully aware. Of 100 persons with chancres on the breast from impure lactation, or in the mouth or throat from contact with an infected infant, 34 had tubercles of the vulva, 19 syphilitic angina, 2 iritis, 14 tubercles of the vulva and angina simultaneously, 5 tubercles of the vulva and others disseminated over different parts of the body, 6 tubercles of the vulva, angina, tubercles of the skin, and iritis, and 19 no secondary symptoms. In nurses, as well as in men infected by them, Dr. Rizzi found tubercles the most common form of secondary symptoms, and angina often superadded. Discharges, vegetations, and exostoses were rare, and buboes, when they occurred, consisted only of swelling and tension of the sub-maxillary or axillary glands. (RANKING'S *Abstract*, &c., vol. v., p. 250.)

#### V. VARIETIES OR MODIFICATIONS OF SYPHILIS—SYPHILOID DISEASES.

i. SYPHILIS ÆTHIOPICA.—*Syphilis vel Lucis Æthiopica*—*Syphilis Africana*—*Yaws*—*Sibiens*—*Sivens*.—*Pian*, *Epian*, *Fr.*—*Frambesia*.

84. This distemper has existed in Africa, certainly, for ages before the epidemic outbreak of syphilis in Europe at the end of the 15th century; and, if not identical with, is at least a form or modification of, the disease which existed in the West Indian islands when they were discovered by COLUMBUS, and which was considered as intimately resembling, if not the same

as, the epidemic syphilis of the 15th and 16th centuries.

85. The African syphilis, or the *yaws*, as commonly termed, in all respects more closely resembles the earlier manifestations of syphilis in Europe than the modern occurrences of this distemper. Indeed the few cases of yaws which I saw in Africa in 1817 agreed with the early accounts of syphilis so prevalent in Europe in the 15th and 16th centuries; not only as respected the character and severity of the distemper, but also as regarded the modes of its communication and the treatment of it found most beneficial. That the yaws in Africa is identical with the yaws or *pian* of the West Indies, is also undoubted; and it is most probable that the identity existed before the discovery of America. The descriptions of the disease, as observed in Africa and in the West Indies, agree as closely as the descriptions of any specific disease furnished by different writers, whether as occurring in negroes or in mulattoes. It is very rarely observed in white persons in modern times, as it is especially dreaded, and hence avoided by them. That it is also the same disease as the *sibiens* or *sivens* formerly seen in the west of Scotland, is admitted by those who have seen both maladies. Dr. THOMSON remarks that he possesses the notes of an old physician in Jamaica, who visited a part of Scotland where the *sibiens* was prevalent; that these notes were made without any regard to theory; and that his observations confirm the identity of yaws and sibiens. (*Edin. Med. and Surg. Journ.*, vol. xv., p. 321, and vol. xviii., p. 31.)

86. This complaint is usually preceded by severe pains in the limbs, often resembling those of rheumatism, which are most severe around the joints. The pains are attended by languor and debility, and often continue for several days without any other appearance of disease. These symptoms are generally precursory, and are succeeded by more or less fever, sometimes preceded by slight rigors. In many cases, however, the fever is so slight as hardly to be noticed. Generally the patient complains of headache, loss of appetite, and pains of the back and loins, which are exacerbated towards evening. These symptoms are continued for several days, and are followed by an eruption of pustules, more or less numerous, in various parts of the body, but especially upon the face, neck, groins, pudenda, and around the anus, vulva, &c. The eruption of these pustules is not completed over the whole body at one time, nor do they appear in any regular succession on the different parts; but while one crop is falling off, another is making its appearance in other places. Every fresh eruption of pustules is preceded by a slight febrile paroxysm. The pustules are filled with an opaque whitish fluid: they are, at their first appearance, not so large as the head of a small pin; but they grow larger gradually, until they attain the size of a sixpence or even of a shilling. When the pustules burst, a thick viscid matter is discharged, which forms a foul and dense crust or scab upon the surface. The number and size of the pustules is proportioned to the degree of eruptive fever. When the febrile symptoms are slight, there are few pustules, but they are mostly of a larger size than when the complaint is more violent. From the larger pustules red fungous excrescences frequently arise of various magnitudes,



from the size of a pea to that of a large mulberry, which fruit, owing to their rough, granulated surfaces, they somewhat resemble. These fungi, though they rise considerably above the surface of the skin, have but a small degree of sensibility. They never suppurate kindly, but gradually discharge a sordid glutinous matter, forming an ugly scab round the edges of the excrescence, and covering the upper parts of it, when much elevated, with white sloughs. When these eruptions appear upon any part of the body covered with hair, the colour of the hair is gradually changed from black to white. At the commencement of the disease, when there is any doubt of the nature of the complaint, the natives open one of the pustules and drop upon it a little of the juice of the capsicum: if it be of the yaws species, little or no pain is excited.

87. The eruption is more elevated and broader, and more numerous in the face, groins, axilla, verge of the anus, and labia majora, than in any other part of the body. The crops of yaws are various. In some there is only one copious eruption, of a healthy nature, with well-defined edges; it continues on the skin for a long time, the patient enjoying his usual health. This is the most favourable form, and in the robust and well-fed is terminated in seven or nine months. More frequently small watery yaws appear, and recede in a month or so. The patients lose flesh; become cachectic, and dropsical; but in these a nourishing diet will often, in a month or two, induce a return of the eruption in a more copious and larger form; and several crops of such eruptions may successively appear. When the disease attacks the throat, the soft parts are always lost. If there be any tendency in the constitution to hereditary or visceral disease, it is generally excited into action, especially upon the disappearance of the eruption; and caries of the bones, disease of the joints, dropsy, &c., supervene. In the successive eruptions of yaws there is often one ulcer which does not heal, but becomes larger than the rest, and if neglected is apt to produce caries of the adjoining bones. Nocturnal pains, swellings of the periosteum, ulcers of the pharynx, &c., generally attend the advanced course of the distemper; and are accompanied by chronic hectic, and general cachexia. If the infection takes place in the mouth or lips, ulcerations appear in these parts, and extend to the fauces, palate—the bones of the palate and those of the nose becoming implicated.

88. *The duration of the period elapsing from exposure to contagion to the commencement of the eruptive or febrile symptoms varied in several cases, accurately observed by Dr. Thomson, from seven to ten weeks. In some cases in which he had recourse to inoculation, the eruption appeared in seven weeks. The duration of the disease after the appearance of the eruption varies from some months to several years. It depends upon the complete eruption of the pustules. When the eruption is slight, the pustules being few and small, the hectic cachexia and complications superinduced prolong the distemper, and ultimately occasion death, the eruption having long previously disappeared.*

89. ii. SIBBENS or SIVVENS.—This form of syphilis was formerly seen in the southwest of Scotland, especially in the counties of Ayr, Galloway, and Dumfries, but is now entirely extinct. The descriptions given of it by ADAMS, HALL, GIL-

CHRIST, HOPE, BARRY, and others, show that this is the same disease as the yaws, and the syphilis epidemic in the 16th century. Indeed, yaws, sibbens, and other forms of syphilis about to be noticed, are merely modifications of the same specific distemper, owing to local circumstances, manner and habits of living, &c.; these forms being in no respect different, as to their modes of communication, from the malady of the 15th century. The syphilis of the present day is that form which has become most sensibly modified in the course of ages, but which, under circumstances of neglect, unwholesome living, want of cleanliness, &c., will in most cases assume as virulent and infectious a character as was displayed by it when first disseminated throughout Europe.

90. *Sibbens* shows itself, according to the mode of infection, in modified states, especially at its commencement. Like yaws and other forms of syphilis about to be noticed, it was communicated by sexual intercourse, by mercury, by the common use of the same utensils, of the same bed-clothes, especially when blankets only were slept in, and by want of cleanliness, and by two or more sleeping in the same bed, as not unusual in former and even in recent times. In infants at the breast, and in children, the distemper appeared first in the throat and mouth, with inflammation of the velum palati and adjoining parts, followed by a whitish eschar, or a superficial red ulcer. At the same time white spots, eschars, and small elevations of a pearly or milky colour occurred on the insides of the cheeks, lips, &c., and in these situations, excrescences, or small fleshy growths, resembling a raspberry, which became covered with a scab, were afterward developed. These excrescences were diagnostic of the malady. This state, when neglected, or occurring in cachectic or debilitated subjects, was followed by destructive ulceration and extension of the mischief to the pharynx, larynx, &c., with loss of the velum palati and affection of the bones of the nose, face, &c.

91. In others, after pains in the joints, bones, and febrile symptoms of varied duration, the disease appeared in the skin, under somewhat different aspects. The whole surface of the body was often spotted with a coppery or dusky-red eruption. In many clusters of pustules broke out, followed by successive desquamations, or scabby eruptions of the scalp, forehead, insides of the thighs, accompanied by little hard tubercles in the skin. In some tumours resembling furuncles were seen in various parts, and gave rise to ulcers which perforated the integuments. These ulcers were supposed to be produced by the virulent matter of the disease having come in contact with the surface, as when the disease had been caught by sleeping with the infected, or in the same foul blankets as had been used by an infected person. Ultimately soft, spongy, raspberry-like tumours (hence the name *frambæsia*, sibbens, sivvens) broke forth in various parts of the body. Affections of the bones were not observed by some; but BELL and others mention *nodes* and *caries*. The affections of the genitals, when not occurring primarily, owing to the contagion affecting the surface of the body, sometimes appeared consecutively. Different cases presented somewhat different appearances, manifestly owing to the parts primarily infected and affected, and to the progress the distemper had made when arrested by treatment. The disease

was often fatal in children and infants in whom it had made progress before submitted to treatment.

92. iii. *PIAN* or *EPHAN* is the term usually applied to yaws, as observed and described by physicians who have practised in the French West India Islands, and although manifestly the same disease as yaws, and as syphilis at its earliest appearance in Europe, presents a few differences in the character of the eruption, especially, according to the descriptions of these physicians. The patient experiences slight fever, with pains in the limbs and bones, and small red spots on different parts of the body. He loses flesh, and the skin becomes scaly. The intensity of these symptoms slowly decreases, but the eruption is developed, and assumes *three* aspects. The first, or *large pians*, sometimes become as large as the hand, from which fungous excrescences shoot, and a thick sanious matter exudes. The *small pians* are much less in size and more numerous than the former; their excrescences are redder and less fungous. The *red pians* are larger than the latter, but less than the former, of a flesh colour, and are developed slowly and successively; but are accompanied and followed by more serious symptoms than those of the other two varieties, particularly those of the first, which is the mildest.

93. One of the ulcers of pian generally becomes larger than the others, forming a deep ulcer of a bad character, without fungi, discharging much sanious matter. It is aggravated by the usual dressings, and is called the *mother pian*, as a similar large ulcer in yaws is called the *mother yaw*. It is dangerous to dry it up before the general infection is fully manifested. In this variety, as in yaws, if a patient has an ulcer on any part of his body before the infection of pians, the first pustules are developed upon it, and the ulcer often becomes the mother pian. This variety of syphilis, if allowed to proceed, is followed by farther alterations. These consist chiefly, 1st. Of excrescences on the soles of the feet and palms of the hand, which are tender at first, or before they break, but which, when they break, discharge a purulent matter; 2d. Of thickenings of the skin of the soles of the feet and palms of the hand. These are red, painful, tender, and hardened, but without exudation; 3d. Of wandering pains in the bones, of the tumefaction of the spongy bones and of the extremities of the long bones, attended by caries, softening, exostosis, &c. This state of the disease, called *bone-evil*, is often attended by the formation of numerous ulcers, by affection of the bones of the face, of the palate, &c.; the patient often being reduced to a horrible state. The chief difference between yaws, pian, and syphilis, in its aggravated state of secondary disease, is in the fungiform aspect of the ulcers in yaws and pian; but this state of the eruption in these affections (*Frambæsia*) is probably to be imputed to the peculiarity of the skin and habit of body of the negro, in whom this distemper was observed by those who have described it. The following accounts of the occurrence of syphilis as local epidemics are interesting, inasmuch as they exactly agree with the descriptions given of syphilis in the 15th and 16th centuries.

94. iv. *DISEASE OF ST. PAUL'S BAY (Canada)*, *Le Mal de Chicot*—prevailed between the years 1776 and 1780, not only in this locality, but also in some other parts of Canada. It was described

by Dr. BOWMAN, who was ordered by the governor to investigate the distemper. In children most frequently the disease commenced with aphthous pustules on the lips, tongue, and inside of the mouth. These advanced rapidly, and the tongue, palate, &c., were sometimes nearly destroyed by them. The whitish puriform matter exuded from them communicated the disease to others. Older patients complained of pains of the bones, and of slight febrile exacerbations, until eruptions, followed by ulcers, appeared on the skin, and in the mouth and throat, when the pains abated. These ulcers, according to their situation, which depended upon the contact of the virus, were followed, in many instances, by cervical, axillary, or inguinal buboes. At a more advanced stage the body became covered with pruriginous tetters, which soon disappeared. The bones of the nose, palate, cranium, pelvis, and extremities were ultimately attacked by nodes and caries. The frame appeared altogether contaminated, all the functions disordered; and many sunk in a state of extreme wretchedness, especially children, the weak, and neglected. Robust persons withstood the successive complications of the distemper for many years.

95. The inhabitants of the parts where the disease appeared stated that it was introduced and extended by sexual intercourse, by contact, and by foul clothing. It spared no one exposed to infection, but was most virulent in children. SWEDIAUR, admitting the imperfections of the description given of the distemper by Dr. BOWMAN, considered that it agreed with the earliest accounts of syphilis in the 15th and 16th centuries. It is also manifestly the same malady as that which was epidemic in 1800, and in following years until 1809, in districts of *Scherlievo*, *Gronemico*, *Fiume*, &c.

96. v. *THE SYPHILIS OF SCHERLIEVO*, or the epidemic which received this name from its prevalence in this locality. MM. PERCY and LAURENT state that, in this district and those adjoining it, the commission appointed to inquire into the nature of the distemper found more than 13,000 persons infected by it, out of a population of 38,000. It reappeared, or became epidemic again, in 1808 and 1809, where it seemed to have been perpetuated by the filth of the lower orders, whose damp cabins were shared with their domestic animals. The disease usually commenced with lassitude of the limbs and pains in the bones, which increased during the night. The voice became hoarse, deglutition difficult, and the velum palati, uvula, the tongue, and pharynx, red and aphthous. Soon after the aphthæ burst and discharged an ichorous matter, which eroded the adjoining parts. Ulcers afterward were formed, which extended into each other, creating sores of various dimensions, but always rounded, of an ashy colour, and with hard or raised and dark red edges. These ulcers were seated chiefly in the tonsils, uvula, velum palati, tongue, and cheeks, and were followed by caries of the bones of the face and nose, and the discharge of foul, fetid pus. The voice was more and more changed, and at last lost, from ulceration extending to the larynx. The exostoses and nodes in rare cases vanished along with the pains, as soon as a pustular eruption was evolved on the skin.

97. In many cases, after the pains in the bones a pustular eruption appeared on the surface, which M. BOUÉ states to have been announced



by itching, which disappeared when the eruption was fully out. The pustules were of a coppery colour, round, and of various extent; and appeared most frequently on the forehead and hairy scalp, on the inner surface of the thighs and extremities, and around the anus and genitals. In some cases an acrid ichor exuded from them, which excoriated the skin; in others the discharge dried and formed scabs. The disease often remained stationary in this state for a long time. After the scabs had fallen off the skin retained marks of a coppery hue, which were removed with difficulty.\*

98. The disease appeared in some cases with various-sized blotches of a coppery colour, in the centres of which ulcers were formed, from which a matter was exuded which fomed scabs similar to those which covered the pustules. These blotches were surrounded by a coppery areola. It was remarked that the female genitals were more frequently affected than the male. Dr. CAMBIERI, among an immense number of cases, found only one of gonorrhœa, which complicated the distemper. The ulcers which often eroded the scrotum were consequent upon the general infection. Buboës in the groins, or enlargements of other lymphatic glands, were seldom seen. The modes of communicating the malady were the same as those which will appear in the sequel (§ 109, *et seq.*).

99. VI. DIAGNOSIS OF SYPHILIS.—This is often very difficult; for although the distemper has generally presented a modified and milder character in modern times, nevertheless cases sometimes occur which, owing to neglect, to constitution and habit of body, to treatment and manner of living, are as virulent as many of those which were described by writers in the 16th century, or of those which have been termed *sypphiloid diseases*. It will have been remarked, from what I have stated above, that I consider these latter as identical with the early manifestations of syphilis in Europe; the differences actually observed being only such as arise from the manner of infection—from the exudation from the cutaneous and other parts, during the constitutional disease, having infected these parts in persons with whom these exudations had come in contact, and from differences of race and other circumstances (§ 109, *et seq.*). That the disease assumes a different character as respects the different races, may be expected in as far as the integuments are concerned; for, owing to the structure and vital condition and functions of the skin, and to the asthenic diathesis of the dark-skinned races, and more particularly of the negro, syphilis attacks these structures with greater severity than in the white race—although even in this there are often exceptions—and assumes in the former the characters described under the head Yaws and other Syphiloid Distempers. As regards the treatment, that found most beneficial in the one is also most beneficial in all the others. I have seen small-pox in the negro in Africa, and yaws in the same race; and the difference of the for-

mer malady in the negro from that observed in the white race is as great as that of the latter disease is from secondary syphilis in the white. The causes, efficient and concurring, are the same in character; the treatment is also the same; and this being admitted as respects yaws, the inference must necessarily extend to the other modifications of the distemper belonging to this category.

100. *The diagnosis of constitutional syphilis*, as it occurs in the present day in the white race, and after the virus has passed through many generations, is often very difficult, even when aided by the history of the case; and this difficulty is increased by the different tissues and parts which are secondarily affected, either singly or conjointly. Mr. HOLMES COOTE has classed the *secondary effects of syphilis* as follows, and to these I may add the *tertiary*:

101. i. SECONDARY SYMPTOMS OR EFFECTS.—1. *Cutaneous eruption*.—*a.* Erythema; *b.* Scaly eruption; *c.* Papular eruption; *d.* Pustular eruptions; *e.* Tubercular eruptions. 2. *Mucous tubercles, or condylomata*. 3. *Ulcerations between the toes, Rhagades digitaria*. 4. *Superficial ulcerations of*.—*a.* The meatus auditorius externus; *b.* The navel; *c.* The nose; *d.* The lips and the angles of the mouth. 5. *Syphilitic affections of the tongue*.—*a.* Excoriations of its surface; *b.* Ulcerations, fissures, &c.; *c.* Induration of its substance. 6. *Ulceration of the gums*. 7. *Ulceration of the tonsils*.—Soft and hard palate. Excoriations of these parts without ulceration. 8. *Ulceration of the pharynx*. 9. *Ulceration extending to the rima glottidis*. 10. *Affections of the eye and appendages*.—*a.* Ulceration of the eyelids; *b.* Iritis; *c.* Scleritis. 11. *Ulceration of the roots of the nails*. 12. *Alopecia, or baldness*. 13. *Ulceration of the rectum and large intestines*. Syphilitic dysentery.

102. ii. TERTIARY EFFECTS.—1. *Tubercles or gummata*.—*a.* Of the skin and cellular tissue; *b.* Of those parts passing into phagedænic ulceration; *c.* Of muscular and fibrous structures. 2. *Inflammation of the periosteum*. 3. *Inflammation and enlargement of joints*. 4. *Diseases of the testes*.—*a.* Inflammation and enlargement of one or both testicles; *b.* Atrophy or other structural lesion of the testes. 5. *Inflammation of bone and its effects*.—*a.* Pains in the bones; *b.* Exostoses; *c.* Caries. 6. *Inflammation and structural change of the eyes, eyelids, or lachrymal apparatus*. 7. *Phagedænic ulceration of the scalp*.—*a.* Without disease of the pericranium and subjacent bones; *b.* With disease of these parts. 8. *Phagedænic ulceration of the pharynx*.—*a.* Extending to the larynx, cartilages, trachea, &c.; *b.* extending upward to the bones of the nose, face, and palate; *c.* extending to and causing caries of the cervical vertebræ. 9. *General syphilitic cachexia*.—*a.* Without any prominent visceral disease; *b.* With prominent disease of the viscera, as the lungs, &c.; *c.* With paralysis; *d.* With dropsy, &c.

103. It is not to be expected that the lesions belonging to the *first* or the *second* of these classes of constitutional disease will appear singly. On the contrary, they are generally associated in various forms or groups; affections of the skin being often complicated with those of the throat, tongue, gums, &c. Affections of the joints may be conjoined with inflammation of the periosteum and bones, and with phagedænic ulcerations.

\* J. BONTIUS (*Medicina Indorum*, 4to, Lond. Bat., 1718) describes the "*Amboyna Pox*" in terms which are equally applicable to *yaws*, *sibbens*, and other varieties of syphilis, and states that the disease is indigenous to Amboyna, the Moluccas, and other Eastern islands. He says that it is identical with constitutional syphilis, but differs from it in being most frequently communicated otherwise than by sexual intercourse. He states that the remedies employed for its cure are preparations of mercury, of antimony, sarsaparilla, guaiacum, China root, &c.

Even various tertiary lesions may be accompanied with one or more of those which are secondary ; or, more correctly, certain secondary affections, such as those of the skin and throat, may persist, although one or more tertiary alterations are fully developed. Thus, in a case which I saw with Sir B. C. BRODIE, there were ulcerations of the throat, pharynx, larynx, nodes, pains in the bones, &c., consequent upon syphilitic eruptions and cutaneous ulcerations, which still remained, the pharyngeal ulcerations implicating the cervical vertebræ. The disease in this case was preceded by suppurating buboes. In another case, which I attended with the late Mr. COPLAND HUTCHINSON, there were extensive ulcerations of the skin ; nodes, caries of the bones of the nose and palate, inflammation of both eyes and eyelids, remarkable enlargement of the knee and elbow-joints, phagedænic ulceration of the scalp, and general cachexia. In other cases, in addition to affections of the bones and joints, there were phagedænic ulcerations of the pharynx, with inflammation and necrosis of the palate and nose, enlargement of the bodies of the testicles, and large ulcerating tubercles of the integuments.

104. *The diagnosis of syphilis* depends chiefly upon the history of the case, especially as respects the existence of primary symptoms, of buboes, and exposure to infection by direct or indirect contact, more especially by sexual intercourse, suckling, &c. (See the CAUSES, § 109, *et seq.*). The eruptions in the secondary stage will generally indicate the nature of the malady ; but even all that has been stated above (§ 57, 81) on this subject may not be sufficient for this purpose, if other particulars be not sufficiently considered. The colour of syphilitic eruptions, although generally yellowish or coppery, especially before they ulcerate, may be of a brighter hue if febrile action be present. In rare cases the pustular eruptions may very closely resemble the eruption of small-pox ; but a few days will disclose the differences. These eruptions and their rapid enlargement and ulceration in the early history of the distemper were very common, and hence the name of *great-pox*, very commonly given to them. Mr. H. COOTE very correctly remarks that syphilitic eruptions do not always preserve the same type in the same individual. The scaly and tubercular, or the scaly, papular, and pustular, may be combined in the same case ; and a scaly eruption may exist on the trunk and a pustular on the scalp. A scaly eruption often becomes tubercular as the constitutional cachexia advances. Scaly and papular eruptions are often coexistent, both terminating in desquamation, leaving copper-coloured stains. Large tubercles of the integument pass into deep, excavated, or phagedænic ulcers, and may be attended by the usual forms of rupia. Syphilitic scaly eruptions are generally circular, and more strictly resemble lepra than psoriasis. The eruption on the trunk is often different from that on the extremities ; on the former it is more generally erythematous, papular, scaly, and pustular ; on the latter it is often tubercular, passing into large and deep ulcers with elevated edges, especially on the lower extremities. Rupia, however, may equally affect all parts.

105. Syphilitic erythema usually precedes other eruptions, but it may continue in the form of dull red or coppery patches, or coexist with other eruptions. The most common eruption is syphilitic lepra, the scales of which are dark, and differ

widely from the silvery scales of lepra vulgaris. This eruption may extend over the whole body, causing the hair to fall off ; and affecting the palms of the hands and soles of the feet. It spreads into mucous outlets and canals, into the nasal, buccal, anal, vaginal, and others, where it causes ulcers, fissures, tubercular elevations, excoriations, discharges, &c. Lepra syphilitica often attacks and exoriates the scrotum, and is frequently attended or followed by foul ulcers between the toes, mucous tubercles about the arms, in the axillæ, groins, or where the transpiration of the surface is allowed to accumulate. The elevation of the scales of lepra into copper-coloured tubercles is always, according to Mr. H. COOTE, associated with impairment of the general health, and is an indication, during a mercurial course, that the medicine is acting injuriously, that the treatment should be changed, or at least that the patient should be allowed a more generous diet, and a moderate amount of stimuli. The cicatrices from syphilitic sores, it may be remarked, are often characteristic, being usually rounded, depressed, of a dull white hue, and irregular on the surface.

106. *The tertiary effects of syphilis* may generally be recognised with greater certainty than the secondary. The history of the case, the antecedent symptoms and lesions, however remote, and the nature of these as inferred from their characters and succession, are to be taken into account. But there are hardly any of the lesions which are termed tertiary that may not be inferred to be one of the more remote effects of constitutional syphilis, when viewed and considered with reference merely to its own characters and relations. The mere enumeration (§ 101, *et seq.*) of these effects sufficiently indicates their nature ; and are equally the results of neglected or injudiciously treated syphilis, as observed in the present day, and of the African yaws as observed by myself and others.

107. VII. THE PROGNOSIS OF SYPHILIS manifestly depends upon so many circumstances as to be stated with much difficulty, and even with uncertainty. It depends not only upon the progress the distemper has made, and upon the effects observed, but also upon the health and constitution of the patient previously to infection, and at the time of his coming under treatment. Nor should the mode of infection, and the course it has pursued, and its recurrences when the distemper has become constitutionally chronic, be overlooked. If the patient be young, in previous good health, be not exposed to fatigue, cold, or anxiety of mind, and not given to excesses of any kind, a favourable opinion may be given both in the primary and secondary stages of the distemper. But if his health, strength, and constitution be manifestly impaired ; if he be dissipated, exposed to fatigue, and irregular in his habits ; and more especially if the secondary effects be severe, be complicated, have been rapidly developed, or have reappeared after courses of mercury, or after other judiciously employed means, an unfavourable or at least a guarded diagnosis should be given, the danger of the case fully admitted, and due precautions for the guidance of the patient fully stated. In most cases ulcerations of the pharynx, owing to their disposition to extend to important adjoining parts, or to become phagedænic, should be viewed unfavourably, more especially in the circumstances just mentioned. The severer kinds of secondary effects should also be much dreaded



in infants; and they are always most difficult to remove in patients of all ages when they are produced by the now infrequent modes of infection (§ 110, *et seq.*) which commonly prevailed in the 16th century, or by the discharges or exudations of secondary sores, either directly or indirectly coming in contact with the naked cutaneous or mucous surfaces.

108. *The tertiary effects* of syphilis are always attended by more or less present or prospective danger. But the imminence of the one, or the amount of the other, will depend upon the extent of lesion already produced, upon its complications and constitutional relations and effects, upon the history of the case, and upon the effects of appropriate treatment. When pharyngeal ulceration has become phagedænic, or has extended to the larynx, to the bones of the face, and to the eyes, the patient is in great danger; and this is more extreme if the cervical vertebræ become implicated. The same prognosis may be given if, with general and increasing cachexia, pulmonary, paralytic, or dropsical disease supervene, after obstinate, prolonged, or even rapid course of the distemper; although in some of these cases life may be prolonged for a considerable time under favourable circumstances, and suitable regimen and treatment. In this far-advanced category of morbid results an opinion of the issue will be based upon experience of the effects of the most influential medicines, upon the local and constitutional associations of each case, upon the previous and existing circumstances of the patient, upon the history of the malady, and upon the various influences which have modified its course. In respect of the tertiary effects of syphilis, I may state that an opinion respecting them should always be given with caution and reservation; even although circumstances may not warrant that opinion to be unfavourable.

109. VII. THE EFFICIENT CAUSE OF SYPHILIS, AND THE CAUSES AIDING ITS OPERATION.—The former has been very generally recognised, and its effects admitted; but all the modes and circumstances of its application and operation have not been sufficiently shown and considered. The latter have been either overlooked or imperfectly estimated, especially as regards the successive changes, promoted and brought to maturity, as manifested in the secondary and tertiary results of the poison. The causation of syphilis has been studied merely from what has been observed in modern times, and from the common way of propagating the distemper at the present day. But the more general way by which this infection was produced soon after its introduction into Europe, and during its epidemic prevalence, has been altogether overlooked; although, under the circumstances existing in these ages, it may be still propagated in the same ways, and its effects present as severe a character, and the same features as those which distinguished it in former times; and which still distinguish it in that form of the distemper which prevails in Africa, and which prevailed there from immemorial ages before it was introduced into Spain.

110. The contagion of syphilis at the present day, and for many years past, has arisen from sexual intercourse, either the male or the female being the subject of the primary disease. In these cases the infection is produced by the virus, poison, or morbid secretion of the primary sore. This mode is generally admitted, and is

now, with very few exceptions, especially in Europe, the common mode, no other being acknowledged by many, the exceptions being altogether ignored. But I have had sufficient reason to conclude that whenever a secondary venereal ulceration, seated on the integuments, or in the mouth and throat, produces a secretion or discharge which comes in contact with a mucous surface, or with an abrasion of the cutaneous surface, or is even allowed to remain in contact with an unabrased surface, infection is liable to take place, and that this liability exists both in children and in adults. The communicability of secondary syphilis, especially when the sores have proceeded to secrete or produce a fluid exudation, was a well-recognised fact in former times, and has been witnessed by myself during the course of my experience in several instances. It was a recognised fact by Dr. COLLES; and although HUNTER believed that secondary symptoms could no longer infect, Mr. BABINGTON remarks, when commenting on this belief, that "the facts (that they do infect) are so well established, that it is more easy to question the principle than to doubt the facts."

111. Judging from what I have seen in several countries and climates, and in children and adults in this country, I conclude that the morbid secretion from secondary sores, if allowed to remain in contact with the more susceptible surfaces or parts of a healthy person, will infect that person, provided that he be predisposed to, or susceptible of, the infection; and that the local contamination, at first confined to, and more particularly and severely affecting, the tissues first infected, will become general, and will the more readily and severely, by means of the secretion from the ulcers or sores produced in the course of the distemper, infect those to whom this secretion is either directly or indirectly applied. This mode of communicating the malady was often observed in all the varieties of it described above as syphiloid diseases, and in the usual manifestations of the malady, from the end of the 15th until the close of the 17th century, or even later. The extensive prevalence of syphilis during these centuries, although imputed by many, and probably not without reason, first to a leprous diathesis, and afterward to a scorbutic diathesis, or to a complication of syphilis with leprous or with scorbutic symptoms, may be more correctly accounted for by the facts of the secondary, or early constitutional effects of the malady having become thus virulently contagious, both by this mode of communication, and by its successive propagation in this manner.

112. If we note the habits of the lower classes in those ages, the ready infection and the severity of syphilis are easily explained. As observed in the present day, with respect to yaws in negroes, the contagion was produced by the secretion from the sores on the cutaneous surface, by mediate or immediate contact, much more frequently than by sexual intercourse. In the lower classes in Europe, in the 15th, 16th, and 17th centuries, the circumstances favouring this mode of communicating the malady were much more remarkable than in the negro, with whom the disease most probably originated; for among this race its antiquity appears to have been the greatest, and by this race the distemper was communicated to the Moors and Jews in the north of Africa, and by them conveyed into the south of

Spain, where it existed long before the expulsion of them from the Iberian peninsula.\* The lower classes in Europe during the centuries of the earlier prevalence of syphilis were remarkable for their neglect of cleanliness, for their use of woolen night and day clothes next to the skin; for the habit of two, three, or more sleeping in the same bed, often in a state of nudity; for drinking and eating out of the same vessels; and for these and other social conditions favouring the communication of the disease, in its secondary stage, independently of sexual intercourse.

113. With the progress of civilization, and with the knowledge acquired of the communication of the distemper by these means, the infection of it otherwise than by sexual intercourse became less frequent, and the virus more generally having to pass through the absorbent system, when the genitals were the seats of primary infection, was either arrested in the course of its constitutional contamination, or rendered more mild, and slower in producing its successive specific effects, than when infection was produced by the virulent secretions from secondary sores applied to parts which more readily admitted of constitutional contamination. The successive propagation of the distemper in this latter mode, and generally without the intermediate interruption and amelioration resulting from the action of the virus on absorbent glands, without the production of buboes, manifestly rendered the malady more rapid and more severe, and was the chief cause of the early prevalence of syphilis being in some respects different from what is observed of it at the present day, but in every respect similar to the varieties mentioned above (§ 84, *et seq.*); many of the influences producing these varieties actually having existed at the time of, and for ages after, the introduction of syphilis into Europe.

114. As observation rendered persons aware of the habits and circumstances causing and favouring infection, more especially in the higher classes of society, these habits were reformed or refrained from. Persons no longer drank out of the same glass or cup, or slept in a strange bed, without due precaution; and much of the manners of modern times originated either in precautions against infection, or in evincing a confidence that no precaution was required. But in whatever manner the infection may be produced, whether by primary sores on the genitals, where the morbid secretion was favourably placed to operate its effects, or by the secretions from secondary sores or ulcers in the cutaneous or in the mucous surface, under circumstances favouring their operation and consequent contamination—now occurring very rarely, in former ages very frequently—there are a variety of causes or influences which aid the efficient or exciting cause

—the syphilitic poison—in developing, hastening, or in aggravating its constitutional or contaminating effects. These are so diversified and yet so influential, whether acting simply or in combination, as to require a brief but particular notice; and are first *predisposing*, and next *concurring* and *determining*.\*

115. A. The chief *predisposing* causes of syphilitic infection are infancy, childhood, and early age; delicacy of constitution, original or acquired; debility or temporary exhaustion; debauchery, fatigue, and irregularities of any kind; and the neglect of all those habits and social observances which constitute modern civilization. The precautions observed in several cities and places against the propagation of the distemper manifestly tend not only to render it less frequent, but also more mild, than in other countries where no precautions are instituted, especially among those who more commonly are infected by, and who communicate the malady. But the predisposition, however produced, or in whatever form it may exist, favours not only the primary infection and effects, but also the development of the secondary or constitutional disease, and the tertiary results, if the morbid procession be not arrested by treatment; and, according to the amount of predisposition, will be the rapidity with which the morbid effects are produced. Doubtless cases are not unfrequent which evince no particular predisposing cause of the infection, or of the rapidity or severity of the results; but these may be imputed to a diathesis, or some unascertained cause favouring the operation of the poison, or to susceptibility of infection and contamination inherent in some constitutions.

[\* M. VIDAL has clearly proved that secondary accidents are transmissible, and the same doctrine is supported by the following British and American authorities: SIR ASTLEY COOPER, *Lectures on Surgery*, by TERRELL, Am. ed., p. 497; MR. LISTON, *Elements of Surgery*, by DR. GROSS, p. 205; MR. COLLES, *On Venereal*, p. 263; MR. WALLACE, *On Venereal*, p. 335; MR. HENRY, *Med. Chir. Trans.*, vol. vii., 1830, p. 541; JESSE FOOT, *On Venereal*, p. 402; H. MAYO, *On Syphilis*, p. 122, 123; SIR B. BRODIE, *Le titre in London Lancet*, Feb., 1844, p. 677; MR. BARINGTON, *Notes to Hunter*, Am. ed., p. 321; MR. LAWRENCE, *Lectures on Surgery*, London Med. Gazette, March, 1830, p. 806, 807; MR. PORTER, *Lectures on Syphilis*, Dublin Med. Press, Feb. 17th, 1847, p. 99; MR. WHITEHEAD, *Illustrations of transmitted Syphilis*; SAMUEL A. LANE, *Lectures on Syphilis*, London Lancet, May 28th, 1842, p. 294; MR. BACOT, *On Syphilis*, p. 252; MR. CARMICHAEL, C. in *Lectures on Venereal Diseases*, p. 51; LANGSTON PARKER, *Modern Treatment of Syphilitic Diseases*, 2d ed., p. 163; MR. EGAN, *On Syphilitic Diseases*, p. 233, 234; I. SMITH WILSON, *On Syphilis*, p. 36; GEORGE M'LELLAN, *Princ. and Prac. of Surgery*, p. 250, 251; DR. NELLIGAN, *Dub. Quar. Journal of Medicine*, Feb., 1853, p. 119; DR. CAMPBELL, *North. Journal of Med.*, 1844; or *Cornwall's Journal*, Sept., 1844, p. 773; JOHN L. CORMACK, *London and Ed. Monthly Journal of Medical Science*, Sept., 1844, p. 773; EVANSON and MAUNSELL, *On Diseases of Children*, Am. ed., p. 350; JAS. STEWART, *On Diseases of Children*, 4th ed., p. 468; DR. WATSON, *United States Med. and Surg. Journal*, vol. ii., p. 103; DR. H. D. BULKLEY, *On Syphilis in Infants*, New York Journal of Medicine and Surgery, Oct., 1849; GEO. C. BLACKMAN, Amer. ed. of VIDAL *On Venereal Diseases*, p. 55. This question is very ably and successfully argued by VIDAL in opposition to RICORD, who very inconsistently admits the infection of the nurse by the child and the contagiousness of the mucous tubercle in the adult—in other words, physiological inoculation, while he denies the fact of experimental inoculation. M. MALGAIGNE has very happily, in few words, characterized this author as follows:

"M. RICORD, possessed of a theatre of observation vast as could be wished, began by rejecting the observations of others; then, adopting a certain theory, he disregards those of his pupils made under his own eye, in his own service; and finally, I must say it, he takes no heed of his own when they conflict with his own preconceived views."—*L'Union Medicale*, Aug. 30, 1851.]

\* DR. WINTERBOTTOM (*An Account of the Native Africans*, see vol. ii., p. 148) remarks that "the yaws is not mentioned by authors as a disease which occurs in Egypt, though, from the frequent communication of that country with those parts of Africa in which the disease is endemic, we might be led to expect that it would be imported. There is reason, however, to suppose that the yaws does actually appear there, though mistaken for the venereal disease." He proceeds to remark that a "Capt. who professed to cure the venereal disease in its advanced states, prescribed 'two coffee-cups of flax oil to be taken every morning fasting,' directing no regimen farther than to keep the patient warm. The pustules and other eruptions he covered with a red earth common in some parts of Egypt. They gradually became dry, and left no mark. At the end of three months a cure was effected. It is farther stated that those persons who have been affected and fully cured have no fear of a second infection."



116. That all persons who have not been previously constitutionally infected are liable to syphilis, provided that the virus is applied in sufficient quantity, or is allowed to remain in contact with a part upon which it is capable of acting, may be inferred; but there is reason to conclude, from what has been observed in persons previously infected, that a second constitutional infection of syphilis rarely or never takes place, and that such an occurrence is merely the return, or the re-development, in a state of active manifestation, of the disease, which had been lurking in a latent state in the body, and which various influences had reproduced independently of any second local infection. While, therefore, all previously uncontaminated are liable to syphilis, those who have been thus diseased are not liable to a second constitutional infection, provided that they have been completely cured; but they are liable to a return in an aggravated form of the secondary or tertiary disease, if it have not been completely eradicated, especially if they are exposed to the causes about to be noticed (§ 117, 118); or, in other words, that constitutional syphilis, when cured, renders the body unsusceptible of a second constitutional infection.\*

117. *B.* Several causes favour, 1st, the development of the constitutional disease from the local infection or primary sores; and, 2d, the aggravation and local manifestations of the syphilitic contamination, when it is not completely removed, but remains lurking in a more or less latent form, in the body. The most remarkable features of constitutional syphilis are the severe and even dangerous developments sometimes assumed by it after it has remained for several, or even for many, years latent in the frame. These cases present two difficulties—first, to estimate the influence of the poison in affecting the vital cohesion and conditions of the tissues in so permanent a manner as to render them liable to ulterior changes and disorganization after very remote periods;

\* We are by no means convinced that syphilis can only occur once in the same individual. No fact is better established than that a person may have repeated attacks of the disease, especially of the milder forms. Syphilis, like other diseases, occurs under various forms and in various degrees of severity. The virus may only induce a chancre, which is readily cured, leaving the constitution perfectly sound; or it may produce caries, necrosis, various visceral affections, and profound cachexia, from which it is very doubtful whether a patient ever entirely recovers. If, under the latter circumstances, a person exposed to new infection has a new bubo or chancre, the advocates of the *unicity* of syphilis maintain that it is only a relapse, and not the result of the recent inoculation. Statistics are wanting on this subject, but it is stated by M. VIDAL that M. BOULEY, physician of the Louvre in Paris, produced a second syphilitic infection in a woman labouring under genuine tertiary symptoms by inoculation. The obstacles in the way of settling this question conclusively are, the difficulty of finding cases so complete that we may know that the syphilitic diathesis is exhausted, that it has produced all it can produce; and, 2dly, to collect under one head a sufficient number of cases to form statistics, the result of which may be considered a pathological law of real value. When we consider the varying durations of syphilis, its modifications in different constitutions, the suppression of many of its manifestations by treatment, its relapses from various causes, &c., we shall perceive at once the difficulty, if not impossibility, of establishing any such law. In cases of typhoid fever, variola, rubella, pertussis, &c., no great difficulty exists, inasmuch as they are acute diseases, continuing but for a short period, and most persons are liable to repeated exposures. At any rate, this question cannot be settled till it is ascertained what is the duration of the *primary*, *secondary*, and *tertiary* stages of syphilis, how long it takes to expend its full force, and, indeed, whether confirmed syphilis is ever perfectly curable, which is denied by some of the ablest syphilographers. See VIDAL, *Ann. ed.*, p. 230.]

and, *second*, to recognise the effects of constitutional remedies upon these vital conditions and consecutive changes, and to determine how much of these effects may be imputed to the operation of the means employed, and to the efforts of nature, or of the vital resistance opposed to successive changes. It is impossible for these difficulties to be overcome without a satisfactory knowledge of the various circumstances which thus tend to develop the constitutional infection, and to aggravate this infection into dangerous local disease.

118. Observation satisfactorily and extensively conducted will demonstrate that all depressing influences acting upon the body after infection has been produced will favour the supervention of the secondary upon the primary disease; and will even more remarkably develop the latent constitutional taint or contamination, wherever it exists, into active disease and disorganization. Among these aiding and determining causes may be mentioned anxiety of mind, and fears of the consequences of infection; fatigue, debauchery, drunkenness, venereal excesses, unwholesome and insufficient food; want of sleep and sufficient repose; excessive exertion, exposure to extreme ranges of temperature; moist states of the atmosphere; and exposure to malaria in any form, more especially miasmatic exhalations in hot countries. While these causes aid the constitutional infection in accelerating the changes resulting in local disorganization, they also counteract the vital resistance opposed to these results, and throw down the barrier which the vital force raises for the protection of the organization.

119. *C. Infection of the Fetus by one or both Parents.*—*Congenital syphilis*, or the direct transmission of syphilis to the unborn fœtus, is a subject of considerable interest. That the syphilitic taint is more frequently in the father than in the mother appears manifest; but it is not so evident that the disease is conveyed directly from the father by means of the seminal fluid to the ovum, for the father may first infect the mother, the disease being afterward communicated by her to the fœtus. Secondary syphilis, however, being a constitutional taint, like other constitutional taints, it may be transmitted to the offspring from either parent, in a more or less modified form. There can be no doubt, also, that secondary syphilis may be communicated to married women by their husbands without pregnancy having taken place; or even to them or to any one else by close contact, independently of sexual intercourse, when the circumstances stated above (§ 112) favour the infection.

120. Dr. PORTER mentions the case of a lady who had become pregnant three months before the father's first contraction of syphilis, and whose fœtus died within a week from birth of unmistakable lues. The circulation of the mother had therefore been poisoned at a considerable time subsequently to impregnation, although the father had never a sore capable of furnishing a drop of matter, and the mother never a symptom of any description, until an eruption appeared a few days before her delivery. Dr. PORTER believes "that the semen of a diseased man deposited in the vagina of a healthy woman, by being absorbed, may contaminate that woman without the necessary occurrence of a chancre or any open sore secreting matter in either the man or the woman." Mr. HOLMES COOTE very correctly remarks (and his

remarks bear out my own observations in a variety of cases) that "when the mother has once been infected with the syphilitic poison it becomes extremely difficult, if not impossible, to say when the taint will become extinct. The immediate effect, as regards the fœtus, is to cause its death *in utero*. As the poison becomes less virulent, the child is born with the disease, and perishes in a few days or weeks. Then comes a class of cases in which the characteristic eruptions break out some weeks or even months after birth; but the exact limits of these periods have not been, and perhaps cannot be, accurately ascertained. In illustration of these remarks, I refer to the two following cases. In the first a respectable woman is infected by her husband. She is delivered consecutively of three dead children. At the expiration of thirteen years she gives birth to a living child, which is covered by the usual eruptions shortly afterward. In the second, a fine healthy-looking young woman is infected by her husband a few weeks after marriage. She is delivered of a dead child; after which she does not again become pregnant. But, eight years having passed, she suffers in her own person from the original taint." (*Op. cit.*, p. 129.)

121. While I was physician to the Infirmary for Children, cases illustrative of the above remarks, as well as of the following statements, were occasionally brought under my observation. 1st. That an infected mother may not communicate the disease to her infant. 2d. That an infected mother is very liable to transmit the distemper to the fœtus or infant. 3d. That the mother has been infected several, or even for many years, has given birth to one or more dead children, and has had at last a living child, which soon after birth presented the syphilitic cachexia, with anæmia, copper-coloured lepra, and ulcerations of the nose, mouth, anus, or genitals. 4th. The mother has had syphilis communicated to her by her husband; and the disease has disappeared, but she has been delivered of dead children; and after a number of years from the infection by her husband, the distemper has appeared in the throat and bones of the palate, or in other parts. 5th. The mother has been the subject of syphilitic eruptions, &c., has been apparently cured; but after many years has had a return of secondary symptoms, and been pregnant, either in the interval or at a later period. The child when born, has been, and has continued in good health for several months or years, but has presented secondary symptoms subsequently. 6th. A woman has been the subject of secondary syphilis—of syphilitic eruptions, &c., and has communicated the distemper to the child given to her to nurse. 7th. Secondary syphilis in a child has been communicated to another child with which it has slept, the severer forms of secondary disease resulting. 8th. Secondary syphilis in a child has been by it communicated to its nurse, who has soon afterward experienced the characteristic syphilitic eruptions, sore throat, alopecia, and other still more severe affections. 9th. A healthy woman has suckled, even for a few times, a syphilitic infant, and the secondary disease has been communicated to this woman by this infant; she afterward has suckled her own infant and given it the distemper.

122. These statements have been fully confirmed by my experience at the institution mentioned above, and in private as well as in gratu-

itous practice, during a number of years, and will readily be admitted by other experienced physicians. Indeed, they are fully confirmed by the writings of Dr. COLLES, Mr. H. COOTE, and by nearly all the old writers on syphilis. Dr. COLLES remarks that the child may be infected after birth by a nurse suffering syphilitic ulceration of the nipple, or by its mother under the same circumstances, if the disease of her nipple has been derived from a strange child; but that no instance is known of a child infecting its own mother, although it will immediately communicate the malady to a strange nurse. The infection of the nurse by a diseased infant manifests itself by syphilitic affections which cannot be distinguished from that succeeding primary disease—by ulcerations of the throat, &c., by cutaneous eruptions, and by the formation of moist excrescences about the pudenda, which are capable of infecting her husband, in whom they are likewise followed by constitutional effects. In him the ulceration of the throat has not the same venereal character; it is superficial, and its surface is covered with patches of whitish lymph. Dr. COLLES believes that the disease may be further imparted to other members of the family by contact, the use of the same utensils, &c., for it is remarkable, he adds, that its contagious property increases as it extends farther from its source. Its symptoms, he states, bear an exact resemblance to each other in different individuals; and in this third remove from the source of contagion, it is permanently fixed in the parts it first seizes, and is of a much milder nature. If we compare the histories of the manifestations of syphilis in different ages, as furnished us by the most trustworthy writers down to OESTERLEN, WALLACE, and to still more recent authors, we are compelled to conclude that syphilis is one specific malady, that it presents various modifications resulting from modes of infection, race, treatment, and other influences; all its varieties being traceable to one stock or source.

123. *D. INFERENCES.*—As the result of observation and research, I conclude, 1st. That syphilis, in the various forms and modifications it has presented in different ages and localities, is derived from, and hence originally identical with, the indigenous yaws of the native Africans. 2d. That this identity or derivation is proved by the characters of both forms of disease, by modes of infection or contamination, by the susceptibility and unsusceptibility of both, as shown by inoculation,\* and by the same treatment being appropriate to both. 3d. That the indigenous African or Ethiopic syphilis was communicated to the Moors and Jews in the north of Africa, and thence conveyed into Spain, and probably also into France and the north of Italy, even before the discovery of America. 4th. That the distemper was farther diffused and rendered epidemic or pestilential by the expulsion of the Moors and Jews from Spain by Ferdinand, towards the end of the 15th century, and by the distresses consequent upon this act; the miseries and the horrible sufferings resulting from it, as well as the diseases diffused by it, being recorded by contemporary writers. 5th. That this occurrence shortly preceding the

\* The yaws are inoculated at an early age in many places in Africa, in order to prevent subsequent infection; and syphilization is now practised in some places in Europe to prevent infection, as well as to produce a permanent cure of constitutional syphilis (see syphilization in the sequel).



invasion of Italy by Charles VIII. of France, by augmenting the sufferings and distresses of the inhabitants, increased the spread of the malady, and rendered it at the same time more virulent, acute, and fatal. 6th. That the diffusion, severity, and the infectious character of the malady were promoted by the distresses then prevalent in those countries, and for many years afterward, by the prevalence of a leprosy, or of a scorbutic diathesis in many, and by the habits and social conditions of communities in those ages and countries. 7th. That there is sufficient evidence to conclude that the disease existed as now stated, and had been propagated extensively, before the connoted malady, the *yaws*, or *pian*, or *epian*, which was said to have existed in America when discovered by COLUMBUS, could have been conveyed by his followers into Europe. 8th. That the manifestations of the distemper, usually described as varieties of it—as *yaws*, *epian*, or as syphiloid diseases, or as pseudo-syphilis;\* the chief of which are noticed above (§ 84, *et seq.*), are merely modifications of the malady resulting from modes or sources of infection, race, social conditions and habits, food and regimen, neglect of cleanliness, treatment, &c., as already insisted upon (§ 111, *et seq.*). 9th. That whatever lowers the vital forces of the economy, and more especially a combination of causes producing this effect, will favour the infection of syphilis, the development of the constitutional contamination, and the outbreak of the distemper when it lurks in the body. 10th. That the parent tainted by syphilis will often, but not always, communicate the disease in a more or less severe constitutional form, with marked local affections, to the fœtus—with a severity often sufficient to destroy the life of the fœtus, either previously to or soon after parturition; and that, in many cases where the venereal taint has not been congenital, serofulous diathesis or more manifest tubercular disease will result. (Sec § 82, *et seq.*) 11th. That many of the circumstances and social habits which have been shown above to have favoured the dissemination and severity of syphilis for ages, after it was introduced into Europe, now no longer exist, excepting in limited localities; but when they have existed in more modern times, the distemper has presented a severity, and other characteristics displayed by it in former ages. 12th. That there is reason to believe that the disease existed in China from time immemorial, or at least ages before the period at which it became epidemic in Europe; but the extent, or the form, of its prevalence in that country at the present day I have not the means of knowing.† 13th. That inoculation, as prac-

tised for ages on children by the negroes on the Gold Coast, for the prevention of yaws, and as lately had recourse to on the Continent against syphilis (see *Syphilization*, § 155, *et seq.*), may be expected to lead to some important results.

123.\* IX. TREATMENT.—i. HISTORY OF.—It would appear, from the earliest writings respecting the discovery of America, that the disease existing in Hispaniola, when discovered by the Spaniards, was a variety of syphilis, if not the same distemper, or the same as the yaws existing at the same time, and for centuries previously, in Africa (see § 84, *et seq.*); that this disease was treated successfully by the natives of Hispaniola by the decoction of guaiacum; and consequently that guaiacum was employed by the Spaniards who had there contracted the disease. We accordingly find many of the early writers on syphilis, especially from the commencement to the middle of the 16th century—as DE HUTTEN, DELGADO, FERRO, POLL, ZENE, GALLUS, MICHEL, RYFF, BONCOSSUS, HUSCIARDUS, &c.—recommend guaiacum for its cure. Although a very few writers mention, towards the close of this century, mercury as a remedy for syphilis, yet it was not until the middle of the 17th century (1649) that BONNJORNIER asserted that this malady could be cured by mercury alone. Some years afterward, MENDEZ (1668) and VON HAMMON (1674) proposed the question, whether or no mercury should be preferred to guaiacum in the treatment of syphilis? Since then, and especially from the commencement of the 18th century until the beginning of the 19th century, mercury has been the almost universal remedy for this distemper; and corrosive sublimate was the most employed preparation of it; more than one hundred writers (117) during the 18th century alone recommending it. CIEZA and BLANCARD prescribed sarsaparilla; the former stating that this medicine was adopted by the native Peruvians for the cure of syphilis, as it prevailed among them; and numerous Spanish and Portuguese writers in the 16th and 17th centuries employed it, in conjunction with guaiacum and sassafras; this combination being very generally resorted to as a part of the treatment of syphilitic cachexia down to the present day.

124. Early in the 18th century, WILLOUGHBY (*Salivation shown to be of no use or efficacy in the cure of the Venereal Disease*, 4to, Lond., 1723) contended against the practice of salivation, then so generally adopted; and in 1779, COCKBURN affirmed that all venereal ulcers will heal under a local treatment merely, and that mercury should be resorted to only when constitutional symptoms appear. Early in the present century several army surgeons, probably instructed by their observations in Spain and Portugal, where the practice followed before the general introduction of mercury still lingered, proclaimed the treatment of syphilis without mercury; and from 1820 to 1830, experiments were made in the hospitals of Sweden—a country where scientific progress is always in advance—and in Hamburg, on the non-mercurial treatment of this distemper. In the

\* SYDENHAM believed the yaws to be the same disease as syphilis. The writer of the article "*Epian*," in the "*Encyclopédie Méthodique*," has classed it, the yaws, and venereal disease as the same maladies. "*Epian*. Nom que les naturels de Sainte-Dominique donnoient à la vérole, qu'on croit avoir été endémique dans cette île. Quelques-uns ont cru que c'étoit un caractère de maladie plus grave et plus fâcheux encore que la vérole; mais il est actuellement prouvé, que c'est la même maladie que les François ont appelé mal de Naples, et les Italiens mal François, chacun s'effrayant de découvrir l'origine d'un mal aussi honteux, et accusant ses voisins d'en avoir propagé la contagion." (*Tome vii.*, p. 2.)

† My relative, Mr. TOTTINGER, who passed some time in China, informed me that syphilis appeared to be a disease of great antiquity in that country, and that the primary sores caught by Europeans from Chinese females generally assumed a phagedenic or sloughing character. The constitutional affection rarely occurred. He states, in answer to my inquiries, that the disease appeared indigenous to the country; that secondary symptoms are

not more frequent among Europeans in China than elsewhere; that the phagedenic form of chancre was very common, but the round indurated ulcer was often met with, and was extremely obstinate; that as the phagedenic sore progressed towards a cure, much hardness appeared about its edges; and that it was then necessary to make the gums slightly tender in order to heal it up completely.

present day there can be no doubt of the success of this treatment in the majority of cases; and that the worst states of the disease—the most prolonged and most dangerous forms—have been those for which mercury had been most abundantly employed at an early stage, and the most copious salivation produced and continued for the longest periods.

125. In the summer of 1825 the iodide of potassium was first prescribed by me for the cure of secondary and tertiary syphilis, and the prescriptions were then prepared by Mr. MORSON, the well-known operative chemist, who also, about the same time, prepared for me an iodide of sulphur, in order to employ it in similar cases; but I soon relinquished the internal use of the latter for the former, as being, even in small doses, too irritating to the digestive mucous surface. In the following year I had recourse, in the case of E. L., Esq., M.P., to the use of iodine. This case, the nature and history of which was well known to Mr. C. BEEVOR, of Upper Harley Street, had been treated unsuccessfully by mercury in every conceivable form and combination; and when it came under my care I viewed the severe symptoms, which were seated chiefly in the large joints, as the result of the combined effects of syphilis and mercury. Iodine was had recourse to successfully in this case. The correspondence between this gentleman and myself respecting the treatment during his absence from London is still preserved by me in proof of the early and successful employment of iodine and its preparations for secondary and tertiary syphilis.

126. Since 1825 I have prescribed these preparations whenever I have been consulted in cases of this nature; but in some, and in certain stages and states of the disease, they have failed, as in two instances which lately came before me, and which I remitted to the care of Mr. H. LEE, for the employment of his plan of mercurial fumigation. Most of the severe and dangerous cases of syphilis which I have had an opportunity of witnessing have been reduced to this state by an excessive or an improper use of mercury; and it has been more especially in those cases that the use of iodine, especially the iodide of potassium, has been most successful. The worst symptoms, which have been too frequently ascribed to local manifestations of syphilis, especially affections of the periosteum, bones, &c., have been demonstrated to me to have been the results of excessive doses of calomel alone, very commonly given in hot countries, during the early part of the present century, for the cure of fevers. At one period it was attempted to bring the system under the influence of mercury in these maladies, but the practice very generally failed; and in some of these cases, in which recovery took place, disease of the periosteum was the result.\*

\* The following interesting case illustrates this fact: it occurred more recently than the period above referred to. Some years ago a gentleman trading to the west coast of Africa was attacked by fever, and was treated by calomel given in scruple doses every three or four hours. He recovered from the fever, and returned to England. I was called to see him soon afterward, and found him completely hemiplegic, with two large swellings of the pericranium. Having heard the account of his case, that he had never any venereal symptom, primary or secondary, that he had taken an excessive quantity of calomel during the attack of fever, I inferred that a tumour of the dura mater, as well as of the pericranium, had resulted from the calomel, and now pressed upon the brain. The iodide of potassium was therefore prescribed, and he rapidly recovered the use of his side, the paralysis disap-

127. ii. TREATMENT OF PRIMARY SYPHILIS.—*A. The intentions of cure in this stage of syphilis are, 1st. To destroy the poisonous ulcer and heal the part as soon as possible; and, 2d. To prevent the contamination of the constitution. The first intention is best accomplished by touching the sore with nitric acid, nitrate of silver, or any other escharotic. The penis may afterward be wrapped in a rag dipped in warm water. An aperient may also be given, and rest and low diet enjoined. If the sore have lasted above a week, it may still be expedient to destroy it; but there will not be the security against constitutional contamination which an earlier recourse to these means might afford. When, however, the chancre consists of a well-marked indurated lump, or when the penis is swollen and inflamed, the patient feverish, or when there is swelling or tenderness in the groin, then the above local treatment is no longer applicable; and mild liquid applications, consisting of the black wash, lotions containing tannin or catechu, or of other substances capable of decomposing the contaminating secretions, may be prescribed to the affected parts. If there be much irritation, the penis should be enveloped in a poultice, or in a fomentation of boiled chamomile flowers and poppy heads, and the patient kept in bed. If induration exist, an ointment with calomel may be applied. "Afterward, during the indolent and granulating stages, the sores may be treated with any astringent lotion, and be touched occasionally with nitrate of silver or sulphate of copper." (DRUITT.)*

128. *B. The prevention of the constitutional contamination of syphilis was formerly attempted by a recourse to mercury contemporaneously with the treatment of the primary sores, the belief being general that where this object was not attained by means of this substance, the disease would infallibly proceed from bad to worse. Had, however, the malady been studied with a due reference to its origin and to its treatment, during the earlier periods of its history, as well as to the treatment of the connate malady, of which I have contended that it is merely an extension and modification, a different method of cure would have been instituted; and a recourse to mercury would have been either reserved or entered upon in such a manner, and with such precautions, as would have secured successful results. The modern opinion, however, is, that every case of primary syphilis may be treated without mercury; that the too profuse administration of it may render the disease infinitely worse; that there are many cases which do not admit of it at all; but that in the right cases the moderate and judicious use of mercury removes the existing symptoms, and renders the patient far less liable to a relapse.*

129. Mercury is either not required or not admissible under the following circumstances: "When the primary sore has been destroyed, or has healed within seven days from its commencement; when it is much inflamed, irritable, sloughing, or phagedænic; when the patient is feverish and irritable; when a bubo is present; when the health or constitution has suffered from attacks of syphilis or the use of mercury; when mercury

pearing with the subsidence of the pericranial tumours. He has continued in good health up to this time.

While this was passing through the press I was called to a lady similarly affected to the above case, after the prolonged use of mercury for hepatic disease. The iodide of potassium has already been very beneficial to her, but sufficient time is not yet elapsed to show the full results.



is known to cause rapid salivation, or to occasion loss of flesh, sore throat, night sweats, or mercurial erethism; and when scrofulous disease is manifestly pronounced, or when tubercular consumption is fully developed. If there be none of these contra-indications, and more especially if the sore be indurated, mercury may be given, not because absolutely necessary to a cure, but because it has been proved by experience to hasten the cure of the primary, and to lessen the chance of secondary symptoms." (DRUITT.)

130. But, as Mr. H. COOTE has justly stated, "every form of primary syphilitic disease may be followed by constitutional affections, the nature and the duration of which no one can predicate," whether the treatment be mercurial or non-mercurial. The want of fixed opinions as to the treatment of the disease, displays itself in all the countries of Europe; and although it causes much uncertainty and distrust of the use of remedies, the injurious recourse to the excessive use of mercury, so common in former times, is no longer adopted. The most important question, however, is the frequency of constitutional disease after primary syphilis, when treated with, or without mercury; for the primary affection is, in by far the greatest number of cases, an evil of comparatively little magnitude. Secondary syphilis, when once established, is a disease of which no one can foretell the termination. Its various phases, their succession and complication, are almost beyond the reach of our knowledge, and often out of the sphere of treatment. Dr. HENNEN treated 105 cases of primary sores without mercury; secondary symptoms followed in eleven instances, and all these were cured without mercury, excepting one obstinate case. In the report of the Army Medical Department, from December, 1816, to December, 1818, 1863 cases of primary chancre were cured without mercury out of 1940 cases, ninety-six having had secondary symptoms; the average time required for their cure being twenty-one days when bubo did not exist, and forty-five days when bubo was present. The average time for the cure of secondary symptoms without mercury was from twenty-eight to forty-five days. In the above period, 2827 cases of primary affection were treated with mercury; secondary symptoms occurred in fifty-one of them. The average time for the cure of primary symptoms without bubo was thirty-three days; with bubo, fifty days; and for the cure of secondary symptoms, forty-five days. Of thirty-two cases treated by Mr. GREEN without mercury, buboes occurred in sixteen cases, six only suppurated, and constitutional disease, preceded by febrile symptoms, followed in nine cases.

131. From these data it will be seen that the balance of advantages is not much in favour of mercury; and yet there are a few cases which cannot be cured, or at least not so soon or certainly cured, without this mineral, when used in a judicious manner. The opinions of some of the ablest recent writers as to the use of mercury for primary syphilis appear to accord with those of H. LEE, DRUITT, and ACTON; and upon the whole, with the results of my own experience, which agrees also with the following remarks by Mr. HOLMES COOTE: "I am far," he states, "from undervaluing mercury as a remedy in syphilis; on the contrary, it is the most certain and powerful remedy we possess; but it requires to be administered with caution. The best method of secur-

ing a patient against the invasion of secondary symptoms is by destroying the primary sore, when small and manageable, by caustic; next, by healing the primary sore when that measure is impracticable as quickly as possible without detriment to the patient's health. If we salivate a patient in whom a small superficial sore is running its usual brief course of two or three weeks, we positively do the man an injury. But if induration should occur, either in the base of the sore as in the indurated chancre, or in the cicatrix, a course of mercury, judiciously administered, is invaluable." The rules which should guide the treatment of chancres, are, 1st. To destroy, as rapidly as possible, the syphilitic virus, by applying the nitrate of silver, the strong nitric acid, or the acid nitrate of mercury, or the Vienna paste, to the sore when it is small, and spreading, but without induration; 2d. For sores which are not indurated, spread feebly, and show signs of incipient granulation, the administration of mercury is injurious, as retarding the healing process, and not protecting the patient from secondary symptoms; 3d. When induration exists in the slightest degree in or around the sore; when the chancre continues to spread quickly, or when, after seven days, it shows no disposition to heal, then mercury is required; 4th. Mercury is either inadmissible, or not required, or even dangerous, for phagedænic and sloughing chancres, and in the other circumstances above noticed (§ 129); 5th. The longer a syphilitic sore continues unhealed and secreting the contaminating matter, the greater the risk of constitutional infection; 6th. The more robust the constitution, and the more perfect the general health, the risk of secondary symptoms from primary sores appears diminished; but this vital resistance to contamination should not prevent the early cure of chancre, more especially when it is indurated, nor prevent a recourse to mercury if the sore has been neglected or of long continuance.

132. Having determined, after due consideration, to have recourse to mercury, the selection of the preparation and mode of exhibiting it require some attention. The preparations which are most suited to the primary disease, when there is no bubo, are the hydrargyrum cum creta and calomel, and in some cases the pilula hydrarg. chloridi composita. The other preparations of mercury, especially the mercurial ointments and the bichloride, are more beneficial in other states of the distemper. The dose, and frequency of exhibiting the hydrarg. cum creta or calomel, require no remarks. They should be regulated according to the state of the patient, and their effects upon the bowels. Calomel generally requires to be conjoined with small doses of opium, or with the pilula saponis composita, but in this latter combination the dose of calomel should be much increased. The object is to produce a slight soreness and sponginess of the gums, with a very slight salivation when indurated chancre exists, and to continue it for four or five weeks, preferring in the latter case the longer period. The dose of the medicine should be regulated according to its effects. During this course the regimen of the patient should in part depend upon his state of health when commencing it. He should live regularly, but not too low. If he be in ill health in other respects, the treatment, and regimen, and diet suited to his state should be prescribed. In

general, excesses in food and wine should be avoided, and whatever is calculated to disorder his digestive and biliary organs. The clothing should be warm; and fatigue, cold, wet, the morning and night air, ought to be carefully avoided. If, notwithstanding this attention to health, and to the prevention of disorder, any of the indications described, when treating of the injurious effects of mercury, make their appearance, the means recommended for their removal, in the articles ERYTHISM, MERCURIAL, and POISONS (§ 562, *et seq.*), should be employed.

[In regard to the use of *mercury* in the treatment of syphilitic diseases, the editor, from a long course of dispensary, hospital, and general practice, has arrived at the following conclusions: 1st. That venereal affections of every description are curable without mercury, and especially all secondary and tertiary forms of the disease; 2d. That the accumulated experience on this point ought to suffice to banish this mineral from the treatment of this class of diseases, except perhaps in some rare cases, when there is hepatic derangement and torpor of the liver, when it may be advantageously given as an alterative, in small doses; 3d. Mercury has no power to prevent secondary symptoms when given in the primary stages; 4th. This mineral, if given freely, will induce, and in all cases increase the tendency to ulceration of the mucous surfaces, especially of the mouth, fauces, palate, and throat, and also cause affections of the bones very similar to those caused by syphilis. The diseases produced by it have very generally been confounded with those produced by the venereal poison; 5th. The symptoms following mercurial treatment are more severe and difficult to remove than those following primary sores not treated with mercury; and, when relapses do occur in the secondary stage, they are far more readily removed in those cases where no mercury has been given; 6th. Mercury, when given incautiously, or in too large quantities, especially in syphilitic diseases, tends to undermine the constitution, to predispose to and aggravate constitutional affections, to increase general irritability, to induce inflammation and ulceration in and destroy the mucous textures, to promote morbid absorption and removal of the fatty, fibrinous, and osseous substances of the system, and to induce synovial, albuminous, and serous accumulations in the respective cavities lined with the membranes producing such secretions; though, given in moderate doses, and with proper care, it may tend to remove such accumulations; 7th. The extent and injury to the soft and bony parts of the system, produced by mercury, are more to be dreaded than any primary or secondary effects of venereal poison; 8th. Mercury is not, therefore, a *specific* against any form of syphilitic disease or virus, and is not essential to its cure; thousands having been easily, effectually, and permanently cured of every form and in every stage of the venereal disease without having taken a particle of mercury; 9th. Mercury should especially be avoided in sloughing sores of the penis and other parts, attended with high inflammation and tumefaction of the parts affected, attended with fever, &c.]

133. *C. Gangrenous chancre*, when it occurs in strong, sanguine, plethoric, or healthy persons, is usually the result of excessive inflammatory action, and requires large vascular depletions, free purging, and afterward opium conjoined with sa-

lines, antimonials, &c. Locally, poppy fomentations, poultices with balsam of Peru, or with turpentine; after the nitric acid lotion, will detach the sloughs. If the ulcer which remains is healthy, and heals, there is no need of mercury; but if it ulcerates, independently of the state of the general health, or if secondary symptoms appear, mercurials should be directed. *Sloughing, gangrene, and phagedæna* of venereal sores are, however, most frequently consequences of an exhausted or broken-down constitution, from intemperance or other causes. In such cases, the application of opiate and camphorated lotions to the sore, of strong nitric acid, if it spread; and opium and camphor, or ammonia, the fixed alkalies and tonics taken internally, aided by a generous diet, beef tea, wine, &c., are indispensable.

134. *D. Phymosis* is sometimes caused either by *balanitis*, or by one or more ulcers under the prepuce. In these cases there is more or less discharge. A chancre is often detected by local hardness and tenderness. If the prepuce be elongated, and cannot be retracted, circumcision may be advisable; but generally it will be sufficient to split the prepuce so as to enable the parts underneath to receive due attention, and the treatment which the character and progress of ulceration may require. The frænum is not unfrequently perforated by a chancre; and it then requires to be divided. In the circumstances now stated, the duration of the chancre, and the confinement of the secretion under the prepuce, increases the risk of constitutional contamination, and requires, unless in very recent cases, a recourse to mercury. A chancre in the urethra requires astringent injections, preferably such as contain the bichloride of mercury, and a course of this mineral if not contra-indicated by the state of the patient.

135. iii. THE NON-MERCURIAL TREATMENT of primary syphilis may be adopted in the circumstances above stated (§ 131, 132), or even in others where it may be considered prudent or advisable to have recourse to means which will improve the general health, and enable the constitution to resist the invasion of the poisonous virus. If there be debility or impairment of the digestive and assimilating functions, tonics, the chalybeates; the preparations of cinchona, or of sarsaparilla, or of guaiacum; cod-liver oil, simple or mediated; the compound decoction of sarsaparilla, with or without iodide of potassium and liquor potassæ, will be found the most deserving of confidence, especially if prescribed appropriately to the circumstances of the case, and if the patient live regularly, and avoid intemperance of all kinds, and all causes of vital exhaustion (§ 118).

136. iv. TREATMENT OF BUBO.—MR. II. COOTE states that he knows of no relation between the occurrence of bubo and the frequency of secondary syphilis; and he believes the idea that a copious suppuration from the groin eliminates the venereal poison to be unfounded. "When swelling of the glands occurs in conjunction with primary syphilis, or is supposed to depend upon the syphilitic poison, mercurial frictions are directed upon the thighs, that the mineral may pass through the enlarged parts." In more chronic enlargements the swelling may be covered by a plaster of the unguentum hydrargyri, or of the unguentum ammoniaci cum hydrargyro. "Leeches are not often required to an inflamed bubo, but they



may sometimes be applied with advantage." The existence of suppuration should not suggest an early recourse to the lancet, as absorption often takes place after the skin has become red or even thin. Absorption of the matter from suppurating buboes does not add, in Mr. H. Coote's opinion, to the patient's danger of secondary syphilis. An opening, when required in a suppurating bubo, should always be made in the long axis of the thigh. If any burrowing of matter occur, particularly in scrofulous persons, who are most liable to buboes, tonics, with a restorative and digestible nourishing diet, are required.

137. The treatment advised by Dr. Druitt and Mr. H. Lee for bubo is very different from that now stated. The former writer remarks that the first indication is to produce resolution of *acute bubo*—"by rest, aperient and saline remedies, low diet, leeches and fomentations. The applications to the chancres must be soothing, and mercury, if being administered, should be at once given up. As soon as the tenderness is relieved, pressure by means of a compress and bandage, or by placing a weight on the part as the patient lies in bed, is useful. Even if matter does form, and does not seem inclined to come to the surface, the iodine paint, cold lotions, aperients, tonics, and pressure will sometimes cause it to be absorbed. But if it increases, and the skin becomes inflamed and shining, a puncture should be made, and the case be treated as any other acute abscess." The chief circumstance deserving notice in this quotation is the abandonment of mercury if it have been already prescribed. My observation in former days has induced me to agree with Mr. H. Coote in a recourse to mercurial inunctions on the thighs, as they produce "a complete effect upon the constitution, and may be used with advantage in cases of chronic bubo, combined or not with primary disease." Suppurating buboes, or solid inguinal swellings, will often disappear under this treatment, which, to be effectual, he advises to be done in the following way: "The patient, sitting before the fire, should rub on the skin at the inner part of the thighs a drachm of the strong mercurial ointment every night, or every night and morning. He should slip on a pair of drawers and go into bed, that the absorption of all that which stains the skin may go on. The patient should not be allowed to wash the part except at intervals, to prevent the skin from being chafed." The introduction of a drachm or two of mercurial ointment into the axillæ when in bed will generally produce the mercurial action when it is required in other circumstances.

138. In cases of *indolent bubo* the indication is to improve the general health, by sarsaparilla, tonics, and the other means advised above (§ 135). For these, change of air, sea-voyaging, removal to a warm and dry locality, and digestible food, are the most beneficial means of cure. The local use of iodine is sometimes of service both in these and in the chronic enlargements of the inguinal glands, but it is not so beneficial as the internal use of the preparations of this substance, which, when used internally, should be combined with either the liquor potassæ, or with either of the carbonates of potash, and be prescribed with other suitable medicines. If *sinuses* form, or if *sloughing* or *phagedæna* occur, or if the ulcers become *irritable* or much inflamed, the means suitable to the case, both internal and external, should be employed.

139. v. TREATMENT OF CONSTITUTIONAL SYPHILIS.—A. Of *secondary Affections*.—It has been contended by some recent writers and stated above (§ 46), that the simple and phagedænic sores are rarely followed by constitutional syphilis, whereas the indurated chancre rarely if ever fails to be succeeded by the secondary disease. Mr. H. Coote disputes these positions, and concludes that secondary symptoms in large proportion ensue after every variety of simple and non-indurated chancre. After primary phagedæna, too, secondary symptoms may be dreaded, and no lapse of time seems to render the patient's constitution free, the secondary disease partaking of the character of the primary sore. "If a person were to have a well-marked phagedænic ulcer, I would not guarantee his not suffering phagedænic ulceration of the throat after an interval of ten years, or even more." Mr. Coote adds, that no one who has primary syphilis in any or in its slightest form can be safely guaranteed from the occurrence of constitutional disease; but if six months elapse after the healing of the primary sore, the patient remaining well, the chances are greatly in his favour that he will escape any further disease. An exception, however, must be made in the case of primary phagedæna.

140. It is often necessary to disabuse the patient's mind of the belief that the syphilitic poison may be destroyed by some specific which will enable him to revert to his former habits. All, however, that can be done is to combat the disease as it appears, and to point out those modes of living which may prevent, although they cannot procure complete security from, the constitutional infection, or certainly remove the contamination when it has already been produced. Much depends upon the patient himself, in respect of the amount of protection which may be afforded him. For anxiety of mind, gloomy ideas, and all irregularities and excesses, and the other concurring causes mentioned above (§ 115–118), will perpetuate the constitutional contamination, and develop its local manifestations, and induce a state of syphilitic cachexia.

141. If venereal eruptions, sore throat, &c., be ushered in, as they often are, by febrile or inflammatory symptoms, aperients, salines, and antimonial diaphoretics will be of service. The diet should be restricted, the patient confined to the house, and the warm bath often resorted to. "When the febrile state has vanished, if the patient has never taken a course of mercury—or if he have been subjected to an imperfect course of it for the primary symptoms—and his constitution is sound, he may take mercury as already directed. If under its use the strength and general appearance are improved, so much the better; but if the patient gets thinner, weaker, and haggard, and suffers from chills and feverishness, or if his ulcers become irritable and phagedænic, it must be given up. The mercurial vapour bath, or the corrosive sublimate in very small doses, and not carried to the extent of affecting the mouth, will often be of great service when the full course of the mineral is inapplicable." (Druitt, *Op. cit.*, p. 189.) The numerous authorities in favour of the bichloride,\* and my own experience

\* Dr. DROZDI, Professor at Halle, prescribes the bichloride as follows: R. Hydrarg. bichloridi, gr. xij. : solve in aque distillatæ q. s. et adde micæ panis, et sacchari albi, aa, q. s. ut fiant pilule co., sing. gr. j. The pills are to be rolled in powdered (anella bark); and on the first day four pills are to be taken (one fifth of a grain); on

of its effects, have rendered me partial to the adoption of it, in preference to other preparations, when a recourse to mercury should be had.

142. The iodide of potassium is often of great service, especially when a recourse to mercury is considered inexpedient or improper (§ 129); or after mercurial remedies have been prescribed without a satisfactory result, or when they appear to have been injurious. It is in these latter circumstances, and especially where a protracted course, or a too liberal exhibition of this mineral has been directed without avail, that the preparations of iodine, especially the iodide of potassium, in due solution and combination, according to my observation, have been most beneficial.

143. The preparations of sarsaparilla, especially the compound decoction, are always productive of great benefit. They may be prescribed either subsequently to a course of mercury or of iodine; or the bichloride of mercury, or the iodide of potassium may be taken with the compound decoction of *sarzæ*, or with the fluid extract or sirup. In some states of secondary syphilis, the muriate or the nitrate of ammonia may be taken in tonic and aromatic infusions, in as large doses as will not offend the stomach; or the nitro-muriatic acids may be tried, either in weak dilutions or in the infusions just mentioned. But in most cases of secondary syphilis, characterized by much debility and loss of flesh, or by anæmia, few means are so generally useful as a prolonged course of the bichloride of mercury in the tincture, or compound tincture of cinchona, in the proportion of half a grain or a grain to the ounce of the tincture, a drachm or a drachm and a half being taken twice or thrice daily in a little water, according to the circumstances of the case. When the throat, palate, or other parts of the mucous surfaces are much affected, this combination, or the bichloride in the sirup or fluid extract of *sarzæ*, aided by gargles containing the bichloride, or by mercurial fumigation, is very frequently efficacious.

144. In cases of indurated chancre of considerable duration, in most cases of secondary syphilis, and generally in tertiary syphilis, analyses of the blood demonstrate a great diminution of red corpuscles, an increased amount of albumen, the fibrin not being materially altered in quantity. These results should not be overlooked, as they indicate the propriety of caution in the exhibition of mercury, and of selecting the mode of exhibiting it now advised; or of adopting the preparations of iodine, and especially the iodide of iron, prescribing it in the sirup of sarsaparilla.

145. During the treatment of constitutional syphilis, it should always be kept in recollection that whatever depresses the vital force or impairs the general health favours the development of the syphilitic contamination and its external

or local manifestations; and that, if the remedies resorted to produce these effects upon the constitutional energies, they will very probably prove more injurious than beneficial. Hence the remedies should be so combined, exhibited, and alternated; and so aided by a regulated diet, and by a healthy, temperate, or warm and dry atmosphere, as to promote the constitutional powers; improvement in the healthy appearance of the patient generally indicating the success of the medicine employed.

146. *B. The local treatment of secondary syphilis* consists chiefly of warm, vapour, or sulphur baths, for the eruptions; of the application of lotions of corrosive sublimate, or ointments containing the unguentum hydrarg. nitratis, or the unguent. hydr. præcipitati albi, especially when the eruptions are severe, or are leprous or tubercular. If itching or irritation be experienced, lotions or frequent sponging the parts with a saturated solution of the biborate of soda in any emollient fluid will generally be of much service. Dr. Druitt states that "for the common excoriated sore throat any soothing detergent gargle will do. When there are ulcers, it is advisable to use gargles of corrosive sublimate; and when the ulcers are indolent they may be touched with the linimentum æruginis. Mercurial fumigation is also occasionally of benefit. It is effected by putting a scruple of red sulphuret, or of the common black oxyde, or twice the quantity of mercury with chalk, on a heated iron, in a proper apparatus, and inhaling the vapour; a heated penny-piece in a tea-cup will answer the purpose.\*

\* Mr. HENRY LEE has given (*Transact. of Med. Chir. Society of London*, vol. xxxix., p. 339) the following directions as to the use of mercurial fumigations:

"Finding from experience that it was the light-coloured oxyde alone which volatilized, and produced its effects upon the patient's constitution, and having reason to believe that the light colour depended upon the presence of calomel, I performed a series of experiments with calomel alone, or mixed in a certain proportion with the gray oxyde. The general result of these experiments has been to satisfy me that, for the purposes of mercurial fumigation, five or ten grains of calomel alone is, in ordinary cases, quite sufficient; and that when the gray oxyde is used, the admixture of a few grains of calomel will facilitate its sublimation and insure its medicinal action.

"Upon making comparative trials with calomel alone and combined with steam, it was found to act more certainly and with greater regularity in the latter case.

"The plan which I have adopted is very simple. Two small lamps are procured in which the methylated spirit (much cheaper than spirits of wine) is used; over the first lamp is a thin metallic plate, upon which the ten grains of calomel are placed; over the second lamp is a small cup of hot water. A small cane-bottomed chair is placed over the lamps, and the patient sits upon it. He is then enveloped, chair and all, in a blanket; at the expiration of a quarter of an hour or twenty minutes he rolls himself up in the blanket and goes to bed.

"For patients to whom it may not be convenient to procure the spirit lamps, the mode of proceeding may be varied as follows: The patient is directed to heat a thick tile in the fire; this is then put into a night-stool, and a gallipot full of warm water placed upon one corner of it. The calomel powder is then sprinkled over the rest of the tile, and the patient sits over it, being enveloped, as before, in a blanket. This mode of applying the vapour is very convenient in cases of affections, either primary or secondary, of the generative organs. It is not necessary in either case that the patient should breathe the mercurial fumes. It is remarkable how soon the patients' systems are brought under the influence of the mercury by this simple means, and, according to my experience, how effectually it acts in cases both of primary and secondary syphilis. Its great advantage, however, consists in the very little constitutional disturbance produced, and in the avoidance of those symptoms of irritation and debility, both mental and physical, which the prolonged internal use of mercury is so apt to occasion. The mercurial action, when the medicine is introduced through the skin, may be continued for nearly any length of time that may

the second day none; on the third day six pills; on the fourth none; on the fifth eight pills; on the sixth none; on the seventh day ten pills, and so on, until the twenty-seventh day, when thirty pills are to be taken (1½ grain). The treatment is then complete, but in some instances of severe secondary symptoms they are to be carried even farther. The pills may be taken on a full meal. Sarsaparilla is also to be taken during the course, or even afterward. Also animal food is to be reduced to one half the usual quantity, and pork and bacon avoided. The cold night and morning air, and cold and wet are to be shunned. I have been consulted by patients for whom this treatment has been adopted, but the cases have been too few to admit of an opinion respecting it. It is merely a modification of the well-known treatment advised by VAN SWIETEN.



When a foul ulcer is seated in the velum, or roof of the mouth, or pharynx, or alæ nasi, an attempt may be made to cheek its ravages, by destroying its surface and edges with acid nitrate of mercury." (*Op. cit.*, p. 190.) The ulcerations at the roots of the nails, or between the toes, are cured by the internal administration of mercury, and the application of a solution of nitrate of silver, from four to ten grains to the ounce of distilled water. When the hair falls off the scalp, the hair should be kept short, and the dilute ointments just mentioned applied, or the means resorted to which are advised in the article on the Hair (§ 32, *et seq.*).

147. MR. H. COOTE remarks that the common warm bath effects but little in comparison with the Turkish bath, which is admirably suited for the chronic stages of secondary syphilitic eruptions,\* and which may now be procured in London. Extremes, or even alternations, of temperature should be avoided; and the regimen and diet should be regulated according to the habit of body, the usual modes of living, and the peculiarities of the case, avoiding too great abstinence on the one hand, and too full living on the other; moderation in all things being always observed.

148. vi. THE TREATMENT OF TERTIARY SYPHILIS.—In this state of constitutional contamination, mercury, if exhibited at all, should be prescribed with great caution, and it ought not to be given if it have been previously resorted to, either in prolonged courses, in large quantity, or in such a manner as to occasion copious salivation, or any of the more unpleasant effects described in the article POISONS (§ 562, *et seq.*). But if the patient have not had recourse to this mineral in any form, if none of the more severe tertiary affections exist, the bichloride of mercury may be prescribed in full and increasing doses in the compound decoction of sarsaparilla upon a full meal, or as advised by VAN SWIETEN, or mercurial fumigations may be resorted to. But if a manifest improvement in health, and in the local affection, in a reasonably sufficient time be not observed, or if there be any aggravation of symptoms necessary, and may be repeated as often as may be convenient without injuring the patient's constitution.

"The small quantity of calomel which it is requisite to use at each fumigation is probably one reason why mercury in this form may be used with such comparative impunity."

\* Mr. COOTE describes this bath as follows: "The clothes having been removed, and a suitable bathing-dress supplied, the bather is conducted into a heated apartment, where he is allowed to sit and accustom himself to the increase of temperature. During this time the body becomes covered with a tolerably profuse perspiration. Next he is conducted to another apartment, where there is a higher degree of heat (115° F.), and the atmosphere is charged with watery vapour. There he reclines on a heated marble slab, and undergoes a slow process of shampooing. The quantity of cuticle that peels off surprises one who has not witnessed the process, but the skin is left in a cleaner state than perhaps it had been in for years. After the movements of the limbs have been tested in a variety of ways the bather is conducted to a recess, in which is a fountain with hot and cold water, where he may apply soap and hot water as his taste dictates, or have the process performed by an attendant. A feeling of languor, not by any means unpleasant, supervenes, which renders a short period of repose on a couch agreeable. This process removes a large quantity of cuticle from the integument, causes the blood to circulate through the minute capillaries, and brings into activity the sudoriparous and sebaceous glands. We may, I presume, infer that without the proper performance of these functions the skin is not in a healthy state; and that any morbid condition, such as lepra or lichen, would be materially benefited by rousing them into activity." (*Op. cit.*, p. 103.)

toms from this treatment, the iodide of potassium should be substituted, and given in doses of three grains thrice daily, increasing them to five grains conjoined with the liquor potassæ, or with either of the carbonates. In cases where mercurials have been freely employed, and especially where there is reason to infer that the affection of the periosteum or bones has been caused or aggravated by these medicines, or where there is doubt whether or no any of the tertiary affections have been caused as much by mercury as by the fixed temper, the decided use of the iodides of the fixed alkalies is generally the most beneficial. In cases manifesting more or less anæmia (*see* § 143, 144), the courses of iodides, and still more those of mercury, should be followed by a course of the iodide of iron taken in sirup of sarsaparilla.

149. If the periosteum or bones be diseased, still greater caution in having recourse to mercury is required, although in strong constitutions, and where mercury has not been previously given, full doses of calomel and opium, or of these with camphor, will often initiate the treatment with benefit, and they may be continued or modified as long as they continue of service, and afterward the iodide may be prescribed, increasing the doses until success result from it. I have generally prescribed this medicine in the following combinations:

No. 378. R Potassii Iodidi, ℥j. ad ℥ij.; Liquoris Potassæ, ℥ij. (vel Potassæ Bicarb., ℥ij.); Tinct. Aurum (vel Cascariæ), ʒvi.; Extr. fluidi Sarzæ, ʒss.; Infus. Gentianæ Comp. ad ʒviij. M. Fiat Mist. cuius capiat cochl. ij. vel ij. larga, ter in die in aquæ cyatho amplo.

150. It will generally be of service to take the iodide in weak solutions, even when it is prescribed in the largest doses. If it relax the bowels, a few drops of tinctura opii, or a little tinctura camph. comp. may be added to each dose; or the iodide and the alkalies may be taken in the compound decoction of sarsaparilla, to which a tonic or aromatic tincture, or an opiate, may be added, according to circumstances. When this remedy succeeds in removing the venereal affection, it should be continued for some weeks afterward, gradually diminishing the dose. In some cases it causes irritation of the mucous surface of the throat, nostrils, and eyes, with a copious defluxion, or pains at the region of the stomach, or irregular febrile symptoms. These disorders are observed especially when the iodide has been given in too large doses, or uncombined with the carbonate or solution of potash. When taken thus uncombined, the acid in the stomach decomposes the iodide, and the free iodine irritates the mucous surfaces.

151. In cases of ulceration of the pharynx, or larynx, or of disease of the bones, of the palate or nose, mercurial fumigations may be first tried, if mercury has not been already employed; but care should be had not to allow it to affect the mouth. Sarsaparilla, with a cautious use of the iodide of potassium and sedatives; the application of a strong solution of the nitrate of silver, or of the bichloride of mercury to the ulcerated surface, and of terebinthinate embrocations to the throat externally, are often beneficial. Gargles containing either the bichloride or the iodine, neither of these substances being in such quantity as to occasion much irritation of the throat, may also be tried. In all these the utmost attention and care are required. When tuberculated or other eruptions assume the characters of open sores or ulcers, the simple or compound

tincture of iodine will be most advantageously applied to them, in modes and in degrees of dilution varying with their appearances.

152. When nodes are formed, the pain and consequences which often result require iodine, alkalies, sarsaparilla, and opiates, with light, nutritious diet, residence in a warm and dry air, and blisters over the affected parts. The blisters often should be repeated, in order to prevent, by the external discharge, the inflammation from extending to, or disorganizing the osseous structure. If mercury have not been employed, the blistered surface may be dressed with strong mercurial ointment, and either with opium or morphia; and the diet and regimen duly regulated, with strict reference to the several peculiarities of the case, to the extent to which the general contamination and cachexia may have advanced, and to the state of the local affections.

153. vii. SYPHILIS IN INFANTS AND CHILDREN. —The treatment should be directed not merely to the infant or child, when the state of either admits of any hope from treatment, but more especially to the parents. For these as well as for the child, a mercurial course, if not previously had recourse to, should be prescribed; and in the majority of cases, the bichloride of mercury, exhibited as above (§ 141), or combined with either of the tinctures of eichona, will be found the most efficacious. Subsequently the iodide of potassium or iodide of iron, and the preparations of sarsaparilla may be employed, according to the peculiarities of the case, more especially if anæmia be very manifest. It has been recommended for children to rub ten grains of mercurial ointment, daily, into the axilla or soles of the feet, or to administer half a grain or a grain of hydrargyrum eum creta every night until the symptoms disappear. But the disease is not so completely eradicated by these means as by a judicious exhibition and management of the bichloride, especially when followed by the means just named, varying the dose, and the vehicle in which it is prescribed, with the age and circumstances of the case.

154. X. SYPHILIZATION, or the inoculation of syphilis, has recently attracted attention not only as a cure, but as a prevention of any future occurrence of the distemper.—i. HISTORY.—M. AUZIAS TURENNE first proposed this startling mode of treating and of preventing syphilis in 1850, by bringing it before the French Academy of Medicine. This young physician commenced, about 1844, a series of experiments with the view of testing JOHN HUNTER'S doctrine of the non-communicability of syphilis to the lower animals. After many experiments and some failures, he succeeded in producing in monkeys, inoculated with chancre-matter, a true chancre, and the disease thus communicated to them was transferred to rabbits, cats, and horses. "The malady was again returned by inoculation from these to the human species, the first trials in this regard having been made by Dr. ROBERT WELTZ, of Würzburg, on his own person. On four separate occasions Dr. WELTZ succeeded in producing an unmistakable chancre on his own person, by inoculation from animals, and this was acknowledged even by RICORD."

155. This discovery, as stated by Dr. RADCLIFFE, issued in one more surprising still, upon which the process of syphilization is founded, namely, the strange and curative change of the

disease when the inoculations are often repeated in the same individual. Experimenting upon apes, it was found that the artificial ulcers regularly diminished in size and virulency, in proportion as the inoculations were multiplied, until at length the virus ceased to take effect. The system seemed to become protected, as in ordinary inoculation and vaccination, and a state or diathesis was produced in which the body was no longer capable of being affected by syphilis; and the process by which this is accomplished is that to which the name *syphilization* belongs. This result, also, is all the more surprising because reiterated inoculations were evidently essential to it, for only once inoculated and then left to themselves, the poor apes speedily perished with all the signs of the syphilitic cachexia. Having satisfied himself of the reality of these results, M. AUZIAS TURENNE then proceeded to inquire whether man was capable of syphilization. He had many ardent followers, who eagerly submitted to the experiment, and who shortly seemed to furnish evidence in the affirmative.\*

156. This pretension excited great opposition, particularly in the Académie de Médecine. In other quarters, however, the impression was more favourable. At Turin, M. CASIMIRO SPERINO, the chief surgeon in the Syphiliticoma, or Syphilitic Hospital of that city, at once took up the new views, and put them to the test on a large scale. He was favourably inclined towards them, he tells us, for several reasons. He had observed that severe inguinal buboes are more apt to follow small and insignificant chancres, which heal in a few days, than those which are large and obstinate; that the constitutional symptoms held an almost inverse relation to the severity and continuance of the local disease; and that he had known many prostitutes, whose constitutions had never been sensibly affected, who had had chancres for years, either constantly open, or closed only to open again immediately. He had repeatedly satisfied himself that foul buboes were more prone to heal in those cases in which their syphilitic character had been tested, after RICORD'S plan, by inoculations on the surrounding skin.

157. The subjects of M. SPERINO'S experiments were fifty-two hospital patients, all prostitutes, and all suffering from aggravated forms of primary or secondary syphilis. The virus was taken from the person syphilized, or from a comrade—from the first, if possible—and always from a growing ulcer. The inoculations were repeated once or twice a week in three or four distinct places, usually in the abdomen. The time required for the establishment of the artificial chancres was from two to three days. The effects of the second inoculations were less serious than the first; of the third, than the second; of the fourth, than the third, and so on until the virus ceased to produce any effect whatever; contemporaneously with which epoch, all former ulcers had healed, and buboes, recent nodular enlargement of bones, and cutaneous stains or blotches,

\* In Dr. WINTERBOTTOM'S work on the native Africans already referred to, it is stated, on the authority of Mr. EDWARDS, the author of the "*History of the West Indies*," that the natives of the Gold Coast of Africa give their children the *yaws* by inoculation, and that they perform the operation by making an incision in the thigh and inserting some of the matter from the sores of the yaws. By this means the infants or children have the disease slightly, and recover speedily; whereas, by becoming infected at a later time of life, it is much more severe, and "gets into the bone." (Vol. ii., p. 156.)



had either disappeared, or were in rapid process of disappearance. The virus, also, which made no impression at this time, was found to retain all its virulence when tried upon an unprotected person.

158. Since this time M. SPERINO has shortened the intervals between the several inoculations, and has increased the number of punctures in each operation to twelve, sixteen, or twenty, and with the effect (he tells us) of expediting the process, and of ensuring a slighter form of artificial chancre. He has also subjected his syphilized patients to a course of bathing in the sulphureous waters of Acqui, which waters are notorious for their power of bringing out secondary symptoms in the subjects of syphilis, and he has found them to resist this test as well as that of inoculation.

159. Such are the main particulars of these fifty-two cases, as gathered from M. SPERINO's communication to the Academy of Medicine and Surgery at Turin. No other treatment was employed. They are said to have been without exception of an aggravated character, and without any spontaneous tendency to heal. For a month before the institution of the experiments they had been purposely left without any treatment, and during this period they had retrograded.

160. An account of Dr. SPERINO's proceedings was given by Dr. RADCLIFFE (in RANKING's *Abstract of the Medical Sciences*, vol. xvi., p. 333), and M. TURENNE's experiments were noticed by Dr. DE MERIC (*Lancet*, July, 1853, p. 203) before Dr. SPERINO's work had appeared. The subject has been very recently brought before the profession in an able article on syphilization in the "*British and Foreign Medico-Chirurgical Review*" (No. xxxvii., p. 410), in which the subsequent experience of Dr. SPERINO in Turin, of Professor BOECK in Christiana, of Dr. DANIELSEN in Bergen, and of Dr. CARLSSON in Stockholm, during several years, has been given. These enlightened men, professors and physicians to hospitals in cities where medical science is in its highest state of rational cultivation, instead of declaiming against the doctrine promulgated by M. A. TURENNE, have been engaged in a series of careful experiments and observations to determine its truth or its fallacy. Experiment and careful observation can alone decide this question, which is one of the greatest importance in practical medicine.

161. Dr. SPERINO's observations were confirmed by similar results obtained by Dr. GAMBERINI at Bologna, and by Dr. GULLIGO at Florence. In 1853, Dr. SPERINO published a detailed account of ninety-six cases of syphilization. Of these ninety-six cases, fifty-three were of primary syphilis, and forty-three of the constitutional disease. Fifty of the cases of primary syphilis were cured, two failed, and one was not treated by syphilization alone. "Of the forty-three cases of constitutional affection, twenty-six were treated by syphilization alone, and seventeen by this method, in conjunction with mercury or iodine. Twenty-five of the twenty-six in the first category are said to have been cured. In only two cases of the primary disease did any constitutional symptoms appear, and these symptoms rapidly yielded under a continuance of the syphilization. No relapse has yet taken place in any case. Many of these cases were of very severe character, and were such as were not likely to have healed spon-

taneously; while the numerous inoculations that were required produced no serious effects, except in one or two instances a slight tendency to form phagedenic sores."

162. Dr. BOECK, of Christiana, in 1853, published, in the seventh volume of the Norwegian Medical Journal, the results of a few experiments he had then made on syphilization. Since then he has closely investigated the subject, and has extended the practice to infants at the breast. The same plan of treatment has also been pursued by Dr. DANIELSEN in the hospital at Bergen. When the writer of the review above referred to (§ 160) revisited this hospital in July, 1856, he was assured by this physician "that he fully coincided with the views of Dr. BOECK, and that the results obtained in Bergen by syphilization were as successful as those recorded by the latter at Christiana." The reputation, talents, and high position of those physicians in Norway are unquestionable.

163. Dr. BOECK states that all the cases which he treated by syphilization laboured under constitutional syphilis, in its most varied stages and forms. Some of those cases had previously undergone every mode of treatment that science could devise, while others had had no treatment at all. He thought it of great importance to collect observations from both classes of cases. If syphilization is not had recourse to till all other remedies have been tried, it is difficult to form a correct estimate of its powers; for under such circumstances, as Dr. BOECK justly remarks, we can hardly know what symptoms belong to syphilis, and what to the medicines administered; and particularly to mercury. He states that cases which have undergone a mercurial treatment, persons of an inflammatory diathesis, habitual spirit drinkers, and weakly constitutions, should not be subjected to this treatment. In these cases the artificial chancres may take on a malignant action. "The bowels should be regulated, and the digestive organs brought into good order; but it is not necessary to enforce any strict rule of diet. In the hospitals of Bergen and Christiana the ordinary full diet was always allowed." Dr. SPERINO and Dr. BOECK mention the readiness with which patients submitted to, and even sought for, the mode of cure which they had seen so successful with their fellow-sufferers.

164. ii. MODES OF INOCULATION.—M. A. TURENNE at first kept up a succession of single chancres; while SPERINO made three or four separate inoculations at once, and repeated these two or three times in the week. After having in this way reached twenty-four or thirty inoculations in all, he found that the chancres last produced were exceedingly small, and he then diminished the intervals, and made more inoculations at each sitting. He found that the first chancres were deeper, larger, and more inflamed than those which succeeded them; and that by diminishing the intervals and increasing the number of inoculations the earliest chancres visibly diminished, and were less painful and inflamed. After a large number of inoculations which did not appear successful, he returned to his former plan of inoculating for six to ten chancres at a sitting. "While these chancres are progressing, it is not advisable to inoculate afresh, nor should this be done until the former chancres are developed. Should the chancres be developed too freely and threaten active inflammation, or to extend

as phagedænic sores, he checks their progress by inoculating afresh at shorter intervals."

165. The practice of Dr. BOECK differs little from that of SPERINO. He inoculates for two chancre only every six days, because he found from experience that it required about five days to produce induration in a chancre, although he does not consider this latter circumstance absolutely essential. He subsequently shortened his intervals to three days, and increased the inoculations to eight or ten. Less time is thus required to produce immunity; but Dr. BOECK is distrustful of pushing cases too rapidly through their course of syphilization. With regard to the parts of the body selected by these physicians for inoculation, SPERINO preferred the lower regions of the abdomen, Dr. BOECK the arms and thighs.

166. The conclusions drawn by Dr. BOECK from the eighty-four cases of syphilization, which he has treated up to March, 1856, are: 1st, that in all cases, without exception, immunity to the venereal virus is obtained, sooner or later, by inoculation of the poison; 2d, that the symptoms of syphilis present at the commencement of syphilization disappear during the employment of this mode of treatment; 3d, that the general health does not suffer in the least from syphilization; on the contrary, if the patient has been in weak health before inoculation, he most materially improves in strength and appearance during the process. These propositions are conceded as undoubted facts by Dr. BOECK's colleagues, by Dr. SPERINO, by M. A. TURENNE, by DANIELSEN, by Dr. CARLSSON, and by Dr. STENBERG of Stockholm.

167. *The time required to produce immunity from syphilis by syphilization depends upon the various strength of the virus, upon the rapidity or otherwise with which the inoculations succeed each other, upon the number of the chancres produced, and upon the idiosyncrasy of the patient.* Dr. BOECK states that "the attaining to immunity depends upon the length of the intervals between each inoculation—the more frequent the inoculation the more rapidly does it ensue. If there were sufficient virus to be obtained, we might, if we chose, inoculate every day; but if, as is generally the rule, we keep to obtaining the virus from the most recent inoculation, we cannot easily do this. From my own experience, I would say that the matter obtained in a pustule of only one day's growth is generally capable of being inoculated; but I have also seen that pustules of three days' growth produced no effect; while three days later, the matter taken from them was decidedly contagious." (P. 196).

168. Granting that immunity is really produced from the disease, the question follows, Is it merely from the existing disease, or from any subsequent infection? and if from subsequent infection, is the immunity, produced for a time only, becoming impaired gradually, and ultimately lost after an indefinite time; or is it continued through life, a diathesis being imparted by it, rendering the frame insusceptible of the syphilitic infection? \* That the immunity is at least for a

time, is shown by the fact of the last inoculation having failed to take effect, however virulent the matter employed. Dr. BOECK is of opinion that persons who have reached perfect immunity to inoculation in the course of syphilization are insured against contracting syphilis for all the rest of their lives; but the lapse of time since the first employment of this practice admits not of any conclusive evidence of the fact.

169. Of forty-two cases of constitutional syphilis, where no mercury had been previously used, not one had exhibited any relapse up to the commencement of 1856, and many of these had been for three years or more without requiring any treatment whatsoever. Of the twenty-one cases recorded in Dr. BOECK's first work, six had been treated without mercury, and in all these syphilization dispersed the symptoms, which have never returned. The average duration of the treatment in these six cases was six months and two days, the average number of chancres were 322. In a second class of cases, in which the constitutional symptoms were chiefly confined to the skin and mucous membranes, but which had all taken more or less mercury, the average duration of treatment was six months and twenty-four days, the average number of chancres being 432; two thirds of the number being, however, very small and transient. In the third category of cases, in which the constitutional disease was very inveterate, all of which had been subjected to mercurial treatment, some repeatedly, the average duration of treatment was seven months and twenty-four days, the average of chancres 570.

170. The increase in both of the last categories of cases in the number of chancres, and in the length of time required to complete the cure, is ascribed by Dr. BOECK to the previous administration of mercury. It is, however, probable, as he observes, that another circumstance may have retarded the cure, viz., that the syphilitic virus may have undergone a material change during the many years it had been resident in the system. The more inveterate, and especially the tuberculo-serpiginous forms, were found to be extremely rebellious to treatment, and some of them were not cured when immunity was reached. It was necessary then to have recourse to iodine, upon the exhibition of which all symptoms rapidly disappeared, though previous to syphilization both mercury and iodine had proved inefficacious.

171. Dr. BOECK suspects that in those very obstinate cases a union of the syphilitic with mercurial poison has taken place. In most instances this union seems to be dissolved by syphilization, and then iodine, which had before been ineffectual against the united poisons, acts readily on the mercury, and eradicates it from the system. During the two years elapsed from the publication of his first work, he had treated sixty-three cases by syphilization, and of these thirty-six had never taken mercury. In the twenty-seven cases, for which mercury had been given, he invariably found the cure more difficult, and in some cases impossible without the aid of iodine. Where

\* "I am much inclined to believe," says Dr. BOECK, "that this is really the case, but to prove it is not so easy; for, according to my views, this question cannot be determined by artificial inoculation. I have not considered myself justified in putting those healed by syphilization to the proof of inoculation after some time had elapsed since the cure, as I thought it possible that such inoculation might produce constitutional symptoms, as I

believe that syphilization *destroys* the syphilitic poison in the system. RACON's dogma, that an individual can only once in his life be affected with constitutional syphilis, may perhaps be erroneous, and the patient might then be in the position of a previously healthy person newly inoculated with syphilis. I have, therefore, always abstained from testing by inoculation those who had not previously been treated with mercury."—*Med. Chirurg. Review*, Apr., 1857, p. 321, Am. ed.]



mercury has not been employed, he is decidedly in favour of syphilization, for, as far as can be ascertained from the forty-two cases of this character thus treated, no relapse had occurred up to the present period. A great objection to syphilization is the length of time required for its complete performance. In the Christiana hospital, the average duration of the mercurial cure is three months and a half, while syphilization averages a full half year. If, however, the latter be not liable to relapse—at least in non-mercurialized cases—it is preferable, even if it required a much longer period. It is doubtful whether it is possible to syphilize, so as to cure permanently, by matter taken from one source alone; for Dr. Boeck met with cases where complete immunity existed to the matter taken from one source; but upon obtaining fresh virus from other persons, the inoculation succeeded perfectly again. However, he has been able, in some instances, to effect a complete and permanent cure with matter from one source alone.

172. I have given this account of syphilization, as it is hardly known in this country. It is manifest that it could not be rationally submitted to, but as a cure of the distemper, and not by a healthy person to prevent the infection of it. If, however, it be found to be by farther experience, not only a permanent cure, but also a permanent preventive, it will establish for itself a reputation not possessed by any other means; for none besides, however judiciously administered, has been found constantly and permanently curative—has proved a remedy under all circumstances, and for the future duration of life in all cases.

BIBLIOG. AND REFER.—*S. Brandt*, Eulogium de Scorra Pestilentiali sive Male de Franzos, &c., 4to. Argent., 1798.—*S. Pistor*, Positio de Morbo Franco, 4to. Lips., 1498.—*P. Beroaldus*, Comment. in Apulici Asinum Aureum, 1505.—*S. Aquilanus*, De Morbo Gallico. Lion., 1506.—*N. Leonicerus*, Liber de Epidemia, quam Itali Morbum Gallicum, Galli vero Neapolitanum vocant, fol. Papie, 1506.—*U. de Hutten*, Libellus de Guaiaci Medici et Morbo Gallico. Mogunt., 1519. (From this date, and for fifty years afterward, numerous works on the Treatment of Syphilis by guaiacum, *lignum sanctum*, were published. See *PROTOQUET*.)—*W. Benzoni*, Historia Novi Orbis, 1525.—*Poll*, Libellus de Cura Morbi Gallici per Lignum Guaiacum, 8vo. Venet., 1535.—*N. Michel*, De l'Administration du Saint Bois (Guaiacum) in Diversis Formis, &c., 12mo. Poict., 1540.—*D. de Ishu*, Tratado contra las Bubas, 1527.—*J. A. Bethencourt*, Nova Penitentialis Quadrage Sima nec non Purgatorium in Morbum Gallicum, &c., 8vo. Paris, 1527.—*P. Loue*, L'asie. Certain, and Perfect Methode to cure and prevent the Spanish Sickness, &c. Lond., 1596.—*Haller's* Bibl. Med. Pr., ii., p. 324.—*P. Monavius*, De Ligno Penicillato sive Sassafras, 1582.—*Anon.*, Morbi Gallici Curandi Ratio Exquissima a variis iisdemque Peritissimis Medicis Conscripta, 4to, 1536.—*P. A. Matthiolus*, De Morbi Gallici Curatione Dialogus. Venet., 1535.—*L. Frisius*, Epitome Opusculi de Curandis Pustulis, &c., Morbi Gallici, Mal de Franzos Appellati, 4to. Basil., 1532.—*Anon.*, Liber de Morbo Gallico, in quo Diversi Celeberrimi in Tali Materia Scribentes Medicinæ Continuatores Autores, 8vo. Venet., 1535.—*W. H. de Brækenen*, Mentagra sive Tractatus de Morbo Gallico Vulgo Mal Franzos, 12mo. Lugd., 1529.—*H. Fracastorius*, De Contagionibus, l. ii., c. 12; et Syphilis, Poema, 4to. Verone, 1530.—*N. Massa*, Liber de Morbo Gallico, in quo omnes Modi Possibiles Sanandi continentur, 8vo. Venet., 1532.—*J. Eichenmann*, Opusculum Præclarum de omni Pestilentia, et de Diuturna Peste Morbi Gallici, 8vo. Colon., 1537.—*M. A. Blondus*, De Origine Morbi Gallici, 8vo. Venet., 1542.—*F. Franco*, Libro del Enfermedades Contagiosas, &c., 4to. Seville, 1569.—*Anon.*, De Morbo Gallico omnia que exant apud Medicos ejusque Nationis, 2 tomes, fol. Venet., 1566.—*N. Macchelli*, Tractatus de Morbo Gallico, 8vo. Venet., 1555.—*P. Rostino*, Trattato di Mal Francese, 12mo. Venet., 1556.—*F. Retra*, De Peste, de Igne Pestilenti Gallico, &c., fol. Brixie, 1598.—*P. Borgarutius*, De Morbo Gallico Methodus, &c. Paris, 1563.—*G. Eaker*, The Nature and Properties of Quicksilver, 1575. (From this date mercury came in use.)—*A. Luisinus*,

Scriptores de Morbo Gallico omnes qui extant, fol. Venet., 1566.—*W. Clowes*, a Prieve and Necessary Treatise touching the Cure of the Disease called Morbus Gallicus, or Lues Venerea, &c., 4to. London, 1585.—*J. T. Menodius*, Tractatus de Virulentia Venerea, 4to. Venet., 1576.—*D. M. Arreus*, Methodo de conhacer e curar o Morbo Gallico. Lisbon, 1642.—*Anon.*, Animadversiones on the New-found Way of curing the Pox, 8vo. Lond., 1663.—*Riccius*, Observat. Cent., i., No. 78, 15 (*verd without mercury by the decoct. of woods*); cent. iv. (*de guaiacum and antimony*).—*E. Rudius*, De Morbo Gallico, lib. v., 4to. Venet., 1604.—*R. Bunworth*, New Discovery of the French Disease, 12mo. London, 1666.—*Cieza*, Istorie del Peru, pt. i., p. 110.—*T. Whittaker*, an Elencus of Opinions, &c., with 1 roboticall Questions on the French Pox, 8vo. Lond., 1671.—*G. Harveij*, of the Venereal Evil or French Disease, 12mo. Lond., 1672.—*E. Magnifying*, History and Mystery of the Venereal Lues, 8vo. London, 1675.—*D. Abercrombuis*, Tutæ ac Efficax Luis Venereæ Curandæ Methodus, 12mo. Lond., 1684.—*C. Thuillier*, Observations sur les Maladies Vénériennes, 8vo. Rouen, 1684.—*H. Fraeustorius*, Poetical History of the French Disease, translated by N. Tate, 8vo. Lond., 1686.—*C. Musitanus*, De Lue Venerea, lib. iv., 8vo. Neap., 1689.—*W. Wall*, a New System of the French Disease, &c., 8vo. Lond., 1696.—*N. Lofrel*, Nouv. Observat. sur les Mal. Vénériennes, 12mo. Paris, 1702.—*J. Marten*, True and Sincere Account of the Venereal Disease, 12mo. Lond., 1706.—*J. Deverax*, Traité de la Mal. Vénérienne et des Remèdes qui conviennent à sa Guérison, &c., 12mo. Paris, 1711.—*R. Boulton*, Physico-Chirurgical Treatises: the Lues Venerea, 8vo. London, 1714.—*J. Spinke*, London's Medical Informer, containing the Venereal Disease in its Cause, &c., 8vo. Lond., 1710; and the Venereal Patient's Refuge, &c., 8vo. Lond., 1717.—*J. Bonez*, Methode Nouvelle pour Guérir les Mal. Vénériennes, 12mo. Paris, 1722.—*G. Cockburn*, Virulentæ Gonorrhœe Symptomata, Natura, &c., 12mo. Lugd. Bat., 1716.—*J. Vercelemus*, De Ludendorum Morbis et Lue Venerea, 8vo. Lugd. Bat., 1722.—*J. Cam*, A Practical Treatise of the Venereal Diseases, 8vo. Lond., 1723.—*D. Turner*, Syphilis; a Practical Treatise on the Venereal Disease (3 parts), 8vo. London, 1724-39.—*W. Cockburn*, The Symptoms, Nature, Cause, and Cure of a Gonorrhœa, 8vo. London, 1728.—*A. Luisinus*, Aphrodisiacus, sive de Lue Venerea, continens omnia quæcumque de hac re sunt conscripta (edit. nov.), fol. 1. Pat., 1728.—*J. Cam*, a Practical Treatise, or Second Thought on the Venereal Disease, 8vo. Lond., 1729.—*P. Desault*, Dissertations de Médecine; sur les Maladies Vénériennes, &c., 12mo. Bord., 1733.—*N. de Janson*, Tableau des Maladies Vénériennes (2 vols.), 12mo. Amst., 1736.—*A. Robinson*, a New Treatise on the Venereal Disease, 8vo. Lond., 1736.—*D. Turner*, Aphrodisiacus; containing a Summary of the Ancient Writers on the Venereal Disease, extracted from Luisinus, 8vo. London, 1736.—*J. Armstrong*, a Synopsis of the History and Cure of the Venereal Disease, 8vo. Lond., 1747.—*J. Douglas*, a Dissertation on the Venereal Disease, 8vo. Lond., 1737.—*G. Key*, Remarks on the Observations of M. Gataker on Venereal Complaints. Lond., 1755.—*J. Higgs*, A Practical Essay on the Cure of Venereal, scorbutic, and other Disorders, 4to. Lond., 1755.—*J. Astruc*, De Morbis Venereis, lib. ix. (2 vols.), 4to. Paris, 1749.—*J. Astruc*, a Treatise on the Venereal Disease (transl.), 2 vols., 8vo. Lond., 1747.—*J. Proffitt*, an Easy and Exact Method of curing the Venereal Disease, 8vo. London, 1748.—*T. Chapman*, Essay on the Venereal Gleet, 8vo. London, 1751.—*T. Gataker*, Observations on Venereal Complaints, 8vo. Lond., 1754; also Essays on Medical Subjects, of the Use of Hemlock and Corrosive Sublimate in Vener. Dis., &c., 8vo. Lond., 1764.—*J. Nevill*, a Description of the Venereal Gonorrhœa, 8vo. Lond., 1754.—*S. Chapman*, a Treatise on the Venereal Disease, chiefly from Astruc (2 vols.), 12mo. Lond., 1755.—*T. Neale*, Practical Treatise on the Venereal Disease, &c., 8vo. London, 1756.—*M. Moony*, a Dissertation on the Nature and Cure of the Venereal Disease, 8vo. Lond., 1756.—*P. Fabre*, Traité des Maladies Vénériennes, 8vo. Paris, 1758.—*M. Locher*, Observations Praticque circa Luen Veneream, &c., 8vo. Vienne, 1762.—*Lallat*, Traité sommaire des Mal. Vénériennes, 8vo. Paris, 1762.—*G.*, 1. Exposition of a Method for preventing the Communication of the Venereal Distemper, 12mo. Lond., 1760.—*J. Becket*, New Essay on the Venereal Disease, 8vo. London, 1765.—*J. Wathen*, Practical Observations concerning the Cure of the Venereal Disease, 8vo. Lond., 1765.—*J. J. Plenk*, a New and Easy Method of giving Mercury in the Venereal Disease (transl.), 8vo. Lond., 1767.—*M. Berdoe*, an Essay on the Pudendagra, 8vo. Bath, 1771.—*A. Duncan*, Observations on the Operation of Mercury in the Cure of the Venereal Disease, 8vo. Edin., 1773.—*W. Fordyce*, a Review of the Venereal Disease and its Remedies, 8vo. Lond., 1772.—*C. Gardane*, Recherches Pratiques sur les Différentes Manières de Traiter les Mal. Vénér. Paris,

1770; et Manière sure et Facile de Traiter les Mal. Vénér. Paris, 1773.—*C. Hales*, a Letter containing Thoughts and Observations on the Cure of the Venereal Disease, Svo. Lond., 1770; also, Salivation not necessary for the Cure of the Venereal Disease, 10th edit., Svo. Lond., 1772.—*Bourry*, Des Moyens les plus Propres à éteindre les Maladies Vénériennes, &c., Svo. Paris, 1771.—*W. Roulet*, the New Method of curing the Venereal Disease, Svo. London, 1773.—*J. Gautier*, Exposition Anatomique des Maux Vénériens sur les Parties sexuelles, &c., fol. Par., 1773.—*J. J. Gardane*, Recherches Pratiques sur les Mal. Vénériennes. Paris, 1774.—*H. D. Falk*, Treatise on the Venereal Disease, Svo. Lond., 1774.—*Dazill*, Observations sur les Maladies des Nègres, &c. Paris, 1776.—*H. Vennet*, Verhandlung over Venusmet, Svo. Rotterdam, 1774.—*J. Andrieu*, an Essay on the Venereal Gonorrhoea, Svo. Lond., 1777.—*P. Lalouette*, a New Method of curing the Venereal Disease by Fumigation, Svo. London, 1777.—*J. Andrieu*, Observations on the Theory and Cure of the Venereal Disease, Svo. Lond., 1779.—*H. Westall*, Observations on a New Mercurial Preparation for the Cure of the Venereal Disease, Svo. London, 1779.—*P. Char.*, a New Method of curing Lues Venerea (3d edit.), 12mo. London, 1780.—*Doublet*, Mémoire sur les Symptômes et le Traitement de la Maladie Vénérienne dans les Enfants Nouveaux-nés, &c., Svo. Par., 1781.—*Russel*, in Med. Observat. and Inquiries, &c., vol. iii., p. 189. (*Diphth. Mesereum*).—*J. Clubbe*, an Inquiry into the Nature of the Venereal Poison, Svo. Lond., 1782.—*G. Renou*, a Treatise on the Venereal Disease, Svo. London, 1782.—*D. Cirillo*, Osservazioni Pratiche intorno alla Lue Venerea, Svo. Nap., 1783.—*D. James*, a Treatise on the Venereal Disease, &c., Svo. London, 1783.—*M. Stoll*, Practicoes, p. 151. (*Mezerion Bark*).—*W. Dease*, Observations on the different Methods of treating the Venereal Disease, Svo. Dubl., 1783.—*P. G. Hensler*, Geschichte der Lusteuche, Svo. Alt., 1783.—*F. Suediaur*, Practical Observations on the more Obstinate Venereal Complaints, Svo. Lond., 1784.—*Perry*, Dissert. on the Lues Venerea, Gonorrhoea, and Tabes Dorsalis, Svo., 1786.—*S. F. Simmons*, Observat. on the Cure of Gonorrhoea, and some other Effects of the Venereal Virus, Svo. Lond., 1785.—*Avon*, La America vindicada de la Columna de haber sido Madre del Mal Venereo, 4to. Madr., 1785.—*J. Clubbe*, Inquiry into the Nature of the Venereal Poison, and the Remedies to prevent its Effects, &c., Svo. Lond., 1782; also, an Essay on the Virulent Gonorrhoea, Svo. Lond., 1786.—*J. Hunter*, a Treatise on the Venereal Disease, 4to. London, 1786.—*J. Foot*, Observations on Hunter's Opinions in his Treatise on the Venereal Disease, Svo. London, 1786.—*W. Turnbull*, an Inquiry into the Origin and Antiquity of Lues Venerea, Svo. Lond., 1786.—*S. Brand*, Strictures in Vindication of the Doctrines misrepresented by Foote, &c., 4to. London, 1787.—*Donovan*, a few Remarks on the Treatment of Venereal and Scorbute Diseases, Svo. Lond., 1788.—*J. F. Carver*, Recherches sur les Maladies Vénériennes Chroniques, Svo. Paris, 1788.—*C. Girtanner*, Abhandlung über die Venerischen Krankheiten, Svo. Gott., 1788.—*J. Peake*, Candid Review of Foote's Observations, &c. London, 1788.—*J. Smith*, Treatise on the Nature, Symptoms, and Cure of the Venereal Disease. London, 1788.—*J. G. Kühn*, Curart der Venerischen Krankheiten, Svo. Bresl., 1788.—*P. Perenotti*, Storia Generale e Ragionata dell' Origine, &c., dell' Infezione Venerea, 12mo. Torino, 1788.—*C. G. Gruner*, Aphrodisiacus, sive de Lue Venerea (Omissa a Lusino), fol. Jen., 1789.—*J. F. Frize*, Handbuch über die Venerische Krankheit, Svo. Berl., 1790.—*D. Cirillo*, Practische Bemerk. über die Venerischen Krankheiten, Svo. Leipz., 1790.—*A. V. Berlinghier*, Handbuch der Venerischen Krankheiten, &c., Svo. Leipz., 1801.—*A. Bertrandi*, Abhandlung von den Venerischen Krankheiten. Nürnberg, 1790.—*W. Houlston*, Sketches of Facts and Opinions respecting the Venereal Disease, Svo. Lond., 1792.—*B. Bell*, a Treatise on Gonorrhoea and Lues Venerea (2 vols.), Svo. Edin., 1793.—*G. Lassi*, Esposizione delle Malattie Veneriche e della Medicazione di Ossi, Svo. Milano, 1793.—*C. G. Gruner*, De Morbo Gallico Scriptores Medici et Historici, &c., Svo. Jen., 1793.—*G. B. Monteggia*, Annotazioni Pratiche sopra i Mali Venerei, Svo. Milano, 1793.—*S. N. H. Linguet*, Histoire Politique et Philosophique du Mal de Naples, Svo. Paris, 1796.—*M. Bree*, Observat. on the Cure of the Vener. Disease, Svo. Lond., 1796.—*F. Suediaur*, Traité Complet sur les Symptômes, &c., des Maladies Syphilitiques, Svo. Paris, 1795; 4th edit. Paris, 1801.—*W. Blair*, Critical Remarks on the Venereal Disease, Lond., 1793.—*C. P. Clossius*, Ueber die Lusteuche, Svo. Halb., 1797.—*S. Howard*, Pract. Observat. on the Nature, History, and Cure of the Venereal Disease, 3 vols. Svo. Lond., 1797; 2d edit., Svo. 2 vols. Lond., 1806.—*T. Beddoes*, Testimonies respecting the Treatment of the Venereal Disease by Nitrous Acid, Svo. London, 1799.—*W. Butler*, a Treatise on the Venereal Rose, Svo. London, 1799.—*H. Clutterbuck*, Remarks on Hunter's Opinions

respecting the Venereal Disease, Svo. Lond., 1799.—*C. Platt*, Inquiry into the Efficacy of Oxygen in the Cure of Syphilis, Svo. Lond., 1802.—*G. Rees*, a Treatise on the Primary Symptoms of the Lues Venerea, Svo. London, 1802.—*E. Geoghegan*, Pract. Observ. on the Nature and Treatment of Exasperated Symptoms of the Venereal Disease, Svo. Lond., 1807.—*J. Pearson*, Observations on the Effects of various Articles of the Materia Medica in the Cure of Lues Venerea, Svo. Lond., 1800; 2d edition, 1807.—*S. Saurer*, Inquiry into some of the Effects of the Venereal Poison on the Human Body, &c., Svo. Lond., 1803.—*W. Buchan*, Observations on the Prevention and Cure of the Venereal Disease, Svo. London, 1803.—*J. Schmidt*, Prolegomena zur Syphilidoklinik, Svo. Wien., 1804.—*G. T. Tidesius*, Tableaux de la Maladie Vénérienne, d'après Nature, 4to. Leipz., 1804.—*P. A. O. Mahon*, Histoire de la Médecine Clinique, et Recherches sur la Maladie Syphilitique dans les Femmes Encueites, les Enfants Nouveaux-nés, &c. Par., 1804.—*L. V. Lagneau*, Exposé des Diverses Méthodes de traiter la Mal. Vénérienne. Paris, 1803.—*Guy Lassac*, Recherches sur les Maladies Vénériennes, Primitives, &c., Svo. Paris, 1813.—*F. H. Martens*, Handbuch zur Kenntniss und Kur der Venerischen Krankheiten, Svo. Leipz., 1805.—*J. Adams*, Observat. on Morbid Poisons, Syphilis, &c., 4to. Lond., 1807.—*J. Capuron*, Aphrodisiographie, ou Tableau de la Maladie Vénérienne, Svo. Paris, 1807.—*P. G. Vassal*, Mémoire sur la Transmission de Virus Vénérien de la Mère à l'Enfant, Svo. Paris, 1807.—*W. Blair*, Essay on the Venereal Disease and its Treatment, Svo. London, 1808.—*R. J. P. H. Bertin*, Traité des Maladies Vénériennes chez les Enfants Nouveaux-nés, les Femmes Encueites, et les Nourrices, &c., Svo. Paris, 1810.—*J. F. Hernandez*, Essai sur la Non-identité des Virus Gonorrhoeique et Syphilitique, Svo. Toulon, 1812.—*L. V. Lagneau*, l'exposé des Symptômes de la Maladie Vénérienne, &c., Svo. Paris, 1812.—*J. Frank*, Acta Instit. Clin., Vln. i., p. 25 (*sine coitu*).—*Brera*, Giarnale da Medicin., vol. i., No. 4. (*Preparation of Gold for*).—*Duportal*, in Journal Génér. de Méd. Mars, 1811, p. 287. (*Preparation of Gold in*).—*P. Petit-Radel*, Cours des Maladies Syphilitiques (2 vols.), Svo. Par., 1812.—*R. Carmichael*, Essay on the Venereal Diseases enfolded with Syphilis, 4to. Lond., 1814.—*E. Geoghegan*, Commentaries on the Treatment of the Venereal Disease, Svo. London, 1814.—*F. Kiernan*, a Practical Treatise on the Nature and Treatment of the Venereal Disease, Svo. London, 1815.—*L. C. W. Wendt*, Die Lusteuche in allen ihren Richtungen und in allen ihren Gestalten, Svo. Bresl., 1816.—*J. E. Arousson*, Vollständige Abhandlung aller Venerischen Krankheiten, Svo. Berl., 1818.—*J. Evans*, Pathological and Practical Observations on Ulcerations of the Genital Organs, Svo. Lond., 1818.—*R. Carmichael*, Observations on the Symptoms and Distinctions of Venereal Diseases, Svo. Lond., 1818.—*Lassone y Horne*, Instruccion Breve sobre el Conocimiento y Curacion de Todas las Enfermedades Venereas, Svo. Madr., 1819.—*G. Petazzi*, Osservazioni Pratiche sopra le Malattie Veneree, Svo. Milan, 1819.—*N. Barbantini*, Notizie Istoriche concernenti il Contagio Venereo, Svo. Lucca, 1820.—*J. Bacot*, Observations on Syphilis, Svo. Lond., 1821.—*Bacot, Thompson, and others*, in Medico-Chirurg. Review, t. ii., p. 593.—*E. Lantbois*, Nouvelle Théori Raisonée sur les Maladies Vénériennes, Svo. Paris, 1822.—*D. Thiene*, Lettere sulla storia de' Mali Venerei, Svo. Venez., 1823.—*J. Boyle*, a Treatise on Syphilis, Svo. Lond., 1824.—*R. Welbank*, Practical Commentaries on the present Knowledge and Treatment of Syphilis, Svo. Lond., 1825.—*A. J. L. Jourdan*, Traité Complet des Maladies Vénériennes (2 vols.), Svo. Paris, 1826.—*B. Travers*, Observations on the Pathology of Venereal Affections, Svo. Lond., 1830.—*W. Lawrence*, a Treatise on the Venereal Diseases of the Eye, Svo. Lond., 1830.—*Fricke*, in Journ. de Progrès des Sciences Médicales, t. v., p. 265. (*On the non-mercurial Treatment of*).—*Desruelles*, in Ib., t. viii., p. 94; et in Archives Génér. de Méd., t. xx., p. 441. (*Non-mercurial Treatment of*).—*Cuillerier*, in Ibid., t. xii., p. 496.—*Harris*, in Ibid., t. xii., p. 442 (*sine mercurio*).—*Dzondi*, Method of, in Ibid., t. xvi., p. 281.—*Lameau*, in Ibid., t. xvii., p. 159.—*Wilson*, in Trans. of Med. and Chirurg. Society of Edinburgh, vol. iii., p. 53.—*Thiène, Huber, Wansuch, Bacot, and Tilley*, on Vener. Dis. Rev. in Edin. Med. and Surg. Journal, No. ciii., p. 165.—*Ferguson*, in Trans. of Med. and Chirurg. Society of London, vol. iv., p. 1.—*Rose*, in Ibid., vol. viii., p. 349 (*sine mercurio*).—*Guthrie*, in Ibid., vol. viii., p. 550.—*Welbank*, in Ib., vol. xiii., p. 563.—*W. Wallace*, Lectures on Syphilis in Lancet, No. 664, and previous numbers.—*Lawrence*, in Med. Gaz., June 18, 1838.—*W. Wallace*, a Treatise on the Ven. Disease and its Varieties, &c., Svo. Lond., 1833.—*H. M. J. Desruelles*, Traité Pratique des Maladies Vénériennes, comprenant l'Examen des Théories et des Méthodes de Traitement qui ont été adoptées dans ces Maladies, et principalement la Méthode Thérapeutique employée à l'Hôpital Militaire d'Instruction du



- Val de Grace. Paris, Svo, 1836. — *A. Colles*, Practical Observations on the Venereal Disease, and on the Use of Mercury, Svo. Lond., 1837. — Procès-verbaux des Séances tenues par les Médecins de Nantes, dans la Grande Salle de l'Hôtel de Ville, pour discuter la Valeur des Doctrines Nouvelles, relativement à la Nature et au Traitement de la Syphilis, Svo. Nantes, 1835. — *F. Oesterlen*, Historisch-Kritische Darstellung des Streits über die Einheit oder Mehrheit der Venereischen Contagien, Svo. Stuttgart, 1836. — *H. Mayo*, a Treat. on Syphilis, Svo. Lond., 1847. — *P. Ricord*, Traité Pratique des Maladies Vénériennes, Svo. Paris, 1833. — Traité Complet des Maladies Vénériennes Clinique Iconographique de l'Hôpital des Vénériens, 4to, plates. Par., 1851. — Lettres sur la Syphilis; avec une Introduction par *Amédée Latour*, Svo. Paris, 1851. — *G. L. Dieterich*, Die Mercurialkrankheit in allen ihren Formen, gesichtlich, pathologisch, diagnostisch und therapeutisch dargestellt, Svo. Leipzig, 1837. — *F. W. Oppenheim*, Die Behandlung der Lusteuche ohne Quecksilber oder die nicht Merkuriiellen Mittel und Methoden zur Heilung der Lusteuche, Svo. Hamburg, 1827. — *P. Boyer*, Traité Pratique de la Syphilis, Svo. Paris, 1836. — *W. H. Judd*, a Practical Treatise on Urethritis and Syphilis, Svo. Lond., 1836, pl. — *J. Hunter*, a Treatise on the Venereal Disease, with Notes by *G. G. Babington*. — The Works of *John Hunter*, edited by *Per. Palmer*. London, 1835. — *Anon.*, on the Nature and Treatment of Syphilis. See British and Foreign Medical Review, vol. v., p. 3 (*on able Article*). — *L. Parker*, The Modern Treatment of Syphilitic Diseases, both Primary and Secondary, 3d edit., Svo. Lond., 1854; also, Treatment of Secondary, Constitutional, and Confirmed Syphilis, &c., Svo. Lond., 1850. — *W. Acton*, a Practical Treatise on the Diseases of the Urinary and Generative Organs in both Sexes, p. 1; Non-specific Diseases, p. 2; Syphilis, Svo. Lond., 2d ed., 1851. — *R. Cruikshank*, The Surgeons' Vade Mecum, a Manual of Modern Surgery, 7th edition, Svo. Lond., 1856, p. 166, *et seq.* — *H. Lee*, Pathological and Surgical Observations, &c.; Lectures delivered at the Lock Hospital on Syphilis, &c., Svo. Lond., 1854, p. 151, *et seq.*; and in British and Foreign Medical-Chirurgical Review, No. xxxvi., p. 497; and in Transact. of Medical-Chirurgical Society of London, vol. xxxix., p. 339. — *H. Coote*, a Report upon some of the more important Points connected with the Treatment of Syphilis, Svo. Lond., 1857.
- ii. YAWS, SIBBENS, PIAN (FRAMBESIA), AND OTHER VARIETIES OF SYPHILIS. — *Piso*, De Medicina Brasiliensis, l. ii., ch. 1643, fol. 1343. — *Labat*, Nouveau Voyage en Amérique, vi. tomes, 1722. — *J. B. Duvillé*, Observat. sur les Maladies des Nègres, 2 vols. Svo. Paris, 1742 and 1776. — *W. Hillary*, Observat. on the Changes of the Air and Epidemical Diseases in the Island of Barbadoes, Svo. Lond., 2d edition, 1761, p. 339. (*Yaws*, &c.) — *Bajou*, Mémoire pour servir à l'Histoire de Cayenne et de la Guiane, Svo. Paris, 1778. (*Pian*). — *B. Pénit*, Précis Th. orique et Pratique sur le Pian et la Maladie d'Amboine, Svo. Paris, 1758. — *Arthaud*, Traité de l'ians au Cap François, 4to, 1776. — *B. A. Gomez*, Mem. de l'Académie Roy. des Sciences de Lisbonne, t. vi., p. 1. — *G. Grainger*, Essay on West India Diseases, Svo. Lond., 1764, p. 55. — *J. Hume*, a Description of the African Distemper called the Yaws, &c., Med. Observ. and Essays by a Society in Edinburgh, vol. v., part ii., p. 57. — *Bancroft*, an Essay on the Natural History of Guiana, Svo. Lond., 1769. — *T. Winterbottom*, an Account of the Native Africans in the neighborhood of Sierra Leone, to which is added an Account of the present State of Medicine among them, 2 vols., 1803, vol. ii., p. 139. (*Of the Yaws*). — *Chopité*, Aperçu sur le Pian et sur les Maladies dont il est suivi, 4to. Paris, 1804. — *G. G. Schilling*, Diatribe de Morbo quem Yaws dicunt, Svo. Ultraj., 1770. — *T. Jordan*, Brunno-Gallicus, Seu Luis novæ in Moraviâ exortæ Descriptio, Svo. Francf., 1577. (*An outbreak of Syphilis allied in Character to that of 1493*). — *Schenck*, Observ. Med. Rarior. Lib. de Brunno-Gallico, p. 792. — *J. Bontius*, Medicina Indorum, 4to. Lugd. Bat., 1718. (*Description of the Amboyna Pox, a Form of Syphilis differing in no respect from that which was epidemic in Scherlievo and adjoining districts, § 96-98*). — *J. Gilchrist*, an Account of an infectious Distemper prevailing in many Places (*Sibbens*), in Essays and Observations, l. i. hysic. and Literary, by a Society in Edinburgh, vol. iii., p. 154. — *J. Adams*, Observat. on Morbid Poisons, 4to. Lond., 1807, p. 176. (*Sibbens*). — *Hensler*, *J. P. Frank*, and others, in Journal de Médecine et de Chirurgie, t. xlii., p. 1. (*Description of Syphilis de Pume*). — *J. Hill*, Cases in Surgery, including an Account of the Disease called Sibbens, 12mo. Edin., 1772. — *P. M. Maé*, Dissert. sur le Yaws, Pian, ou Frambesia, 4to. Paris, 1804. — *Alibert*, Dict. des Sciences Méd., t. xvi., art. *Frambesia*. — *H. H. Ecker*, an Account of the pseudo-Syphilitic disease Radesyge, prevalent in some parts of Sweden and Norway, in Edin. Med. and Surgical Journal, vol. v., p. 420. — *T. Bateman*, in Trans. of Med. Chirurg. Society of London, vol. v., p. 225. — *J. Frank*, Reise nach Paris, London, &c., 2 Th., Svo. Wiesc, 1805, et Prax. Med. Univ., &c., t. iii., cap. 37. (*Radesyge*), et Ibid., cap. 36. (*Yaws*). — *Percy* and *Laurent*, Dict. des Sciences Médicales, art. *Mal de Pume*. — *Boité*, Essai sur la Maladie de Scherlievo (de Pume), 4to. Paris, 1814. — *J. Thomson*, Observations and Experiments on the Nature of the Morbid Poison called Yaws, Edinb. Medical and Surgical Journal, vol. xv., p. 321, and vol. xviii., p. 31. — *Cullerier*, Dict. des Sciences Médicales, t. 4, viii., art. *Yaws*. — *J. Maxwell*, Observations on Yaws, &c., Svo. Edinb., 1830. — *Laquean*, Dict. de Méd., t. xvi., art. *Pian*. — *W. Kerr*, Cyclop. of Pract. Med., vol. iv., p. 563. — *R. Thomas*, Practice of l. hysic. &c., Svo, p. 645. — *A. de Moulon*, Nouv. Observat. sur la Nature et le Traitement du Scherlievo, Svo. Milan, 1834. — *Marcolini*, Memorie Medico-Chirurgiche. Milano, 1820, p. 13. — *Flandand*, Journal Complem. du Dict. des Sci. Méd., t. v., p. 134. — *P. Rayer*, Theoretical and Practical Treatise on l. diseases of the Skin, Eng. Ed., Svo. Lond., 1835, p. 1147. (*Symph. of Day of St. Paul's*).
- iii. SYPHILIZATION. — *Diday*, in Gazette Médicale de Paris, July 10th, 1852. (*Syphilization*). — *V. de Merie*, in Lancet, July, 1853, p. 233. — *C. B. Radcliffe*, in Half-yearly Abstract of the Medical Sciences, &c., vol. xvi., p. 333. — *W. Doeck*, Syphilizationen, Svo. Christiana, 1854. — Also, Die Syphilization bei Kindern, Svo. Christiana, 1856. — *Anon.*, in British and Foreign Medical-Chirurgical Review, &c., No. xxxviii., April, 1857, page 410. The writer of this review has observed this practice in the hospitals in Christiana and Bergen.
- [AMER. BIBLIOG. AND REFER. — *John W. Francis*, an Inaugural Dissertation on Mercury, embracing its Medical History, Curative Action, and Abuse in certain Diseases. N. York, 1811; also, an Essay on the same subject in Amer. Med. and Phil. Register for April, 1813, and April, 1814. In this Essay Dr. F. condemns the practice of giving large quantities of mercury for the cure of syphilis, and especially the practice of inducing salivation at that time generally supposed necessary for the cure of the disease, and advocates the use of small doses of *corrosive sublimate* in connexion with the free employment of a decoction of guaiac and sarsaparilla, drunk warm. The advantages which he claims for this mercurial preparation over all others are that, if judiciously administered, it is particularly mild and safe in its operation, will admit of a more extensive use in all the various forms of the disease, and subject the patient to fewer inconveniences; that it readily enters the circulation, and soonest arrests the progress of the complaint by eliminating the morbid matter from the system; that it supercedes the necessity of salivation by its action on all the secretions, and especially those of the skin and kidneys; that it is the only preparation to be depended on in those peculiar habits of body so susceptible to salivation by every other form of mercury now in use; and, lastly, that in its ultimate effects on the constitution it is attended comparatively with no injury. Dr. F. recommends it to be given in doses of one eighth of a grain twice a day la pill, after the following formula: R *Oxymercurii, Hydragr. Murat. Ammon.*, aa, gr. xv.; *Aque destillat.*, jss.; *Panis q. s.*, ft. pil. exx. To children he recommends it to be given in a state of solution, two grains to one ounce of brandy, of which three or four drops may be given in sweetened water to a child of one year, and repeated three times a day; and to a child of two or three years old, six or eight drops three times a day, increasing the dose after two or three days to ten or twelve drops. This mode of treating syphilitic affections was introduced into the New York Hospital in 1811, and about the same time into the New York Alms-house and City Dispensary, and, according to Dr. Francis, with marked success compared with former modes of treatment. He advises that the medicine should be continued two or three weeks after the disappearance of the disease, in order more effectually to accomplish a radical cure. The decoction of guaiac and sarsaparilla are to be prepared by boiling an ounce of each in three pints of water to two pints, of which the whole is to be drunk warm in the course of twenty-four hours. See also in this connection McEwen's Account of the Robt. La Fayette, in New York Medical and Phil. Journal, vol. iii., p. 28. — *S. A. Cartwright*, Essay on Syphilis, Am. Med. Recorder, vol. viii. — *D. M. Reese*, An edition of Cooper's Surgical Dictionary. N. York, 1832. — *John Le Conte*, an Essay on the Origin of Syphilis, in New York Journal of Med. and the Collateral Sciences, vol. xi., p. 63. — *Wm. H. Prescott*, on the American Origin of Syphilis, in Ibid., vol. ii., p. 150; also, "History of Ferdinand and Isabella," vol. ii., p. 504; also, "History of the Conquest of Mexico." — *Washington Irving*, History of "Columbus"; also, New York Journal of Med., vol. ii., p. 153. — *Humboldt*, Nouvelle Espagne, tom. i., p. 333; and iv., p. 162, 2d ed. — *Samuel Forry*, New York Journ. of Med., &c., vol. ii., p. 180, on the Origin of Syphilis. — *A. J. L. Jourdan*, Historical and Critical Observations on Syphilis, translated from the French, by *R. La Roche*,

M.D. Phila., 1823. (Dr. J. proves beyond a doubt that the venereal disease was not derived from America.)—*N. H. Chesbrough*, Summary of Observations on Syphilis in Infants, New York Journal of Med. and Collateral Sciences, vol. i., N.S., p. 184.—*George McClellan*, Princ. and Pract. of Surg., edited by his son, J. H. B. McClellan, Phila., 1848.—*John Watson*, Observations on some of the more obscure and remote effects of syphilis, in New York Journal of Med. for July, 1843, and November, 1845, vols. i. and v.; also, U. S. Med. and Surg. Journal, 1835.—*Henry M. Gray*, Review of Meord's "Practical Treatise on Venereal Diseases, or Critical and Experimental Researches on Inoculation applied to the study of these Affections," &c., in *Ibid.*, vol. x., p. 78.—*A. Sidney Doane*, Am. edition of "The Study of Medicine," by John Mason Good, 2 vols., N. York, 1835.—*John Thompson*, on the Treatment of Syphilis without Mercury, Am. Med. Recorder, vol. I., p. 405.—*J. C. Rousseau*, Sketches on Venereal Complaints, Am. Medical Recorder, vol. iii., p. 171, and Philadelphia Medical Museum.—*G. Buck*, Select Hospital Reports, "Venereal Diseases and their Sequelæ," in New York Journ. of Med., vol. iii., p. 360.—*H. D. Bulkley*, on Syphilis in Infants, in N. York Quar. Journal of Med. and Surgery, vol. iii., p. 239. A most elaborate and able essay on the subject of Infantile Syphilis, illustrated by the history of 35 cases of the disease; also, Am. edition of *Cazenave and Schedel* on the skin. New York, 1848.—*M. Devergie*, on the simple Antiphlogistic Method of treating Syphilis. See Amer. Journal of Medical Science, vol. xviii., N.S., p. 498, and vol. xix., p. 230.—*F. W. Oppenheim*, on the Treatment of the Venereal Disease without Mercury, or an Account of the Non-mercurial Remedies recommended for its Cure, &c., in *Ibid.*, vol. xix., p. 454.—*Gouverneur Emerson*, Review of Pract. Researches relative to the Treatment of Syphilis; a Work founded upon Observations collected in the Service and under the Eye of *M. Cullerier*, chief surgeon of the Hôpital des Vénériens, by *Lucas Champoignière*, in *Ibid.*, vol. xxi., N.S., p. 155; also, of *Colles's* Practical Observations on the Venereal Disease and on the Use of Mercury, in *Ibid.*, vol. xx., p. 47.—Analysis and Translation of *J. Burlet* on Syphilitic Diseases, in Amer. Medical Recorder, vol. ii., p. 555.—*Thomas Hewson*, on Venereal Ophthalmia, in *Ibid.*, vol. viii., p. 356; on Syphilitic Ulcers, in *Ibid.*, p. 647.—*J. R. Lucas*, on Syphilis, in a Letter to Dr. Eberle, in *Ibid.*, vol. v., p. 764.—*Thomas Harris*, on the Mercurial Treatment of Syphilis, in *Ibid.*, vol. ix., p. 376.—*O. R. Bachelor*, Mercury as employed by Hindoo Physicians, in Boston Med. and Surgical Journal, vol. xxxi., p. 318.—*Charles H. Stedman*, Report of Cases in the United States Marine Hospital, Chelsea ("Primary Syphilis," says Dr. S., "has for the last six years been treated on the antiphlogistic plan; with a very few exceptions, mercury has seldom been made use of, and the cure has been easily effected in all cases where the patient has submitted to the necessary restrictions in diet and regimen"), *Ibid.*, vol. xv., p. 245.—*Prof. Sigmund*, on the Duration of the Incubation of Syphilis, in Brit. and For. Medico-Chirurg. Review, No. xxxvii., January, 1857, Am. edition, p. 205; also, on the Cure and Relapse of Syphilis, *Ibid.*, January, 1853, p. 201.—Notice of *H. Labat's* Observations on Venereal Diseases, *Ibid.*, July, 1853, p. 138, American edition.—*Thomas Harris*, on the Mercurial Treatment of Syphilis, in North Amer. Med. and Surg. Journal, Nov., 1825. (Dr. Harris states that he had not used mercury in the treatment of any forms of this disease for the last six years, during which time he attended 164 cases of venereal. He treated it by bleeding and purging, the warm bath once a week, and the "decoction of the woods." Secondary symptoms rarely appeared; in two cases of the latter, nitric acid and the above decoction were entirely successful. Twenty-three other secondary cases, which had been treated with mercury by other practitioners, were effectually cured without it. The local treatment consisted in poultices and cooling lotions, if there was much inflammation; afterward the black wash, a strong solution of blue vitriol and the nitrate of silver, where a stronger caustic was indicated.)—*John Bell*, a Treatise on Baths; including Cold, Sea, Warm, Hot, Vapour, Gas, and Mud Baths, &c., 12mo, p. 653. Phil., 1850. (Dr. Bell gives a very favourable account of the influence of the Vapour Bath in Syphilitic Eruptions and Ulcers, also of sulphurous fumigations; he also gives a history of mercurial fumigations, and baths of corrosive sublimate for the cure of venereal affections, which the reader may consult with advantage.)—See also "Lectures on the Theory and Practice of Physic, by John Bell and William Stokes," 2 vols., N. York, 1845. (Dr. Bell advocates the non-mercurial treatment, and says, p. 567, "I can speak confidently, after positive experience, of the success attending the use of iodine in tincture, and of the *iodide of potassium*, with the compound sirup and decoction of sarsaparilla in cases of venereal disease, both of the tonsils, and mouth, and tubercular ulcerations, after mercury had been prescribed by

those who preceded me in vain.")—*Grover Coe*, "Concentrated Organic Medicines; being a Practical Exposition of the Therapeutic Properties and Clinical Employment of the combined proximate medicinal Constituents of Indigenous and Foreign Plants," &c., 8vo, p. 431. N. Y., 1853. Of the indigenous plants recommended for the cure of syphilitic affections, the most important are: *Smilacin*, the active, neutral principle of the *Smilax officinalis*, in doses of two grains three times a day; the concentrated Tincture of *Smilax sarsaparilla*, in doses of fifteen drops; *Menisperm*, derived from the *Menispermum Canadense*, in doses of from two to five grains, three times a day, especially for the train of symptoms termed *Mercurio-syphilitic*; *Xanthoxyl*, derived from *Xanthoxylum fraxinum*, in doses of from two to four grains, including the Oil and concentrated Tincture of *Xanthoxylum*, in doses of from two to five drops each; *Hydrastin*, from *Hydrastis Canadensis*, in gleet and gonorrhœa in doses of one or two grains three times a day; *Irisin*, from *Iris versicolor*; *Corydatin*, from *Corydalis formosa*; *Stillingin*, from *Stillingia sylvatica*; *Phytolacin*, from *Phytolacca decandra*; *Rumin*, from *Rumex crispus*; *Alwin*, from *Alnus rubra*, Swamp Alder; *Podophyllin*, from *Podophyllum peltatum*, May-apple; *Chimaphillin*, from *Chimaphilla umbellata*; *Ampelopsin*, from *Ampelopsis quinquefolia*; *Macrotin*, from *Macrotis racemosa*. The actual value of the above remedies, in the various forms of syphilis, is to be determined by farther observations and more extended experience. There is good reason, however, to believe that among them will be found some of the most valuable alternatives in the Materia Medica, and good substitutes for the foreign sarsaparilla, guaiac, mezereum, &c.]

VERTIGO.—*SYN.*—*Vertigo* (from *verto*, I turn round); περιστροφή, σκότωμα. *Vertige*, Fr.; der Schwindel, Germ. *Giddiness*, *dizziness*, *swimming in the head*.

CLASSIF.—IV. CLASS, III. ORDER (*Author*).

1. DEFIN.—*A transitory erroneous perception, or a sense of general whirling or turning round, with difficulty of standing, or a feeling of impending sinking or falling.*

2. *Vertigo* has been noticed by HIPPOCRATES, GALEN, ARETÆUS, and other ancient writers; and by these, as well as by modern writers, it has been viewed chiefly as a symptom of many diseases, and in some, but in much rarer cases, as the chief or only apparent disorder. That it is as much a primary affection, on some occasions, as headache, or several other disorders, may be admitted, although it may be shown, if the pathogeny of the affection be duly considered, that it is commonly owing to previous disorder of the organic nervous influence endowing the brain, or to the state of the capillary circulation in this organ, or not improbably to both in various degrees. In the great majority of cases, however, it is merely a symptom, either of a very early, or of a more or less advanced stage of some malady, very often of some disease which has not fully declared itself, or which still remains latent or imperfectly developed, or of extreme debility, or of protracted indigestion, &c.

3. I. DESCRIPTION.—*Vertigo* occurs as an illusion, or a transitory erroneous perception of objects, although quiescent, in a state of more or less rapid motion, usually in that of gyration or whirling round; but also not unfrequently with either a descending or ascending movement, or with a sense of sinking. In the more extreme cases, or when caused by ebriety, these sensations are often present in a greater or less degree, although the eyes at the time are quite shut. In some instances the objects which thus appear in motion are also changed in colour—are either variegated or obscured. *Vertigo* may be experienced only when assuming the erect posture, as in cases of fever, extreme debility, &c.; but it may also be felt while recumbent in bed, objects presenting not only a rotatory, but also an ascend-



ing motion, with a feeling of sinking, and sometimes also with noises in the ears. In this latter form it should be viewed as a most serious symptom, especially when occurring in malignant or pestilential maladies, or when these are prevalent, or in the course of organic disease of the brain. In many instances, vertigo precedes, or is followed by, severe paroxysms of retchings or of vomitings. This sequence is commonly observed in pestilential cholera, in sea-sickness, in fits of drunkenness, after ingestion of the sedative or depressing and irritating poisons, and especially after the improper or inordinate use of tobacco. In all cases of vertigo, walking or even standing is difficult or impossible; and, from a dread of falling, objects are laid hold of for support. Vertigo may be only temporary and quickly evanescent, or it may continue for a considerable time. It is more rarely continued or prolonged. It is often evanescent, but marked, when it occurs as a prelude of syncope, or of fully-developed disease of the brain, as epilepsy, paralysis, or apoplexy. It often precedes amnesia and other states of insanity. SWIFT was very subject to vertigo at different periods of his life, and more especially before the loss of his powerful mental faculties. It is more prolonged or continued when it is a symptom of either active or passive congestion of the cerebral vessels, or of anæmia of the brain, or of the vascular system generally. When vertigo occurs as a severe or acute paroxysm, it may gradually pass into the epileptic state; the extreme giddiness, after several occurrences of the seizure, being attended by a temporary loss of consciousness, and ultimately by convulsions and all the phenomena of a complete epileptic attack.

4. The more continued or prolonged states of vertigo are generally referrible to the following pathological conditions: 1st, to determination of blood to the brain; 2d, to congestion of blood in the cerebral vessels, owing to impeded return of blood or retarded circulation through the heart; 3d, to lesions of the cerebral arteries, and softening of the structure of the brain; 4th, to general or local, momentary or prolonged anæmia, or insufficient supply or circulation of blood in the brain. In these states, however, one or other of the primary changes already assigned as characterizing the more evanescent states of the affection (§ 3) are also present. In either of these forms, or owing to either of their pathological states, vertigo may manifest certain grades, either of which only may be complained of, or all of which may supervene in succession, either very slowly and imperceptibly, or more or less rapidly. These states or grades are usually described as, 1st, confusion, unsteadiness, or indistinctness of perception; 2d, dizziness or fear of falling; 3d, giddiness, with incapacity of progression; and, 4th, swimming in the head, or complete vertigo, with an incapability of standing.

5. i. *The occasional exciting causes* of vertigo are very different, or even opposite in different cases. Whatever determines the blood inordinately to the brain, as long and intense thought and reflection; or prevents and impedes the return of blood from this quarter, as cinetures of the neck, &c.; and whatever promotes a rapid return of blood from the brain, as suddenly assuming the erect from the recumbent posture, long abstinence, inanition; and, in short, whatever occasions too great fullness on the one hand, or too great a deficiency of blood in the brain on the

other, will, in weak, susceptible, or predisposed persons, give rise to this state of morbid perception.

6. Vertigo is most frequent in persons of advanced age, in hysterical females, in persons who are bald, especially on exposure to cold, or in cold seasons and in variable weather; in those liable to hæmorrhoids, epistaxis, or other hæmorrhages, especially when these are suppressed, and in crowded and close apartments; in females during prolonged lactation; in persons addicted to excessive sexual intercourse, or to the vice of masturbation; and in those who indulge in too much sleep, or who lie too long in bed, or who live irregularly as to diet and regimen.

7. The more common causes of vertigo are obviously those which produce the diseases of which vertigo is a more or less prominent symptom; while those occurrences of it which assume more of a primary or idiopathic form, are referable entirely to whatever occasions the pathological states of which it is a chief manifestation. Thus, if it be imputed to vascular determination to, or congestion of blood in the brain, the numerous remote and efficient causes of these conditions should be ascertained, as indicating the only obvious means of removing the affection. If it be chronic, protracted, or of frequent recurrence, the temperature of the scalp, the state of the arterial and venous circulation in the neck, temples, &c., the circulation through the heart; the functions of the stomach, bowels, and kidneys, &c., severally require examination, especially with reference to excessive or to deficient fullness of blood in the vessels of the brain. The causes of these very opposite conditions are generally manifest on due investigation; but these conditions are commonly attended by others of not less importance, namely, by excited or by depressed vital power—by the latter especially. This association of disordered circulation with depressed vital power obtains in most cases of this affection, whether protracted or evanescent; and in febrile diseases the blood is also more or less altered, although not in a manifest degree at an early stage of these diseases. The impairment or depression of vital power is especially evinced by the organic nervous system, through the media of the several organs which this system endows, and more particularly of the digestive, assimilating, and generative organs. Impairment of the former, and exhaustion from abuse of the latter, are among the most efficient sources of this affection, in its more chronic forms. When it proceeds from this last source, the disorder is often most protracted and most difficult to cure, for the cause generally continues; and it not unfrequently assumes a recurrent or periodic form, and even ultimately, but gradually, passes into fully-developed epilepsy, or the worst forms of hysteria. Of these results I have seen several instances in both sexes, in the course of my practice.

8. ii. *The chief states and associations* of vertigo may be enumerated as follows, with reference to their causes: 1st. *Vertigo nervosa*: nervous, hysterical, epileptical, or hypochondriacal vertigo. 2d. *Vertigo traumatica*, from injury, concussion, &c., of the brain. 3d. *Vertigo plethorica*, from determination of blood to, or inflammation or active congestion of, the brain. 4th. *Vertigo toxicata*, from poisons, especially sedative and narcotic poisons, and from poisonous fish, meats, &c. (See art. Poisons.) 5th. *Vertigo febrilis*,

in the invasion and progress of most fevers, especially when the organic nervous force is depressed, and the blood contaminated. 6th. *Vertigo gastrica vel Stomachica*, from gastro-bilious disorder; such disorder, however, often being, as well as the vertigo, merely symptomatic of disease of the brain. 7th. *Vertigo exsanguinea*, from an insufficient supply of blood to the brain, or from general anæmia, or unequal distribution of blood. 8th. *Vertigo cardiaca*, from disease of the heart impeding the return of blood from the brain. 9th. *Vertigo arthritica*, from misplaced or retrocedent gout. 10th. *Vertigo rheumatica*, from rheumatism of the membranes of the brain, or of the pericranium. 11th. *Vertigo accidentalis vel fugax*, from various odours or smells, especially in certain idiosyncrasies, or from various causes, often of an indefinite or not very manifest nature.

9. iii. *The Diagnosis and morbid Relations of Vertigo*.—The nature of the affection is generally manifest from the account given by the patient of his sensations. It may, however, in the more sudden attacks, be mistaken for a slight seizure of either apoplexy or epilepsy. From both these it may be readily distinguished by the loss of consciousness, which does not occur in vertigo. When fits of vertigo are likely to pass into epilepsy, a momentary loss of recollection or consciousness then generally characterizes them. The difficulty in the diagnosis respects chiefly the pathological condition of which vertigo is a chief or related manifestation—as regards the states of organic nervous or vital power, and of vascular action or congestion in the brain—as to the affection being a precursor of a febrile or exanthematous disease, or a symptom of disordered digestive function, or of misplaced gout, or of most serious disease, or of structural lesion of the nervous masses within the cranium. This, the most important diagnosis of vertigo, entirely depends upon the peculiarities of individual cases; upon the age and previous diseases of the patient; upon the recognised and presumed causes of the affection; upon the states of organic, nervous, or constitutional power, and of local and general vascular action; and upon the phenomena observed, and the symptoms ascertained, during the disorder. It must be apparent from this that the knowledge, acumen, and experience of the physician will be called into requisition in most cases of vertigo; and his success in their treatment will altogether depend upon the pathological inferences he may form.

10. There are other circumstances than the above to which attention should be directed; and among these the probable existing morbid states causing this affection at different periods of life may be noticed. If the disorder occurs soon after, or even several years after, puberty—and if the patient be thin, pallid, or anæmic, and be incapable of directing his eyes firmly on the person addressing him, impaired nervous power, very probably occasioned by masturbation, may be inferred. If the affection occur in mature or advanced age, although it may proceed from disorder of the digestive organs, it may, as well as such disorder, be much more likely a prominent symptom of disordered circulation in the brain, caused either by atheromatous, fatty, ossific, or other changes in the coats of the arteries, or by disease of the heart, of its valves, or even by organic lesion of the intimate structure, or by more mani-

fest alterations of the brain, either consequent upon one or other of these morbid conditions of the vessels, or taking place independently of them. I have seen cases where this affection has been produced by these several lesions, by scrofulous, tubercular, cancerous, or other formations in the membranes or substance of the brain, and by impeded return of blood from the head. In a remarkable case of colloid cancer of the mamma, under my care a few years ago, that was seen by Dr. RAMSBOTHAM and Mr. FERGUSSON, the cancerous disease ultimately invaded the brain, occasioning, for a considerable period, constant vertigo, and ultimately general paralysis and coma. The connexion, also, of vertigo with the gouty diathesis, and the occurrence of it as a form of misplaced gout, should not be overlooked when it affects persons of mature or advanced age, especially when the exact nature of this affection is clinically investigated. The connexion of this affection, also, with cachectic states of the system, with imperfect excretion and depuration of the blood, and with disordered function or organic lesions of the kidneys, but still more intimately with organic lesions of the heart, its orifices, or of its valves, demands due consideration. Several instances of chronic vertigo have come before me which had been referred to cerebral disease, but which, upon auscultation of the heart, were found to depend upon impeded return of blood from the head, owing to interrupted circulation through the heart.

11. II. THE PROGNOSIS of vertigo should be always given with caution, and often with much reservation. In some cases, especially in early or middle age, when the affection is slight, and depends chiefly on disorder of the digestive organs, or the organic nervous system, a favourable opinion may generally be given, unless there be reasons to infer that it is a precursor of fever of an exanthematous or any other form; and then the result will entirely depend upon the consecutive disease. Whenever the affection occurs suddenly or in fits, then its passage into fully-developed epilepsy should be dreaded, however judicious the treatment may be, more especially if there be any reason to infer that it is caused by masturbation, or by excessive venereal indulgences. Of this causation and transition of vertigo, many cases have come under my observation, not only in early and middle, but also in far-advanced age. In this last period of life, as well as in middle and mature age, vertigo, in any of its grades, should always be dreaded and viewed as a precursor of a more serious or dangerous attack. In these cases the symptoms connected with the organs contained within the cranium should be carefully observed, especially the several senses; the temperature of the scalp, the state of the pulse in the carotids; the action, rhythm, and sounds of the heart, and the appearance of the veins of the head and neck, and an opinion be given conformably with the evidence furnished by these sources, the juvenia and lædientia being also taken into due consideration.

12. III. THE TREATMENT should be based upon the inferences arrived at as to the causes and pathological states of vertigo.—(a) If the causes inferred be such as reduce organic, nervous, or constitutional power, and if they are of such a nature as are likely to convert the disorder into either hysterical or epileptical seizures, as certain of the causes above noticed (§ 6, *et seq.*), a restor-



ative, antispasmodic, or tonic treatment, such as the preparation of valerian, asafœtida, zinc, &c., cod-liver oil, oxyde of silver, &c., ought to be prescribed; and if there be any indications at the same time of local or general anæmia, chalybeates, either alone or in addition to these means, are also required. In cases of this description, as well as in those indicating a tendency to assume either an hysterical or epileptic character, I have found the tincture of sunbul, either alone or conjoined with other medicines of a tonic or antispasmodic nature, of great service in several cases. In these, also, I have prescribed the cotyledon umbilicus, but not with so marked benefit as I expected, although it also was sometimes very beneficial.

13. (b) In persons who are liable to vertigo from prolonged or profound thought and reflection (§ 5), and especially if the scalp be hot, and vascular determination to the brain, as evinced by the action of the carotids, be excessive, cooling applications to the brain, local depletions, internal and external derivations, purgatives, a regulated diet, and, above all, the avoidance of the cause, change of air, of scene, and of habits, travelling, voyaging, &c., and relaxing amusements, or agreeable and slight occupations merely, are the means upon which the chief reliance should be placed.

14. (c) In persons of a full habit of body, in those who live luxuriously, or even moderately, and who take little exercise, the temperature of the scalp, the pulsation of the carotids, or the action or sound of the heart, indicating local or general plethora, or impeded return of blood from the head, the occurrence of vertigo should be viewed in a very serious manner, and local depletions, derivations, both external and internal, purgatives, setons, or issues, spare diet, and regular exercise in the open air, are generally beneficial. Other means in addition to these may be resorted to; but they must be left to the judgment of the physician, who will prescribe them appropriately to the features characterizing individual cases. Emetics, the application of cold to the head, the restoration of suppressed hæmorrhages, bleeding from the nostrils, and venæsection, were the chief means recommended by ARETÆUS for vertigo, and they are indicated in the circumstances just now mentioned; but emetics should follow, not precede, the other means when cerebral or general vascular plethora is present.

15. (d) In cachectic habits of body, in cases manifestly depending upon disorder of the digestive organs, and when the temperature of the scalp, and the local and general states of the circulation and of vascular action, present no contradiction of the propriety of the practice, the treatment of vertigo may be initiated by the exhibition of an emetic. When this affection is indicative of the commencement of fever, or of one of the exanthemata, and is attended by lassitude, pains in the back or limbs, or by chills or shivering, this practice is then also productive of benefit; but ipecacuanha or sulphate of zinc should be preferred to antimony as an emetic; or, if this last be prescribed, it will be advantageously conjoined with a warm, aromatic, or antispasmodic medicine, such as Cayenne, ginger, &c.; but it ought not to be repeated oftener than once. Vertigo in the gouty diathesis requires, in the first instance, chologogue purgatives, followed by alkalies, magnesia, sulphur, and other vascular depurants, which increase the functions of the kidneys, skin, and digestive mucous surface. In

all cases of vertigo unconnected with the invasion of either of the forms of fever, the previous habits, modes of living, and disorders of the patient should be ascertained, and a more or less complete change of these habits be insisted upon, as far as his age and other circumstances may render the change advisable.

BIBLIOG. AND REFER.—*Aretæus*, *Curat. Chronic.*, l. i., c. 3. (*Emetics for.*)—*Galenus*, de loc. Affect., l. iii., c. 5. (*Distinguishes the Idiopathic and Symptomatic.*)—*Oribasius*, *Synopsis*, l. viii., c. 5.—*Celsus Aurelianus*, *Morb. Chron.*, l. c. 2.—*Paulus Ægineta*, l. iii., c. 12. (*Sternutatories.*)—*Avicenna*, *Canon*, l. iii., Fœn. i., Tr. 5, cap. 1.—*Ballonius*, *Comment. in Libr. Theophrasti de Vertigine*, Opera, vol. i., p. 221, et consil. vol. iii., No. 1, 24, 52, 101.—*Willis*, *Opera*, t. ii., p. 185.—*G. Fontanus*, *Tetras gravissimum capitis affectuum*, 4to. Lion, 1657.—*De Pigeoroles*, *De sensuum affectibus*, t. ii., c. 5.—*Island*, *Curat. Empyr.* et *Hist. Cent.*, ii., c. 26, 60, 67. (*Purgatives.*)—*Robillard*, *Ergo Vertigine Arteriotomia*, Paris, 1621.—*Wapfuer*, *Observat.*, p. 230. (*Caused by Tænia.*)—*Zucutus Lusitanus*, *Prax. Admir.*, l. i., (Obscr. 45. *Prax. Hist.*, l. vii., Obs. 20.—*T. Mayerne*, *Praxis*, &c., p. 59. (*Calculus Aroniacus advised.*)—*Donet*, *Sepulchret.*, l. i., s. xi., Obs. i., 2, 4. (*Lesions of the Brain.*)—*Obs. 9. (Hydatids in the Brain.)*—*Boerhaave*, *De Morbis Nervorum*, p. 576.—*Riccioli*, *Lin. Med.*, 1700, p. 1100. (*Hysterical.*)—*Boerhaave*, *Prælect. Acad. de Morb. Nervor.* Cur. v. Eems, Svo. Lipsie, 1762, p. 476.—*F. Hoffman*, *De Vertigine*, Opera, t. iii., Obs. 8, p. 226.—*J. C. Ramspick*, *Biga Remediorum Præstantissimum*, &c. Basil, 1745, p. 730. (*Cajeput Oil recommended.*)—*Fontana*, *Opuscula Scientifici* Firenze, 1755, p. 180. (*Hydatids in the Brain.*)—*M. Stoll*, *Prælectiones*, t. i., p. 382. (*Caused by Murther.*)—*Fogel*, *Précis de la Méd. Pratique*, t. i., p. 174.—*Bang*, in *Acta Reg. Soc. Med. Havni.*, t. i., p. 281, et t. ii., p. 43. (*Seton in the Nose.*)—*Kawor*, in *Ibid.*, t. iv., p. 113. (*Guaiacum for Arthritis*), p. 261 (*caused by Cole.*)—*Bellini*, *De Morbis Capitis*, p. 681.—*M. Stoll*, *Prælectiones*, l. p. 335. (*Intense study, Mammaryratio*)—*F. Darwin*, *Zoonomia*, &c., vol. i., p. 231, et seq.—*Horn*, *Archiv. für Pract. Mdecin.*, b. vi., p. 116. (*Camphor advised for.*)—*Summeir*, in *Journ. de Médecine*, t. lxi., p. 271.—*Wanders*, in *Ibid.*, t. lvi., p. 115. (*Advises Asafœtida.*)—*Pictiz*, in *Bichter. Chirurg. Biblioth.*, b. vi., p. 721. (*The Willow Bark for.*)—*M. Herz*, *Versuch über den Schwindel*, Svo. Berlin, 1791.—*Parry*, in *Edin. Med. Comment.*, vol. xiii., p. 245.—*L. B. Borsieri*, *Instit. Med. Pract.*, vol. iii., cap. ix., § 294.—*Musgrave*, *De Arthritide Anomala*, c. 14. (*Misplaced Gout.*)—*J. P. Frank*, *De Curand. Hom. Morbis*, l. v., p. 250 (*caused by seminal Emissions*), et *Opuscula Iosthuma*, 1824, p. 237.—*Werner*, *Apologie des Brownischen Systems*, b. ii. (*Stimulant advised.*)—*Rudolphi*, *Bemerkungen*, t. i., p. 26. (*Hydatids.*)—*Horn*, *Archiv. für Pract. Mdecin.*, b. vi., p. 116. (*Camphor advised for.*)—*Jordens*, in *Hufeland Journ. des Pract. Arzneyk.*, b. iv., p. 531. (*Mentha Piperita in Asthenic Vertigo*)—*Comradi*, in *Hufeland Journ. der Pract. Arzneywissenschaft*, b. vi., p. 469. (*Scarificatio mæchæ et verticis.*)—*J. Frank*, *Præceps Medicæ Universæ Præcepta*, v. i., par. ii., § i., p. 537. (*Seminalis jactura.*)—*J. Müller*, *Physiology*, Italy's edition, vol. ii., p. 1179.—*R. Hull*, *Essays on Determination of Blood to the Head*, Svo. Norwich, 1842. Essay 1st, On Vertigo. Rev. in *Brit. and For. Med. Review*, vol. xvii., p. 201.—*M. H. Romberg*, *Lehrbuch des Nervenkrankheiten des Menschen*, Svo. Berlin, 1843. Transl. for Sydenham Society, Svo. Lond., 1853.

#### VOICE AND SPEECH—DISORDERS OF.—1.

Voice and speech are functions by means of which the human species claims and maintains an ascendancy over all animated nature. The more perfect animals, including the winged creation, possess the power of emitting vocal sounds, which admit of such changes in power, modulation, and character as convey intimations to individuals of their own genus or species of danger, of pleasure, of sources of nourishment, of desire, and even of affection. The practised ear can recognise, in nearly all animals which emit sounds, variations in cadence, character, and power, which are known by the same species as announcements of the presence of objects of prey and subsistence, of sources of danger, of the loss of offspring or objects of affection, and of danger, suffering, or distress. And it is by no means improbable that

the sounds characteristic of individual species, even of the lowest capable of emitting them, are so modulated as to convey to one another the various instincts and suggestions which seasons, localities, and external circumstances and influences may excite; the sounds thus modulated becoming known, as regards each species, as a distinct, but limited language, although unknown, unless in its more manifest and prominent characters, to man.

2. The sounds produced by the organs, so wonderfully and beautifully provided for them, in the human species, are the chief means of developing the mental faculties, of exercising dominion over the rest of the animal creation, and of acquiring and of exerting power over those requiring guidance or governance. The sounds produced by the human organs of vocalization and articulation are the manifestations furnished to the species of the finest sentiments, of the deepest as well as the highest states of feeling, of the most profound and abstract results of thought, and the wisest and best revelations of mental reflection and of human reason. But considered philosophically, they are studies rather for the physiologist than for the pathologist. To the latter, however, the more strictly philosophical consideration of human sounds, as manifested in the modulated voice and in speech, becomes a necessary introduction to an intimate knowledge of the several modes in which both voice and speech are disordered, or more or less impeded, or even lost. For these preliminary sources of knowledge the reader is referred to the recent writings of MÜLLER, CARPENTER, TODD, BOWMANN, BISHOP, and WILLIS, which are in the hands of most medical men.

3. Vocal sounds and articulate speech or language are two distinct functions; and although the latter proceeds from the former, an additional apparatus is required for its production. The instrument of vocal sound, the larynx, is distinct and appropriate to this purpose, and is calculated by its mechanism to produce the several grades and modulations of voice; but, although thus independent, the vocal sounds cannot be modified into articulate speech, or even into a near approach to articulation, without the aid of the *oral cavity*, more especially of the *tongue*. Hence there may be vocal sound without speech; but this latter cannot be produced without the former; and hence both may be separately or even conjointly disordered, or even lost. But, although speech may be altogether lost, a vocal sound can hardly be quite lost while respiration is performed, unless in complete syncope, catalepsy, apoplexy, in the coma of fever, and in other occasions of loss of sensibility and consciousness; for even in these states, unless in profound syncope and catalepsy, a simple or low respiratory sound may still be emitted.

4. I. Voice is produced, according to Mr. BISHOP, by the conformation of the vocal apparatus, which combines the properties of a stretched chord, a membranous pipe with a column of air vibrating in it, and a reed, and is the perfect type, of which these instruments are only imperfect adaptations. Dr. CARPENTER states "that the sound is the result of the vibrations of the vocal ligaments, which take place according to the same laws with those of metallic or other elastic tongues; and that the pitch of the notes is chiefly governed by the tension of these laminae." However the various tones, modulations, &c., of the

voice may be explained, or referred severally to the especial or combined movements and actions of the different parts constituting the vocal apparatus by physiological writers, it must be manifest that a healthy condition of the vocal chords and ligaments, of the cartilages, of the muscles which move them, and of all the parts both above and below the larynx, as well as of the larynx itself, and the mucous membrane covering it and its vicinity, and even of the velum palati also, is necessary to the production of the human voice in its natural and perfect state; and consequently that this function, capable of the utmost perfection, of the greatest range in power and modulation, and of astonishing improvement as regards these, by careful and scientific cultivation, depends upon a perfect condition of their several parts, disorder or structural lesion of any one of them affecting the voice in a more or less remarkable manner.

I. APHONIA.—LOSS OF VOICE.—SYN.—*Ἀφωνία* (from *a priv.* and *φωνή*, voice). *Aphonia*, Vogel, Sagar, Cullen. *Dysphonia*, Good. *Raucedo paralytica*, Darwin. *Perte de la Voix*, Fr. *Die Stimmlosigkeit*, *Aphonie*, Germ.

CLASSIF.—IV. CLASS, II. ORDER. (See Preface.)

5. DEFINIT.—*More or less impairment or complete loss of the power of emitting vocal sound, owing either to functional disorder or to structural lesion.*

6. The voice may be impaired in every degree from the slightest catarrhal form to the most complete loss from organic change. The impairment or loss may be either temporary or permanent. The slightest as well as the less permanent aphonia often proceeds from functional disorder, especially from extreme nervousness, fright, fear, and hysteria; but it also is frequently caused by catarrhal congestion of the mucous membrane of the larynx and of the subjacent cellular tissue, and by temporary impediment to the movements of the vocal chords from this cause, or from inflammation and its results implicating for a time any of the parts of the vocal apparatus. In the more strictly nervous states of aphonia there is no manifest lesion of structure, the nerves supplying the laryngeal muscles and chords having become for a time incapable of conveying the dictates of volition to these parts, unless volition be most energetically exerted.

7. A. FUNCTIONAL APHONIA occurs chiefly in delicate, nervous, or hysterical females, and much more rarely in similarly constituted males. In the former sex it is most frequent about and subsequent to the period of puberty, and during the catamenial epoch of life; in the latter chiefly before the period of puberty, and only in very rare cases, and when occasioned by fear or fright, and it is then of short duration only.

8. *Hysterical aphonia* may be viewed as one of the forms of functional paralysis, which not unfrequently complicates disorder of the female organs, such disorder being generally either not otherwise manifested, or latent, or masked by some other affection. In most cases it is easy to distinguish the hysterical from all other forms of aphonia; other allied symptoms, the previous history of the case, the state of the uterine functions, the moral affections, impressions, and sentiments, which may have preceded the loss, &c., generally indicating its nature. It should not be overlooked that, in hysterical females, more especially in those most subject to uterine or sexual



irritation, aphonia is sometimes *feigned*. In rare instances, also, it may be difficult to determine whether or no it is hysterical or owing to structural disease in or near to the base of the brain; and this difficulty is increased, 1st, by the absence of other hysterical symptoms; and, 2d, by the presence of other states of cerebral paralysis, the catamenial functions or organs having been previously disordered. I was recently called in consultation to a delicate, nervous female, aged 18, who had menstruated irregularly and scantily, and was seized with incomplete hemiplegia and complete loss of voice—the muscles of the face not being affected. In this case it was difficult, at first, to determine whether the aphonia was hysterical or owing to some lesion within the cranium, causing also the hemiplegic affection. Then history and progress, however, generally elucidate the nature of these cases.

9. *B. STRUCTURAL APHONIA* is caused, *firstly*, by changes implicating one or more of the parts composing, or in the immediate vicinity of, the vocal apparatus; and, *secondly*, by lesions at the origin or in the course of the nerves distributed to the laryngeal muscles and vocal chords. The slighter or more incomplete forms of aphonia are those of a catarrhal nature, arising from more or less congestion and tumefaction of the mucous and sub-mucous tissues of the larynx and adjoining parts. Severe cases of aphonia are often occasioned by serous infiltration into the sub-mucous tissue, with or without inflammation of the mucous membrane of the larynx and of its vicinity, in the direction either of the fauces or of the trachea, or of both. This serous infiltration may be slight, and continue only during the catarrhal attack, or it may be so very considerable as to nearly suppress the voice altogether and cause suffocation, as observed in *œdema* of the glottis and epiglottis. Aphonia from this and other affections of the vocal apparatus is fully considered in the articles LARYNX and TRACHEA, where the lesions which affect the voice are described, and the treatment appropriate to each pointed out. The voice may also be affected in different degrees by inflammatory affections of the fauces, pharynx, and tonsils, by tumours in these situations, or by morbid growths pressing upon or implicating the larynx or trachea, by aneurisms, and most frequently by chronic laryngitis and its consequences, especially thickening, ulceration, &c., arising either primarily or consecutively of acute laryngitis, or of tubercular disease of the lungs, or of syphilitic infection. All these are fully discussed in the articles now referred to; but in all the voice is affected rather than the power of articulation, which is perfect as far as the production of vocal sound admits; for the affections of the larynx in such cases are rarely associated with any interruption to the movements of the tongue and of the parietes of the oral cavity, by means of which articulation or speech is performed.

10. II. DEFECTUS LOQUELÆ.—SYN.—*Alalia*, Frank. *Loquela Abolita*, Auet. Var. *Mutitas*, Sauvages, Macbride, &c. *Sprachlosigkeit*, *Stummheit*, Germ. *Loss of Speech*.

11. *Voice*, as stated above, is produced by the larynx, its modulations into musical sounds being effected by means of this organ aided by the epiglottis and adjoining parts. *Speech* is the modification of the voice, or sounds emitted by the larynx, by the organs or parts intervening between

it and the os externum. It is obvious that, to produce articulate sounds, forming language, the movements of the tongue, fauces, and connected parts must be complete; and that these should be in a healthy condition to render articulation perfect. The tones of the voice, and articulate speech, cannot be produced in childhood, when the sense of hearing is completely lost in early infancy, or in the fetal state; and as long as the sense of hearing continues lost, *dumbness* is the result: for the sense required to *dumbify* and adjust vocal sounds does not exist.\* *Voice*, especially in its healthy and cultivated states, and in its modulations into music, is capable of expressing the several emotions of mind, in a more remarkable degree and manner than articulate speech; but *speech* or language has a much greater, more varied, and more extensive power of addressing, informing, and enriching the intellect, of furnishing definite ideas of objects, properties, actions, &c., and of conveying the results of reflection and of rational deductions. The vocal organ, aided by the movements of the tongue and parts composing the oral cavity, is adapted for, and in health is capable of, forming a number of simple sounds, which are readily combined into groups forming words. Dr. CARPENTER justly remarks, that the number of combinations which can be thus produced is so inexhaustible that every language has its own peculiar series, no difficulty being found in forming new ones to express new ideas. There is much diversity in different languages, even with regard to the use of the simplest of these combinations; some of them are more easy of formation than others, and these accordingly enter into the composition of all languages; while, of the more difficult ones, some are employed in one language, some in another; no one language possessing them all, or using them to any co-ordinate extent.

12. The mechanism producing vocal sounds being complicated, and actuated in its individual parts and in its combined movements by volition, and by the states of vital force, as influenced by health, constitution, and disease, and adjusted by the sense of hearing, it necessarily follows that the faculty of speech, in whatever language, will be modified, altered, interrupted, impeded, and even altogether lost, in numerous modes, so as not only to furnish most important indications of disease of the slightest as well as of the most dangerous nature. The articulate sounds which have become familiar to the ear are often remembered as long as the appearance of the person by whom they were furnished; and the per-

\* The finest modifications and adjustments of the actions of the muscles of the larynx, and of the several parts of the fauces and oral cavity, are requisite to the production of determinate tones, accents, and speech; and these actions are ordinarily adjusted and modified by the sense of hearing. Hence a fine or educated ear in music is of great advantage in singing and in the pronunciation of languages. This adjustment, being learned in the first instance under the guidance of the sounds actually produced and heard, is subsequently effected voluntarily, in accordance with the mental conception—or inward sensation—of the tone or sound uttered, which conception cannot be formed unless the sense of hearing has previously brought similar tones to the mind. Hence it is that persons who are born, or become, quite deaf before articulate speech is formed or attempted, are also *dumb*. They have no malformation, no paralysis of any part of the organs of voice and speech; but they cannot utter distinct musical tones or articulate speech, because they have not the guiding conception or sensation of the nature and character of these sounds, furnished by the sense of hearing.

son, even after many years, is often recognised by his voice and speech before he is seen. Debility weakens the articulating power, or the strength of articulate sound; but disease may alter it more remarkably, different maladies affecting it in various ways. When the voice is altered, or lost by disease, the speech is then necessarily similarly circumstanced, as already stated (§ 5, *et seq.*). But speech is more especially affected as a precursor, or as a symptom, of apoplexy and paralysis; and, when so affected, it indicates the most serious results at a period which, although indefinite, may generally be viewed as comparatively short. In cases where speech is altogether lost, especially at an advanced age, or is so nearly lost as hardly to be understood, or when the sounds are mostly inarticulate, if no apoplectic or paralytic seizure have preceded or accompanied this loss, then either of these seizures may be expected before a long time elapse, unless the time be deferred by treatment, and diet, and regimen; and more frequently, notwithstanding these means of prevention. (See *arts.* APOPLEXY and PARALYSIS.)

13. *Loss of speech*, whether complete or incomplete, is generally to be imputed to structural disease, wounds, or fractures, implicating either parts within the cranium, or the nerves in their course to the organs of articulation. Cases of loss of speech, consequent upon apoplexy, or associated with other paralytic states, are very frequent, and are by no means rare as a precursor of a dangerous apoplectic or paralytic attack. When thus present, as the only apparent ailment, the result is not the less to be dreaded. In several cases, for which I have been consulted in the course of my practice, speech was so completely lost, that no articulate sound was produced, the simple vowel-sounds *a* and *o* being only emitted, and yet none of the organic, or of the cerebro-spinal functions, and none of the senses, evinced any disorder. In all these, an apoplectic, hemiplegic, or more general paralytic seizure supervened generally in a few weeks or months, owing to the development of latent pre-existing organic lesion. Whenever, therefore, the faculty of speech becomes impaired, or is lost by persons who had previously possessed this faculty in a healthy state, more especially if this change occur in mature, middle, or advanced age, it should be viewed as a form of local or partial paralysis, which is generally followed, at no very remote period, by a very dangerous form of apoplectic, or of more general paralytic seizure.

14. III. IMPEDIMENTS OF SPEECH—HESITATIONS OF SPEECH—STAMMERING—STUTTERING.—This affection is generally functional, or of a nervous nature, and may present several forms. These are usually observed in childhood and in early life; while incomplete or complete *loss of speech*, briefly considered above (§ 13, *et seq.*), is the consequence of structural lesion or of injury, and is a form of paralysis of a most dangerous nature. Hesitations in articulating sounds, or a momentary impediment in uttering certain words or letters, or a stammering, or repetition of certain consonants, are generally observed from infancy or childhood, but they may increase or diminish, or even disappear as age advances. They may continue during a long life, or they may occur only occasionally. In this latter case they are induced or aggravated by fear, anxiety, and various mental emotions. They cannot be mis-

taken for impairment or loss of the previously healthy power of articulation, which, as stated above (§ 13), proceeds from slowly-formed organic lesions implicating the origins or course of the glosso-pharyngeal nerves; and which occurs under different circumstances, and is attended and followed by very different phenomena and consequences.

15. The muscles employed in the production of definite vocal sounds and of articulate speech, being actuated by volition conveyed from the brain to these muscles by means of the nerves proceeding from the former to the latter, it necessarily follows that both voice and speech depend on the capability of the brain to generate or exert volition, and of the nerves to convey this act to the muscles. Thus speech, as well as voice, requires for its perfection a due exertion, and a healthy transmission of volition, by means of the nerves, to the apparatus destined for its production; and, if volition be feebly exerted, or imperfectly transmitted to the muscles concerned in articulation, various imperfections of these functions will result. But the complete performance of both voice and speech depends also upon the healthy functions of the lungs and respiratory passages, these functions being modulations of expiration by means of the larynx, tongue, fauces, oral cavity, and lips.

16. Thus it is apparent, as remarked by Mr. BISHOP, that "the mechanism provided for the production of speech comprehends a large assemblage of organs. The most simple vocal sounds require the combined action of the lungs, windpipe, larynx, and respiratory muscles; and for articulate language, an additional set of organs must be called into play, namely, the pharynx, hard and soft palates, uvula, tongue, teeth, lips, and nostrils."

17. It is justly observed by Dr. CARPENTER that, "great as is the number of muscles employed in the production of definite vocal sounds, the number is much greater for those of articulate language; and the varieties of combination which we are continually forming unconsciously to ourselves, would not be suspected, without a minute analysis of the separate actions. Thus, when we utter the explosive sounds (explosive consonants), we check the passage of air through the posterior nares, in the very act of articulating the letter; and yet this important movement commonly passes unobserved. We must regard the power of forming the several articulate sounds and their simple combination, as so far resulting from intuition, that it can in general be more readily acquired by early practice than other actions of the same complexity; but we find that, among different races of men, there exist tendencies to the production of different sounds, which, though doubtless influenced in great degree by early habit (since we find that children, when first learning to speak, form their habits of vocalization in great degree in accordance with the examples amid which they are placed), are certainly also dependent in part upon congenital constitution, as we often see in the case of children among ourselves, who grow up with certain peculiarities of pronunciation, not thus derived from imitation, of which they do not seem able to divest themselves."

18. I must refer the reader to Mr. BISHOP for a notice of mechanical contrivances for the production of vocal sounds; but these can never suf-



ficiently illustrate the intonations of voice or the production of articulate speech, or even satisfactorily show what it is that constitutes the essential character or distinction between the vowels, and on what part of the mechanism of the voice the vowel-sounds depend. These sounds, as well as those of the consonants, are formed by so slight changes in the relative position of the several parts of the complex organs of voice and speech, varying in accent and intonation so remarkably with the language, &c., as hardly to admit of any estimate. Mr. BISHOP observes that, "in the application of the theory of vowel-sounds to the mechanism of the human voice and speech, there are two hypotheses which would equally satisfy the conditions for their production artificially. The first is, that the glottis produces the primary, and the *air* in the pharynx, mouth, and nostrils, the secondary or vowel quality pulsations. The second is, that the glottis produces the primary, and the *membranes* of the pharynx, mouth, and nostrils produce the secondary pulsations of the air." Dr. THOMAS YOUNG observes, in respect of the first of these, that the "reflection of the sound from the various parts of the cavity of the mouth and nostrils, *mixing* at various intervals with the portions of vibrations directly proceeding from the larynx, must, according to the *temporary form of the parts*, variously affect the laws of the motion of the air in such vibration."

19. As to the second view, Mr. BISHOP remarks, that "we know by experience that the breath passing through the glottis is thrown into a certain state of vibration, and reaches the cavity of the mouth, which is already so disposed as to present a proper extent of its own membranes to the action of the breath. By these means the membranes are also made to vibrate, and these latter vibrations, coexisting with the original vibrations of the glottis, may generate the vocal sounds." Now the chief objections which may be offered to this view are, that the surfaces of parts, over which the vibrations of air from the glottis pass, are not membranous or are not membranes capable of vibration, but are surfaces constantly changing their configurations by means of the muscles by which they and the subjacent parts are actuated, the vibrations of air thrown out by the glottis being modified or changed by the alteration in the configuration of these surfaces—of the surfaces of those parts between the glottis and the external features—so as to produce the different vowel-sounds, and to pass from one simple vowel-sound to another. Without attempting to proceed farther in the consideration of the other simple sounds, or of the physiology of voice and speech, my limits oblige me briefly to notice the more practical part of this subject.

20. Very great ignorance, some mischief, and no little discredit to medical science, have been displayed by the energetic proceedings of some surgeons who have either written upon *stammering* and *stuttering*, or who have officiously meddled with, and injuriously operated upon, certain parts which are in no way implicated in the disorder under consideration. It has been supposed by these meddlers, with surpassing profundity, that these momentary or temporary affections arise from some lesion of the muscles of the tongue, or of the *frænum lingue*, or of the *velum palati*, or of the *uvula*, or even of the tonsils, each

acting on his own peculiar inspiration—with a success properly exposed by Mr. BISHOP, and sufficiently manifested to my own observation. It must be very demonstrative of the progress of surgical science to see one surgeon "dividing the muscles of the tongue at its root, cutting at the same time through the linguales, the *genio-hyo-glossi*, and *stylo-glossi* muscles, with their blood-vessels and nerves; or cutting a transverse wedge-shaped slice out of the dorsum of the tongue!" Or another surgeon extirpating the tonsils, which may affect the pitch and the quality of the voice, but which can have nothing to do with stammering! Or a third surgeon cutting off the *uvula*, which is unconcerned in articulation! Now these pleasant operations have all been done, and may be done again and again, under the seductive and perfectly safe (!) influence of chloroform, but what are the results! Let the victims articulate the answer, if they can intelligibly—for I have seen some of them who found this very difficult. For, as I have already noticed in another place, both the *uvula* and the tonsils perform functions necessary to the perfection of both voice and speech; and if these be removed, the pharynx and glottis are insufficiently lubricated, and are liable to experience, in consequence, more or less irritation, often passing into chronic inflammatory action, as have been demonstrated by cases which have come under my observation, and in which these parts had been extirpated. In other cases, where these effects have not appeared, or where the speech has been without huskiness, or any lesion of distinct articulation, the voice has been so much injured as to prevent attempts to sing.

21. There are several *conditions* which combine to produce stammering, each being more or less concerned in the morbid effect. The *first* is imperfect vocalization, or an insufficient expiration, owing generally to an imperfect respiration or to the lungs having been nearly emptied of their due quantity of air at the moment of articulation; the *second* is an insufficient force of volition, by which the act of articulation is attempted; the *third* is, generally owing to the foregoing, a want of synchronous and appropriate action of one or more of the parts concerned in the production of voice and speech; and *fourth*, an irregular or spasmodic action of some of the muscles engaged in articulation. This last state is generally, also, a consequence of attempts at articulation being made either without sufficient force of volition, or without due vocalization, or during an insufficient expiration from defect of air. It follows from the above that the chief source of stammering is to be referred to the nervous centres—more especially to the seats of volition and emotion, and to the functional condition of the *medulla oblongata*.

22. Dr. CARPENTER has justly remarked the analogy between stammering and chorea, the former being sometimes one of the modes in which the disordered condition of the nervous system in chorea manifests itself. "The slightest disturbance of the feelings is sufficient in most stammerers to induce a complete perturbation of the vocal powers; the very fear that stammering will occur, particularly under circumstances which render it peculiarly annoying, is often sufficient to bring it on in a predisposed subject; and the tendency to consensual imitation sometimes occasions stammering in individ-

uals (especially children) who never show the slightest tendency to it except when they witness the difficulty in others."

23. That one or more of the *four conditions* which I have stated to be chiefly concerned in the production of stammering actually exists, will appear from what is observed as to the manner in which timidity, fear, and anxiety affect these conditions, and, by thus affecting them, produce in many persons either stammering or stuttering; although they are not subject to these disorders of articulation in other circumstances. On this topic Mr. BISHOP very correctly remarks: "The emotions which arise in a person when he is about to address an audience are often so overpowering that the voice loses its natural volume, becomes tremulous, and sometimes inaudible, the respiratory functions are irregular, the flow of ideas is impeded, and the articulating organs perform their office so imperfectly, that he who is generally ready and fluent in conversation hesitates, stammers, and cannot utter a single connected sentence. Now if persons, who at other times have a perfect voluntary control over the organs of voice and speech, partially lose it under the circumstances just mentioned, *à fortiori* those who have at all times an imperfect control over their articulation will, in similar states of feeling, find their powers paralyzed, and their speech more than usually defective."

24. But it is chiefly in childhood and boyhood, when the sensibility and the emotional susceptibility are greatest—while the due co-ordination of those movements of the parts which contribute to correct articulation is either being formed, or is in the course of development, or only recently perfected—that stammering either commences or is chiefly manifested. At these ages, and more especially in those children in whom the faculty of speech is slowly developed, or appears only at a later period than usual, the emotions are most likely to disturb the force of volition, and, with this disturbance, the normal exercise of the intellectual, the respiratory, the vocal, and the articulating functions.

25. Whatever may be the cause or nature of the changes in the brain corresponding to the several emotions, they are propagated to the medulla oblongata, and influence the action of the respiratory and the motor nerves of the face, throat, and tongue, as well as other nerves, and through them the muscles they supply. The emotions may thus occasion irregular actions of the parts concerned in articulation: 1st, by causing a momentary spasm or closure of the glottis, and thereby arresting all vocal sound; 2d, by causing irregular action, or by closing the isthmus of the fauces and obstructing the pronunciation of letters and syllables which begin with *guttural letters*; 3d, by the irregular or spasmodic motion of the tongue, the dorsum of this organ being carried backward, or brought into contact with the palate, thereby affecting the *lingua-dentals*, *lingua-palatals*, and *lingua-palatonasals*, and syllables or words commencing with these letters; and, 4th, by closing the lips and posterior nares, by affecting the pronunciation of the *labials*, and even also of all the other letters. An acute and experienced observer may readily detect the particular cause of obstruction—whether the glottis, fauces, the dorsum or tip of the tongue, or lips.

26. IV. THE TREATMENT of stammering must

be based upon the result of observation as to the seat of difficulty, or obstruction in the organs of articulation. Dr. ARNOTT proposes that all the words should be connected by a vocal intonation, in such a manner that there shall never be an entire stoppage of the breath. But the difficulty is often at the commencement of a word or sentence, especially when the glottis is spasmodically or irregularly affected; and, as MÜLLER contends, this plan cannot do all that is required, as the impediment often occurs in the middle of words, although it may afford some benefit. The most important remedial means is that much insisted upon by Dr. CARPENTER, and this is to study carefully the mechanism of the articulation of the difficult letters, and to practice their pronunciation repeatedly, slowly, and analytically. "The patient would at first do well to practice sentences from which the explosive consonants are omitted; his chief difficulty, arising from the spasmodic suspension of the expiratory movement, being thus avoided. Having mastered these, he may pass on to others, in which the difficult letters are sparingly introduced; and may finally accustom himself to the use of ordinary language. One of the chief points to be aimed at is to make the patient feel that he *has* command over his muscles of articulation; and this is best done by gradually leading him from what he finds he *can* do, to that which he fears he *cannot*." (*Op. cit.*, p. 771.)

27. The circumstance of stammerers being often able to *sing* their words better than to speak them has been explained by the supposition that, in singing, the glottis is kept open, so that there is less liability to its spasmodic action; but, in singing, the velum palati, and the other parts concerned in articulation, are also much less liable to irregular or spasmodic action, they being brought less into action than in articulation. The difference may, however, as Dr. CARPENTER supposes, be due to the direction of the attention rather to the muscles of the larynx than to those of the mouth. One of the most obvious and important objects in the treatment of stammering is the prevention of any emotional disturbance during the act of speech; "and this requires the exercise of the voluntary powers over the direction of the thoughts, in the following modes: 1st. To *reduce* mental emotion, by a daily, hourly habit of abstracting the mind from the subject of stammering, both while speaking and at other times; 2d. To *avoid exciting* mental emotion by attempting unnecessarily to read or speak, when the individual is conscious that he shall not be able to perform these actions without great distress; 3d. To *clude* mental emotion, by taking advantage of any little artifice to escape from stammering, so long as the artifice continues to be a successful one." Having mastered the articulation of the difficult letters, and of the words containing them, and having thus avoided or overcome mental emotion, the patient should practice reading and speaking aloud, slowly, and with due enunciation and intonation, and with a full and free respiration, never allowing the lungs to become too far exhausted of air. Due attention should also be paid to the digestive and excreting functions, and to the improvement of the organic nervous force and of the mental powers, by air, exercise, medical treatment, and diet. Frequent declamation, and reading or reciting aloud such passages as interest the mental emo-



tions, should be practiced as soon as the patient has acquired a complete command over his articulation and over the difficulties which mental emotions have occasioned him.

[Did our limits permit, it would be interesting to trace the history of the treatment of stammering, in this country, from the empirical modes adopted by teachers down to the still more empirical practice of various surgeons, who, following in the footsteps of DIEFFENBACH, severed the muscles at the root of the tongue, removed a V-shaped portion from its substance, or excised the tonsils and uvula, mistaking the temporary relief produced by the strong mental impression caused by the operation for a permanent cure; and this, too, when it is well known that a severe toothache, rheumatic affections of the jaws or face, tic-doloureux, ulcers on the tongue or inside of the lips, and other casualties, will cause a temporary cessation of stammering. The late Dr. C. C. YATES, of New York, was the first to hit upon a philosophical and successful method of treatment. This was imparted to the governess in his family, Mrs. LEIGH, who, in connexion with him, established an institution for the treatment of such cases, which was carried on for many years with very remarkable success. Pupils flocked to them from every part of the Union, and were in most cases speedily cured. Other teachers, instructed by them, established other schools in different parts of the United States, and were equally successful in effecting speedy cures. The result which followed was what might have been anticipated; the cures obtained were so numerous and wonderful, and attended with so much profit to the teachers, that multitudes of other persons soon set up to cure impediments of speech who were totally unqualified, and the system soon fell into disrepute. At present very little is heard of the system, and it would seem to have been generally abandoned. Dr. YATES's method may be found fully and very ably described by Dr. E. WARREN, of Boston, in vol. xxi. of the *Am. Jour. Med. Sciences*, p. 75. One thing is certain, that, although apparent cures are easily made by this system, and appear perfect for the time, there is great danger of a relapse unless confirmed by long habit. In a few cases they will remain permanent, but in a majority, unless the course is persisted in, the difficulty returns. Whatever method is employed for the relief of this affection, in a majority of cases no permanent advantage will be gained unless resolutely persevered in for one or two years.]

BIBLIOG. AND REFER.—i. APHONIA, OR LOSS OF VOICE.—*Galenus*, De Soc. Affect., l. i., c. 6; l. iv., c. 6.—*Azilius*, Tetrab. ii., serm. ii., c. 32.—*Avicenna*, Canon, l. ii., Fen. 10, tr. 2, c. i.—*Zacutus Lusitanus*, De Princ. Med. Hist., l. ii., 15, 16; et Med. Pract. Hist., l. ii., obs. 14; Prax. Admir., l. i., obser. 97. (*Ponticuli in inguine, sanata Aphonia, ex suppressa phallorhœa*).—*C. Bartholinus*, Aphonologia, seu de Aphonia. Hafn., 1684.—*Beniventus*, De Abd. Morb. Caus., cap. 91.—*Bonet*, Sepulchretum, l. i., s. xxii., obs. 8, 10.—*Blankard*, Collect. Med. Phys., cent. iv., n. 28.—*C. Bartholinus*, Act. Hafn., t. i., obs. 7, 86.—*Ranoe*, in Act. Reg. Ser. Med. Hann., t. i., p. 455.—*La Motte*, Chirurgie, obs. 212.—*Osiander*, Denkwürdigkeiten, b. ii., p. 136, 174.—*Haighton*, in Memoirs of Med. Society of London, vol. iii., n. 24. (*Lesion of the Recurrent Nerves as a Cause*).—*Smith*, in Med. Commun., vol. ii., 23.—*M. F. Ramepont*, De la Voix et l'Parole, Svo. Paris, 1803.—*A. Portal*, Cours d'Anatomie Médicale, t. iv., p. 361, et in Mém. de la Soc. Médicale d'Emulation, t. i., p. 14.—*Lamb*, in Lond. Med. and Phys. Journ., April, 1801. (*Electricity recommended for*).—*Horn*, Archiv. für Pract. Medicin., July, 1809, p. 321.—*Græpingsæsser*, Versuche, &c., p. 136. (*Apleurism*).—*Thomann*, Annales Wurceburg., b. i., p. 166. (See also BIBLIOG. AND REFER. to article LARYNX, &c.)

ii. PHYSIOLOGICAL PATHOLOGY OF THE VOICE.—*Adeion*, in Dict. de Médecine, 2d ed., art. l'Voix.—*J. Savart*, Mém. sur la Voix Humaine, Ann. de Chimie et de Phys., t. xxx., p. 64, 1825; Mém. sur la Voix des Oiseaux, Ibid., t. xxxii., p. 5, 113; et dans Journ. de Physiologie Expér. de Magendie, t. v., p. 390.—*Mayer*, Lehrb. der Mensch. Stimme und Sprache, Meckel's Archiv., 1820, p. 188.—*P. N. Garay*, Physiologie, t. i., p. 728.—*J. F. Malgaigne*, Nouv. Théorie de la Voix Hum., dans Archives Génér. de Méd., t. xxv., p. 201, 1830.—*Valette*, Du Rôle des Fosses nasales dans l'Acte de la Phonation, in Ibid., t. viii., 2d ser., p. 454, 1835.—*J. M. G. Itard*, in Ibid., t. viii., p. 385.—*C. Bernard*, in Ibid., t. iv., et v., 4e ser., 1844.—*J. P. Brun-Sechaud*, Sur la Voix et son Mécanisme dans le Chant de l'Homme et des Oiseaux, 4to, Paris, 1831.—*P. Bonnaï*, Recherches sur le Mécanisme de la Voix Humaine, Svo. Paris, 1832.—*C. E. Noemrath*, De Voce, Lingua, Respiratione, Deglutitione, Observationes quedam. Bonn, 1841.—*Diday* et *Peterquin*, Mém. sur la Voix, &c., in Gazette Méd. de Paris, 1840, p. 365; et Ibid., 1844, p. 113, 135.—*M. Garcia*, Mém. sur la Voix Hum., dans Comptes rendus Hebdom. des Séances de l'Acad. des Sciences de Paris, t. xii., p. 638, 1841.

iii. STAMMERING.—IMPEDIMENTS OF SPEECH.—*Codrus*, De Vitis Vocis, l. ii., Svo. Fr., 1597.—*J. Fallopius*, zio d'Agguardante, De Visione, Voce, Auditu, Tractatus, fol. Venice, 1600.—*Tractatus de Locutione et Instrumentis*, 4to. Ven., 1603.—*Liber de l'uturo*, Loquela, fol. Padua, 1603.—*Horstius*, l'Problem. Med., c. c. vltib., 1608.—*Menjotti*, De Mutitate et Balbutia, 4to, Paris, 1662.—*Panorolus*, Pentecost., iv., obser. 30. (*Issu over the Coronal Suture, advised by*).—*Widel*, De Vocis ejusque Affectibus, Lon., 1677.—*Pazzi*, De Voce Humana, ejusque vitis, Bns., 1704.—*J. C. Amman*, Surdus loquens, seu Dissert. de Loquela, Svo. Amster., 1702.—*J. Wallis*, De Loquela, seu Sonorum Formatione, Svo. Leyd., 1727.—*D. Dodart*, Mémoires sur les Causes de la Voix de l'Homme et ses différents Sons, dans Mém. d'Acad. des Sciences de Paris, Ann., 1700, p. 244.—*A. Bergen*, De Balbutientibus Dissert. Fr., 1756.—*A. Perren*, De la Formation de la Voix de l'Homme, dans Mém. de l'Acad. des Sciences de Paris, Ann., 1744, p. 409.—*H. O. Vogel*, De Laryngo Humano et Vocis Formatione, 4to. Erf., 1747.—*De Haan*, Opuscul. Inéd., p. 1, n. 18.—*Stee*, Prosodia Rationalis, Svo. Lond., 1779, p. 49.—*J. Watson*, Instruction for the Deaf and Dumb, &c.: Hints for the Correction of Impediments in Speech, &c., Svo. Lond., 1800.—*S. H. Dutrochet*, Essai sur une Nouvelle Théorie de la Voix, avec l'Exposé des divers Systèmes qui ont paru jusqu'à ce Jour sur cet Objet, 4to. Paris, 1806.—*T. Sheridan* et *R. G. Loebel*, Ueber die Declamation, Svo. Leipzig, 1793.—*A. Portal*, in Mém. de la Société Méd. d'Emulation, t. i., p. 80; et in Mém. de la Nature et le Traitement de plusieurs Maladies, t. ii., n. 8.—*F. L. Double*, in Journ. Génér. de Médecine, t. xxix., p. 137, 1807. (*The Senology of Speech*).—*T. Young*, Natural Philosophy, vol. ii., p. 559.—*J. Thebault*, a Letter to Henry Cline, Esq., on Imperfect Developments of the Faculties, Mental and Moral, &c.; and on the Treatment of Impediments of Speech, Svo. London, 1810, Rev. in Edin. Med. and Surg. Journ., vol. vi., p. 489. (*Containing very just Views of the Causes of Stammering*).—*W. Kempe*, Le Mécanisme de la Parole, suivi de la Description d'une Machine parlante, Svo. Vienne, 1791, i. p. 1.—*J. B. Boulland*, in Archives Génér. de Méd., t. viii., 25, 1825; l'Expérience, t. iv., 1839.—*R. Shuteless*, De Stammereln und Stottern, Svo. Zur., 1830.—*A. M. Iap*, Versuch einer Phys. der Sprache, Svo., 2 vols. Svo. 1836.—*F. A. Longet*, Recherches Expér. sur les Fonctions des Nerfs et des Muscles du Larynx, et sur l'Influence du Nerf accessoire de Willis dans la Phonation, Svo. Paris, 1844; et in Anat. Phys. du Syst. Nerveux, t. ii.—*Columbat*, Du Bégaiement et de toutes les autres Vices de la Parole, traité par de Nouvelles Méthodes, 2d ed., Svo. Paris, 1831.—*L. A. Legend*, Hygiène du Chanteur, &c., Svo. Paris, 1845.—*C. Bell*, in Philos. Trans., 1832, p. 311.—*Müller*, Physiologie, lib. iv.—*R. D.*, in Dict. de Méd., 2d ed., art. l'Voix.—*Pathologie*.—*Willis*, in Transactions of the Cambridge Philosoph. Society, vol. iv.—*Bacc. Med.*, On Stammering and its Treatment, Svo. Oxon., 1850.—*J. Ihml*, a Treatise on the Cure of Stammering, &c. Lond., 1856.—*J. Bishop*, on the Physiology of the Human Voice, in Philos. Transact., 1846.—On Articulate Sounds; and on the Causes and Cure of Impediments of Speech, Svo. Lond., 1857 (*an able and scientific treatise*); also on the Construction of Hearing and Speaking Instruments, Svo. Lond., 1832. See also article *Voix* in Cyclopædia of Anatomy and Physiology, vol. iv.—*W. B. Carpenter*, Principles of Human Physiology, with their chief Application to Psychology, Pathology, &c., 5th edition, Svo. London, 1855, § 515, p. 765, et seq.

[AMER. BIB. AND REF.—*J. W. Draper*, Human Physiology, Statical and Dynamical; or, the Conditions and Course of the Life of Man, Svo., p. 649. N. York, 1856.—*Samuel Jackson*, The Principles of Medicine, founded on

the Structure and Functions of the Animal Organism, Svo, p. 630. Phil., 1832; also, *Amer. Journ. Med. Sciences*, Feb., 1829, p. 272. (A case of total loss of language, vocal and written, temporarily produced by cerebral congestion, and attended with any other functional disorder. Speech was immediately restored by copious bleeding, going to establish the doctrine of a specific intellectual organ for language.)—*Robley Dunglison*, Human Physiology, with 365 illustrations, 2 vols. Svo, p. 651, 654. (This work contains one of the most able and elaborate articles on the voice in the English language.)—*Isaac Parish*, Quarterly Summary of the Transactions of the College of Physicians of Philadelphia, Nov. and Dec., 1841, and Jan., 1842.—*Daniel Oliver*, First Lines of Physiology, Svo, p. 520. Boston, 1835.—*J. E. S. Jackson*, on the Modification of the Voice and Respiration in Pleural Effusion, in *Amer. Journ. Med. Science*, N. S., vol. ii., p. 16.—*J. P. W. Lane*, Amer. Translation of a Treatise upon the Diseases and Hygiene of the Organs of the Voice, by Colombat de l'Isere, 12mo, p. 220. Boston, 1845.—*Edward Warren*, Remarks on Stammering, in *Amer. Journ. Med. Science*, vol. xxi., N. S., 1837, p. 75. (A very philosophical and judicious essay, containing the substance of all that is known on the subject of curing impediments of speech.)—*Dr. Serre*, on the Cure of Stammering, in *Ibid.*, April, 1846, vol. ii., N. S., p. 532. See also vol. vi., N. S., for Dr. Abercrombie's views on the management of such cases. (The views of Dr. M'Cormac, of Dublin, who published a small volume on the subject in 1828, were obtained from Dr. Yates, while Dr. M'C was on a visit to this country, and are substantially those of the former.)—*John Webster*, Cases of Aphonia, depending on an Affection of the Head, in *Ibid.*, vol. xii., O. S., p. 221.—*Marshall Hall*, on Stammering, in *Ibid.*, vol. viii., O. S., p. 220.—*Baron Cuvier*, Mechanism of the Human Voice during Singing, in *Ibid.*, vol. ix., p. 191.—*M. Adam Boivin*, Case of Idiocy and Aphonia, produced by Fright, in *Ibid.*, vol. vi., p. 220; Cases of Intermittent Aphonia, in *Ibid.*, p. 222.—*Horace Green*, Cases of Aphonia, &c., successfully treated by Nitrate of Silver, in *N. York Journ. Med.*, Jan., 1846, p. 16; also vol. iv., p. 251.—*Isaac F. Taylor*, Cases of Aphonia treated by Applications of Nitrate of Silver in *Ibid.*, vol. iv., p. 348.—Aphonia successfully treated by Croton Oil, externally applied, in *Ibid.*, vol. ii., p. 126.—*C. A. Lee*, Clinical Lecture on Aphonia, Buffalo Med. and Surg. Journ., 1847.—*James Rush*, The Philosophy of the Human Voice, 2d ed., 8vo. Phil., 1833.]

## VOMITING AND RETCHING.—SYNON.—

'*Euecia*, Hipp. *Vomitus*, *Vomitio*, *Vomitum*, *Vomutum*, *Evomitio*, *Emesis vomito*, *Vomiturio*, *Emesia*, Auct. Var. *Hyperemesia*, *Swed. diar*. *Palmus vomitus*, Young. *Emesis Vomitus*, Good. *Erbrechen*, Germ. *Vomissement*, Fr. *Vomito*, Ital. and Span. *Puking*, *Spueing*.—*RETCHING*.—*Vomendi conamen inane*, *Subversio stomachi*; *Dysemesia*, *Egritudo ventriculi*.—*Ayant envie de vomir*, Fr. *Sich Worgen*, Germ.

CLASSIF.—PATHOLOGY—SYMPTOMATOLOGY AND THERAPEUTICS.\* (See Preface.)

\* The mechanism of vomiting has been a subject of discussion with both physiologists and pathologists. Three principal opinions have been entertained on this subject. MAGENDIE was of opinion that the stomach was passive in the act, and that the contraction of the diaphragm and abdominal muscles on that organ is the sole cause of the phenomenon. "This view was adopted by RICHERAND, ROSTAN, and PIEDAGNEL; while MARQUAIS, MAINGAULT, PORTAL, TANTINI, GRAVES, STOKES, and HALL have embraced more or less contrary opinions." MAINGAULT attributed vomiting exclusively to a gradual anti-peristaltic movement and contraction of the stomach. PORTAL concluded that this act takes place during expiration, consequently during relaxation of the diaphragm. That vomiting may take place without the action of the diaphragm is shown by a case observed by Drs. STOKES and GRAVES, where vomiting was a principal symptom, but the stomach was found situated above the diaphragm. In a case recorded by M. LEPSIE (*Bullet. de l'Acad. Roy. de Med.*, 1844), in which the abdominal parietes having been accidentally laid open in the human subject, and the stomach having wholly protruded itself, it was seen to contract itself forcibly and repeatedly, until, by its own efforts, it had expelled all its contents except gases. The relaxation of the cardiac sphincter is essential to the act of vomiting, for its fibres can resist, by their contraction, the combined force of the expulsive muscles. The retchings or fruitless efforts at vomiting are owing to the contrac-

1. DEFINIT.—The rejection of the contents of the stomach, with or without retchings, generally symptomatic of visceral or of constitutional diseases, but sometimes occurring independently of these, or of any serious derangement: RETCHING is an ineffectual effort to reject the contents of the stomach, or painful contractile efforts, either before the stomach is evacuated, or afterward, and when the stomach is empty.

2. Vomitings and retchings are subjects of great interest: 1st, as symptoms of disease; 2d, as a therapeutical indication; and, 3d, as a prominent manifestation, if not a primary or idiopathic state, of serious disorder. The first of these is considered in the article on SYMPTOMATOLOGY (§ 130, *et seq.*), as well as in the history of the several forms of disease; the second is partially noticed under the head of THERAPEUTICS (§ 40, 43, and 56), and in the eighth class, and the third order of THERAPEUTICAL AGENTS. Before, therefore, I proceed briefly to consider vomiting as a chief and prominent affection, requiring to be palliated or allayed, I shall notice the circumstances which appear mainly to require the artificial production of vomiting.

3. 1. VOMITING AS A THERAPEUTICAL INDICATION AND AGENT has not, in the article just now referred to, owing to the scope and object of that article, been considered so fully as its importance demands. It is more especially required when poisonous or injurious substances have been taken into the stomach; or when the stomach is overloaded by food or drink to a hurtful amount, more particularly when either or both threaten to occasion apoplexy, or any other seizure, or when these attacks actually result from these causes. In all such cases the selection of the emetic should be suitable to the cause and nature of the evil produced, and always be so energetic as to produce a rapid and full effect.

tions of the cardiac sphincter. Vomiting, like other efforts at expulsion of the contents of the natural cavities, is performed by the muscles of expiration, and while the diaphragm is relaxed and pressed up upon the lungs by the action of the abdominal muscles.

The immediate causes, or the physiological pathology of vomiting, may be stated under the following heads: 1st. The contact of irritating, poisonous, or unwholesome substances irritate the ganglial nerves supplying the villous coat of the stomach, and affect the coeliac ganglion and adjoining plexus. The morbid impression or irritation is conveyed to the roots of the spinal nerves and cord by the ramifications of the ganglial nerves to these parts, and is reflected thence, by the motor nerves of expiration, to the abdominal muscles, by what I termed a "reflex sympathy," and Dr. MARSHALL HALL long subsequently designated a "reflex function." 2d. Irritations, &c., affecting other parts of the body (as stated § 18, *et seq.*), are propagated by the splanchnic ganglia and plexuses to the stomach, and through them to the spinal cord, and are reflected in a similar manner, by the motor nerves chiefly of expiration, to the abdominal and expiratory muscles. The vomiting which thus occurs I have denominated from reflex sympathy, because it is only occasional or contingent, and not so constant or necessary an effect as to warrant the appellation of a function. 3d. Impressions made on the senses, or violent emotions, may, through the medium of the pneumo-gastric nerves, affect the ganglial centres, and either through these latter affect also, in the way above stated, the spinal cord and motor nerves, &c., or be more directly propagated to both the splanchnic and spinal nerves. 4th. Sea-sickness and vomiting cannot be referred to either of the above categories. They proceed from an impression of an irritating or depressing character—the latter more particularly—made primarily on the semilunar and other splanchnic ganglia and plexuses, and propagated on the one hand to the ganglial nerves of the stomach, and on the other to the ramifications of these nerves to the spinal nerves and cord, thereby occasioning contractions of the stomach simultaneously with contractions of the muscles supplied by the motor expiratory nerves.



4. *a.* Diseases of the *respiratory passages*, especially those attended by spasm, by suffocation, difficulty of breathing, by difficult expectoration, &c., are generally much benefited by a suitable emetic and free vomiting. Croup, whooping-cough, asthmatic seizures, spasm of the larynx, and laryngitis, congestion of the lungs, bronchitis, and bronchial catarrh, are severally relieved by emetics. In most of these, ipecacuanha, in a full dose, is the best emetic; but when there is fever or inflammatory action, the potassio-tartrate of antimony may be given, but if it fail of producing vomiting in a short time, a full dose of ipecacuanha should be exhibited. The sulphate of zinc and ipecacuanha, conjoined with capsicum or other warm spices, are most useful when vomiting is indicated during states of vital depression or exhaustion; and in cases of poisoning by sedatives, narcotics, &c.

5. *b.* The *invasion of fevers*, continued or exanthematous, is often most satisfactorily treated by an active emetic; and, as well as in affections of the respiratory passages and organs, the good effect is enhanced by the free promotion of vomiting, and by exhibiting warm diluents, especially the warm infusion of chamomile flowers, or demulcents. *Agues* and other *periodic fevers*, especially *remittent, gastric, and bilious fevers*, are also much benefited by initiating the treatment by an active emetic, and by promoting its effects by these means. Antiperiodic and febrifuge remedies, and chologogue purgatives, exert a more certain effect when they are preceded by free vomiting, artificially produced.

6. *c.* Various disorders of the *digestive canal* are most beneficially treated by procuring free vomiting at the commencement of the disorder or of the treatment. The several forms of *Cynanche* or *Angina*, especially when they embarrass respiration or deglutition, often require a recourse to emetics. In the more malignant states of *Cynanche*, or those characterizing *Scarlet fever*, the sulphate of zinc, or ipecacuanha, conjoined with capsicum or other spices, and promoted by the decoction of senega, and by tonics, stimulants, camphor, ammonia, &c., should be preferred to others.

7. *d.* Some forms of *indigestion*, or those arising from accumulations of mucous sordes, or crudities, and torpid states of the biliary formations, as indicated by a foul or loaded tongue, and by morbid appearances of the evacuations, are often the most successfully treated by commencing with an ipecacuanha emetic. All forms of *dysentery*, inflammatory or sthenic, adynamic or asthenic, acute or chronic, endemic or epidemic, simple or complicated, hepatic or scorbutic, derive benefit from free and copious vomiting, especially when produced and promoted by means suited to the peculiarities of individual cases. Ipecacuanha is, however, the emetic which is most generally applicable to dysenteric affections; and next to it the sulphate of zinc. After a free effect has been procured by means of ipecacuanha, this medicine, so valuable in *dysenteries* and *chronic diarrhæas*, may be continued subsequently, in as large doses as the stomach may tolerate, but preferably in the form of pill, combined with appropriate remedies—narcotics, aromatics, tonics, &c.

8. *e.* *Hypochondriasis* and *melancholia* are sometimes relieved for a time by an energetic emetic, judiciously selected and exhibited. But it ought, in order to be of service, to be followed by medi-

cines calculated to promote the secretions and excretions, and to impart tone and energy to the organic nervous system and to the organs which it actuates, by exercise, change of air and locality, and by travelling and occupations which both employ and interest the mind.

9. II. VOMITING AND RETCHING AS PROMINENT AFFECTIONS, OR STATES OR SYMPTOMS OF DISEASE.—Retching or vomiting may be the most remarkable and distressing symptoms, owing, 1st. To injurious or poisonous ingesta; 2d. To severe constitutional disease, as at the invasion, or in the course, of severe exanthematous or continued fevers, or of pestilential maladies; 3d. To severe functional disorder or irritation, or structural disease of the stomach itself; and, 4th. To sympathy with disease or irritation in some allied or more or less distant organ. The presence of either vomiting or retching, or of both, necessarily induces the physician to inquire, 1st. As to the exciting causes, manifest or presumed; and, 2dly. As to the pathological states to which either or both may be referred.

10. *A.* When a physician is called to a person who has previously enjoyed good health, or who has not complained in such a manner as to indicate a liability to an attack of vomiting or retching, then he should suspect the nature of the *ingesta* as having produced it, and inquire as to the food or drink, or other matters which the patient may have taken; and the matters ejected from the stomach should all be preserved for future examination, if circumstances should arise to require such examination. Where neither food nor drink is the cause, then poisonous matters taken voluntarily or accidentally, or given by others, ought to be suspected, and be carefully and artfully ascertained, and the matters rejected from the stomach carefully preserved and examined by a competent person. If poisonous substances have been taken or given, or are manifested by the character of the vomiting, by the allied symptoms, or by the state of the vomited matters, or by their presence in these matters, the antidotes and other means of treatment described with reference to the individual poisons (*see that article*) will be required.

11. *B.* When the vomitings or retchings are not caused by the ingesta, their *pathological relations* must then receive the necessary attention. In infants and children, as well also in adults, these affections may proceed from hot seasons, owing to bilious or gastric disorder; from a bilio-gastric, continued, or remittent fever; from the invasion of exanthematous fevers, especially scarlet fever and small-pox, and in the former class of patients more frequently than in the latter from disease of the brain or of its membranes. They may be the invasion of the usual forms of cholera, or of gastro-bilious disorder, during summer and autumn; or the very prominent and urgent symptoms of pestilential cholera; or, in warm climates, of hæmagastric or yellow fever. In these climates, also, they may usher in remittent or other fevers and maladies; and in all these, although most severe and even dangerous as well as the most prominent, manifestations of disease, they are very far from being the disease itself, or even the greatest part of it.

12. *C.* Severe functional disorder, local or constitutional, will occasion vomitings or retchings as that following dissipation or DRUNKENNESS (§5), and that occurring at the commencement of the

fevers, and pestilential maladies already noticed ; but the most distressing attacks of retching and vomiting are often caused by the *motions of vessels at sea*, and by *organic lesions of the stomach itself*. Of the former a more particular notice will be taken in the sequel under the head of SEA-SICKNESS, or *vomiting and retching during voyaging by sea* ; and as to the latter causes, viz., inflammation and structural changes of the STOMACH (§ 22-95), the symptoms now being considered, when arising from these lesions, are duly noticed at that place. To what I have there stated, and to the article on the pathology of the DIGESTIVE CANAL (§ 37-43), I must refer the reader. But there are other remarks which may be adduced at this place calculated farther to elucidate the history of vomiting.

13. i. VOMITING AND RETCHING FROM ORGANIC LESIONS *seated in, or implicating the Stomach*.—These lesions have been described at the places now referred to ; and, among these, *ulcerative perforation of the stomach*, either commencing in this viscus or extending to it from structural changes in adjoining parts, has occupied a conspicuous rank. These perforations may give rise, owing to previous agglutination or adhesion of the opposite serous surfaces, to communications, 1st. Between the stomach and the substance and vessels and ducts of the liver, owing most frequently to abscess in the latter viscus ; 2d. Between the stomach and the pleural cavities and lungs ; 3d. Between the stomach and pericardium ; 4th. Between the stomach and vena cava ; 5th. Between this organ and portal vein ; 6th. Between the stomach and external surface of the abdomen ; 7th. Between this viscus and the gall-bladder ; 8th. Between the stomach, gall-bladder, and duodenum ; 9th. Between the stomach and duodenum ; 10th. Between the stomach and some part of the small intestines ; 11th. Between the stomach and the colon ; 12th. Between the stomach and peritoneal cavity. Other fistulous communications between parts of the digestive canal and other viscera are met with on rare occasions, and are occasionally attended by vomiting ; but they are noticed in their appropriate places. Of the several kinds of perforated communications between the stomach and other viscera now enumerated, the *first* is most commonly the result of abscess in the liver ; although it may arise otherwise in rare instances, as in a case which came under my care where the perforation of the stomach extended far into the substance of the liver. The *second* is also most frequently the result of an abscess opening into the stomach. The *third, fourth, fifth, and sixth*, almost in all cases, are referable to perforating ulceration, cancerous or simple, commencing in the stomach. The *seventh and eighth* forms of fistulous communication are most commonly caused by large gall-stones in the gall-bladder. The *ninth, tenth, and eleventh* most frequently proceed from cancerous or simple ulceration commencing in the stomach or pylorus. The last of these lesions are caused chiefly by the absence of adhesion of the opposite peritoneal surfaces, which adhesion takes place in the others, although it is weaker, or more readily separated, in the cancerous or malignant, than in the simple forms of ulceration. Of these forms of fistulous communications between the stomach and other viscera, *gastro-colic fistula* is probably the most frequent. This form has been ably described by Drs. BRINTON and MURCHISON,

and references have been given by them to interesting cases, published in medical journals, and to preparations contained in the principal pathological collections.

14. ii. VOMITING FROM GASTRO-INTESTINAL FISTULA.—The *vomiting* caused by an *abscess* in the liver, or by abscess from diseased vertebræ, opening into the stomach, or by a communication with *purulent collections* in the pleura or lungs, or in any other situation, may be recognised by the history of the case, and by the purulent characters of the rejected matters. When occasioned by *cancerous ulceration* or *growths*, the vomitings, with the antecedent and attendant symptoms, are described at the places above referred to. But when perforation of the stomach, either from these lesions, or from other ulcerative processes, takes place, then the vomitings frequently assume distinctive characters, which indicate the nature of the mischief. In cases of *gastro-colic fistula* the matters vomited very frequently indicate, or at least render probable, the existence of lesion from either cancerous or simple ulceration. In a very able memoir on this subject, Dr. MURCHISON has adduced 33 cases, of which 21 were caused by cancer, and 9 or 10 from simple ulceration. As to these he remarks, “that the proportion of cases resulting from cancer is more than double that from simple ulceration ; and, as simple ulcer of the stomach is about five times as common as cancer, Dr. BRINTON was not far wrong when he conjectured ‘that its proportion in the malignant disease is at least thrice (and probably six to ten times) as great as in the ulcer.’ This accounts for the fact that some pathologists, as ROKITSKY and BOCK, speak of it as a result of cancer of the stomach, but make no mention of it under the head of simple ulcer.” Had Dr. MURCHISON consulted what I have stated on this subject in the article STOMACH, and in the chapter on “*Ulceration and Perforation of the Stomach*,” he would not have asserted that pathologists “make no mention of it (gastro-colic fistula) under the head of simple ulcer.” This may be true as respects the foreign pathologists whom he has referred to ; but if he will turn to p. 1008 of the *third vol.* of this work he will find, among other remarks pertinent to this subject, the following : “The ulceration may be *cietrized*, as shown in the article just now referred to (§ 39), or it may proceed onward after adhesions have been formed between the opposite portions of the peritoneal membrane, and thus the ulceration may proceed not only to perforation of the stomach, but also to perforation of a contiguous portion of the digestive canal, as the colon, or to more or less ulceration and perforation of another organ ;” and I proceed to farther illustrate the subject, and, in the following paragraphs, to describe the commencement and course of ulceration and perforation of the stomach, the several varieties they present, and the symptoms which they occasion.

15. This greater rarity of gastro-colic fistula, as a sequela of simple ulcer, may, according to Dr. MURCHISON, “depend on three causes : viz., the fact that simple ulcer is much more rarely met with in that part of the stomach nearest the colon—the great curvature (in 5 only of 220 cases) ; and that there is a greater tendency in cancer to contract adhesion to neighbouring parts before perforation ; while, at the same time, the cementing matter is of a less permanent quality than the lymph thrown out in the vicinity of a



simple ulcer." The absolute frequency of gastro-colic fistula, as a sequela of *cancer* of the stomach, can only be approximated. DIETRICH observed this lesion in 6 out of 160 cases, or in 3·75 per cent.; Dr. BRINTON in 11 out of 507 cases collected by him, or in 2·17 per cent. That the ulceration generally commences in the stomach, I have shown in the places above referred to; but I have admitted that it may originate in the colon or other parts, and extend by perforation into the stomach. The cases recorded by Dr. MURCHISON fully illustrate this inference. He remarks that, "Out of the thirty-three cases, there is every reason to believe that the disease commenced in the stomach in twenty-six; in four cases there are not sufficient data for forming an opinion on the point; and in three only does the disease appear to have been most advanced in the colon after death." In cases where tubercular disease or abscess finds its way into the stomach or into both stomach and colon, as in very rare instances, when this result has occurred from disease of the kidney or the gall-bladder, the course of the alteration is manifest.

16. iii. THE DIAGNOSIS of *gastro-intestinal*, or *gastro-colic fistula*, depends chiefly on the characters of the matters thrown off the stomach. The topic is partly discussed, especially as respects the antecedent and many of the existing symptoms, in the articles referred to above; but those phenomena which indicate the presence of this fistula have not been so fully described. *Vomiting* is always present, although it sometimes recurs only at intervals. It is often preceded, and attended, by fetid eructations, or by bilious, dark, or grumous matters in the ejected fluids. When there is a free communication between the stomach and intestine, the vomited matters generally are more or less faecal. But where the fistula is long or circuitous, vomiting of faecal matters may not, or only occasionally, be observed. Dr. MURCHISON remarks that out of nineteen cases in which the history was clear, faecal vomiting was observed in eleven, and fetid—perhaps faecal—in three; and he draws the following conclusions: "1. Faecal vomiting is probably present in all cases in which the opening (except this be very minute) is situated in the fundus, or great curvature, of the stomach, and may also be present when the disease is in the pylorus. 2. In all cases in which food is vomited the opening is at or near the pylorus, so as to preclude the passage of food." In cases of cancer of the pylorus or duodenum, vomiting may be less after the formation of the fistula than before, as the food in the former case may pass into the intestine, into which the fistula opens.

17. Where *gastro-intestinal* or *colic fistula* exists there may be present eructations with a faecal odour, as well as faecal vomitings; or there may be only fetid eructations. Next to faecal vomiting, the presence of undigested food in the stools is an important indication of *gastro-intestinal fistula*. I have long supposed that at least some of the cases of *lientery*, among the many which came before me at the Infirmary for Children, were actually instances of this form of fistula. As the disease advances, as it usually does, to a fatal issue in the course of several days (although it is sometimes prolonged to some weeks or even months, with intervals of partial ease), diarrhoea with undigested matters in the stools soon after they had been taken, or an occasional recurrence

of costiveness, emaciation, anaemia, general cachexia, or yellowness of the body, as described in the articles already referred to, are commonly observed.

18. III. VOMITING AND RETCHING FROM SYMPATHETIC IRRITATION.—Irritability of the stomach, so great as to be attended by vomiting or retching, on receiving all, or most kinds of food or drink into the stomach, is often occasioned by vascular erythsm, inflammation, or organic alterations of an adjoining, or even of a distant organ or part. The vascular excitement of, and determination of blood to the uterus during *pregnancy*, and the death of the foetus in utero in the advanced months of gestation, are often productive of vomitings or retchings; and organic and inflammatory diseases of the uterine organs frequently occasion the same symptoms, especially in delicate and susceptible females, or when those diseases are of an acute or severe kind. As may be readily inferred, inflammations and organic lesions of any of the allied or adjoining viscera very often are productive of vomiting, the rejected matters consisting, as in the preceding diseases, chiefly of the ingesta, and of watery,ropy, and mucous fluids, sometimes coloured with bile, unless when congestion, inflammation, or abscess may give rise to the discharge of blood or purulent matter from the stomach, or from adjoining parts, communicating with the stomach. Enlargements, morbid growths, or other lesions, in the liver, spleen, pancreas, mesentery, omentum, disease of the diaphragm, or of the gall-bladder and ducts; misplaced, or suppressed, or retrocedent gout; suppression of urine, or retention of this excretion, verminous diseases, &c., severally occasion vomitings when they reach an advanced stage of development.

19. In some serious organic diseases of the brain, vomitings sometimes occur, and occasion, in both children and adults, in the latter especially, much difficulty in determining the true cause and morbid relations of this symptom, which, however, may be readily ascertained in most instances from the history of the case, and by estimating the succession and grouping of the accompanying phenomena. Diseases of the stomach itself, especially of the pylorus, duodenum, and of the intestines, particularly of the small, of the liver and gall-bladder—more especially when the concave surface of the liver is much affected—and of the kidneys, are frequently attended by vomiting; and when gall-stones irritate the gall-bladder or ducts, or are passing along the latter, the vomitings and pain are then very distressing. The irritation of calculi in the kidneys, or in their pelvis, or when calculi are passing along the ureters, produces the same distressing symptoms; but the most urgent and dangerous vomitings occur in obstructions of the bowels, especially of the small intestines, from internal or external strangulation, from intussusceptions, from inflammations, or from various mechanical or structural causes of intestinal obstruction, as shown in various places (see *arts. COLIC AND ILEUS, CONCRETIONS, BILIARY AND INTESTINAL, &c.*), more particularly when the vomitings are attended by fetid eructations, and when the vomited matters present a fetid or faecal odour, or a more unmistakable faecal character. In all cases of obstruction, and irritation of any of the ducts and canals within the abdomen, especially when the obstruction is caused mechanically or by a solid

body, the sympathetic occurrence of vomiting is generally very urgent and distressing, although often presenting intervals of comparative ease. In all cases of vomiting and retching, the history of the case should be ascertained as fully as possible.

20. Besides these more strictly local diseases, which are attended by vomitings and retchings, there are several constitutional maladies, especially those adverted to above (§ 18, 19), in which these symptoms are of a most prominent character, and proceed from contamination of the blood, acting both on the frame generally and upon the stomach and its allied viscera in particular. No doubt that in all these maladies, whether the choleric and hæmagastic pestilences, or the contamination occasioning malignant puerperal fevers, or that arising from poisoned wounds, inoculation, &c., the morbid impression is primarily and energetically made upon the organic nervous system, the retching and vomiting often following closely upon it; but nevertheless, this impression being made, the alteration produced in the blood aids it, and promotes both by increasing the depression of the organic nervous force, and by irritating the stomach and adjoining parts, thereby rendering the vomitings of a more serious, dangerous, or obstinate character, as evinced in these maladies.

21. IV. VOMITING AND RETCHING FROM SEA-SICKNESS are common to all persons soon after they feel the motions of vessels on the sea, if they have not acquired an immunity from this suffering by habit.

22. i. DESCRIPTION.—In some, vomiting is preceded by a prolonged nausea, with extreme prostration, faintness, vertigo, and apathy. In others, vomiting takes place more or less quickly, after nausea is first felt; and in many the nausea and distressing retchings, with headache, vertigo, and prostration, continue or return at shorter or longer intervals after the stomach has been completely evacuated, but only if the motion of the vessel continues. When the retchings continue or return after free vomiting, a ropy, mucous fluid, mixed with more or less bile, is evacuated, owing to the emulgent operation of the retchings on the liver, gall-bladder, and ducts, thereby producing a favourable influence on certain diseases noticed hereafter (§ 25).

23. The severity and duration of sea-sickness depend much upon the susceptibility of the individual, and the extent of motion to which he is subjected; and, although generally all persons are liable to sea-sickness on first going to sea, yet its severity and continuance are great in proportion to weakness and delicacy of constitution. Usually, however, the sickness either subsides or ceases altogether in a few days; and in previously healthy persons it is followed by a good or craving appetite, and a return of health, although the cause of the suffering may continue. Many persons who, from frequent or prolonged voyaging, have become exempt from sea-sickness, at least while at sea, experience a recurrence of it when they return to sea, after having passed a considerable time on land; but it is usually of short duration, or slight in these persons. Sea-sickness occurring during a short passage, as in crossing the Channel, immediately ceases with the stillness of the vessel, or on landing, vertigo only remaining for a time. Some delicate persons, who are very susceptible of sea-sickness,

are also liable to nausea and vomiting from the motion of a carriage, especially while they remain inside, but escape from the sickness when they ride outside.

24. ii. PROGNOSIS. — Sea-sickness, although mentally and physically most depressing, and although both vomitings and retchings are most severe, is generally unattended by danger, and it very rarely terminates fatally. When this event takes place, it is more the consequence of the continued nausea, and of the loathing of all kinds of ingesta, owing to their inducing retchings, and of the resulting inanition, exhaustion and fatal sinking, than of any alteration of structure, or contingent lesion, produced by the severity of the retchings. In all cases where this species of sufferings is prolonged by severe weather, and susceptibility or peculiarity of constitution, more or less debility, exhaustion, inanition, anæmia, and loss of flesh are observed; but generally, as soon as the cause ceases, or even considerably subsides, as on the occurrence of fair weather after storms, or on landing, these effects soon disappear, and are often followed by restored health, or even by an improved state of health, owing to the circumstance noticed above (§ 22).

25. iii. THE NATURE OF SEA-SICKNESS has been a subject of frequent discussion. The brain, the heart, and the cerebro-spinal nervous system generally, have been severally referred to as the seat of this distressing disorder. That these are more or less affected during its continuance—that the brain and nervous system are impaired in volition and in the vigorous discharge of all their functions, mental and physical, cannot be doubted; and that the heart acts feebly, although sometimes rapidly, but without tone or vigour, is equally manifest, until the retchings and vomitings occasion more or less reaction, accompanied with perspiration, which varies with the severity of the sickness and the constitution of the patient. But the affection of these—of the cerebro-spinal nervous system and of the vascular and muscular systems, with the organs and parts more immediately concerned in the act of retching—is the necessary result of the effect produced by the motion of the vessel upon the semilunar and allied ganglia, and the viscera they endow with the organic nervous force. This effect continues until retching and vomiting supervene and occasion more or less reaction, according to the constitutional powers of the sufferer. That the primary influence of the vessel's motion on the semilunar and allied ganglia is depressing may be inferred from the distressing sense of sinking referred to the epigastric region, and from the general physical and mental prostration preceding the retchings. That vomiting and retching, each varying in grade and character, follow very powerful depressing influences, is shown by the effects of most sedative and exhausting agents—whether poisonous, morbid, or infectious—which act more especially or immediately on organs or surfaces endowed by the organic nervous force. It may, therefore, be inferred that the vital depression produced by the vessel's motion is the chief cause of the sickness and vomiting, the irritation caused by matters contained in the stomach during this depression merely aiding in developing the retching and vomiting, this act and the evacuation of the stomach affording a slight temporary relief, the depression and sickness still continuing more or less, or for a period, according to



the continuance of the cause, and to the constitution and predisposition of the sufferer.

26. iv. THE REMEDIAL INFLUENCE OF SEA-SICKNESS is sometimes remarkable in several diseases, more especially when the sickness is attended by free vomiting, the appetite returning afterward, and when the patient does not suffer inordinately, or when the suffering is not long continued. In severe *hooping-cough*, especially in persons near or past puberty, and even in infants and children, sea-sickness is often of marked advantage. In this complaint the patient, sufficiently protected from exposure or weather, may be placed in a rowing or sailing boat, when much swell of the sea is observed, and carried out to sea, until vomiting takes place, when a return to land may be directed. In other cases and circumstances, a short voyage in sailing vessels furnishing the requisite accommodations, may be taken with benefit. A similar advantage may accrue in cases of *tubercular consumption*, as I have shown in that article (§ 420); in *hæmoptysis*; in *spasmodic asthma*; in *chronic bronchitis*; probably in some cases of *chronic diarrhœa* and of *dysentery*, when suitable accommodations are afforded, and in *torpid states of the liver*, &c. In these cases, the influence of nausea in lowering vascular action and removing spasm, and the action of retching and vomiting in emulging the biliary apparatus (§ 21), and in evacuating mucous accumulations in the bronchi, are of essential service. By this action, also, congestions of the lungs and liver are removed, or are aided in their removal, and a healthy secretion of bile promoted—circumstances of great importance in several pulmonary, biliary, hypochondriacal, gastric, and intestinal diseases.

27. v. THE RETCHINGS AND VOMITINGS which may be viewed as idiopathic or primary, and which are not necessarily connected with inflammation or structural disease of the stomach and allied viscera, although they ultimately, by persistence in their cause, become thus associated, are those which take place in the morning, and which either recur frequently or habitually, and which the patient generally removes for the time with a glass of brandy, or of brandy and water, or of some other favourite liquor. In these cases, morning sickness is the result of exhaustion from previous over-stimulation, and for a time is merely functional, but sooner or later it becomes more and more structural. The same form of sickness often follows in the morning heavy suppers, either with or without excessive drinking. The circumstance of a person complaining of sickness or vomiting habitually or frequently in the morning, and more especially if he have recourse to spirits to remove it, before any food can be taken, is most positive evidence of such person being an incurable drunkard, although he may never have been intoxicated.\*

\* The following cases will illustrate this: A young man in a large wine-merchant's house, and having free access to extensive wine vaults, was seized, after habitual sickness and vomiting in the morning, with most violent pain in all the smaller joints, and especially in the wrists and ankles. He came under my care, when he confessed that sickness and vomiting every morning upon getting out of bed had continued for three or four years; that it was instantly cured by a glass of brandy, but that he could take little or no breakfast. As soon as he returned to business in the morning, he continued drinking at intervals sherry or port wine, or brandy, as either came in his way, and he thus took from two to three bottles of wine, besides brandy, every day, unless Sunday, when his supply was not so liberal. He recovered his health,

The form of disorder may be considered as allied to *vomiting from sea-sickness* (§ 21, *et seq.*), the most idiopathic form of vomiting.

28. When the functions of the stomach are exhausted by the excessive excitements of intoxication, or by the irritation of indigestible or unwholesome food, and more especially by the ingestion of substances which readily enter into the acetous, the lactic, or the vinous fermentations, when received in the weak and exhausted stomach, then pain, vomiting, or eructations are produced by the gaseous products, by the acidity, and by the various irritating matters and combinations resulting from the fermenting substances, which, if they fail in undergoing these processes during the imperfect digestion, experience putrefactive changes, and occasion the same, or even more serious and more obstinate disease.

29. When the digestive processes are impaired or exhausted, owing to general debility (*see that article*, § 15, *et seq.*), or to inordinate muscular or mental exertions, or to local or constitutional disease, the articles of food most prone to undergo fermentation, as bulky vegetables, raw fruits, fermented bread and liquors, &c., produce an increase of disorder, by the fermentation which ensues, and the frequent repetition of such disorder at last passes into more serious disease, which is characterized by recurrences of retching and vomiting, and by gastrodynia, whenever such disease is aggravated by the ingestion, or commixture of fermentative substances. The connexion of fermentation in the stomach with indigestion and vomiting, has been well discussed by Dr. TURNBULL, and although the doctrine of fermentation has been pushed too far by him, there can be no doubt of the importance of giving due consideration to changes of this nature, which certainly take place in the digestive canal, when the nature, the quantity, and the admixture of indigestible, saccharine, and putrescent substances are taken into the stomach during functional or structural lesions of the digestive organs. Persons addicted to the excessive use of intoxicating

relinquished this habit, and he has for very many years been sober and temperate. He never evinced any symptom of disease of the stomach or liver, and he is the only instance I can recollect of a complete reformation from drunkenness.

A cook in my family was always sick and retching in the morning, and could take no breakfast. Her principal meal was supper; soon after which she retired into her own room, and nothing was known of her until she had partly recovered from her sickness and resumed her morning duties. Upon hearing this I became alarmed at the probable consequences of her after-supper indulgence, and means were devised to prevent her apartment from being fastened on the inside, and then she was there found drunk. These cases are not of unfrequent occurrence; but in some instances vomiting is only occasionally present, chiefly in the morning—a chronic diarrhœa, sometimes passing to a fatal dysentery, with diseased liver, taking its place.

Several cases of very young persons, mostly females, who have died from the excessive use of spirituous liquors have been brought under my notice. These were characterized by habitual sickness and retchings in the morning, which were allayed by the accustomed stimulus or by strong tea, but followed, after a longer or shorter period, by enlarged and fatty liver; or by emaciation, chronic diarrhœa or dysentery, with ulcerated bowels; or by the most violent pains in the extremities, of a mixed neuralgic and gouty or rheumatic character, terminating in several of the cases before the age of twenty. In one fatal case, at the age of 17, the growth was remarkably stunted owing to this vice, all the others who had commenced it at an early age being very much under size. In this instance the fatty liver filled almost the whole abdomen, and descended deep into the pelvis, and produced an abdominal enlargement as great as the full period of pregnancy.

liquors experience more or less fermentation in the stomach after the excitement caused by these liquors has subsided; and the products of the fermentation, acting on the exhausted organ, frequently produce that amount of irritation which is manifested by nausea, retchings, vomitings, and gastrodynia, and which the drunkard relieves by a recourse to the accustomed stimulus.

30. VI. VOMITING ATTENDED BY THE DISCHARGE OF THE SARCINA VENTRICULI.—In 1842 Professor GOODSIR described this remarkable production, and since that time many cases of this kind have occurred, most of which have been either observed or referred to by Dr. TURNBULL, of Liverpool. I have not observed more than three instances of this production in the substances vomited since attention was first directed to it, and these occurred in cases of organic disease of the stomach, in which the fermentative and putrefactive processes appeared to have been readily produced. The writer just mentioned has noticed thirty cases of *sarcina ventriculi* recorded by various authors, and has himself observed six. Of these eighteen had terminated fatally. He arranges these cases in four groups: "1. Cases in which ulcers or eicitricies arising from them, or some other non-malignant disease of the stomach, obstructed the pyloric orifice. 2. Cases of cancerous disease contracting the pylorus. 3. Cases in which there was no disease of the stomach itself, but displacement or some other condition obstructing the pylorus. 4. Cases in which the disorder may have been functional, recovery having taken place more or less perfectly." The analysis of these cases furnishes the following: the disease is more common in males than in females, in the proportion of twenty-four to ten, and between the ages of thirty and fifty. Of the three cases which I saw two occurred in confirmed drunkards between forty and fifty-five years of age. In all the cases vomiting was the prominent symptom; flatulent distention, offensive eructations, pain in the stomach, costiveness, emaciation, and anæmia being also present. According to Dr. TURNBULL, the sensation of "something alive in the stomach" was also experienced, but this was not remarked in any of the cases for which I was consulted. Dr. B. JONES found the urine alkaline, and this excretion has, in some instances, contained oxalate of lime and sugar.

31. VII. TREATMENT.—i. TREATMENT OF SYMPTOMATIC VOMITING AND RETCHING.—It is manifest that the treatment of retching and vomiting can only be successfully accomplished by a strict examination of the history of each case, and of its causes, extrinsic and intrinsic; and by ascertaining the particular category of causes to which each individual case should be referred; whether the vomiting has been occasioned, 1st, by the ingestion of an injurious or poisonous substance (see POISONS); 2d, or by the invasion or accession of a febrile, exanthematous, or pestilential malady; 3d, or by disease of the stomach or bowels, or of some adjoining organ or part; 4th, or by sympathy with the irritation or structural lesion of a more remote organ; 5th, or lastly, by the abuse of intoxicating or stimulating liquors.

32. A. If the vomiting be caused by poisonous ingesta, it is obvious that the means advised in such cases in the article now referred to are required, conformably with the evidence obtained as to the nature of the poisonous substance which

has been taken. To this extensive subject I can add nothing to what I have adduced in the article POISONS.

33. B. If there appear any reason to ascribe the vomiting to the invasion of an exanthematous, infectious, or pestilential malady, especially when any such is prevalent or epidemic in the same locality, or when the vomiting is associated with shivering or any of the other symptoms of the invasion of any of these maladies, then the treatment advised for the accession of such malady ought to be adopted. (See the treatment recommended on the accession of the CHOLERIC, and HÆMAGASTRIC PESTILENCES, of SCARLET FEVER, SMALL-POX, &c.)

34. It should, however, be recollected that the vomitings accompanying marked vital depression, especially those occurring in, or characterizing pestilential and malignant maladies, and in animal or fish poisons, and in contaminated states of the blood, admit not of being cured, or even mitigated, by depressing or sedative remedies, whether narcotic or anodyne, unless exhibited in small doses, and conjoined with stimulants, aromatics, and cordials. Opium, morphia, and their preparations, hydrocyanic acid, chloroform, and hydrochloric ether, will produce little benefit unless they be given in the manner now stated. In these cases, opium and hydrochloric ether, when judiciously combined with other means, will sometimes be of service; but the hot spices, warm stimulants, and cordials, prescribed in large doses, according to the malignancy of the case, will be found the most efficacious. Thus large quantities of capsicum, brandy, and of other powerful stimulants, have been retained by the stomach in malignant and pestilential maladies, while sedatives and narcotics have been instantly rejected by it; and even the spirits of turpentine have been retained, both in these maladies and in the last stage of low fevers, as well as in similar states of disease, especially when the blood is contaminated and vital depression is extreme. I have seen these effects in numerous instances since 1817, when I first employed these substances in the hæmagastria pestilence or yellow fever. In all these diseases the usual means of allaying vomiting had failed, and increased the vital depression, the sense of sinking and mental apathy, and therewith the vomiting; which symptoms generally terminated in a fatal pumping up, or rejection of the contents of the stomach, without retchings, but often with singultus, when sedatives and narcotics were employed.

35. C. It is obvious that the vomitings and retchings caused by inflammatory and organic lesions of the stomach and allied viscera can be allayed only by means which will remove or alleviate the disease of which the vomitings are merely a symptom. In the less severe of these a temporary aid may be obtained from the use of hydrocyanic acid, from opiates given with oleaginous demulcents and nitrate of potash, or the muriate of ammonia in very small doses, and from external derivatives. But creasote and the more heating substances, often of service in the opposite states of vomiting, are seldom of service in these. In cases of intestinal disease the remarks now made are equally applicable; and where strangulation or obstruction from any cause exist in, or otherwise implicate, the intestinal canal, the removal of it is essential to the removal of the vomiting. (See arts. COLIC and



ILEUS, CONCRETIONS, BILIARY and INTESTINAL, DIGESTIVE CANAL, STOMACH and INTESTINES, INFLAMMATION and ORGANIC LESIONS, &c.)

36. *D.* The retchings or vomitings caused by irritation, inflammation, and organic lesions of distant organs require careful examination and discrimination; and although these sympathetic vomitings are often allayed, especially by demulcents conjoined with refrigerants and sedatives, or with hydrocyanic acid, or creasote, opiates, &c., yet the treatment should be mainly directed to the particular disease, or structural lesion, of which vomiting is a distressing symptom, whether it be seated in the brain, in the kidneys, uterus, or other part. When the irritating cause is a calculus, or concretion in the gall-ducts or bladder, or in the urinary apparatus, the means advised for these, under their respective heads, and warm anodyne fomentations, tepid or warm baths, are those which are most appropriate, although these may be conjoined, or alternated, with those which are most serviceable in allaying the vomiting (§ 34). Creasote is often of much benefit, when the stomach itself and its allied viscera are free from inflammatory and organic disease, and when the retchings are purely sympathetic; but it soon fails as a palliative when the primary or chief disease has not received due attention, or when it remains unsubdued. Moreover, creasote, when given in too large or frequent doses, is apt to increase inflammatory action when it exists, especially if it be of a sthenic or plegmonous character. When the vomiting is attended by manifest asthenia, or vital depression or exhaustion, creasote, as well as stimulants, aromatics, and cordials, are frequently very beneficial.

37. *E. The vomitings, &c., attending pregnancy*, especially in the earlier months of this process, will often be palliated or prevented by the above means—by the combination of the alkaline or earthy carbons with infusions of columbo, cascarilla, and with tinctures of the same tonics, and with the addition of hydrocyanic acid, or small doses of opium, or of chlorodyne. In this class of cases fermentation often accompanies the sympathetic irritability of the stomach, and develops this latter state into the act of retching or vomiting. In the more obstinate and severe cases, or when these means prove inefficacious, then creasote in pill or in mixture, combined, according to circumstances, with opiates, alkalies, &c., should be prescribed.

38. *ii. TREATMENT OF SEA-SICKNESS.*—This is a very hopeless subject, yet it is nevertheless one which should not be abandoned, for with care and judgment sea-sickness may be more or less alleviated and its duration abridged. The usual means employed for it are seldom of service and often tend to prolong the nausea, without ultimately preventing the vomiting. It is generally preferable, when the sufferer is young or even moderately strong, to partake of such food and drink as he may prefer, thereby to prevent ineffective retchings; and when free vomiting is accomplished, to take small and frequent doses of a suitable anodyne, in small quantities of fluid. Substances of large bulk, or even in moderate quantity, or gaseous fluids, by distending or filling the stomach, generally bring back the retching and vomiting. During the nausea, or even after it is moderated, the stomach is quite incapable of digesting alimentary substances; there-

fore their presence in the stomach acts only as an irritant of the weak and susceptible organ, and in a short time brings back the sickness and vomiting. Having, therefore, promoted a free evacuation of the stomach, in the way now advised, small doses, often repeated, of either hydrocyanic acid, or tincture of opium, or chlorodyne, or of chloroform, or of hydrochloric ether, may be given in small quantities of a demulcent mixture, which may be made agreeable by the addition of a few drops of an aromatic cordial. Creasote has been recommended, but its odour is disagreeable to many persons; but, when prescribed for sea-sickness either in the form of pill, or in a demulcent mixture, it should be given in small doses, or not exceeding half a minim for a dose, which may be repeated according to its operation. The demulcent and anodyne medicines may be given in any of the mint waters, especially when the patient is distressed by flatulence and eructations, and any cordial or aromatic may be added if sinking at the epigastrium or vital depression be experienced.

39. Females and delicate persons, subject to sea-sickness, should retire to their cabins immediately on embarking, if the voyage be likely to be longer than a few hours, or to continue during the night. Unless the sufferer be weak, or extremely depressed by the sickness, retchings, and vomitings, it is generally preferable for him to keep up and struggle against his enemy, as he will be the more likely to overcome ultimately, and to shorten the duration of the attack. If he have any return of appetite after vomiting, it should be indulged in great moderation, the food being the most digestible within his reach; if sickness and vomiting recur, they will generally be of short duration, and be followed by a return of appetite, which, if prudently indulged, will be generally followed by health. This plan is to be preferred if a long voyage, or one beyond three or four days be anticipated; for by that time, or not much longer, the evil will cure itself. It is only for the more severe cases, or in short voyages, or for delicate females and weak persons, that the medical treatment advised above (§ 38) is either much required, or particularly appropriate.

40. *iii. TREATMENT OF RETCHINGS AND VOMITINGS CAUSED BY DRUNKENNESS AND BY FERMENTING INGESTA.*—The drunkard generally knows well how to remove the morning effects of his previous indulgence, and he finds the recurrence to his accustomed liquor, or to one still more energetic, to be the most efficacious remedy. But he counts not the ultimate cost, viz., according to the nature of the liquor indulged in, organic disease of the stomach, pylorus, liver, &c.; or chronic diarrhœa, or dysentery, delirium tremens, &c., often complicated with the foregoing. Safer remedies for retchings and vomitings consequent upon DRUNKENNESS are the aerated waters, the compound decoction of aloes with cinnamon water, creasote in pills or in mucilaginous mixtures, and the means advised in the article now mentioned (§ 15, *et seq.*). When the vomitings are of daily recurrence, it is evident that the only permanent cure is to subject the patient to such restraint as may be legally permitted, seeing that he is incapable of restraining himself. This is, however, one of those forms of moral degradation against which the laws have no provision, and for which medical aid is rarely

of any avail, especially as regards prevention or permanent cure—

"Ille cum hominibus, non cum Diis agitur."

41. Vomitings caused by *excessive fermentation* in the stomach are generally allayed by medicines which either arrest or neutralize the process, or develop the vital force of the organ, or allay excessive irritability of it, or which operate in more than one of these modes. The sulphite of soda, the alkaline carbonates, the carbonates of magnesia or of lime, calcined magnesia, the citrate of magnesia, the sub-nitrate of bismuth, the biborate of soda, are severally of use in these cases, especially when prescribed in conjunction with tonics, stimulants, and anodynes, and sometimes with narcotics. As the fermentation and the vomitings are generally attended by impaired organic nervous force, as well as by irritation of the digestive mucous surface, tonics and stimulants are required for the former morbid condition, while anodynes, especially hydrocyanic acid, or small doses of opium, or of opiate preparations, or of the lupulus, or of hyoseyanus, are appropriate for the latter. In many instances, in addition to a frequent recourse to certain of the above, in varying combinations, other substances which are calculated to remove irritation and to check fermentation, and at the same time to promote a healthy secretion from the stomach, liver, and duodenum, may be given from time to time. Of these the most beneficial are Hydrargyrum cum cretâ, the pilula hydrargyri, and calomel, and these, according to circumstances, may be given in full doses with opium, creasote, the preparations of hop, &c. Small doses of the nitrate of potash, or of the hydrochlorate of ammonia, given with hydrochloric ether, in mint water, &c., are also beneficial in these cases.

42. In all cases of *retching and vomiting*, referable either to the *abuse of intoxicating liquors*, or to *extreme dyspepsia attended by vomitings*, or to *gastric fermentation*, or to *pregnancy*, attention should not be directed alone to the morbid condition of the stomach, for the vomitings or retchings will not be permanently removed, or they will be liable to recur after a time, if the biliary and gastro-intestinal secretions and excretions be not duly promoted. In all such cases, therefore, having palliated the vomitings, a moderate action should be kept up on the bilio-intestinal functions; and the means which I have most frequently employed have been the hydrarg. cum cretâ, or blue pill, or Plummer's pill with soap taken at bed-time, once or twice in the week, and the following draught early on alternate mornings, or every morning, or at bed-time:

No. 279. R Potassæ Bicarb., gr. xij. ad xvij.; Ammonia Carbonatis, gr. vj.; Tinct. Sennæ Comp.; Tinct. Cardamom. Comp., aa, ʒj.; Infusi Sennæ Comp., ʒss.; Infusi Gentianæ Comp. ad ʒjss. Misce, et sit Hæustus.

To this draught may be added, according to the peculiarities of the case, a dose either of hydrocyanic acid or of the extract of taraxacum.

43. iv. VOMITINGS ATTENDED BY THE REJECTION OF THE SARCINA VENTRICULI are generally the result of protracted indigestion, attended either with fermentation or with organic disease, malignant or otherwise, of the stomach or pylorus (§ 80, *et seq.*). In the majority of these cases the means already advised may first be employed, and if these fail, as they often will in this form of complaint, other more energetic medicines should be prescribed, generally in efficient combinations,

viz., camphor, creasote, and small doses of opium, made into pills, with any suitable powder, and with either common tar (pix liquida) or the balsam of Peru. These having been taken for a time, the exhibition of tonics with alkalies, or alkaline carbonates and hydrocyanic acid; or of the sulphites, or the pyroxylic spirit, or limewater, or the chlorides, may be tried, conjoined with preparations of either cinchona or cascarilla bark, or with an infusion or decoction of cedar or pomegranate bark.\*

44. v. DIET IN CASES LIABLE TO VOMITINGS, &c.—*Vomitings*, when palliated or removed, present the greatest difficulties as to the selection of alimentary substances. As a general rule, all such as are liable to readily undergo any of the fermentative processes should be avoided. But most alimentary substances undergo one or other of these processes, whether of an acid, or of a putrefactive, or of a saccharine nature, when mixed with the morbid secretion of the stomach, and when the organic nervous force of this organ is much impaired. Still there are aliments which are much less prone to undergo these changes than others, although much depends upon the peculiar idiosyncrasy of the patient. Frequently the food which the patient most desires in these cases, or for which he feels a relish, will be found the most easily digested or retained. Substances which readily undergo fermentation, as fermented new bread, vegetables, raw fruit, the ingestion of varieties of food, and fermenting liquors should be avoided. In this subject, however, I can add nothing to what I have advanced in the article on INDIGESTION. (See § 55, *et seq.*)

BIBLIOG. AND REFER.—*Hippocrates*, Opp. p. 1080. (*Vom. nigra*).—*Celsus*, l. ii. c. 13.—*Oribasius*, Synopsis,

[\* We present some of the *Formule* which we have found most successful in allaying idiopathic vomiting:

i. R Catechu, ʒi.; Columbo, grs. xxx.; Winter's Bark, grs. xx.; Boiling Water, fl. ʒiv. M. Digest for eight hours; strain, and add Sirup of Red Roses, fl. ʒj. M. In tea-spoonful doses, repeated ʒro re nata.

ii. R Powdered Columbo, ʒiv.; Opium, grs. iv.; Oil of Peppermint, gtt. x.; Sirup sufficient. M. Beat into a mass, and form thirty pills. Give two-three times a day in spasmodic vomiting.

iii. R Columbo, ʒss.; Boil in Water, liij. to five fl. ʒ.; strain, and add Carbonate of Potassa, grs. x.; Lemon Juice, fl. ʒij.; Tinct. of Opium, gtt. xii. M. A tea to a table spoonful every hour as an anti-emetic.

iv. R Creasote, gtt. j.; Camphor Water; Comp. Infus. Gentian, aa, fl. ʒvj. M. A tea-spoonful occasionally.

v. R Tinct. of Opium, fl. ʒss.; Decoct. of Starch, fl. ʒiv. M. For an enema in obstinate vomiting.

vi. R Burgundy Pitch, ʒij.; Yellow Wax, ʒss.; Powdered Cinnamon, ʒj.; Oil of Pimento; Oil of Lemons, aa, ʒj. M. Melt the resin and wax together, and strain; when they begin to thicken, on cooling, mix in the cinnamon previously rubbed with the oils, and make a plaster. This plaster over the stomach will very generally relieve nausea and vomiting, and relieve gastric uneasiness when nausea is not present.

vii. R Bicarbonate of Soda, ʒjss.; Powd. Gum Arabic, ʒj.; Oil of Mint, gtt. lv.; White Sugar, ʒj.; Carbonic Acid Water, ʒiv. M. A table-spoonful occasionally; very useful.

viii. R Powdered Ipecac., grs. ij.; Carb. of Soda, grs. x.; Sirup of Poppies, ʒj.; Mint Water, ʒvj. M. In tea-spoonful doses, to check spasmodic vomiting.

ix. R Infusion of Spearmint, fl. ʒvj.; Burned Brandy, ʒj.; Paregoric, ʒj.; White Sugar, ʒss. M. A table-spoonful every fifteen minutes.

x. R Licarb. Potassa, ʒj.; Powd. Gum Arabic, ʒj.; White Sugar, ʒj.; Seltzer Water, ʒvj.; Tinct. of Camphor, gtt. xi. M. A tea-spoonful frequently.

A strong mustard cataplasm over the epigastric region will often prove more successful than any internal remedies. These cases, however, must not be treated empirically, but always in reference to the pathological cause.]



l. vi., c. 41.—*Alexander Trallianus*, l. iii., c. 8.—*Paulus Aegineta*, l. i., c. 42.—*Avicenna*, Canon, l. iii., fen. 13, tract. 6, cap. 8.—*Sennertus*, Pract., l. vi., p. 9, c. 3.—*Riverius*, Observat. Communic., p. 349, 662.—*F. Salandi*, De Vomitu ac de aliis Affectibus præter Naturam, Svo. Veron., 1609.—*Zacutus Lusitanus*, Prax. Admirab., l. iii., obs. 115. (*Excrementis per os reddita*).—*Blankard*, Collect. Med. Phys., cent. vii., n. 40.—*Schurig*, Lithologia, p. 150. (*Calculi ejection*).—*Diemerbroeck*, Anatomia, l. i., c. 7, 8. (*Enemata vomited*).—*Benivenius*, De Abditis Morb. Causis, c. 88. (*With rejection of flesh-like masses*).—*Fabricius Hildanus*, cent. iv., obs. 32; cent. v., obs. 117. (*Chronicus*).—*Koenig*, Specimen Lithogonesias Humanae, 1:85. (*Calculi ejection*).—*Willis*, Pharmacut. Ration., par. i., cap. 3. (*Caused by Tobacco applied to the Head*).—*J. Veridet*, Tractatus de Prima Coctione et de Ventriculi Fermento, 12mo. Geneva, 1692, par. ii., p. 231.—*Riedlin*, in Med., 1695. (*Produced by Tobacco applied to the Head*).—*Huzham*, in Philos. Transact., no. 382; et Opp., vol. iii., p. 8. (*From diseased Omentum*).—*Bonet*, Sepulchretum, l. iii., s. viii., obs. 39, 49, 42; et s. xiv., obs. 20. (*Clysmata per os reddita*).—*Jessop*, in Philos. Transact., no. 417.—*Lister*, in Ibid., no. 417. (*Larvæ varia insectorum per os reddita*).—*Hoffman*, De Vomitu, Opp. iii., p. 147.—*De Doloribus Præcordiorum*, obs. ii., Opp. ii., p. 273.—*C. Tricren*, Observat. Medicæ-Chirurg. Fasciculus, 4to, plates. Lugd. Bat., 1743. (*Clysmata per os reddita in ileo*).—*Harris*, De Morbis Acutis Infantum, p. 30.—*Stroom*, in Acta Soc. Reg. Med. Havn., t. iv., p. 214.—*Beuland*, De Difficili Alimentorum ex Ventriculo in Duodenum Progressu, 4to. Lugd. Bat., 1737.—*De Haest*, Rat. Med., par. ii., p. 60; par. iii., p. 95; par. vii., c. 4. (*Clysmata per os reddita: quomodo id fiat*).—*M. Stoll*, Prælect., t. ii., p. 169, 429.—*Thomman*, Annales Wurcheb., b. ii., p. 171.—*Geoffroy*, in Journ. de Méd., t. viii., p. 244. (*Succus hydatidosus per os redditus*).—*Crumpe*, in Med. Facts and Observat., vol. viii., no. 23; et in Transact. of Royal Irish Academy, vol. vi. (*Larvæ of Insects rejected*).—*Ostander*, Denkwürdigkeiten, b. i., 2, st. 3.—*Wall*, in Philos. Transact., vol. iv., par. ii., p. 451. (*Ecereta singularia*).—*Hodges*, in Mem. of the Med. Society of London, vol. v.—*Vaughan*, in Ibid., vol. ii., art. 13.—*Klein*, Chirurg. Bemerkungen, p. 245.—*Zeviani*, in Mém. de la Société Italienne, t. vi., p. 93. (*Vom. urtiosa*).—*Thilentus*, Medicæ et Chirurg. Bemerkungen, p. 302. (*Angustatio jejuni*).—*J. P. Frank*, De Curand. Hom. Morbis, l. v., 2d p., p. 370-478.—*Autenrieth*, in Hufeland Journ. der Pract. Heilk., b. iii., p. 268.—*Badeley*, in Edin. Med. Comment., vol. xviii., p. 249. (*Habitual in Morning*).—*Barthez*, in Mémoires de la Société Médicale d'Emulation, iii. ann., p. 491.—*Wichmann*, Ideen zur Diagnostik, b. i., p. 159.—*Bouvenot*, Recherches sur le Vomissement, Svo. Paris, 1801; 3d ed., 1807.—*Rangue*, in Bulletin de la Société de Médecine de Paris, p. 143; et App. ad Journ. de Méd. Contin., t. xii. (*Larvæ reddita*).—*Dumanoir*, in Journ. de Méd., t. lxxvii., p. 73.—*A. Portal*, Mémoires sur la Nature et Traitement de plusieurs Maladies, 5 tomes, Svo. Paris, 1808, t. iv., p. 272, et *pluries*; et Observations sur les Maladies du Foie, Svo. Paris, 1813, *pluries*; et Cours d'Anatomie Médicale, t. v., p. 174.—*J. Copland*, in Appendix to Translation of A. Richerand's Elements of Physiology, &c., 2d ed., Svo. Lond., 1829, p. 577.—*Spangenberg*, in Horn. Archiv., &c. March, 1812, p. 261.—*Cooke*, in Dublin Journ. of Med. Sciences, July, 1837, p. 367.—*J. W. Arnold*, Das Erbrechen; die Wirkung und Anwendung der Brechmittel, Svo. Stuttgart, 1840.—*J. Budg*, Die Lehre vom Erbrechen; nach Erfahrungen und Versuchen. Mit einer Vorrede von Dr. F. Nasse, Svo. Bonn, 1849.—*Anon.*, in British and Foreign Medical Review, &c., vol. xv., p. 60.—*W. Brinton*, in Ibid., vol. xvii., p. 162; et vol. xix., p. 479.—*C. Murchison*, on Gastro-colic Fistula, &c., in Edin. Med. Journ. for July and Aug., 1857. (*Gives numerous Cases and References to Papers on Vomiting, &c., from Perforation of the Stomach, &c.*).—Also Transact. of Pathol. Society of London, vol. viii., and Lancet, 1857, i., p. 43.—*Med. Times and Gazette*, 1857, i., p. 41.—*Gardner*, in Edin. Med. Journ. for July, 1855, p. 51.—*W. B. Carpenter*, Principles of Human Physiology, &c., 5th ed., Svo. Lond., 1855, p. 66.—See also BIBLIOG. and REFER. to the diseases of the STOMACH, LIVER, DUODENUM, INTESTINES, &c.

[AMEB. BIBLIOG. and REFER. See various American Treatises on the Practice of Medicine, already so often quoted; also American Journ. Med. Science, vol. viii., p. 243, &c.—N. York Journal of Med., vol. ii., p. 167: Review of *Langston Parker*, "The Stomach in its Morbid States," &c. See ref. to art. on INDIGESTION.]

WORMS—VERMES—VERMINATION—ENTOZOA (from *ἐντός*, within; and *ζῶον*, an animal). *Σκωληκισμός*, *ἐλμυνς* vel *ἐλμυνς*, Gr. *Ἐλμυνθολογία*, Ramsay. *Verminatio*, Pliny. *Helminthia*, Good. *Helminthologia*, *Helminthiasis*,

Swediaur. *Parasitismus intestinalis*, Young Vers, Fr. *Würmer*, *Wurmsucht*, Germ. *Vermi* Ital. *Worms*, *Invermination*, *Intestinal Worms*. *Animal Parasites*.

CLASSIF.—I. CLASS, I. ORDER. (See Preface.)

1. DEFIN.—*Animal parasites are independent organized beings, descended from peculiar animal parents, which require, in order that they may be enabled to complete their development, growth, or reproduction, to take up abode either constantly or temporarily in or upon a second animal organism of a different kind, from which they also derive their nourishment. Human parasites are those which select the human body as this second organism.*

2. The above definition is a modification of that given by Dr. KÜCKENMEISTER, in the very able translation of his work *On Animal and Vegetable Parasites*, by Dr. LANKESTER. LEUCKART (*Parasiten und Parasitismus*, in VIERTODT's Archiv, 1852) remarks, that whenever "an animal is too small and too imperfectly armed to overcome and destroy another living being upon which its instincts direct it to seek for nourishment, it must be contented with robbing it, by feasting upon its blood, juices, and solid parts." As respects the human body especially, it would be more correct to state that, whenever the vital force of this body is reduced by disease, inanition, and exhaustion, it is then exposed to the invasion of those parasites which are peculiar to it; and that these parasites are developed and multiplied with a rapidity generally in proportion to the diminution of vital force or of vital resistance to their invasion and multiplication. The only animal parasites which appear in or upon the human body belong to the classes of insects and worms, and probably also to the infusoria. "As far as we know, these parasites of man are not subject to the attacks of secondary parasites." Many of them are common to man and other mammalia, while others are peculiar to him.

3. It has been very justly remarked by Dr. LANKESTER, in his excellent and instructive preface to the work just referred to, that the study of animal parasites involves questions of the highest scientific and practical interest, and that it teaches that, though scientific theories may sometimes be barren of immediate practical results, they cannot fail to free the mind from prejudices which lead to erroneous practice, and even to disastrous results. On this ground, therefore, he refers to some apparently of the least practical topics, with the hope of assisting the reader to understand those generalizations which the subject of animal parasites involves. But however barren the consideration of the generation and reproduction of organic beings may at first sight appear to be, it is of the utmost importance in respect of its ultimate or practical results; and Dr. LANKESTER has done medical men a great service in furnishing them with a succinct and correct summary of the results of the recent researches of Dr. KÜCKENMEISTER and others as to this subject, especially as regards the history of the human entozoa. Dr. LANKESTER justly remarks that, although it was easy to account for the existence of intestinal worms, by referring it to the ingestion of their eggs, yet a difficulty presented itself regarding hydatids, which evidently had an independent animal existence. Hydatids exhibited no sexes, they produced no eggs, and readily supported the theory of "spontaneous, or equivocal generation." Even as this theory was driven successively from

every other part of the animal and vegetable kingdoms, it "found refuge among the strange and paradoxical creatures imbedded in the tissues of man and other animals, far removed from any external influences." The time has, however, at length arrived when it can be demonstrated that the cystic worm is no longer to be regarded as the result of a "fortuitous concourse of atoms," but that it is the offspring of the tape-worm, undergoing one stage of its growth, through which it must pass before it can attain to the more dignified development of its parent. In many cases the cystic worm has the power of developing, at this stage of its growth, a large number of creatures resembling itself, and these have, each of them, the power of developing themselves into tape-worms. "The cystic worm—let it be an *Echinococcus*—has originated from the egg of a tape-worm, the embryo of which has found its way from the stomach and intestines, through their walls, into the tissues of the body. This worm consists of a vesicle or bag, to which is attached a head, called the 'scolex.\*' In *Cysticercus*, the hydatid of the pig, there is but one scolex, but in *Echinococcus* there are many scolices. Now this scolex, or scolex-head, as it is sometimes called, is the stock or germ—the head—from which all the segments of a tape-worm proceed. The cyst of *Echinococcus*, then, has the power of producing a large number of these heads, each of which may grow into a tape-worm. The cyst—the original cyst of the worm—is, in the language of STEENSTRUP, 'a nurse.' KÜCKENMEISTER and the Germans call it a mother cyst. But this cyst will produce not only scolex-heads, but other cysts like itself. These are 'daughter cysts;' and these secondary cysts will also produce scolex-heads. They are also 'nurses;' and in virtue of their existence the mother cyst becomes, in the language of STEENSTRUP, a 'parent nurse.' The second cyst may contain, as it frequently does in the *Echinococcus altricapariens* of KÜCKENMEISTER, a third cyst—a 'grand-daughter cyst,' which is also a 'nurse,' and thus on." (LANKESTER, in *Preface to his Trans. of KÜCKENMEISTER, &c.*)

4. Neither these cysts nor scolex-heads have any sex. Nor do they acquire sexuality as long as they remain in the flesh in the hydatid condition; and to this state of the worm Professor HUXLEY applies the term "*agamozoid*." In order to acquire the conditions necessary to the development of sexual organs, the cystic form of the worm must be followed by another animal. "The scolex-head then becomes, in its turn, truly a 'nurse,' and this of a most prolific kind; for, the cysts below being displaced, the numerous segments ('proglottides,' as they have been called) begin to make their appearance. The conditions are now such, that sexes appear; each segment is merely a capsule containing a male and female generative apparatus, and nothing else. Eggs, the result of the union of sperm-cells and germ-cells, are now produced in myriads. These pass into the external world, and, being swallowed and digested, set free the embryos, which again

become cystic, as above described." (*Op. cit.*, p. xiii.)

5. These phenomena are not peculiar to *entozoa*. STEENSTRUP observed them in the *medusæ*, the claviform polypes, the salpæ, and the trematode entozoa. Professor OWEN has also adduced similar cases, in the exposition of his views on "Parthenogenesis," or the successive production of procreating individuals from one ovum, or asexual reproduction. Not only are there some among the lowest animals, in various stages of development, capable of producing buds, or individuals like themselves, without sexual union, and embryo-bearing eggs, but there are also among the *articulata*, both in the *crustacea* and *insects*, females producing eggs, which proceed to the development of perfect animals without any sexual intercourse, or union of sperm-cells and germ-cells. Such a phenomenon is so opposed to the general opinion as to the necessity of sexual intercourse for the development of the embryo in the higher animals, that many have not hesitated to express their disbelief in it. Dr. LANKESTER thus expresses himself respecting it: "Regarding, however, the phenomena of reproduction from the point of view afforded us by the *entozoa* and other forms of lower animals, we must receive the facts in both cases equally cautiously, and judge according to the evidence. VON SIENOLD, in his work on 'True Parthenogenesis,' affords good evidence for believing that the queen bee deposits two kinds of eggs, the one of which has come under the influence of the sperm-cells of the male, and the other not. A very curious point in this history is the fact that while both eggs produce young bees, the impregnated eggs produce worker or female bees, while the unimpregnated eggs produce male or drone bees. In a recent communication to the Royal Society, Mr. LUBBOCK has shown that species of the entomotracheous crustaceous genus *Daphnia* produce living young in all respects like their parents, without any sexual intercourse. It would appear, then, that up as high as the most developed forms of articulate animals, we have evidence that there is no real difference between the functions of reproduction and generation."\* (*Op. cit.*, p. xiv.)

#### 6. I. THE ORIGIN OF ANIMAL PARASITES, more

\* Dr. LANKESTER, for the better understanding of these and other general remarks he has offered, has subjoined the following diagram:

GENESIS.		
Growth.	Reproduction.	Generation.
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p><b>HOMOGENESIS.</b> (Reproductive force acting through similar cells.) It is represented in— A. Plants, by Phytoids. 1. Isophytoids. Poda. 2. Allophytoids. Pulbilli. Bulbs. Sporules, &amp;c. B. Animals, by Zooids. 1. Isozooids. Gems or buds. 2. Allozooids. "Nurses" (Steenstrup). "Agamazoids" (Iluxley). "Virgin Aphides" (Owen). "Agamic eggs" (Lubbock). "Drone bees" (Siebold).</p> </div> <div style="width: 48%;"> <p><b>HETEROGENESIS.</b> (Reproductive force acting through dissimilar cells, sperm-cells and germ-cells.) It is represented in— A. Plants, by 1. Gynophytoids. Female flowers. Pistillidia, &amp;c. 2. Androphytoids. Male flowers. Antheridia, &amp;c. 3. Androgynophytoids. Hermaphrodite flowers. B. In Animals, by 1. Gynozooids. Females. 2. Androzooids. Males. 3. Androgynozooids. Hermaphrodites.</p> </div> </div>		

\* The word "Scolex"—σκόληξ, Worm, or Spuiwurm, Germ., or round worm, was employed by MÜLLER to designate, generically, imperfectly-developed forms of tape-worm. "The head was the most characteristic part of these creatures, and gradually the term 'scolex' was applied to the heads of all forms of cystic or tape worms. The term *scolex* has now no generic signification, as the creatures to which it was applied were immature forms of other genera." (LANKESTER, in *Preface, &c.*)



especially of the worms which often infest the human body, has long been a subject of speculation among naturalists and physicians. One class of writers believed that these parasites, at least many of them, originated in the endowment of animal molecules with vitality from the parent body, favoured by certain states of the vital forces of that body, the states originating their organization also promoting their growth and propagation. Since the progress of microscopic research consequent upon the improvement of our instruments, this doctrine, which till then had been gaining ground, has received a signal overthrow, chiefly at the hands of German helminthologists. VON SIEBOLD, one of the most recent and of the ablest of these, remarks on this topic, "that he has gradually arrived at the conclusion that these parasites do not originate by 'equivocal generation' from substances of a dissimilar nature; and physicians and naturalists thought themselves justified in assuming that the parasitic worms in the intestines of men and animals owed their origin to ill-digested nutriment, or that they were developed in the most widely different organs from corrupt juices. They took it for granted that certain morbid processes in any organ were competent to give rise to parasites, assuming that the elementary constituents of an organ affected by disease, separated themselves from their natural connexion, and not perishing, but transforming themselves into independent organisms, became parasites. It was certainly more convenient thus to speculate than to endeavour to attain, by patient researches and careful experiments, a secure insight into the hidden workings of nature. It was by the latter method that the hitherto unanticipated development of the sexual apparatus was discovered in many parasites, such as round worms, thread-worms, tape-worms, and flukes, in which such an immense mass of eggs and young can be generated, that it seems unnecessary to look farther for their origin. As to tape-worms, it is well known that a single individual is often composed of many hundred joints. Each joint is capable of laying many hundred ova, so that the number of the progeny of a single tape-worm is enormous. Dr. ESCHRICHT, of Copenhagen (*Das Physische Leben in Popularen Vorträgen*; Berlin, 1852; p. 112-115), possesses a tape-worm expelled by a patient of his, which consists of 1000 joints; and some of the joints contain more than 1000 ova. According to this writer, a careful examination of the reproductive organs of a female *Ascaris lumbricoides* shows the number of ova to be innumerable." (VON SIEBOLD, *Op. cit.*, p. 4.)

7. The precise mode in which such an immense brood of these parasites make their way into the interior of animals was long imperfectly understood. It was, however, ultimately ascertained that intestinal worms undertake emigrations in order to reach that animal whose organs are fitted by nature for their habitation. VON SIEBOLD states that the young of the tape-worm (which inhabits the intestine of the higher animals only) "leave the place where they were brought forth, or laid as eggs (that is to say, they emerge from the intestine of their parent's host), and seek an opportunity to enter into the intestine of some other creature. It is easy to convince one's self of the emigration of the tape-worm, by examining the excrement of animals infested by them, at those times of the year at which they attain their

sexual maturity. We then observe that sometimes single joints, or connected series of joints, full of ova, sometimes immense masses of the ova, are passed with the fæces. The same thing holds good with regard to the ova of the *Distomata* that infest the livers of our ruminating animals; their eggs, after they have been transferred from the liver to the gall-ducts, being washed out with the bile into the intestine, and evacuated with the dung. These emigrations of the young of the intestinal worms benefit not only the creatures they infest, but themselves. There are many kinds of intestinal worms in whose eggs the embryo is never hatched, if they remain in the place where they have been laid."

8. The description (German like) given of the accidental but frequent ingestion or passage of the ova of parasites into other animals, and the dignifying of this passage into an emigration, as if it were an act of instinct, imparts an air of imagination to what is nevertheless the fact of the frequency of this passage, and of its consequences. This writer states that these parasites "must wander to some other place in order to develop their young, or to allow of the escape of the young already developed in them. The young must then either wait for, or seek, an animal to lodge in, having entered into which, they are capable of attaining sexual maturity. By such emigrations the infested animals are at the same time freed from guests whose increase would be both troublesome and prejudicial. For example, what would happen if the millions of eggs that a single round worm or tape-worm can produce were developed and generated in the same intestine in which they were laid? Would not the intestine, after the young had attained their full growth, and brought forth others in their turn, become at last so choked up as to disable this part of the digestive apparatus, so that the whole organism of the unhappy animal must perish along with his parasites!" (*Op. cit.*, p. 5.)

9. These emigrations and immigrations of the young of intestinal worms, or, in less imaginative language, this discharge and passage of their ova from and into other creatures, are very important, though long an unregarded part of the history of their propagation; and numerous facts have been discovered showing that the origin of intestinal worms in the viscera of animals can be readily accounted for according to natural laws, without recurring to the mysterious hypothesis of "equivocal generation." An important circumstance favourable to the preservation and passage of the ova of parasites into animals in which they become developed is the hardness of the shells which envelop them. Owing to this the germ or embryo of many of them are protected from external injury, and their vitality preserved for many months, and until circumstances admit of their development. After leaving the dwellings of their parents the ova pass into privies, drains, dust-heaps, &c., where, surrounded by more or less moisture, and subjected to various grades of temperature, and contained in manures, and spread on fields and meadows, they are, either in the state of ova or in that of more advanced development, taken with various articles of food into other animals, or they are washed by rains into streams or brooks, and are swallowed in the drink. Many of the young intestinal worms, according to VON SIEBOLD, more or less developed, but still enclosed in their egg-shells, remain quite

inactive in their passive emigrations, and it is of course a mere chance whether they reach their goal or not. The young of others, having left their egg-shells, may take a more active share in the process, creeping out of their holes and corners in wet weather, or in damp mornings, upon plants or grass, and enter animals suited for their habitation and development with the food. By preventing sheep from being driven out in the morning till the dew is off the grass, or from grazing in wet swampy pastures, these animals are so far protected from *Strongyls* and *Distomata*. The origin of the thread-worm, known as the *Filaria insectorum*, that lives in the bodies of adult and larval insects, could not be accounted for, and was referred to equivocal generation; especially as they contained no trace of sexual organs. But VON SIEBOLD ascertained that they were not true *Filaria*, but belonged to the peculiar family of thread-worms, comprising the genera *Gordius* and *Mermis*; and that these parasites wander away when full grown, boring their way from within through any soft part of the body of their host, and thus creeping out. "These parasites do not emigrate because they are uneasy, or because the caterpillar is sickly, but from that same internal necessity which constrains the horse-fly to leave the stomach and intestine of the horse where he has been reared; or which moves the larva of the gad-fly to work its way out of the boils on the skin of oxen. The larvæ of both these insects creep out in order to become chrysalises, and thence to proceed to their higher and sexual condition." Now this desire to emigrate is implanted in very many parasitic insect larvæ, and the perfect full-grown, but sexless thread-worms of insects, are in like manner moved by this desire to wander out of their previous homes in order to enter upon a new period in their lives, which ends in the development of their sexual organs.

10. As some kinds of parasites that have emigrated are never met with below a certain size, so some kinds that have already made their way into the interior of animals are not to be found under a certain size. It is known that many parasites do not enter into the animals in which they are to pass through their farther stages of growth, until they have attained a certain degree of development elsewhere. This is particularly the case with such intestinal worms as remain parasitic in the last stage of their existence, viz., that of sexual maturity, while the *Gordiacæ* quit their parasitical life, in order to become sexually mature away from the animal they have infested. During these early wanderings, the worms in question, VON SIEBOLD remarks, commonly undergo a change of form, often accompanied by other phenomena of so highly remarkable and abnormal a character as to render their metamorphosis or phases of existence almost incomprehensible. By degrees a mass of observations of remarkable metamorphoses of intestinal worms accumulated and formed a complete chaos of seemingly irregular phenomena, until the Danish naturalist, STEENSTRUP, succeeded in evolving a certain order out of this confusion, by the discovery therein of a hidden underlying law of nature, by which all the phenomena that had seemed so devoid of plan could be reduced to order. He named this law the "*Alternation of Generations*," and advanced two points of difference between it and *metamorphosis*; the first is,

that the young of those animals which come under the former term are not only unlike their parent at first, but remain so; the second distinction is, that this young generation, so dissimilar to the parent animal, brings forth new creatures, which either themselves or their descendants revert to the original form of the first parent. Whereas, in simple metamorphosis, the dissimilar young pass by gradual changes into the likeness of the parent animal, and until this metamorphosis is complete are incapable of generation. Thus in the alternation of generation the parent animal produces dissimilar young, which STEENSTRUP terms "*nurses*," whose descendants only take her form. "A most important circumstance which characterizes these *nurses* or '*Agamozooids*' physiologically is, that they bring forth young without themselves possessing any real sexual apparatus. Those agamozooids, in fact, multiply by division, by external or internal gemmation; they develop within their bodies germs which become new creatures. But these germs do not deserve the title of eggs, nor is the place where they are developed to be called an ovarium, since the germs which VON SIEBOLD distinguishes by the name of '*sporule*' are not only devoid of the ordinary constituents of an ovum, a vitelline membrane, yolk, germinal vesicle, and so-called germinal spot; but the farther development of the germ-body is not preceded by those conditions which are essential to the development of true ova within an ovarium. The organ in which, in certain agamozooids, the '*geminae*' are formed, cannot, therefore, be properly termed an ovarium, and I shall distinguish it by the name of '*sporularium*.' No '*nurses*' present any sexual distinctions, and hence their method of multiplication and propagation, which takes place by means of sporule formed within sporularia, or by ordinary budding, or by division, must be arranged amid the modes of asexual reproduction." (VON SIEBOLD, *Op. cit.*, p. 13, 14.) I must refer the reader to what this writer farther remarks on the topic of alternation of generation, especially as it occurs among the *Trematoda* and *Cercariae*.

11. From his researches, VON SIEBOLD infers that certain sexually matured Trematoda—*Monostomum*, *Distomum*—generate young within their sexual organs, which are not developed into sexual individuals similar to their parents in form and structure; but that each embryo is converted into an animal of remarkably different form—into a *Cercaria*-sac, which has the nature of a sexless nurse, since, without possessing sexual organs, it nevertheless generates young *Cercariae*. These *Cercariae* again differ from their parents, but gradually become sexually perfect, and in form and structure take the likeness of their grand-parents. If we follow these *Trematoda*, which are subject to the alternation of generations, in their wanderings, we shall find that they meet with many obstacles to the completion of their developmental course, which is the entering into the viscera of an animal in which they can become sexually developed. The destruction of the various forms of *Trematoda*, by the untoward circumstances to which they are liable, is compensated by the fact that they are furnished by the alternation of generations with the means of greatly multiplying the various developmental stages of their descendants—a sufficient number of individuals always remaining out of the numerous young of the



nurses and larvæ, which achieve the propagation of their species.

12. The history of the *Cercariæ* explains many phenomena erroneously interpreted by the supporters of the doctrine of equivocal generation. It was difficult to understand how living entozoa could have originated in the viscera of animals, sometimes in organs deeply seated or cut off from all external communication, and could there propagate their kind; the mode of origin—by equivocal generation—assumed for them apparently accounting for the circumstance of these entozoa being unprovided with sexual organs. Frequently, also, young or imperfectly developed intestinal worms were met with in the substance of organs, and were attributed to equivocal generation, "though in reality these *entozoa* were in the act either of emigrating, or immigrating, or else were tarrying until the creature they infested should be swallowed by some other animal, when the passive immigration for which they waited would take place. Many wandering parasites are unresistingly suffered to bore their way into and remain in the organs of animals, while certain kinds are stopped by becoming enclosed in a coagulable lymph thrown out by the organs they traverse." There are two kinds of cysts connected with parasitic worms: in the one the cyst is thrown out by the parasite itself, as in the case of the *Cercariæ*; in the other, the organ in which the encysted parasites lie imbedded furnishes the walls of the cyst. In such cysts or capsules are found the most diverse kinds of intestinal worms, whose farther course may be very various. "Many of the encysted young of intestinal worms experience no farther change, but only remain for a longer or shorter period until such time as they may, together with their host, pass into the intestine of some animal of prey suitable for their future development. To this kind belong the *Cercariæ* already mentioned. There is also a small, imperfectly developed, round worm, hitherto always erroneously described as a perfect intestinal worm, under the name of *Trichina spiralis*, which remains a long time in its cyst without either growing or developing sexual organs. This minute *Trichina spiralis* is met with not only in the substance of the muscles of man, but also in the pleura and peritoneum of the most widely different kinds of vertebrate animals, enclosed in oval capsules about a quarter of a line in length." After a certain time of confinement is allotted to this little worm, and its deliverance not effected, it dies and undergoes a process of calcareous degeneration, its form being altered or entirely destroyed. Other encysted intestinal worms succeed in obtaining nourishment through the walls of their prison, and thus go on growing. Those, however, which are intended by nature to attain their sexual maturity only in the digestive organs of certain animals cannot arrive at this condition in their cysts, and must, notwithstanding their farther growth, fail in the attainment of the power of sexual propagation, until the animal they inhabit is devoured by the predaceous creature whose intestine is alone fitted to allow of the passage of these asexual intestinal worms into the last stage of their development. (VON SIEBOLD.)

13. From what has been stated we gather that those young intestinal worms which are developed at a distance from the nidus of their parents succeed, in the end, in reaching those situations

where they may repeat the part of their progenitors, and reproduce their kind. The embryo parasites that have only just left their eggs disperse in all directions, so that they may immigrate into other animals, whenever an opportunity offers. Many thousands of these embryos of necessity never attain their object, owing to the numerous casualties they are liable to. However we may accept the facts displayed in the researches of VON SIEBOLD and others, it by no means follows that the emigration or immigration of these parasitic animals is the result, as they suppose, of instinct. The parasite having arrived at the full stage of sexual development produces numerous ova, many of which necessarily are so circumstanced, by situation, dissemination, &c., as to admit of their passage through the different phases and metamorphoses of evolution and development; but that these changes, and the emigrations resulting from the circumstances common to all or most of them, admit of the inference that instinct has any thing to do with the phenomena; or that their temporary or continued residences, their journeys or passages from one place or animal to another—their migrations, &c., proceed from their possession of this endowment or principle, or that their migrations and residences are otherwise than altogether *passive*, cannot be received or credited without farther evidence. But, after thus stating a disbelief of the instinctive faculties of these parasites, the facts connected with their propagation and evolution become practically of importance.\*

14. Instead of viewing the migrations of the embryo or young parasites as passive, and the accidents connected therewith as equally so, VON SIEBOLD considers the former as altogether instinctive, and the latter as stray migrations. But, while altogether disbelieving that instinct has any thing to do with the matter, this writer's views deserve consideration. The point of most importance, he remarks, is "that these embryos should select, as their temporary residence, such creatures as will be consumed by those animals, whose intestines served their parents as a habitation and birthplace for their young. But many of these young, immigrated, intestinal worms will die without reaching the last stage of their development, in consequence of their host and involuntary carrier escaping from his natural enemies. Again, many embryos will be led astray

\* If we understand by the *instinct* of animals that unknown faculty or endowment implanted in their constitution by the Creator, by which, independent of instruction, observation, or experience, and without a knowledge of the end in view, they are impelled to the performance of certain actions tending to the well-being of the individual and the preservation of the species, there is as much reason to believe that the minutest organisms in nature are as perfectly controlled by it as the largest. That it is not infallible in either is evident from the fact that both are sometimes at fault, and commit mistakes; but then these errors are quite as frequent among the one class as the other. Indeed, facts would seem to establish that insects, and even worms, are endowed with a much more exquisite and flexible instinct than the larger animals. Such pliability to circumstances, such adaptation of means for accomplishing an end, as is observed in the bee, the spider, the ant, the silk-worm, the moth, the caterpillar, the locust and its larvæ, &c., can nowhere be found among birds, fishes, or any of the higher species of animals below man; and the same remark, we think, will apply to human entozoa and ectozoa in all their varied conditions and modes of existence. No one can read "An Introduction to Entomology," by KIRBY and SPENCE, one of the Bridgewater Treatises, without being convinced that instinct is more strikingly manifested in the insect tribe than in any other class of animated nature.]

by the migratory impulse (!), and pass into animals which never become the prey of those whose digestive canal is their goal." The embryos which thus "fail in their object" are here viewed as "strayed parasites;" and VON SIEBOLD remarks that "the *Trichina spiralis*, which is found in human beings, and which must be regarded as an encysted sexless nematoid worm, can hardly have found its way into the muscular structure of man, except by having gone astray: so also the *Cysticercus cellulosæ*, which not unfrequently appears in the muscles and other organs of man, and which is an asexual tænioid agamozoid. The *Cysticercus cellulosæ* changes to a sexual tape-worm in the intestinal canal of certain mammals; the *Trichina spiralis*, after transportation to another and more favourable situation, will also become sexually developed." Many of the young of the intestinal worms, which only attain the last stage of their development in the digestive canal of the *vertebrata*, are said, by this writer, to pass, in the course of their wanderings, into the wrong organs [their instincts, I may infer, have not yet been fully developed or perfected!]; for instance, into the muscular substance, the liver, or the peritoneum; here they remain undeveloped, while other individuals of the same brood, which have found their way into the intestines of the same animals, arrive at maturity. "The *Triænophorus nodulosus*, infesting fishes, offers an example of this, developing into a long sexually mature tape-worm, in the intestines of pikes and perch, while at the same time these fishes often harbour other tape-worms, which are, however, always sexless, in cysts in their liver. These last must certainly be also regarded as strayed parasites."

15. VON SIEBOLD believes that, in the bodies of vertebrate animals, the small embryos of intestinal worms bore their ways not unfrequently through the walls of the blood-vessels, and fall into the current of the circulation, and are carried thus to distant parts. Embryos of intestinal worms, to which the term of hæmatozoa has been given, have often been discovered in the blood of birds, reptiles, and fishes. These hæmatozoa never increase in size, nor become farther developed in the blood, but often stick in the small blood-vessels of organs, which afford a more congenial soil for their farther growth; and hence appear, on some occasions, worms in the brain, in the spinal marrow, and in the eyeball of man and animals. The *Cysticercus cellulosæ*, the *Cænurus cerebri*, and the *Echinococcus hominis* and *veterinorum*, have been occasionally found in these situations, and have served as an argument for the doctrine of equivocal generation; [also the *Filaria*.] "With the migrations and alternation of generation among the intestinal worms two other phenomena are connected, which were formerly quite unnoticed, but which now have been generally observed. In the vicinity of those sexually perfect intestinal worms which, in their wanderings, are subject to the alternation of generations, only eggs, or recently-hatched embryos, are met with; but the farther stages of development are always wanting, since they first make their appearance after the emigration of the young to other places. Farther, many of these intestinal worms, taken while in the act of migrating, are never found below a certain size, since they do not commence their wanderings, either as nurses or larvæ, until they have already

reached a certain stage of their development." (*Op. cit.*, p. 30.) Would it not be more correct to view these evolutions of parasites from germs and ova, and their passages, or passive migrations, during their development, as accidents connected with the numbers generated, and with the locations and transitions of the embryos—their development and sexual perfection being results of favourable circumstances which happen only to a few of the many generated—instead of viewing these migrations and their consequences as events produced by the instinctive endowment which VON SIEBOLD has conferred on these parasites? While the possession of this endowment by these animals may be disputed, the facts adduced by this writer, respecting their origin, development, and alternation of generations, are more deserving belief and consideration.

16. II. THE CLASSIFICATIONS OF INTESTINAL WORMS have been so numerous and so different the one from the other, that an attempt to place them before the reader would not be consistent with my limits and with expectations of utility. Recent researches, also, have thrown doubts on the principles by which the older arrangements were guided; and the orders, *genera*, and *species* of *entozoa*, which have been found in the animal kingdom, are so numerous as to prevent even a brief notice of them at this place. I must, therefore, refer the reader to the more recent works enumerated in the BIBLIOGRAPHY, and especially to those of Dr. JOY and M. FELIX DUJARDIN. Dr. KÜCHENMEISTER has given a classification of animal and vegetable parasites, which, as far as it refers to the *human entozoa*, I shall, with some alterations, adopt.

17. I. Class, INFUSORIA.—II. Class, VERMES, HELMINTHIA.—i. Order, PLATYELMIA.—A. Sub-order, *Cestodea*. (a) Genus, *Bothriocephalus*. (b) Genus, *Tænia*.—B. Sub-order, *Trematoda* or *Trematodea*. (a) Genus, *Monostoma*. (b) Genus, *Distoma*.—ii. Order, NEMATELMIA.—A. *Trichocephalus dispar*, *Trichina spiralis*.—B. *Oxyuris vermicularis*.—C. *Strongylus gigas*, *S. longigginatus*.—D. *Ancylostomum duodenale*.—E. *Ascaris lumbricoides*.

18. 1st Class.—THE INFUSORIA are destitute of high organization. They are simple, vitalized, membranous structures, which live by mere endosmose. The *vibriones*, the *bursaria*, *monads*, and *bodones* "are a peculiar attribute of fermenting and putrefying fetid animal substances, or always presuppose a half-dead soil, and do not derive their nourishment so much from living substances as from matters which the living body has expelled, or are in the course of expelling as foreign to it; they are properly only to be regarded as indirectly parasitic upon the human body." FICINUS found sluggish bean-shaped infusoria 1-1000 to 1-1500 of an inch, and sometimes double this size, and of a globular form, in the perspiration of the feet, on the places where the epidermis was thrown off, as well as on the moist folds of the skin in young children; and others have met with them in purulent and foul secretions from the vagina, urethra, bladder, putrescible urine, &c.

19. i. *Trichomonas* (DUJARDIN). *T. vaginalis*.—"Corpus nodulosum, gelatinosum, lacteum; cauda brevis; flagellum corpore triplo longius. Motus vacillans. Longit. 1-222." This parasite occurs only in women with gonorrhœal discharge, or with an abundant vaginal secretion containing



mucous and pus globules, and never in a healthy vaginal secretion. KÖLLIKER and SCANZONI found it in the vaginal—never in the cervical—secretion of both pregnant and unimpregnated women, especially in the creamy and acid secretion, sometimes in the neutral, but never in the alkaline. Owing to its resemblance to the mucous corpuscles, it has been confounded with them. The body of this parasite is 0.01 to 0.018 millim. in length; the flagellum, 0.028 to 0.03 millim. in length; and furnished with 4 to 8 short cilia, in continual movement, which facilitate its recognition. The capability of infection by these infusoria has not been determined, although very probable.

20. ii. *Denticola hominis* (FICINUS). “*Genus valde dubiosum*” (KÜCHENMEISTER).—This parasite, according to FICINUS, is an aciliated infusorium, with the mouth on the ventral surface, and probably furnished with a carapace, resembling the *paramesia* and *kolpoda*; but he considers it more allied to the *monodes* and *vibriones*. The genus he believes to be numerous; and he infers that every mammal has its peculiar species. Dogs and horses, he says, next to man, exhibit these infusoria in abundance. He states that he found them especially in the interstices of the molars; more rarely on the mucous membrane of the mouth, scarcely in the saliva; but most abundantly where the teeth have been neglected, and in hollow teeth. They adhere, form filaments, and advance between the teeth and gums, pushing between the roots of the former and the latter, destroying their union. These effects are, however, prevented and remedied by the usual operations on the teeth, and by aromatic, tonic, astrigent, and antiseptic dentifrices.

21. 2d CLASS.—a. VERMES, HELMINTHA, are of the greatest importance to both the pathologist and the practical physician. The parasites belonging to this class are destitute of many of the organs possessed by the higher animals. They have no distinct respiratory organ; the oxygen necessary to their existence can only be taken up in their fluid food. Hence they are enabled to exist within the human body, either in its closed or open cavities, or in its tissues. “They constitute the true entozoa, and furnish no representatives to the series of human *Epizoa*, although some of them may be destined, in the course of their development, to pass a portion of their lives in water, or perhaps (as in the case of the *Cercaria*) as epizoa upon other animals. Sexual organs may always be detected in those specimens of these animals which have attained their last grade of development.” The senses of sight, smell, and taste are wanting in all these parasites, but their sense of touch appears to be highly developed. The intestinal canal is wanting in the *Cestodea*. In the *Trematoda* it forms a cæcal canal, in which the mouth also performs the functions of the anus; while in the *Nematodea* it becomes a complete alimentary canal, with a mouth, œsophagus, stomach, intestine, and anus. In the tissues of the *Cestodea* is a tendency to the formation of an envelope of a calcareous nature, which is wanting in the *Trematoda* and *Nematodea*. These three kinds of true HELMINTHA are characterized, 1st. By a general sense of touch; 2d. By a vascular system, of four longitudinal lateral canals in the *Cestodea*, and of a fine network of vessels in the *Trematoda*, which are less distinctly marked in the *Nematodea*; 3d.

By a muscular system, composed of transverse and muscular fibres, without transverse striæ; 4th. By the structure of the epidermis, which consists of a homogeneous finely checked substance, closely approaching the character of chitine; 5th. By the property of giving off a strongly refractive, albuminous substance, in oleaginous drops, when in contact with water; and, 6th. By their scarcely effecting their development without a passive and active migration of their embryos and immature young.

22. b. As to the last of these characters, KÜCHENMEISTER, more rationally than was stated, as shown above, by VON SIEBOLD, remarks that “His migration itself is passive during the embryonic state, and as long as the embryos are still enclosed in the egg-shells or envelopes, during which period they usually emigrate once, passively, into the external world, generally with the excrements of the hosts of their parents; and then again, passively in general, into the intestinal canal of the animal in which they are to acquire a higher development. From the latter moment commences their active migration, by which they seek the situations, usually external to the intestinal canal, in which they are to undergo their metamorphosis into the next higher step or steps of development, which is generally accompanied by an encysting process. Finally, as a general rule, at least as regards the trematoda and cestoid worms, they must afterward migrate, passively, once more into the intestine of the animal in which they are to attain maturity; that is to say, they must pass with the food of their new and final host into its intestine.” (*Op. cit.*, p. 4.)

23. c. General pathology shows that the worms cannot effect their active migration without causing some irritation of the regions through which they pass, whether this migration is performed by the youngest brood, as is usually the case, or by the more or less mature animal, as rarely occurs, and chiefly among the *Nematodea*. The passive migration of all immature parasites into the human intestine takes place without any perceptible morbid phenomena.

24. d. The general prognosis of this class of parasites may be stated as follows: 1st. The young animals engaged in their migration are the most dangerous; 2d. Next to these, the migrating mature individuals, which inhabit the intestinal canal, produce the most dangerous symptoms; 3d. The animals which reside in cysts or closed cavities can become dangerous only when they attain an enormous size; but, when small, they may be present without doing any mischief; 4th. Most of the mature individuals are more accessible to curative means than those of lower stages, especially those which live outside the intestinal canal.

25. e. The principles of treatment for the *Helmintha* are, 1st. The destruction or removal of the mature worms, and of their progeny; 2d. The observation of a rational prophylaxis, founded on the modes of life and migrations of the immature individuals; on the constitution and circumstances, and the habits and modes of life, of people subject to these parasites; and on a knowledge of the nature and peculiarities of the situations in which these plagues are endemic.

26. III. The animals of which I have now to treat belong to the first sub-class of DIESING—*Helmintha achæthelminthica: animalia erectebrata, inarticulata* (i. e., *extrematibus articulis nullis*

*prædita*), nunc molia, aut elastica, ebranchiata, setis retractilibus nullis. I have, following VOGT, VIRCHOW, and KÜCHENMEISTER, divided this class into two divisions: i. *Platyelmia*, flat worms; and, ii. *Nematelmia*, round or thread worms; and again dividing the first section or order into, 1st. The *Cestoidea*, VOGT; the *Cephalocotylea*, DIESING; or the *Platyelmia colonias exhibentia*, or flat-worm colonies, of KÜCHENMEISTER; and, 2d. The *Trematoidea*, VOGT; *Myzelmia*, DIESING; or *Platyelmia isolata*, isolated flat-worms, KÜCH.

27. i. Order, *PLATYELMIA*.—*Entozoa solitaria aut composita, androgyna. Corpus depressum vel teretiusculum, molle, organis ad fixandum aptis præditi. Anus nullus; canalis cibarius aut divinus (rarissime simplex), aut nullus. Cavitas corporis non distincta. Metamorphosis in plerisque; larvæ gemmiparæ aut sporoliparæ.* (LEUCKART.)

28. A. Sub-order, *CESTOIDEA*.—*Cephalocotylea, DIESING; Platyelmia composita, aut colonias exhibentia, Plattwurm-Colonien, or flat-worm colonies, KÜCHENMEISTER; Bandwürmer, tape-worms—Animalia tomotoca, per longum plerumque tempus larvæ nutrice juncta et una cum ea corpus elongatum, articulatum, polymorphum formantia. Larva (Scolex, vulgo caput) pyriformis, foveis aut oculis suctoris quatuor vel duobus instructa, sæpissime uncinata. Proles sexualis (Proglottides, vulgo articuli) organis externis destituta, embryones uncinatis armatos gignentes. Canalis cibarius nullus.* (LEUCKART.)—*Quinque varæ inveniuntur in us metamorphoses: 1. Animal maturum (Proglottis); 2. Embryones uncinati (Grand-nurse, Grossamme); 3. Scolex passivam vitam agens sub forma vermis cystici seu Cysticeera, sub forma Platyceera, et sub forma Acerca; 4. Scolex activam vitam agens (Nurse, Amme); 5. Strobila.*

29. It is only recently that the *cystici*, or *hydatus*, have been shown to be only a stage in the development of the *Tæniæ*, and not to be a distinct family among the *Helmintha*. HIPPOCRATES, ARISTOTLE, and many anatomists and physicians up to the times of REDİ and HARTMANN—in 1683-5—regarded the *Cysticeeræ* as *hydatus*; but the distinct animal nature of these was not recognised until the work of REDİ appeared, and not fully established until the researches of TYSON were communicated to the Royal Society in 1691. (*Philosoph. Transact.*, No. 193, p. 506.) PALLAS, in 1766, stated that all cystic worms are forms of tape-worms, and belong to a single species—“*Tænia hydatigena*, cystic tape-worm”—which only presents some differences, especially in the caudal vesicle, according to the animal it inhabits. But neither TYSON nor PALLAS, by the terms *Tænia hydatigena*, or *Lumbricus hydropicus*, given by them to cystic worms, expressed any opinion as to the genesis of these worms, or their derivation from ordinary tape-worms. GOEZE, in 1780, and WAGLER, advanced but little the views of TYSON; and, although the subject of cystic worms was considered by ZEDER and RUDOLPHI, it made no progress in their hands. At last, in 1842, STEENSTRUP's theory of the alternation of generations made its way, he believing that the cystic worms were early steps in the development of helmintha, which were unknown to him. In 1845, in consequence of STEENSTRUP's discovery, DUJARDIN first asserted that the cystic worms were undeveloped animal forms, and young states of tape-worms; and that they

were produced from those germs of tape-worms which, instead of the intestine, had got into the parenchyma of the body of their host, and, under the influence of this unusual dwelling-place, had advanced to the abnormal state of development which is called a “cystic worm.” Simultaneously, VON SIEBOLD, in Germany, expressed the same opinion with DUJARDIN in France. At first, however, VON SIEBOLD inclined towards STEENSTRUP's view, and said: “In its form, its suckers, and its circle of hooks, the head of the asexual cystic worms possesses such a striking similarity to the heads of certain tape-worms, that one is tempted to believe that the cystic worms are nothing else than undeveloped and larvæ-form tape-worms.” He subsequently, nevertheless, arrived “at the most decided conviction that the cystic worms are strayed tape-worms which have remained undeveloped and become degenerated, and of which the body grew out in the foreign soil into a vesicle, without developing sexual organs.”

30. In 1850, VAN BENEDEN, the Belgian zoologist, declared the vesicular worms to be larval-like, or young states (*scoliecs*) of *Tæniæ*, and compared them with the larvæ of *Tetrarhynchus*. According to him, the head of the tape-worm (*scolex*) is produced from the egg of the tape-worm. If an egg of a tape-worm reaches the intestinal canal of an animal in which it may be farther developed without interruption, the jointed mature tape-worm (*strobila*) immediately grows from the egg in uninterrupted succession; but if it does not reach an intestine of this kind, a longer or shorter period of rest ensues in the farther development as soon as it has arrived at the evolution of the head of the tape-worm (*scolex*); in this case the anterior part of the head sinks into its inflated hinder part, and it becomes a *Cysticercus*, or a cysticercal animal form. KÜCHENMEISTER, however, finds two errors in this inference. 1st. It is not proved that a tape-worm can pass through all the phases of its development in the intestines of its host; and, 2d. And just as little as the caudal vesicle is produced subsequently by dropsical degeneration (DUJARDIN and VON SIEBOLD), does the ready-formed head sink into its inflated hind part, in order to become a *Cysticercus*.

31. As GOEZE had suggested in 1780, KÜCHENMEISTER, in 1851, administered various cystic worms to different animals. For this purpose the latter selected the *Cysticercus pisiformis* of the rabbit, and also the *C. fasciolaris*, and gave the former to the dog and the latter to the cat, and in the intestines of both these animals he “succeeded in rearing *tæniæ* rapidly approaching maturity.” From these experiments he makes certain deductions, of which the following are the most interesting: 1. The caudal vesicle occurs in all individuals of all species of cystic worms, even though they live in the most various zones and different animals. 2. The universal loss of the caudal vesicle has its analogue in the metamorphosis of many animals. 3. All cystic worms, in the earliest period of their existence, have the head constantly inverted towards the caudal vesicle. 4. The state of rest in which the cystic worms must live in the interior of their caudal vesicle, in order to their development, would be inconceivable, if they had to collect the nutritive fluid for themselves, and did not contain it in them. 5. The cystic worms are not strayed dropsical tape-worm nurses, but tape-



worm larvæ furnished with a provisional organ (caudal vesicle), probably being a reservoir of nourishment, and incapable of sexual multiplication, for which there is neither room nor sufficient nutritive material. 6. The cystic worms constitute a necessary step in the development of the *Tænia*. 7. We cannot speak of dropsy or degeneration, and not even of straying, because we do not yet clearly perceive how the brood could get to the dwelling-place of the cystic worm. And, 8. *Cysticerci*, when transferred to the intestines of other animals, do not become developed into jointed tape-worms, unless the species of *Cysticercus* is suited to the intestines of particular animals; thus, the *Cysticercus pisiformis* was not developed in the intestines of the cat, but it was fully developed in those of the dog. KÜCHENMEISTER asserts that all eminent German zoologists now agree with him in believing "that every cestode worm, and not merely the *Tænia*, pass through a cysticercal state; that the cysticercal larva lives in various parenchymatous organs, and the free *scolex* (*strobila*) usually in the intestine of a different host; and, lastly, that the tape-worm head (*scolex*) is produced in the interior of the previous embryonic body (i. e., the caudal vesicle), and remains enveloped in this until it gains the situation for which it is ultimately destined."

32. But to place beyond all doubt that the cystic worms were necessary steps in the development of *Tænia*, it was also requisite to prove their production from the embryos of the tape-worm brood. "It is true that the six characteristic embryonal hooklets have not yet been detected upon true vesicular worms, but we shall shortly see that the laws of analogy, as well as experiment, afford us a glance into this process." After various experiments, KÜCHENMEISTER proceeds to state that he resolved to resume those experiments with the *Tænia Caninus* in order to obtain the remarkable phenomena of the vertigo in sheep. On the 15th of May, 1853, he obtained the cystic *Canini*; on the 25th of July mature proglottides of the *Tænia* were passed by the dog to which the *Canini* were administered; and these, in order to make the experiment under the most unfavourable circumstances, were administered to a perfectly healthy two-year-old wether, a description of sheep which are usually free from *Canini*. On the 10th of August the sheep was vertiginous; and on the 13th it was necessary to kill the animal; and in the brain he found fifteen young vesicles of *Caninus*, partly on the surface of the brain, which was reddened by inflammation, partly in the substance of the brain, and even in the ventricles. In January, 1854, six lambs were fed with *Tænia Caninus*. Of these five became vertiginous in about eleven days. LEUCKART fed, in October, 1853, a colony of white mice with *Tænia crassicolis*. In January, 1854, he examined his mice, and found them infested by cystic worms. KÜCHENMEISTER subsequently proved that, by the administration of mature species of *Tænia*, as far as they were accessible to him, to suitable animals, only the cystic worms belonging to these species can be reared; but not any kind of cystic worm at pleasure. From the concordant experiments of HAUBNER, LEUCKART, VAN BENEDEN, MÖLLER, and himself, KÜCHENMEISTER considers that this much is established:

33. "1. Mature *Tænia* have hitherto been rear-

ed successfully from all vesicular worms administered when a suitable host was selected; thus, from *Cysticercus pisiformis* the *Tænia serrata vera* was obtained; from *Cyst. tenuicollis*, the *Tænia ex Cyst. tenuicollis*; and from *Caninus cerebri*, the *Tænia Caninus*; all three in the intestine of a dog; from *Cyst. fasciolaris*, the *Tænia crassicolis*, in the intestine of the cat; from *Cysticercus cellulosa*, the *Tænia solium*, in the human intestine; from *Echinococcus velerorum* (*Scoliciparicus* of KÜCHENMEISTER), a *Tænia Echinococcus*, in the intestine of a dog; and from *Cysticercus longicollis* *Hyperdæi*, the *Tænia crassiceps*, RUD., in the intestine of the dog (LEUCKART)."

34. "2. From the eggs of *Tænia solium* in pigs, from those of *T. Caninus* in sheep and cattle, of *T. serrata vera* in rabbits, of *T. crassicolis* in rats and mice, of *T. ex Cysticercus tenuicollis* in sheep and lambs, the corresponding vesicular worms have been reared. The experiments with the eggs of the *Tænia* of *Echinococcus* have hitherto remained unsuccessful."

35. Up to a recent period it was the most general opinion, still entertained by some, that the tape-worm (tape-worm chain) was a simple animal, with numerous segments. Nevertheless, some older physicians correctly perceived the tape-worms were not simple, but compound animals. By many the several segments of *Tænia* were regarded as separate worms; and when DUJARDIN has recently called *proglottides* are described by them in the human tape-worms as "*Vermes cucurbitini*." At the same time they fell into the great error of not regarding the chain as produced by a successive formation of joints placed one behind the other from the head, but expressed the remarkable opinion that the tape-worm was produced by the adhesion of the individual "*Vermes cucurbitini*" one after the other, by which means the many-jointed worm was formed. The opinion that the tape-worm was a compound animal—an animal composition—was first expressed by LEUCKART. Soon afterward, ESCHRICHT and STEENSTRUP expressed this opinion more strongly, and VAN BENEDEN proved it, after DUJARDIN had described the segments of tape-worms which occur isolated, as peculiar animals, under the name of *proglottis*.

36. i. *The mature Animal, or Proglottis* — "From the moment that the hindmost segment or segments of a tape-worm colony has become so far developed as to contain the six-hooked brood ready formed and enclosed in the egg-capsules, this segment seeks to break loose, either by itself or in company with several others, in order to continue an independent existence, either in the same place (the intestine of its previous host) or in a different one (in the external world). All this varies according to the species. In *Tænia*, *Tetrarhynchus*, &c., each joint usually breaks loose; in *Bothrioccephalus*, a series of joints." In those in which no regular formation of segments exists, no single proglottides or segments can break loose, but only single brood-places, or fragments of the body of the cestode worm with such brood-places; or the eggs must escape singly. The proglottides have for the most part a flat quadrangular form, very similar to the *Trematoda*, and usually a white or yellowish, rarely a reddish or brownish colour; they have neither mouth, anus, nor intestine. "As the eggs possess a much greater diameter

than the vagina, they cannot pass through this, but can only escape out of the proglottis when the vagina acquires a larger opening, by tearing, &c. This takes place sometimes even in the intestine of the first host, and the eggs escape separately into the outer world with the excrements, which then appear as if sprinkled with fine white sand; or immediately without the intestine, where the progress of the proglottis is seen indicated by a white milky streak. Sometimes the proglottis does not burst in either of the above-mentioned places, but gets uninjured into the intestine of a new host, in which case it distributes its brood only after it has been destroyed by digestion. According as the eggs reach the intestine of their host in this way separately, or enclosed in the proglottis, and therefore in a mass, solitary or numerous specimens of a cystic, or of the analogous state, are produced within one and the same host." The proglottides thus perform an *active* migration from the intestine of their previous host, and are *passively* or contingently transferred into the intestinal canal of a new host. With the dissemination of their brood their function ceases.

37. ii. *The six-hooked Brood, enclosed in separate Egg-capsules.*—These are called eggs, although their development differs greatly from that of ordinary eggs. The embryos enclosed in the egg-shells are globular naked vesicles, unlike their parents; the smallest of them measure only 0.022 mill., and the largest 0.05. They are destitute of any organs, possess an epidermis with a double outline, and usually bear six, but in the *Tetrarhynchi* only four, very small microscopic hooklets on their anterior extremity, so that they carry their destination, that of boring forward through the tissues, as it were, written on their foreheads. The bodies of these small but very dangerous vesicles, whether armed or unarmed, are always capable of motion. The embryos which are destined to migrate into cold-blooded animals are much larger, possess larger hooks, and exhibit distinct movements in the usual temperature of a room. Those destined for warm-blooded animals are much smaller, with smaller hooklets, and exhibit distinct movements only about the temperature of the stomach. (KÜCH.)

38. iii. *The Destiny of the six-hooked Brood when set free.*—A. *What is the fate of this brood until it reaches its settled dwelling-place external to the intestinal canal?* As soon as the embryo becomes free in any part of the digestive canal of an animal which suits it, according to VAN BENEDEN, it brings together the central pair of its embryonal hooklets like a wedge, and at the same time, by thrusting and twisting, begins to force them forward. Having in this way made a little progress, it assists itself farther with the two lateral pairs of hooklets. KÜCHENMEISTER supposes that, having thus penetrated into the tissues, they pass into the blood-vessels, and thus they are conveyed either into the liver by the *vena portæ*, and remain fixed in the finest ramifications of the blood-vessels, or into the brain, or into other parts. The migration of the young of the *Cestoidæ* to the places where we meet with them as vesicular worms, or in analogous states, takes place in the following way:

39. 1st. A portion of the six-hooked brood, in all species of *Cestoidæ*, may reach their dwelling-place directly and by active migration, by boring their way. 2d Others, by an uncertain duration

of this migration, reach the vessels of the new host, penetrate these, and are conveyed with the blood to the smallest ramifications, where they (a) either become developed in these ramifications, the walls of the vessel becoming their envelopes; or (b) they migrate passively into the neighbouring tissues, after the rupture of the walls of the vessels, in consequence of the swelling of the embryo; or (c), after being detained in these ramifications, they enter anew upon an active migration, passing into the tissues by means of their hooklets, and increasing in size.

40. B. *What farther takes place with the embryos when they have come to rest in their new dwelling-places?* The third stage of the development of the *Cestoidæ* consists of the so-called vesicular worms and their analogous asexual forms, "which, in accordance with the alteration which the embryonal vesicle undergoes in the different species of tape-worms, and with the different animals infested by them, may be divided into *cysticercal* (vesicular worms), *platy-cercal* (forms with a flat, inarticulate, tail-like appendage), and *acercal* (or tailless) forms. It is a common peculiarity of all the three forms here mentioned, that they are cestode-heads produced from the embryonal vesicle, which occur still in a state of rest. We may therefore best comprehend this stage under the name of *resting scolices*." The metamorphosis or transition of the embryos to the resting, and usually *cysticercal* scolices, may be stated as follows:

41. 1st. "The embryo, still furnished with its six hooklets, begins to swell by the reception of fluid (liquid nourishment) which is secreted from the place in which it has established itself: this is at first a fluid similar to protoplasm, but after the formation of the enveloping cyst, or after the cessation of inflammation, when the creature lives free in the interior of serous cavities, it does not agree so much in its composition with the serum of the blood as with the ordinary products of the secretion of serous membranes." (LUSCHKA.)

42. 2d As soon as the embryo has in this way rather rapidly enlarged to a certain size, and arrived at a state of repose, the round vesicle thus formed, when it does not project freely into a serous cavity, and has not fallen into one, surrounds itself with an envelope, which protects it and assists it in procuring repose. These enveloping cysts constitute an absolutely new formation, which is analogous to serous membranes, and which constantly increases in size with the growth of the young cestode vesicle. When, however, the brood of a cestoid worm gets freely into serous cavities, it either never attains to this formation of an enveloping cyst, or does so at a rather late period, and at a time when the young embryo has become a vesicle of very considerable size, and often exhibits the *Tænia* head in an advanced state of development. In places where the young cystic worm again falls into repose, a fresh exudation of plastic matter adapted to the formation of cysts takes place, the walls of the cyst being rich in blood-vessels. (KÜCHEN.)

43. 3d. By the reception of the secretion of the serous membranes, the young cestoid vesicle swells up. At its anterior end, and at the point where the six embryonal hooklets are situate, a funnel-shaped pit is at first formed, and this gradually penetrates more deeply into the parenchyma of the embryonal body. In the bottom



of this pit the first traces of the head appear, while the lateral walls of the depression become converted into the body—the central body—of the future cystic worm, and the remaining portion of the embryonal vesicle, which is not inverted, or not implicated in the metamorphosis, becomes the so-called caudal vesicle. This inversion and first formation of the head most frequently commences at the anterior surface of the vesicle, and are seen distinctly in the cestodes of *Arion empiricorum*, for in these the six small hooks are placed in pairs at the point of transition of the central body into the caudal vesicle of the worm. The central body and the head are always developed in the interior of the embryonal vesicle, and during the whole period of the vesicular state the head always has its apex directed towards the caudal vesicle, even when the central body, which encloses the head in the form of a hollow canal, has not sufficient room in the embryonal vesicle, but is pushed out of it. (KÜCHEN.)

44. 4th. From the experiments of HAUBNER, KÜCHENMEISTER, LEUCKART, ROLL, VAN BENEDEK, ESCHRICHT, &c., with the various *Tania* which pass through a vesicular condition, the following appears: According to LEUCKART, at least in experiments with *T. serrata*, we find twenty-four hours after administration the six-hooked embryos in the blood of the large abdominal veins, especially the vena portæ; and on the fourth day, in the livers of rabbits to which they have been administered, small, white, clear vesicles of 0.3 millim. in diameter, but rapidly increasing in size, which on the sixth are already 1 mill. in diameter. In *T. serrata* the actual embryo, after the lapse of fourteen days, measures 1.5 millim.; in *Camurus* it is about the size of a grain of millet at this period. The small vesicle (the worm), after it has begun to grow clear, acquires, in its interior, numerous large, clear enucleate vesicles, which, according to LEUCKART, are similar to sarcode drops. In the parenchyma we recognise a cortical layer, which becomes thinner, and the cells of which are converted into muscular envelopes by fibre-formation, and a medullary layer, in which elastic vesicles or cells occur in great quantity. From the appearance of the medullary substance, the growth of the little worm, which is capable of motion even before the muscular layer is developed, advances with rapidity. Even in the first fortnight, and shortly afterward, the form of the young cestoid worm varies according to the species. Some, such as the younger *Camuri* and *Cystic. cellulosa*, *tenuicollis*, and *fasciolaris*, are spherical; others, such as *Cystic. pisiformis*, and probably also *Cystic. longicollis* and *fistularis*, are oval. Many of those seated upon the surface of organs, projecting into closed serous cavities, wander for a time in the organ, and finally fall into these cavities, the oval forms appearing to wander more than the round ones. About fourteen days after administration, the above changes take place almost universally and in all places. But those individuals which have not found a situation favourable to their development undergo a retrograde metamorphosis, passing "to the state of caseous, granular, or atheromatous masses, in which we may seek in vain for any remains of the embryo, although this certainly is present. Many cases of miliary tubercular disease of particular organs may indeed consist of nothing

else than the dead, fatty, and calcified young of worms."

45. 5th. In the third or fourth week, when the young brood of *Cysticercus pisiformis* measures about 2 millim., and that of the *Camurus* is of the size of a pin's head, we may see, according to LEUCKART, beneath the epidermis a layer of muscular fibres. Then follows a fatty structure, and then the medullary substance. At the point where the head is to be formed, a turbidity is produced by the aggregation of small nucleated cells, in the interstices between the muscular and medullary layers. This is the first foundation of the head of the tape-worm. Opposite to this turbidity a pit is observed externally, the inner wall of which is formed by the inverted epidermis, and which passes through nearly the whole depth of the globular foundation of the head; this latter appearing like a peg attached to the inner wall of the worm. In the central mass of the head, especially in its upper half, calcareous deposits appear, at first sparingly. Two or four vessels are also observed rising in a tortuous form through the upper part of the lobe, and passing over to the external sac-like envelopes. The vesicle now becomes larger and clearer, and the medullary layer, pushed against its peripheric layers, grows thicker, while vessels and calcareous corpuscles make their appearance, especially in the anterior part of the body, between the muscular and epidermic layers, but not in the former, in some cases before, in others after, the formation of the cephalic process. From the time when this process commences, the caudal vesicle ceases its activity in the true *Cysticerci*; its functions are then only passive, serving as a reservoir of nutriment, or as a protection to the head, which requires repose for its farther development, and preserving sufficient room for this end. I cannot follow the descriptions of KÜCHENMEISTER and other helminthologists farther, as respects the development of the head and its hooklets, &c., but must refer the reader to Dr. LANKESTER's translation of the work of the former, and to the other works referred to in the Bibliography. I may, however, notice the following conclusions of this observer:

46. 6th. In the progress of the metamorphosis of the six-hooked cestoid brood into scolices, it has been shown that a portion of the *Tania* pass through a true *cysticercal* (bladder-worm) state, while the other part, without ever arriving at this state, furnish exactly the same structure (cestoid heads—scolices). This latter part KÜCHENMEISTER has divided into *platycercal* and *acercal* forms.—(a) True *Cysticerci* occur only in warm-blooded animals, especially mammalia; and cysticercoid forms principally in cold-blooded animals.—(b) The eggs of all *Tania* which pass a cysticercal stage are distinguished by the small size of the embryo, and its six hooks, and by their brown, hard shell beset with asperities. The eggs of the *Tania* with only a cysticercoid phase of development have softer, colourless, transparent shells, are much larger, and contain a much larger embryo, furnished with larger hooks.—(c) *Tania* with a cysticercal phase of development are inferior to the platycercal and acercal forms in regard to the length and cylindrical form of the rostellum.—(d) *Tania* with a cysticercal stage possess during this a highly developed *receptaculum capitis*, which forms a part of the future neck, in which, as long as this stage lasts,

the head is introverted. The allied platycercal and acercal forms are destitute of the accumulation of fluid, and of the *receptaculum*.—(e) If the six-hook cestoid brood gets into animals which are not suitable to it, or into such organs in an animal otherwise suitable, it is destroyed in a very short time, even in the few first days of its immigration; the form of miliary tubercular disease of the organ may thus have frequently occurred. This may be demonstrated by administering mature proglottides to various animals.

—(f) A great number of the cestoid embryos which become developed to the scolex state die, and are destroyed either by a natural or a pathological death. We only know that their life may extend even to several years, but inflammatory processes and alterations of the secretions extending to them from the organs they inhabit may destroy them more or less rapidly, and change them into masses consisting of cholesterine, calcareous, fatty, suety, and similar substances.

47. iv. *The Scolex passing into activity*.—On this topic I must refer chiefly to recent writers, more especially to KÜCHENMEISTER, and notice merely a few of the more prominent parts of their descriptions. As a general proposition, it is inferred “that the animal infested by cystic worms is usually the source of food, or the prey, of that infested by tape-worms.” The host of the cystic worm is devoured by a carnivorous predaceous animal, and by this means the cystic worm arrives, together with his previous host, in the stomach of the carnivorous animal. During the process of digestion, the enveloping cysts in which the cystic worms were enclosed, or, if the animal lived free in cavities, these latter, perhaps both, are digested, or opened previously by the teeth of their devourer, when the cystic worm escapes into the cavity of the stomach. Here the worm extends itself; its caudal vesicle collapses. On the caudal vesicle and the middle of the body of the cystic worm digestion begins to act perceptibly. The body at the same time elongates and extends itself, but the head and the short neck are still inverted, as during the cysticercal state. But now the head and neck extend themselves. The head, the hooks still exhibiting the position of cysticercal existence, their apices being directed backward towards the suckers, and their shafts towards the apex of the head, draws itself, as it were, outward through the neck, by turning itself inside out. As a matter of course, the whole worm is thus turned inside out; and the margins of the head and neck which were previously turned in, become the free outer sides of the worm. A portion of the *receptaculum capitis* is then cast off, with the body and the caudal vesicle, and a portion wraps itself into the funnel-shaped constriction of the young *Tenia*.

48. At various times, sooner or later, according to the evolution and age of the cystic worm, the formation of segments commences, and with this, consequently, this stage of development is concluded. It should be recollected that *Tenia* cannot be reared from such scolices as do not exhibit perfectly-developed hooks. They die immediately. The first transformation of all cystic worms introduced into the intestines of a warm-blooded animal takes place in the same way; but the process stops before the commencement of segmentation, in those cases in which the intestine of the animal in which the vesicular worm

has arrived is unfavourable for it and its future development. Thus circumstanced, it lasts but for a short time, no trace of it remaining a fortnight after. The transformation of the platycercal forms into mature Cestoidea takes place exactly like that of the cysticercal forms; in the acercal forms no casting off of a portion of the former embryonal vesicle takes place, but the whole of it is retained, and the formation of segments commences immediately upon it. It still remains to consider—*How the scolex, after entering upon its activity becomes converted into a tape-worm colony—Strobila*.

49. v. *The Strobila, or the so-called Tape-worm Colony*.—“Immediately after the healing of the cicatrix on the neck and on the former *receptaculum capitis*, there commences between the posterior end of the head and this cicatrix a budding forth of the body, produced without sexual propagation, and which becomes constricted into segments by transverse furrows or wrinkles. By the constant production of new masses on this place, that previously formed is continually pushed farther back, so that this cicatrix is at last removed to a considerable distance (varying according to the species) from the head. During this time the individual segments increase, and grow in the same ratio as their removal from the head: they at the same time acquire sexual organs, male and female, in each segment, and which are very rarely, and probably never wanting in the colony. Finally, when they have attained a sufficient size and maturity, they produce the embryos (§ 41, 2), and last of all cast themselves free in the form of the proglottides (§ 36). If we were to give a definition of the strobila—it is a series of joints, or individuals, which are formed from the active scolex in the space between the part of the latter that must be called the head proper, and its cicatrized extremity, by a sexual reproduction; which are in direct union with the scolex, and which, when examined from the anterior to the posterior, present asexual segments, half and fully formed sexual segments, and segments engaged in sexual retrogression, the last of which have become truly independent individuals.” (KÜCHENMEISTER, *Op. cit.*, p. 84–5.) Thus we have seen how the segments with their ova and embryonic structures, are developed; and, when they have become the hindmost of the colony, cast themselves loose.

[Five different conditions, then, may be distinguished in the development and history of the *Tenia*: 1. *The embryo*, with six tenaculi; 2. *The Cysticercus*; 3. *The Scolex*; 4. *The jointed Tenia*; 5. *The independently living and sexually developed joint or section, proglottis*. The development of the cestodæ presents us therefore, as described by our author, a true instance of alternation of generation. Three different generations succeed each other in these animals: the embryo, with six tenaculi, as great-nurse; the scolex, as nurse; and the isolated living proglottis, as the generic animal. The great-nurse is the product of sexual development; she has her origin in the germinated ovum; while the two other generations are the products of budding or sprouting, the nurse from the grand-nurse; the generic animal from the nurse. The intermediate conditions of cysticercus and strobila must be characterized as polymorphous colonies. The strobila might be compared to a colony of polypi, in which each individual is growing out of the posterior body of the scolex, their native soil, thus forming



but one and a continuous line. Such a treble alternation of generation is also found in other animal organisms. It is to be understood that by the alternation of generation the generic animal produces *only* an unsexual race which is dissimilar to its parent, and remains so; and this generation produces, by budding, generations of new animals which, either themselves or their offspring, return to the original form of the stock.]

50. My limits admit not of a full description of the minute structure of the fully-developed *Tania*. It will be found in the work just quoted. I may, however, briefly state that no digestive apparatus has been found in these animals. Most writers assert that up to this time no nerves have been detected in them; but HUXLEY states that a single ganglion is situated in the axis of the head, and that it sends off nerves to the suckers in some *Tania*. The most important points are the dissemination of calcareous corpuscles in their structure, and the formation of circulating vessels. With the development of the scolex it was seen that a union of four principal lateral vessels takes place in the head, and that smaller branches are given off from these trunks. These vessels probably open outward near the *receptaculum capitis* or neck, or about the situation of segmental production; but the ultimate structure, connexion, and termination of these vessels have not been precisely determined. The muscles consist of transverse and longitudinal fibres, which may be recognised most readily in the neck. The suckers, peculiarly muscular parts, present radiate fibres uniting in the middle of the sucker, under which lies a layer of circular fibres, and the *rostellum*. It has not been ascertained whether or no muscular fibres run to the hooklets of the embryo. The hooks of the *Tania* appear to ride upon the skin or integument, or in slight impressions. The movements of the hooks seem to be produced by changes in parts of the head, particularly of the rostellum. The sexual organs, both male and female, exist in each segment, in which numerous eggs are produced. A very minute description of these organs—the penis, testes, vagina, uterus, &c.—is given by KÜCHENMEISTER.\*

\* The developmental history of the Cestoidea may be understood, if considered as follows:

"i. The mature sexual animal, which is produced by asexual gemmation, separates from the colony as soon as it has attained its majority, migrates actively from the intestinal canal of its host into free nature, and thence passively into the stomach of another usually herbivorous animal. It bears within it,

"ii. The grand-nurses or embryos produced by sexual, and perhaps by asexual, reproduction, furnished with four or six hooks, which are destined to enter passively into the stomach of an herbivore, and thence to migrate through the body of the latter, either actively, or by the intervention of the vessels, active—passive—actively. (The asexual propagation of the brood in the Cestoidea is rendered improbable even by the fact that, in the whole developmental series of these Cestoidea, a sexually mature animal has never been met with.)

"iii. The resting scolex (nurse), produced by asexual gemmation in and by the large six-hooked embryo, still concealed within this embryonal vesicle, or lying beside it enclosed in peculiar cysts, or in closed serous cavities. In its non-gemmiparous part the embryonal vesicle acquires, according to the species of cestoid worm, and according to the different hosts (cold or warm-blooded), sometimes the form of a globular vesicle, sometimes that of a flat band-like strip, and sometimes is only just sufficient to cover the scolex, lying quite close upon it, when it really forms nothing but a *receptaculum capitis*. Thus we obtain three forms allied to each other in their degree of development: the cysticercal forms (*Vermees cystici*, including *Cenuri* and *Echinococci*); the platyercal (similar to Stein's cestoid worm of *Tenebrio molitor*, and Von

51. THE CESTOIDEA, or Cestode worms, occur in man either in the mature state, and then in the intestines only (*Bothriocephalus latus*, *Tania mediocanellata*, *Tania nana*); or in the larva or scolex state (*Cysticercus visceralis* seu *tenacollis*, *Echinococcus veterinorum*, seu *scoliciparicus*, and *E. hominis* seu *altricparicus*); or, lastly, in all known stages of development (*Tania solium* and *Cysticercus cellulosa*).

52. Genus 1. BOTHRIOCEPHALUS = DIBOTHRIUM.—This division is abundantly represented in predaceous fishes, more sparingly in piscivorous birds, especially the marine Raptores, and rarely in a few mammalia. Of the terrestrial mammalia inhabiting inland places, man only harbours *Bothriocephali*. KÜCHENMEISTER defines this genus,\* and the species here to be considered, as subjoined,† and gives the following as the synonyms of the species, *Bothriocephalus latus* or *Dibothrium latum*; *Tania lata*, *T. grisea*, *T. vulgaris*, *T. membranacea*, *T. dentata*, *T. crinis*; *Ténie à amcaux courts*, *T. large*, *T. épinc*; *Lindworm*, *Baandworm*, *Bacndworm*: the tape-worm, jointed worm, the short-jointed worm.

53. i. GENERAL DESCRIPTION.—The colour of the living worm is bluish white. Specimens preserved in spirits change greatly in colour. The active scolex, or head, is obtusely conical. The two lateral pits (analogues of the sucking disks of *Tania*) are fissuriform, and appear, like the sucking disks on the feet of flies, rather to effect adhesion than to draw nourishment, which is probably introduced through the entire skin. The nec-

Sibold's from *Arion empiricorum*); and the acercal (contain embryos of *Tetrarhynchid*). Every one of these is a normal form; even the cysticercal forms are neither markedly degenerate, nor become dropsical, nor strayed.

"iv. The resting scolex, transferred into the intestine of an animal, becomes converted into the scolex *passive* into *active*. The latter is distinguished from the resting scolex by the extension of the entire body, by the altered position of the adherent apparatus (suckers and hooks), by the attachment in the intestinal canal, and by the cystical and platyercal forms, by the casting off of the barren portion of the embryonal vesicle, and the formation of a cicatrix on this spot. In the acercal form nothing is cast off, nor is there a cicatrix formation.

"v. The strobila—equal the tape-worm colony, budding immediately from the scolex, which has become active by asexual propagation (gemmation), is more or less distinctly jointed, and becomes sexually mature posteriorly. Its last segments, which are cast off, and lead an independent existence, are called *proglottides* (i.), and bear within them the embryos produced by sexual reproduction (ii.)." (KÜCHENMEISTER, *Transl.* by Dr. LANKESTER, p. 93.)

\* "Cestoidea, 2 oculis suctoriis, aut 2 foris marginalibus, oblongis aut longitudinalibus oppositis instructa. Capite subtriangulo, depresso, articulo plerumque inermi. Porci genitales omnium articulo in linea mediana animalis et in ejus superficie abdominali s. t. Scolices extra tubum intestinale in cystidibus peculiaribus ad verum platyercorum modum, aut in tubo intestinali animalium minorum aquaticorum statu immaturo viventes; Strobilae in tubo intestinali animalium aquaticorum rapacium, arum marinarum et mammalium viventes; Proglottides rere interdum absunt, interdum absunt, sepiissime in longa articulo serie conjuncte desinentes. Embryones sex hamulis armati; ovariorum testae sepiissime coloratae.

† "i. BOTHRIOCEPHALUS LATUS = DIBOTHRIUM LATUM.—Caput oblongum, inermis, 2 bothriis-foveis marginalibus, formam rimae aut fissurae (fente) adaptantibus; collum subnullum; articuli numero circa 2000, maturi omnino latiores (ad 27 millim.), quam longi, sociatim decedentes; porci genitales in linea mediana siti, masculus major et superior, ex quo penis laxis et brevis prominet, feminus minor, posterior inferiorque. Scolex quiescens ignotus; scolex activus cum strobila in hominis tubum intestinale incoens, longitudinem 7-8 unarum, secundum Dujardinum ad 20 metres (f.) exhibet.

"Embryones 6 uncinatis (f.) armati, in ovulis 0.025-32 mill. longis et 0.002 mill. lati, elliptici, flavo-fusci, operculo dehiscitibus inclusi."—KÜCHENMEISTER.

is more distinct in young than in old specimens, the transverse wrinkling, *i. e.* segmentation, commencing immediately behind the head. The *strobila*, or jointed body, presents a ventral surface, on which the sexual apparatus opens, the opposite being the dorsal surface. Each segment has four margins—two free lateral margins, slightly undulated, and an anterior and posterior margin, articulated with the upper and lower segments in the colony. The form varies according to the preponderating contraction of the longitudinal or transverse fibres, the breadth, however, being much greater than the length—as three to one. In the central line the segments are thicker (up to 1") and darker; the lateral margins flatter and whiter. The *vascular system* consists of lateral longitudinal cords, which contain a limpid fluid. A respiratory system and organs of sense are wanting. The *sexual organs* generally are single in each segment, but they are sometimes double.

54. *A. The Ova and Embryos.*—The former exhibit an external hard brittle shell, which often breaks so as to represent operculated ova, like those of the *Trematoda*. From the opercular opening a limpid vesicle emerges, in which, however, KÜCHENMEISTER did not find the six hooklets which VON SIEBOLD considers similar to those in the circlets of the *Tænia*. Possibly a part of the eggs of the *Bothriocephali* are not produced with undeveloped embryos, so that the latter are perfectly formed only when free in nature, as the eggs of the *Ascarides*. The resting scolex exists in the fishes, especially marine fishes. In these certain cestode worms live, having a band-like, inarticulate appendage, but exhibiting no commencement of sexual development. These become converted into mature *Bothriocephali* in the intestines of higher fishes, or of the marine birds of prey. Whether the cestode worms are developed in the intestines of fishes in which they are found, or are conveyed there in one or other of the animals on which these fishes feed, in which they had been converted into scolices, after the animal had swallowed the eggs of the mature *Bothriocephali*, is still undecided. Probably the ova and scolices are developed as already described (§ 37-47). As the host of the *Cysticercus* is devoured by an animal, in the intestine of which the scolex, being set free, immediately develops itself.

55. *B.* We have no data as to the production of the *Bothriocephalus latus* in man. This worm has been found in the cat, but is extremely rare in all terrestrial animals. The cat has evidently obtained it from the intestines of fishes, which in sea-ports and on the sea-coasts are left in large quantities, and are used as manures. It is difficult, notwithstanding, to account for the presence of this animal in man. The ova from the proglottides of this worm may, however, be introduced into the human intestines by means of vegetables, where the intestines of fish have been used as manures, or where they have been conveyed in sewerage water. The passive anigration of the embryo into the intestine of another animal, and its conversion in this intestine into an asexual band-like scolex, is much more probable than the development of all the grades in the same intestine, on account of the dissimilarity existing between the embryo and its parent.

56. *C. The physiological relations of Bothriocephalus* are chiefly its weaker vital manifesta-

tions, and the smaller number and less perfect development of its sucking organs, than those of the *Tænie*, which explain its easier expulsion from the intestines. The power of imbibing fluids by the bodies of the *Bothriocephali*, and all *Cestoidæ*, has been proved by ESCHRIENT and others. Transudation takes place in small, pellucid, oleaginous drops (sarcode). While the *Nematoda* and *Echinorhynchi* swell up by imbibition, the *Cestoidæ*, owing to an abundant exudation, experience only a slight swelling from imbibition. Whole series of segments of the *Bothriocephali* pass off spontaneously, but never single segments, as in the *Tænie*. The duration of the life of the former is not known. More than one or two worms of this genus are rarely found in the same intestine, and their length seldom exceeds twenty feet.

57. Genus 2. TÆNIA.\*—i. TÆNIA SOLIUM, and its *Scolex-nurse*=*Cysticercus cellulosus*.

SYNONYMES.—*Tænia*, Aristotle; *παραία ἐλμυς*, Hippocrates; *Lunbricus latus*, Pliny; *Tænia solium*, Linnæus et Auct. permulti; *T. cucurbitina*, Pallas, Goeze, &c.; *T. vulgaris*, Wer-

\* "Second Order (KÜCHENMEISTER), TÆNIE.—*Cognat subglobosum aut tetragonum; acetalibus oculis surtorius 4, rarisime 6, muscularibus, orbicularibus, symmetrice oppositis, valde contractilibus; rostellum imperforat, retractile, in scolicebus quiescentibus inverso, in a tiris s. Tæniis maturis propulso, hamulorum simplicium, duplicit, aut multiplicit corona armato; corpore plerumque albo, plano, depresso, bilaterale aut triquetro, articulo (Strobila); articulis maturis androgynis, aut non asexualibus (2), sponte et alio post alium dehiscens, Trematode nudam similibus (Proglottides); systemate ruscioso perclaro; poris genitalibus lateralibus, plerumque alternantibus, masculo majore et anteriore, femine minore et posteriore; genitalibus perfectis. Scolices quiescentes et immaturi formam cysti-, pluri-, aut necerum ineuntes. Scolices activi cum strobila longitudine et latitudine valde variantes. Embryones 6 hamuliculis armati, parvuli, periceves; ovula in illis qui formam cysticercum ineunt, minima, pileata, flavescentia, in ceteris majora, leviora et clariora."*

1. TÆNIE WHICH OCCUR IN MAN IN THE MATURE STATE.—i. "Tænia solium, and its scolex nurse= *Cysticercus cellulosus*.—Tænia matura = *Scolex activus cum strobila*: longit. 4-5 metres = 6-8 unguarum, latit. ad 13 millim. Caput = scolex sensu striatore, brevis, antorsum planum, 0.56-0.95-1.0 mill. lat., acetalibus validis, prominens, 0.12-0.21" = 0.434-0.521 mill. long., et 0.132-0.224" = 0.410-0.505 mill. lat.; rostellum parvulo 0.4 mill. ad latera nigrescente; hamulorum 22, 24, 28, 30, plerumque 26, duplice ordine, longit. 0.167 quoad majores, 0.11 mill., quoad minores hamulos (secund. LEUCKART), 0.13 et 0.12 secund. meas mensuras, ungue et stylo hamulorum ex longit. fere similibus, formâ hamulorum omnino eadê; locis hamulorum perclaris, nigrescentibus; collo parvulo, fere nullo; corpore antorsum maxime attenuato, deorsum ad 10-14 mill. lato, articulo, poris genitalibus alternantibus, interdum irregulariter; utro ramis 6-10-13, irregulariter alternantibus, demum ramificatis instructo; corporibus calcareis in capite rarioribus (0.004" = 0.009 mill. long. et lat.), in corpore crebrioribus et majoribus (0.005" = 0.012 mill.). Proglottides ad 16 mill. longæ et ad 6 later, ad inferiorem partem crassiores, margine magis toroso et angulis magis prominentibus, quam ad superiorem partem, ut in aliis Tæniis, oculis 0.016" = 0.036 mill. long., 0.016" = 0.035 mill. lat.; testâ ovariorum crassiore (0.0063 mill.). Embryonibus 6 hamulis ornatis, 0.023-0.032 mill. long. et lat., migratione indigentibus.

"Habitat.—Solitarie aut solaliter (ad 40 usque) in tubo intestinali hominis, inque terris diversissimis; vix in Canis domestico.

"Scolix quiescens = *Cysticercus cellulosus*, vesicâ cuticuli haud magnâ (ubi plurimum 15 mill. in diametro) transverse ellipticâ; corpore inverso, transverse rugato, 8-10 mill. longo. In tubum intestinale translatum intra 3 menses maturarescit. Habitat in telâ cellulosa totius corporis et nonnullis corporis cavitatibus clausis (oculis, cerebro, &c.) imprimis in homine, Sic scrasâ comesticia, rarius ferâ, Simiâ, Cerco, Capreolo, Cane domesticio (Arachnoidi, et mus ul.) valde dubiosis in primone Cimis domesticis et Muris Ratti. Per injuriâ a nonnullis Cæburis cerebriâ hominis nominatus."—KÜCHENMEISTER.



ner; *T. dentata*, Gmelin, Nicolai; *T. osculis marginalibus solitariis*, Bradley; *T. armata humana*, Brera; *T. lata*, Reinlein; *T. fenestrata*, Delle Chiaje; *T. stigmatibus lateralibus*, Bonnet; *T. secunda*, Plater; *T. solitaria*, Leske; *T. articulos demittens*, Dionis; *Halysis solium*, Zeder; *Pentastoma coarctata*, Virey; *Vermiscucurbitinus*, Plater; Kürbiswurm, Kürbisformiger; bewaffneter Bandewurm; Kettenwurm, Germ. Ténie à longs anneaux; T. sans épines; T. de la seconde espèce; le solitaire; ver solitaire; T. bandelette, &c. The following names are also given it, in common with *Bothriocephalus latus* and *Tania medrocanellata*: le ver plat, Bandelorm, tape-worm, jointed worm.

58. *Tania solium* presents five steps of development. 1st. The sexual animal—*Proglottis*; 2d. The grand-nurse—six-hooked embryo; 3d. The resting *Scolex*—*Cysticercus cellulosus*, in the parenchyma, areolar tissue, and cavities of the body; 4th. The active *Scolex*-nurse, that is the *Cysticercus cellulosus*, which will become a *Tania solium* in the intestines; and, 5th, the *Strobila*, the series of segments of *Tania solium* produced by gemination from the fourth step.

59. A. THE MATURE *TANIA*.—The name *Tania solium* is incorrectly applied to this worm, inasmuch as frequently two or three occur in the same person. Dr. PFAFF has seen seven expelled, KÜCHENMEISTER ten, HELLER thirty, and KLEEFELD counted forty expelled from one patient.

60. (a) *The Strobila*.—The head, although varying somewhat in size, is seldom larger than the head of a common pin. It is of a blackish-brown colour, especially around the base of the short rostellum, and in the sacs around the base of the hooks, and in and around the sucking disks. The hook-sacs, as well as the hooks, are placed in a double circular series. The one series does not materially differ from the other. As in all the *Tania*, the points and spines of all the hooks fall in the same circle, or in two circles lying close together, the number and position of the hooks corresponding with the sacs, and varying from 22 to 28. The sucking disks are nearly circular, or somewhat oval, and surrounded by a circular collateral branch of the longitudinal canals, by which a sort of vascular net is formed. Close behind the sucking disks, and near the head, the vessels collect in four main branches, which are united quite at the front of the head by a common transverse branch, thicker than they. In the vessels of various *Cestoides*, VIRCHOW, WAGENER, and others, have seen a sort of ciliary epithelium projecting into them, and moving in the fluid. The calcareous corpuscles reach about to the middle of the sucking disks. They are few and small on the head. The slender neck, of about 6" in length, exhibits no traces of transverse striæ or segmentation. The calcareous corpuscles are somewhat more abundant, and also larger than in the head. Behind the neck commences the true jointed body of the *Tania*, in which KÜCHENMEISTER counted 825 segments in one specimen ten feet two inches in length. The proportionate size of the segments gradually increases posteriorly, or as they depart from the head—in length from 1.12" to 7". In this species, as in all *Cestoides*, contact with water causes the emission of DUJARDIN'S sarcodæ, in oleaginous drops. The sexual organs appear from about the 280th to the 300th segment, and onward, from the

head, in the median line of the *Cestoides*, at first as a simple brownish-yellow canal, with short lateral offshoots, towards which two transverse slightly coloured lines (seminal cord and vagina) run from the sides. The alternating *pori genitalis* first appear about the 317th segment, and become distinct in the 350th. The sexual organs are more and more developed from the 350th to the 600th segment, where ova commence, which become mature from the 650th to the 700th segments. Both male and female organs generally exist in the same segment, and are minutely described by KÜCHENMEISTER. Each joint, when divided, presents, 1st. *Epidermis* of a chitinous structure, without calcareous corpuscles; 2d. *Longitudinal fibres*, with calcareous corpuscles; 3d. *Transverse fibres*, with few calcareous corpuscles; 4th. Sexual organs.

61. B. *SCOLEX OF TANIA SOLIUM*.—*Cysticercus cellulosus*.—The former is identical with the latter as proved by the identity of the head in both; by the general and particular circumstances under which *T. solium* occurs, and by converting, by experiments in feeding, *Cysticercus cellulosus* into *Tania solium*, and the eggs of the latter into *Cysticercus cellulosus*.

62. (a) *The ordinary habitation of the Cysticercus cellulosus* is the flesh of the pig; and *Tania solium* is almost entirely unknown where the use of this flesh is avoided, as among the Jews and Mohammedans, who strictly adhere to their religious precepts. On the other hand, *Tania solium* is abundant wherever the breeding of pigs occurs, as in Poland, Hungary, Pomerania, Thuringia, England, &c., "and especially among those engaged in trades which bring them in contact with raw pork, and therefore with raw *Cysticerci*, as butchers, cooks, sausage-makers." KÜCHENMEISTER found *Cysticerci* in the water used in washing sausages. The direct proof of the identity of this cystic worm and *Tania solium* is shown by the following experiment upon a murderer condemned to death. Exactly 72, 60, 36, 24, and 12 hours before his execution, 12, 18, 15, 12, and 18 specimens of *Cysticercus cellulosus* were administered to him partly in rice or vermicelli soup of a blood heat, and partly in blood-puddings. The *Cysticerci* had already lain seventy-two hours in a cellar before KÜCHENMEISTER discovered them. The last administered had consequently lain about 130 hours out of the living organism, and he hardly believes that those *Cysticerci*, which had lain more than eighty hours, were still capable of development, any more than he can believe this to be the case with the *Cysticerci* contained in smoked sausages and hams. On dissection forty-eight hours after execution, he found ten young *Tania*, of which six were deprived of their hooks, but four distinctly showed the hooks of *T. solium*. The little *Tania* were 4 to 8 millim. in length, and had attached themselves by their hooks and proboscis to the intestine, and possessed a small band-like appendage, 2 to 5 millim. long. The preceding experiment is proof of the conversion of the cystic worms into *Tania* in the human intestine, and also of the mode of infection. KÜCHENMEISTER is convinced that the scolex of a *Tania* retains its power of development in its dead host only as long as no putridity occurs.

63. (b) The farther proof of the identity of *T. solium* and *Cysticercus cellulosus* is derived from the structure of the head of the latter. "This

cystic worm, like all others, forms a vesicle the size of a pea or very small bean, with a little white head in its interior, from which the true scolex may be evolved by pressure. This scolex bears a head with four, and sometimes six, sucking disks (the latter especially in the human brain), round which the vascular system runs, and collects into two longitudinal canals on each side. The short rostellum bears from twenty-two to twenty-eight hooks, placed in a double crown. Besides these, the head exhibits a sparing brownish-yellow, or blackish-brown pigment,\* and five sacs round the stems of the hooks. The neck is very short, poor in calcareous corpuscles, opaque, and colourless; the body is wrinkled, abounds with calcareous corpuscles, and the head is inverted into it as long as the caudal vesicle is alive and uninjured. After the death of the worm the head becomes everted. (See also § 46, *et seq.*)

64. (c) *Proofs of the Conversion of the six-hooked Embryos enclosed in the Eggs of Tenia solium into Cysticercus cellulosæ*.—KÜCHENMEISTER, in 1851, expressed the opinion that the pig infects itself with *Cysticercus cellulosæ* when it meets with the eggs and proglottides of *Tenia solium* upon the pastures; and in 1853 VAN BENEDEN administered *T. solium* to two pigs, and thereby rendered one pig measly. The following year KÜCHENMEISTER fed three sucking-pigs, on the 7th, 24th, and 26th of June and 2d of July, with segments of tape-worms, partly given off spontaneously and partly artificially expelled. On the 13th of July they were again fed with artificially expelled segments. "One of the pigs was killed on the 26th of July, and exhibited young *Cysticerci* corresponding with the days of administration, of which the largest individuals formed vesicles of the size of a hemp-seed, with a central turbidity, *i. e.*, the commencement of the head. The second pig was killed on the 9th of August, when thousands of *Cysticerci* were found in all parts of the body; the largest individuals were as large as peas, and exhibited a distinct head, while the smallest were only of the size of a hemp-seed. The third pig, which was killed on the 23d of August, was uniformly set, throughout all parts of the body, with *Cysticerci* of various degrees of growth and development. The largest were almost perfectly developed; others resembled those last described. He undertook the examination of a weighed piece of the flesh, and found 133 *Cysticerci cellulosæ* in  $4\frac{1}{2}$  drachms of it. If we calculate from this quantity the number of *Cysticerci* which would have existed in 1 stone, or one fifth cwt. of the pork, we obtain the great number of 88,000 individuals in this weight. A fourth pig of the same litter, to whom no *Tenia* had been administered, exhibited no traces of *Cysticerci* on dissection." (KÜCHENMEISTER, *Op. cit.*, 121, 21.)

65. LEUCKART repeated and confirmed the above experiment, and recognised, in the mode in which *Cysticercus cellulosæ* is developed from the embryo of *T. solium*, exactly the same type as that above described as the type of the formation of the so-called *Cysticerci* in general. It may, however, be noted that this worm acquires the vesicular form, and becomes covered with a vascular net, rather early, and at a time when no trace of the head can be observed. The first appearance of the head commences in *Cyst. cellulosæ* soon after the seventh week, at which time the embryo is about 2.5 millim. in diameter.

66. (d) *The Scolex of Tenia solium, Cysticerc-*

*cus cellulosæ*, has hitherto been found in the most various muscles; in the muscles of the heart, in the cellular tissue, in the brain, and in the eye of man. In these it acquires various forms and sizes, according to the space afforded for its development. In the ventricles of the brain and eye, its caudal vesicle attains even the size of a walnut, and remarkable forms. The size and form of the *Cysticercus* are determined chiefly by excess of nourishment, and by softness, looseness, and other properties of the tissues in which it occurs. The form is not material, the nature of the worm is the same.

67. (e) *The symptoms it produces differ with its seat or position.* It is almost harmless in the sub-cutaneous cellular tissue. In muscles it often occasions but little inconvenience. In the muscles of the heart, however, it may cause softening and other organic lesions. But its situation in the deeper muscles, even in the muscles of the heart, admits not of diagnosis. The situation of this *Cysticercus* in the eye is very important.—a. It has been found between the conjunctiva and the sclerotica, where it is of least serious occurrence, as it may easily be removed by operation, as in cases recorded by HÖRING, ESTLIN, BAUM, and others.—b. In the anterior chamber. It was first seen in the living subject by SOEMMERING and SCHOTT, and in the posterior chamber by VON GRAEFE.—c. In the vitreous humour by the last-named writer and others.—d. In the retina and under the retina in very rare cases. In these latter situations this cystic worm has been detected during life chiefly by means of the ocular speculum of HELMHOLTZ. In most of these cases, partial or complete loss of sight by the affected eye, squinting, movements of the worm, inflammation of the structures, followed by partial disorganization, and a greenish tint of the vitreous humour, were the symptoms chiefly observed. In rare instances only were tape-worms present, or *Cysticercus* present in other parts of the body.—e. *Cysticercus cellulosæ* in the human brain seldom occurs, and as seldom can be recognised during life, unless conjoined with cerebral symptoms, vertigo, &c.—f. *Cysticerci* are observed in other parts of the body, or *Tenia solium* has existed at an earlier period of the life of the patient.

68. ii. *TENIA MEDIOCANELLATA\** (KÜCHENMEISTER).—DESCRIPTION. (a) The epidermis of the animal is distinct, soft, consisting of delicate decussating lines, without calcareous cor-

\* "*Tenia matura*.—Species longissima (ad 12—14 *ulnas* longa), latissima, crassissima. Capite therni, permagno, ad 2 millim. lat., valde nigrescente; acetalibus 4 permagis (ad 0.367" = 0.829 millim. long. et 0.259" = 0.711 millim. usque lat.).

"Systemate vasculoso: in capite simpliciore, quam in *T. solium*; Corpore calcar.: ad 0.012 millim. in capite, ad 0.018 millim. in articulis magnis, magisque numerosis, quam in *T. solium*. Rostellum nullum. Collum perbreve, sed distinctius, quam in *T. solium*. Articuli posteriores latissimi, ad 17 millim. lat. et ad 9—14 millim. long. crassius; poris genitalibus irregulariter alternantibus. Proglottides permagis et pervicaces, scississime sponte et sine fecibus humanis ex ano demissa, apertumque valde perturbantes; in maxima sua extensione 25—30 millim. long. et ad 7 millim. lat.

"Uterus permultos ramos (ex utroque latere usque ad 30) in margine libero claviformes, non amplius dendritice, ad summum bifurcatum divisos, inter se parallelas. Ova magna ovalia, leviora, et clariora, quam in *T. solium*, ad 0.036 millim. longa et 0.028—33 lata. Testa crassa uti in *T. solium*. Embryones 0.028—32 millim. longi, 0.023—26 lati.

"Scolex quiescens ignotus. Fortasse in sue aut bore, fortasse in animal. inferior. ordinum."—KÜCHENMEISTER.



puscles. Underneath are longitudinal fibres, running through the whole body of the animal; these, as well as the next layer of transverse fibres, contain the calcareous corpuscles embedded in them. The size of the sucking disks, which are quite black, gives the head of this *Tænia* a considerable bulk. Transverse vessels run through the space between the sucking disks, and from these a branch runs to and around the disks, until the four longitudinal vessels are developed from them in the neck; these vessels becoming thicker as the segments increase in size. The segments, which have a great tendency to increase in breadth, are at first 1 millim. in length, and about three in breadth. Afterward, also, the breadth predominates over the length for a considerable space. But this proportion does not continue downward, and segments of 1—1½ in. of length and only 3—4 lines in breadth are met with. That the last segments or proglottides have a tendency to pass away without faeces is beyond a doubt; but this also takes place with *T. solium*, although more rarely. The segments usually pass when the patient is standing, and passing along the thighs, occasion a moist and cool sensation, and are found creeping over the surface.

69. (b) This *Tænia*, when artificially expelled, breaks off close to the neck. After the lapse of about ten weeks from this expulsion, a fresh passage of proglottides takes place. From the spontaneous passage of these without faeces it may be inferred that the reproduction and growth of the segments are extremely rapid, and that the animal must be more injurious to its host than *T. solium*. KÜCHENMEISTER mentions a case in which the number of proglottides, which passed almost daily, amounted, in the aggregate, to upward of 100 feet in 80 days; and that in the course of this time 1½ foot of tape-worm was passed and regenerated each day. The internal irritation of the rectum and anus, produced by these segments when forcing their passage, and the unpleasant clamminess they occasion, especially by the deposition of their eggs, which often also occurs at this time, and which appear like to a white moist sand, are very distressing to the patient. In the case just referred to, from 5—15 proglottides passed daily from the patient with the faeces; and as these immediately laid their eggs, the faeces looked as if sprinkled with white sand.

70. (c) The *Scolex* is unknown. In Dresden it cannot be rare, as this *Tænia* is not uncommon there. It is not improbable that the cystic worm belonging to this species may occasionally occur among the specimens pronounced to be *Cysticercus cellulosa*. This point might have been determined by feeding pigs with the eggs of the *Tænia*. An intelligent patient, from whom KÜCHENMEISTER expelled this *Tænia* by means of his preparation of the extract of pomegranate root, states that he had observed his *tænia* soon after dining frequently, at an eating-house, on raw beef-steaks and green salad and radishes. The scolex was either seated in the beef, or in molusca in the salad or on the radishes. "The embryos resemble in size and structure those of *T. solium*. Their migrations are unknown." Its habitat appears to be in Europe and Africa.

71. VARIETY\* from the Cape of Good Hope.—

\* "Nihil notum, nisi Strobile pars posterior. Articuli per totum corpus, cristâ longitudinali præditi, crassi, et longi. Pori genitales marginales alternantes. Uterus et

A number of segments of this *Tænia* were expelled by pomegranate bark, and, like *T. mediocanellata*, were very difficult of expulsion. They were destitute of head and neck. Its total length must be at least 6—10 yards. Its segments are very thick, white, and fat; in the mature state more than one inch in length, and 3—5" in breadth, and extremely massive. They are distinguished by having a longitudinal ridge along the whole of the mature and immature segments. This *Tænia* is rich in cholesterine. Mr. ROSE, who sent the segments to KÜCHENMEISTER, states that the migrations of the six-hooked embryos and the scolices are unknown, that it is impossible that the latter should live in the flesh of pigs, as the worm was obtained from a Hottentot, and the Hottentots, like the Jews and Mohammedans, eat no pork. A thick *Tænia* occurs in Abyssinia, among Mohammedan inhabitants. The Hottentots probably brought this tape-worm with them from the Caffre wars, in which they enjoyed themselves among the cattle of the Caffres. The scolex probably lives in their cattle and sheep. May not the scolex have been a *Cysticercus tenuicollis*?

72. iii. *TÆNIA NANA*† (BILHARZ; VON SEBOLD).—This small filiform *Tænia* has broad and perfectly developed segments, and a large quadrangular head, at the angles of which the round sucking disks are placed upon globular eleva-

ovula simillima illis *Tænie* mediocanellatæ. Verum, ut limum est, strobilum nihil notum proliferatum esse. *Tænia* mediocanellatæ scolice quodam 6 oculis ornato. —KÜCHENMEISTER.

\* [In a recent work by Mr. PARKYNS, entitled "Life in Abyssinia" (New York, 1845, 2 vols.), we find it stated that the whole population in Abyssinia are affected with tape-worm; that out of above forty persons, male and female, employed by the writer as servants only two were exempt from it. It is in that country ascribed generally to eating raw meat, which is a universal custom. Mr. P. states that the Abyssinians are in the habit of taking physic regularly once every two months to relieve themselves of the malady; that they also use the *kayapo*, both the flowers and seed, besides the bark of another tree whose botanical name is not given; although the *kayapo* is always preferred, when it can be had. The dried flowers are ground or powdered as fine as possible, and a strong infusion made, of which the patient drinks half a pint, fasting: about six hours after, a good quantity of beer is drunk. Mr. PARKYNS supposes, as many white persons who visit the country are infected with *tænia* who do not eat raw meat, that the cause is to be sought for in the climate or in the use of bread made of a species of millet. Vol. ii., p. 224, 5. KÜCHENMEISTER, however, has proved by his experiments that individuals fed on pork tainted with measles, and containing the cysticercus, become subject to tape-worm. Various German writers have supposed that these entozoa are destroyed by boiling, salting, and smoking the pork. Dr. RIECKE, of Nordhausen, has published a paper in which he recommends the prohibition of the sale of pork unless it has undergone these processes; and, in support of these views, he states that *tænia* is an exceedingly frequent complaint in the neighbourhood of Nordhausen, where there is a large consumption of raw pork by the people; and, on the other hand, that at Altmärk, where this practice is not prevalent, he has only seen six cases of this disease among about ten thousand patients who have been under his care during a period of fourteen years.—*Ed. Med. Jour.*, Dec., 1850, p. 560. Also, for June, 1855. The same subject, the production of *tænia* by eating raw pork, is also ably treated by Professor ALLEN THOMPSON, in *Glasgow Journal*, July, 13, 1855. Professor BENNETT entertains doubts whether the salting of pork is capable of destroying the vitality of the cysticercus.—*Ed. Med. Jour.*, Feb. 18, 1855. See, also, HENKE'S *Zeitschrift*, 3, 1855.]

† "Corpus filiforme, depressum; Caput antice obtusum, collum versus sensim attenuatum, acetabulis subglobosis, rostellis pyriformi uncinulorum bifidorum corona armatum. Articuli transversi; cirri unilaterales, ovula globosa; testa levi simpliciter (C) instructa 1-100" magni. Longitudo totalis 6-10". Patria Egyptus, in hominibus intestino tenui semel reperta numero permagno." —KÜCHENMEISTER.

tions. The head is flat in front, and gradually diminishes in breadth, and passes into a long slender neck, which is followed by segments which become broader, until at last the hinder segments are three or four times the width of the head. These *Tæniæ* occupy only a limited space of the ilium. The ova are globular. The six hooklets of the embryo *Tæniæ* are distinctly seen in the fresh ova. From the number of the *Tæniæ* found, and their very small size, KÜCHENMEISTER has believed this worm to be a *Tænia echinococcus*.

73. iv. SYMPTOMS AND DIAGNOSIS OF THE MATURE CESTOIDEA OCCURRING IN THE HUMAN INTESTINE, OF BOTH BOTHRIOCEPHALI AND TÆNIÆ.—KÜCHENMEISTER remarks that the stronger the patient is, the less the irritability of his system, the more regular his appetite and food, the fuller and richer his nourishment, the fresher his colour, the less he is inclined to diarrhoea, to anæmia, and chlorotic symptoms, the less does he complain of tape-worm. According to most writers, chlorotic or anæmic symptoms are increased by the great appetite of the tape-worm for proteinic substances, calcareous salts, and fat; and according to the degree of the symptoms are also the complaints of the patient. SEEGER gives the following statement of the frequency of particular symptoms in 100 cases of tape-worm: In 68 instances nervous affections and general or partial convulsions occurred—epilepsy, hysteria, abdominal spasms, convulsive cough, dyspnoea, melancholy, and hypochondriasis. In 49 cases nausea, with faintness and vomitings, was present; in 42, various pains in the abdomen; in 33, disordered digestion and irregular states of the evacuations; in 31, irregular appetite and voracity; in 19, habitual or periodical hemiparesis; in 17, sudden colic; in 16, sensations of undulatory movements in the abdomen up to the chest; in 15, vertigo, delusions of the senses and defects of speech; and in 11, shifting pains in various parts. These symptoms are deceptive; many of them will be often experienced after the worm has been completely expelled; and even viewed in connexion with the patient's habits, occupations, and residence in a locality in which the *Cestoidæ* are known to be prevalent, are not of themselves diagnostic of the existence of tape-worm. It is only by the discharge of segments of the worm that the nature of the disease can be satisfactorily recognised. The passage of the segments *per anum*, either with the fæces, especially when there is diarrhoea, or without this accompaniment, is the most frequent. The discharge of them by the mouth is extremely rare, and can occur only when there is violent vomiting, and when there is dangerous obstruction of the bowels. The passage of them through the intestines into the peritoneal cavity, or into the urinary bladder, or through fistulæ opening on the surface of the body, can occur only when ulceration of the intestines has been followed by perforation and a fistulous communication in either of these directions, or after wounds penetrating into the bowels. These several ways by which segments of tape-worm were passed externally were known to the older writers, and were ascribed by them to the mechanical or perforating action of the worm. But it is singular that, whenever ulceration and perforation of the bowels occur coincidently with the presence of worms, an instinctive desire of the latter to es-

cape from the bowel, through either the morbid opening or the natural passages, is observed.

74. v. IMMATURE TÆNIÆ FOUND IN THE HUMAN BODY EXTERNALLY TO, BUT NOT WITHIN, THE INTESTINES.—These form the CYSTICI and ACEPHALOCYSTIDES of older writers. The CYSTICERCUS CELLULOSÆ, being identical with *Tænia solium*, has been noticed when treating of that tape-worm (§ 62, *et seq.*). I shall only briefly notice the other immature *Tæniæ* occasionally found in the human body externally to the intestines.

75. A. CYSTICERCUS TENUICOLLIS (ESCHRICHT), CYSTICERCUS VISCERALIS (AUCT.).—As the mature *Tænia* of this cystic worm is not found in man, but chiefly in the dog and wolf (*Tænia marginalis*), I shall not occupy any part of my limited space by describing it, but refer the reader to Dr. LANKESTER's translation of KÜCHENMEISTER's work (p. 178).

76. (a) The *Scolex* or immature state\* of this *Tænia*, however, being sometimes formed in man, especially in former times, requires a brief notice at this place: it forms the *Cysticercus tenuicollis* of recent writers, and the *C. visceralis hominis* of earlier authors. The rarity of this scolex in human subjects in modern times has induced VIRCHOW and DIESING to doubt its occurrence, while ESCHRICHT has proved its rare appearance in man, especially in the liver.

77. (b) The structure of this cystic worm is rendered remarkable by its frequently enormous caudal vesicle, which in animals may attain the size of a child's head, by the concentric wrinkles or rings, visible externally, which pass round the worm, and which are crossed by very fine longitudinal striæ, so that when it is laid upon a plate, and held on the same plane with the eye, the animal has a finely checkered appearance. In the dead *Cysticercus tenuicollis*, incrustated with calcareous matter, these concentric rings may be recognised, and the calcareous deposit often forms a plastic-like cast of the form and structure of the cystic worm. The parietes, also, when a transverse section of the dead *Cysticercus* is made, present a structure consisting of concentric strata, analogous to that of the *Echinococci*. Here, however, it is so extremely fine and delicate, that there is great trouble in detecting it.

78. B. ECHINOCOCCI.—Some naturalists admit only of one species or variety of *Echinococcus*, others of two, and others of even a greater number. VON SIEBOLD divides this species into *E. hominis* and *E. vcterinorum*; but, from the accounts of various writers, both varieties have been found in the human subject.

79. 1st Var. ECHINOCOCCUS SCOLICIPARIENS†—*Echinococcus vcterinorum*, of authors.

\* "*Scolex quiescens*—*Cysticereus tenuicollis*. Vesicæ caudali tenui permagna (1, 2, 4, 6" et ultra); Corpore 14—30 millim. et ultra longo, 5—10 millim. lato, cylindrico; Collo 8—15 millim. longo; Capite uti in *Tænia filis* 2 gelatinosis, pone collo ex receptaculo capitis aut scolici in vesicæ cavitate emissis. Metamorphosis in *Tæniam* 10—12 hebdomadis post partum peracta.

Habitat. Rarius in hominis abdomine (mesenterio et hepate), sæpius in Ruminantium, Equi, Suis Scrofæ Scuri, Simie, &c., cavitate abdominali."—KÜCHENMEISTER.

† *Tænia matura*.—*Tænia minima*, ad 3 millim. longo, corpore 3-aut 4-articulato. Capite subgloboso, 0.3 millim. lato; rostellum parvulo, rotundato, 0.125 mill. longo; osculis suctorii magni 0.13 mill.; hamuli in duplici ordine positi 23—36, quorum majores ex *Leuckartii mensura* 0.045, minores 0.035, ex mea mensuris 0.034 et 0.028 habent. Collo longiusculo. Articulis 3—4, quorum ultimis toto corpore longior (2 mill. long. 0.5 mill. lat.) est. Utero medianâ loculis et stolonibus nec ramis propriis



SYNON.—*Tania visceralis granulosa*, GÖZE; *T. granulosa*, GMELIN; *Vesicaria granulosa*, SCHRANK; *Hydatis erraticia*, BLUMENBACH; *Polycephalus hominis*, GÖZE; *Pol. granulatus*, ZEDER; *Pol. Echinococcus*, ZEDER; *Echinococcus velerorum*, RUDOLPHI; *Echin. giraffe*, GERVAIS; *Echin. simiae*, RUDOLPHI, alique; *Echin. granulatus*, RUDOLPHI; *Echin. infusorius*, LEUCKART; *Echin. polymorphus*, DIESING; *Echin. scolicipariens*, KÜCHENMEISTER.

80. (a) The mature *Tania* has hitherto not been found in the human subject. VON SIEBOLD in 1852, and KÜCHENMEISTER in 1854, bred this *Tania* by giving *Echinococci* to dogs. The description in the subjoined definition gives all that is required to be known of it; but the eggs and six-hooked embryos must occur at some period in the human intestines, in the water and raw articles of diet, especially vegetables, fruits, roots, &c. Like the embryos of other *Tania*, however, they escape the human eye. "Their migration is certainly performed, like that of the embryos of other *Tania*, by their perforating the intestine and getting into the abdominal cavity, where they prefer attaching themselves to the liver or the kidneys, or to the organs in the thoracic cavity. A portion of them, however, may migrate along the *ductus choledochus* to the outer surface of the liver." They take up their position in the same way as the other *Cestodea*, the envelopes formed around them being similar, but much thicker.

81. (b) The *Scolex* forms a vesicle which, according to ESCHRICHT, measures  $2\frac{1}{2}$  to 3 inches, and is firmly attached to the organ in which it dwells. The enveloping cyst is like others, but more concealed and more abundantly permeated by proteinous unorganized substances, by which its walls are thickened. It may be partly separated into layers, the inner being smooth, like a serous surface. A second vesicular body fits exactly to the inner surface of the innermost layer of this enveloping cyst, and is the true *cystic worm*, the so-called mother vesicle of the *Echinococci*, that is, the six-hooked embryo, which, continually increasing, has attained an extraordinary size. It is almost impossible to get the cystic worm uninjured out of its cyst, to which it adheres so firmly. The walls of this worm are elastic, and tremble like jelly, when touched, even after they are empty. They never collapse altogether as seen in *Cysticerci*, nor lie, like these, even when dead, at the bottom of the envelope cyst. Their cut margins roll themselves up, and present a gaping appearance. The transverse section of this cystic worm shows a structure of more or less numerous consecutive circular strata, varying according to age.

82. c. The structure of this cestode has been described by ESCHRICHT, VON SIEBOLD, and others,

instructa; Oculis ovalibus, 0.034 long. et 0.030 lat., testa 0.0019 mill. crassa, cavitate interna 0.021 lat. et 0.030 long. Habitat. In Canis domesticus, imprimis in Canis lani, fortasse etiam in Canis lupi, tubo intestinali.

Scolex quiescens.—Echinococcus scolicipariens. Vesica minus pellucida, membranacea, in pariete ad 1—2 mill. crassa, ex pluribus 0.005—0.01 mill. crassis lamellis concentricis composita, parvulas gemmas (brood-capsules) stylosas gignens, in quibus scolices singuli proliferantur, magnitudinem 30 mill. et ultra exhibens. Scolices sociales gemmis disruptis libere in vesicam emissi, parvuli, capite Tentac modo dictæ. Metamorphosis in Taniam post 7—8 hebdomades peracta.

Habitat. Interdum in homine, plerumque in aliis animalibus plerumque domesticis ex ordine ruminantium et herbivorarum.—KÜCHENMEISTER in Op. cit., p. 192, 3.

ers, who say that its parietes consist of two similar membranes, loosely connected, the outer being firm and cartilaginous, and the inner thin and smooth, resembling a mucous surface, which is beset with small elevations of a size up to  $\frac{1}{4}$ ", which are partly very young scolices in the act of development, partly farther developed scolices of 1-10", and partly the points on which such scolices formerly sat. In the fluid contained in these vesicles there are also free scolices, part of which are still furnished with the remains of the stalk. For other minutæ of structure I must refer the reader to Dr. LANKESTER's translation of KÜCHENMEISTER's work.

83. This cestode worm is found chiefly in the liver of man and ruminating animals. It has been detected also between the choroid coat and the retina of the human subject. When present in the liver, this organ is generally swollen, especially posteriorly, pale, or of a uniform greyish-brown colour. Its surface presents larger or smaller spots of a whitish-yellow colour, of a regular form, and very slightly raised. The species is generally seated so deeply as hardly to project above the level of the surface of the organ, unless it is very largely developed.

84. d. The symptoms caused by this *Echinococcus* are usually slight, limited, and equivocal. The vesicles seldom exceed the size of a walnut or hen's egg. Even when they are present in numbers, their diagnosis is most difficult. When they are small or few, the disturbance of the functions of the liver may be slight. When more numerous or more fully developed, there are generally pain and uneasiness in the hepatic regions, with increased pain on pressure and percussion; the dull sound on percussion being more extensively heard, and the liver being often felt from one to two inches below the false ribs. There is also irregularity of the bowels, the evacuations being unhealthy, and often deficient in bile. Jaundice is sometimes observed. But of these symptoms may be caused by other lesions of the liver.

85. B. ECHINOCOCCUS ALTRICIPARIENS. *Echin. hominis*, Auctorum.

86. KÜCHENMEISTER\* believes that this species has been confounded with the preceding.—a. Its mature *Tania* is unknown. Nevertheless, he thinks that it probably occurs in the human intestines, and indeed in the intestines of those individuals who suffer, or have suffered, from the species of *Echinococcus* belonging to it in some part of their bodies, and in whom such a colony of *Echinococci* has opened towards the intestine. This *Tania* may also develop itself in the intestines of domestic carnivorous animals. That the eggs and embryos must occur at some time

\* He gives the following definition of its *Scolex*: "*Vesica animata Echinococco scoliciparienti similis sed cm. uno eo multo major (ad  $\frac{1}{2}$  ped. in diamet.)*. Scolices singuli quiescentes majore hamulorum minorum numero (46, 52, et ultra) armati parantur, aut ex modo Echin. scoliciparientis, aut in gemmis aut capsulis a vesicæ matris superficie interna solutis in quibus iterum scolices et vesicæ secundariæ scolices gignendi si præditæ giuntur (mother, daughter, and grand-daughter-vesicles); aut fortasse in vesicis, quæ divisione quadam aut sectione ex vesica matre in vasibus animalis hospitis repente et serpente formantur. Vesica mater nihil aliud est nisi vesicula embryonalis 6 hamulis armata, et valde amplificata; vesicula filia et neptis hamulis 6 destituta, quia ex vesicula embryonalis restituta videtur non exorte sunt.

Habitat. Non solum in homine, sed etiam, auctoribus Haubner et Creplin, in mammalibus majoribus domesticis, et quidem in diversissimis et hominis et illorum animalium corporis regionibus. Ovula, lucusque ignota."

or other in the human body must be admitted, although they escape observation from their small size.

87. *b. The Scolcx*—the *Echinococcus altricipariens*—occurs not only in man, but also in the larger domestic animals, especially herbivora. It is very prevalent in Iceland. Dr. SCHLEISSNER states that he saw fifty-seven human patients suffering from *Echinococcus* in that island; that it occurred more frequently inland than on the coast; and that it constituted one eighth of the diseases of the place. Dr. THORSTENSON, of that island, says that every seventh living human being in it suffers from *Echinococci*; that females are more liable to them than males, and that their abundance increases with age, men being most frequently attacked by them between their thirtieth and fortieth, and women between their fortieth and fiftieth years.

88. *c. The characteristics* of this species of *Echinococcus*, as distinguished from the preceding, appear to be as follows: (*a*) The enveloping cyst, and the mode of annexation of the inner wall of this cyst to the primary vesicle of the *Echinococcus*, derived from the six-hooked embryo, are similar in this and the foregoing species; but the cyst formed by *Echin. altricipariens* is much larger than that of *Echin. scolicipariens*, and hence projects far above the level of the organ in which the colony exists.—(*b*) Owing to its much greater bulk a proportionately increased interference with the functions of the organ results, and eventually with the whole organism.—(*c*) As regards the animal itself, we find not only single scolices or a single vesicle in such a colony, but the constant production of fresh vesicles with young (daughter and grand-daughter vesicles), sometimes with, and sometimes without, the production of separate scolices adhering directly to the walls of the vesicle. According to THORSTENSON and SCHLEISSNER, the hydatids occurring in Iceland exhibit this structure. "The hydatid sacks," they state, "are formed not only in the human liver, but also in many parts of the abdomen, and are often of enormous size. Hundreds of hydatids are frequently evacuated through the external opening of the sac, or with the stools, and in vomiting. They do not, however, occur only in the interior of the body, but also very frequently in the skin, where they appear like large saccular swellings. The course of the disorder is very chronic." KÜCHENMEISTER states that the vesicles produced do not, like the original mother-vesicle, bear six embryonal hooklets, as they never have occasion for them. The six hooklets may be sought for in vain, even in the mother-vesicle, as, although certainly present, they must, from their extreme minuteness, escape detection on such a large vesicle. The smallest of the grand-daughter vesicles are but just visible, and enclose four, five, or more scolices, which adhere peripherally, by a small stalk, to the inner wall of the common cyst, but converge with thin free ends towards the centre of the cavity of the small vesicle. In very large daughter-vesicles scolices also swim about freely.—(*d*) The scolices produced or *nursed* by the mother-, daughter-, or grand-daughter vesicles are in general more slender than those of the preceding species: they have the head with the double circlet of hooks, more frequently protruded during life, at least within the larger daughter-vesicles, exhibit distinctly

marked sucking-disks, and bear a greater number (46 to 54) of hooks, which appear more slender than in the preceding species.—(*e*) The dwelling-places of this species are not limited. They may occur in the liver, the lungs, the kidneys, the sheaths of the testicles, the spleen, the ovaries, the breasts, the throat, in the sub-cutaneous tissues, in the bones, &c.—(*f*) With the increase of the secondary and tertiary cysts in the mother-cyst the swelling advances; and the more rapidly this takes place, the recognition of the malady and its natural cure are facilitated; inasmuch as the mother-cyst is often burst by the distention, and probably in many cases becomes destroyed. Sometimes, however, the burst colony appears to heal and to recommence the production of fresh daughter-vesicles.

89. *d. The prognosis* of this species is more unfavourable than that of the preceding, "although the *diagnosis* is easier, on account of the more rapid growth and greater bulk of the swelling, the occurrence of the hydatid-buzzing, and the more distinct sensation of fluctuation. The structure of the walls of the mother-vesicle is the same in both species, and is characterized by the numerous parallel concentric layers in the substance of the walls, which appear more distinctly marked in the daughter-vesicles, and make their appearance with remarkable clearness after treatment with caustic potash, with the addition of a drop of red ink." (LANKESTER's *Transl. of KÜCHENMEISTER*, &c.)

90. *e. The Diagnosis of Echin. altricipariens*.—The symptoms produced by a colony of these parasites vary with the organ in which it is located, and with the size and pressure of the tumour it develops. At an early stage of their growth these animals generally occasion little inconvenience, and when largely increased in bulk they produce phenomena which vary little from those occasioned by tumours of the same size in similar situations. Their superficial or deep-seated positions, and their vicinity to, and pressure upon, nerves and blood-vessels, will also modify effects, or even indicate their existence. But it is comparatively rare to obtain certain evidence of the presence of a colony of *Echinococcus* in the body, unless the passage of the gelatinous vesicles already described from the cavities after the bursting of such a colony, or from the punctures or incisions made into tumours. At the same time, the little scolices of the *Echinococcus* must be found in the vesicles, part of these retaining, others wanting their hooks, their sucking-disks being often indistinct. When the vesicles passed have an opening, the little scolices slip out very easily, and if the structures just mentioned be not found, it is doubtful whether or no a steril colony or an acephalocyst be present.

91. Before perforation or bursting of the cyst has occurred, the tumour produced by it being very considerable, an examination of it should be made by palpation and percussion, and if there be an obscure or sensible fluctuation, and when aneurismal symptoms are wanting, and when the general health is either good, or not injured to the extent that might be expected from the size of the tumour, if it were of a malignant nature, then an explorative puncture should be made to complete the diagnosis, and the evacuated fluid examined by the microscope in order to ascertain the presence of *Echinococcus scoliceis*, or of albuminous gelatinous shreds of *Echinococci*. By



these means only can the nature of a cystic or saeculated, fluctuating or elastic tumour be determined, and the existence of these parasites ascertained.\*

92. Without these proofs the diagnosis can never be brought beyond one of probability. A saeculated or cystic swelling filled with fluid can alone be inferred. The most useful objective symptoms are the existence of such a tumour, which is elastic to the touch, and of a peculiar consistency and form, in places where swellings do not usually occur; but when these do make their appearance, they are generally *Echinococci*. The highest degree of probability that an unopened tumour belongs to a colony of *Echinococci* is attained when the swelling occurs in places such as the liver, spleen, kidneys, lungs, breast, testicles, throat, &c., where *Echinococci* are otherwise brought to light, either artificially or naturally. On percussion, the finger, placed over the swelling, often feels a trembling or oscillation of the mass underneath it, especially when several gelatinous tremulous cysts are enclosed within a larger vesicle; these being set in

\* ACEPHALOCYSTS.—LAENNEC, in 1804, viewed these structures as independent animal organisms. VON SIEBOLD and KÜCHENMEISTER more recently opposed this view; and very lately the last of these writers, in consequence of his experiments with the eggs of *Tænia*, considered that *Acephalocysts* are six-hooked cestode embryos, the growth of which has proceeded without hinderance, but which, nevertheless, have remained barren; or, more correctly, which have never attained to proliferation and the production of scolices.† If *Acephalocysts* occur where normally-developed *Echinococci* usually have their abode, they cannot be called stray cestode embryos, but only cestode embryos which have been disturbed in their normal development and remained barren. KÜCHENMEISTER considers the following to be the characteristic marks of *Acephalocysts*: 1st. A vesicle adhering to the inner walls of a larger cyst from which it is capable of being detached, or is already detached, in particular spots, but never all over, and collapsed in wrinkles, and which presents very sparing calcification in its white and scarcely discoloured walls. 2d. The transverse section exhibits walls consisting of distinctly developed, parallel, concentric layers. 3d. The walls have a peculiar elastic gelatinous trembling. 4th. The contents consist of a watery fluid, or of a substance of a purulent consistence, and contain the microscopic elements of calcifying encysted protein masses in the act of resorption. 5th. The vesicle sometimes conceals, in its interior, secondary cysts, with gelatinous walls, in which, however, we seek in vain for scolices of cestodes or their remains, especially their hooks. "The *Acephalocysts* which are referred to here belong to the following three species of *Tænia*: 1. *Acephalocysts* derived from *Tænia Echinococcus scoliciparus*. Many of those *acephalocysts* which bear no daughter-vesicles in their interior must be referred to this species. 2. *Acephalocysts* derived from *Tænia Echinococcus altriciparus*. These are *acephalocysts* with a formation of daughter-vesicles. 3. *Acephalocysts* derived from *Tænia ex Cysticercus tenuicollis*." KÜCHENMEISTER remarks respecting these last that what ESCHRIEUT regarded as possible has since proved to be the case; for that in one administration of eggs of *T. ex Cyst. tenuicollis* to a lamb, he found a sterile *Cysticercus tenuicollis* in the midst of other equal-sized and fully-developed *Cysticerci* of this species. This sterile individual bore perfectly distinct indications of life. All structures, he adds, which are really *acephalocysts*, and which are living sterile specimens of *Cysticerci* and *Cœnuri*, are distinguished from those derived from *Echinococci* in that the walls of the latter consist of very distinct concentric layers, tremble like jelly, and are extraordinarily elastic; while the walls of the analogous structures derived from *Cysticerci* are considerably thinner, have not the elastic consistence of jelly, and consist of such fine and delicate concentric layers as hardly admit of detection. Such being the origin and nature of *Acephalocysts*, it is obvious that the phenomena produced by them cannot be materially different from those caused by the two species of *Echinococcus*.

The subject of *Acephalocysts* has been already treated of under the article LYDIDIDS; but instead of viewing them as in that article, as independent organisms, the more recent Continental microscopists and experimenters have shown them to originate as now stated.

motion by the percussion, appear to produce this trembling or oscillation, which, however, frequently is not felt.

93. *f. The etiology of the Echinococci* is manifestly the ingestion of one or more of the eggs or six-hooked embryos of the *Tænia Echinococcus altriciparus* at some time of the life of the patient. The mode of life of persons in some localities and in some circumstances may be favourable to the passage of the eggs of this *Tænia* into the stomach; and it is now well understood that certain *Cestodea* often have a very limited habitat. "The duration of the life of the *Echinococcus* does not appear to be very short. According to ESCHRIEUT, one patient must have borne his colony eighteen years."

94. *g. The prognosis of the Echinococci* varies according to the organ in which they are seated, to their situation in that organ, and to the primary and consecutive injuries caused by them to the organ and to the whole system. But the prognosis is upon the whole more favourable than is generally supposed, especially when the general health and the powers of vital existence are duly promoted. "The tumours, when they are accessible, are among the number of curable tumours; they may cure themselves by bursting, and when they are once got rid of relapses in the same colony are rare and exceptional cases, and every *Echinococcus* produced usually owes its existence to a new immigration of embryos. But for this very reason the continuance of the mode of life in endemically affected places furnishes a more unfavourable prognosis. The natural cure by the bursting of the colony, and the passage of daughter-vesicles, may be accompanied by symptoms dangerous to life, or, if it take place in the direction of the larger bronchi, by difficulty of breathing, or may even lead to actual suffocation." (*Op. cit.*, p. 227, 228.)

95. *B. Sub-order, TREMATOIDEA.—SYNON.—Myximitha, DIESING; Egghwürmer; Platyhelmintha isolata, Isolated flat-worms, KÜCHENMEISTER.*

DEFINIT.—"*Animalia solitaria, plerumque hermaphrodita, rarissime sexu distincto. et poris plerumque suctorius, medianis aut laterahbus instructa. Canalis cibarius furcatim divisus aut ramosus, rarissime simplex. Evolutio fit plerumque metamorphosi et sapissime generatione alternante, rarissime sine illis.*"—LEUCKART.

96. This sub-order is divided by KÜCHENMEISTER into two Families, the *Monostoma* and the *Distoma*.

97. (a) *MONOSTOMA.\*—SYNON.—Cucullanus; Festuaria; Fasciola; Amphistoma; Distoma; Monostoma; Monostomum.*—It is very doubtful whether or no any species of *Monostomum* has been found in the human body. Professor JÜNGKEN was said to have found eight *Monostoma* in

\* "*Corpus depressum vel tereusculum. Caput continuum, vel collo discretum. Os terminale vel anticum, ut plurimum acetabuliforme, integrum, crenulatum, interne vel armatum. Apertura genitalium perclara, duplex; mascula infra os, interdum acetabuliformis, pene protractilis; feminea pone masculum, minima, ut plurimum inconspicua. Porus excretorius supra caudæ apicem antice margine caudali. Animalia manna nalia, avium, amphibiorum et piscium corpora, i. e., præter tractum intestinale organa varia inhabitantia, libere aut folliculis inclusa.*" (DIESING.) *Metamorphosis et generatio alternans inter evolutionem, uti in Distoma.* The ventral sucker is therefore deficient, and DIESING gives a warning, "*Cave, ne Bothriocephalidearum articulum solitarium pro 'Monostomum' habeas, aut porum genitalen, interdum callosum, cum acetabulo confundas.*"

an incipient cataract; and hence VON NORDMANN named the species *Monostomum lentis*.

93. (b) *DISTOMA*\* (KÜCHENMEISTER); *Distomum* (DIESING).—*a. Distoma hepaticum*†—*Distomum hepaticum*—The fully-developed *Distomum hepaticum* has been minutely described by KÜCHENMEISTER, but I must refer the reader for his description to his work, or to its excellent translation by Dr. LANKESTER.—*a.* I may, however, briefly state that its *skin* and *parenchyma* consist of muscular layers—of longitudinal, transverse, fusiform, and short fibres; that its organs of sense are wanting, and its nervous system has not been described; that its alimentary apparatus presents a mouth, pharynx, and excretory organ; that its *female* sexual organs lie towards the ventral surface of the animal, and consist of a germ-stock, with its efferent duct, two vitellines, a short oviduct, a sac-like uterus, and a vagina; that its *male* sexual organs consist of testicles, a ductus spermaticus, a vesica seminalis, and a penis; and that “the *Distoma* are hermaphrodites, with the following sexual actions: self-impregnation with and without copulation, and impregnation and copulation with a second individual.” This *distoma* occasions great devastation in the livers of herbivorous and domestic animals, especially in wet seasons; but it very rarely occurs in man.

99. *b. Diagnosis*.—*Distoma* in the liver causes dilatation and inflammation of the gall-ducts, and destruction by pressure and disappearance of large portions of the parenchyma of the liver in the vicinity of the enlarged ducts. These changes, however, cannot always be recognised, or referred to their true source in the human subject, as several lesions of the biliary organs and apparatus occasion the same symptoms as they produce. The *distoma* may even cause many

of the phenomena of gall-stones passing along the ducts, with or without more or less of jaundice; but these cannot assist in establishing a diagnosis, the passage only of the animals with the fæces or with the matters vomited being the only proof of their presence in the human subject.

100. *c.* It is obvious that no *prognosis* of the *Distoma* *malady* can be formed unless the animal be discharged and recognised. When this takes place, although the prognosis is upon the whole unfavourable, yet there may not be any immediate danger. The life of the patient may be prolonged, or even a recovery ultimately obtained, by promoting the secretions and excretions by suitable means, and by supporting vital force and resistance.

[Several years since we prescribed for a railroad engineer in the State of Ohio, who complained of a sensible movement in the epigastrie region, with considerable derangement of the digestion, loss of appetite, pain, anorexia, bilious symptoms, &c. He said he was positive there was a living animal in his stomach, which he had probably swallowed while drinking at some of the stagnant pools while pursuing his vocation as surveyor and engineer. Meeting him some months after, he stated that he had passed the animal after taking a powerful purgative; that it was from three to four inches in length, flat, alive, and of a dark colour, &c. It was evidently an enormous *Distoma*. In the same region of country, the livers of animals, especially the ox and sheep, and frequently the hog, are infested with the same parasites under the name of *fluke-worms*, which frequently prove destructive to life. We have often seen the ox liver perforated by these animals like a honey-comb.]

101. *β. Distoma lanceolatum*\* (MEHLIS). This species was seen in the human subject by BUCHOLZ, CHABERT, and MEHLIS. It is narrow and elongated, and distinguished by its long neck, by the want of any spinous coat, and by the female organs especially occupying the abdomen, and the testicles the anterior part of the body. SCHAEFFER, RUDOLPH, and MEHLIS established this as a distinct species of *Distoma*, and showed that GÖRZE, ZEDER, and BREMSER were wrong in re-

\* “Corpus depressum vel teretiusculum, armatum vel inerme. Caput continuum, vel collo discretum. Os terminale, vel anticum, ut plurimum aet. bulbiforme. Acetabulum unum ventrale sessile, vel pedicellatum, medianum, ab extremitate postica plus minusve remotum. Aperturæ gentilis approximatae, scississimæ ad exitum conjunctæ (clonæ instructæ), supra vel infra acetabulum sitæ. Antennæ plerumque hermaphroditicæ, rarissime siccæ distinctæ. Ovid. embryones pœntibus rarissime similes, plerumque dissimiles aut fimbriatos, aut fimbriis destitutos continentes, quare evolutio sit metamorphosi et generatione alternante.

“Statu immaturo aut libere in natura vagantia, aut in organorum p. enchymate, imprimis in animalibus inferioribus inclusa. Statu maturo endoparasita animalium propriis vertebratorum, aut libere in variis organis et cavitatibus apertis et clausis viventia, aut in folliculis inclusa.”—DEJARDIN et DIESING.

\* “Corpus plenum, armatum, saltem in juvenilibus, et majus profectū adhuc in collo. Individua juvenia 4”–9 mill. longa, 1”–3.3 mill. lata; adulta 8–14”–18–31 mill. longa, 3½–6”–8–13½ mill. lata.

“Collum subconicum, breve. Os hanc rotulosum, terminale, triangulare, 1.4 mill. latum. Acetabulum 1.5 mill. latum, os majus superum ad colli basin, aperturæ triangulæ, 3–4 mill. pone os situm.

“Organis genitalia fere contigua, mediū in parte inter os et acetabulum sita. Penis cylindricus, 3 mill. longus, 0.5 mill. latus, fulciformis, prominens, uncinulis parvis armatus. Testiculi macinā ex parte mediū in corporis posteriori parte siti, ex trunco medio et ramificationibus, ad finem cæcis, compositi. Organa vitellina ad latera animalis sita, inter se horizontali quodam et transverso ramo conjuncta et statim in utrum simplicem magnitudine crescentem, multifarie volutum transcurrentia. Ovid. flavū, infra quendam porculam ad obsequio, delatens, 0.055–0.063” (V. et Par.) = 0.126–0.144 mill. longa, et 0.035–0.038” = 0.079–0.086 mill. lata.

“Embryones Cercarum atriculi aut Iridie, nec minus Cercarie libere, si omnino hæc forma præbeatur, ignote. Migratio nūn modum nonnullis committitur. Distomum juvenile immaturo semel sub cute humanā inventum.”—KÜCHENMEISTER.

\* “Corpus leve, lanceolatum, planum, aliquid p. hercidum, ad oris flavofuscum, 4.5–12 millim. seu 2–6” longum, 2 ad 2.3 millim. aut 1–2” latum in anteriore parte tenuius, acetabulo fixatum, in posteriore aliquid obtusum. Collum continuum, conicum, planum, longius quam in D. hepatico. Os fere terminale, globosum, 0.45 mill. latum, acetabulum orbiculare, 0.43 mill. latum, 1.1 mill. pone os situm, os majus. Oesophagus 0.45 mill. longus, bulbos oesophagi 0.10 mill. latus; intestinum bifurcatum, rectum, simplex, non amplius ramificatum, 0.04 mill. latum.

“Genitalia intra os et acetabulum ventrale sese aperientia, inter intestini bifurcationem sita. Vesica seminalis exterior=cirrus claviformis; funiculus spermaticus flexuosus; penis longus, cylindricus, plerumque rectus; testiculi 2 majores et tertius minor vesicam seminales internam exhibens; unus pone alterum et pone acetabulum ventrale siti, vix lobati. Organa vitellina multo minora, quam in D. hepatico, albida, lateralia, ramificata, 1–1½ mill. longa, in ovarium et uterum intrantia, longiora quam in Dist. hepatico et tenuiora, ad colore obscuriore prædita, multifarie voluta. Ovid. multo minora, quam in Dist. hepatico, 0.041 mill. = 0.018” Par. 0.0185” Vienna longa, et 0.0246 mill. = 0.0108” Par. 0.011” Vienna lata, sed in statu maturo multo obscuriora quam in D. hepatico, et nigro-rubra.

“Systema excretorium: Vasa lateralia, ad collum usque prominentia, ibique recurrentia et intumescunt in minora, ad animalis apicem sita, finita.”—KÜCHENMEISTER.



garding it as a young *Distoma hepaticum*. It is stated by KÜCHENMEISTER to be less injurious to the structure of the biliary apparatus than the *D. hepaticum*. The diagnosis is possible only when it passes off. The prognosis is probably more favourable than in the case of the other parasite.

102. *γ. Distomum heterophysis*\* (VON SIEM-BOLD).—This parasite has hitherto been found only in two instances, but in very great numbers, in the small intestines, by BILHARZ. Its influence on the animal economy is unknown. It is unnecessary to give a farther description of it than that contained in the subjoined definition.

103. *δ. Distomum hamatobium*† (BILHARZ).—*a.* This parasite was first found in 1851, in the blood of the portal vein. It appeared as a white elongated entozoon, resembling a nematoid worm when examined with the naked eye; but was found to be *Distomum*, with a flat body and a cylindrical tail ten times as long as the body. This tail was no loosely attached, deciduous portion of the body, as in the *Cercaria*, but a continuation of the body of the worm itself, which was flat and rolled towards the ventral surface. This first animal found was clearly recognised as the male; another subsequently found in one of the mesenteric veins of the same subject was ascertained to be the female. For a minute description of the sexual organs, eggs, and development of this animal, I must refer the reader to KÜCHENMEISTER'S work. It may, however, be stated that, according to Professor GRIESINGER, this parasite is so extraordinarily abundant in Egypt as to have been found 117 times in 363 dissections. It would appear that the *Distoma*

get into the blood-vessels and lay their eggs, which at last escape from the ruptured vessels in the intestinal and urinary mucous surfaces. Dr. REINHARD saw, hanging out of a vessel accidentally opened by KÜCHENMEISTER, one of these *Distoma*, which bore his female with him. The action of their eggs and embryos on the mucous coat of the intestines and urinary organs, and on the biliary apparatus, is of a very dangerous nature.

104. *b. In the intestines* are found deposits upon and beneath the mucous membrane, verrucose and lobate fungous excrescences, and also the aggregations of the eggs in the vessels of this membrane, "where the eggs are often fixed in rows in the mucous and sub-mucous tissues, in and beneath the croupous exudations upon the intestinal ulcers; and, lastly, after the rupture of the vessels upon the free surface of the mucous membrane."

105. *c. Action on the Liver*.—"The entire trunk of the portal vein is sometimes filled with mature animals, with eggs in the substance of the liver; and it is not impossible that the *Distoma* situated in these places may give rise to a tough, dry, anæmatus consistence of the liver, or perhaps even to abscesses."

106. *d. The alterations in the urinary bladder* produced by *Distoma hamatobium* are at first circumscribed spots of hyperæmia, with bloody extravasation and swelling of the mucous membrane, or tenacious mucus, with grayish-yellow masses of exudation, in which the eggs are imbedded. "It is rare that the whole inner wall of the bladder is injected and ecchymosed. The urine is mucous, but pale and clear; and BILHARZ found eggs in the urine passed." In later stages, yellowish discoloured elevations, mixed with many pigment spots. These elevations often form a soft coat, sometimes a line in thickness, mixed with bloody extravasations, firmly attached to the mucous membrane. Sometimes calcareous incrustations of the egg-shells, the deposition of the salts of the urine, and the aggregation of eggs, give the whole a sandy texture. Very rarely this coating covers true ulcers with loss of substance. At other times, single or aggregated vegetations, varying from the size of a pea to that of a bean, of a yellowish colour or ecchymosed with blood, are found on the vesical mucous surface. In the smooth-edged spaces of these vegetations, sitting in the sub-mucous tissue, formed by the diverticula of its vessels, and only constituting productions of the vessels, BILHARZ first found the *Distoma*, and in the mucus and exudation over these spots their eggs. We may conclude from this that the *Distoma* collect there, and in similar situations, to lay the eggs which are to be passed off.

107. *e. The mucous membrane of the ureters*, either alone or with that of the bladder, or even with that of the pelvis of the kidney, in rare cases, is attacked in a similar manner. A gravelly matter, in molecular masses of imbedded eggs of *Distoma*, either empty or containing embryos, with blood, exudation corpuscles, and crystals of uric acid, is sometimes passed in the urine. Individual embryos also occur free, but GRIESINGER found these in a dead state only. In consequence of the thickening of the inner coats of the ureters, complete or partial occlusion of these ducts with dilatations above it, with retention of urine and its consequences, sometimes supervene.

\* Descriptio.—"Dist. heter., hermaphroditum. Corpus orato-oblongum, depressum, subtus planum, supra leviter convexum. Aetabulum oris subapicale, infundibuliforme, parvum. Aetabulum ventrale paululum ante medium situm, magnum (aetabulum oris decies et ultra superans), globosum. Pharynx muscularis, globosa; canalis cibarius ante aetabulum ventrale in 2 partes cæcæ divisis. Cirrus post aetabulum ventrale situs, et oblique eum sinistrâ ejus parte cohitus, globosus, aetabuliformis, circulo incompleto setarum 72 minutissimarum, ramulis 5 secundis instructum coronatus, testiculis organoque germinifero globosis. Longitudine 4—4½; latit. ½."

† Patria.—Egyptus; in hominis intestino tenui bis reperiuntur, numero permagno."—KÜCHENMEISTER.

‡ Descriptio vermis secundum BILHARZ.—"Distomum hamatobium, sexu distincto. Moris corpus molle, albidum, filiforme, parte anteriore totius longitudinis octava vel nona ('truncus') depressa, lanceolata, subtus plana vel concava, supra leviter convexa, superficie levî, reliquis corporis parte ('cauda') terete, margine corporis ad aetabulum ventrale retro utrinque versus faciem ventralem conflexo, eoque modo canalem gynæceophorum, efficiente, apicè postico, attenuato, superficie externa tuberculis piligeris conferta, superficie candida interiore linea mediana levî et partibus lateralibus aculeis minutissimis scabra. Aetabulum oris apicale subinflexum, triangulare. Aetabulum ventrale sub finem 'trunci' inserum, orbiculare eadem magnitudine cum aetabulo oris. Superficies utrinque aetabuli granulis crebris minutissimis scabra. Canalis cibarius sine pharynge musculari ante aetabulum ventrale in 2 partes divisis, in posteriore ('caudâ') parte demum unitus, cæcus. Porus genitalis inter aetabulum ventrale et canalis gynæceophori originem situs."

"Femine forma dissimilis, teneriora, gracillima; corpus teretiforme, larve, hyalinum, antice sensim valde attenuatum, cauda canali mullo apicè angustata. Aetabulum oris apicale cibarius, ut in mare. Porus genitalis cum margine posteriore aetabuli ventralis cohitus."

"Longit. 3—4 lin.; mas feminam latitudine multo superans."

"Patria.—Egyptus; in hominis vena portuum ejusque ramificationibus et in vesicæ urinariæ parietibus. In renis mesenterico reperiuntur mares feminam in canali gynæceophoro gerentes, in renis intestinalibus et hepaticis, in vena lienali semper reperiuntur."

The kidneys are somewhat swollen and congested with blood, and the mucous membrane of the pelvis is much injected. The kidneys, in rare instances, ultimately degenerate in a fatty or suetty state. "The aggregation of eggs of the *Distoma* are not unfrequently the nuclei of deposits of gravel and stones, consisting chiefly of crystals of uric acid in the kidneys, ureters, and bladder, and thus give rise to the well-known consequences of stone and gravel. This is the *Lithiasis* of the Egyptians, described by PROSPER ALPINUS in "*Medicina Egyptiorum*."

103. The seasons appear to have some influence upon the frequent occurrence of this worm, as it has been observed to be more abundant from June to August, and more rare in September, October, and January. This difference is probably owing more to the kind and quality of the food in these months, than to temperature or season.

109. *f.* The symptoms of this parasite are manifested chiefly in the urinary apparatus, and in the urine itself, at an early period of the lesions produced by it. Causeless hæmaturia, especially if frequent, and attended by æmia, emaciation, and disordered bowels, should be a cause of suspicion, especially in tropical countries. The diagnosis, however, during life, can be certain only when the eggs are found in the bloody urine and in other evacuations, as they were by BILHARZ.

110. *ε.* *Distomum ophthalmobium*\* (DIESING).—This parasite was found in the eye of an infant, between the lens and the capsule, by GESCHIEDT. The infant was five months old, and was born with *cataracta lenticularis*, with partial suffusion of the capsule. Four specimens of this *Distoma* were found, and were recognisable by the naked eye.

ii. Order, NEMATELMIA—NEMATODEA.—Thread worms, Round worms.

111. The worms now to be treated of are the *First Order* of RUDOLPH.—"Nematodea: *Corporis elongato, tereti, elastico*." DIESING, in his "*Systema*," arranges them as the *Sixth Order* of his *first sub-class*, and defines them—"Nematodea: *Corpus clasticum, cavum, subcylindricum; tractus cibarius simplex, caput in proboscidem haud protractile. Endoparasitica, tandem rarius exus libere vagantia*." They form the *second order* of KÜCHENMEISTER's *second sub-class*, and he defines them as follows: "NEMATELMIA: *Corpus teres, clasticum, sæpe attenuatum, filiforme; ore centrali, vel sub-centrali; canalis cibarius aut distinctus aut obsoletus, anoque destitutus. Metamorphosis in paucissimis. Migrationes activæ aut passivæ in permultis*."

112. *Mature Nematode worms* are met with in the human subject in the cavities of the body, having mucous surfaces, in the sub-cutaneous cellular tissue, with an artificial external communication, and during their youth, and in an immature state, in various muscles, especially primitive muscular fasciuli. The division of this order of worms into numerous genera and species has been attempted by DUJARDIN, VON SIEBOLD, DIESING, and others, but without sufficient agreement to admit of further reference to it than is made by KÜCHENMEISTER, who does not adhere to a strict classification, but rather re-

views them in accordance with their dwelling-place in the human body, and selects for them the name most generally employed. It was formerly thought that the *Nematodea* were the most accurately known of *Entozoa*, but at the present day we have more positive knowledge of the history and development of the cestode worms, and even of the *Trematoda*, than of this, the order of round worms.

113. "The distinct presence of a digestive apparatus, divisible into mouth, œsophagus, stomach, intestine, and anus, the separation of the sexes into two individuals, the certain detection of a nervous system in some of them, and the apparently jointed structure of the round worms, bring them near to the articulata. In the human subject we must take into consideration: 1, the *Trichocephali* and *Trichina*; 2, the *Oxyuri*; 3, the *Strongyli* and *Ancylostoma*; 4, the *Filaria*; and, 5, the *Ascarides*." (Op. cit., p. 289.)

114. A great part of the nematode worms appear to reach maturity only after they have undertaken various immigrations and emigrations during their youth. One species of round worm common to man is to some extent capable of migration also in the mature state. The migration in the early stage of development consists of the escape outward of the eggs of these worms with the human fæces, with which they get into dung-hills, sewers, &c., and experience the transitions described above (§ 7, et seq.). My limits admit not of an account of the sexual and other organs of this order of worms, and of the various stages of their development; sufficient reference to these topics for practical purposes has already been made, and the reader may farther peruse the minute descriptions of KÜCHENMEISTER and VON SIEBOLD, and of other recent observers, to whom I have referred.

i. TRICHOCEPHALUS.\*—SYNON. *Trichuris*, RÖDERER; *Ascaris*, LINNÆUS; *Mastigodes*, ZEDER; *Trichocephalus*, GÖTZE, DIESING, DUJARDIN, &c.

115. 1st. *Trichocephalus dispar*,† with its pro-

\* Descript. Systemat.—"*Corpus longissimum, ex 2 partibus formatum, quarum anterior tenuior, filiformis, posterior crassius, organa sexus continens*."

† Mas: *tenuior quam femina; penis simplex; organon copulatorium auxiliare spinosum, ex 3 branchiis compositum*.

‡ Femina: *mare major et crassior; vagina muculosa in abdomine sese aperiens; uterus simplex; ovarium simplex. Animalia ovipara, vix aut rarissime vivipara*.

§ "*Ovula oblonga, subfusca, in utraque extremitate collo quodam pirculo prominente ornata* (en une sorte de gonflet court, Dujardin)." —KÜCHENMEISTER.

¶ Systematic description of *Trichocephalus dispar*.—"utis transversa striata, marginales rugas ad anum versus magnitudine adductas exhibens. Caput 0.02 mill. latum, retrahile, obtuso-acuminatum, interdum perparvâ papillâ instructum. Tractus intestinalis constituitur ex œsophago ab initio recto, angustissimo paullo post tortuoso, sensim per totum collum intumescente; ventriculus pyriformis, ad lat. sua glandulosa 2 perparvas aut appendices aliosas aut verorum ganglia gerens. Animalia fœcibus humanis pro nutrimento utentia. Mas: omnino colore clarius, fusco-âlbior; circiter 37 mill. longus (caput et collum 22; truncus aut abdomen 15); in trunco 0.5 mill. — 1.0 mill. latus; formam spiralem amans. Testis et funiculus spermaticus simplex ad intestini tenidis formam volutus; unâ cum tubo intestinali autem in cloacâ communem apertus. Penis simplex; 3.55 mill. longus; 0.442 mill. ad extremitatem infundibuliformem, 0.027 mill. ad apicem versus latus; rugââ levî cylindricâ instructus. Extremitas caudalis organo copulatorio auxiliari, spinis armato, subcylindrico ornata, cuius longitudo 0.451 mill. — 0.198" Par. = 0.203" V. latitudo in parte libera 0.090 mill. — 0.090" Par. = 0.047" V. in parte opposita fere 0.040 mill. — 0.0216" P. = 0.022" V. est. Cloacâ communis musculoze in maribus longitudo circiter 4 mill. = 2" P.; latitudo 0.261 mill. = 0.116" P. = 0.119" V.; latitudo fora-

\* "*Corpus ovato-lanceolatum, d pressum, variabile. Collum breve subcylindricum. Os terminale orbiculare. Aortulolum ore majus, subcylindricum, apertura circulari. Longitudo.  $\frac{1}{4}$  —  $\frac{1}{2}$ ''; latitudo.  $\frac{1}{4}$ ''.*" —DIESING.



eny known as *Trichina spiralis*,\* OWEN and LUSCHKA.

SYNON.—*Trichocephalus dispar*, GOEZE; *Trichuris*, ROEDERER and WAGLER; *Ascaris*, LINNÆUS; *Mastigodes*, ZEDER; *Trichina*, FILARIA, Auct.; *Trichurc*, Fr.

116. A. This worm was first discovered by MORGAGNI in the cæcum and vermiform appendage of typhous patients; and ROEDERER and WAGLER, in 1761, recognised it as a distinct worm, in the “*morbus mucosus*,” or mucous fever, so prevalent in Germany in the middle of the 18th century. It was long supposed to exist only in the intestines of typhous patients, but it is now fully ascertained to have no particular relation to any disorder of the human bowels. It is found chiefly or only in the lowest region of the small intestine, near the ileocæcal valve, in the cæcum, and colon. From the dingy colour of the worm, it is liable to escape detection, and only is detected with ease when the lower intestines are free from their thick and coloured contents, as in disorders attended by diarrhœa. If carefully sought after, these worms will be found more frequently and in greater numbers than is commonly believed. RUDOLPH found many hundreds in the situations just named. BELLINGHAM saw upward of 100 in the cæcum only of one patient in Dublin. They occur in both children and adults, and in Europe and Africa. KÜCHENMEISTER’s work and its translation by Dr. LANKESTER, contain very minute descriptions of the organization of this parasite. The subjoined systematic description is sufficient for all practical purposes.

117. *B. Trichina spiralis* (OWEN and LUSCHKA), as the brood of *Trichocephalus dispar*, engaged in migration.—This asexual worm was first described by OWEN in 1835, although previously seen by TIEDEMANN in 1822, and by HILTON and WORMALD in 1833. It was afterward seen and described by PAGET, KNOX, and others. The seat of this worm is, as is well known, the muscles of voluntary motion, and indeed all the muscles excepting the heart and the sphincter ani, where it has not yet been found. In the places where capsules of *Trichina* are seated, fatty tissue is constantly inserted, chiefly at their

*minis cloacæ ipsius*—(the lumen of the canal formed by the cloaca) 0·130 mill.=0·58” P.=0·053” V. *Spermatozoida globuliformia* ad 50 mill. longa.

“*Femina*: in trunco rectori, minus curvata, mare aliquid latior, minusque elastica et flexibilis, ob ovulorum in utero et in ovaris copiam, eaque de causa colore magis fusca; extremitate caudali obtuso acuminata.

“*Ovula fusca eum generis speciminibus*: 0·054 mill.=0·022” P. et V. longa; media in parte 0·025 mill.=0·0112” P. et V. in apicibus 0·01 mill.=0·0048” P. et V. lata. Embryonum migrationes adhuc ignote. *Vermis minimum est, Trichinas, quas dicunt spirales, Trichocephali disparis embryones esse.*”

“*Description of Trichina spiralis.*—“*Corpus plerumque in spiras 2 retortum, ad anum versus crassius et oblongatum, ad caput attenuatum; tubus intestinalis, uti apud Trichoc. disparum, ab initio multifarie retortus, ventriculus pyriformis eum lateralibus 2 appendicibus aosis (lobulis aut glandulis aut nervis), intestinum rectum post coarctationem quandam iterum incrassatum, rectaque viâ ad anum in extremitate posteriore eaque crassiore apertum profectum. Funiculus quidam secundus in utraque extremitate cæcus et semilunaris genitalium primordia format (?).*”

“*Longit. vesicularum* 0·2—0·5—0·7”=0·4—1·0—1·5 mill.; *latitudo, fere mediam partem exhibet.*

“*Longitudo vermiculi ex eystide liberati et evoluti secundum LUSCHKA*  $\frac{1}{4}$ — $\frac{1}{2}$ ”; *secundum meas mensuras* 1·15 mill.=0·50” P. et 0·513” V.; *latitudo in capitis apice* 0·008 mill.=0·0036” P. et 0·0037” V.; *latitudo extremitatis posterioris seu ani* 0·024 mill.=0·0108” P.=0·111” V.”—KÜCHENMEISTER.

anterior and posterior extremities; the fat being apparently deposited to fill up the space produced by the *Trichina* having penetrated between the muscular fibres.

118. a. The development of *Trichina spiralis* seems to be as follows: “When a human being has swallowed the eggs, or the youngest brood developed into ready-formed embryos which occur in the eggs, or perhaps also when any female *Trichocephali* residing in the small intestine scatter their eggs with the ready-formed embryos in them, and when in either case the egg-shells are burst, and the embryos set free in the intestinal canal, the desire of migration awakens in them, and they set out, like the embryos of many other *Nematoda*, in the shortest and easiest way towards the tissues which they prefer as their resting-place.” That in this case, as in that of the *Cestoda*, the digestive canal may be the place of immigration from the exterior, is shown by the fact that the muscles of the tongue, pharynx, and œsophagus, as well as the sphincter ani internus, are visited by the *Trichina*. In some cases the blood may be the bearer of the migrating brood. MEISSNER found the young attached to the inner walls of blood-vessels of the heart; and both he and LEUCKART think that the circumstance of the brood of cestode worms being found so abundantly in the blood-vessels shows that the blood is their most usual course of migration. KÜCHENMEISTER believes that both courses of migration are followed—penetrating the tissues, and by the blood. The *Trichina* having found a resting-place, a cyst closely adhering to the tissues is formed around it. This cyst consists of concentric layers of a fibrous or lamellar substance, with imbedded nuclei. The brood reposing in this cyst approximates the head and caudal extremities in spirals, without, however, contracting a part of the head, and is then perhaps surrounded, even on the part of the worm, with a peculiar layer, but certainly enveloped on the part of the host with a capsule and cyst, in which the worm increases in size; and, besides the intestinal canal, develops the primitive foundations of an organ which belongs to the generative apparatus. The material for the capsule or cyst enveloping the *Trichina*, according to LUSCHKA, is formed from the inflammatory exudation produced by the passage and site of the worm; and hence the cyst varies in appearance with the time which has elapsed since the immigration, the oldest cysts exhibiting granules of lime-salts combined with an organic substance, this deposition of lime-salts increasing with the age of the cyst. SANDERS and KIRK state that there are around the worm—1, an external fibrous envelope; 2, a tolerably thick layer of a white, transparent, homogeneous substance; and, 3, an internal round capsule.

119. b. The contents of the cyst consist of one or more animals, and a small quantity of fluid, which keeps the inner envelope extended (which envelope KÜCHENMEISTER and LUSCHKA believe to be derived from the animal itself); the fluid is sometimes clear, especially in the comparatively young *Trichina*. In cysts with worms recently dead or destroyed, it showed traces of organic decomposition. In cysts with worms which have been long dead, or in those which contained no worms, which are rare, is found a clear, thickish fluid, with small formative elements, or only a

few elementary granules. These wormless cysts probably had previously enclosed a *Trichina*, which had died, and that a complete solution of the worm had taken place, or which had migrated from the cyst, and wandered to some other situation, where it had again become encysted.

120. As to the destination of the *Trichina*, there is no doubt that a great number, if not all, of those which occur in the muscles of man become abortive and die. The latter then lie in their cysts, in the midst of the cyst-fluid, which is in course of sebification, desiccation, and calcification, rolled in spiral convolutions, in the same way as the *Trichina* seen in a living state. These spiral structures are, however, broken up into fragments, which indicate a ringed appearance, or a segmentation of the bodies of these animals. "But how these encysted nematode worms, with our present state of civilization, can reach, before the period of their death—which, however, only occurs very late, perhaps in 30 to 40 years, or after a still longer period in particular cases—places in which they are in a position to pass through their father and higher development, is beyond my power to divine" (KÜCHENMEISTER). On this subject the experiments of this writer, and of ZENKER and LEUCKART, have thrown no light.

121. *c.* The reasons which have induced KÜCHENMEISTER to regard the *Trichina* of OWEN and LUSCHKA as the young brood of *Trichocephalus dispar*, and to consider both these nematode worms, hitherto placed separately, as belonging to one species, are the following: 1. The skin of both has a peculiar ringed and jointed structure, which presents itself more distinctly than in many other *Nematoda*. 2. In both, a longitudinal stria runs down the sides, indicating the limit to which the contractile parenchyma of the worm, in which its internal organs are imbedded, reaches. These striæ are certainly the points of attachment of the parenchyma to the inner wall of the integument of the *Trichina*. 3. The alimentary canal is organized in exactly the same way in both. The mouth and anus are situated exactly in the centro of the two extremities of these bodies, the anterior and posterior; this circumstance excluding the *Ascarides*, *Oxyurides*, and *Strongyls*, and most of the *Filarie*, from any relationship with *Trichina spiralis*. 4. The second tube which occurs in the abdomen, together with the intestinal canal, favours the identity of the two worms; the course of this tube admitting of being so developed as to produce either female or male *Trichocephali*. For these reasons KÜCHENMEISTER regards the *Trichina* as the brood of *Trichocephali* engaged in migration, by swallowing which we infect ourselves with the *Trichocephalus dispar* of both sexes. The symptoms produced by these worms have not been observed or stated. Even the immigration of the brood of *Trichina* appears to take place without any general reaction, and is also borne without injury for many years.

122. ii. OXYURIS = sharp-tail (from *ὄξύς* and *οὐρά*). This name applies only to the female, but by no means to the male. This worm is differently classed by DUJARDIN and DIESEN, whose classifications are too artificial, and too subdivided to admit of notice at this place. The *Oxyuris*, according to DUJARDIN and most other authors, is a genus of *Nematoda* separated from

*Ascaris*. This writer gives the subjoined systematic description of it.\*

123. *A. Oxyuris vermicularis*, BREMSER, DUJARDIN, VON SIEBOLD, GOEZE, RUDOLPHI, DIESEN, &c.; *Fusaria vermicularis*, ZEDER; *Kinder-, Mastdarin-, Madenwurm*; Thread worm.†—*a.* Three forms as to size, sex, &c., of these worms are met with: 1. The mature females, which are

\* "*Corpus cylindricum aut fere fusiforme, sublongum, in feminis retrorsum subulatum; caput incrne; os rotundum (in statu contractionis) aut triangulare (in statu actionis), trilabiatum; œsophagus musculosus cylindricus aut claviformis et canali triquetro perforatus; ventriculus globosus cavitate triangulari; intestinum in feminis ante apicem caudæ acutæ, in maribus in centro caudæ apertum.*

† "*Mares: fere microscopici; plerumque spirales in fine posteriore obtusi; penis simplex, uncinatus.*

"*Femina: cauda acuta; vagina semper in parte vermiformi sita; uterus bilocularis cum ovaris 2. Ovaria levia, oblonga, non symmetrica, multo longiora quam latiora, omnino magna: 0.064 mill. 0.136 longa.*"

† "*Corpus album; cutis transverse striata, in margine utroque cum duplice ordine dentium acutiorum et obtusorum, secundum Dujardin mensuras 0.018 = 0.023 mill., secundum meum in feminis 0.024 = 0.030 mill. = 0.0108 = 0.014" P. = 0.011 = 0.015" V., in maribus autem 0.008 mill. = 0.0036" P. = 0.0037" V., inter se distantium; caput 2 appendicibus lateralibus, vesiculosis epidermidibus duplicatæ; os rotundum, antice margine trilabiatum et angustum; œsophagus carnosus, musculis longitudinalibus et transversis, canali triquetro; ventriculus strictura; œsophagus sejunctus, globosus, cum cavitate interna triquetra, et valvularum apparatu; epithelio polyedrico cum nodulo pellucido sparsim instructus.*

"*Mas: 2.05 mill. = 0.90" P. = 0.95" V. ad 2.5 mill. ad 3.37 mill. longus (si caudam semper curvatam tanquam lineæ rectæ extensionem mensuris est); in capite una cum appendicibus 0.004 mill. = 0.041" P. = 0.042" V., sine appendicibus 0.024 mill. = 0.0108" P. = 0.011" V., medio in corpore 0.123 mill. = 0.054" P. = 0.055" V., in cauda 0.023 mill. = 0.0144" P. = 0.0148" V. latus. (œsophagus a 0.024 mill. = 0.0108" P. = 0.011" V. ad 0.041 mill. = 0.0108" P. = 0.011 V. ad 0.041 mill. = 0.015" P. = 0.015" V. latitudo linea intumidus est, circiter 0.311 mill. = 0.137" P. = 0.141" V. longus. (œsophagus sequitur brevis tubi intestinalis strictura 0.008 mill. = 0.0036" P. = 0.0037" V. longa, et 0.016 mill. = 0.0072" P. = 0.0074" V. lata. Postea sequitur ventriculus 0.115 mill. = 0.050" P. = 0.052" V. longus, et 0.065 mill. = 0.0288" P. = 0.0296" V. latus, cum valvularum apparatu cognito; tubus intestinalis paulo post ventriculum latitudinis 0.057 mill. = 0.023" P. = 0.026" V. est, ad anum vero 0.008 mill. = 0.0036" P. = 0.0037" V. Penis simplex, 0.007 mill. = 0.0025" P. = 0.026 V. longus, ad basin 0.008 mill. = 0.0036" P. = 0.0037" V., in apice vero semper ad hamuli instar recurvatur, latitudinis (adultiorum) 0.003 mill. = 0.001" P. et V.). Punculus spermaticus et testis simplex; spermatozoïdia epitheliorum imaginem simulantia. Caudæ apex in foream suetoriam mutabilis.*

"*Femina: 7.54 ex aliis ad 10 mill. = 3.48, ex aliis ad 4.337" P. = 3.51, ex aliis ad 4.56" V. longa; in capite apice cum appendicibus 0.196 mill. = 0.087" P. = 0.088" V.; sine appendicibus 0.065 mill. = 0.029" P. = 0.029" V.; in medio corpore 0.49 ad 0.59 mill. = 0.21 = 0.26" P. = 0.22 = 0.27" V.; extremitas caudalis acutissima. Longitudo caudæ (i. e. partis inter anum et apicem) 1.798 mill. = 0.797" P. = 0.819" V.; latitudo caudæ ad anum ipsam 0.26 mill. = 0.116" P. = 0.119" V., inde diminuta. (œsophagus 0.65 mill. = 0.29" P. = 0.298" V. longus, in capite apice 0.065 mill. = 0.029" P. = 0.298" V., in parte posteriore 0.095 mill. = 0.043" P. = 0.044" V. latus. Strictura tubi intestinalis pone œsophagum uti in maribus perbrevis et 0.028 mill. seu 0.128" P. et V. lata. Ventriculus 0.172 mill. = 0.0765" P. et V. et longus et latus, interdum latitudine aliquid minor. Vagina ex Dujardin mensuris 1.3 mill. ex meis ad 1.64 mill. = 0.7" pone caput sita; in vivis 1.06 = 1.2 mill. = 0.46 = 0.54" longa et 0.11 mill. = 0.049" lata; cum foramine latitudinis 0.13 mill. = 0.06" P., longitudinis 0.15 mill. = 0.07" V.; uterus duplex, cujus ramus posterior 2.0 mill. = 0.9" P., cujus anterior 1.35 mill. = 0.6" longus; ramosum ovulis impletorum latitudo ad 0.4 mill. = 0.18" et ultra ovulis expulsi, 0.2 mill. = 0.09" P.; ovarium duplex, in transitu uteri in anum 0.03 mill. = 0.015" latum.*

"*Ovula fere oblonga non symmetrica; ex Dujardin mensuris 0.055 mill. latus et 0.064 mill. longa, ex meis media in parte ovulorum 0.029 mill. = 0.012" P. = 0.015" V., in apicibus circiter 0.012 mill. = 0.005" P. = 0.006" V. lata et 0.05 mill. = 0.022" P. et V. longa. Embryones viventes in oculis nondum vidi.*"—KÜCHENMEISTER.



remarkable for their size, thickness, and whiteness, for their acute capillary tail, and for an obtuse, broad head. 2. *The young immature females* resemble the pale-gray colour of the males, but they are somewhat larger than they, and are recognised by their acute tails, and by the female sexual organs in grades of development varying with their age. 3. *The mature males* are remarkable by their pale silver-gray colour, and their obtuse anterior and posterior extremities, as also by the penis. All the three forms occur abundantly in one and the same intestine. The skin, head, and œsophagus, and intestine are similar in both sexes. The nervous system of the *Oxyurides* is, according to WALTER, greatly developed, although hitherto overlooked. They have both cephalic and caudal ganglia, with other ganglia, plexuses, and lateral filaments, which are minutely described by WALTER and KÜCHENMEISTER. The primitive nervous filaments are produced from the processes of the ganglionic cells; by the union of several primitive filaments of this kind, narrower or broader branches are produced. The skin of the oxyurides consists of an external *epidermis*, and beneath this a delicate but densely fibrous corium. The *parenchyma* of the body does not extend into the tail. The *muscular system* is highly developed. The *alimentary apparatus* consists of a mouth, œsophagus, stomach, intestine, rectum, and anal cleft. For a minute description of these and of the sexual organization, my limits oblige me to refer the reader to the works of the authors just named, who ascertained that the males of the oxyuris vermicularis are much more numerous than was formerly supposed.

124. *b. The locality* of these worms in the human body is the lower portion of the intestinal canal, especially the rectum. They occasionally stray upward, but rarely higher than the lower part of the small intestine. They wander, however, out of the anus and into the vagina of females. Although most frequent in boys and young persons, yet they are not uncommon at all more advanced ages, even in the most aged, in whom I have repeatedly found them the most tormenting. They are gregarious, forming balls in the large intestines, frequently along with other worms, especially the *Ascaris lumbricoides*. J. P. FRANK found them in the intestines of an infant so young that the umbilical portion of the cord had not separated. They are, of all the *Helminths*, the most frequent tormentors of every age and of every people; for they are not limited to particular parts of the world.

125. *c. Symptoms.*—These vary with the number of the worms and their position. A few hardly occasion any marked symptoms; but when numerous, in the lowest part of the rectum, they occasion extremely distressing itching and an irritating annoyance, difficult to be described, extending to adjoining parts. Certain articles of diet, as onions, carrots, fruits, &c., render the worms more restless and irritating during the whole day; but they are generally most annoying when the patient goes to bed. When the patient falls asleep, grinding of the teeth, excitement of the sexual organs, and restlessness are caused by them. The consequences of this local and constant irritation are, especially at, and subsequently to, the period of puberty, increased sexual irritation, masturbation, &c., in both sexes, and in the female sex most distressingly when

the worms wander into the vagina, when they occasion not merely pruritus, but also leucorrhœa, &c. The loss of rest and the irritation they produce ultimately impair nutrition, give rise to pallor, anæmia, and loss of flesh; irritation of the nostrils, sneezings, discoloration of the countenance, or a dark circle around the eyes, dilated pupils, and various sympathetic phenomena.

126. *d. The diagnosis*, however, of these thread worms can be established with certainty only by examining the fecal evacuations, especially after the administration of an enema. The *prognosis*, although the complaint is unattended by danger, is not favourable as respects either a speedy or a permanent cure.

127. *iii. STRONGYLUS\* and their Allies*.—This genus of worms has been often described; but, of the less recent writers, more especially by RUDOLPHI and BREMER. The species which most particularly interests the physician is,

128. *A. The Strongylus gigas*—*Ascaris visceralis aut renalis*, GMELIN; *Lumbrici renibus*, BLASIUS; *L. renalis*, REDI; *Fusaria visceralis aut renalis*, ZEDER. KÜCHENMEISTER remarks that BREMER has shown this worm, which occurs, although rarely in the abdominal cavity, the omentum, but especially in the kidneys and urinary bladder, more rarely in the lungs and liver, and only when strayed in the intestinal canal of martens, dogs, wolves, seals, otters, oxen, and horses, is still more rare in man; and that a number of those accounts of worms passing off through the urinary passages are delusions. Since a minute knowledge of the pathology of the kidneys has been acquired, it may be inferred that many of these cases would be recognised as fibrinous casts thrown off in the urine during disease of these organs. That these worms are extremely rare, even in the kidneys, must be admitted, since KÜCHENMEISTER has never met with a case in his own practice. He has, moreover, thrown rational doubts on the authenticity of most of the cases on record, showing that these cases, at least some of them, may have been instances of mistaken diagnosis. Dr. LAX-

\* "A. *Strongylus veri*. Corpore subcylindrico, utrinque attenuato; capite nudo raris alato, 2 appendicibus lateralibus armato; ore terminali, nudo vel sex papillis instructo, vel orbiculari; œsophago triangulari, muscicolo; cute tenui. Mas: appendices multilobata aut radiata; penis simplex vel duplex, multilobatus, ad digitum instar. Femina: cauda obtusa, recta; ano in parte caudali; vagina anterosum sita; utero simplici aut biloculati; oculis magnis (0.06–0.12 mill.). Animalia ovi- aut vivipara."—KÜCHENMEISTER.

DEJARDIN arranges the *Strongylus veri* as the xvth genus of his *Nematodes*. DIESSING places the two species, *Str. gigas* and *Str. longicaudatus*, in his Gen. liv., *Eu-strongylus*, thus defined by him: "Corpore subcylindrico, utrinque sensim attenuato, capite corpore continuo, ore terminali, orbiculari, papilloso; bursa maris terminali, integra; pene filiformi longo, haud vaginato; vagina anterosum aut retrorsum sita. Systemati ganglionum distinctissimo. Animalia ovi- aut vivipara, extra tubum intestinale habitantia."

† "Corpore rubro, cylindrico, longissimo, utrinque attenuato, atris aut annulis transversis interruptis et 8 fasciis fibrarum longitudinalium instructo; capite obtuso, truncato; ore orbiculari 6 papillis aut nodulis plurimis, appropinquatis; œsophago 15–22 mill. circiter longo, tenui et angustiore quam canalis intestinalis."

"Mas: corpore anterosum magis attenuato, 140 ad 140 mill.—10"—1" longo, 4–6 mill. lato; cauda obtusa cum bursa membracea patelliformi, circa 3 mill. latâ, truncatâ; pene tenuissimo simplici."

"Femina: corpore utrinque attenuato, 2 decim. ad 1 metr.=5"—3" longo, 5–12 mill. lato; cauda magis recta, obtuso-rotundatâ; ore triangulari, oblongo, sub extremitate caudali sito; vagina anterosum sita; utero simplici; oculis fere globosis."—KÜCHENMEISTER.

KESTER, however, states that there is a fine specimen of this worm taken from a human kidney in the Museum of the Royal College of Surgeons of England.

129. *a.* When fresh, this worm has a reddish colour. In spirit this colour fades, and the worm assumes a grayish leaden hue. Four longitudinal stripes are observed on it. The total length of a female specimen was 19 Saxon inches. DUBJARDIN states that the vagina opens 1 to 2 inches from the caudal extremity. DIESING says that the ganglial system of nerves is most manifest in this worm, a remark which is confirmed by BLANCHARD, OTTO, and VON SIEBOLD.

130. *b.* The symptoms of this worm are equivocal, for there can be no evidence of its existence to be relied upon until it is discharged, thereby demonstrating its existence. Another species of *Strongylus*, the *S. longecavignatus* of DIESING, has been said to have been found in the human subject, but without sufficient proof.

131. iv. *Ancylostomum*.<sup>\*</sup>—*Ancylostoma*, DUBINI; *Ancylostoma*, CREPLIN.—This worm was found by DUBINI in Milan, in 1838, in the duodenum and upper part of the jejunum; and subsequently also by PRUNER, BILHARZ, and GRIESINGER, in the countries watered by the Nile. According to VON SIEBOLD, it has never been found in Europe to the north of the Alps. DUBINI established this as a distinct genus from the *Strongylus*, by the symmetrical arrangement of the dental apparatus. We are, however, at present acquainted only with a single species of it.

132. *A. Ancylostomum Duodenale*.†—BILHARZ, having had his attention called to this worm by VON SIEBOLD, in consequence of PRUNER having found it in Egypt, observed it in every body he examined after death in that country, sometimes in small numbers, sometimes in hundreds, less in the duodenum than in the jejunum, between the transverse folds of the mucous membrane. One male is found to three females. At the oval end, a large, obliquely truncated horny capsule, furnished with four strong teeth on the projecting portion of the upper margin, is seen. The oval orifice is turned to the surface opposite to the

sexual and anal orifices. The animal attaches itself by its mouth so firmly to the mucous surface that the mouth is torn away when it is detached by force. Its nourishment is blood, as proved by its intestine being filled with this fluid.

133. *a. Pathology*.—This worm is of great interest and importance, and is often fatal to those afflicted with it. GRIESINGER, the best chemical observer of this worm, states that this worm attaches itself firmly by biting into the mucous and sub-mucous membranes; and that the spot on which a worm has been attached is indicated by an ecchymosis of the size of a lentil, in the centre of which a white spot the size of a pin's head appears, which is pierced by a hole penetrating into the sub-mucous tissue. From these wounds the blood enters freely into the intestine of the worm, which is filled with blood from the punctured places. Frequently the mucous membrane of the intestine is studded with flat, livid, brownish-red elevations of the size of a lentil. This is owing to the collection of the blood between the mucous membrane and muscular coat. In some cases a specimen of the worm is found lying in the cavity thus formed, covered with blood, with which it has completely engorged itself. The manifest consequence of this infestation is *anæmia*. GRIESINGER imputes the "*Egyptian chlorosis*," which he had previously described, and which, he avers, attacks one fourth of the population, entirely to the presence of this worm.

134. *b. Symptoms*.—At an early period, pallor of the face, general surface, lips and gums; palpitations of the heart, especially on any exertion, sounds in the jugular veins on auscultation, lassitude, debility without emaciation, are the chief phenomena. Subsequently disordered digestion, irregularity of the bowels, and *Catarrhus intestinalis* are complained of. These symptoms may continue an indefinite time; but if not removed by a decided treatment, the consequences are most serious, and generally fatal. Emaciation often does not commence until late in the disease. Edema of the extremities and eyelids; a pale yellowish or greenish yellow hue of the general surface; a withered, dry, flabby, and cold state of the integuments, and a remarkable pallor of the outlets of mucous canals; remarkable apathy, and sense of exhaustion; constant and distressing palpitations, the sounds of the heart being often heard at the distance of several feet; murmurs in all the larger arteries, and a rushing or purring sound in the jugulars, slowly supervene. The pulse is uncommonly quick and small; the respiratory movements are weak, frequent, and short; the urine is abundant, pale, and rarely contains albumen. Giddiness and headache are commonly experienced. Constant hunger, singular appetites, and slight febrile movements, sometimes with enlargement of the spleen and atrophy of the liver, are observed. With indulgence and full diet this state may last for years; but in very many cases the progress of the malady is rapid. Even in the best circumstances the patient is pallid, sickly, and miserable, exhibiting a high degree of *anæmia* and *hydræmia*. Various acute affections often supervene and complicate the disease, and a chronic diarrhœa or dysentery ultimately carries off the patient. Fatiguing labour, a lowering or antiphlogistic treatment, and debilitating agents hasten dissolution. A restorative regimen, change of climate, and

\* "*Termes subinervi, vivipari, corpus cylindricum; caput aequali attenuatum; pharynx infundibuliformis, colore subfuso, parietibus resistentibus. Os aculeiforme, subtriangulare; apertura oris ampla circiteris subdorsalis; dentes in fundo oris intra apertura marginem ablongiorem 4, uncinati (os in altitudine infundibuli 4 uncinis intus recurvatis munitum et in fundo cum eminentiis conicis, in tabularum explicacione 'unguli tegimentarii' nominatis, in uncinis versis, utriusque generi communibus, Dubini); oesophagus carnosus, qui ad clavam instar iter descendendum largitur; cutis transverse striata, unde 2 eminentiæ conice prominent, unde alteri opposita, inter sectionem anteriorem partem longitudinis vermiculi totalis et inter reliquas posteriores vermiculi partes, quæ quinquies sectionem longitudinis totalis partem exhibent; anus lateralis et aliquid ab extremitate caudali remotus. Extremitates cæcæ maris bursam terminalem integram subhis excisum multiradiatam expandentialem; penem duplicem longissimum exhibens; femina obtusa, apertura genitalem retrorsum sitam præbens.*"

—DIESING et DUBINI.

† "*Caput apice rotundatum; oris limbi papillis conicis inaequalibus, duabus minoribus, uncinis papillis impositis apicibus convergentibus. Corpus subrectum v. parum curvatum, anteriori parte transparens, ventriculo globoso nigrescente, posteriore flavido-fusco, maris antorsum attenuatum, extremitate caudali inflexa; bursæ cyathiformis bilobæ 11-radiatæ, cujus radii ita sunt positi, ut triplum eorum ordinem conspiciere possis, in utroque enim latere ordinem quatuor, media in parte trium radiorum (radii laterales utrinque 5 simplicibus: Diesing); radii dorsali apice fureto; femina extremitate posticâ recte conicâ. Longit. mar. 3—4''; fem. 4—5''; crassit. ad 1''.*" —DIESING et VON SIEBOLD.



judicious treatment, often arrest the complaint. All the phenomena consequent on the presence of these parasites are characteristic of a very slow but continued loss of blood, which, if not arrested, goes on until the quantity and the quality of this fluid are no longer sufficient to sustain life; death supervening with faintness, dyspnoea, and fatal syncope.

135. c. On examination after death, the organs and structures generally are wasted, pallid, and softened. The spleen is often enlarged; the liver is pale and atrophied; the veins are nearly empty; the heart and large venous trunks contain only soft, small brown coagula, with very little fibrin. In many even of the large venous trunks there is only a dark serous-looking fluid, with a few pale, large, and colourless blood-globules. The substance of the heart, especially the inner layers of muscles, are very pale and even fatty. This organ is generally large, thick, hypertrophied or dilated, particularly on the left side. The endocardium and valves are often irregular, as if thickened in parts. The brain, the lungs, the muscles, the digestive mucous surface, &c., exhibit remarkable pallor and anæmia; the cellular tissue and muscles being softened, flabby, and in parts exhibiting a watery infiltration (§ 134).

136. v. THE FILARIE.\*—These form the seventh genus of the first-class "Nematodes" of Dujardin, and the fortieth genus of the sixth order, "Nematoidea" of Diesing. From the *Gordii* they are distinguished by structure, mode of life, the nature of the youngest brood, and by the circumstance that they readily burst in water, like other *Nematoda*, which is not the case with the *Gordii* (Diesing).

137. A. *Filaria Medinensis*.†—PLUTARCH refers, in the ninth question of the eighth book of his "Symposiacon," to the statement of RHATHIARCHUS of Cnidus, the geographer and philosopher, "That the people on the Arabian side of the Red Sea suffered many strange diseases; among others, worms, like little snakes (*δρακόντια μικρά*), came out upon them, which gnawed their legs and arms, and when touched retracted themselves, coiled themselves up in the flesh, and gave rise to the most insupportable pains; but that this evil has been found only then, and nei-

ther before nor since among any other people." Many authors, with much appearance of justice, believe that the fiery serpents, which MOSES states to have been so destructive to the Israelites when journeying in the vicinity of the Red Sea, were *Filaria Medinenses*, and consequently that MOSES is the first writer to notice this worm, and that the fiery inflammation produced by it gave rise to the appellation bestowed upon it by the Hebrew writer.\* That the *Filaria* was considered a species of serpent by the ancients, is proved by the Greek name *δρακόντιον*, *dracunculus*, which was given it, and by the inflammation, pain, and swelling which occurred with the breaking out of the worm. The mortality among the Israelites may be explained by their ignorance of the proper treatment, and of the danger consequent upon the breaking of the worm. AVENZOAR states that, in his country, "Æger in continenti post dolorem vehementem in parte affecta exortum moriatur." The distemper being endemic in the place where the Israelites were sojourning (in Arabia Petrea), in circumstances of great difficulty and even distress, and during the hygienic privations of encampments in a barren country, it is not surprising that it then and there assumed an epidemic and fatal character.

138. SYNON.—The *Filaria Medinensis* has received a variety of names, viz., the *Dracunculus*; the *Drac. tibiarius*; the *Drac. Persarum*; the *Guinea-worm*, or *G. thread-worm*, from its frequent occurrence on the coast of Guinea; the *Guinea dragon*; the *Guinea hair-worm*; *Pharaoh's worm*; the *Skin-worm*; the *leg-worm*; *le Dragonneau*, *le ver de Guinée*, *le ver Cutané*, by the French; *Gumwischer Fadenwurm*; *Gumwische Drache*, *Pharaohswurm*, by the Germans.

139. a. Our knowledge of the natural history of this worm, and of the early stages of its development, is very deficient. KÜCHENMEISTER states that it is of the thickness of pack-thread, its anterior extremity obtuse, the mouth circular, without lips, but beset with four hooks, or more correctly with four styles, or acute straight spines; the vagina opens in the vicinity of the mouth, and the vagina and uterus are probably double, as in most *Filaria*. The length of the worm

\* Diagnosis: "Vermes albi, subfusci, aut rubri, corpore filiformi, elastico, cylindrico, ut plurimum longissimo; capite corpore continuo, inermi aut spinulis rectis et cornis (dentibus seu papillis prominentibus Autorum) armato; ore terminali non labiato, vel labiato rotundo, aut triangulari; œsophago brevi, tubuloso, rectiore quam intestinum; ano terminali aut ante caudæ apicem sito; cute levi aut leviter oblique striata.

"Mas: caudâ plerumque obtusâ, interdum membranâ accessoriâ aliam exhibente; spinulis filiformibus in vagina tubulosa aut ligulariformi, ex Dujardino inaequalibus, curvatis (?). Femina: vagina antorsum proximè ad os sita, plerumque duplici (*Filaria rigida* aut multiplici (ex. quinqueoculari in *Filaria labiata*, Nathusius); oculis ellipticis aut globosis, laceribus. Nunc ovi- nunc vivipara."

† "Mares omnino ignoti aut potius ab auctoribus neglecti et omissi, quin ob minorem magnitudinem minores efficiunt et molestias et dolores et vix unquam majores tumores; sed uti Diesingius ipse enarrat, a Clellandio in Calcutta Journ. Nat. Hist., l. 359, Pl. X., fig. 1, delineati.

"Femina: corpore longissimo (ad 3 ulnas et aliquid supra), subalbo, filiformi, subequali, secundum Dujardinum antorsum, sed secundum Diesingium et quidem quod ipse affirmare possum retrorsum, sensim attenuato, ad 1" seu ad 1—2½ null. lato; ore orbiculari, spinulis 4 cruciatim oppositis; ocellis ad apicem uncinatâ, subcutâ, in apice 0.065—0.068 mill.=0.025—0.036" Par.=0.029—0.037" l. latâ, interdum in vermibus ipsius cute ita affixâ, ut vix apicem liberum facere possis; vagina ovalis; embryonibus 1" longis, vix ½" latis. Species vivipara."—KÜCHENMEISTER.

\* Upon referring to a translation of the Bible from the Hebrew into Latin, with very copious annotations, by IMMANUEL TREMBELLI and FRANCIS JUNIUS (the former a learned Rabbi converted to Christianity, the first and second editions of which, published in London in 1679-80, and 1684, in quarto, are in my library), I find that he translates the Hebrew description as follows: "Tum inimisti Jehova in populum illum serpentes presteres, qui morderunt populum: ita moriatur populus multus ex Israele." Here TREMBELLI translates the Hebrew into venomous serpents; but in a note he states that according to the original they were fiery serpents. To this translation of the Bible and to its copious annotations, the translators of King James's Bible, and modern annotators, are more indebted than has been made to appear. Upon referring farther to the very rare edition of the Vulgate, also in my possession, which was printed in 1481, and known by the term "*Fontibus et Græcis*," &c., the serpents are called "fiery serpents (*Misit Deus ignitos serpentes*)—which inflicted wounds and death on many." This edition of the Bible is in folio, on a thick, beautiful paper, the ink being a bright jet-black, without the name of either printer or publisher, and without the verses being numbered, but with the Initial letters illuminated and coloured. These translations vary only in the term "venomous" being used by the former for "fiery," while the statement in the latter, that these serpents "inflicted wounds and death on many," may be considered as nearer the truth, as the infliction of wounds does not imply that death was always the result. Some translations, which retain the appellation "fiery," very justly explain it by stating it to refer entirely to the inflammation and pain produced by these animals.

varies from several inches to three yards. Statements of greater dimensions are probably founded in error. The whole surface of the worm and its tail exhibits the well-known fine rings, placed at a uniform distance. The substance of the body is homogeneous, finely granulated, and exhibits no traces of muscular fibres. Its œsophagus, intestinal canal, uterus, &c., require no description.\*

140. *b.* The worm is indigenous only in the hot zone, and, even when transported into colder climates, does not appear to propagate itself. Even in the hot zone it does not occur everywhere, but only in particular countries, like all the *Helmintha*, and is entirely in certain places in affected countries; as, for instance, in the Gambia, Angola, Canlabah, &c. The places in which the *Filaria Medinensis* more particularly occurs are Senegal and the coast of Guinea, the East Indies, Persia, Arabia Petrea, the coasts of the Red Sea, especially towards the south, the shores of the Ganges, Bombay, the Caspian Sea, Upper Egypt, Abyssinia, Nubia. It was introduced into America by negro slaves, especially into Surinam. Throughout the countries now mentioned it attacks aborigines and foreigners without distinction. According to PRUNER the worm often becomes epidemic, in wet seasons and in marshy districts. BREMER states that it is most frequently seen in the East Indies from November to January (the rainy season); and in Upper Egypt, according to BILHARZ, shortly after the inundations of the Nile.

141. *c.* The mode of production of the worm is still enveloped in obscurity. English officers, who never went about with the feet and arms uncovered, remained free from this worm. PRUNER thinks that the germ of the worm is an independent marsh animal, which is converted into a *Dracunculus* within the human body. FORBES believes that he found the brood of the *Dracunculus* free in the red, ochrey mud of the drying marshes. However, the aborigines think that it comes from the marshy grounds into the skin. The ordinary seat of the worm is the sub-cutaneous cellular tissue, especially of the lower extremities, around the ankle. It may, however, occur under the skin and muscles in all other parts of the human body. Instances of its occurrence in other parts of the body besides the extremities are recorded by KÄMPFER, BAJON, BAILLIE, PERÉ, and have been seen by myself in Africa. MCGREGOR, in 172 cases, states that it occurred 124 times in the feet, 33 times in the lower, 11 times in the upper part of the thigh, twice in the scrotum, and twice in the hands. PRUNER found a specimen behind the liver, between the layers of the mesentery. Sometimes the worm lies coiled up in a small space, sometimes it is extended; and in the latter case, if it lies on the surface, it feels as a varicose vein. PERÉ saw it lying in a snake-like form under the whole of the skin of the abdomen and a part of that of the chest, and similar cases of its extension are on record. "These examples will suffice to give a clear idea of this worm, of which, moreover, as many as twenty-eight, thirty, nay

even fifty specimens have been observed in one man." (KÜCHENMEISTER.)

142. *d. Diagnosis.*—If the worm is superficial, with a hard substratum, its growth is seen to take place with extraordinary rapidity, from 4" it becomes several inches long in a couple of days. It is then easily killed by poultices of boiled garlic, after which it is absorbed without injurious consequences. Frequently the worm occasions little or no annoyance for a long time. DAMPIER and ISERT had quitted the district of these worms for 6 to 8 months, and WENGLER's patient for 4 to 6 months before the worm betrayed itself. According to KÄMPFER and others, this latent state may continue 12 to 15 months, and in rare cases even until the third year. In other instances, emaciation, notwithstanding a good appetite and absence of fever, takes place, terminating at last in fatal exhaustion. When the worm is making its way out, a small pustule appears at the point where it will break through, sometimes with, and sometimes without, preliminary annoyance, or headache, pain in the stomach, nausea, fever, &c. At the point where it breaks through, inflammation, swelling, and suppuration occur several days previously, and continue until the worm is extracted. If it lies over or near to a joint, the use of the limb is prevented, and the symptoms are still more severe. In the case of DRUMMOND, after pain and stiffness of the leg, a reddish swelling, with a black point in the centre, was formed above the inside of the ankle; and at the same time he felt a firm, round, catgut-like substance twisted under the integuments. About three weeks after the first sensation of stiffness, he was seized with a sudden insupportable itching over the whole body, with fever, violent colic, vomiting, and purging; after which, shiverings without perspiration followed. In the mean time the swelling had burst, and a hard white substance appeared, but so deep that it could not be laid hold of, the animal having buried itself deeper among the muscles. The catgut-like twisted substance formerly felt was not now present. In the following night the ankle and vicinity were much inflamed; and three days afterward a thread was passed round the animal, and a bloody ichorous discharge continued for six or seven weeks from the wound, which healed up gradually to a small point, when the worm again came forth, and was fastened with a thread, rolled upon a stick, and drawn out twice a day. In twenty days the extraction was completed. Two or three days after the formation of vesicles on the inflamed part these open up, or are opened by a lancet, when matter, blood, and sanies, and two or three inches of the anterior end of the worm come forth. If this end be carefully pulled, several inches more often follow. All this is coiled around a little roll of linen or a small stick, and fastened over the wound with a compress and adhesive plaster; and the worm is thus wound out by repeated, careful operations, twice daily. The worm rarely comes away on the first attempt, several days, or even weeks, being required before this is accomplished. Mr. BUSK, in the *Transactions of the Microscopical Society*, has given one of the best descriptions of this worm.

[There are several species of *Filaria* not described by our author:

1. *Filaria Medinensis*, or Guinea-worm, above described. This is the most common and best

\* BREMER gives the following systematic description of this worm: "Longissima cylindrata, elastica, ferè equaliter crassa, capite attenuata, ore minime, circulari, cauda maris medium sui finis ad locum, quintali spirali, prominente, subulata, inflexa; femina semitereti, acutiuscula, incurva præstita: in hominis tela cellulosa subcutanea, præsertim pedum; in regionibus tropicis figi solita."



known species, being found chiefly in warm climates, where it is often seen in the morning dew, sometimes 10 or 12 feet long, and not thicker than a horse-hair. BACON states that he saw two instances where it had burrowed under the mucous membrane of the eyeball. As yet, only females have been observed in the human body—*viviparous*.

2. *Filaria Bronchialis*.—This species is described by TREUTLER, and so named from its occurrence in the lungs of persons labouring under phthisis. It has also been called *Hamularia lymphatica*; and by RUDOLPH, *Hamularia subcompressa*. This is also met with in the lungs of the inferior animals, especially when affected with tubercles. Dr. HOPKIN states that he often found the filaria in the lungs of the *boa constrictor*. They are usually about an inch long, roundish, blackish-brown, sometimes spotted white; and at one extremity, two projecting hooks. This species of filaria is probably allied to those worms which are not unfrequently found in the bronchi and lungs of animals belonging to the genus *Mustela*.

3. *Filaria Gracilis*, found in apes and monkeys in great abundance, grows to a length of 10 or 12 inches, about as thick as a fine thread, head obtuse, and tapering slightly at both extremities.

4. *Filaria Attenuata*, found in the abdominal cavity of crows, and in the cornea of the eye of fishes; from one to six inches long, and obtuse at both extremities.

5. *Filaria Obtusa*, inhabits the intestines of swallows; head somewhat acute, tail obtuse, body comparatively thick and elastic; has been found 12 inches in length. RUDOLPH has traced out its intestinal canal and ovaries.

6. *Filaria Truncata*, about 5 inches long, head truncated, tail somewhat thick, obtuse, terminated by a very sharp point; inhabits the larva or caterpillar of certain species of moths—(*Tinea padella*.)

7. *Filaria Ovale*.—This species went formerly under the name of *Gordius piscium* (hair-worm of fishes), because it is found in the liver of the carp, &c. It is 3 or 4 inches in length, head oval, tapering forward; tail round.

8. *Filaria Capsularis*; from half an inch to one inch long, and resembles in thickness a middle-sized thread. Borders of mouth recurved, tail obtuse, papilliform, ending with a sharp point. Often met with in the herring in large quantities; very tenacious of life, as it will live for many days in a dry place, and even revive after having been long frozen in masses of ice. This species has been formed into a genus by ZEDER, and other naturalists, under the name of *Capsularis*.

9. *Filaria Papillosa*.—The *Filaire cqui* of GMELIN, and the *Gordius equinus* of other writers—the species which inhabits the eye of the horse, from 1 to 7 inches in length, and one third of a line in diameter—of a yellowish-white or ash colour, sometimes of a brownish hue; head slightly obtuse; mouth orbicular; neck studded with papillæ; tail slender and curved. It occurs in different parts of the horse, chiefly in the muscles and intestinal canal, though it has been detected in the brain, as well as the aqueous humour of the eye. They often occur in the eyes of horses in the East Indies, as well as the muscles of the loins, causing paralysis. The Transactions of the American Philosophical Society, vol. ii., contains two communications on this subject, one by F. HOPKINSON, Esq., entitled "Account of a Worm

in a Horse's Eye;" the other by JOHN MORGAN, M.D., describing the same phenomenon. Similar cases will be found in the *Ed. Med. and Surg. Journ.* for June, 1826, and the *Bulletin des Sciences Medicales*, Feb., 1826. See, also, "An Account of a Filaria in a Horse's Eye, with Remarks on similar Phenomena, and the Mode of their Origin," with a plate, by C. A. LEE, in *Amer. Jour. of Science and Arts*, No. II., vol. xxxix.]

143. vi. ASCARIDES.—These worms are arranged by DUJARDIN as the nineteenth genus of the *Nematoda*; and by DIESING as the twentieth genus of the sixth order of the *Achathelmintha elastica*, but the *Oxyuri* are also introduced by him into this genus. The classification of DIESING is so involved that more confusion than elucidation is the result. Refining, hair-splitting, and drawing distinctions, which are either observed with difficulty, or not at all, are not the least faults of some modern observers. I subjoin DUJARDIN's systematic description of this genus.\* The only species to be here noticed is the,

144. *A. Ascaris Lumbricoides*.—SYNON.—*Ascaris gymnoascarida*, DIESING; *Ascaris lumbricoides*, LINNÆUS; *A. gigas*, GOEZE; *Lumbricus teres*, AUCT; *Fusaria lumbricoides*, ZEDER; but the Linnaean name is very generally retained.†

145. a. Description.—The head of the worm is distinctly composed of three papillæ, which can undoubtedly be spread out upon the intestine, in a broad, circular, sucker-like surface, in

\* "Ascarides: corpore albo aut subalbo, subcylindrico, utriusque attenuato, fusiformi, 4 strâs longitudinalibus subalbis, opacis, lineariibus, instructo; cute transverse striatâ; capite tilius, rufus (labris) convexis aut semilunariibus, interne fenestratis; œsophago valde musculosulo, cylindrico aut clavaiformi; ventriculo cavitatem triannularem præbente.

"Mas minor quam femina; extremitate caudali aliquid curvata, et involuta, nunc nudâ, nunc membrâ alidâ duplici, aut duplici tuberculorum et papillarum ordine aut rarissime acetalulo instructâ caudâ leviori, obtusiori, quam in feminis; spiculo aut pene duplice plus minusve longo et arcuato.

"Femina caudâ rectiore et longiore; vaginâ simplici anthorsum sitâ; utero bi-aut multiloculari; ovâs filiformibus, longissimis, duplicibus aut multiplicibus; ovula ellipctica aut globulosa, extus levia. Species aut ovâ viviparæ, plerumque in tubo intestinali riventes."

† "Utriusque aut rubro-pallidi, cylindrici, in extremitatibus attenuati, fusiformis elastici; cute transverse subarticulata strâs transversis 0.02 mill. inter se distinctibus, ex duobus stratis composita, 4 lineis lateraliibus longitudinalibus subalbis majoribus, capite distincto. parvo (0.7 mill. lato), tribus valvulis semilunariibus, prominentibus, ad margins hyaliniis armato, interne denticulatum musculorum strâum ad galli jubar modum præbente; œsophago musculosulo, 6—8 mill. longo, filiformi, triquetro, ventriculo clavaiformi (0.7 mill. lato, 2—3 mill. longo) parvulo, intestino simplici valvulis aut vilis et cythello polyedrico sparsim instructo.

"Mas: 15) ad 170 mill.—4 ad 6" longi. 3.2 mill. lat., caudâ aliquid depressa, conica, inflexa et curvata, spinulis 2 planis, subensiformibus, fere rectis, 1.8 mill. ad 2.12 mill. longis, 0.13 ad 0.23 mill. latis. Organo spermatico simplici, 1.200 mill. longo, testiculo cæco parvulo, retortiformi, fundo spermatico albo-intumido, ductu ejaculatorio angustiore ad aut latus sese aperienti. Spermatozoïda globuliformia, gramdosa, in femine vagina maturescunt.

"Femina: 200 ad 275 mill. et supra longa—8 ad 18"; media in parte 4 ad 5.5 mill. lata; caudâ conicâ obtusâ; aut aliquid ante caudâ apicem sito (1 mill. circiter); vaginâ simplici ante corporis dimidiam sitâ. ex magnitudine feminarum variabilis (ex c. 85 mill. pone caput in femina 245 mill. et 103 mill. in femina 214 mill. longa); utero ab initio simplici, bipartita aut biloculari. Ovaria filiformia, sensim attenuata, retrorsum usque ad anum, et anthorsum supra vaginam aliquantulum pergentia. Totâs utriusque ovarii longitudo ad 4" Lips.

"Ovula immatura subtriquetra, numero 4 ad 8 conglomerata, matra isolata, rotunda, ad 0.87 mill. lata, cum testâ tenui, levi; in natura libera sensim embryones evolventia."—KÜCHENMEISTER.

the sucking act of the worm. BREMSER has seen the opening and closing of these papillæ, and described the mechanism. He even reports that at the moment of opening he saw a little tube protrude from the centre, which is the true oral orifice. WEDL thinks that this is the cleft proboscis, which is everted from the oral aperture for the reception of nourishment. The true oral aperture is, however, formed by the opened lips or papillæ; the small tubule in the centre represents the *introtus faucium*. Its protrusion is probably as much by its own muscular structure as by the contraction of the general muscular structure of the body. The males and females may be distinguished by their form and external appearance. The abdomen of the female is slender, and fusiformly pointed. The male is bent like a hook, and sometimes presents, a short distance from the tail, a pair of white, delicate, projecting hairs, which are the protruded penis. If the female be pressed, or allowed to swell in water, a prolapsus of these tubes (ovaries), and a discharge of a milky substance (eggs), takes place in the anterior half of the animal from the vaginal orifice. If the male be pressed, a milky juice (seminal globules) flows out in the vicinity of the anus, without the occurrence of a prolapsus. The intestinal canal is whitish and muscular at its commencement; the œsophagus is composed of thick layers of longitudinal and transverse fibres, and passes rapidly, and without any marked constriction, into the intestinal canal, the parietes of which are thin, internally covered with epithelium, and shines through, of a brownish colour, from the brown excrement. This intestine has a muscular coat, which is connected with the cutaneous longitudinal and circular muscles. The external integument consists of six layers. Under the outer layer are two layers of fibres crossing each other obliquely, and two laid at a right angle over each other, and between the former and latter two a sixth homogeneous layer, which appears to contain a peculiar odoriferous fluid of an oily and reddish appearance, and exhibits refractive phenomena (KÜCHENMEISTER).

116. *b. Symptoms.*—Very generally the host and his guests, the *Ascarides*, agree very well together, until, owing to causes affecting these animals, or the digestive organs of their host, a disagreement between them takes place, and various disorders or symptoms ensue. When these worms are few in number, notwithstanding their size, they often occasion but little disorder, and live amicably with their entertainer on unelaborated chyme, until their numbers, changes of diet, and other occurrences produce more or less ailment. In most cases, when their numbers are not great, a good, or a too good appetite, is the chief injury they do; and in this respect they are much less noxious than the much smaller *Ancylostoma*. Great numbers of these worms in the intestines, and a firm aggregation of them into coils and knots, sometimes with the small threadworms intervening, often occasion much disorder, according to the mechanical obstacle and the irritation they may produce. Colic, ileus, constipation, diarrhœa, flatulency, congestions of the brain, especially in children, and various reflex phenomena manifested in distant parts, and on voluntary muscles both of the trunk and of the lower extremities, are then not unfrequent occurrences. Besides the influence of inordinate numbers—of 200 to 350—knotted into balls,

which I have expelled from the bowels of both children and adults, the irritation and the consequent effects produced by even small or moderate numbers are often serious; for, owing to states of the digestive organs of their host, to the influence of certain kinds of food, or of change of diet upon them, or to the agitation arising in them from the influence of season, and to the periodical seeking of the females by the males, much disturbance may ensue, or the worms may travel or stray into parts of the digestive canal not usually visited by them, and thus induce very serious effects, which may even terminate in death. These effects, however, will depend much upon the irritability and other circumstances of the patient, the number of the wanderers, and the parts which they have reached. When irritations of the intestinal canal occur, and produce watery diarrhœa, cholera, &c., these worms are thereby affected; they swell up, lose their powers of adhesion, and are often carried away *per anum*. But one or more worms may pass unusually high in the intestines, may rise through the pylorus into the stomach, and occasion retching, vomitings, &c., irritation in the œsophagus, fever, delirium, and upon the discharge of the worm all rapidly disappear. But before rising so high in the digestive canal, one or more may pass into the common duct, or even into the cystic, or the hepatic, or the pancreatic ducts, and produce symptoms similar or approaching to gall-stones, or inflammation, spasm, and disease of these ducts. These latter occurrences are, however, very rare; for generally the secretions passing along these ducts into the duodenum are not much relished by these worms, and these routes are not pursued by them. When the worm passes into the stomach, it may rapidly rise into the upper part of the œsophagus or into the pharynx, and even get entangled in the larynx and produce the most distressing effects. But such occurrences, although observed, are very rare. After long periods of abstinence or inanition they have been found to migrate and escape from the anus, mouth, and nose; and such migrations are not uncommon in the course of continued and remittent fevers.

147. The *symptoms* produced by *Ascarides*, while they continue in the intestine, are mechanical, direct, and reflex. The former are the phenomena of the usual catarrhal affections of the stomach and intestines (gastro-intestinal irritations) in every grade; costiveness, tormina, colic; a sense of weight, of irritation, or of a ball, or gnawing and itching near the umbilicus; disordered, craving, and irregular appetite, and digestion, &c. The latter are hiccup, subsultus of the abdominal muscles, cramps of the lower extremities, yawning, increased secretion of saliva, snuffling or tickling of the nose, but rare of the anus, unless upon the passage of a worm.

148. The question has been often entertained as to the possibility of these worms perforating the parietes of the healthy intestines, and making their way into places more or less distant from their usual residence. That these worms can never perforate the healthy intestine, the structure of its head and its thin lips being adapted only for suction and not for boring, is the opinion of RUDOLPHI, BREMSER, ROKITANSKY, BEMBERGER, J. P. FRANK, KÜCHENMEISTER, and myself, in opposition to that of VON SIEBOLD and MONDIÈRE. Therefore it may be concluded that when these



worms are found in situations external to the digestive canal, they have reached it by some pre-existing ulceration, perforation, or fistula.

149. Many, especially of the older authors, have attributed a prognostic and generally an unfavourable import to the discharge of worms during febrile diseases, and more especially during typhoid fevers; and this opinion is not limited to the Ascarides, but is extended to the flat worms, and they have argued that the worms in these circumstances are like the rats, and have the presence of deserting a sinking ship! But as the discharge of worms from a fever-patient does not occur until after the seventh day, according to ZIMMERMANN, it is much more probable that they travel from the intestines, owing to the food obtained by them being insufficient or not suited to them, and to the secretions of the intestines being injurious to them, and in search of more abundant or more suitable aliment. The ulcerations of the intestines and the morbid matter from these ulcers in the advanced stages of continued fevers, will also tend to expel or to occasion a discharge of these worms, which, when observed, may be justly viewed, both as an indication of the existence of these lesions and of the extreme danger of the malady.

150. VI. A GENERAL VIEW OF THE SYMPTOMS PRODUCED BY WORMS IN THE DIGESTIVE CANAL.—Most of the symptoms produced by worms may arise from other causes; but a careful recognition and observation of these symptoms, of their successions, grouping, &c., are requisite for the due regulation of the treatment, and for the ascertaining of the species of worm which is present. The symptoms produced most commonly by the individual species of worm have been noticed with reference to each; but recent writers have been more intent upon the microscopic descriptions of these parasites, and upon drawing minute distinctions, &c., than upon more useful and practical considerations connected with them. It is justly argued that the discharge of the more common species of worms infesting the intestinal canal is the only true *diagnosis* of verminous diseases; but this discharge, even in the most serious cases, may not occur without means being used to effect it; and it is by a knowledge of these symptoms, independently of such discharge, that we are led to administer the means most likely both to establish this diagnosis and to effect a cure.

151. A. The more direct and local symptoms, or those more immediately caused by worms, are—a capricious and variable appetite—at one time a craving and insatiable hunger or an unsated desire of food; at other times, nausea, or cardialgia, borborygmi, loathing, retching, or vomiting, being present; a sense of weight in the abdomen, with distention, gnawing, or erosion; a feeling of cold internally, or of emptiness or inanition, often with palpitations, or leipothymia, or faintness; a dragging, twisting, or lancinating pain in the abdominal regions, especially near the umbilicus, or tormina, spasms, colicky attacks, tenesmus, constipation, or irregularities of the intestinal functions; leucorrhœa, and itching, or a mucous or watery exudation from the anus, sometimes a mucous diarrhœa, tenesmus, and bearing down pains in adult females, or derangements of the catamenia, or even abortion; and in children more especially tormina, colic, constipation, and intus-susception of the bowels, with various cerebral symptoms

about to be noticed. In both sexes “manustupratio” is not unfrequent, even at an early age.

152. B. The symptoms caused in more distant parts by sympathy with the seat of irritation, or by direct and reflex sympathy, are chiefly a frequent, dry, and tickling cough; hiccough, anxiety at the præcordia, or pungent pains passing under the false ribs and at the epigastrium; a sense of something in the œsophagus, sometimes with tickling in the pharynx; partial amaurosis and dilatation of the pupils; sneezings, itching and dryness of the nose and nostrils, sometimes epistaxis, itching of the skin, without eruption; grinding or grating of the teeth, and sudden startings when asleep; subsultus and spasms of the abdominal muscles; partial or general convulsive movements without complete loss of consciousness; chorea or twitchings, or irregular contractions of particular muscles, especially those of the face and lower extremities; and more or less fully developed, general, or epileptic convulsions. The urinary excretion is sometimes disordered, and dysuria or frequent micturition complained of, the urine being whey-coloured, turbid, &c., with or without a sediment.

153. C. A general verminous cachexia is not unfrequently present, manifested by a pale, tumid, or livid state of the features; by a sunken appearance of the eyes and a leaden hue beneath them; a general pallor, and more or less anæmia of the surface of the body, lips, &c.; a perverted state of the sense of smell, or the entire loss of smell; a strawberry hue of the tongue, or mucous sordes on the tongue, and about the teeth and gums, stridor of the teeth, and a peculiar fœtor of the breath, sometimes a more or less evident affection of the voice and speech; a morose, irritable state of temper, vertigo, frightful dreams, timidity, somnolency; slight or low delirium, risus sardonius, and prostration of strength. The biliary secretion is sometimes scanty, and in some cases even jaundice is observed. The abdominal secretions are very often disordered, and the functions of excretion generally impeded. These and other effects—local and sympathetic—are manifestly produced: 1st, by the irritation of the digestive mucous surface, which may, in the cases of certain worms, and in susceptible constitutions especially, go on to inflammation and its consequences; and, 2d, by the changes these animals produce in the chyme and chyle derived from the ordinary food, and upon the secretions of the gastro-intestinal surface, and upon those of the liver and pancreas. The former of these effects, namely, those consisting of gastro-intestinal irritation and its consequences, will also contribute to the production of the latter; but it cannot be doubted that much of the nourishment which should be taken up by the intestinal surface is intercepted by these parasites, while a portion of the fluids, lacteal or serous, are removed from this surface by the suction exerted by these animals.

154. All the symptoms now enumerated are not observed in the same case, but many of them either coexist or appear in succession, and are variously grouped in different subjects, so as to render a diagnosis very difficult between this and other complaints. When the cachexia, debility, and sympathetic disturbance of the brain and its functions are considerable, more especially when the circulating fluids are diminished in quantity from deficient aliment, or impaired in quality by

imperfect assimilation and depuration, the symptoms may assume a febrile character, sometimes mistaken for a form either of low fever, or of gastric fever, but more correctly recognised by some of the older writers by the term worm or verminous fever. (See also § 73.)

155. vii. THE CAUSES OF WORMS may be inferred from what has been stated above; yet it may be of use to notice some particulars too generally overlooked by the recent writers, who have insisted upon the propagation of worms by means of ova, &c., and who may be considered as having disproved the doctrine of equivocal generation, or, more correctly, of spontaneous formation. A knowledge of the *predisposing causes* furnishes important indications in both the prevention and the treatment of verminous diseases; for, although the obsolete doctrine of spontaneous formation rendered this knowledge of the greatest interest, inasmuch as it was founded upon antecedent changes in the constitution, yet these changes are by no means devoid of influence in favouring the development of the ova and embryos of parasitic animals. There can be no doubt that children of weak, aged, and vitally exhausted parents; the female sex, debilitated males; and persons of all ages, who have been insufficiently or improperly fed in early life, or of a relaxed fibre or asthenic diathesis, are much more subject to worms than those who are otherwise circumstanced. A tender and delicate state of health in early life; the use of crude, viscous, gelatinous, and vegetable food; whatever tends to lower the organic nervous force and vital resistance; a relaxed and asthenic habit of body; hereditary conformation; a residence in crowded and insufficiently drained cities and towns, or in cold and moist situations, especially in those which are abundantly covered with vegetable productions peculiar to the country, and a scanty use of such condiments, as salt and hot spices, as the climate may require, predispose to the generation of worms. In places where salt cannot be obtained in quantities requisite to the wants of the economy, as in some intertropical countries, the hot spices are used in its place by the natives. Those who contend, and, from recent researches, with manifest truth, that the presence of ova is necessary to the generation of human parasites, consider that the predisposition produced by these causes favour this generation, and that robust health and a sound constitution are subversive of their development. Those who argue for their spontaneous formation believe that these causes not merely predispose to this formation, but also directly produce it; and that, owing to a weak and imperfect chylification and assimilation, or to a metamorphosis of the secretions, a material is evolved which, under the favourable circumstances in which it is placed, and owing to a vital emanation from the body in which it lodged, assumes an organized and separate existence. These doctrines, however opposite—the former assuming, as predisposing causes, merely what the latter contends to be direct and exciting, or efficient, causes—agree in that which is of the greatest importance to the physician: they both point out the best indications for preventing the continued or the future generation of worms, where they already exist or have existed, and for guarding against their invasion in circumstances which render such invasion more or less probable.

156. IV. TREATMENT OF WORMS.—The treatment of worms should have reference, 1st. To their *prophylaxis*, or prevention; 2d. To their *expulsion*; and, 3d. To the *prevention of their recurrence*.

157. i. PROPHYLAXIS.—A. As to the *first of these intentions*, it must be admitted that the accomplishment of it is always difficult, and often impossible. Our knowledge, also, of the modes and channels by which these parasites are conveyed into and propagated by the lower animals and human subjects is imperfect. Admitting that they originate in ova which experience the changes in the processes of their development above described, we still find it difficult to account for the presence of these ova, and for their passage into the human stomach. That the ova, as stated above, may attach themselves to raw vegetables and fruit, is not improbable. The feeding of domestic animals also upon the garbage or viscera of fish, fowls, or the mammalia, certainly favours the production of worms, especially those of the cistoid order, in these animals; and the ova from these, where perfect cleanliness in all respects is not observed, may be conveyed in the food or drink, or by the hands, especially unclean hands, into the human body. The amount of knowledge as to this topic appears to be limited to the observance of perfect cleanliness in all its bearings, including the utmost care as to the purity of the water used, and as to the use of raw vegetables and fruits. Marsh, stagnant, and even river water ought not to be used; or if the latter be taken, it ought to be previously boiled or filtered. Vegetables and fruits should be carefully washed, especially fallen fruit, if eaten in a raw state; and the domestic animals ought to be confined to their proper places, and neither petted nor fondled. The diet is also of some consequence; and no kind of animal food should be taken unless it be sufficiently cooked. The raw flesh of animals, especially of pigs, and imperfectly cooked viscera of animals, and all unnatural modes of living, and neglect of the strictest attention to cleanliness in respect of diet and modes of living, should be most carefully avoided.

158. B. But it is not only the *prevention of the ingestion of ova* into the human body that should be studied, but also the *means of rendering these ova inert, or rather of preventing their development* in the digestive canal. As with the former, so with the latter means of prevention, our knowledge is very imperfect. We may, however, infer that those *predisposing* causes of worms enumerated above should, as much as possible, be removed or counteracted. Without a due attention to the removal of the predisposition, which favours the generation and development of the entozoa; the treatment of verminous diseases will prove inefficient as regards the issue, and empirical in practice, especially when viewed in relation to the scientific application of the resources which the progress of knowledge and the discoveries of our contemporaries have placed within our reach. In furtherance of this indication, the diet and the treatment should be adopted that are most efficacious in promoting the organic nervous force, and the tone of the digestive organs, and in removing tenacious mucus and pituitous sordes, which often adhere to the digestive mucous surface, especially in asthenic, leucophlegmatic, and debilitated subjects, and



which often form the nidus in which the ova of parasites are lodged and hatched. It will generally be noticed that the secretions and excretions, which in all persons form the principal part of the fecal discharge, are seldom thrown off from the secreting surfaces so quickly and entirely in the delicate and debilitated as in the robust and healthy; but remain or are retained in the former class of subjects, and become the soil in which these animals are reared.

159. C. Persons who are, or who have been, subject to verminous diseases, ought to adopt that kind of food, and to have recourse to those medicines which their feelings and observation indicate as being calculated to distress, injure, and ultimately to destroy or eject intestinal worms. A due attention to such means is required not only for the expulsion, but also for preventing the future generation of these parasites. Another object, and one, indeed, which is the basis of the prevention and of the treatment of worms, is to determine in as accurate a manner as possible, from the character of the symptoms, and from the examination of the feces, the species of the animal which is to be dislodged. While, however, this diagnosis receives its due attention, care must be taken not to mistake other diseases, which possess many of the same features, for those proceeding from the presence of worms. This error is likely to occur frequently, since the one class of disorders often reciprocally bear the relation of cause and effect to each other. Nor, in many cases, will it be attended by any serious consequences, farther than from wanting appropriate direction, the treatment must be inefficient, and redundant and superfluous. It should also be kept in recollection that worms are more apt to be generated during fevers, and during convalescence from fevers, especially such as are epidemic, adynamic, or nervous, or are gastric or exanthematous, than in robust health, or even in other circumstances. The generation of parasitical animals in these maladies is not confined to the surface of the intestinal canal only. It is not unusual to observe the parasites usually produced, in favourable circumstances, on the external surface of the body, become remarkably abundant during and after these fevers, especially when the diseased secretions are allowed to accumulate from a neglect of ablutions and of frequent change of linen. The appearance of animal parasites on these occasions was explained by the supporters of spontaneous formation, in the way above noticed (§ 6, *et seq.*); while it was viewed, by the believers in generation from ova, as the result of a more favourable occasion being furnished for the development of the ova during these diseases.

160. One of the earliest methods of preventing and of curing verminous diseases, resorted to by many physicians, is to remove or attempt to remove, by purgatives or drastic means, the tenacious mucus adhering to the digestive mucous surface, and which, as they believe, forms the nidus or lodgment of worms; and they believe that the quantities of mucus dislodged from the bowels during and for some time after the exhibition of vermifuge, and other purgatives, are proofs of the accumulation of this mucus on the intestinal surface. That this mucus or sordes may be excessive in many cases, may be admitted; but it may also be allowed that the greater portion of this mucus is produced by

the irritation of the intestinal mucous membrane by these purgatives. This method of prevention and treatment, when moderately and appropriately prescribed, may be of service in many cases, but it should not be overlooked that the rough operation of these medicines often leaves a debilitated state of the intestines after their operation, which disposes them to generate, and prevents them from throwing off the mucous sordes and worms which these medicines were employed to remove. They cannot by any mechanical property, or by any chemical or other influence on the intestinal secretions and excretions, always remove them from the extended surface covered by them in the manner or so completely as contemplated; and, even when the proposed end is completely attained, the intestinal functions are left in a more favourable condition than before, to reproduce both mucous sordes and worms, especially if any of the ova still remain unexpelled. Therefore, instead of trusting to the medicines usually employed as anthelmintics, vermifuge purgatives, alterants, &c., our attention ought to be directed (in some cases instead of these medicines, in others in addition to them, and subsequently to the use of them) to the adoption of remedies which promote the organic nervous forces, and the digestive and vital energies in general, thereby increasing the healthy and vigorous discharge of the various functions, and the due evolution and evacuation of the secretions and excretions from the digestive organs. (*See also the treatment after the expulsion of worms.*)

161. ii. DIRECT AND CURATIVE TREATMENT — J. P. FRANK, whose experience of the treatment of worms, when he wrote on the subject, had extended to half a century, considered that drastic purgatives and anthelmintics at the commencement of the treatment were seldom so serviceable, especially against tænia, as more gentle measures, which, in his opinion, should be first adopted, and be followed by more energetic remedies. But the diversity not only of these medicines, and of the combinations and methods of prescribing them, bewilder the inexperienced, until repeated opportunities of observation enable him to select those means and combinations upon which confidence can be placed. KÜCHENMEISTER justly remarks that, if the multitude of remedies recommended for any disease is an evidence of their want of power against it, the therapeutics of worms are extremely defective. In truth, the treatment of these parasites leaves much to be desired as respects the efficacy of the medicines prescribed for them, the pleasantness of the most efficacious among them, and the disagreeable effects which often accompany and follow those most to be relied upon.

162. A. THE TREATMENT OF TAPE-WORM will firstly, and more especially, occupy attention, as it will comprise the most efficacious medicines and methods which have been employed, not only for these worms, but also for many of the others which have been noticed above; and when the treatment of these latter comes under consideration, then a brief reference to what has already been stated will be sufficient. KÜCHENMEISTER tested a great many of the medicines recommended against tænia, by placing live tape-worms in a mixture of the particular medicines with white of egg, and by determining the time in which they died by the assistance of the rotation apparatus, the two poles of which he introduced into

the mixture. According to these experiments, the *tenia* lived for many hours, or even for days, in the mixture containing the *cuprum oxydatum nigrum*, in that containing *dolichos pruriens*; and for several hours in *castor-oil*, and in a salad made with *pickled herrings*, *onions*, *garlic*, &c. Tin has little or no effect, or merely the same effect as the cow-itch. Electricity has no destructive action on *Tenia*. "It is otherwise, however, with *koussou*, in the infusion of which, mixed with milk, the *tenia* died within half an hour of their introduction; and with *oil of turpentine*, in a mixture of which with white of egg, they died in 1 to 1½ hour. In a decoction of *Brucra* (*koussou*) mixed with white of egg, the *Tenia* died in 1½ to 3 hours. In a decoction of *rad. punice granatorum*, mixed with white of egg, in 3 hours; and with the same decoction, mixed with milk, in 3 to 3½ hours. In a mixture of *extract. filicis maris æther.* with white of egg, the *Tenia* died in 3½ to 4 hours. The so-called *filicine* (*filicie acul* of Lutz), mixed with white of egg, also has an energetic action on the *Tenia*, which die therein in the course of a few hours, and exhibit œdematous swellings in various parts." The particular methods of expulsion, arranged according to the remedies, have been enumerated by MEYER, SEEGER, and KÜCHENMEISTER; but the faults which this last-named writer finds with his two predecessors, viz., that in the enumeration of methods these are thrown together in a disorderly manner, may also be imputed to himself, although in a less degree.

163. *a* METHODS WITH TIN.—FRANK commences the treatment with the powder of *tin*, or its filings, given in a simple sirup, either alone or with *sulphur*, or the *extractum absinthii*. After having pursued this plan during three or four days, allowing only a spare diet, he prescribes, in addition to the tin, a moderate dose of *jalap*, low diet being still observed. DUPUIS prescribes, without any preliminary treatment, at six and at half-past six in the morning, each time a powder of *Stann. rasp. Angl.*, ʒss.; *Tannini puri*, ʒi.; *Giguthi* (*cambogæ*), gr. vi.; *Elæosacchari cajuputi*, gr. ijss.; and after each dose the patient drinks two cups of black coffee. In two hours the worm is expected to pass off, usually with colicky pains, on the occurrence of which strong black coffee is immediately given. For the subsequent treatment, a tincture of iron is advised. BECKER recommends the chemically precipitated *tin*. According to him, it is certain in its action, does not irritate the intestines mechanically, and is preferable in doubtful cases. It is, however, difficult to be obtained. KÜCHENMEISTER protests against the administration of tin-filings, as being, in his opinion, a much too irritating medicine. But he has twice prescribed *tin*, precipitated from chloride of tin, in an extremely fine powder, making it into an *electuary with honey*, a little *extr. punice granat.*, *extr. filicis maris æther.*, and *camboe* or *jalap*. Even young and weakly children support this remedy very well. On one occasion the entire worm passed, dead, on the second day. In the other case, an adult, several yards passed after this medicine, but the remainder of the worm was expelled by his ordinary mixture (§ 181). He considers the medicine to be uncertain, but suitable to children and persons who are much reduced. Tin, in various combinations, has been prescribed, also, by ALSTON, MAYER, MATTHIEU, HAUTESIARK, and AU-

TENRIETH; but its operation, as they have prescribed it, is often either ineffective, or too irritating to the digestive mucous surface.

164. *b* METHODS WITH THE MALE FERN.—The *Aspidium filix mas*, which is always efficacious against the *Bothriocephali*, is much less so against *Tenia*. BUCHHEIM prescribes a soft resin, obtained from this plant, with good effects. The most efficacious preparation, according to KÜCHENMEISTER, is the *æthereal extract of Filix Mas*, the powder being mixed with the extract, so as to increase the surface of contact of the medicine; or the extract being mixed with pomegranate root, which latter he prefers.—(a) WAWRUCH's method is a *preliminary treatment* of three to four days, consisting of strong beef-tea with white bread, three times a day, taking at the same time the following resolvent: *R. Rad. taraxaci et cichoræ*, ʒā, ʒj.; *decoque per ½ horæ: colaturæ* ʒvj., *adde ammon. chlor. præcip.*, ʒj.; *syrup. cichoræ cum rhco*, ʒss. M. Two table-spoonfuls every two hours. With this, daily laxative clysters of milk, linseed, herb. althææ, flor. verbasc., and flor. papaver. are ordered, and on the evening before the expulsion, a very rich gruel (½ lb. of water, and 2 to 4 ounces of butter and wheat bread). The *expulsion* is attempted by taking, "in the morning, fasting, a thick gruel; and about five, six, and seven o'clock a clyster of linseed and milk; about eight o'clock, two table-spoonfuls of castor-oil; at half past eight, pulv. rad. filicis maris ʒij.—Div.; at nine o'clock, two table-spoonfuls of castor-oil; at half past nine, the fern-powder again; at ten o'clock, two table-spoonfuls of castor-oil; and at half past ten, the third powder. After each dose the patient washes his mouth with tea made from flor. tilia, and summit. millefolii; and in the intervals he chews flavid. cort. aurantior., of which a dose of ʒss. is prescribed. At one o'clock he takes a powder of camboe and calomel, ʒā, gr. v.—vj., with ʒss. sacch. albi, and applies emollient poultices over the abdomen. If the worm be not expelled, castor-oil is again given in half an hour; in a second half hour, camboe powder; then castor-oil again; and possibly, if no inflammation occurs, the powder of camboe and calomel again at half past four. At the same time, a clyster is administered every hour!" The subsequent treatment consists of the removal of the inflammatory state of the intestines by leeches, mild diet, &c.

165. (*b*) *Weisshaar's method* is a modification of the above. On the second, third, and fourth day of *preliminary treatment*, a pickled herring diet; and on the following day he attempts the *expulsion* of the worm nearly as advised by WAWRUCH, excepting that he gives the castor-oil in meat broth, and, instead of orange-peel, candied calamus. Of the fern-powder he gives only xv.—xx. gr. *pro dosi*, with 15 to 20 grs. olei filicis maris; and even the latter only to irritable subjects. Recently he prescribes 60 to 80 drops ol. filicis maris with ʒss. ol. ricini; in half an hour, two table-spoonfuls of castor-oil; in an hour, the first powder of camboe and calomel; in half an hour, oil again; in another half hour, the second powder of camboe and calomel, and so forth. He states that he easily expels *T. solium* by this method; but that *T. medioancillata* (§ 68 to 70) requires strong doses of oil of turpentine.

166. (*c*) The *Wurtemberg method* is one ounce of fern-root boiled for an hour with three pints of



water; one drachm of fresh *cort. mezerei* is added to the hot decoction, which in ten or twelve minutes is strained, and then mixed with two or three drachms of finely-powdered fern-root. This is taken in the morning fasting, either at once, or in three portions at intervals of an hour. In three or four hours sickness and disorder of the stomach cease; and then calomel, freshly prepared sulphate of iron, *aa*, gr. x.— $\mathfrak{z}$ j., according to age, are administered, and repeated if vomiting occur. The worm is said to be generally expelled in the evening; when this is not the case, a rich gruel is given on the same evening; and on the following morning, fasting, rhubarb and jalap, *aa*, gr. x.—xv.— $\mathfrak{z}$ ss.

167. (d) *Alibert's and Dubois' methods* are nearly the same, and as follows: After a preliminary treatment for eight days, to which garlic, roasted under the ashes, is added, the abdomen is to be rubbed several times a day with a liniment of camphor, with balsams and nut-oil, and with crushed bulbs of garlic, also a pisan of *helminthocorton* and *filix mas*, and a nightly enema of marsh-mallow water are prescribed. Without this preparation, ALIBERT prescribes,

No. 330. R Rad. Filicis Maris,  $\mathfrak{z}$ iv.; Coque cum Aq. Font., lb ij., usque ad remanentiam lb ij.; Colature adde Syrupi Helminthocort.  $\mathfrak{z}$ j. M.

This is to be drunk in cupfuls during the day. After three hours of repose, calomel and corn. cerv. ust., of each gr. ij., made into a bolus with conserv. rosæ q. s., are given. In the evening,  $\mathfrak{z}$ j. of oil of sweet almonds; and on the second day the following purgative:

No. 331. R Scammonii, gr. xvij.; Rad. Filicis Maris,  $\mathfrak{z}$ j.; Cambogiæ, Calomel., *aa*, gr. xij. M.

To be taken in three portions in sugar and water. DUBOIS, after the preliminary treatment just noticed, prescribes, early in the morning,  $\mathfrak{z}$ ss. of *filix mas* in broth; and every half hour one of the following:

No. 332. R Res. Jalap., Scammonii, Cambogiæ, *aa*,  $\mathfrak{z}$ ss.; Syrupi I.hamnii Cathart., q. s., ut fiant boli, sing. gr. vj.

168. (c) *Bichung's and Seeger's Methods*.—The former commences with draughts and clysters of cold water, and with full diet and cold baths. With this diet, but without the cold water, according to SEEGER, a saturated decoction of  $\mathfrak{z}$ ss. of fern-root is drunk cold after every meal, when the worm will be expelled in from three to fourteen days. SEEGER's plan, according to KÜCHENMEISTER, is suited to irritable and weak persons.

169. (f) *Nuffer's and Odier's Method*.—The evening before the treatment the patient takes a thin gruel with two ounces of butter; a quarter of an hour afterward, a glass of wine, and, if necessary, a clyster. The next morning, fasting,  $\mathfrak{z}$ ij. pulv. fil. maris in  $\mathfrak{z}$ iv.— $\mathfrak{z}$ vj. aq. tilis. If vomiting occur, this is to be repeated; and if sickness be felt, black coffee is taken. Two hours after this the following bolus is given:

No. 333. R Calomel., Scammonii, *aa*, gr. x.—xv.; Cambogiæ, gr. v.—vij.—viij.; Confect. Hyacinth., q. s. Misco.

For weak patients and children, in two doses. If the bolus be thrown up, or not have operated in four hours, or if the worm hangs out of the anus,  $\mathfrak{z}$ vj.— $\mathfrak{z}$ j. of Epsom salts, dissolved in warm water, are given. If the worm be not expelled by this, the gruel and powder are to be repeated, but the Epsom salts are to be given instead of the bolus. ODIER directs a table-spoonful of castor-oil in meat broth every half hour instead

of the bolus. This treatment is said to be certain against *Bothriocephali*.

170. (g) *Blossfeld's and Rapp's method* is much praised. The previous evening a thick mixture of bread and milk is taken; and in the following morning  $\mathfrak{z}$ j. pulv. rad. fil. maris is given every hour, in an ounce and a half of nutmeg tea. After six or eight doses the worm is expelled. RAPP directs the root to be fresh, and administers  $\mathfrak{z}$ vj.— $\mathfrak{z}$ j. of it one dose.

171. (h) *Mayor's Method*.—MAYOR, of Geneva, regards the root of *filix mas* as specific against *Bothriocephalus*, and tin and pomegranate root against *Tenia solium*, and states that the powder of the fern-root should appear quite green, as it is otherwise inefficacious. He gives  $\mathfrak{z}$ ij.— $\mathfrak{z}$ iv. in a mixture of balm tea and  $\mathfrak{z}$ j. of gum sirup. This draught is to be taken at night, and  $\mathfrak{z}$ jss. of castor-oil the next morning. MAYOR, in some cases, instead of the powder, prescribes the *oleum filicis maris* in the form of pills—thirty to fifty drops in twenty-four pills, of which twelve are taken at night and twelve in the morning, and an hour afterward  $\mathfrak{z}$ jss. of castor-oil. In other cases he gives the fern-oil, either pure or mixed with castor-oil, in doses of  $\mathfrak{z}$ ss.— $\mathfrak{z}$ j.; but usually the castor-oil afterward.

172. (i) *O. Bang's Method*.—"For three days the patient takes only one basin of meat broth, with white bread. At night he has a clyster of warm milk. On the fourth day he takes also eight cups of black coffee with plenty of sugar, and two to three large pickled herrings in the form of salad, with plenty of vinegar, pepper, oil, and onions. On the fifth day he takes alternately, every two hours, one third of a herring, and a heaped-up tea-spoonful of pulv. rad. filicis maris, and with this two to three cups of coffee. At night a milk clyster and a dessert-spoonful of castor-oil. On the sixth morning, fasting, two tea-spoonfuls of fern-powder; an hour afterward, two table-spoonfuls of castor-oil, and the same quantity every two hours until the worm is expelled. During this he drinks tea; and, lastly, for the subsequent treatment, iron is used."

173. (k) *Ullersperger's Method*.—Without any previous treatment, he gives  $\mathfrak{z}$ ij.— $\mathfrak{z}$ iv. of the bark of the roots freshly peeled, treated with alcohol the day before, and lets the patient lie in bed. When no vomiting takes place within two hours, an aperient of 6 gr. calomel and  $\mathfrak{z}$ j. of sapo jalap. in pills is given. This method is said to be rapid and efficacious.

174. (l) *J. P. Frank's method* is to commence either with the exhibition of tin, as above, and to follow with the *male fern*, or to begin at once with this latter, giving about three drachms in a draught of cold water, and to give frequently cold diluents, allowing the most rigorous abstinence. A dose of castor-oil may be taken the following day, and repeated every two hours until copious evacuations are procured.

175. (m) *Mayer's and Karsten's Methods*.—On the day when fragments pass off spontaneously, the patient takes a herring salad at night. At six o'clock next morning,  $\mathfrak{z}$ ij. of fern-powder in  $\mathfrak{z}$ vj. of aq. flor. tilis is taken in tea-spoonfuls without stopping, and immediately after this a table-spoonful of castor-oil, and then a cup of thin broth. The oil is then continued every half hour until  $\mathfrak{z}$ ij. are taken. For any sensation of fulness and nausea, hot black coffee is given. About twelve o'clock the greater part of the

worm is expelled, and the head passes at one or two o'clock. Bitters are prescribed subsequently. KARSTEN'S method consists of a mild aperient and scanty diet the day before; and early in the morning,  $\text{zij}$ . of fern-root in teaspoonfuls. If sickness be felt, thin broth is given. Between eleven and one o'clock the worm is expelled without any farther treatment. Several other methods of employing the male fern root have been enumerated by KÜCHENMEISTER, generally premising various means, the modus operandi and utility of which are not very apparent. I shall next notice two other preparations of this root—the *extract* and the *æthereal oil*, which have been used with great benefit. The *compound decoction of male fern*, for which I have given a *Formula* in the APPENDIX, will be found one of the most efficacious modes of prescribing this remedy. (See *Form.* 62.)

176. (n) The *extractum filicis maris* has been prescribed by several physicians. PESCHIER administers it as follows:

No. 384. R Extr. Filicis Maris Æther.,  $\text{Oj}$ .— $\text{3ss}$ .; Pulv. Rad. Fil. Mar., q. s., ut fiant Pillule xx.

To be taken in two portions half an hour before bed-time, after fasting from five o'clock in the evening; next morning an aperient. Several physicians have adopted this preparation and its mode of exhibition with success. KIESER and HILLER gave the extract, for several days together, to the total amount of  $\text{zij}$ . with good results. After several days of spare diet, MÖSING gave fifteen of PESCHIER'S pills to the fasting patient at nine o'clock, and again at half past nine. His prescription is as follows:

No. 385. R Extr. Filicis Maris Æther.,  $\text{3jss}$ .; Pulv. Rad. Fil. Mar., q. s., ut fiant Pillule xxx.

After the last dose, he gave  $\text{zij}$ . infusi sennæ compos. at once. FUNK administered the extract night and morning with sirup and gum, and afterward gave castor-oil every hour until it operated freely. NOSS prescribed an aperient on the preceding day, and the extract to the fasting patient with sirup— $\text{Oss}$ .— $\text{3ss}$ . of the extract twice with an interval of an hour; then castor-oil every hour. ALBERS, after a restricted diet for one to three days, and on the day before the exhibition of the extract, prescribed a purgative of Glauber's salts; and on the following morning,  $\text{3ss}$ . of extract of male fern while fasting, and the same quantity an hour afterward; one to two hours afterward, castor-oil. RAYER gave seventy-two drops of PESCHIER'S thin extract of fern made into pills with the powder of the root, of which eight are to be taken at night, and eight in the morning; two hours afterward, castor-oil. MAGENDIE prepared a *tincture* from the buds of the fern, and made it into pills with the powder of the bark of the root, each containing a drop of the tincture. From eight to twenty were said to be sufficient for expulsion of the worm. The circumstance of no farther accounts of the employment of this tincture having appeared is not in favour of its efficacy.

177. (o) The *æthereal oil of male fern* has been much employed and praised by Dr. JENNER. He caused the patient to be kept without food for sixteen or eighteen hours before he gave the oil; and he farther recommends the following mode of administering it: "For an adult, two pills may be taken at bed-time, containing three grains of calomel, and eight of compound colocynth pill; the following morning, a dose of castor-oil. A lit-

tle broth only should be given till the bowels have been thoroughly cleared out. As soon as that object is effected, one drachm and a half of oil of male fern is to be given on an ounce of some aromatic water; and the dose of oil of male fern is to be repeated in six hours, if the first dose has not proved effectual before the expiration of that time. For a child, calomel and jalap may be substituted for the colocynth and calomel. The dose of the oil of male fern must be as large for the child as for the adult; seeing that its action is on the parasite, and not on the patient, I have never seen any unpleasant results follow its employment in the child." I have, in several cases, given the male fern successfully, when connected, many years ago, with public medical institutions; and since the publication of Dr. JENNER'S interesting paper on the use of the *æthereal oil of male fern*, I have prescribed it in two cases—in one with complete success, but in the other it failed. In this latter, the oil of turpentine and the kousoo had been prescribed separately and after considerable intervals, and both had failed, portions of the worm only having come away. An opportunity, however, was not afforded me of persevering in the treatment beyond the exhibition of two doses of two drachms each. The oil was procured from an undoubted quarter. I give, in the subjoined note, Dr. JENNER'S account of his experience with this oil.\* In a case re-

\* "The anthelmintics chiefly employed in cases of tape-worm in this country are turpentine, kousoo, pomegranate, and male fern. The objection to turpentine is its horribly nauseous flavour, and its very unpleasant effects on the head, and occasionally on the kidneys. It is a remedy which should be used only as a last resource. Kousoo is expensive and bulky. Pomegranate is bulky and nauseous, and, as ordinarily obtained in this country, not very certain in its action. Male fern has the advantages of being inexpensive, only moderately disagreeable in flavour, so that children take it readily, of small bulk, perfectly innocuous to the patient, and more certain than the other agents in its action on the parasite. It is one of the oldest of the remedies for tape-worm, and one of the very best. The preparation I have used is the *æthereal oil*. An aperient was given in the morning, the patient was kept without food for sixteen or eighteen hours, and then one or two drachms of the oil of male fern were administered on a little cinnamon water.

"I have notes of twenty-four cases to which the oil of male fern was given. Sixteen of these cases were cured by a single dose. In three of these sixteen cases the head was found; three of the remaining thirteen were ascertained to be well two years after the administration of the oil, one a year after, one seven months, two six months, three four months, one three months; and before the other two ceased to be under observation, a second dose was given by way of precaution, as it was to all the patients when the head was not found, without any tenia coming away with the stool.

"Three required two doses of the drug; in one of these three, some yards of tenia were expelled by the first dose; for two months after this no joints were found in the stools, then a few appeared, and a second dose was given, and was followed by the expulsion of nine yards of tenia; the patient continued well two years after this. In the second case, three yards were expelled by the first dose; and a month after, five feet by a second dose; at the expiration of four months and a half, the patient continued well; in the third case, five and a half yards of tenia were expelled by the first dose, and seven yards by the second, given two months after the first.

"Three doses were required in two cases. The first dose of the oil, however, given to one of these cases, was not of good quality. In one of the two three days elapsed between the first and second dose, and four hours between the second and third. In the other two days elapsed between the first and second dose, and one between the second and third. In both cases the head was obtained.

"In one case, viz., that of a child five years and six months old, between the 15th of July and the 4th of August inclusive, five doses of castor-oil, and as many of oil of male fern, were administered without a decided effect; a few joints of tenia only being expelled. On the 17th of August, twenty grains of the extract of male fern,



corded in the same journal (August 30, 1856, p. 733) by Mr. SYMPSON, two drachms of the æthereal oil of male fern, given without preparation, brought away the *Bothriocephalus* in three hours after their exhibition, the worm being voided in two portions with its head connected with the part last voided.

178. *c. METHODS WITH POMEGRANATE BARK.*—DIOSCORIDES, CELSUS, and PLINY mention the *radix punice granati* as a vermifuge; and in the East its reputation as an anthelmintic remedy has been great from time immemorial. It was introduced into Europe early in this century by BUCHANAN, BRETON, FLEMING, and others. SEEDER states that of 419 cases treated with it up to 1852, 371 are reported as complete cures, 24 as doubtful, and 24 as unsuccessful. KÜCHENMEISTER adds that he could considerably increase the number of successful cases, partly by his own observations, and partly by those made by others, according to his method—this appearing to be his favourite remedy. The following inferences are stated by him as to the preparation of the bark: 1st. All experiments to ascertain the active principle of the bark of the *radix punice granati* have failed. 2d. This bark is often adulterated, or contains much impurity. 3d. The bark of the root is more active than the bark of the trunk;  $\mathfrak{z}\text{ij}$ . of the former =  $\mathfrak{z}\text{iv}$ . of the latter. The bark of the branches has no action. 4th. The fresh bark acts more gently than the dried bark, but more of it is required;  $\mathfrak{z}\text{ij}$ . =  $\mathfrak{z}\text{ij}$  of dried bark. 5th. According to several authorities, the East Indian bark—which is thicker—should be preferred to the European. 6th. “After maceration for at least twelve to twenty-four hours, the bark is well boiled; and, according to CENEDELLA, it is better made in earthen than in metallic vessels; it is filtered while hot, as, on cooling, active substances appear to be thrown down again. The decoction was formerly most generally used, but I prefer the extract. The best method of preparing this is as follows:

No. 356. R. Corticis leviter contusi Rad. Punice Granati,  $\mathfrak{z}\text{iv}$ .; maceantur per horas xxiv. cum aquæ destill.  $\mathfrak{v}\text{ij}$ .;

obtained from Duncan and Floekhart, of Edinburgh, were given without effect. On August 23d, one pint of infusion of pumpkin-seeds; on September 1st, decoction of pomegranate; and on September 5th, infusion of kousoo; all produced copious evacuations, but no tape-worm. The child now left the hospital. In November he was readmitted, and, during my absence, was treated with success, by my friend Dr. BALLARD, with the oil of male fern. This time the child was kept for forty-eight hours with little, if any, food, before the oil was given. The child was free from tape-worm some months after he left the hospital.

“One man took the oil two or three times without any good effect; but then large quantities of solid feces were discharged from its action; and before it could be administered in a more effectual manner, the patient escaped observation.

“Among those cured by a single dose, and well two years afterward, was one man who had taken kousoo three times, and oil of turpentine twice. Several of the others had taken turpentine and other remedies with permanent good effect. In three cases (children), the patients rejected the oil by vomiting; with one exception, all admitted that it was much less nauseous than castor-oil. In no case did it cause griping or other unpleasant symptoms. The shortest time after taking the oil in which the worm was expelled was half an hour; the longest twelve hours; the ordinary time four hours. A large quantity of tenacious yellow mucus was usually expelled either with or before the worm, and often, also, when no worm was present, as when the oil was given to ascertain that no worm remained, the head not having been found.

“In no case was the worm alive when expelled, and in no case was it expelled entire.”—(*Association Med. and Journ.*, Aug. 23, 1856, p. 718.)

posthæc coque in leni calore per horas xij., ad remanentiam,  $\mathfrak{v}\text{ij}$ . et cola.

To be taken in three to four doses at intervals of from half an hour to an hour.” 7th. According to German physicians, the fresh bark, or the extract prepared in the East Indies from the fresh bark, is to be preferred. Even the fresh bark cultivated in Germany and in green-houses is more efficacious than the dried bark. WAITZ’s extract, prepared from the fresh bark in the East Indies, is very active, the dose of it being  $\mathfrak{z}\text{ij}$ .— $\mathfrak{z}\text{ij}$ . 8th. “The most efficacious form, under all circumstances, is the solution of the extract in a certain quantity of water. The extract itself, made into an electuary with honey, or administered in pills, is to be recommended where there is great tendency to vomit, but, on the whole, its aqueous solution is the best. 9th. An alcoholic extract is also recommended by DESLANDES, and recently by MARTINS, and an æthereal extract has been prepared by WAITZ in Java. Of the latter  $\mathfrak{z}\text{ij}$ — $\mathfrak{z}\text{iv}$ . are administered in  $\mathfrak{z}\text{v}$  of fennel-water with syru<sup>i</sup> corticis aurant  $\mathfrak{z}\text{ij}$ ., in three doses, at intervals of half an hour.” 10th. Although boiling water is, to a certain extent, sufficient for the preparation of the active substance of the bark, yet the addition of caustic potash or soda, or of a little white wine to the water employed in the maceration, and afterward in the decoction, of the bark, greatly increases the efficacy of the extract. 11th. Bark which has been long kept is to be rejected as inefficacious. 12th. KÜCHENMEISTER has recourse to another method of preparing the decoction and extract beside that advised above (6th.) It is as follows:

No. 357. R. Cort. Rad. Punice Granati,  $\mathfrak{z}\text{v}\text{ij}$ .; Pulv. Khamni Cathart.,  $\mathfrak{z}\text{ij}$ .; Aquæ Destillat.,  $\mathfrak{v}\text{ij}$ .; Liq. Kali Caustici Concent.,  $\mathfrak{v}\text{ss}$ . Macera per horas 12—14; coque in leni calore in balneo vapor. per horas 24 ad remanentiam extracti.

The woody parts are to be removed by washing and pressing some time before the conclusion of the evaporation, the washing water being evaporated with the rest. A quantity of this extract, corresponding with the dose of the pomegranate bark prescribed, is to be dissolved in  $\mathfrak{z}\text{v}\text{ij}$ .— $\mathfrak{v}\text{ij}$  of hot water; and, before administration,  $\mathfrak{z}\text{ij}$ .— $\mathfrak{z}\text{ss}$ . extracti filicis maris æther. may be added, when it is desired to combine the two extracts. (See § 176.)

179. *d. METHODS OF PRESCRIBING POMEGRANATE BARK.*—(a) *Recent Bark.*—BUCHANAN prescribes  $\mathfrak{z}\text{v}\text{ij}$ . of fresh bark of the root to be boiled with three pints of water until two pints remain, and drunk in cupfuls at short intervals, until the worm is expelled. KÜCHENMEISTER says that by this violent vomiting, colic, and purging are produced. BRETON recommends  $\mathfrak{z}\text{ij}$ . of the fresh bark to be boiled down from  $\mathfrak{z}\text{v}\text{v}\text{ij}$ . to  $\mathfrak{z}\text{iv}$ ., or, according to GOMEZ, from  $\mathfrak{v}\text{ss}$ . of water to  $\mathfrak{v}\text{ss}$ ., and this decoction to be taken by cupfuls. MÉRAT advises  $\mathfrak{z}\text{ij}$ . of fresh bark to be infused at night in  $\mathfrak{v}\text{ss}$ . of water, and left to macerate through the night, and to be boiled down to  $\mathfrak{v}\text{ss}$  in the morning. After being filtered and well pressed, this decoction is to be taken in three equal parts within two hours. If vomiting occur after the first dose, this should not prevent the following doses from being given; but if the patient vomit these the treatment must be desisted from. According to SCHMIDTMEYER, after one day’s fasting, and the administration at night of  $\mathfrak{z}\text{ij}$ . of castor-oil,  $\mathfrak{z}\text{ij}$ . of fresh bark are macerated for twelve hours in  $\mathfrak{z}\text{v}\text{ij}$ . of water, and concentrated to  $\mathfrak{z}\text{v}\text{ij}$ .; this is taken in three doses within an

hour. KÜCHENMEISTER remarks that “in all these methods evacuations take place without purgatives, as the fresh bark usually acts as an aperient itself; and in this lies the great advantage of the fresh bark, and a principal cause of the great uncertainty of most of the previous methods, in which the dried bark was employed. To produce the aperient action with certainty, the dried bark needs the addition of purgatives. According to my experience, the neutral salts and the true drastics, such as jalap, are greatly to be preferred to the oils.” The decoction of fresh pomegranate bark may also be prescribed as stated in the APPENDIX. (See *Form.* 69.)

180. This writer prefers the extract. *radicis punice granati*, prepared according to the prescription given above (§ 178, No. 387), to all other remedies for tape-worm with which he is acquainted; for, in almost every case of expulsion by this medicine, the worm was passed in one piece with the head, or unbroken and in a single coil—sufficient reason, in his opinion, for endeavouring to make the administration of this remedy more agreeable, and its results still more certain.

181. (b) *Combinations of Pomegranate Bark and Male Fern.*—This was attempted by VON KLEIN, and afterward by KÜCHENMEISTER. The latter prescribed it as follows:

No. 388. R Extracti Radicis Punice Granati Aquosi quantum est ex Rad., ʒiv.—ʒvj., solve in Aq. Destill. Fervidæ, ʒvj.—viij. Adde Extr. Filicis Maris Æther., ʒj.—ʒss.; Extr. Tanacet. Vulgaris, ʒij.; Cambogiæ, gr. iv.—vj. ad x. Misco.

A cupful to be taken in the morning, fasting; a similar dose in three quarters of an hour. The third is kept in reserve. If the worm be not expelled in an hour and a half after the second dose, the last portion is also to be taken. If vomiting occur, a table-spoonful of the medicine is given every ten minutes; and, to alleviate the tendency to vomit, the patient is recommended to gargle, after every dose, with fresh milk, without swallowing any of it. Small pieces of candied citron or lemon-peel are allowed between the doses. If no evacuation have occurred three hours after the first dose, and the worm have not been expelled, an aperient is administered. “With *tania solium*, castor-oil is usually sufficient; one to two table-spoonfuls every half hour or hour; or,

No. 389. R Cambogiæ, gr. vj.—viij.; Pulv. Rad. Jalapæ, gr. x.—xv.

To be repeated in two hours, if required.” With *T. mediocanellata*, this writer has found the best results with the following aperient:

No. 390. R Calomelanos, gr. iv.—vj.; Pulv. Jalapæ, gr. x.—xv.

To be taken at once. After the expulsion of the worm, he advises no treatment, excepting tonics in cases of great weakness.

182. (c) *The preliminary treatment, advised by KÜCHENMEISTER*, is as follows: At the seasons of fresh strawberries and grapes, he gives half a pint of these fruits every morning, fasting, for six to eight days; and on the evening before the expulsion, a herring salad with plenty of vinegar, onions, raw and boiled ham, and plenty of oil; and to very costive persons, ʒj. of castor-oil; after which the patient may drink a large glass of light Rhenish wine, or a glass of bitter beer. If the fresh fruits are not to be had, the salad alone will suffice. In very obstinate cases

of *Tania mediocanellata*, he allows the patient to take as much confection of senna with extr. tanaeti vulg. (ʒij. to the ounce of the confection) as will produce two soft motions daily; he then takes the mixture, and not before. Fasting the night before is not advised, as the medicine does not agree well with an empty stomach.

183. e. METHODS WITH OIL OF TURPENTINE.—I have prescribed this medicine both as a preliminary means variously combined, and as a direct remedy, or after little or no previous treatment. As a preliminary medicine, I have most frequently given it in the following form:

No. 391. R Olei Terebinthinæ, ʒij.—ʒiv.; Ætheris Sulphurici (vel Spirit. Ætheris Sulph. Comp.), ʒiv.—ʒj.; Tinct. Camphoræ Comp. (vel Tinct. Benzoniæ Comp.), ʒss.; Olei Cajuputi, ʒxij.—xx. Terc. cum Pulv. Traga-canth. Comp., ʒij.; Pulv. Glycyrrh., ʒij., et adde Syrupi Rosæ et Syrupi Tolutani, aa, ʒss., Aquæ Destill., ad ʒviij. Fiat mist. cujus capiat cochl., j. vel ij. larga, 4tis vel 6tis horis, prius agitata phialâ.

Cold water, or linseed tea, barley water, &c., may be taken frequently during the continuance of this medicine; and in some cases, as soon as any indication of disorder of the urinary functions occur, a full dose of either castor-oil, or of calomel with camboe or jalap, so as to freely evacuate the bowels, should be given. Frequently a considerable portion of the worm is expelled by these means; but nevertheless the male fern, or its æthereal oil, or the pomegranate bark, should be taken, as prescribed above (§ 164–181), a few hours after the exhibition of the purgative; or in other cases a few hours before, especially if the bowels have not been long confined.

184. KÜCHENMEISTER states that “the dose of this remedy is ʒij. at once, in the morning, fasting; and if no stools result, another ʒj.—ʒij. afterward (FENWICK and COPLAND); or ʒj. olei terebinthinæ, made into an electuary with honey, &c., in two doses at night before going to bed (THOMPSON); or ʒij.—ijss. (SCHMIDTMANN); or with the olei filicis maris (MAYOR). Or the patient for three days is allowed to eat only water-gruel with small portions of white bread, three times a day; and on the next day, when fasting, to take the following:

No. 392. R Olei Terebinthinæ, ʒj.; cum Vit. Ovorum, ij.; Sacchari Albi Subacti, ʒss. M;

and if the worm is not expelled on this day, the dose is repeated on the following day (MERCK). Some also give ʒij.—ijss., one half in the morning, and the other at night.” This is one of the most effective agents against tape-worms, as LANGE, KÜCHENMEISTER, and others admit. The latter of these writers states that tape-worms laid in turpentine mixed with white of egg, died within one hour and three quarters; and that the touch-stone of a remedy for tape-worms is not whether it expels *Bothriocephalus latus* or *Tania solium*, but whether it is also capable of expelling the *T. mediocanellata*. That the oil of turpentine is efficacious in the latter case, he can prove; for the finest specimen of this last-named worm was expelled by it. In general it acts with tolerable rapidity, and entirely. This latter circumstance he regards as a requisite of a good vermifuge in cases of tape-worm, especially as the doctor and the patient are anxious to ascertain the expulsion of the head of the parasite.

185. The principal objections to this substance are its nauseous taste, the inclinations to vomit, the unpleasant eructations, griping pains, and disorders of the urinary excretion, it often occa-



sions. It more frequently produces these unpleasant effects when taken in the form of an electuary. When prescribed in the form of mixture, as above (§ 183), or suspended by white of egg, or taken either pure in a full dose (ʒj.—ij.), or with the addition of castor-oil, on the surface of coffee, or milk, or on any aromatic water, at bedtime, or early in the morning, it is generally the most efficacious, and least likely to produce any of the above unpleasant symptoms. It is often taken with less discomfort on the surface of Hollands or common unsweetened gin. When castor-oil is not given with it, and when it does not act on the bowels in a few hours, either a full dose of castor-oil, or of some one of the purgatives already mentioned, should be taken without delay.

186. *f. METHODS WITH KOUSSO.*—*Kosso*—*flores kouso*—the dried and powdered flowers of the *Brueya anthelmintica*, has lately been much in vogue against tape-worm. It has been supposed by several physicians to have been adulterated. KÜCHENMEISTER supposes that it is not so much adulterated as mixed with other Abyssinian medicines against tænia, as with the powder of the root of *Verbascum ternstro*, and with the powdered leaves of *Jasminum floribundum*. The dose of the powder of kouso is ʒvj.—ʒj. I have prescribed this remedy in four cases. In the first, successfully in the case of a medical man in Hertfordshire, the entire worm with the head having been brought away after turpentine and some other anthelmintics were said to have failed; and in two cases with only a partial benefit; and in one case without any effect. The writer just mentioned states that he has always been more or less unlucky with this remedy, which, in the ordinary mode of administration, shares all the defects of the other remedies for tape-worms, and easily produces sickness and violent pains in the intestines; and that the worm has generally been expelled by it in numerous fragments, and at most the worm up to the neck; but that he never found the head, excepting once, after a second dose of the kouso, which caused violent pain in the abdomen. Several attempts have been made in Germany to isolate the active constituents of this substance, and to prepare infusions, decoctions, and infuso-decoctions of it, with and without the flowers being retained in them; but although the effect appeared to equal or to approach that of the powder of kouso itself, yet little was gained, excepting when the quantity (ʒvj.—ʒj.) of kouso usually employed was macerated in cold water for twenty-four hours, and then boiled for half an hour, and the whole taken—without straining—with the flowers in it, in two portions; ʒj. to ʒij. of castor-oil having been given two hours after the second portion. This infuso-decoction was said to have been well borne, and to have acted with certainty.

[To avoid the nauseating effects of kouso flowers, however different the mode of administration, the resin of the flowers, extracted in the same manner as the resin of jalap, has been recently recommended. Two scruples to one drachm of the resin are dissolved in about three drachms of alcohol. This solution is then poured on a piece of sugar weighing about half an ounce. After the sugar has dried by evaporation of the alcohol, it is powdered, three drachms of powdered sugar being added. The whole is then divided into five doses, four of which are given at six, seven, eight,

or nine o'clock in the evening; the remaining at six o'clock in the morning; an hour later, six to nine drachms of Glauber's salts are given, dissolved in water.]

187. *g. NOTICES OF SEVERAL OTHER MEDICINES AND METHODS AGAINST TAPE-WORMS.*—(a) The *Spigelia anthelmintica* has been employed, according to NOVERRE, in the West Indies; but its effects are unpleasant, and it not easily admits of use in Europe.—(b) *Sabadilla* has been given in a dose of half a drachm of the powder in the morning, the patient having been purged on the previous day with rhubarb and Glauber's salts. The sabadilla powder is given with the same quantity of fennel sugar, and the patient afterward drinks one to two cups of chamomile or elder-flower tea. If vomiting be produced, worms in the stomach are thrown up. On the second day the same dose of sabadilla is taken; and if no more of the worm appears, half the quantity of this medicine is taken morning and evening of the third and fourth days. On the fifth morning, while fasting, a purgative is administered, and the living or dead worm is brought away. For children from two to four years, two grains of sabadilla powder is a sufficient dose. This medicine is of service against *ascarides*.—(c) The *schebdi*—the *Phytolacca dodecandra* or *Abyssinica*. The fruit of this plant has been tried in Europe, and fragments of the worm have been brought away; but sufficient trials have not been made of its efficacy.—(d) The *fructus saoria*, the fruit of *Masa picta*, HOCHSTETTER, has been given in doses of ʒj.—ʒjss. with uncertain results. This remedy is easily taken. Its taste is less repulsive than that of other remedies. Nausea, vomiting, and slight pain in the abdomen are often experienced from it. In two cases the worms were expelled by it up to the head, but always in fragments. This remedy appears to be deserving recommendation for *ascarides* and *oxyurides*.—(e) The *Mucuna*—*cortex mucuna*—from *Mucuna anthelmintica*. The dose of the powder is ʒvj., and is usually, in the East, given with honey in a stiff paste. Single fragments of the worm were brought away by it, but the medicine was probably injured by keeping.

[The *petroleum* has been found very successful in the treatment of tape-worm. The mode of administering is to combine half an ounce of the petroleum with six drachms of the tincture of asafoetida, and give forty drops three times a day.

The seeds of the pumpkin (*Peponis semen*) have recently obtained considerable reputation for the cure of tape-worm. They have the very remarkable property of being bland and almost tasteless, while at the same time they yield to few, if any, anthelmintics in point of efficacy. Two ounces, or even more, as they are perfectly harmless, may be given for a dose. They should be taken upon an empty stomach in the morning, before breakfast; first depriving them of their outer covering and rubbing them into an electuary or paste, with sugar and a little water; or a larger quantity of water may be added, forming an agreeable emulsion. The whole should be taken in successive draughts, and in two hours after followed by a full dose of castor-oil.]

188. *h. DRASTIC PURGATIVES WITH AND WITHOUT CALOMEL.*—BREMSER's and SCHMIDT's methods of employing these medicines are too severe, and are often productive of inflammation of the digestive mucous surface, which may not be al-

laid for some weeks. I will not, therefore, mention them. According to ETTMÜLLER's plan, the patient takes, at seven o'clock in the evening, calomel., gr. xij., lapid. cancor., ʒj.; and about nine o'clock, olei amygdal. dulc., ʒjss.; which usually operate twice in the night. At seven and nine o'clock next morning he takes cambogiæ, gr. xij., rad. valerianæ, and sem. cinæ, āā, gr. iv., when the worm is afterward expelled. I much doubt this result. It is quite unnecessary to state the various modes in which the changes are rung upon the purgatives believed to be most appropriate in cases of tape-worm, by writers of no mean reputation, and the several ways these medicines may be combined and successively administered. Calomel, camboge, jalap, castor-oil, the sulphates of potash, soda, magnesia, &c., variously conjoined or administered in succession, with or without valerian, oleum tanacetii, &c., are the chief medicines advised. But, in order to be efficient, their doses and the repetitions of them are such as to risk the supervention of inflammation; and in a large proportion of cases they fail altogether.

189. i. INFERENCES.—(a) Simple methods of treatment with the *flux mas* and its *æthereal oil* and *extract* (§ 176, 177), are sufficient to remove the *Bothriocephali*.—(b) For the expulsion of *Tænia solium*, the combination of the aqueous extract of the bark of the pomegranate root, with the addition of the *æthereal extract* of male fern, is considered by KÜCHENMEISTER as the most efficacious, camboge, gr. iv.—viij., being preferable to the saline addition mentioned above.—(c) The *Tænia medocancllata* is generally expelled by the same combination, especially when a powder with calomel and jalap, or camboge, is given afterward.—(d) In very obstinate cases, the methods with tin, or those with turpentine, or with these latter following the former, may be employed with care and circumspection.—(e) The kousso does not promise any advantage over the above remedies, if, indeed, it be equal to any of them.—(f) When the worms depend from the anus, the German physicians advise a cup of strong black coffee with plenty of sugar to be given immediately. A dose of calomel and jalap, or this followed by castor-oil, appears to be more efficient.

190. k. TREATMENT WITH KAMALA (*the red powder obtained from the capsules of Rottlera tinctoria*, Roxburgh).—This substance, long known in India as a valuable dye for silk, has been much employed against tape-worm, which is very prevalent in the Punjab and Northwestern Provinces of India, and has recently been prescribed with success in this country by Dr. LEARED and others. This peculiar red powder may be prescribed in doses of half a drachm to three drachms suspended in water. "A single dose is often found sufficient, and in general it is not necessary to give any other medicine before or after. In some cases, however, where a small dose of kamala has been administered, castor-oil has been afterward given with good effect. Dr. GORDON has prescribed kamala in the dose of one drachm, repeated at intervals of three hours. Kamala may be given also in the form of tincture, the formula for which, recommended by Dr. ANDERSON, is as follows :

No. 393. R Kamalæ, ʒvj.; Spiritus rectificati, ʒxvj. Marcera per biduum et cola.

An *æthereal tincture* may be prepared of the

same strength; but it is said to offer no particular advantage over the alcoholic. The dose of *tinctura kamalæ* is from ʒj to ʒiv., diluted with some aromatic water." (Dr. HANBURY, in *Pharmaceutic Journ.*, Feb., 1858, p. 405.)

191. Drs. C. MACKINNON, ANDERSON, CORBYN, and GORDON have praised the anthelmintic powers of this medicine. Dr. MACKINNON states that the results have been so satisfactory, that he has continued to employ this whenever a case of *tænia* presented itself, and that he has given it in sixteen cases without a single failure. In none of his cases, excepting one, did he ever exceed, for a single dose, three drachms. This dose usually purges from five to seven times; and the worm is usually expelled, dead, in the fourth or fifth stool. In about half the cases some degree of nausea and slight griping were experienced; in the remaining half no inconvenience whatever was felt. Dr. MACKINNON states the following as the results of his experience of this medicine: "1st. That kamala is a safe and efficient remedy for tape-worm, and more certain than either turpentine or kousso. 2d. That, to a strong European, three drachms may be safely given as a dose. 3d. That to a person of feeble habit, or to a female, one drachm and a half, followed, if necessary, by half an ounce of castor-oil, is a sufficient dose." Since the above was published, Dr. MACKINNON has administered this medicine to nearly fifty patients, and in two instances only was no worm expelled. (*Medical Times and Gazette*, Dec. 19, 1857, p. 628; and *Indian Annals of Med. Science*, vol. iii., p. 86.)

192. Dr. ANDERSON states that, "after three drachms of the powder (of kamala) have been administered, the worm is usually expelled in the third or fourth stool. It is generally passed entire, and almost always dead; and in all the cases I have examined (about fifteen) I was able to detect the head. In only two cases do I know of the worm being passed alive. The advantage of the tincture over the powder consists in its action being more certain and milder, and in its being rarely accompanied by nausea and griping. In two or three cases, only two or three stools followed the dose usually given, and the worm was expelled in the second stool; in one patient, only one stool was caused by the medicine, and in it the worm came away dead." (*Ind. Ann. of Med. Sc.*, vol. iii., p. 82.) Dr. ANDERSON alludes to ninety-five cases of tape-worm in which kamala was prescribed, and of this number (eighty-six were European soldiers) he was aware of only two in which no worm was expelled. Dr. C. A. GORDON remarks that "with this medicine there is no unpleasant effect. It is not even necessary to take a dose of purging medicine as a preparative; and, beyond a trifling amount of nausea and griping in some instances, no unpleasant effects are experienced; while by far the greater number of persons to whom it is administered suffer no inconvenience whatever beyond what they would from a dose of ordinary purging medicine." (*Med. Times and Gaz.*, May, 1857, p. 429.)

193. Dr. ANDERSON and Dr. GORDON agree in stating that the frequency of *tænia* in the North-west and Upper Provinces of India arises from the free use of animal food of a very unwholesome character by the European soldiers; while among the Hindoo natives, whose food is entirely vegetable, this parasite is unknown. Foul-feed-



ing and half-starved pigs, cattle and sheep, as well as ducks, turkeys, fowls, pigeons, equally foul-fed and diseased, are often made articles of diet by the European soldiers, and are justly viewed, by the physicians mentioned above, as the causes of the prevalence of tape-worm in this class.

194. iii. TREATMENT OF THE OTHER WORMS.—*A. Echinococi, cysticerci, and accephalocysts* rarely admit of treatment, and only of surgical treatment. This subject is sufficiently noticed in the article HYDATIDS.

195. *B. The comparative rarity of the Distoma hepaticum* (§ 98–100), and the difficulty of its diagnosis, render the prophylaxis and treatment of this worm, in some respects, matters of subordinate importance. The prevention is either difficult or impossible, owing chiefly to our imperfect knowledge of its developmental history. As far as this history may be inferred from the subjoined remarks of KÜCHENMEISTER, the prophylaxis must be founded on it, and be viewed as conformable with what has been stated above.\* (§ 157–160). The direct treatment of *Distoma hepaticum* can rarely be ventured upon with success, owing, first, to the almost impossibility of its diagnosis, unless its presence be inferred from the passage upward or downward of some individuals of this species; and next, from the serious nature of the lesions produced by it. Even granting, then, the detection of the malady, medicines can be exhibited only with great uncertainty as to their beneficial effects. As, in many of these cases, the biliary functions are more or less interrupted, and organic vital force impaired, it becomes necessary to attempt the restoration of the former, and the development of the latter, by suitable means. To remove biliary obstruction, calomel and other mercurial preparations combined, according to the peculiarities of the case; the nitro-muriatic acids internally and externally; the preparations of taraxacum, and the mineral waters of Carlsbad, Marienbad, Kissingen, and similar springs. DURAND's medicine against gall-stones and obstruction of the gall-ducts has also been recommended. This medicine consists of equal quantities of oil of turpentine and sulphuric ether. It may be given in moderate and frequent doses; or the oil may be conjoined with alcohol, or with nitric ether, or with the sweet spirits of nitre. These appear to be appropriate for this

parasite, as the efficacy of the turpentine against other worms, and the rapidity of the absorption of it into the circulation, are indications in favour of the use of it in cases where the existence of this animal is inferred. KÜCHENMEISTER states that the principal ingredient of the remedy of DURAND has been successfully administered for *distoma* of some of the lower animals; and that, upon his recommendation, turpentine was administered to several sheep, and followed by a purgative; but the results were not fully ascertained when he wrote. The propriety of enabling the constitution to throw off the parasitic animal by the exhibition of tonics conjoined with alteratives and deobstruents, such as the bichloride of mercury with preparations of cinchona; the extract of taraxacum with the solution of potash, and with tonic and bitter infusions or decoctions; and the nitro-muriatic acids with these latter and with taraxacum, cannot be reasonably doubted.

196. *C. The Distoma hematobium*, so remarkably prevalent in Egypt (§ 103–109), cannot be encountered with any means of prevention or of cure, upon which any reliance may be placed. GRIESINGER, who has furnished the chief amount of information respecting this parasite, considers that—1st, the waters of the Nile used without filtration; 2d, the bread, grain, and dates employed for food; and, 3d, the use of half-putrid fish, being the chief causes of its existence—the prevention of it must be based on the avoidance of these causes, and of the circumstances connected with them, which admit of avoidance. As regards the cure, calomel and turpentine are chiefly recommended by GRIESINGER, the latter being readily absorbed into the circulation, as first shown by me in a memoir on this remedy, published in the *London Medical and Physical Journal* for 1821. He also advises the use of onions, garlic, &c. The tinctura ferri muriatis, and other preparations of iron, of camphor, asa-fetida, &c., variously combined, and long persisted in, may also prove of benefit, especially as anæmia and chlorosis form a marked characteristic of these cases.

197. *D. The Oxyuris vermicularis* (§ 123–126) is always treated with difficulty, and, according to my experience, with greater difficulty in old than in young subjects. KÜCHENMEISTER states that internal remedies in general are but little to be recommended. I am of a very different opinion, based upon very considerable experience. This writer advises the long-continued use of a tea made from the *flores verbasci*. The flowers are left in the infusion, and used with it. The fine hairs appear to irritate and disturb the worms mechanically. The remedies already noticed for the cure of tape-worm, especially turpentine, the pomegranate root, the filix mas, &c., often bring away the thread-worms, but they are soon regenerated. The permanent removal of them cannot be effected by these or by similar means. Medicines calculated to act upon the lower bowels, and to restore the tone of the digestive mucous surface, and to correct the state of the intestinal secretions and excretions, are especially required against these worms. Dr. PÖCKELS recommends the powder of filix mas and jalap in some suitable vehicle; KÜCHENMEISTER, the preparations of the semen cinæ—the santonium, or semen contra vermes—internally for two days, and afterward strong purgatives, followed by clysters; DUJARDIN advises enemata with valerian, or garlic, or

\* Although it is still unknown to us how the embryo becomes metamorphosed, and into what *cercaria-sacs* or *redie* it is converted, and where these *cercaria-sacs* or *redie* live; although we do not know whether the brood of *D. hepaticum* is tailed or tailless, and where it encysts itself, whether free in the water in the manner of *Monostomum*, in aquatic mollusca or insects, or in higher animals which occasionally visit stagnant waters, yet there is much probability that the herbivorous or omnivorous domestic mammalia infect themselves with free encysted young *Distoma*, either by devouring snails which adhere to the grass of the meadows, especially in moist pastures, or by drinking from impure, stagnant waters (marsh or pond water). Exactly the same thing would then take place in man, by means of snails adhering to salad, fallen fruits, radishes, turnips, and other roots. Nay, such small snails might even be introduced with dry fodder into the stomachs of our domestic animals during the winter, by their eating the small species, passing their winter sleep in their closed shells, or the shellless slugs adhering to roots protected from frost in warm cavities or cellars. Whether the production of *D. hepaticum* in the human liver may take place by drinking impure water, must remain quite undecided. The finding of a young *Distomum* in the sole of a woman's foot appears to be in favour of an immigration, and a mode of existence similar to the *Cercaria*.—(Op. cit., p. 270. 1.)

wormwood, with the addition of aloes; and many administer clysters of salt water, or a solution of salt in water with olive or castor oil. When the patient is distressed by these parasites during the night these or similar enemata should be administered at bed-time or shortly before. Numerous preparations of the santonicum, and various combinations of this seed with other substances, as the powder (3j.—3ij.), the infusion, the decoction, the extract—in the form of electuary, mixture, confection, bolus, &c.—with valerian, or jalap, or calomel, or aloes, or rhubarb, or sulphate of potash, or with sulphate of iron, or with alkaline carbonates, are contained in the Continental pharmacopœiæ, and employed against this and other species of worms.

198. The means which I have usually employed, for many years, against the *Oxyuris vermicularis*, with the view not merely of removing them, but also of preventing their regeneration, and of improving the functions of the bowels and the state of the general health, are combinations of preparations of iron with those of aloes, taken internally for some days, or even weeks, according to their effects; and afterward enemata with olive or castor oil, spirit of turpentine, or asafetida, camphor, salt, &c., in gruel, according to the peculiarities of the case. The mist. ferri may thus be conjoined with the decoctum aloes compos., or with the tinct. aloes; or the pilula ferri comp., or sulph. ferri, may be given with the pilula aloes cum myrrha, the pilula galbani comp. and camphor. Electuaries may also be prescribed in other cases, with the carbonates or oxides of iron, the santonicum and confection of senna, with a small proportion of the confection of black pepper; and, if these do not completely remove the annoyance, the use of the enemata already recommended should be adopted (see FORM. 71, 80, 105, 106, 149, 151, and 153). In some cases where these are required, the long flexible tube should be introduced above the sigmoid flexure of the colon, so that the remedies may reach above this part of the bowel. Having removed the worms, it will be of service, in order to prevent their regeneration, to continue the use of the preparations of iron in conjunction with aperients and the other medicines which the circumstances of the case will suggest. The following pills have been found by me, for many years, to be most successful in removing and in preventing the regeneration of the *oxyuris vermicularis* and the *ascarides lumbricoides*, both of which parasites are often present in the same case:

No. 394. R Ferri Sulphatis; Quinæ Sulphatis; Camphoræ, aa, gr. xvj.; Pilulæ Galbani Comp., ʒijss.; Pilulæ Aloës cum Myrrha, ʒj.; Pulv. Capsici, gr. xvj.; Olei Cajuputi, ℥xxx.; Mucilag. Acaciæ, q. s. Misce, contunde bene, et divide in pilulas xxxvj., quarum capiat unam, duas, vel tres, bis terve in die.

The aloes, in combination with sulphate of quinæ, acts energetically on the bowels; therefore the dose of these pills should be regulated according to their operation—a larger dose being given for the expulsion of the different species of ascarides; and the smaller doses for the prevention of their regeneration. The enemata already recommended should also be administered after the pills have been taken during two, three, or five days, the repeated exhibition of these latter rendering the former more efficient and generally successful.

199. E. The *Strongylus gigas* (§ 128–130).—

This worm, which is found chiefly in the kidneys and urinary bladder, can hardly be inferred to exist during life unless its discharge takes place, which very rarely occurs. KÜCHENMEISTER remarks that if several worms, or one large female, be present, the kidneys will be enlarged, so that the enlargement may be detected by palpation, percussion, and perhaps by inspection; but the cause of this swelling, or any flow of blood from the urinary passages, or of any existing retention of urine, could be referred to the presence of these worms only when any of them are passed from the bladder; and in this case the treatment would be chiefly to alleviate irritation by mucilaginous and oily medicines, and emollients, demulcents, &c. The oil of turpentine internally and externally may probably be of use in some instances.

200. F. The *Ancylostomum duodenale* (§ 132–135) is one of the inflictions on Egypt and some other tropical countries, and to GRIESINGER we are indebted for all we know respecting it. Unacquainted at first with the real cause of the disease which it occasions—with the prevalent anæmia, chlorosis, &c., produced by it—he had prescribed iron, quinine, calcarea phosphorica (phosphate of lime?), &c., with much benefit in slight cases, but never with complete success in those which were severe. KÜCHENMEISTER states that in one of his last dissections a sudden light broke in upon him on this subject, when he found the duodenum, the jejunum, and even the upper half of the ileum, entirely filled with fresh red blood, only coagulated here and there, and thousands of *Ancylostoma* on the mucous membrane of the small intestine, each with its little ecchymosis resembling the bite of a leech. Although he thus left Egypt, and could collect no farther clinical observations, he told the Arabian prosecutor, “You must now employ calomel and other anthelmintics against these *Ancylostoma* and the *Distoma* of the portal vein; in short, against the tropical chlorosis, as well as against hæmaturia, stone, dysentery, abscess of the liver, and all the undetermined diseases of tropical countries, perhaps even some of the tropical fevers, and investigate the latter illness itself, with reference to the most recent helminthological discoveries.” Above all things, GRIESINGER praises calomel and oil of turpentine *à priori*, the latter, indeed, especially for the *Distoma* of the portal vein, above all for the *Ancylostoma*, as it certainly reaches the worms situated in the uppermost parts of the intestine; in substance, worms die in it very readily, and it also acts as a styptic upon the injured, bleeding vessels. This last remedy, when mixed with castor-oil, or with castor-oil and a few grains of santonine, or the *natron santonicum*, to which vegetable purgatives are added, must prove particularly efficacious. “None of our colleagues working in the tropics should forget that tropical chlorosis is the consequence of the repeated, small intestinal bleedings, which scarcely betray themselves externally, caused by intestinal worms, especially *Ancylostoma*.”

201. G. The *Filaria Medinensis* (§ 138–142). —a. The prevention of this worm may be inferred from the causes and circumstances connected with its occurrence, namely, the endemic prevalence of filaria in certain climates and localities, its youngest brood living free in the water, or in wet grass, marshes, or moist soil, &c. Hence,



wading through these places with naked feet, or exposing naked parts of the body to foul or impure water, should be avoided as sources from whence the brood comes in contact with these parts in the native countries of this worm. PRUNER states that an infection of the filaria may occur, as shown by numerous facts, even in those tropical regions in which the worm is not endemic, an actual transfer from one person to another or to dogs and horses taking place. BREMER says that even in his time the worm had become naturalized in Curaçoa by the importation of negroes. No one, therefore, should use the same vessels employed by the patient in bathing or washing the feet; and that great caution should be observed with the bandages of such patients.

202. *b. Curative Treatment.*—At the commencement of its growth, this worm is said, when superficial, to be easily killed by poultices of boiled garlic. When quite superficial, an incision is made upon it, and the worm pulled out with a hook. Slave-dealers rub in civet and musk on its first appearance. But the worm often produces no annoyance for a long time—six to eight months. When it inflames and ulcerates the integuments over its seat, the part which appears is seized, and carefully pulled and fastened to a roll of linen or stick, and gradually extracted by turning these twice daily. Some writers advise, when the worm is felt, to cut down through the integuments, making an incision of several inches long, and removing the worm in a loop, or wedging into a piece of wood, and then pulling now on one side and now on the other, the muscles being all the while relaxed. If inflammation, swelling, and pain are great, and the worm resists dragging, or breaks off, these symptoms are to be treated in the usual way, by poultices of linseed meal, or of onions and bread, or onions boiled in milk, or of roasted onions, &c. In these cases numerous means have been recommended in addition, but none of them appear very appropriate or successful.

203. From the most ancient periods the breaking of the worm has been considered a very serious accident; and severe inflammation, fever, gangrene, &c., have been, even by some modern writers, said to have resulted from it. According to the observations of most authors, who had themselves suffered from the breaking of the worms, violent swelling, inflammation, fever, sleeplessness had occurred, and were cured only when they were killed. The diagnosis in cases of *Filaria medinensis* should always be correctly made, in order to determine the presence of this worm, and to distinguish between *FURUNCULI* (see that article) and inflammatory swellings caused by it.

204. *II. The Treatment of Ascaris Lumbricoides* (§ 141–149).—*a.* For the prevention of this worm it is necessary to bear in mind the circumstances in which the eggs may occur, and the long period during which they may be preserved. RICHTER ascertained that the eggs may remain in sewerage and foul water for some time, and that they attain their full maturity, and undergo the process of segmentation in this situation. BARRY, BISCHOFF, and others have shown that alkalies and salts do not prevent this process. VERLOREN, that a period of eleven or twelve months is required for the completion of this process in the *Ascaris lumbricoides*. RICHTER and KÜCHENMEISTER state that eggs which had been put in

water had not shown any appearance of embryos several months afterward. As to what becomes of the ready-formed embryos nothing is known positively; they probably get into our bodies with water, and perhaps this is sufficient for their development.

205. *b. The Cure of Ascaris Lumbricoides*.—The number of medicines recommended with this object are so great that the judgment is distracted respecting them. In order to assist the selection, it has been attempted to determine the effects of the most reputed vermifuges upon living intestinal worms from recently-killed domestic animals, by REDI, ANDRY, LECLERC, TORTI, ARNEHMANN, CIABERT, and others. More lately, KÜCHENMEISTER has had recourse to similar experiments made in the temperature of the animal, by mixing the anthelmintic in white of egg, and placing the living worm in the mixture, and has given us the following results, “arranged according to the time in which round worms died in white of egg mixed with the various remedies.

206. “1. Death took place in one to two hours in white of egg mixed with creasote, and large doses of common salt and corrosive sublimate.

207. “2. Death took place in two to five hours in white of egg mixed with petroleum, cajuput-oil, oil of turpentine, mustard, weaker solutions of common salt, and washed herring’s milt.

208. “3. Death took place in five to fifteen hours in white of egg mixed with garlic, onions, laurel, cloves, wood vinegar, rad. jun. granati, tinct. gallarum, concentr. sol. of sulph soda.

209. “4. Death took place in fifteen to twenty-four hours in white of egg mixed with camphor, anise, and infusions or decoctions of ginger, gentian, elm-bark, koussou, and hops.

210. “5. Death took place after twenty-four hours in white of egg mixed with infusion or decoction of parsley, rice, milfoil, tansy, valerian, chamomile, wormwood, myrrha, quassia, calamus, ipecacuanha, walnuts, china-bark, willow-bark, oak-bark, catechu, kino, asafoetida, gum ammoniac, Peruvian balsam, ol. ricini, aqua picis, creasote water,” &c.

211. This writer states that besides the remedies here enumerated he has tested the *semina cinæ* (*santonici*) with their preparations. In a mixture of white of egg with coarsely-powdered seeds the worms live for days; and in a mixture of white of egg with a strong infusion of *semina cinæ*, with repeated additions of unboiled powder, they also lived for days. In a mixture of *santonine* with water and white of egg, the worms lived for days; and also in white of egg with *santonine* and a little vinegar. At the same time, however, the total insolubility of the *santonine* was proved by farther experiments. In white of eggs mixed with castor-oil and *santonine* the worms died within an hour; but in this experiment the temperature was raised too high. In a mixture of white of egg with *natron santonicum* (*santonate of soda*) dissolved in water, *ascarides* lived more than twelve hours. These experiments form an introduction to the treatment advised for *Ascaris lumbricoides* by KÜCHENMEISTER, and more especially to the use of the preparations of *santonine*; but he previously notices the employment of the *semina santonici* by other helminthologists, who generally prescribed this remedy in the form of an electuary.

212. (*a*) *Storck’s Formula*:

No. 395. R Pulv. Semin. Santonici (vel Cinæ), ʒij.;

Rad. Valerianæ Min. Pulv., ʒj.; Rad. Jalapæ Pulv., ʒss.; Oxytellis Scill., q. s. ut fiat electuarium molle.

One tea-spoonful every three hours.

213. (b) SELLE'S Tonic Worm Electuary:

No. 396. R Pulv. Seminum Cinæ, ʒvj.; Ferri-Sulph. Cryst., Extr. Chloæ Fuscæ, āā, ʒij.; Syrupi Cinnam., q. s. ut fiat electuarium molle.

One tea-spoonful three times a day. This electuary is to be preferred some time after the expulsion of *Ascarides*, and to ascertain their permanent removal.

214. (c) HUFELAND'S Worm Electuary:

No. 397. R Pulv. Sem. Santonici, ʒss.; Pulv. Rad. Jalapæ, ʒj.; Kali Tartar. depur., ʒij.; Pulv. Rad. Valerianæ, ʒss.; Oxytel. Scillæ, ʒvj.; Syrupi Simp., q. s. ut fiat electuarium molle.

One tea-spoonful every two or three hours.

215. (d) CLARUS and other German physicians advised the Semin. Santonici, coarsely powdered, to be sprinkled over bread, and spreading sirup of honey over the powder, administering from ʒss. to ʒj. several times a day in this manner, followed every third or fourth day by a purgative.

216. (e) BREMSER'S Electuary:

No. 398. R Seminum Santonici vel Tanacetii Vulgaris ruditer contusum, ʒss.; Pulv. Rad. Valerianæ, ʒij.; Pulv. Rad. Jalapæ, ʒjss.—ij.; Tart. Vitriol. (Potassæ Sulph.), ʒss.—ʒij.; Oxytel. Scillæ, q. s. ut fiat electuarium molle.

A tea-spoonful to be taken two or three times a day. After taking two tea-spoonfuls daily for three or four days, slime and worms pass off with more copious stools. If the worms are not expelled, BREMSER administers some more of the electuary twice or thrice. If the first pot of electuary be insufficient, a second is taken, but watery stools must not be produced. He never allowed more than two potfuls to be taken; and he considered it unimportant whether worms passed or did not pass during its use. To relax the bowels once in the midst of this treatment he prescribed the following:

No. 399. R Pulv. Rad. Jalapæ, ʒj.; Pulv. Fol. Sennæ, ʒss.; Potassæ Sulph., ʒj. Miscæ. Fiat pulvis in partes iij. vel. iv. æq. divid.

Half a powder to be taken every half, or every hour, or two hours, until it operates. For leucophlegmatic subjects he often gave CHABERT'S oil (composed chiefly of turpentine rendered still more nauseous), in doses of two tea-spoonfuls in water, night and morning.

217. The Semina Santonici, KÜCHENMEISTER states, have been recently displaced by the preparations obtained from them, and in his opinion with justice. He extols chiefly two of them, viz., Santonine and the Santonate of Soda; all the rest being unnecessary. He considers it to be preferable to administer santonine with fatty oils, in order to bring it into solution as readily as possible; and for this purpose he prefers to give it sprinkled upon bread and butter, or in the yolk of an egg with sugar; and afterward to follow it every three or four days with a gentle purgative (jalap or confection of senna), or to administer it in castor-oil—gr. ij. to iv. of the santonine\* in ʒj. of the oil, to be taken in tea-spoonfuls until

purgative action commences. In this way the remedy should be repeated, if possible, for some days, or every other day, so that soft stools, rather than actual purging, should be passed. Milk and butter-milk may be taken during this treatment. "Among the santonine lozenges, those prepared from cocoa, undeprived of oil, are most deserving praise." KÜCHENMEISTER remarks that the most troublesome effects of this remedy are spasms, obstructions, with tenesmus, and even bloody stools; but that with a careful employment of the remedy (gr. ij. to iv. with ʒj. of castor-oil) he has never seen ill effects produced by it, the administration of it with castor-oil always preventing intestinal obstructions. The most annoying symptom, to the patient only, is the yellow or blue, or even green appearance of objects, owing probably to the effect of this remedy on the nervous system; but this appears to be only a temporary inconvenience, which soon disappears after the discontinuance of the remedy. This writer adds that "it follows, as a matter of course, to be cautious in the use of santonine, that he would never give more than eight grains of it in two days, divided into doses of two grains each twice a day, and that, on the second day of its use, he would administer an aperient."

218. (f) The Santonate of Soda.—Natron santonicum has recently been greatly praised by H. E. RICHTER and KÜCHENMEISTER, for its successful action in cases of *Ascaris lumbricoides*. The latter of these physicians states that he has never seen injurious effects from this medicine, even when administered in doses of eight to ten grains twice a day to adults. "The remedy to be given alone, as every acid decomposes it, and it must not be mixed in electuaries." He adopts nearly the following method: He lets children (or adults) take a powder of santonate of soda with sugar (from two to six grains) on a Friday night, and he repeats the same dose on Saturday morning (fasting) and evening, and again on Sunday morning. On Sunday, half an hour or an hour after the last powder, an aperient electuary (confectio sennæ, &c.), or a sufficient dose of jalap, is taken, so that several soft motions may follow. By these means the worms usually pass off alive; or they wander forth singly afterward, and without stools, their residence having become disagreeable to them. Dr. PÖCKELS, who noticed a blackish discoloration of the tongue after santonine, praises, as a remedy for *Ascaris lumbricoides*, the root of *Aspidium filix mas* in conjunction with purgatives.

219. (g) I have found no remedies more efficacious for the *Ascaris lumbricoides* than turpentine, as prescribed above (§ 183–185) and in Form. 216, and the infusion of *spigelia* and *santonicus*, as directed in Form. 264 in the APPENDIX. For this worm, also, as well as for the *Oxyuris vermicularis*, the preparations of the semina santonici, prescribed in the APPENDIX, will also be found successful. (See Formula 71, 80, 105, and 106.) These and other medicines will be frequently as successful without as with the preliminary treatment recommended by the German writers; the exact operation of such treatment often being not very manifest. The great success derived from the powder and tincture of kamala, in India, in the treatment of tape-worms (see § 190–193), and the effects of this substance upon these worms, promise similar results from it, if it were prescribed against the *Ascaris lumbricoides* and the *Oxyuris vermicularis*.

\* The preparation of santonine is best effected by the employment of ammonia. It must be tasteless, when pure, because it does not dissolve in the mouth. Dissolved in alcohol, it is bitter. It is sparingly soluble in warm water, but is readily in oils. It is inodorous, has a slight acid reaction, combines readily with alkalies, and becomes yellow in the light of the sun. When impure, it still contains resins and essential oils, and is consequently nauseous to the taste.—(CALLOND, in *Pharmacie Centralblatt*, 1849, p. 413; and J. CLARUS, in *Handbuch der Speziellen Arzneimittelehre*, 1852, p. 333.)



[One of the best remedies against worms is the *Absinthum* (wormwood) tincture, wine infusion, or essential oil. The tincture, made by adding one part of wormwood to eight of proof spirit, is powerfully tonic, stomachic, and anthelmintic, and may be given in doses of from one fluid scruple to two fluid drachms three times a day; or 2 parts wormwood to 50 of wine, digested and filtered, may be used in 2 or 3 drachm doses, several times a day. This is a very useful remedy as a corroborative and preventive, after the removal of worms. An excellent anthelmintic may be prepared after the following formula:  $\mathcal{R}$  Seeds of artemisia, extr. of tansy, each six grains; oxyde of iron, four grains; oil of valerian, one drop. *M.* The following, though disagreeable, is very efficient:  $\mathcal{R}$  Black oxyde of iron, 3ss.; asafetida, 3jss.; oil of tansy, gtt. x.; extr. of wormwood, q. s. *M.* Divide into 90 pills; six three times a day. The *chénopodium* is a safe and effectual vermifuge, used after the following formula:  $\mathcal{R}$  Fresh leaves, 5j.; new milk, Oj.; orange peel, 3ij. Boil and strain. Dose, a wine-glassful twice a day.— $\mathcal{R}$  Oil of worm-seed, 3j.; sugar, gum Arabic, each 3jss.; mix, and add mint-water, 5jss. Dose, a tea-spoonful four times a day, for two or three days, to be followed by a purge. In cases of lumbrici, the following will be found very successful:  $\mathcal{R}$  Cowhage, 3j.; sirup, 5ss.; mix. A tea-spoonful every morning, fasting, for three days, to be followed by oil; or,  $\mathcal{R}$  Cowhage, 3j.; honey, sufficient to make electuary, given as above. The following vermifuge emulsion is a pleasant and successful remedy for lumbrici:  $\mathcal{R}$  Castor-oil, mucilage of gum Arabic, each, 5j.; sirup of Corsica moss, water of lemon, contra-chamomile, each, f. 5ij.; emulsion of sweet almonds, f. 5viij. Mix. For tape-worm, a mixture of one ounce of castor-oil and two drachms of sulph. ether, in doses of a spoonful every two hours, is very efficient. Of the *spigelia* (pink-root) the following formulæ will be found useful:  $\mathcal{R}$  Powdered pink-root, grs. x.; calomel, grs. iv. *Mix.* Take morning and evening, and, after four doses, a cathartic of castor-oil.— $\mathcal{R}$  Powdered pink-root, senna, each, 5ij.; savin, grs. xij. *M.* One every morning for three days, followed by a purgative.— $\mathcal{R}$  Pink-root, 5ss.; boiling water, Oj.; macerate for two hours in a covered vessel, and strain. 4 fl. drachms to one fl. 5, to children; 4 to 8 f. 5 to adults, morning and evening, followed by a purgative.— $\mathcal{R}$  Pink-root, 5ss.; senna, 3ij.; manna, 5j.; fennel-seed, 3ij.—5ss.; boiling water, Oj. Infuse. Half a wine-glassful to a child two years old, 3 times a day.— $\mathcal{R}$  Pink-root, 5j.; bruised rhubarb, 3j.; senna, 3ij.; semen contra, 3j.; manna, 3ij.; coriander, 3ss.; boiling water, Oj. Infuse. A small tea-cupful 3 times a day. Besides these, the simple fluid extract of pink-root, prepared by displacement, and the compound fluid extract, prepared in the same manner from pink, senna, savin, manna, sugar, alcohol, and water, will be found extremely convenient and efficacious in tea-spoonful doses 3 times a day, to young children, followed by oil. TILDEN'S fluid extract of pink and senna is a very successful preparation.

For ascarides, one of the most successful remedies is an *infusion of tansy*, as an injection, in the proportion of one ounce of the fresh leaves to one pint of boiling water. The *oil of tansy* is very effectual against the lumbricoid worm also, as in the following formula:  $\mathcal{R}$  Oil of tansy, one scruple; extract of gentian, two drachms; pow-

dered marsh-mallows, sufficient. Mix, and make 60 pills; 3 to 5 every two hours. The following is equally efficient:  $\mathcal{R}$  Tansy, 5j.; wormwood, rhubarb, each, 5ij.; sherry wine, f. 5ij.; diluted alcohol, fl. 5xx. Digest for eight days, and filter. Dose, f. 5j.—f. 5ij., 2 or 3 times a day. Also, the extract of tansy in doses of from 6 to 20 grs. three times a day.

Of the *purgative* anthelmintics, the following are some of the best:  $\mathcal{R}$  Powdered gamboge, grs. ij.; sulphate of iron, grs. vj.; sugar, 5j.; oil of peppermint, gtt. iij. Mix. To be taken twice a day against tape and lumbricoid worms.— $\mathcal{R}$  Calomel, grs. iij.; compound powder of scammony, grs. xii. For a dose for lumbrici.— $\mathcal{R}$  Calomel, grs. iv.; powdered pink-root, grs. x. To be taken two mornings in succession, also on afternoon of second day, followed by a mild purgative, for children over 4 years of age. As a fortifying tincture to prevent the recurrence of worms, equal parts of the muriated tincture of iron and tincture of aloes, in doses of 20 drops three times a day, will prove very effectual; or powdered sulphate of iron and aloes may be used in small doses.]

220. iv. AFTER-TREATMENT OF WORMS.—It is often requisite, after the expulsion of intestinal worms has been effected, 1st. To soothe the irritation, and to subdue the inflammatory action produced in the digestive mucous membrane by the vermifuges and drastic purges which had been prescribed. 2d. To remove any stray worms which had become so sickened, or so injured by the treatment, as to be readily thrown off by means which would restore the vital tone of the bowels and farther injure the worms, and render their residence disagreeable or untenable. And, 3d. To prevent the regeneration of these parasites by removing their ova and rendering the digestive mucous surface ungenial to their development. (a) The first of these intentions is best accomplished by emollients and demulcents with small doses of nitrate of potash, of hydrocyanic acid, and sirup of poppies, &c. When sickness is troublesome, and no inflammatory action is present, a pill with half a drop of creasote may be given with each dose of the above, or may be taken in the intervals between each. The diet should be spare, light, and digestible, and the bowels assisted by gentle laxatives, such as magnesia, with or without confection of senna, and by suitable enemata, especially by such as contain castor or olive oil, with oil of turpentine when the irritation is chiefly experienced in the stomach and upper portions of the intestinal canal; at the same time, the warm bath or terebinthinate embrocations, or a recourse to these latter upon leaving the bath, will be found of much service. The drink of the patient should be demulcent, and in small quantity, thirst in these cases being most relieved by sucking small morsels of ice.

221. (b) The second intention presupposes either the non-existence or the removal of those conditions against which the first intention was directed, and consists in the occasional exhibition of a moderate or less irritating dose or doses of the anthelmintic suitable to the expulsion of the worm found to be present, and the combination of it with such other means as the peculiar features of the case will suggest; a recourse to vermifuge clysters, especially to those already suggested, or those advised above (§ 194). being had after the internal remedies had been taken.

222. (c) The third intention is of no small im-

portance, if the permanent cure of the patient be considered. For the original conformation, or the depression of vital power, of the patient; or the irritability and exhaustion of the digestive canal may be so great, in consequence both of the existence of these parasites and of the means taken to expel them, that a tonic and restorative treatment becomes imperative in order to prevent various unpleasant contingencies. Besides, in many instances, anæmia has become so considerable as to require a treatment directed more or less to it, and to the other morbid tendencies. In these circumstances not only should due care be directed to the prevention of intestinal worms, but recourse should be had to those medicines which are calculated to restore the vital tone of the digestive organs, to improve the state of the secretions and excretions of the body generally, but of the intestines in particular, to promote the functions and actions of the bowels, and to render the human intestinal canal an unsuitable and an uncongenial habitation for the ova of worms and for their development. These are objects which should always be entertained after the expulsion of worms of whatever species, and should be attempted by such means as are most likely to accomplish them. It may be asked, however, where are we to find, how are we to combine these means, and how are we to prevail on the patient to persevere in their use, or even to have recourse to them when he believes himself free from his enemy? I cannot say that there are no other means calculated to attain these objects, but I may enumerate\* those which I have employed with these views, combining them variously, and exhibiting them in such successions, intervals, &c., and as the circumstances of particular cases appeared to require. The medicines which I have thus employed are the preparations of iron, asafetida, of cinchona and quina, of myrrh, camphor, aloes, infusions of willow, cascarrilla, and cedar bark, berberine, &c. The compound mixture of iron may be given with the decoction or tincture of aloes, &c.; or the sulphate of iron may be prescribed with sulphate of quina, compound galbanum pill, and with the aloes and myrrh pill. Camphor may be conjoined with these latter substances (§ 198) singly or in the combination now stated. The sulphate of quina may be given with dilute sulphuric acid, and sulphuric ether. The infusions of the barks may be taken with tonic and laxative tinctures, or with the mineral acids, &c., and laxative electuaries may be conjoined with sulphur, or antispasmodics, aromatics, or spices.

223. It is obvious that the diet of patients who have suffered from worms should be nutritious, digestible, and restorative; while it ought not to be too rich or full, or calculated to produce general plethora or local congestions, as of the liver, &c. The regimen ought to be regulated so that suf-

ficient exercise may be taken in the open air, and that all causes of debility and exhaustion should be avoided. The remarks already offered for the prevention of the human entozoa (§ 157, *et seq.*) are equally necessary to the prevention of their return after their expulsion.

BIBLIOG. AND REFER. — *Celsus*, l. iv., c. 17. (*Absinthium and Garlic recommended by*). — *Coriolus Aurelianus*, Morb. Chron., l. iv., c. 8. (*Ox-gall for*). — *Avicenna*, Canon., l. iii., fen. 16, tr. 5, cap. 1. — *M. Savonarola*, Practica Canonica: de Vermibus, &c., fol. Venet., 1408. — *H. Brilli*, De Vermibus in Corpore Humano, Svo. Venet., 1540. — *H. Gabucini*, De Lumbricis Alvi occupantibus Commentarius, Svo. Venet., 1547. — *T. Alexander*, I pistola de Lumbricis: interprete Mercuriali, 4to. Venet., 1570. — *E. Camptolonus*, De Vermibus, de Uteri Affectibus, &c., 4to. Paris, 1634. — *F. Salandi*, Trattato sopra li Vermii, 4to. Verona, 1667. — *W. Ramsey*, Εγκυκλοπαια, or some Physical considerations of Wormes uncrating and direfully cruciating the Bodies of Mankind, &c., 12mo. London, 1668. — *C. F. Paulini*, Disquisitio: An Mors Naturalis plerumque sit Substantia Verminosa? Svo. Franc., 1671. — *G. H. Velschius*, De Vena Medinensi sive de Dracunculis, &c., 4to. Ang. Vind., 1674. — *F. Redi*, Osservazioni intorno agli Animalii Viventi che si trovano negli Animalii Viventi, Svo. Napoli, 1687. — *J. Jung*, Historia Vermium. Hamburg, 1691. — *N. Andry*, De la Génération des Vers dans le Corps de l'Homme, &c., 12mo. Paris, 1700 (3d edition, 2 vols. Svo, 1741). — *J. B. Contuli*, Osservazioni sulle Ascaridi, 4to. Rom., 1704. — *F. Redi*, Observaciones de Animalculis Vivis quæ in Corporibus Animalium Vivorum reponuntur, 12mo. Harder., 1708. — *A. Vallisnerii*, Osservazioni intorno alla Generazione Vermii, 4to. Pad., 1710. — *A. Vallisnerii*, Nuove Osservazioni intorno all' Ova de' Vermii, 4to. Padova, 1713. — *D. Clericus*, Historia Latorum Lumbricorum intra Hominem, &c., 4to. Genev., 1715. — *D. Le Clerc*, a Natural and Medicinal History of Worms (transl.), Svo. Lond., 1721. — *J. Sulzmann*, De Vermis Naribus exussio: in Hall. Diss. ad M. i., 4to. Argent., 1721. — *Brückmann*, Epistola de Excretionis Vermis nunquam ante excreti, Svo. Wolfenb., 1723. — *G. de Gols*, a Theologico-philosophical Dissertation concerning Worms, Svo. London, 1727. — *S. Coulet*, Historia de Ascaridibus et Lumbrico lato, Svo. Lugd. Bat., 1729. — *H. A. Fabricius*, De Ascaridibus et Lumbricis latis, 4to. Duisb., 1733. — *F. Hoffmann*, De Animalibus Humanorum Corporum infestis Hospitiis (Opp. Supp. II.), 4to. Hal. Gen., 1740. — *G. Dubois*, Tænia (Linn. Amœn. Acad. II.), Svo. Upsal, 1743. — *C. G. Kratzenstein*, Abhandlung von der Erzeugung der Würmer, Svo. Halle, 1748. — *J. P. Bianchini*, Lettere intorno all' Indole delle Febbri, colla Storia de' Vermii del Corpo, &c., 12mo. Venez., 1759. — *J. Burserius*, De Anthelmintica Argentii Viti Facultate, 4to. Faventini, 1753. — *T. Nicholls*, of Worms in Animal Bodies, Phil. Trans., in London, 1755. — *A. Cocchi*, Discorso de' Vermii Cucurbituli dell' Uomo, Svo. Pisa, 1753. — *P. S. Pallas*, De Infestis Viventibus intra Viventia, Sandif. Thes. I., 4to. Roterd., 1760. — *J. F. Patner*, De Vermibus Intestinorum, Smellie Thes. III., Svo. Edin., 1766. — *S. S. Beddies*, De Vermis Tænia, Svo. Vlen., 1767. — *W. Heberden*, Observations on the Ascarides, Med. Trans. I., Svo. Lond., 1768. — *J. J. Van den Bosch*, Historia Constitutionis Vermineos Ann. 1760-63, Svo. Lugd. Bat., 1769. — *J. J. Boonwerts*, De Vermibus crebrioribus Intestinorum Incolis, Diss. Lovan. I., Svo. Lov., 1770. — *S. Vorstot*, Specimen Annotationum Helminthologica-rum, Francoq., 1772. — *G. Van Doveren*, Abhandlung von den Würmern in den Gedärmen des Menschlichen Körpers, Svo. Leipzig, 1776. — *Anon.*, an Account of the Tænia, and Method of Treating it at Morat, transl. from the French by Dr. S. F. Simmons, Svo. Lond., 1777. — *N. Hulme*, Safe and Easy Remedy for Stone, &c., and for the Destruction of Worms in the Human Body, 4to. Lond., 1778. — *C. Perceboom*, Descriptio Novi Generis Vermium in Corpore Humano Hospitantium, Svo. Amstel., 1780. — *M. v. Plessum*, Naturgeschichte der Springwürmer (2 vols.), Svo. Gotha, 1781. — *D. M. E. Bloch*, Abhandlung von der Erzeugung der Eingeweidewürmer, 4to. Berlin, 1782. — *Rosenblad*, Animadversiones Physicæ de Tænia, 4to. Lundin., 1782. — *P. C. F. Werner*, Vermium Intestinalium Brevis Expositio, Svo. Lips., 1782. — *P. C. F. Werner*, Continuatio Vermium Intestinalium Brevis Expositio, Svo. Lips., 1782. — *P. Chabert*, Traité des Maladies Vermineuses dans les Animaux, Svo. Paris, 1783. — *J. Cusson*, Remarques Pratiques sur le Tænia, Svo. Montp., 1783. — *Roderer and Wagner*, Tractatus de Morbo Mucoso, de Trichuridibus, &c., Svo. Gott., 1783. — *W. Chamberlaine*, a Practical Treatise on Coughs in Worms, Svo. London, 1785. — *J. G. C. Eutsch*, Naturgeschichte der Bandwurm-gattung, Svo. Hal., 1786. — *J. A. E. Goetze*, Versuch einer Naturgeschichte der Eingeweidewürmer, Svo. Halle, 1786.

\* I may here state that the pharmacopœia of the United Kingdoms are very deficient in vermifuge remedies, and in formulae for the preparation and combination of them—a remark by no means applicable to the pharmacopœia of most Continental countries. But verminous diseases are much more prevalent on the Continent than in the British Isles, in which, however, I am confident that their prevalence has hitherto been much underrated, and their importance undervalued. The very general and noxious vice of smoking tobacco, and of otherwise using this poison—so much extended in recent times—has rendered, and will still more render, verminous diseases more prevalent, by weakening the digestive organs, and disposing them to the generation and development of the ova of worms.



weidwürmer, 4to. Lips., 1787.—*D. M. E. Bloch*, Traité de la Generation des Vers des Intest., &c., 8vo. Strassb., 1788.—*J. P. S. Ponsériz*, Epistola Lumbricorum Teretium, &c., non esse Corpori Immorta, 8vo. Viteb., 1788.—*Chabert*, Journ. de Med. Contin., t. ixii., p. 321. (*Recommends the Oil known by his name.*)—*Luchaire*, in Act. Reg. Med. Hann., vol. ii., p. 496. (*Advises Clysters of infus. of Tolacco—a dangerous practice.*)—*A. J. Retzius*, De Vermibus Intestinalibus, Frank. del. Op. IX., 4to. Stockholm, 1788.—*J. Church*, on Ascaris lumbricoides, Mem. Med. Soc. Lond. II., 8vo. London, 1789.—*F. A. Trendelenburg*, Observations Pathologico-anatomiques d'Ascariacum ad Helminthologiam Humani Corporis continens, 4to. Lips., 1793.—*A. Carlsie*, on the Structure and Economy of Tenie (Linn. Trans. II.) Lond., 1794.—*J. Longfeldt*, Beschreibung der Bandwürmer und deren Heilmittel, 8vo. Wien, 1794.—*R. Hooper*, on Intestinal Worms, Mem. Med. Soc. Lond., vol. v., 8vo. Lond., 1799.—*J. A. E. Goetze*, Erster Nachtrag zur Naturgeschichte der Eingeweidwürmer von J. G. H. Zeder, Svo. Leipz., 1800.—*F. L. Brera*, Lezioni su i Principali Vermii del Corpo Umano, 4to. Crema, 1801.—*J. H. Joerdens*, Entomologie und Helminthologie des Menschlichen Körpers (2 vols.), 4to. Hof., 1801—2.—*C. Sultz*, Dissertation sur un Ver Intestinal nouvellement découvert, 4to. Strassb., 1801.—*J. G. Steinbuch*, Commentatio de Tænia Hydatigena Anomala, Svo. Erlang., 1802.—*J. G. H. Zeder*, Anleitung zur Naturgeschichte der Eingeweidwürmer, 8vo. Hamb., 1803.—*F. L. Brera*, Traité des Maladies Vermineuses (transl.), 8vo. Paris, 1804.—*M. Bailly*, Series of Engravings, &c., fasc. iv., t. 9.—*C. F. Calvet*, Mamel pour le Traitement des Maladies Vermineuses, 8vo. Avign., 1805.—*J. B. Vigné*, Essai sur les Affections Vermineuses, Svo. Paris, 1805.—*F. L. Brera*, Memoria per servire di Supplemento alle Lezioni su i Vermii, fol. Crema, 1805.—*C. A. Rudolphi*, Entozoonum sive Vermium Intestinalium Historia Naturalis (3 vols.), 8vo. Amst., 1810.—*G. D. Zamponi*, Dissertazione intorno al Nascimento de' Vermii, 8vo. Rimini, 1810.—*Anon.*, Notitia Collectionis Insignis Vermium Intestinalium in Museo Historia Naturalis Viennensis, 4to. Vienna, 1811.—*F. L. Brera*, Memoria Medico-medice sopra i Principali Vermii del Corpo Umano Viventi, 4to. Crema, 1811.—*J. Reinlein*, Animadversiones circa Ortum, &c., Tenie latæ, 8vo. Wien, 1811.—*M. Friedlander*, Fœtus Historique sur les Ouvrages relatifs aux Vers, Bull. de la Fac. de Med., Svo. Paris, 1812.—*T. Bradley*, Treat. on Worms, 12mo. London, 1813.—*W. Lawrence*, in Med. Chirurg. Trans., vol. ii., p. 382.—*J. Elliotson*, in Ibid., vol. xlii., p. 51.—*G. Breschet*, in Ibid., vol. xlii., p. 53.—*J. R. Fenwick*, in Ibid., vol. ii., p. 24.—*T. B. Curling*, in Ibid., vol. xlii., p. 274.—*F. A. Brera*, Tabula ad Illustrandum Historiam Vermium, &c., 4to. Vien., 1818.—*G. A. Hergesell*, De Morbis Verminosus Intestinalibus, 4to. Lips., 1818.—*J. G. Bremser*, Ueber Lebende Würmer in Lebenden Menschen, 4to. Wien, 1819.—*C. A. Rudolphi*, Entozoonum Synopsis, 8vo. Berol., 1819.—*A. Straiwkowski*, Abhandlung über die Würmer in Menschen, Svo. Wien, 1819.—*G. Montesanto*, Analisi delle opere su i Vermii da Bremser e Rudolphi, 8vo. Padova, 1820.—*Merat*, Diet. des Sc. Méd., art. Vers, t. lvi. Par., 1821.—*J. P. Frank*, De Curandis Hom. Morbis, &c., l. vi., pars iii., De Retentionibus, 8vo. Vien., 1821, p. 180.—*J. Copland*, London Med. and Phys. Journ. for 1821, and London Med. Repos. for 1822.—*J. G. Bremser*, Icones Helminthum Systema Rudolphi Illustrantes, fol. Vien., 1822.—*J. G. Bremser*, Traité sur les Vers Intestinaux; augmenté de Notes par Blainville (transl.), 8vo and 4to. Paris, 1821.—*J. Cloquet*, Anatomie des Vers Intestinaux, 4to. Par., 1824.—*Barry*, in Transact. of Irish Coll. of Phys., vol. ii., p. 383. (*On the Generation of.*)—*Günther*, Rev. Méd., t. iv., 1825, p. 479. (*On the Diagnosis of.*)—*Pontancilles*, in Ibid., t. iii., 1825, p. 404.—*N. Ramsey*, in Trans. of Med. and Chirurg. Soc., t. ix., p. 389.—*Young*, in Glasgow Med. Journ., vol. i., p. 388. (*Asc. lumb. per ulcus abdom. evacuati.*)—Ibid., vol. ii., p. 186.—*H. Cloquet*, in Nouv. Journ. de Méd., t. xv., p. 350. (*On Anthelmintics for.*)—*Larini*, in Archives Génér. de Med., Mars, 1823; et Philad. Med. Journ., vol. vi., p. 412. (*Advises the Crithmum maritimum—samphire—for.*)—*Journ.* de Progrès des Sciences Méd., t. xv., p. 265.—*F. L. Brera*, Treatise on Vermineous Diseases, transl. by Coffin, 8vo. Boston, 1827.—*Guersent*, Diet. de Méd., art. Vers, t. xxi. Paris, 1828.—*T. G. Van Lidth de Jeude*, Recueil de Figures des Vers Intestinaux, fol. Leide, 1829.—*W. Rhind*, a Treatise on the Nature and Cure of Intestinal Worms, 8vo. Edin., 1829.—*Jay*, Cyc. of Pract. Med., art. Worms, vol. iv. Lond., 1835.—*Bryant*, Lancet, Jan. 20, 1838.—*Bellingham*, Dublin Journ. of Med. Sciences, vol. xli., p. 841.—*M. Felix Dujardin*, Histoire Naturelle des Helminthes ou Vers Intestinaux, 8vo. Par., 1845, Planches.—*F. Kichenmeister*, Ueber Clotiden im Allgemeinen, und die des Menschen insbesondere, &c., 8vo. Zittau, 1853.—Diein und an dem Körper des Lebenden Menschen vorkommenden Parasiten. Ein Lehr- und Handbuch der

Diagnose und Behandlung der Thierischen und Pflanzlichen Parasiten des Menschen, 8vo. Leipzig, 1855.—*A. Kramer*, 1 fragmentarische Notizen und Abbildungen zur Helminthologie und Parasitenlehre, in "Illustrirte Medizinische Zeitung," Band iii., Heft 6. Mit 2 Tafeln.—*T. H. Barker*, on Cystic Entozoa in the Human Kidney, with an illustrative case, 8vo. London.—*Histow* and *Ilaney*, on the Trichina spiralis. "Transactions of the Pathological Society of London," vol. v., Session 1853—4.—*H. G. Carter*, Note on Dracunculæ in the Island of Bombay. "Transactions of the Medical and Physical Society of Bombay," No. 2. New Series. Years 1853—4.—*G. Bush*, Observations on the Structure and Nature of the Filaria Medinis, or Guinea Worm. "Transactions of the Microscopical Society," vol. ii., p. 65, et seq.—*C. J. von Siebold*, Ueber die Band- und Linsenwürmer, nebst einer Einleitung über die Entstehung der Linsen- und Bandwürmer, 8vo. Leipzig, 1854.—*R. Leuckart*, Die Linsenbandwürmer und ihre Entwicklung, zugleich ein Beitrag zur Kenntnis der Cysticerenleiste, &c., 4to. Giessen, 1856.—*Huxley*, on the Development of Echinococcus Veterinarius, in Proceedings of Zoological Society of London, Dec. 14, 1852.—*H. Jenner*, on Tape-worm and its Treatment by the Oil of Male Fern, in Association Medical Journal, Aug. 23, 1856, p. 719.—*T. Simpson*, in Ibid., Aug. 30, 1856, p. 734.—*E. Lankester*, Animal and Vegetable Parasites of the Human Body: a Manual of their Natural History, Diagnosis, and Treatment, transl. from the second German edition of *F. Kichenmeister's* work, vol. i.; Animal Parasites belonging to the Group Entozoa, with Plates, 8vo. Lond., 1857.

AMER. BIBLIOG. AND REFER.—*A. Lrigham*, Worms in the Urinary Bladder, simulating stone in that organ, Am. Journal of Medical Sciences, vol. xx, N.S., p. 59. (See similar case in Med.-Chirurg. Transact., vol. ii., by *Wm. Lawrence.*)—*Harvey Campbell*, Case of Worms in the Urinary Bladder, Amer. Journal of Medical Sciences, vol. xxi, N.S., p. 131.—Ibid., Ictherial Tinct. of Male Fern buds in cases of Intestinal Worms, by *Dr. Pesciari*, in doses of 8 to 30 drops in pills, followed by ol. ricini.—Ibid., Symptoms of acute Henuria caused by Worms, vol. ix, N.S., p. 200.—Ibid., vol. viii, N.S., p. 473, Case of Deafness and Dumbness cured by discharge of Worms in a child nine years of age.—Ibid., vol. vi, N.S., p. 181, Worms in the Blood of a Dog, by *M. M. Grady* and *L. Lafond*.—Ibid., vol. xvi, O.S.—*W. Stokes*, on Worms, p. 198, 201, 202, 203, 204, 206, 217.—*John Walker*, Amer. Medical Recorder, vol. vii, p. 433, Case of a Boy eleven years of age, who discharged over 2000 lumbricoid worms in a few days under the use of the oil of turpentine.—*Edmund Porter*, Account of a number of Worms found in the Kidneys of a Dog, Ibid., vol. vi, p. 151.—*Henry Wolf*, Ibid., vol. ix, p. 415, Root of Pomegranate-tree in cases of Tænia.—*Dr. Brochus*, on Cedar Apple as a Vermifuge, Phil. Jour. of Med. and Phys. Science, May, 1827.—*J. W. Nichols*, Worm discharged from the Lungs, Am. Med. Recorder, vol. xii, p. 450.—Ibid., vol. xi, p. 479, Case in which a number of living Worms were voided from a Child's Bladder.—*Robley Dunglison*, Commentaries on Dis. of the Stomach and Bowels of Children; also Practice of Med., 2 vols.—*D. Chiaye*, on Existence of Worms in the Human Blood (*Polysoma Sanguinea*), Eclectic Journal of Med., edited by John Bell, vol. ii, p. 328.—*C. L. Seeger*, on Anthelmintics, Boston Med. and Surg. Journal, vol. xxv, p. 57.—*J. T. Bradford*, Singular Case of Worms, Ibid., vol. xxviii, p. 300.—*E. G. Wheeler*, Worms in the Lungs of a swine, Ibid., vol. xxiii, p. 304.—*C. G. Poncey*, Escape of Worms at the Navel, Ibid., vol. xxi, p. 175.—Ibid., vol. xx, p. 307, Stuttering occasioned by Worms.—*Levis Emmons*, Case of Hæmaturia in a Woman's Breast, Ibid., vol. xxvii, p. 35. (150 worms, from three to four inches in length, "with sharp-pointed heads and tails.")—Case of Trichina Spiralis in the Human Body, Ibid., vol. xxvii, p. 241, 320.—*P. Spalding*, Case of Worms, Ibid., vol. xix, p. 801. (A lady treated for several years for dyspepsia, liver complaint, spinal irritation, and leucorrhœa, cured by the discharge of over 200 lumbrici after taking ol. tereb., followed by calomel and jalap, and Carolina pink.)—*Dr. Cunningham*, Tape-worm expelled by Tobacco and Anise-seed, followed by ol. ricini.—*C. Spencer*, Singular Case of Worms, Ibid., vol. xiv, p. 58.—*Fr. Garbett*, on Melia Azedarach as an Anthelmintic, Ibid., vol. viii, p. 119.—On the Effects of Male Fern Buds in cases of Worms, Ibid., vol. xiii, p. 165.—*B. N. Brown*, Case of Worms, in which 652 lumbrici were discharged in one week under the use of calomel, scammony, jalap, epigella, and senna in large quantities, Ibid., vol. ii, p. 583.—*E. Schilling*, Case of Cysticercus cellulosa, with Remarks, New York Journ. of Medicine, March, 1857, vol. ii, N.S., p. 194. (This was a case of a female aged thirty-one years, who was affected with epilepsy, severe headaches, and stupidity, who died suddenly during an epileptic seizure. Autopsical examination revealed several hundred cysticerci adherent to the inner surface of the dura mater and the surface of the

brain itself, of the size of a pea, suspended by a pedicle from the membrane, or lying free upon and between the cerebral convolutions, and even the substance of the brain and choroid plexus. Five were found in the muscles of the heart; several were found in the gluteal and deltoid muscles. No traces of tæniæ were found in the intestines. Dr. S. relates also the history of another case, a German emigrant, who was seized with dizziness and headache, followed by fatal hemiplegia. The autopsy revealed a cerebral abscess, in which was found a shriveled-up *cysticercus cellulosæ*.—H. Bigelow, Case of Worm discharged from an Abscess, *ibid.*, vol. xxxiii., p. 486; *ibid.*, vol. iv., p. 179, 194, on the Production of Intestinal Worms, by the Editor; also vol. vii., p. 291. See Stewart, Meigs, Condie, Dawes, and Churchill, on Dis. of Children; also Wood, Dickson, Dewees, Eberle, Hosack, Dunlison, and other Amer. Treatises on the Practice of Medicine; also American Trans. of Hufeland's Enchiridion Medicum.—Charles A. Lee, an Account of a Filaria in a Horse's Eye, *Sillman's Journal of the Natural Sciences*, 1840; also N. York Journal of Med., vol. iii., p. 237. (This filaria was about three inches long, of a white thread-like appearance, with a larger extremity, which was probably the head. It occupied the anterior chamber of the eye, was constantly in motion, revolving upon itself, and twisting into every possible shape. The eye was not materially affected, though the lower portion of the aqueous humour was a little cloudy, perhaps owing to excrementitious deposit. The eye afterward became opaque, and the vision was lost.)—Benjamin Rush, Medical Inquiries and Observations, &c., Worms and Anthelmintic Medicines, 8vo, 2 vols.—G. Hopkinson, Account of a Worm in a Horse's Eye, *Trans. Amer. Phil. Society*, vol. xi.—John Morgan, of a living Snake in a living Horse's Eye, and of other unusual Productions of Animals.—Cloquet, *Arch. Gen.*,

Dec., 1827.—Larvæ of the common fly in the eye of a man, the eggs deposited during sleep, afterward hatched out, with a total loss of vision, *Lond. Med. Gazette*, Aug., 1833.—Case of *Cysticercus cellulosæ* in the human Eye, *Ed. Med. and Surg. Journal*, Jan., 1826.—Filaria in the Eyes of Horses in the East, *Bulletin des Sciences Medicales*, Feb., 1826.]

YAWS. See VENEREAL DISEASES (§ 85, *et seq.*).

ZYMOTIC DISEASES.—Ζυμωτικός, causing to ferment; ζύμωσις, a fermentation; ήπατος ζύμωσις, a swelling of the liver, HIPPOCRATES. The term *Zymotic* has recently been applied by Dr. FARR to epidemic, endemic, infectious, and contagious diseases, and has comprised small-pox, measles, scarlatina, hooping-cough, croup, thrush, diarrhœa, dysentery, cholera, influenza, ague, remittent fever, typhus, erysipelas, syphilis, hydrophobia. Viewing the Greek term to mean a leaven by which the organic nervous system, or the vascular system and blood, may be infected or contaminated either successively or contemporaneously, or nearly so, the term well designates an extensive class of diseases, although its application implies a hypothesis; but it is well suited to the arrangement adopted by Dr. FARR in his admirable Annual Reports of Deaths, &c., in England (which see).





## SUPPLEMENT.

SUPRA-RENAL BODIES. — SYNON. — *Glandulæ ad Plexum, Glandulæ ad Plexum Nervium*, T. WHARTON. *Glandulæ supra-renales, Renes Succenturiati*, Auct. *Supra-renal glands, Supra-renal capsules, &c.*

1. I. STRUCTURE AND FUNCTIONS.—In the present state of our knowledge the name "*supra-renal bodies*," or that adopted by WHARTON, appears more correct than supra-renal glands, the functions of glands not having been proved in respect of them; and the term capsules is equally inapplicable, even to their more external structure. Succenturiati, or reserved kidneys or bodies, are not less appropriate. The earliest notice of the connexions and nature of these bodies appears to have been taken by WHARTON, who pointed out their relations to the ganglial nerves, as remarked by Dr. GULL. Nevertheless the functions and diseases of these bodies received no attention from physiologists and pathologists (although in several instances organic lesions observed in them had been published in the *Ephemerides Naturæ Curiosorum*, and more recently by VETTER and BAILLIE) until very lately, when the structure and functions of these bodies were remarked upon by NAGEL, BERGMANN, ECKER, KÖLLIKER, LEYDIG, and GREY; and their diseases, especially in connexion with a bronzed discoloration of the skin, were first investigated by Dr. ADDISON, and subsequently by Mr. HUTCHINSON and others. It is chiefly, however, to Dr. ADDISON that the distinction of having first directed attention to these lesions is due. Although several cases have been recently observed and recorded—not always, however, with due care and precision—still the number of those in which a bronzed state of skin appeared more or less intimately connected with, and most probably caused by, disease of these bodies, is so great as to induce a presumption that where the former appearance exists the latter lesion will be found. In order, however, to form correct views as to the phenomena by which diseases of the supra-bodies are indicated, as well as to the nature and consequences of such disease, it becomes requisite that we should previously briefly inquire into what is known of the structure and functions of these bodies. Unfortunately opinions on these topics have been, and, notwithstanding the frequency of microscopic research in modern times respecting them, still continue to be, very unsatisfactory. Dr. WHARTON, about the middle of the 17th century, first noticed their connexions with the ganglia of the solar plexus, and suggested a name for them, which appears more appropriate than any other which has more recently been given them.

2. I. STRUCTURE.—KÖLLIKER has very recently described the microscopic appearances of these bodies, and noticed what appears to be their func-

tions, and Dr. HARLEY has still more recently examined their structure.—A. The *cortical structure* of these bodies is described by the latter observer as consisting of cells, arranged in irregularly-sized rows, in a fibro-areolar matrix, the rows of cells appearing like a number of dark-yellow columns placed perpendicularly to the surface. The cells, when examined individually, seem to be composed of a homogeneous cell-wall, filled with granules, pigment, and some fat globules. Each cell has a well-marked nucleus, although not always visible. The cells are arranged in a number of larger and smaller masses, which are placed in regular rows, and thus give rise to the columnar appearance. In some cases a column is composed of several cell-masses of different lengths, placed end to end; in others it consists almost entirely of one long cell-mass. Each column, as well as each cell-mass, is separated from the others by delicate fibrous tissue, in which are included the vessels and nerves. Sometimes the cell-masses present the appearance of long tubes, enclosing a single straight row of quadrilateral cells. Each cell-mass is closed at the extremities, and is surrounded by a delicate homogeneous membrane.

3. B. The *medullary substance*, according to KÖLLIKER, also has a *stroma* of connective tissue, which, prolonged from the cortical lamellæ, pervades the whole interior, for the most part, in more delicate fasciculi, constituting a net-work with narrow, rounded meshes. In this net-work lies a pale, fine-granular substance in which, in man, and in recent preparations, pale cells of 0.008 to 0.16" are generally observed. These pale cells occasionally present, in their fine-granular contents, a few fat or pigment granules; their frequently very distinct *nucleus* with large *nucleoli*, their angular form, and occasionally their single or multiple, or even branched processes, resembling the nerve-cells of the central organs, although they cannot definitively be declared to be such. Dr. HARLEY states that the dark slate-coloured medullary substance is composed of a net-work of fibres, in the meshes of which are a number of large nucleated cells, which have been described by various writers as ganglion corpuscles; but he thinks that these, like the cells in the cortical substance, are true secreting cells. This great difference of opinion (so frequently observed among microscopists)—the same nucleated cells being considered as ganglial corpuscles by some observers, and as true secreting cells by others—prevents, in the present state of our knowledge, much reliance to be placed upon the results of microscopic researches, each successive observer being liable to the distrust which attaches itself to his predecessors. However, the following is less liable to objection:

4. C. The *nerves* of the supra-renal bodies are, according to BERGMANN and KÖLLIKER, extreme-



ly numerous; arising, according to them, from the semilunar ganglion and renal plexus, and to a small extent from the vagus and phrenic nerves; but most probably intercommunicating with, rather than arising from, the latter. In man, KÖLLIKER counted in the right supra-renal body thirty-three trunks, eight of which were 1.5 to 1.10''; five of 1.14 to 1.20''; seven of 1.25 to 1.33''; and thirteen of 1.45 to 1.50''; and found that without exception, or at all events in a very preponderating proportion, they were constituted of dark bordered, finer and medium-sized, or even thick fibres; were whitish or white, and furnished with isolated larger or smaller ganglia. They are especially apparent on the inferior half and inner border of the organ, and appear to be all destined for the medullary substance, in which, at least in the mammalia, an *extremely rich plexus* of dark-bordered, finer fibres occurs, enclosed in the *trabeculae* and connective tissue, their terminations, however, being nowhere perceptible.

5. ii. FUNCTIONS.—As regards the *functions* of the supra-renal glands, in the absence of all physiological indications, and so long as the course of the nerves in them is not more accurately known than at present, only very general observations can be offered. KÖLLIKER considers the *cortical and medullary substances as physiologically distinct*, and that the former may, provisionally, be placed with the so-termed "blood-vascular glands," and a relation to secretion assigned to it; while the latter, on account of its extremely abundant supply of nerves, must be regarded as an apparatus appertaining to the *nervous system*, in which the cellular elements and the nervous plexus either exert the same reciprocal action as they do in the gray nerve-substance, or stand in a relation as yet wholly unascertained towards each other.

6. According to LEVDIG, the *cortical substance* of the supra-renal capsules of the mammalia corresponds to the yellow, granular, and striped supra-renal bodies of fishes and amphibia; while the *medullary substance* of the mammalian organ, which is abundantly supplied with nerves and cells, very like the ganglion globules, represents the other divisions of the sympathetic ganglia: whence he concludes that BERGMANN'S view, according to which the supra-renal capsules are closely related to the nervous system, is undoubtedly correct, and that those organs bear the same relation to the ganglia of the sympathetic nerves as the pituitary body bears towards the brain. Besides this relation to the nervous system, however, they have an intimate one with the vascular; and are, therefore, always pervaded by a very close capillary plexus.

7. The functions of the supra-renal bodies have been *experimentally* investigated by BROWN-SÉQUARD, HARLEY, and others, but with different results. We know how uncertain these results are in the lower animals, and the amount of confidence which may be reposed in them, not only in those which were so frequently performed thirty and forty years since in order to determine the functions of distinct portions of the nervous system, but also in those more recently made with these and with other views. The former of the experimenters just named removed the supra-renal bodies from fifty-one rabbits, eleven adult cats and dogs, eleven young dogs and cats, eleven adult Guinea-pigs, four young Guinea-pigs, and two mice; and he states that the adult ani-

mals operated on died, on an average, in twelve hours, while the young or new-born animals lived thirty hours. From these experiments Dr. BROWN-SÉQUARD concludes that the supra-renal bodies are more necessary to life than even the kidneys; for animals will live two, or even three days, after the removal of the latter organs. Dr. HARLEY quotes from a later publication of Dr. BROWN, in which the latter states that, of ten rabbits from which he extirpated the supra-renal capsules, six died between the seventh and tenth hour, and four between the tenth and fourteenth hour after the operation, and adds, that the animals died too quickly to admit of their death being the result of peritonitis; and farther, that the extirpation of these capsules is followed by symptoms which do not occur after injuries of the peritoneum or liver, &c., these symptoms indicating that the supra-renal bodies have an important influence on the blood, and that their nerves have a singular power upon certain parts of the central nervous system. He states that this latter influence manifests itself very distinctly in some cases after the extirpation or the puncture of one of these bodies, the animals being sometimes seized a few minutes before death by vertigo and rolling over. Dr. BROWN-SÉQUARD concludes, 1st, "that if these organs are not essential to life, they are at least of very great importance. Secondly, that their functions appear to be at least as important as that of the kidneys, for when they are absent death in general supervenes more rapidly than after the removal of the kidneys." (*Archives Génér.*, 1857, p. 374.)

8. Dr. HARLEY has published experiments which furnish different results from those now stated; and from those he infers that "the supra-renal capsules are not absolutely essential to life;" that "the removal of the right is generally more fatal than the removal of the left capsule;" that "convulsions do not necessarily follow the removal of the capsules;" that, "when death follows upon the extirpation of the supra-renal bodies, it is in most cases in consequence of the injury done to the neighbouring tissues; perhaps more frequently the mutilation of the ganglionic system of nerves;" that "absence of the function of the supra-renal bodies is not proved to have any special effect in arresting the transformation of hæmatin or in increasing the formation of blood-crystals;" and that the suppression of the functions of these bodies is not attended by an increased deposit of pigment in the skin, or its appendages, in certain of the lower animals—the problem of the connexion of bronzed skin and supra-renal capsular disease being more likely to be solved in the dead-house than in the physiological laboratory.

9. Viewing the structure and connexions of the supra-renal bodies as altogether similar to those of the pituitary gland, and considering these organs as very intimately connected, anatomically and functionally, with the ganglia and ganglionic plexuses, I have been induced to view them as organs contributing or subsidiary to the organic nervous force or influence exerted by the ganglionic nervous system. Thirty-four years ago I published this opinion of the function of the pituitary gland in my *Physiological Notes*, &c. (in 1824), and stated that this gland reinforced the ganglionic nervous influence endowing the brain by means of the ganglionic nerves distributed to the cerebral organs—that it was a portion of the gan-

glial nervous system contributing to the nourishment and functions of the brain, *and imparting a unity of development, of permanent nutrition and of function, to the double organs composing the cerebral mass.* It appears very probable that similar offices are performed by the supra-renal bodies as regards the ganglia and ganglionic plexuses of the abdomen; these bodies contributing to the functions of the organic nervous or ganglionic system, as displayed by the abdominal organs—whether digestive, assimilative, or generative. That both the pituitary body and the supra-renal bodies perform these important functions—important not only as respects the performance of their respective functions, but also as regards the life of the individual—appears to be manifest from the nature and character of the nervous communications existing between them and other parts of the ganglionic nervous system; for, instead of describing these communications merely as branches of nerves detached from other ganglia or parts, it would be more correct, taking the size and appearance of these branches into consideration, to describe them as branches sent from the medullary structure of these bodies, to those ganglia, plexuses, and nervous trunks, in order to convey to these the special influences or functions of these bodies; or, otherwise, to reinforce and combine the influence exerted by these several ganglia and parts, with which they are anatomically connected. That these bodies are of the greatest vital as well as functional importance is evinced not only by the consequences following their structural lesions, and by the presumed nature of their functions, but also by the manner and the positions of their lodgments; both the pituitary and the supra-renal bodies being so located as to render them, in their respective situations, farther removed, and better protected from injury, and even from structural or other disease, than any other part of the animal organization.

10. II. STRUCTURAL DISEASE OF THE SUPRA-RENAL BODIES.—*Lesions of the Supra-renal Bodies, and their Associations, &c.*

CLASSIF.—IV. CLASS, I. ORDER (see Preface, &c.).

11. DEFINIT.—*General languor and debility, anæmia, feebleness of the heart's action, remarkable irritability of the stomach, frequent vomiting, and pain in the back and loins, often with a bronzed or dusky hue of the general surface, rapidly increasing exhaustion, emaciation, &c.*

12 Disease of the supra-renal bodies usually commences so gradually as not to admit of the patient's knowledge of the exact period at which he first began to experience loss of health or strength. It is almost always gradual in its early progress, although often rapid in its more advanced course. The slowness or rapidity of its progress must, in the present state of our knowledge, be attributed to the nature and extent of the organic lesion, to the circumstance of one or both bodies being affected, and to the nature and severity, local or constitutional, of the malady

with which structural change of these bodies is complicated.

13. i. *Symptoms.*—Generally the patient at first complains of weakness or more marked debility, of languor, and of indisposition to bodily and mental exertion. The appetite is impaired or lost; the pulse is soft, weak, and often frequent; the whites of the eyes are pearly; the body is sometimes more or less emaciated, or, if not emaciated, leuco-phlegmatic or cachectic, or discoloured, and generally anæmied. Uneasiness or pain, often severe, is referred to the region of the stomach, epigastrium, back, or loins. Nausea, sickness, retchings, and frequent vomitings often occur, especially as the prostration, anæmia, and discoloration of the skin advance. In some cases, complicated with disease of other organs, especially when such disease is acute or disorganizing, the discoloration may either be absent or overlooked. In other cases it is slight, or in patches, consisting of a murky hue; but in others it amounts to a bronzed tint, and is general over the whole surface, but is commonly most marked on the face, neck, superior extremities, penis, and scrotum, in the flexures of the axillæ and limbs, around the umbilicus, &c., varying in deepness from a dingy or smoky appearance to a chestnut-brown, or colour of a mulatto. In some cases patches of a lighter hue occur in various parts; and in many the discolouring may be remarked in some of the internal surfaces, the peritoneum, pleura, &c.

14. With the continuance and progress of disease, the languor, anæmia, loss of appetite, and feebleness of the heart's action are aggravated. The discoloration of skin becomes in some cases more marked, the commissures of the lips much darker, the pulse smaller and weaker, vomiting more frequent and urgent, and pain and weakness of the back and loins more complained of. At last the patient sinks and expires, after a period which is very indefinite, so that the disease may appear almost acute in some instances, and more or less chronic in others, most probably owing either to the severity of the disorganizing lesions affecting the supra-renal bodies, or to the nature of the complications characterizing particular cases.

15. Although lesions of these bodies are often uncomplicated with disease of any other organ—although no lesion or disorder of any important or vital part can be detected, in many cases, during the life of the patient, lesions of these bodies, and a peculiar anæmia, being the only or chief lesions found after death, very frequently accompanied with discoloration—yet they are often associated with other diseases, chiefly of a constitutional and cachectic nature, more especially with general or partial tuberculosis, with cancer, and with disease of the lungs, &c.

16. The following table of cases of disease of the supra-renal bodies comprises nearly all those which have been published up to this time. It is constructed according to that published by Mr. HURCHINSON; and to it I have added some recent cases.



No.	References.	Sex and Age.	Occupation.	Previous Health, &c.	Early Symptoms.	Bronzing of Skin—its Degree or Absence.
1.	Dr. Addison's Works, p. 9.	Male, 32..	Baker.....	No history. Skin white when in health.	Cough, followed by debility and bronzing of skin.	Colour of mules to: scrotum and penis darkest.
2.	<i>Ibid.</i> , p. 12....	Male, 35..	Tide-waiter. Exposed to weather.	Rheumatism eight years previously. Health generally good.	Acute attack of fever, followed by debility and bronzing of skin.	Dark olive-brown; also in lining of lips.
3.	<i>Ibid.</i> , p. 15....	Male, 26..	Carpenter. Married. Intemperate.	Very good until three months before the change of colour.	Pain in the back and right leg, followed by debility, wasting, and giddiness.	Dark olive-brown, deepened in patches.
4.	<i>Ibid.</i> , p. 19....	Male, 22..	Stonemason.	No history. Died soon after admission.	Pain in stomach, vomiting, the douloureux.	Face, axillæ, and hands of bronzed colour.
5.	<i>Ibid.</i> , page 23. (From Dr. Bright's Reports.)	Female, adult.	Not stated ..	No history.....	No history.....	Complexion very dark...
6.	<i>Ibid.</i> , p. 25....	Male.....	Barrister. Of middle age.	No history.....	No history.....	Surface generally dark; face, neck, and arms covered with deep brown patches.
7.	<i>Ibid.</i> , p. 30....	Female, 60	Not stated ..	No history. Cancer of supra-renal bodies; consecutive of cancer of breast.	Cancer of breast .....	Skin of arms, chest, and face of a light-brown colour.
8.	<i>Ibid.</i> , p. 32....	Female, 53	A servant. Single.	Always thin, but of good health.	Cutaneous eruption four months previously, its cure being followed by stomach symptoms.	Skin generally very dark, with darker patches.
9.	<i>Ibid.</i> , p. 35....	Male, 53..	Sailor. Married. Sober.	Very good. A strong muscular man.	Two months previously began to lose appetite and be generally unwell.	Face of a yellow bronzed tint, becoming still darker.
10.	<i>Ibid.</i> , p. 38....	Female, 28	Not stated ..	Died of cancer uteri. Disease of supra-renal bodies being consecutive.	Those of cancer uteri....	A peculiar dingy appearance.
11.	<i>Ibid.</i> , p. 39....	Male, adult.	Not stated ..	Died of cancer of lungs, &c.	Those of cancer of the thorax.	Face of a dingy hue, with freckles and brown discoloured spots.
12.	Med. Times & Gaz., Dec. 15, 1855. (Dr. Burrows.)	Male, 24..	Hawker. Single.	Had lumbar abscess in childhood.	Pain in the back, followed by emaciation and bronzing.	A dark copper or bronzed colour generally, and lighter patches.
13.	<i>Ibid.</i> , Jan. 19, 1856. (Dr. Gull.)	Male, 24..	Carpenter. Temperate.	Robust.....	Debility, breathlessness on exertion, nausea, &c.	Skin of a sallow olive-brown, darker on inside of lips, knees, &c.
14.	<i>Ibid.</i> , Jan. 19, 1856. (Mr. Bakewell.)	Male, 23..	Labourer ...	Not known.....	Not known .....	Skin generally dark brown or bronzed, and darker over the thighs.
15.	<i>Ibid.</i> , Feb. 20, 1856. (Dr. Thompson, &c.)	Male, 20..	Baker. Sober	Good.....	Bronzing of skin.....	Skin of a general peculiar dark dirty-brown colour.
16.	<i>Ibid.</i> , Feb. 28, 1856. (Dr. Rowe.)	Male, 20..	Not stated ..	Delicate.....	Delicate health and bronzing of skin.	Skin generally brown, with darker spots.
17.	<i>Ibid.</i> , March 8, 1856. (Dr. Parro.)	Male, 37..	A publican. Intemperate.	A year before had pain in the lumbar region, which subsided.	Admitted for delirium tremens.	Skin generally of a peculiar yellowish brown.
18.	Dr. Addison's Work, p. 29.	Male, 60..	Not stated ..	No history .....	No details .....	Generally dark and bronzed, with blanched patches.
19.	Med. Times & Gaz., p. 233. (Dr. Stocker.)	Male, 56..	Physician ..	Dyspeptic, but not otherwise ill.	General malaise and irritability of stomach, increasing debility and emaciation.	Patches of brown colour, which extended; small patches on the face.

General Symptoms, Complications, &c.	Duration of Disease.	Mode of Death.	Inspection after Death.	Remarks.
Excessive debility, emaciation, demeanour puerile, urine healthy, pain in lumbar region, cough, soreness at the epigastrium.	3 yrs.	Acute pericarditis and pneumonia.	Supra-renal bodies both remarkably indurated and as large as eggs, and quite disorganized; recent pericarditis and pneumonia; no tubercles nor other visceral disease.	A well-marked case. No chronic lesions but those of supra-renal bodies.
Pinched anxious expression, vomiting, pulse very feeble, depression, constipation, tenderness at epigastrium, numbness of extremities.	6 mo's	Not stated.....	Both supra-renal bodies contained compact fibrous concretions; gastric mucous surface inflamed; no tubercles; no other visceral disease.	The deposits in supra-renal bodies resembled tubercle, but there was no tubercle in other organs.
Thin, pale, and feeble; fainting on rising from bed, sickness and hiccough, pain in back, aug. curvature of spine, leucothymia, &c.	7 mo's	Passed into a torpid state.	Supra-renal bodies completely destroyed and converted into stumous deposits; psoas abscess and caries of lumbar vertebrae; tubercles in lungs; spleen enlarged.	The blood, both before and after death, contained a great excess of white corpuscles.
Vomiting and pain in stomach, great debility, emaciation, extreme prostration, &c.	Seve'l mon's.	From collapse and sinking.	Supra-renal bodies wasted and destroyed, both weighing only 49 grains. No other disease.	The disease of supra-renal bodies was an atrophy, probably consequent on inflammation.
Extreme debility, vomitings, emaciation, abscess in breast, &c.	Not stated.	Slight wandering, gradual sinking, and drowsiness.	Both supra-renal bodies were enlarged, lobulated, and the seat of tubercular-like deposits, both four times the natural size; the left had suppurated.	This case was recorded by Dr. Bright before the importance of dissection of supra-renal bodies was recognised.
Slight emaciation, great anæmia, extreme languor, urgent vomiting, pulse very compressible.	1 year	Speedy sinking ...	Both supra-renal bodies greatly enlarged, of irregular surface, and much indurated; natural structure lost; nucleated cells. No other important disease.	Vomiting had been so urgent in this case as to suggest the existence of malignant disease of the stomach.
No history. Died of ulcerated cancer, the bronzing being remarked at the post-mortem inspection.	Not stated.	Not stated .....	Both supra-renal bodies contained much cancerous deposit throughout their structure.	
Emaciated and feeble, much irritability of stomach.	4 mo's	Died of exhaustion in three days after admission.	Cancer of pylorus; left supra-renal body destroyed by cancer.	The extent of discoloration of skin was proportioned to that of disease of supra-renal body, one being sound.
Sickness without vomiting, weakness and loss of appetite, frequent rigors, no pain, pulse 80, feeble; body irritable.	3 mo's	Sunk gradually ...	Tubercular deposit in one supra-renal body; in the spleen also; and the kidneys were degenerate.	The degree of bronzing appears to have been proportioned to that of disease of supra-renal body, one only being affected.
Discoloration of skin not noticed until the post-mortem inspection, when disease of supra-renal body was first told. No history preserved.	Not stated.	Died from cancer..	Right supra-renal body healthy; the vein emerging from the left obstructed by cancerous deposit, and the organ itself occupied by recent extravasation of blood.	The degree of bronzing was slight, the disease of one supra-renal body being recent.
No history preserved .....	Not stated.	Died of cancer ....	One supra-renal body entirely disorganized by cancer, the other healthy.	One supra-renal body was affected, and the bronzing was slight.
Irritability of stomach with vomiting, pain across the back, great debility, emaciation, urine natural, &c.	8 mo's	Died from exhaustion consequent upon a purgative.	Both supra-renal bodies contained pus and bodies resembling hardened tubercle. There was no other disease.	The chain of morbid phenomena was very complete in this case.
Nausea, vomiting, great malaise, exhaustion, emaciation, urine healthy, blood loaded with white corpuscles.	5 mo's	Sudden exhaustion	Both supra-renal bodies atrophied and destroyed, the left contained cysts, the right solid concretions.	
Weak and low for a long time, not much emaciation.	Unkn.	From exhaustion caused by a short journey.	Both supra-renal bodies completely atrophied, and contained calcareous concretions; emphysema of lungs; fatty degeneration of heart.	
Suddenly languid, and afterwards collapsed, and died after three days; tint of skin observed for six weeks.	6 w'ks	Collapse .....	Each supra-renal body enlarged to the size of half a kidney; their structure converted into a firm tubercular-like matter, and in parts softened.	This appears to have been an idiopathic disease of supra-renal bodies, no tubercles being found in other organs.
Had also disease of knee-joint, and health rather improved until within three days of death. He remained fat and muscular.	8 mo's	Diarrhœa, followed by succession of epileptic fits, vomiting, &c.; died on fourth day of these.	Both supra-renal bodies destroyed, containing gritty, cheesy, and semi-purulent deposit. No other disease.	In this, as in case 23, a peculiar disagreeable odour exhaled from the patient for three or four weeks before death.
He died in a fortnight from delirium tremens.	3 w'ks or more.	Sunk into a typhoid state, with low delirium.	Both supra-renal bodies were converted into abscesses, but their cortical substance was not wholly destroyed; circumscribed abscess in the liver.	In this case the suppuration and inflammation of supra-renal bodies had probably been acute and recent.
Anæmic, heart's action very feeble, irritability of stomach, œdema of upper extremities.	Not stated.	Died of debility, cancer in mediastinum suspected.	No inspection .....	The œchexia was precisely that of diseased supra-renal bodies.
Great debility and wasting, but no organic disease but that of supra-renal bodies indicated.	About 6 mo's	From exhaustion..	No inspection .....	The bronzed patches indicated the patient's speedy death when there were not other alarming symptoms.



No.	References.	Sex and Age.	Occupation.	Previous Health, &c.	Early Symptoms.	Bronzing of Skin—its Degree or Absence.
20.	<i>Ibid.</i> , Dec. 15, 1855. (Mr. Startin.)	Male, 12..	At school. (Irish.)	Had suffered from abscess in the neck, and cough.	Loss of appetite, flesh; increasing languor and debility.	Copper colour general, and deepest on the face and neck.
21.	<i>Ibid.</i> , Dec. 29, 1855. (Dr. Peacock.)	Female, 14	At school...	Healthy.....	Lassitude, muddy complexion, and slight cough.	A brown muddy tint, deepest on face, arm, and shoulders; no mottling.
22.	<i>Ibid.</i> , Jan. 19, 1856. (Dr. Burrows.)	Female, 28	Married. Temperate.	Delicate.....	Menorrhagia and debility two years before the discoloration.	A fawny or yellowish brown tint, most marked on face, arms, thighs and legs; patchy discoloration in parts.
23.	<i>Ibid.</i> , Feb. 23, 1856. (Dr. Rowe.)	Male, 45..	A carter. Married. Temperate.	Robust.....	Dark spots in various regions of body. At first no illness.	Skin dusky-brown, resembling that of a mulatto; darker in some parts than in others.
24.	The Associate Journ., Jan. 19, 1856. (Dr. Budd.)	Female, 42	Married....	Good.....	A brown tinge of skin, followed by typhoid fever, after which bronzing became more marked.	Skin like that of a North American Indian; certain parts darker than others.
25.	<i>Ibid.</i> , Jan. 19, 1856. (Dr. Budd.)	Female, 40	Not stated..	Not stated.....	Not stated.....	Very dark general discoloration; large patches in mouth.
25.	Med. Times & Gaz., Feb. 23, 1856. (Dr. Thompson.)	Female, 33	Married....	Good.....	Paroxysmal pain in the abdomen; loss of strength; amenorrhœa.	Skin became suddenly and generally of a dirty-brown tinge.
27.	<i>Ibid.</i> , Dec. 22, 1855. (Dr. Rankin.)	Female, 58	Married....	Formerly very stout and of large frame.	Loss of strength and flesh	Face and hands dark-brown—"as brown as a Japanese;" other parts not seen.
28.	Trans. of Path. Society, vol. viii., p. 325. (Dr. Baly.)	Male, 18..	Baker.....	Headache, pains in the limbs, languor and debility, followed by pain in the loins.	As stated, with bronzing of the skin; pain increased by pressure on the loins; vomiting, &c.	Bronzing deep and general.
29.	<i>Ibid.</i> , vol. viii., p. 330. (Dr. Baly.)	Not stated.	Not stated..	Diseased vertebral column.	Not stated.....	No bronzing of the skin.
30.	<i>Ibid.</i> , vol. viii., p. 330. (Dr. J. Ogle.)	Female, 14	Not stated..	Incontinence of urine, scalding, containing blood and pus.	Consequent on the urinary disorder; symptoms of phthisis, under which she sunk.	No bronzing of the skin.
31.	<i>Ibid.</i> , vol. viii., p. 332. (Dr. J. Ogle.)	Male, 86..	Not stated..	Emaciation, &c. .	Symptoms of phthisis....	No bronzing of the skin.
32.	<i>Ibid.</i> , vol. viii., p. 333. (Drs. Peacock and Bristowe.)	Female, 18	Tent-maker.	Had a fall, and severe pain in the right side.	Fever, with pains in the lower extremities; œdema, &c.	No bronzing of the skin.
33.	<i>Ibid.</i> , vol. viii., p. 337. (Drs. Peacock and Bristowe.)	Male, 55..	Coppersmith	Good.....	Declined in flesh and strength; pains in back and limbs.	No discoloration of the skin.
34.	Med. Times & Gaz., Nov. 21, 1857. (Mr. Wilks.)	Female, 18	Young lady.	Delicate, but of full habit.	General debility and chronic rheumatism; lassitude and sickness.	A deep bronze tint of skin.

17. Mr. HUTCHINSON has collected a number of the cases which have been recorded, and has given a view of the chief symptoms which have characterized them. I shall notice these symptoms briefly and in succession, but independently of his account of them.—1st. *Bronzing of the skin* was observed in the majority of cases of structural lesion of the supra-renal capsules recorded by Dr. ARNISON and some others, and this physician was inclined to believe that this symptom was indicative of such lesion. Several cases have

more recently been observed where lesions of these capsules have been found without this change of the colour of the skin, and without any change whatever. Several such instances are recorded in the 8th vol. of the Transactions of the Pathological Society.—2d. *Great debility*, without any evidence of thoracic or organic disease, loss of mental energy, faintness, exhaustion, &c., were very general symptoms.—3d. *Irritability of stomach*, nausea, occasional or frequent vomitings, were also prominently observed.—4th. *Pain in*

General Symptoms, Complications, &c.	Duration of Disease.	Mode of Death.	Inspection after Death.	Remarks.
Some emaciation; great and increasing debility; oppressed aspect; urine healthy.	9 mo's	Sank from diarrhoea; a succession of convulsions just before death.	No autopsy .....	Gradually increasing prostration for four months.
Countenance expressive of great languor; emaciation; marked debility; liability to faintings, &c.	13 m's	Suddenly, from an epileptic fit.	A chalky concretion found in the medulla oblongata. The supra-renal bodies said to be free from disease.	
Appetite very bad, thirst, great debility, pain in the loins, menorrhagia, anxious expression.	7 mo's	Not known .....	No inspection.	
No material loss of health until within a few weeks of death; debility, loss of appetite, irritability of stomach supervened, failure of memory for some months, urine normal.	3 yrs.	From incessant vomitings; delirious before death.	The chief lesion observed was tubercles in the lungs. The supra-renal bodies were not examined.	A peculiar and disgusting odour a few days before death.—See case 16.
About eight months after the first bronzing she began to lose flesh and strength; harassing cough, irritability of stomach, extreme anæmia, and debility supervened.	16 m's	Sunk gradually from exhaustion.	No autopsy .....	Eight months after the change of colour began the patient had a fine healthy infant.
Anæmic and extremely feeble, sickness and vomiting.	Not stated.	Gradually sank from exhaustion.	No autopsy .....	This case very closely resembled the preceding one.
Anæmic and feeble, followed by discoloration of skin, and by a peculiar collapse.	5 w'ks	Recovered under the use of tonics, the skin becoming simply pallid.	Recovered .....	Inflammatory disease of supra-renal bodies may be conjectured.
Sinking at pit of stomach, nausea, loss of appetite, strength, &c.; secretions healthy, heart's action very feeble.	Not stated.	Still living.....	Living at time of report .....	The symptoms combine to indicate disease of supra-renal bodies.
Fever; small, feeble, and quick pulse; severe pain in loins, increased by pressure; frequent vomiting; tendency to diarrhoea; abdomen flat, empty, and tender; urine albuminous; peculiar odour of skin.	12 m's	Exhaustion, stupor, unconsciousness.	Both supra-renal bodies atrophied, and their entire structure destroyed. History and inspection fully given, with a plate.	The case very chronic, well marked, and the supra-renal bodies most completely disorganized. A very interesting case.
Disease of the vertebral column, apparently causing death.	Not stated.	Not stated.....	Both supra-renal bodies contained nodules of firm substance, gray and semi-transparent externally, and yellow and opaque internally. A great part of their proper structure unaltered.	Apparently an earlier stage of the lesions observed in case No. 28.
Phthisis, under which she sank.	Not stated.	Died from scrofulous deposits and vomicae in lungs.	Extensive deposits of crude tubercular matter in both supra-renal bodies, and in the lungs and left kidney.	No symptoms but those of phthisis mentioned.
Hectic and symptoms of phthisis.	Not stated.	Died from phthisis	Extensive deposit of scrofulous matter in one supra-renal body, the other not affected.	No symptoms excepting those of phthisis mentioned.
Tumour in left side of abdomen, emaciation, prostration, liver enlarged, the spine very prominent at the last dorsal vertebra, &c.	3 mo's	Exhaustion.....	Cancer of both supra-renal bodies, and cancerous deposits in both kidneys and in other parts.	History, case, and of the diseased appearance full and interesting.
Emaciation, care-worn countenance; retraction of gums, loss of teeth, sordes on the gums, &c.; general want of power, pains in the loins, &c.; anæmia.	4 mo's	Exhaustion....	Supra-renal bodies both destroyed, their substance being replaced by a soft white encephaloid deposit; similar deposits in the lungs.	History and morbid appearance fully detailed.
Sickness, feeble pulse; fits of incessant vomiting, returning after short intervals, for seven weeks; emaciation.	12 m's or more.	Exhaustion.....	Both supra-renal bodies enlarged, inflamed, and contained purulent matter, with gritty matter in the right.	No other visceral disease observed.

the epigastrium, back, and loins, sometimes acute, in some instances dull, or an aching increscency, was general.—5th. *Anæmia* was also generally present, this fluid being impoverished and abounding with white corpuscles, the soft solids being flabby.—6th. *Feebleness of the heart's action*, a soft, compressible, feeble, and more rarely a quick pulse, were usually observed.—7th. *A cachectic, leuco-phlegmatic, and unhealthy appearance* of the body, with or without emaciation, were frequently remarked.—8th. *A disagreeable and pe-*

*culiar odour* was exhaled from the body, in some cases, during life; and, 9th. *Several nervous and convulsive symptoms* were observed in a few instances. The tongue, the bowels, and the urine, did not present much indication of disorder. *Death* appeared to result chiefly from vital depression or exhaustion, with more or less indications of alteration of the circulating fluids. In some cases death was attributable to the disease with which the lesion of the supra-renal bodies was complicated, as to cancer, tubercular disease of the lungs,



&c. The circumstance of one of those bodies only being diseased, and the extent to which the structure of one or both had been destroyed, may be viewed as modifying or altogether altering the symptoms and the final issue.

18. ii. *The chief lesions of these bodies* which have been recorded are the following: (a) Appearances of acute inflammation and its consequences, suppuration, &c.—(b) Atrophy and total disorganization of their structure.—(c) Calcareous depositions, or fibro-calcareous concretions, with or without cysts, some of which contained a fluid puriform matter.—(d) A fibrous degeneration, with great enlargement and induration.—(e) Tubercular deposits, with great enlargement and loss of the healthy structure of these bodies.—(f) Deposits of cancerous matter, consecutively of cancer in other organs, more or less of the normal structure of these bodies being still preserved. Although these structural lesions were more frequently observed in both supra-renal bodies, yet one only was not unfrequently affected, and in a few cases a portion of the healthy structure of the diseased body was preserved. The disease of one body only, or the preservation of a portion of the structure of the organ, may rationally be allowed to modify or more manifestly alter the resulting phenomena.

19. The *diagnosis* of disease of the supra-renal bodies is very difficult: 1st. As respects the certainty with which this disease may be inferred from the symptoms present—of which, bronzing of the skin, the persistence of retchings and vomitings, the anæmia, and the weakness and smallness of the pulse, are the most characteristic; and, 2d. As regards ascertaining during life whether or no the existing discoloration is to be imputed to disease of these bodies, or to one or other of the forms of JAUNDICE, which I have described as *Green*, and as *Cachectic*, or *spurious*, *Jaundice*. (See § 46–57.) In the histories of cases of disease of the supra-renal bodies which I have perused, no such diagnosis has been made or suggested; and the appearances of the stools and the states of the biliary and urinary excretions during life, and even of the biliary apparatus after death, have been either insufficiently investigated or entirely overlooked.

20. The *prognosis* is most unfavourable, as it does not appear that any case has recovered where the skin had become bronzed or much discoloured. The prognosis may therefore be ranked in the same category as the green form of JAUNDICE described in that article. (See § 46, *et seq.*)

21. The *treatment* should be directed according to general principles, conformably with the phenomena and with the complications characterizing individual cases. These will suggest the rational indications, and the means by which they are most likely to be fulfilled, as far as this may be possible.

[In the present state of the question, the following conclusions may be legitimately drawn: 1. Disease of the supra-renal capsules is not necessarily associated with bronzing of the skin. 2. Bronzing of the skin may be produced by other causes than supra-renal capsular disease. 3. Disease, or even complete disorganization of the supra-renal capsules, may exist without giving rise to any special symptom. 4. Peculiar symptoms have been found associated with supra-renal disease in so many cases as to render it probable that the association is more than accidental, and that under certain unknown conditions a real influence may be exerted on the economy by a disease of the capsules. In a case which came under our own observation and treatment recently, the supra-renal capsules were extensively diseased, and one of them disorganized, without any change of colour in the skin.]

BIBLIOG. AND REFER.—*T. Wharton*, *Adenographia sive Glandularum Descriptio*, 18mo. Amstel., 1659.—*Nagel*, *Dissert. Sistens Ilen. Succent. Manual. Descript.* Berol., 1838; and *Müller*, *Archiv.* 1336.—*C. Bergmann*, *Dissert. de Glandulis Supra-renalibus*, cnm Tab. Gitt., 1839.—*A. Ecker*, *Der feinere Bau der Nebennieren beim Menschen*, &c. Brauns., 1846.—Art. Blutgef. adriksen in *Wagner's Handw. d. Physiologie*, b. iv. 1849.—*H. Frey*, in *Todd's Cyclopedia of Anat.* Oct., 1849.—*H. Gray*, on the Development of the Useless Glands, &c. in *Philosoph. Trans.*, 1852.—*A. Kölliker*, *Mikros. Anat.*, 2; and *Manual of Human Histology*, transl. by *G. Bush* and *T. Huxley*, vol. ii., p. 214.—*Leydig*, *Anatomisch-histologische Unters. üb. Fische u. Reptilien*, 1853.—*T. Addison*, on the Constitutional and Local Effects of Disease of the Supra-renal Capsules, 4to. Lond., 1855, with Plates. (*Was the first to direct attention to Diseases of these Structures.*)—*Brown-Séquard*, in *Archives Gén. raies de Médecine*, Paris, 1856, p. 395.—*Ibid.*, 1857, p. 374.—*Haly, Ogle, Peacock, Bristowe, Wilks, Harley, and Hutchinson*, in *Transactions of the Pathological Society of London*, vol. viii., 8vo. Lond., p. 325–345.—*G. Harley*, on Functions of the Supra-renal Capsules, &c. in *British and For. Med. Chirurg. Review*, &c., Jan., 1858, p. 204.—*Gull, Barrowes, Roue, Bakevell, Thompson, Schley, Parre, Stocker, Peacock, Budd, Renkin*, &c., Cases by, in *Medical Times and Gazette* from 15th December, 1855, until 8th March, 1856.—*J. Hutchinson*, in *Ibid.*, March 8th and 22d, 1856, p. 233 and p. 281.—*G. Harley*, in *British and Foreign Med. Chirurg. Review*, &c., No. xli., Jan., 1858, p. 204; and in *Lancet*, 19th December, 1857, p. 629.—*Wilks* in *Lancet* and in *Med. Times and Gaz.*, 21st Nov., 1857.—*J. Copland*, in *Ibid.*, 21st Nov., 1857.—*Edman Martin*, in *Ibid.*, May, 1858.—*Edin. Med. Journ.*, May, 1858.—*Am. Journ. Med. Sciences*, July, 1858, p. 2–2.]

# INDEX.

The Numerals denote the FIRST and SECOND VOLUMES; the figures the number of the page. The THIRD or LAST VOLUME is indicated by figures, the numbers of the pages only. The FORMULE in the APPENDIX are represented by F. followed by the number in figures, and by Ap. and the number of the page also in figures.

## A.

ABDOMEN, auscultation of..... i. 5  
— examination of..... i. 1  
— inspection of..... i. 1  
— manual examination of..... i. 2  
— percussion of..... i. 4  
— various states and appearances of, requiring examination..... i. 2-4  
Abdominal tumours, feigned..... i. 1030  
Abortion, *Bibliog. and Refer.*..... i. 15  
— causes of..... i. 5  
— causes depending on the uterus and placenta..... i. 6  
— causes depending on the foetus..... i. 6  
— definition of..... i. 5  
— diagnosis of..... i. 9  
— feigned..... i. 1030  
— occasional exciting causes..... i. 6  
— palliative treatment of..... i. 11  
— pathological causes of..... i. 7, 8  
— prognosis of..... i. 10  
— prophylactic treatment of..... i. 10  
— remedial treatment of..... i. 12  
— symptoms of..... i. 8  
— treatment of..... i. 10  
Abscess, *Bibliog. and Refer.*..... i. 26  
— chronic..... i. 18  
— chronic, pus in..... i. 18  
— consecutive..... i. 19  
— definition of..... i. 15  
— diffusive, or in cachectic habits..... i. 17  
— from acute sthenic inflammation..... i. 15  
— of the opening of..... i. 25  
— of the prognosis of..... i. 23  
Abscess in the brain..... i. 262  
— of brain, the parietes of..... i. 262  
— lumbar. See also Psoitis..... i. 516  
— of the absorption, &c., of the contents of..... i. 24  
— of the diagnosis of..... i. 22  
— of the influence of air when admitted into..... i. 22  
Abscess of the kidney..... ii. 725  
— chronic, of the kidney..... ii. 726  
Abscess of the liver, description of..... ii. 849-51  
— different kinds of..... ii. 867  
— directions in which it may point or open..... ii. 851  
— external opening of..... ii. 863  
— regimen and diet in..... ii. 862  
— symptoms of..... ii. 849-52  
— treatment of its several modes of opening..... ii. 861-3  
— treatment of..... ii. 861-3  
Abscess of the spleen describe i. 892  
— of the treatment of..... i. 24  
— origin of consecutive..... i. 19  
— parietes of..... i. 16  
— parietes of chronic..... i. 18  
— pathology of..... i. 15  
— primary and secondary, of the pancreas..... i. 6  
— pus contained in..... i. 16  
— symptomatic, described..... i. 18  
— termination of..... i. 20  
— progress of..... i. 20  
Abscess of the vulva..... 1433

## AF

Absorbent Glands. See also Lymphatic Glands..... ii. 923  
— system, diseases of..... ii. 915  
Absorption, following metamorphosis and waste of tissues..... i. 29  
— from diseased organs and structures..... i. 29  
— from the alimentary canal, pathology of..... i. 28  
— from the lungs, pathology of..... i. 27  
— in relation to the causation, perpetuation, and removal of disease..... i. 27  
— of morbid matters in the economy..... i. 28  
— on the skin, pathology of..... i. 27  
Abstinence, associated with morbid agents..... i. 32  
— bibliography of..... i. 34  
— feigned..... i. 30  
— its morbid effects..... i. 30  
— treatment of its morbid effects..... i. 34  
Accession of disease to be studied..... ii. 31  
Accessory symptoms in insanity..... ii. 509  
Accephalocysts described. See also Hydatids..... ii. 293  
— characters of..... 1584  
— of the liver..... ii. 872  
Acetic acid, slow poisoning by..... 392  
Acetum Antihystericiem..... F. 1. Ap. 5  
Acetum Camphoratum..... F. 2. Ap. 5  
— Camphoræ et Annnonæ..... F. 3. Ap. 5  
Acid, acetic, of poisoning by..... 373  
— hydrocyanic, its use in phthisis..... 1267  
— See Prussic Acid, poisoning by..... 398-405  
— oxalic, poisoning by..... 378  
— treatment of poisoning by..... 350  
— prussic. See Prussic Acid, poisoning by..... 398-405  
— sulphuric, its use in phthisis..... 1267  
Acids contained in urine, described..... 1319-21  
Acids, mineral, appearances after poisoning by..... 376-7  
— slow poisoning by..... 392  
— symptoms of poisoning by..... 373-5  
— treatment of poisoning by..... 377-8  
Acids, of their use in phthisis..... 1267  
Acidum Nitro-Hydrochloricm..... F. 4. Ap. 5  
— Nitro-Hydrochl. dilut. F. 5. Ap. 5  
Acne, causes of..... i. 36  
— definition of..... i. 34  
— diagnosis of..... i. 36  
Acne indurata, described..... i. 35  
— treatment of..... i. 37  
— prognosis of..... i. 36  
Acne punctata, described..... i. 36  
— treatment of..... i. 35  
Acne rosacea, described..... i. 35  
— treatment of..... i. 35  
Acne simplex, described..... i. 35  
— treatment of..... i. 37  
Acne syphilitica, described..... i. 36  
— treatment of..... i. 35  
Aconite, its use in phthisis..... 1263  
— operations and symptoms from poisoning by..... 415-16  
— poisoning by..... 415  
— treatment of..... 417  
— recommended in acute rheumatism..... 687  
Acrids, vegetable, operation of, in poisoning by..... 391  
— treatment of poisoning by..... 392  
— poisoning by..... 388  
Acro-alterant medicines, enumerated, &c..... 1147  
— poisonous, described..... 447  
— operation of..... 448  
Acro-narcotic poisons, described..... 474  
Acro-sedatives, arrangement and enumeration of..... 1147  
Action, vascular, to be allayed when increased..... 1140  
Actions, morbid, duration of..... i. 682  
— vital and vascular, should be equalized..... 1139  
Acute, acceptance of the term..... i. 683  
Adhesions, *Bibliography.*..... i. 44  
— of cellular tissue..... i. 42  
Adhesions, morbid, described..... i. 41  
— of mucous surfaces..... i. 43  
— of opposite surfaces of the pericardium..... ii. 216  
— pathology of..... i. 40  
— of the pleura, described..... i. 300  
— reparative..... i. 41  
— of serous surfaces..... i. 42  
— various, &c..... i. 43  
Adipose tissue, effusion of blood into..... i. 45  
— hypertrophy of..... i. 44  
— its morbid states..... i. 44  
— of tumours in..... i. 45  
Adolescence, remarks respecting..... i. 50  
Adult age, notices of..... i. 51  
Adventitious productions, consequent on inflammation..... i. 678  
— from perverted organic action in their seats..... i. 678  
Adventitious secretions and productions..... i. 674  
Adynamia. See also Debility..... i. 547  
Adynamic Fever. See also Typhoid Fever..... i. 1168  
Agophony, described..... i. 203  
Aither Phosphoratus..... F. 6 & 7. Ap. 1  
Ætiology, or causation of disease..... i. 644  
Affections of mind, as remedial agents..... 1143  
— classification of..... ii. 510  
Affections of the sexual organs caused by pregnancy..... 498  
— treatment of..... 495  
Affections, various sympathetic, during pregnancy..... 501-4  
Affusion of cold or tepid water for insanity..... ii. 606  
Affusion of cold water on the head, &c., first advised by the author for poisoning by prussic acid..... 404  
After-pains, defined..... i. 45  
— symptoms and diagnosis of..... i. 45  
— treatment of..... i. 46



- Agaiactia.** See also Milk, deficiency or suppression of. . . . . ii. 929
- Agamuzoids** noticed. . . . . 1517
- Age,** advanced, described. . . . . i. 56
- divisions of. . . . . i. 51
- adult and mature, remarks on. . . . . i. 51
- as disposing to phthisis. . . . . 1231
- as predisposing to insanity. . . . . ii. 538
- as predisposing to disease. . . . . i. 646
- *Bibliography, &c.* of. . . . . i. 57
- changes of structure produced by. . . . . i. 52
- declining, described. . . . . i. 55
- in its generic acceptation. . . . . i. 46
- in its specific acceptation. . . . . i. 51
- its first period. . . . . i. 47
- its several periods arranged. . . . . i. 46
- functional changes resulting from. . . . . i. 53
- old, described. . . . . i. 56
- Agents,** examination of, producing irritation. . . . . 708-10
- hygienic, arrangement of. . . . . 1144
- medicinal, the operations of. . . . . 1144
- physical and medicinal, causing insanity. . . . . ii. 566-7
- their effects on the character of irritation. . . . . ii. 707
- therapeutical classification of. . . . . 1144-8
- Agnesia,** described. . . . . 12
- Ague,** appearances in fatal cases of. . . . . i. 1089
- *Bibliog. and Refer., &c.* of. . . . . i. 1090
- Ague-cakes,** described. . . . . i. 1089
- Ague,** causes of. . . . . i. 1089
- adynamic states of. . . . . i. 1086
- complicated states of. . . . . i. 1087
- complicated with disease of abdominal organs. . . . . i. 1087
- with disease of respiratory organs. . . . . i. 1087
- consequences and terminations of. . . . . i. 1088
- conversion of one type into another. . . . . i. 1086
- definition of. . . . . i. 1085
- diagnosis of. . . . . i. 1089
- diet and regimen of. . . . . i. 1099
- inferences as to its nature and consequences. . . . . i. 1092
- intermissions and paroxysms of. . . . . i. 1086
- malignant states of. . . . . i. 1087
- masked and anomalous. . . . . i. 1088
- means of cure during the intermissions. . . . . i. 1094, 6
- nature or proximate cause of. . . . . i. 1091
- paroxysms and intermissions of. . . . . i. 1086
- prognosis of. . . . . i. 1089
- regimen of convalescence from. . . . . i. 1099
- remedies which prevent the paroxysms of. . . . . i. 1094
- simple or mild. . . . . i. 1085
- cerebral complication of. . . . . i. 1088
- inflammatory state of. . . . . i. 1086
- treatment during the intermissions. . . . . i. 1094
- treatment of adynamic. . . . . i. 1093
- of complicated. . . . . i. 1094
- of, during the paroxysm. . . . . i. 1093
- of inflammatory. . . . . i. 1093
- of masked or agonal. . . . . i. 1098
- of simple. . . . . i. 1093
- of the sequelæ. . . . . i. 1098
- types or varieties of. . . . . i. 1085
- Air,** of the influence of, when admitted into abscesses. . . . . i. 22
- contaminated and close states of, a cause of scrofula. . . . . 806, 7
- heated, as a disinfectant. . . . . 275
- respired, states of, as signs of disease. . . . . 1092
- Air-cells,** dilatation of the. . . . . ii. 901
- Air-passages,** diseases of the. . . . . i. 296
- Albumen** in the urine, tests for. . . . . 1335
- Albuminaria,** description of. See also Nephritis Cachectica. . . . . ii. 736
- Albuminous** principles in morbid growths. . . . . i. 56
- Alcohol,** poisoning by, symptoms of. . . . . 405
- treatment of poisoning by. . . . . 407
- Algiers,** climate of, advised for phthisis. . . . . 1278
- Alimentary** canal, absorption from, &c. . . . . i. 28
- morbid changes of. . . . . i. 619
- Alkalies, &c.,** advised for rheumatism. . . . . 600
- poisoning by, symptoms of. . . . . 380
- appearances after death from. . . . . 351
- slow poisoning by. . . . . 393
- of their use in phthisis. . . . . 1268
- Alkaline** sulphurets, poisoning by. . . . . 436
- treatment of. . . . . 436
- Almonds,** bitter, poisoning by. . . . . 403
- Alopecia,** described. See also Baldness. . . . . ii. 102-3
- Alopecia,** Syphilitic, described. . . . . 1468
- Alterants,** vegetable, mineral, and animal. . . . . 1147
- Alterations** of blood in disease. . . . . i. 227
- of structure connected with insanity. . . . . ii. 549-53
- of structure in puerperal fevers, inquiries respecting. . . . . 579-81
- of structure observed after nephritis. . . . . ii. 727
- Alteration** of generation in worms. . . . . 1522
- Alvine** Concretions. See also Concretions, intestinal. . . . . i. 463
- Anaurosis, Bibliog. and Refer.** . . . . i. 70
- causes of. . . . . i. 58
- congestive. . . . . i. 62
- definition of. . . . . i. 57
- diagnosis of. . . . . i. 65
- from disorganization. . . . . i. 63
- efficient causes of. . . . . i. 59
- functional. . . . . i. 62
- inflammatory. . . . . i. 63
- from injury. . . . . i. 63
- from lesions of the nerves, &c. . . . . i. 64
- from organic changes. . . . . i. 59
- pathology of. . . . . i. 59
- prognosis of. . . . . i. 65
- seats of. . . . . i. 57
- stages, grades, and forms of. . . . . i. 62
- symptoms of. . . . . i. 60
- treatment of congestive. . . . . i. 6
- of functional. . . . . i. 66
- of inflammatory. . . . . i. 69
- of organic, &c. . . . . i. 69
- Amenorrhœa,** causes of. . . . . ii. 964
- complicated with hysteria and epilepsy. . . . . ii. 971
- complicated with various diseases. . . . . ii. 970
- with vicarious hæmorrhage. . . . . ii. 970
- from congenital and organic lesion. . . . . ii. 966
- treatment of. . . . . ii. 967
- diagnosis of. . . . . ii. 964
- functional. . . . . ii. 964
- pathological states causing. . . . . ii. 965
- prognosis of. . . . . ii. 964
- prognosis of complicated. . . . . ii. 971
- regimen and diet for. . . . . ii. 966
- treatment of. . . . . ii. 965
- of complicated. . . . . ii. 971
- various means advised for. . . . . ii. 965, 6
- Amnesia,** described. . . . . ii. 530
- America,** the question of the introduction of syphilis from, considered. . . . . 1462
- Anmoniacum,** formulæ for prescribing, in phthisis. . . . . 1268
- Amusements** and employments for the insane. . . . . ii. 623
- Anæmia, Bibliog. and Refer.** . . . . i. 222
- causes of. . . . . i. 221
- complicated. . . . . i. 221
- general, described. . . . . i. 220
- local, described. . . . . i. 219
- pathology of. . . . . i. 219
- Anæmia,** symptoms of. . . . . i. 221
- treatment of. . . . . i. 221
- Anæsthesia** from chloroform and vapours of æther. . . . . 464, 5
- Anæsthesia,** described. . . . . 13
- pathology of. . . . . 13
- Anæsthetics,** enumeration of. . . . . 1147
- Anasarca, Bibliog. and Refer.** . . . . i. 731
- consecutive acute. . . . . i. 726
- consequent upon scarlet fever. . . . . 730
- definition of. . . . . i. 724
- Anasarca,** description of. . . . . i. 724
- from disease of the kidneys. . . . . i. 728
- primary acute and sub-acute. . . . . i. 725
- primary asthenic. . . . . i. 727
- symptomatic. . . . . i. 727
- treatment of acute general. . . . . i. 729
- of primary asthenic. . . . . i. 730
- of primary sthenic. . . . . i. 729
- of symptomatic. . . . . i. 730
- Anatomy,** general, of scirrhus and other tumours. . . . . 778
- pathological, of phthisis. . . . . 1215-21
- Ancients,** their opinions of mind and vital phenomena. . . . . ii. 575
- of life and organization. . . . . ii. 575
- Ancylostomum,** systematic description of the genus. . . . . 1514
- Ancylostomum** diodenale, systematic description of. . . . . 1514
- examination of cases after death. . . . . 1515
- pathology of. . . . . 1515
- symptoms of this worm. . . . . 1515
- systematic description of. . . . . 1514
- treatment of. . . . . 1530
- Andes,** elevated localities on the, advised for phthisis. . . . . 1278
- Anæuone,** species of, poisoning by. . . . . 388
- Anæurism,** different forms. . . . . i. 132
- Anæurism** of aorta, described. . . . . i. 81
- causes of. . . . . i. 84
- effects produced by. . . . . i. 83
- of its opening or bursting. . . . . i. 84
- symptoms of. . . . . i. 84
- treatment of. . . . . i. 86
- varieties of. . . . . i. 81
- Angina,** complicated, treatment of. . . . . 1162
- of. . . . . i. 64
- Angina,** diffusive, association or complications of. . . . . 1158
- causes of. . . . . 1157
- definition of. . . . . 1157
- Angina,** erysipelatous, described. . . . . 1157-8
- symptoms of. . . . . 1158
- terminations and prognosis of. . . . . 1158
- treatment of. . . . . 1162
- Angina** Membranacea. See also Croup. . . . . i. 519
- Angina** Pectoris, acute, described. . . . . i. 70
- *Bibliog. and Refer.* . . . . i. 78
- causes of. . . . . i. 72
- proximate cause of. . . . . i. 73
- chronic, described. . . . . i. 71
- definition of. . . . . i. 71
- diagnosis of. . . . . i. 72
- pathology of. . . . . i. 71
- prognosis of. . . . . i. 72
- symptoms of. . . . . i. 71
- treatment of. . . . . i. 72
- of, during the intervals. . . . . i. 76
- of, in the paroxysm. . . . . i. 7
- Angina** with pellicular exudation. . . . . 1155
- Angina** pellicularis, appearances of, after death. . . . . 1157
- description and terminations of. . . . . 1155
- treatment of. . . . . 1162
- Angina** plastica, constitutional symptoms of. . . . . 1156
- definition of. . . . . 1155
- description of. . . . . 1155-56
- Angina** Pharyngea. See also Pharyngitis. . . . . 117
- Angina** Tonsillaris. See also Tonsillitis. . . . . 1150-2
- Angina** Trachealis. See also Croup. . . . . i. 749
- Angor** Pectoris. See also Angina Pectoris. . . . . i. 70

- Animal functions, sympathetic relations of ..... 1053
- Animal molecules, injurious effects of ..... i. 166
- Anomia, described ..... 12
- Anteversion of the uterus ..... 1391
- treatment ..... 1392
- Anthelmintics, arrangement and enumeration of ..... 1145
- those advised against Tænia ..... 1549
- Anthrax, described. See also Carbuncle ..... i. 1251
- Antimonial preparations, poisoning by ..... 431
- treatment of poisoning by ..... 432
- Antimonial, of their use in phthisis ..... 1273
- Antimony, chloride of, poisoning by ..... 382
- treatment of ..... 382
- Antimony - tartate of potash, poisoning by ..... 431
- Antipathy, defined ..... i. 78
- treatment of ..... i. 79
- Antiseptics, arrangement and enumeration of ..... 1148
- vegetable, mineral, and saline ..... 1148
- Anus, abscess of, described ..... 650
- contraction of the ..... 658
- treatment ..... 658
- excoriation about the ..... 657
- excoriations and inflammation of, in children, treatment of ..... 649
- fissures and rhagades of ..... ii. 148
- fissures of, causes ..... 654
- their symptoms ..... 654
- their treatment ..... 655
- fistula in, described ..... 652
- treatment of ..... 653
- of inaction of the ..... 645
- symptoms and treatment of ..... ii. 150
- inflammation and excoriations of, in children ..... 648
- treatment of ..... 649
- itching of the ..... 649
- treatment of ..... 650
- laceration of the ..... 644
- treatment of ..... 644
- mucous discharges from ..... 650
- treatment of ..... 650
- paralysis of ..... 645
- causes ..... 645
- treatment of ..... 645
- prolapse of the, forms of ..... 655
- treatment of abscess of the ..... 653
- ulceration of ..... 652
- Anus and Rectum, diseases of. See also Rectum and Anus ..... 642
- Aorta, aneurism of ..... i. 81
- different kinds of aneurism of ..... i. 81
- symptoms and signs of aneurism of ..... i. 84
- treatment of aneurism of ..... i. 86
- Bibliog. and Refer. ..... i. 88
- constriction and obliteration of ..... i. 88
- its diseases ..... i. 79
- inflammation of ..... i. 80
- nervous pulsation of ..... i. 79
- rupture of, described ..... i. 87
- Aortitis, causes of ..... i. 80
- changes produced by ..... i. 81
- symptoms of ..... i. 80
- treatment of ..... i. 81
- Aphasia, definition of ..... ii. 74
- description of ..... 15
- functional ..... 1500
- hysterical ..... 1500
- pathological states of ..... ii. 784, 5
- structural ..... 1500
- treatment of ..... ii. 783
- Aphasia, in last stage of phthisis ..... 1293
- See also Thrush ..... 1167
- treatment of ..... 1169
- Apoplectic paralysis, lesions producing ..... i. 95
- Apoplexy associated with palsy ..... i. 25
- associations and complications of ..... i. 104
- Bibliog. and Refer. ..... i. 118
- Apoplexy, predisposing causes of ..... i. 101
- classification of its forms ..... i. 97
- commencing with paralysis ..... i. 95
- complicated with, or terminating in, paralysis ..... i. 93
- complicating insanity ..... ii. 536
- complications of ..... i. 104
- its connection with hemiplegia ..... 16, 17
- consecutive states of ..... i. 104
- consequent on diseases of the heart ..... i. 105
- definition of ..... i. 88
- description of ..... i. 89
- diagnosis of ..... i. 99
- distinctions of ..... i. 89
- exciting causes of ..... i. 102
- its ingravescent form ..... i. 91
- morbid appearances in ..... i. 92, 96
- morbid relations of ..... i. 98
- of new-born infants ..... i. 119
- operation of its causes ..... i. 103
- pathological states constituting ..... i. 107
- premonitory symptoms of ..... i. 89
- preventive treatment of ..... i. 110
- prognosis of ..... i. 100
- remedies advised for ..... i. 115
- simple and primary ..... i. 90
- symptoms constituting the attack ..... i. 90
- treatment of ..... i. 109
- during the attack ..... i. 111
- of the sthenic attack ..... i. 111
- of the asthenic attack ..... i. 114
- subsequently to the attack ..... i. 117
- Apoplexy, pulmonary ..... ii. 911
- course and terminations of ..... ii. 911
- Apoplexy of the spinal cord ..... 968-9
- prognosis of ..... 969
- treatment of ..... 969
- Apoplexy of the spleen ..... 993
- Apostema Cerebri ..... i. 262
- Appearances, morbid, of the blood ..... 1045
- Appendages, uterine, specific inflammation of ..... 1379
- treatment of Inflammation and abscess of ..... 1379
- abscess of, in non-puerperal states ..... 1367
- non-puerperal inflammation of ..... 1365
- causes of non-puerperal inflammation of ..... 1366
- symptoms of inflammation of ..... 1367
- non-puerperal suppuration of ..... 1366
- Appendix Cæci, inflammation, &c. of ..... i. 332
- Appetite, insatiable ..... i. 120
- morbid, its causes ..... i. 121
- definition of ..... i. 120
- organic lesions in ..... i. 121
- treatment of ..... i. 122
- varieties of ..... i. 120
- vitiated, described ..... i. 123
- treatment of ..... i. 124
- Appetites, as signs of disease ..... 1079, 81
- Aqua Cosmetica ..... F. 8. Ap. 5
- Styptica ..... F. 9. Ap. 5
- Styptica Capri et Zinci ..... F. 10. Ap. 5
- Styptica Zinci ..... F. 11. Ap. 5
- Traumatica Thedenii F. 12. Ap. 5
- Vanille ..... F. 13. Ap. 5
- Arachnitis, described ..... i. 280
- Arachnitis Spinalis, described ..... 957
- Arachnoid of dura mater, lesions of ..... i. 255
- of pia mater, cysts, tumours, &c. of ..... i. 258
- structural changes of ..... i. 258
- Arachnoid of the spinal cord, inflammation of ..... 957
- Armies, protection of, from pestilence ..... 272, 3
- Arrangement, natural, of diseases affecting the skin ..... 863-873
- Arrangements of therapeutical agents ..... 1144-45
- Arsenic administered in enemas as a poison ..... 420
- compounds of, causing poisoning ..... 417
- diagnosis of poisoning by ..... 420
- introduced into the vagina, as a poison ..... 420
- lesions produced by its preparations ..... 421
- operation of, in poisoning by ..... 420
- palsy from ..... 27
- period required to destroy life by ..... 422
- poisoning by, and its compounds ..... 417-22
- poisoning by its external application ..... 420
- quantity of, required to destroy life ..... 422
- spasms and convulsions from ..... 418
- symptoms of acute poisoning by ..... 417
- of slow or chronic poisoning by ..... 418
- treatment of poisoning by ..... 422
- convalescence from ..... 423
- Arsenical fumes, poisoning by ..... 420
- Arterial system, symptoms furnished by ..... 1086-7
- Arteries, albuminous and purulent exudations in ..... i. 133
- aneurismal changes of ..... i. 132
- atheromatous or fatty matter in their coats ..... i. 133
- Bibliog. and Refer. ..... i. 136
- calcareous deposits in their coats ..... i. 134
- chronic inflammation of ..... i. 129
- constrictions of ..... i. 132
- their diseases ..... i. 124
- of the heart, ossification of ..... ii. 225
- inflammation, acute, of ..... i. 126
- morbid changes of ..... i. 130
- nervous affections of ..... i. 125
- obliteration of ..... i. 133
- organization of ..... i. 124
- ossific deposits in ..... i. 134
- of their vital properties ..... 596
- Arteritis, defined ..... i. 126
- causes of ..... i. 127
- chronic, described ..... i. 129
- complications of ..... i. 129
- diagnosis of ..... i. 130
- pathology of ..... i. 126
- prognosis of ..... i. 130
- symptoms of ..... i. 128
- treatment of acute ..... i. 135
- of chronic ..... i. 135
- Arthritis, rheumatic, symptoms of ..... 667-9
- Arts and Employments, Bibliography ..... i. 168
- as causing disease ..... i. 162
- Arum maculatum, poisoning by ..... 380
- Ascarides, description of. See, also, Worms ..... 1543
- symptoms of ..... 1544
- treatment of ..... 1571
- Ascaris lumbricoides, Synonymes of ..... 1544
- systematic description of ..... 1544
- symptoms produced by ..... 1545
- prevention of ..... 1557
- remedies prescribed for ..... 1553
- various experiments on ..... 1568
- Ascites. See Dropsy of abdomen ..... i. 716
- puerperal, described ..... i. 722
- Asphyxy, appearances after death ..... i. 170
- Bibliog. and Refer. ..... i. 174
- causes of ..... i. 169
- defined ..... i. 168
- general treatment of ..... i. 172
- of new-born infants ..... i. 175
- phenomena characterizing ..... i. 170
- theory of ..... i. 170
- treatment of the, of new-born infants ..... i. 175
- treatment of particular kinds of ..... i. 174
- varieties of ..... i. 171



- Assimilating organs, morbid sympathies of. . . . . 1036
- Associations of disease, their numerous sources examined. 1036-1035
- Asthenia. See, also, Debility. . . . . i. 547
- Asthenic Fever. See, also, Typhoid Fever. . . . . i. 1165
- Asthenic inflammation, described. . . . . ii. 439-445
- nature of. . . . . ii. 456
- treatment of. . . . . ii. 470
- Asthma, antispasmodics, &c., in appearances after death. . . . . i. 180
- *Bibliog. and Refer.* . . . . i. 196
- predisposing causes to. . . . . i. 185
- change of air and climate for. . . . . i. 196
- common or humid. . . . . i. 182
- complicated with organic diseases of heart. . . . . i. 187
- complications of. . . . . i. 187
- definition of. . . . . i. 176
- diagnosis of. . . . . i. 184
- diet and regimen for. . . . . i. 196
- emetics and diaphoretics for. . . . . i. 193
- exciting causes. . . . . i. 186
- expectorants for. . . . . i. 191
- humoral form of. . . . . i. 182
- indications of treatment. . . . . i. 188
- inhalations for. . . . . i. 191
- mineral waters for. . . . . i. 196
- narcotics and anodynes for nervous form of. . . . . i. 180
- physiology of. . . . . i. 177
- prescriptions for. . . . . i. 189
- prognosis of. . . . . i. 184
- proximate cause of. . . . . i. 188
- of the regional treatment of. . . . . i. 195
- spasmodic form of. . . . . i. 181
- symptomatic. . . . . i. 186
- symptoms of. . . . . i. 178
- terminations of. . . . . i. 180
- of tonics, sulphur, and various other means for. . . . . i. 194
- treatment of the fit. . . . . i. 188
- during the interval. . . . . i. 195
- of symptomatic and complicated states of. . . . . i. 195
- varieties of. . . . . i. 180
- Astringents, of various, in phthisis. . . . . 1270
- vegetable, mineral, and saline. . . . . 1145
- Atheromatous or fatty deposits in coats of arteries. . . . . i. 133
- Atlantic, climate of places in the Northern. . . . . i. 414
- Atrophy, appearances and states of. . . . . i. 197
- of the brain. . . . . i. 270
- of the coats of the digestive canal. . . . . i. 625
- of convulsions of the brain. . . . . i. 197
- definition of. . . . . i. 270
- description of. See, also, Tabes. . . . . 1100
- of the heart, characters of. . . . . ii. 245
- causes of. . . . . ii. 248
- symptoms and treatment of. . . . . ii. 248
- of the liver. . . . . ii. 869
- of the mamma. . . . . ii. 936
- of muscles. . . . . ii. 936
- of the pancreas. . . . . 7
- physiological pathology of. . . . . i. 197
- treatment of. . . . . i. 199
- Atropia, poisoning by. . . . . 448
- Attitude of body, signs and symptoms furnished by. . . . . 1057
- Auditory nerves, deafness from affections of. . . . . i. 187, 8
- treatment of. . . . . ii. 988, 9
- Auditory passages, deafness from various lesions of. . . . . ii. 182, 3
- treatment of. . . . . ii. 183
- Aura epileptica, remarks on. . . . . i. 917
- Auscultation of the abdomen. . . . . i. 5
- *Bibliog. and Refer.* . . . . i. 207
- of the heart. . . . . i. 204
- of morbid respiratory sounds. . . . . i. 201
- of the morbid sounds and impulse of the heart. . . . . i. 205
- Auscultation of respiration. . . . . i. 200
- of the voice. . . . . i. 202
- Azores, Climate of. . . . . i. 414
- B.
- Bacon, poisonous effects of. . . . . 428
- Baldness, causes of. . . . . ii. 163
- history and pathology of. . . . . ii. 163
- partial or limited. . . . . ii. 162
- general or diffused. . . . . ii. 162
- syphilitic, described. . . . . 1468
- treatment of. . . . . ii. 164
- Balmeum Iodoretum. . . . . F. 14. Ap. 5
- Sulphureum. . . . . F. 15. Ap. 5
- Potassii Sulphureti. . . . . F. 16. Ap. 5
- Potassii Sulphureti et Gelatinæ. . . . . F. 17. Ap. 5
- Balsams, of their use in phthisis. . . . . 1265
- Balsamum Astringens F. 1 & 19. Ap. 5
- Odontalgicum. . . . . F. 785. Ap. 29
- Succinum. . . . . F. 20. Ap. 5
- Sulphuris, vel Oleum Sulphuris. . . . . F. 21. Ap. 5
- Sulphuris Terebinthinatum. . . . . F. 22. Ap. 5
- Terebinthinatum. . . . . F. 23. Ap. 5
- Barbers, remote causes of. . . . . i. 205
- defined. . . . . i. 208
- symptoms of. . . . . i. 208
- treatment of. . . . . i. 205
- Baryta and its salts, poisonings by. . . . . 432
- symptoms of. . . . . 432
- treatment of. . . . . 433
- Basis of Therapeutics. . . . . 1131
- Bath, Turkish, in the treatment of Syphilis. . . . . 1488
- Belladonna, Atropa, poisoning by treatment of poisoning by. . . . . 440
- Belly-ache. See Colic. . . . . i. 426
- Belly-ache, dry or West Indian colic, treatment of. . . . . i. 439
- Beriberi, causes of. . . . . i. 209
- defined. . . . . i. 208
- diagnosis of. . . . . i. 209
- nature of. . . . . i. 210
- symptoms and morbid change of. . . . . i. 209
- treatment of. . . . . i. 210
- Beverages advised for indigestion. . . . . ii. 395, 7
- Bichloride of mercury in syphilis. . . . . 1484
- Bile, alterations of the. . . . . ii. 1
- chemical and physiological changes of. . . . . ii. 1
- congestion of the, in the ducts. . . . . ii. 841
- congelion, symptoms of. . . . . ii. 842
- treatment of. . . . . ii. 843
- congestion of the, in warm climates. . . . . ii. 834
- ducts, spasm of. . . . . ii. 7
- excessive secretion of the. . . . . ii. 836
- morbid secretion of. . . . . ii. 837
- morbid states of. . . . . ii. 837, 8
- treatment of morbid states of the. . . . . ii. 837
- of inspissated states of. . . . . ii. 8
- diminished secretion of. . . . . ii. 835
- treatment of. . . . . ii. 836
- Biliary apparatus, appearances of, after jaundice. . . . . ii. 344
- Biliary concretions described. . . . . i. 458
- organs, torpor of. . . . . ii. 835
- treatment of. . . . . ii. 836
- Bismuth, sub-nitrate of, poisoning by. . . . . 981
- Bitters and tonics in phthisis. . . . . 1268
- Bladder, abnormalities of the. . . . . 1318
- diseases of, *Bibliog. & Ref.* . . . . 1313
- inflammation of the urinary. See, also, Cystitis. . . . . 1300-9
- inflammation of the peritoneal coat, treatment of. . . . . 1311, 12
- irritability of, defined. . . . . 1293
- irritable, causes of. . . . . 1293
- diagnosis of. . . . . 1294
- treatment of. . . . . 1294, 5
- malignant and other formations of. . . . . 1312
- symptoms of malignant disease of. . . . . 1312
- treatment of malignant disease. . . . . 1312
- Bladder, paralysis of the, defined. . . . . 1297
- paralytic of, from disease and injury of the spine. . . . . 1293
- causes and forus of paralysis of. . . . . 1297
- paralytic of, described. . . . . 1297
- treatment of paralysis of. . . . . 1299
- phosphatic urine from diseased. . . . . 1338
- of polypous excrescences in the. . . . . 1312
- spasm of, defined. . . . . 1296
- diagnosis of spasm of. . . . . 1297
- treatment of spasm of. . . . . 1297
- ulceration of. . . . . 1304
- urinary, diseases of. . . . . 1293-1313
- urinary, symptoms of irritation. . . . . 1293
- Blains, described. . . . . i. 1326
- Blasmatena of morbid growth, described. . . . . 771
- Bleeding, of general and local, in insanity. . . . . ii. 608-6
- Spontaneous. See Hemorrhage. . . . . ii. 79
- Blennorrhagia virulenta, described. . . . . 1454
- Blindness, feigned. . . . . i. 130
- Blindness, night or day, causes and pathology of. . . . . ii. 1030-3
- Blisters and rubeficients, their use in phthisis. . . . . 1257
- Blood, alterations of, in disease. . . . . i. 227
- alterations of, causing hemorrhage. . . . . ii. 75
- alterations of, in scarlet fever. . . . . 741
- appearances of, in pleuritis. . . . . 317, 18
- *Bibliog. and Refer.* . . . . i. 250
- proofs of its changes in disease. . . . . i. 231
- causes of changes of. . . . . i. 237
- changed by the chyle. . . . . i. 237
- by the food. . . . . i. 237
- by impaired functions of depuration. . . . . i. 238
- changes in, arising from the nature of food. . . . . i. 237
- changes of, in relation to special diseases. . . . . i. 231
- changes of, by the states of vital power. . . . . i. 230
- chemical analysis of the, in senry. . . . . ii. 843
- chemical constitution of, healthy. . . . . i. 212
- congelation of. . . . . i. 212
- congelation and appearances. . . . . 1045, 6
- congelation of, in inflammation. . . . . ii. 432
- conditions of, complicating disease. . . . . 1048-9
- congestions of, described. . . . . i. 407
- symptoms of. . . . . i. 278
- the removal of. . . . . 1142
- considered with relation to the pulse. . . . . i. 566, 8
- organic constitution of. . . . . 1041
- the contamination of, 1042-50
- its contamination from absorption of morbid matters. . . . . i. 29
- contamination of, in diseases. . . . . i. 2-3
- contamination of the, directly by causes of fever examined. . . . . i. 1063
- contamination of, by vegetable, animal, and morbid matters. . . . . i. 244
- contamination of, its treatment. . . . . 1447
- sources of its contamination. . . . . 1042-50
- deficiency of. See Anæmia. . . . . i. 219
- depuration of, by the kidneys and other emunctories, necessary to health. . . . . i. 238-40
- impaired depuration of, a cause of phthisis. . . . . 1239
- necessity for the depuration of. . . . . i. 177, 9
- determination of, by art. . . . . i. 218

- Blood, expectoration of, as a sign. 1093, 4  
 — extravasation of, in tuberculate lungs. 1216  
 — exuberance of. 1214  
 — indications and signs of a vitiated state of the. i. 231  
 — infiltrated into the substance of the heart. ii. 250  
 — influence of the states of, on irritability. ii. 701  
 — direct influence of the ganglionic or the organic nerves on the. i. 244, 6  
 — influence of the organic nervous system on. 1046, 54, 5  
 — influence on the, by muscular contractions. 1020  
 — local determination of. i. 217  
 — loss of, in diseases of depressed vital power. i. 225  
 — effects of small but often repeated losses of. i. 224  
 — remote effects of large loss of. i. 223  
 — excessive loss of, in disease i. 224  
 — excessive loss of, in diseases of excitement. i. 224  
 — metamorphosis and waste of its globules. 1044, 5  
 — mode of avoiding excessive loss of, in disease. i. 224  
 — morbid effects of its loss in disease. i. 224  
 — morbid effects of its loss in health. i. 222  
 — connexion of morbid actions and organic lesions, with states of the. i. 650  
 — morbid conditions of, complicating disease. 1047  
 — morbid matters in the, causing fibrinous concretions in the cavities of the heart. ii. 235  
 — signs of. ii. 236  
 — treatment and prognosis of. ii. 256  
 — passage of morbid matters into the. i. 246  
 — morbid states of the, consequent upon diseased kidneys in scarlet fever. 733  
 — morbid states of the, to be corrected or counteracted. 1140, 1  
 — the effects of morbid states of, on the ganglionic nerves. i. 244, 6  
 — illustrations of its morbid states. i. 240  
 — prevention of morbid states of the. i. 250  
 — removal of morbid states of, by depurants, &c. i. 243, 50  
 — of the organic nervous influence on the. i. 244  
 — of its organization. 1041  
 — signs furnished by. 1037  
 — states of, in health. i. 211  
 — of the states of the, in acute sthenic inflammation. ii. 431  
 — of the states of the, in phthisis. 1209  
 — of the quantity of, with reference to the area of the blood-vessels. 1040  
 — states of the, in rheumatism. 675, 6  
 — states of, in the vessels. i. 211  
 — symptoms of fulness of. i. 215  
 — therapeutic indications for diseased states of. i. 248  
 — treatment of buffy states of. i. 248  
 — treatment of, with loose coagulum. i. 248  
 — treatment of the effects of large losses of. i. 226  
 — of exhaustion from losses of. i. 226  
 — of reaction after losses of. i. 226  
 — urea and its combinations in the, productive of disease. i. 233-40  
 — and its elements in the urine. 1335
- Blood or its elements in urine, pathological relations of. 1336  
 — Blood-globules, their presence in urine. 1336  
 — Blood-letting, best mode of conducting. i. 272  
 — in fever. i. 1024  
 — in inflammations. ii. 471  
 — cautions as to, for spasms and convulsions. 931  
 — Blood-vessels, alterations of those of the heart. ii. 260  
 — effects of cold on. i. 420  
 — influence of the organic nerves upon. 1040, 54, 5  
 — of want of accord between their area and the amount of blood in them. 1046  
 — Blood-vessels, and lymphatics, diseases of, causing dropsy. i. 697  
 — Blue-disease described. See Cyanosis. i. 251  
 — noticed. ii. 261  
 — Bodies recently dead of certain diseases impart a dangerous poison. 437-444  
 — Body, signs of disease furnished by its surface. 1059, 60  
 — position of, influences the pulse. 601  
 — Boils, description of. i. 1249  
 — Bolus Anodynus. F. 24. Ap. 6  
 — Auto Spasmos. F. 25. Ap. 6  
 — Arnica. F. 26. Ap. 6  
 — Bismutha Comp. F. 27. Ap. 6  
 — Cambogia. F. 28. Ap. 6  
 — Camphora. F. 29. Ap. 6  
 — Camphora Composit. F. 756. Ap. 29  
 — Camphora et Hyoscyami. F. 757. Ap. 29  
 — Catechu. F. 758. Ap. 29  
 — Catechu Thebaicus. F. 30. Ap. 6  
 — Ferri. F. 31. Ap. 6  
 — Galiaci Ammoniaci. F. 32. Ap. 6  
 — Galiaci Comp. F. 33. Ap. 6  
 — Kino Thebaicus. F. 34. Ap. 6  
 — Moschi Compositus. F. 35. Ap. 6  
 — et Camphora. F. 759. Ap. 29  
 — Nitro-Camphoratus cum Opio. F. 36. Ap. 6  
 — Rhei Compositus. F. 37. Ap. 6  
 — Sedativus. F. 38. Ap. 6  
 — Sutorum clens. F. 39. Ap. 6  
 — Valeriane cum Ferro F. 40. Ap. 6  
 — Bone, formation of new. ii. 1056  
 — necrosis or mortification of. ii. 1053  
 — Bones and periosteum, syphilitic disease of. ii. 1471  
 — Bones, caries of. ii. 1053  
 — of the cranium, lesions of the. i. 599  
 — erosion of. ii. 1057  
 — foreign bodies, &c. ii. 1060  
 — fragility of. ii. 1057  
 — hydatids in. ii. 1060  
 — prognosis of. ii. 1060  
 — symptoms of. ii. 1060  
 — treatment of. ii. 1060  
 — Inflammation of. See, also, Osteitis. ii. 1053  
 — serofulous inflammation of. ii. 1057  
 — organic lesions, non-inflammatory. ii. 1057  
 — malignant tumour of. ii. 1059  
 — symptoms of malignant tumour of. ii. 1059  
 — softening of. ii. 1057  
 — treatment of softening of. ii. 1057  
 — suppuration of. ii. 1055  
 — tubercular formations in. ii. 1055  
 — symptoms of tubercular formations in. ii. 1055  
 — syphilitic disease of the. ii. 1471  
 — tumour of. ii. 1054  
 — sanguineous tumours of. ii. 1055  
 — ulceration of. ii. 1055  
 — Bothricephali, systematic description of. 1526  
 — Bothricephalus latus, described. See, also, Tænia lata. 1526  
 — Synonymes of. 1526  
 — treatment of. 1547  
 — Boyhood, remarks on. i. 49
- Brain, reflex actions of. 41  
 — atrophy of the. i. 270  
 — Bibliog. and Refer. to its diseases, &c. i. 295  
 — physical conditions of the, and spinal cord. 37  
 — congestion of, appearances, terminations, and complications. i. 273  
 — congestion of, treatment. i. 279  
 — concussion of, causing general palsy. 20  
 — determination of blood to, treatment of. i. 278  
 — ecchymosis of the. i. 277  
 — hæmorrhage in the. i. 263  
 — hardening of the. i. 271  
 — hypertrophy and atrophy of. i. 269  
 — imperfect development of the. i. 270  
 — Induration of, symptoms of. i. 273  
 — inflammation of, definition. i. 279  
 — inflammation of its membranes. See Meningitis. i. 280  
 — inflammation of the meninges and substance of—Encephalitis. i. 283  
 — inflammation of its substance. i. 261  
 — inflammation of its substance. See, also, Cephalitis vel Cerebritis. i. 282  
 — laceration of the. i. 277  
 — lesions of the, in insanity. ii. 549-552  
 — lesions of its membranes. i. 254  
 — lesions of the sinuses and vessels of. i. 260  
 — and its membranes, diseases of. i. 253  
 — the organization of, influencing the mind. ii. 578  
 — and organs of sense, morbid sympathies of. 1040  
 — rupture of the. i. 277  
 — softening of. i. 263, 292  
 — its causes. i. 267  
 — symptoms. i. 292  
 — treatment. i. 294  
 — pulpy softening of. i. 266  
 — sphacelation of. i. 265  
 — structural changes of the substance of. i. 261  
 — suppuration of. i. 262  
 — tubercles in the. i. 273  
 — tumours in the. i. 214  
 — ulceration of the. i. 265  
 — vascular determination to. i. 273  
 — Breast-pang described. i. 70  
 — Bronchi, alterations of their calibre. i. 300  
 — alterations of the fibrous, muscular, and cartilaginous structures of. i. 299  
 — of their mucous membrane. i. 296  
 — of the secretions of the. i. 293  
 — Bibliog. and Refer. to diseases of the. i. 323  
 — congestion of the. i. 301  
 — treatment of congestion of. i. 302  
 — dilatation of the. i. 321  
 — diseases of the. i. 296  
 — hemorrhage from. i. 299  
 — inflammation of. See, also, Bronchitis. i. 302  
 — perforation from tuberculosis of the glands of. 1221-22  
 — ulceration of. i. 321  
 — treatment of ulceration of the. i. 321  
 — Bronchial flux, diagnosis of. See Bronchorrhœa. i. 321  
 — Bronchitis, acute, described. i. 302  
 — diagnosis of acute. i. 303  
 — prognosis of acute. i. 310  
 — treatment of the acute states of. i. 311  
 — acute, morbid appearances of. i. 303  
 — æthenic, described. i. 304  
 — catarrhal or mild. i. 303  
 — chronic, described. i. 307  
 — the several means of cure for. i. 317



- Bronchitis, chronic, diagnosis of i. 308  
 — treatment of..... i. 317  
 — complications of..... i. 306  
 — complicated with pneumo-  
 nia..... ii. 387  
 — complicating phthisis..... 1211  
 — its complications, treatment  
 of..... i. 320  
 — its complicated states, treat-  
 ment of..... i. 315  
 — the means of cure of..... i. 312  
 — definition of..... i. 302  
 — inhalations for..... i. 313  
 — treatment of, in the third  
 stage of phthisis..... 1260  
 — prescriptions for..... i. 311  
 — regimen and diet for..... i. 320  
 — sub-acute, described..... i. 306  
 — prognosis of the sub-acute  
 and chronic..... i. 310  
 — terminations of..... i. 305  
 — true or sthenic..... i. 303  
 Bronchocele. *Bibliog. and Ref.*  
 — causes and morbid rela-  
 tions of..... i. 323  
 — defined..... i. 323  
 — diagnosis of..... i. 324  
 — treatment of..... i. 324  
 Broncho-pneumonia described.. ii. 387  
 — treatment of..... ii. 397  
 Bronchorrhoea defined..... i. 327  
 — treatment of..... i. 322  
 Bronze tint of skin a sign of dis-  
 eased supra-renal bodies..... 1570  
 Brood of Tania described..... 1525  
 Brucea, poisoning by..... 414  
 Bryonia dioica, poisoning by... 389  
 Buboes of septic pestilence no-  
 ticed..... 292  
 Bubo, syphilitic, described..... 1466  
 — diagnosis of..... 1466  
 — treatment of..... 1445  
 — treatment of indolent..... 1485  
 Bulimia, described..... i. 120  
 Bulimæ, definition of..... i. 326  
 Burial places productive of pes-  
 tilence and disease..... 106  
 Dying places, restrictions re-  
 specting, advised..... 265
- C.
- Cachexia Africana, noticed.... i. 1030  
 — of parents productive of  
 scrofula..... 802  
 — syphilitic, described..... 1471  
 — verminous, described..... 1546  
 Cachexy, *defined*..... i. 326  
 — symptoms of..... i. 326  
 — treatment of..... i. 326  
 — African, causes of..... i. 328  
 — *defined*..... i. 327  
 — described..... i. 327  
 — treatment of..... i. 327  
 — mercurial, described..... 451  
 Cacodemonia described..... ii. 525  
 Cæcum, acute inflammation of.. i. 331  
 — symptoms of acute inflam-  
 mation of..... i. 332  
 — treatment of acute inflam-  
 mation of..... i. 335  
 — chronic inflammation of the  
 — symptoms of chronic inflam-  
 mation of..... i. 334  
 — terminations and complica-  
 tions of chronic inflammation  
 of..... i. 334  
 — its diseases..... i. 328  
 — symptoms of its disorders... i. 330  
 — treatment of its disordered  
 functions..... i. 331  
 — prognosis of its diseases... i. 335  
 — disordered functions of... i. 329  
 — pathology of its disorders... i. 329  
 — inflammations of, in con-  
 nexion with *colitis*..... ii. 665  
 — causes of its inflammations i. 332  
 — treatment of other inflam-  
 matory diseases of..... i. 336  
 — inflammation of its appen-  
 dix..... i. 332  
 — treatment of inflammation  
 of its appendix..... i. 336  
 — inflammation of its sur-  
 rounding tissues..... i. 333
- Cæcum, laceration of the..... i. 335  
 Calculi, biliary, described..... i. 458  
 — intestinal, origin of..... i. 464  
 — in prostate gland..... 511  
 — diagnosis of..... 512  
 — treatment of..... 512  
 — renal, diagnosis of..... 1350  
 — symptoms of..... 1349  
 — symptoms of their pas-  
 sage to the bladder..... 1350  
 — treatment of..... 1352  
 — treatment of the pas-  
 sage of, to the bladder..... 1352  
 — vesical, treatment of..... 1352  
 — urinary, age and sex as dis-  
 posing to..... 1345  
 — urinary, *Bibliog. and Ref.*  
 — diagnosis of, in the bladder 1351  
 — symptoms of, in the bladder 1351  
 — causes of..... 1345, 9  
 — of climate, locality, and  
 race, as predisposing to..... 1346, 7  
 — mode of ascertaining their  
 composition..... 1340  
 — chemical composition of... 1340  
 — or concretions in urine, de-  
 scribed..... 1339-45  
 — urinary, from constitution-  
 al and vital conditions..... 1347  
 — urinary, diagnosis of..... 1351  
 — of diet and regimen as  
 causes of..... 1347  
 — from disease of urinary pas-  
 sages..... 1347  
 — from foreign bodies..... 1347  
 — forms of..... 1339  
 — of their growth and origin 1348, 9  
 — habits of living which pre-  
 dispose to..... 1345  
 — inferences as to their for-  
 mation..... 1348  
 — treatment of, in kidneys... 1352  
 — from mal-assimilation, &c. 1347  
 — from metamorphosis and  
 waste of tissues..... 1347  
 — origin and growth of..... 1348, 9  
 — size and weight of..... 1339  
 — surface and structure of,  
 described..... 1340  
 — symptoms of..... 1351  
 Calculous concretions, alvine... i. 463  
 Calculus, alternating, described 1343  
 — ammoniaco-magnesian phos-  
 phate, described..... 1342  
 — carbonate of lime, described 1343  
 — cystic oxide, described..... 1342  
 — fibrous, described..... 1343  
 — fusible, described..... 1342  
 — oxalate of lime, described... 1342  
 — phosphate of lime, described 1342  
 — urate of ammonia, described 1341  
 — uric acid, described..... 1340  
 — xanthic, or uric oxide, de-  
 scribed..... 1342  
 Calomel for worms..... 1560  
 Caltha palustris, poisoning by.. 389  
 Camboja, poisoning by..... 391  
 — for worms..... 1560-6  
 Camphor, in cases of insanity.. ii. 613  
 — when useful in phthisis... 1248  
 — poisoning by..... 408  
 — treatment of..... 409
- Canal, digestive, morbid changes  
 of the..... i. 619  
 Cancer, *Bibliog. and Refer.*... i. 344  
 — causes of..... i. 339  
 — definition of..... i. 337  
 — description of..... i. 337  
 — diagnosis of..... i. 338  
 — epithelial, of the uterus,  
 described..... 1404  
 — feigned..... i. 1030  
 — fungoid, or medullary of the  
 uterus..... 1402  
 — of the liver..... ii. 871  
 — microscopic diagnosis of... 790  
 — prognosis of..... 791  
 — question as to its contagion  
 considered..... 785, 6  
 — scirrhus of the uterus... 1404  
 — shown to be contagious in  
 peculiar circumstances... 785  
 — of the stomach, causes and  
 diagnosis of..... 1014
- Cancer of the stomach, symp-  
 toms of..... 1013  
 — treatment of..... 1014, 16  
 — treatment of..... i. 349  
 — various means and pre-  
 scriptions for..... i. 341-4  
 — of the womb, forms of, de-  
 scribed..... 1403-5  
 Cancer-cell, described..... 772, 3  
 Cancer nteri, causes of the... 1406  
 — symptoms of, described... 1405  
 — treatment of..... 1407  
 Cantharides, poisoning by, symp-  
 toms of..... 450  
 — treatment of..... 451  
 Capsules, supra-renal, disease  
 of. See, also, supra-renal bod-  
 ies..... 1572  
 Carbonic acid gas, appearances  
 of the body from poisoning by 462, 3  
 — treatment of poisoning by... 463  
 — deleterious operation of... 461  
 Carbonic oxide gas, poisoning  
 by..... 463  
 Carbuncle, *Bibliog. and Refer.* i. 1253  
 — causes of..... i. 1252  
 — complicated with internal  
 disease..... i. 1253  
 — description and progress of i. 1251  
 — diagnosis of..... i. 1252  
 — treatment of..... i. 1252  
 — local treatment of..... i. 1252  
 Carbuncles of septic pestilence 222, 3  
 Carburetted hydrogen gases, poi-  
 soning by..... 463  
 — appearances after death,  
 from..... 464  
 — poisoning by, treatment of 464  
 Carcinoma, or second stage of  
 cancer..... i. 338  
 — of the heart..... ii. 254  
 — means and prescriptions for i. 340  
 — of the œsophagus..... ii. 1047  
 — of the pancreas..... 9  
 Carcinomatous tumours of the  
 liver described..... ii. 871, 2  
 Cardialgia, symptoms of..... ii. 380  
 Carditis, causes of..... ii. 224  
 — complications of..... ii. 227  
 — diagnosis of..... ii. 227  
 — internal in children..... ii. 233  
 — internal, symptoms of..... ii. 211  
 — treatment of..... ii. 229  
 — progress and duration of... ii. 225  
 Carditis vera, characters of... ii. 220  
 — diagnosis of..... ii. 220  
 — structural lesions in..... ii. 220  
 — symptoms of..... ii. 223  
 Cartilage-cell, described..... ii. 773  
 Cascarilla, when of service in  
 phthisis..... 1209  
 Catalepsy, definition of..... i. 344  
 — described..... i. 344  
 — feigned..... i. 1030  
 — remarks on..... 42  
 — symptoms of..... i. 344  
 Cataleptic ecstasy, description  
 of..... i. 346  
 Cataleptic and ecstatic fits, *Bib-  
 liog. and Refer.*..... i. 349  
 — causes of..... i. 348  
 — diagnosis of..... i. 347  
 — termination of..... i. 347  
 — treatment of..... i. 348  
 Catamenia. See, also, Menstru-  
 ation..... ii. 960  
 — disordered, in connexion  
 with rheumatism..... 675  
 Cataphora, described..... i. 454  
 Cataplasma Tolutinum... F. 41. Ap. 6  
 — Sinapeos Fortius... F. 42. Ap. 6  
 — Mitius... F. 43. Ap. 6  
 Catarrh, *Bibliog. and Refer.*... i. 354  
 — causes of..... i. 350  
 — complications of..... i. 352  
 — definition of..... i. 349  
 — epidemic. See Influenza.. ii. 489  
 — nature of..... i. 372  
 — prescriptions for..... i. 353  
 — prognosis of..... i. 351  
 — symptoms of..... i. 350  
 — treatment of..... i. 351  
 Catarrhus stomachalis..... i. 350

- Cathartics, arrangement and enumeration of ..... 1146
- Causation of choleric pestilence considered. .... 115-37
- of disease ought to be made an object of study. .... 1131
- of suicide. .... ii. 636-49
- Causes, the predisposing, to disease. .... i. 645
- predisposing to insanity. .... ii. 555
- productive of insanity. .... ii. 561
- recognition and removal of all, requisite to the treatment of disease. .... 1133
- acting on the several functions. .... i. 651
- Cautions required in ascertaining the causes of vomiting. .... 1506
- Cavities of the heart, dilatation of. .... ii. 244
- causes of. .... ii. 244
- of the lungs in phthisis described. .... 1194
- serous, hemorrhage into. .... ii. 250
- tubercular, in the lungs, their cicatrization. .... 1219
- tubercular, in the lungs, healing processes of, described. .... 1219
- and vomica of the lungs, contents of, may be absorbed. .... 1219
- Celiacy, a cause of phthisis and how. .... 1230
- Cells, forms of, in morbid growths. .... 772-5
- Cellular tissue, cedematous, hardening of. .... i. 362
- diagnosis and prognosis of indurations of. .... i. 364
- alterations of. .... i. 354
- *Bibliography and Refer.* .... i. 365
- causes of indurations of. .... i. 364
- induration of, *definition of.* .... i. 362
- pathology of induration of the. .... i. 363
- treatment of indurations of. .... i. 364
- causes of diffusive inflammation of. .... i. 356
- diffusive inflammation of, complicating scarlet fever. .... 735
- curative treatment of diffusive inflammation of. .... i. 360
- diagnosis and complications of diffusive inflammation of. .... i. 358
- diffusive inflammation of, *definition of.* .... i. 355
- morbid changes from diffusive inflammation of. .... i. 357
- pathological inferences as to diffusive inflammation of. .... i. 359
- prognosis of diffusive inflammation of the. .... i. 360
- prophylactic treatment of diffusive inflammation of. .... i. 360
- symptoms of diffusive inflammation of. .... i. 356
- terminations of diffusive inflammation of. .... i. 357
- treatment of diffusive inflammation of. .... i. 360
- Cephalalgia, described. See, also, Headache. .... ii. 167-81
- Cephalitis, *definition of.* .... i. 282
- symptoms of. .... i. 282
- Cerebellum, lesions of, occasioning paralysis. .... 37
- Cerebral congestion, described. .... i. 278
- diseases, the relations of, to cachectic nephritis. .... ii. 745
- functions, treatment of their disorders in fever. .... i. 1081
- organs, connexions subsisting between, and the mind. ii. 587, 90
- Cerebral plethora, causes and symptoms of. .... i. 278
- Cerebritis, description of. .... i. 281
- general and partial. .... i. 282
- Cerebro-spinal affections connected with gastro-enteritis. .... ii. 30
- fluid in connexion with palsy. .... 38
- meningitis, symptoms and appearances of. .... 958
- Cerebrum, inflammation of the. See, also, Cerebritis. .... i. 282
- Cestoides, developmental history of. .... 1521
- sub-order of Platyhelmin, described. .... 1519
- Chalybeates, of their use in phthisis. .... 1269
- Chancre, description of. .... 1464
- gangrenous, treatment of. .... 1485
- indurated or Hunterian. .... 1485
- sloughing. .... 1486
- urethral. .... 1486
- varieties of, described. .... 1485
- Changes of climate, diseases benighted by. .... i. 411
- effects of. .... i. 404
- Charcoal, when useful in phthisis. .... 1268
- Charlatanism and impostures, &c., retard therapeutical knowledge. .... 1130
- Cheese, poisonous effects of. .... 428
- Chelidonium majus, poisoning by. .... 409
- Chest, deformities of the, described. .... i. 367
- their treatment. .... i. 368
- examination of the. .... i. 365
- signs furnished by. .... 1083
- Chicken-pox, conical. .... i. 370
- *definition of.* See Varicella. .... i. 369
- diagnosis of. .... i. 370
- globular, described. .... i. 370
- lenticular, described. .... i. 370
- treatment of. .... i. 371
- Childhood, remarks respecting. .... i. 40
- Children, convulsions of. .... i. 484
- paralysis of. .... 24, 5
- acuto peritonitis in. .... 82
- of phthisis in. .... 1207
- spastic convulsions of. .... i. 485
- of syphilis in. .... 1472
- Chin-cough. See, also, Hooping-cough. .... ii. 273
- Chlorate of potash, effects of. .... 452
- Chlorides, several advised in scrofula. .... 832
- Chlorine and the chlorides, poisoning by. .... 451
- treatment of. .... 451
- Chloroform and chloric ether, of their anæsthetic effects. .... 464
- Chlorosis, *Bibliog. and Refer.* .... i. 375
- causes of. .... i. 370
- *definition of.* .... i. 371
- diagnosis of. .... i. 372
- history and symptoms. .... i. 372
- means prescribed for. .... i. 374
- pathology of. .... i. 373
- prognosis of. .... i. 373
- treatment of. .... i. 374
- Cholera, autumnal, *definition of.* .... i. 375
- *Bibliog. and Refer.* .... i. 382
- causes and pathological states of. .... i. 379
- diagnosis of, and corrosive poisons. .... 366
- diagnosis between, and pestilential cholera. .... i. 379
- history and symptoms of. .... i. 375
- medicines prescribed for. .... i. 381
- treatment of. .... i. 380
- Cholera biliosa, causes and states of. .... i. 375
- *defined.* .... i. 375
- symptoms of. .... i. 377
- Cholera flatulenta, causes of. .... i. 377
- *defined and described.* .... i. 377
- Cholera spasmodica, causes, symptoms, &c., of. .... i. 378
- *defined and described.* .... i. 378
- Choleric fever of infants, causes and symptoms of. .... i. 382
- of infants *defined.* .... i. 382
- prophylactic and regimenal means for. .... i. 384
- treatment of. .... i. 383
- Cholecystitis, *defined.* .... ii. 6
- Chorea, affections resembling. .... i. 390
- appearances after death. .... i. 388
- *Bibliog. and Refer.* .... i. 396
- the causes of. .... i. 389
- Chorea, complications and terminations of. .... i. 387
- *defined.* .... i. 387
- indications of cure in. .... i. 392
- diagnosis and prognosis of. .... i. 388
- history of medicines, recommended for its cure. .... i. 392
- history and symptoms of. .... i. 387
- nature of. .... i. 389
- prescriptions for. .... i. 395
- in connection with rheumatism. .... 674
- treatment of. .... i. 392
- treatment advised by the author. .... i. 393
- treatment of complicated and irregular states. .... i. 395
- torsk and cod-liver oil first advised for, by the author. .... i. 393
- Choroid plexus, changes in. .... i. 259
- Choroiditis, symptoms and treatment of. .... i. 1020
- Chrono, acceptance of the word. .... i. 683
- Chrysiad, disorders of. .... i. 622
- Chymification, disorders of. .... i. 622
- Cicuta virosa, poisoning by. .... 465
- Cinchona, of its use in phthisis. .... 1269
- Circulation affected by muscular contractions. .... 1112
- conditions of, complicating disease. .... 1049, 50
- influence of the organic nervous system on the. .... 1040-52
- Circumcision, sanitary importance of this rite. .... 456
- Circumstances of life as predisposing to disease. .... i. 647
- modifying the form, duration, and termination of disease. .... i. 687
- Cirrhosis of the liver. .... ii. 869
- Classification of the affections and manifestations of mind. .... ii. 512
- of infectious agents. .... ii. 402
- of diseases of the skin. .... 863-874
- of disorders of the mind. ii. 510-13
- of hemorrhages. .... ii. 79
- of lunatics required. .... ii. 624
- of states of insanity, by the author. .... ii. 512
- of therapeutical agents. .... 1144-8
- of poisons. .... 482-3
- synopsis of. .... 510
- of healthy and morbid sympathies. .... 1029, 30
- Climacteric decay, causes of. .... i. 397
- *definition of.* .... i. 396
- symptoms of. .... i. 396
- treatment of. .... i. 397
- disease, *Bibliog. and Refer.* .... i. 398
- Climate, in the North Atlantic. .... i. 411
- *Bibliog. and Refer.* .... i. 413
- as regards the causation and cure of diseases. .... i. 404
- of change from a cold or a temperate to a warm. .... i. 409
- effects produced by change of. .... i. 400
- of change from a warm to a cold or temperate. .... i. 410
- as regards the food of man. .... i. 407
- in relation to preventing diseases. .... i. 404
- the elements of, or conditions constituting. .... i. 398
- of certain places in England. .... i. 411
- as influencing the food and varieties of the species. .... i. 407
- changes of, as a means of cure. .... i. 409
- general view of. .... i. 401
- and localities disposing to phthisis. .... 1232-37
- the physical relations of. .... i. 395
- as a remedial agent. .... i. 411
- and season, influence of, on insanity. .... ii. 550
- as a therapeutical agent. .... 1132
- in relation to the varieties of the human species. .... i. 404
- Clothing proper for the insane. .... ii. 594
- Coagulation and appearances of the blood. .... 1045, 6
- Coal-gas, poisoning by. .... 463



- Coal-gas, poisoning by, treat-  
 ment of ..... i. 412  
 Coast, south of England, climate  
 of ..... i. 412  
 Cocculus Indicus, poisoning by ..... i. 414  
 Colchicum autumnale, poison-  
 ing by ..... i. 423  
   — treatment of ..... i. 424  
 Cold, *Bibliog. and Refer.* ..... i. 425  
   — causation of disease by ..... i. 422  
   — as causing and curing dis-  
   eases ..... i. 419  
   — changes after death from ..... i. 422  
   — circumstances favouring  
   the effects of ..... i. 422  
   — counteraction of its ill ef-  
   fects ..... i. 423  
   — death by ..... i. 420  
   — effects produced by ..... i. 419  
   — effects of, in various states  
   of the system ..... i. 421  
   — effects of, on the brain, or-  
   gans of sense, &c. .... i. 421  
   — physiological and patholog-  
   ical effects of ..... i. 419  
   — prevention of its ill effects ..... i. 423  
   — the remedial action of ..... i. 423  
   — stage in fevers ..... i. 1046  
   — treatment of its ill effects ..... i. 423  
 Cold ingesta, treatment of their  
 bad effects ..... i. 423  
 Colic and ileus, *Bibliog. and  
 Refer.* ..... i. 448  
 Colic, definition of ..... i. 426  
   — the diagnosis and prognosis  
   of ..... i. 436  
   — divisions of its species ..... i. 426  
   — after parturition ..... i. 45  
   — remarks on its pathology ..... i. 435  
   — from morbid secretions,  
   treatment of ..... i. 438  
   — species of, described ..... i. 426  
   — treatment of ..... i. 436  
   — bilious, pathology of ..... i. 429  
   — bilious, treatment ..... i. 437  
 Colic, complicated states of ..... i. 434  
   — complicated, treatment of ..... i. 446  
   — from injurious ingesta,  
   treatment of ..... i. 437  
   — from obstruction, descrip-  
   tion of ..... i. 432  
   — from obstruction, treatment  
   of ..... i. 442  
   — simple, defined ..... i. 427  
   — treatment of its simple or  
   functional form ..... i. 436  
   — sympathetic or symptomat-  
   ic forms of ..... i. 434  
   — symptomatic, treatment of ..... i. 446  
 Colic, lead, definition of ..... i. 430  
   — pathology of ..... i. 430  
   — remedies advised for ..... i. 439  
   — symptoms of ..... i. 430  
   — treatment of ..... i. 439  
   — treatment of the sequelæ  
   of ..... i. 442  
 Colica biliosa, described ..... i. 428  
   — ciliaris, described ..... i. 427  
   — constricta, treatment of ..... i. 442  
   — hepatica, described ..... i. 428  
   — saturnina, pathology of ..... i. 430  
 Colitis, acuta, symptoms of ..... ii. 666  
   — chronic, symptoms of ..... ii. 666  
 Colloid, or glue-like substance,  
 noticed ..... i. 676  
 Colloid, or gum-cancer, or glue-  
 cancer, described ..... 779  
 Colon, *Bibliog. and Refer.* ..... i. 453  
   — its diseases ..... i. 449  
   — flatulent distension of ..... i. 449  
   — fecal collections in ..... i. 449  
   — inflammation of. See, also,  
   Colitis ..... ii. 665-7  
   — over-distension of ..... i. 450  
   — torpor of, defined ..... i. 449  
   — effects of ..... i. 450  
   — treatment ..... i. 451  
   — unnatural positions of ..... i. 452  
 Colour of the blood, changes in ..... 1045  
   — changes of, in the skin ..... 1059, 60  
 Column, spinal, diseases of ..... 928  
 Coma, *Bibliog. and Refer.* ..... i. 458  
   — complicating scarlet fever ..... i. 436  
 Coma, definition of ..... i. 453  
 Coma, diagnosis, duration, and  
 terminations ..... i. 454  
   — pathology of ..... i. 455  
   — profundum, described ..... i. 454  
   — prognosis of ..... i. 455  
   — somnolentum, described ..... i. 454  
   — symptomatic ..... i. 455  
   — treatment of ..... i. 457  
   — varieties and symptoms of ..... i. 453  
   — various states of, treatment  
   of ..... i. 457  
 Coma vigil described ..... i. 453  
 Communications between the  
 sides of the heart described ..... ii. 260  
   — symptoms of ..... ii. 261  
 Compartments of the heart, signs  
 of their hypertrophy ..... ii. 241  
 Complications of disease from  
 morbid state of blood ..... 1049  
   — of diseases, their sources or  
   causes examined ..... 1038  
   — of, from lesions of the heart  
   of scarlet fever, treatment  
   of ..... 750, 61  
 Composition, chemical, of urin-  
 ary calculi ..... 1340  
   — mode of ascertaining the ..... 1340  
 Concretions, biliary, *Bibliog. and  
 Refer.* ..... i. 463  
   — causes of ..... i. 461  
   — composition and situa-  
   tion of ..... i. 459  
   — definition of ..... i. 458  
   — description of ..... i. 458  
   — diagnosis and prognos-  
   is of ..... i. 462  
   — lesions produced by ..... i. 460  
   — symptoms of ..... i. 459  
   — symptoms of their pas-  
   sage ..... i. 460  
   — treatment of the pas-  
   sage of ..... i. 462  
   — treatment of ..... i. 462  
   — calcareous, expectoration of ..... 1094  
   — expectorated in phthisis ..... 1219  
   — fatty, noticed ..... i. 466  
   — felting of ..... i. 1036  
   — fibrous, in the cavities of  
   the heart ..... i. 255  
   — heterogeneous ..... i. 466  
   — intestinal, *Bibliog. and  
   Refer.* ..... i. 467  
   — causes of ..... i. 465  
   — definition of ..... i. 463  
   — local effects of ..... i. 465  
   — origin and composition  
   of ..... i. 464  
   — symptoms of ..... i. 465  
   — treatment of ..... i. 466  
   — in the pancreas ..... 1219  
   — in tuberculated lungs, their  
   formation ..... 1339-40  
   — urinary. See, also, Calculi,  
   urinary ..... 1339-45  
   — or calculi in urine described ..... 20  
 Concussion of the brain ..... 1133  
 Conditions or states, pathologic-  
 al, must be studied in all cases ..... 1133  
   — requisite for paracentesis  
   thoracis ..... 332  
 Condylomata, described ..... 1467  
 Confectio Menthe Viridis. F. 44. *Ap. 6*  
   — Senna Comp. .... F. 45. *Ap. 6*  
 Confinement, causing disease ..... i. 137  
 Congestion, the accession and  
 causes of ..... i. 468  
   — appearances of congested  
   parts ..... i. 469  
   — *Bibliog. and Refer.* ..... i. 471  
   — of blood ..... i. 467  
   — of blood the removal of ..... 1142  
   — of the brain, symptoms and  
   causes of ..... i. 278  
   — of the bronchi ..... i. 301  
   — consequences and termina-  
   tions of ..... i. 469  
   — doctrine of, in fever exam-  
   ined ..... i. 1062  
   — of the mamma ..... ii. 935  
   — of the venous sinuses of the  
   vertebræ, effects of ..... 40  
   — symptoms of ..... i. 469  
   — textures most liable to ..... i. 470  
 Congestion, treatment of ..... i. 470  
 Congest, symptoms of poisoning  
 by ..... 465  
   — use of, in phthisis ..... 1269  
 Conjunctiva, inflammation of ..... i. 986  
   — See, also, Conjunctivitis ..... i. 987  
 Conjunctivitis, symptoms of ..... i. 987  
   — diagnosis of ..... i. 987  
   — terminations of ..... i. 987  
   — treatment of ..... i. 987  
 Connexion of gastro-enteritis  
 with cerebro-spinal affections ..... ii. 30  
   — subsisting between the mind  
   and cerebral organs ..... ii. 573  
 Consecutive causes of diseases ..... i. 657  
 Consensus nervorum, noticed ..... 1027  
 Conserva Acetousella. .... F. 46. *Ap. 6*  
 Consistence, alterations of, in  
 the heart ..... ii. 249  
   — treatment of ..... ii. 250  
 Constipation, *Bibliog. and Refer.* ..... i. 479  
   — causes of ..... i. 472  
   — consequences and termina-  
   tions of ..... i. 474  
   — definition of ..... i. 471  
   — duration, &c. .... i. 471  
   — lesions occasioning ..... i. 473  
   — means and prescriptions for ..... i. 475  
   — pathology of ..... i. 471  
   — during pregnancy ..... 502  
   — treatment of ..... 502  
   — prescriptions for ..... i. 475  
   — prognosis of ..... i. 475  
   — synopsis of its treatment ..... i. 478  
   — treatment of ..... i. 475  
   — treatment of obstinate ..... i. 476  
   — prolonged, treatment of ..... i. 476  
 Constitution and habit of body  
 as predisposing to disease ..... i. 647  
 Constitution, effects of irritation  
 upon ..... ii. 706, 7  
   — prevailing epidemic, should  
   be studied ..... 1133  
 Constrained positions cause dis-  
 ease ..... i. 144  
 Constriction of aorta ..... i. 88  
   — of arteries ..... i. 132  
 Consumption, pulmonary, diet  
 advised in ..... 1284  
   — means of prevention advised  
   for ..... 1250  
   — remarks on the remedies  
   used in ..... 1267-77  
   — pulmonary, the treatment  
   of ..... 1240-67  
   — treatment advised for by  
   authors ..... 1240-50  
   — treatment advised when it  
   is threatened ..... 1252  
   — treatment of its usual form ..... 1252  
   — tubercular. See, also,  
   Phthisis ..... 1188-1285  
 Contagion. See, also, Infection. ii. 401  
   — means which protect from. ii. 417  
   — manner in which the sys-  
   tem is invaded by it ..... ii. 414  
   — morbid impression made by it ..... ii. 416  
 Contamination of blood, sources  
 of ..... 1047-50  
   — and structures from  
   absorption of morbid matters ..... i. 28  
   — of circulating fluids, sources  
   of ..... 1042-50  
   — syphilitic, description and  
   diagnosis of ..... 1471  
 Contamination consequent upon  
 phlebitis, treatment of ..... 1450  
 Contaminations, occasioning  
 puerperal diseases ..... 538-40  
 Contiguity and proximity of po-  
 sition a cause of sympathy ..... 1007  
 Continuity of surface a cause of  
 sympathy ..... 1033, 1007  
 Contractility, cerebro-spinal, de-  
 scribed ..... ii. 694  
   — insensible organic, de-  
   scribed ..... ii. 694  
   — sensible organic, described ii. 694  
   — various grades of, described ii. 694  
 Contractions of the cavities and  
 orifices of the heart ..... ii. 249  
   — treatment of ..... ii. 249  
   — of muscles, effects of on the  
   circulation ..... 1112

- Contractions of muscles, effects of, on the blood..... 1113
- Contra-indications of cure, remarks on..... 1113
- Convalescence from fever, symptoms and stages..... i. 1048
- contingencies and treatment of..... i. 1083
- Convulsions, *Bibliog. and Refer.* i. 505
- exciting causes of..... i. 491
- remote and efficient causes of..... i. 490
- acute or spastic, of children i. 485
- of children, diet and regimen for..... i. 501
- prevention of..... i. 498
- treatment of..... i. 498
- treatment of symptomatic..... i. 483
- chronic, described..... i. 483
- complications of..... i. 488
- complicating scarlet fever..... 736
- consequences and terminations of..... i. 489
- definition of..... i. 479
- diagnosis of..... i. 489
- duration and recurrence of..... i. 484
- from exhaustion, hemorrhage, &c., treatment of..... i. 495
- forms of..... i. 481
- general, described..... i. 483
- general, indications of cure of..... i. 492
- infantile, description of..... i. 484
- their duration and recurrence..... i. 485
- the premonitory signs..... i. 485
- the treatment of..... i. 498
- from irritation, treatment of local, described..... i. 495
- various means advised for..... i. 496
- modifications of..... i. 484
- pathology of..... i. 492
- partial, described..... i. 482
- during pregnancy..... 504
- prevention of the paroxysms of..... i. 495
- puerperal..... i. 486
- modifications of puerperal..... i. 487
- puerperal, prevention of..... i. 504
- puerperal, remedies advised for..... i. 503
- puerperal, the premonitory symptoms..... i. 486
- puerperal, treatment of..... i. 492
- regimen for..... i. 498
- symptoms of..... i. 487
- remedies for..... i. 503
- symptomatic states of..... i. 487
- tonic, described..... i. 485
- treatment of..... i. 492
- Convulsive disorders resembling chorea..... i. 500
- Copper, poisoning by its preparation, &c..... 385
- treatment..... 385
- compounds and preparations of, poisoning by..... 433
- Copper vessels, poisoning by..... 433
- Cord, spinal, causes of its diseases..... 935-8
- Cornes, inflammation of. See, also, Cornetitis..... i. 1013
- Cornetitis acutis, described..... i. 1014
- seroflous, described..... i. 1014
- sub-acute et chronicis, described..... i. 1014
- Cosmetics, mineral and vegetable..... 1145
- Corrosive sublimate, of its use in syphilis..... 1486
- Costiveness of bowels..... i. 471
- Cough, *Bibliog. and Refer.* i. 508
- causes of..... i. 506
- definition of..... i. 506
- humid, described..... i. 507
- remedies for..... i. 507
- as a symptom of phthisis..... 1199
- idiopathic, treatment of..... i. 507
- symptomatic, treatment of..... i. 507
- treatment of, in second stage of phthisis..... 1258
- Countenance, signs of disease furnished by..... 1087, 59
- Cow-pox, complications of..... 1419
- defined and described. See, also, Vaccination..... 1414
- inoculated..... 1417
- protective influence of..... 1421
- regular—inoculated..... 1414
- irregular or anomalous..... 1415
- nature of..... 1416
- inferences respecting..... 1417
- recurrent..... 1416
- Cramps, as signs of disease..... 1066
- Cranial bones, diseases of the..... i. 509
- Cranioscopy or phrenology, remarks on, in relation to sanity..... 578-584
- Cranium, *Bibliog. and Refer.* i. 511
- lesions of its bones..... i. 509
- lesions of the envelopes of the..... i. 508
- Cresote, of its use in phthisis..... 1269
- Cretenism, *Bibliog. and Refer.* i. 513
- causes of..... i. 512
- definition of..... i. 511
- description of..... i. 511
- treatment of..... i. 512
- Crisis, *Bibliog. and Refer.* i. 519
- causes of..... i. 516
- defined and described..... i. 513
- hemorrhagic..... i. 515
- manifestations of..... i. 513
- pathological remarks respecting..... i. 513
- stage of, in fevers..... i. 1047
- Critical days, remarks on..... i. 518
- Croton Tiglium, poisoning by..... 889
- Croup, acutely inflammatory, described..... i. 523
- *Bibliog. and Refer.* i. 546
- causes of..... i. 525
- complicated with exanthematous fevers..... i. 526
- complications of..... i. 525
- curative treatment..... i. 534
- definition of..... i. 519
- diagnosis of..... i. 527
- diet and regimen in..... i. 546
- history of..... i. 520
- humid and spasmodic forms, treatment of..... i. 539
- modifications of..... i. 523
- mucous or bronchial..... i. 524
- nature of..... i. 532
- pathological conclusions..... i. 533
- pathology of..... i. 530
- prophylactic treatment..... i. 546
- remarks on remedies recommended for..... i. 540
- remedies advised for..... i. 534, 40
- sequelae of, treatment for..... i. 540
- the..... i. 540
- spasmodic, described..... i. 524
- stages of, described..... i. 521
- terminations and prognosis..... i. 527
- treatment of..... i. 534
- treatment of consecutive and complicated..... i. 539
- usual form of..... i. 521
- Crystals in morbid growths..... 775
- Cuemis Colocynthis, poisoning by..... 389
- Cupreous poisoning, diagnosis of..... 433
- treatment of..... 434
- Cupreous poisons, operation of..... 434
- appearances from..... 434
- Curvatures of the spine described..... 938-40
- treatment of..... 940, 4
- Cuticle, affections of the..... 863
- Cyanosis, cause of..... i. 253
- defined..... i. 251
- lesion in..... i. 252
- symptoms, &c., of..... i. 251
- treatment of..... i. 253
- Cynanche pharyngea. See, also, Pharyngitis..... 1153
- Cynanche tonsillaris. See, also, Tonsillitis..... 1150, 3
- Cynanche trachealis. See, also, Croup..... i. 519
- Cysticercal stage of Tania described..... 1524
- Cysticercus cellulosa, described..... 1528
- identity of with Tania soium..... 1528
- Cysticercus cellulosa, symptoms produced by..... 1530
- tennicollis, systematic and general description of..... 1532
- various species of, noticed..... 1525
- Cystine, indications of, cure for..... 1327
- the origin of..... 1327
- pathological relations of..... 1326
- Cystitis, acute, description of..... 1303
- duration and terminations of..... 1303
- suppuration and gangrene from..... 1304
- treatment of..... 1310
- appearances after death from..... 1306
- causes of..... 1307
- chronic, described..... 1304
- terminations of..... 1304
- treatment of..... 1311
- complications of..... 1305, 6
- diagnosis of..... 1306
- primary seat of..... 1300
- prognosis of..... 1307
- synonyms of, and definition..... 1200
- treatment of..... 1310
- true seat of..... 1302
- Cysts or vesicles, described..... ii. 295
- compound, described..... ii. 296
- description of, containing hydatids..... ii. 293
- in the heart..... ii. 253
- in the liver..... ii. 872
- Cytoblastema, of morbid growth described..... 771
- D.
- Daphne Gnidium and D. Mezereum, poisoning by..... 390
- Day-blindness. See, also, Hemeralopia..... ii. 1020
- Deafness, *Bibliog. and Refer.* ii. 192
- Deafness and dumbness..... ii. 190
- Deafness from diseases of the Eustachian tube..... ii. 186, 9
- treatment of..... ii. 186
- Deafness from affection of the external ear..... ii. 182
- treatment of..... ii. 183
- and deaf dumbness, feigned i. 1031
- from lesions of the tympanic cavity..... ii. 185
- of local remedies for ii. 190, 2
- from various pathological states of the auditory organ..... ii. 183
- treatment of..... ii. 184
- of the remedies advised for..... ii. 190-2
- from diseases of the tympanic membranes..... ii. 182
- Debility of associated organs..... i. 552
- *Bibliog. and Refer.* i. 560
- a cause of phthisis..... 1239
- of the cerebro-spinal system..... i. 553
- of the circulating systems..... i. 552
- consecutive or secondary..... i. 550
- consecutive, treatment of..... i. 553
- consequences and terminations of..... i. 555
- of convalescence, treatment of..... i. 559
- complicated, described..... i. 551
- complicated, treatment of..... i. 553
- definition of..... i. 547
- diagnosis of..... i. 555
- special effects of..... i. 551
- from exhaustion..... i. 551
- feigned, noticed..... i. 1031
- of the general system..... i. 554
- sympathetic..... i. 550
- of the muscular system..... i. 553
- of the organic nervous system..... i. 552
- of various organs, treatment of..... i. 553
- pathological conditions of..... i. 553
- pathological relations of..... i. 555
- causes and states of primary..... i. 548
- treatment of primary..... i. 556
- regimen and diet of..... i. 560
- of respiratory and assimilating functions..... i. 553
- of sexual organs..... i. 553



- Debility, characteristic signs of  
 general..... i. 554  
 — states and manifestations of i. 547  
 — treatment of..... i. 556  
 Decay, climacteric..... i. 596  
 Decoctum Althææ..... F. 47. Ap. 6  
 — Aretii Lappæ..... F. 48. Ap. 6  
 — Comp..... F. 49. Ap. 6  
 — et Infusum Baccabagæ..... F. 50. Ap. 6  
 — Calumbæ Composit. F. 51. Ap. 6  
 — Cacuminum Pini Compositum..... F. 52. Ap. 6  
 — Cinchouæ Compositum..... F. 53. Ap. 6  
 — — Aperiens..... F. 53. Ap. 6  
 — — et Rhei..... F. 55. Ap. 6  
 — et Serpentaria..... F. 56. Ap. 6  
 — Cydoniæ Compositum..... F. 57. Ap. 6  
 — Deobstruens..... F. 58. Ap. 7  
 — Depurans..... F. 59. Ap. 7  
 — Dulcamare..... F. 60. Ap. 7  
 — — Comp..... F. 61. Ap. 7  
 — Filicis Compositum..... F. 62. Ap. 7  
 — Gallæ..... F. 63. Ap. 7  
 — Gentianæ Comp..... F. 64. Ap. 7  
 — Guaiaci et Dulcamare Comp..... F. 65. Ap. 7  
 — Helenii Comp..... F. 66. Ap. 7  
 — Inule Comp..... F. 67. Ap. 7  
 — Pectorale Elæneri..... F. 68. Ap. 7  
 — Punice Granati..... F. 69. Ap. 7  
 — Quassie Compos..... F. 70. Ap. 7  
 — Santonici..... F. 71. Ap. 7  
 — Sarzæ Compos..... F. 72. Ap. 7  
 — Secalis Cornuti..... F. 73. Ap. 7  
 — Senegæ..... F. 74. Ap. 7  
 — Scoparii Comp..... F. 75. Ap. 7  
 — Taraxaci Comp..... F. 76. Ap. 7  
 — — Comp. Stollii..... F. 77. Ap. 7  
 — Tormentillæ..... F. 78. Ap. 7  
 Decrepitude, described..... i. 560  
 Degeneration of structure of the heart, partially into fat..... ii. 250, 2  
 — causes of..... ii. 251  
 — treatment of..... ii. 252  
 Deglutition, difficult, described. i. 561  
 — difficult. See, also, Dysphagia..... i. 561  
 — as a sign of disease..... 1079  
 Delirium, *Bibliog. and Refer.*..... i. 571  
 — defined..... i. 565  
 — diagnosis of..... i. 567  
 — from exhausted nervous influence..... i. 568  
 — from exhausted vital power and excited vascular action.. i. 568  
 — from inflammatory action in the brain, or its membranes... i. 568  
 — lesions in fatal cases..... i. 568  
 — pathology of..... i. 568  
 — phenomena of..... i. 566  
 — prognosis of..... i. 569  
 — treatment of, recommended by authors..... i. 570  
 — treatment of, in third stage of phthisis..... 1569  
 — treatment of its several states..... i. 569  
 — with tremor, described..... i. 571  
 — the causes of..... i. 572  
 — the different states of..... i. 572  
 — distinctions of forms of..... i. 572  
 — symptoms of..... i. 573  
 — modifications of their symptoms..... i. 574  
 Delirium Tremens. See, also, Delirium with tremor..... i. 571  
 — *Bibliog. and Refer.*..... i. 580  
 — the diagnosis of..... i. 574  
 — pathology of..... i. 575  
 — prognosis of..... i. 575  
 — remedies recommended for treatment..... i. 576  
 — of its stages..... i. 576  
 — of its first form..... i. 576  
 — of its second form..... i. 577  
 Delivery, of convalescence after deviations from the natural course of convalescence after, feigned, noticed..... i. 1031  
 — hemorrhage during..... ii. 130  
 Delusions, description and classification of, in insanity..... ii. 502, 5  
 Delusions in insanity, their sources..... ii. 519  
 Dementia, causes of..... ii. 533  
 — diagnosis of..... ii. 532  
 — prognosis of..... ii. 533  
 — described..... ii. 530  
 — forms and states of..... ii. 531  
 — treatment of..... ii. 602  
 Demonomania, description of..... ii. 524  
 — treatment of..... ii. 509  
 Demulcents, enumeration and arrangement of..... 1145-6  
 Dengue. See, also, Scarlatina rheumatica..... 721  
 Denticola hominis, described... 1620  
 Dentition, difficult, *Bibliog. and Refer.*..... i. 582  
 — defined..... i. 580  
 — pathological relations of difficult..... i. 580  
 — treatment of..... i. 581  
 — the treatment of sympathetic disorders of..... i. 582  
 Deobstruens, recommended for dropsy..... i. 709  
 — vegetable, mineral, and animal..... 1147  
 Deposits of blue and black matters in urine..... 1335  
 — calculous, of uric acid, and its combinations..... 1325  
 — earthy and ossific, in the heart and pericardium..... ii. 252  
 — signs of..... ii. 252  
 — organic, in the urine..... 1335  
 — phosphatic, in urine, pathological relations of..... 1332, 4  
 — in urine, therapeutical relations of..... 1334, 5  
 — of uric acid, and its combinations, diagnosis of..... 1322, 4  
 — treatment of..... 1323, 6  
 — urinary, their formation 1321, 2  
 Depression. See, also, Debility  
 — lateral, of the ribs..... i. 367  
 — of the ribs, treatment of... i. 368  
 Depurans advised in morbid states of the blood..... i. 249  
 — arrangement and enumeration of..... 1146  
 Depuration of blood, necessity for promoting..... 1137, 9  
 — by the emunctories, requisite to health..... i. 238  
 — functions of, on the states of the blood..... i. 243  
 — means of, for morbid states of the blood..... i. 248  
 Derivation, means of producing i. 218  
 Derivatives in cases of insanity ii. 615  
 — of their use in phthisis..... 1276  
 Descent of the uterus..... 1387  
 — symptoms of..... 1389  
 — treatment of..... 1389  
 Desire for food and drink, disordered states of..... i. 621  
 Dependency during pregnancy  
 — treatment of..... 604  
 Destruction of organized parts. i. 679  
 Determining or consecutive  
 — causes of disease..... i. 657  
 Diabetes, *Bibliog. and Refer.*... i. 598  
 — causes of..... i. 588  
 — complications of..... i. 586  
 — indications of cure for..... i. 596  
 — definition of..... i. 583  
 — diet and regimen for..... i. 597  
 — duration of..... i. 586  
 — organic changes..... i. 586  
 — prognosis of..... i. 587  
 — proximate cause of..... i. 588  
 — remedies prescribed for... i. 586  
 — symptoms of..... i. 584  
 — terminations of..... i. 586  
 — treatment of..... i. 592  
 — treatment proposed by the author..... i. 595  
 — treatment of, proposed by writers..... i. 592  
 Diabetes mellitus described..... i. 583  
 Diagnosis of diseases..... 1056-1099  
 Diaphoretics, arrangement and enumeration of..... 1146  
 Diaphragm, *Bibliog. and Refer.* i. 602  
 Diaphragm, inflammation of.  
 See Diaphragmitis..... i. 599  
 — inflammation of, *defined*... i. 599  
 — seat of inflammation of... i. 599  
 — organic lesions of..... i. 601  
 — paralysis of..... i. 602  
 — rupture of..... i. 601  
 — spasms of..... i. 602  
 Diaphragmitis, appearances after death..... i. 600  
 — causes of..... i. 599  
 — in connexion with rheumatism..... 675  
 — complications of..... i. 600  
 — prognosis of..... i. 600  
 — symptoms..... i. 600  
 — terminations of..... i. 600  
 — treatment of..... i. 601  
 Diarrhœa, appearances after death from..... i. 607  
 — associations or complications of..... i. 606  
 — *Bibliog. and Refer.*..... i. 619  
 — bilious, described..... i. 603  
 — treatment of bilious..... i. 610  
 — chronic, feigned..... i. 1031  
 — chronic mucous, treatment of..... i. 611  
 — of children, medicines prescribed for..... i. 614  
 — in children, when weaning i. 606  
 — colliquative, treatment of i. 616  
 — complicated, treatment of i. 616  
 — in the dark races..... i. 606  
 — treatment of..... i. 615  
 — definition of..... i. 602  
 — diagnosis of..... i. 609  
 — with discharge of unaltered ingesta..... i. 605  
 — duration and termination of i. 607  
 — idiopathic, described..... i. 603  
 — treatment of idiopathic... i. 609  
 — in infants and children, treatment of..... i. 614  
 — inflammatory..... i. 604  
 — treatment of inflammatory i. 610  
 — lenticular, treatment of..... i. 613  
 — mucous, or catarrhal..... i. 604  
 — treatment of mucous..... i. 611  
 — during pregnancy..... 502  
 — treatment of..... 502  
 — prognosis of..... i. 609  
 — puerperal, described..... i. 605  
 — treatment of..... i. 613  
 — regimen and diet for..... i. 618  
 — relations of..... i. 605  
 — remedies for, recommended by authors..... i. 616  
 — symptoms of..... i. 602  
 — symptomatic, described... i. 603  
 — treatment of idiopathic... i. 609  
 — treatment of symptomatic i. 610  
 — treatment of, in second stage of phthisis..... 1268  
 — treatment of, in third stage of phthisis..... 1260  
 — from ulceration of mucous follicles..... i. 605  
 — with ulceration, treatment of..... i. 612  
 — varieties of, described... i. 603  
 Diathesis and other circumstances of a patient should be studied..... 1132  
 Diathesis and temperament disposing to phthisis..... 1265  
 Dibothrium latum, described. See, also, Tenia lata..... 1261  
 Diet, different kinds of, required in different climates..... i. 497  
 — recommended in indigestion..... ii. 7  
 — after parturition..... 728  
 Diffusive inflammation of cellular tissue..... i. 585  
 Digestion, states of, in phthisis..... i. 582  
 Digestive canal, alterations of situation..... i. 637  
 — anæmia of..... i. 624  
 — appearances simulating disease..... i. 619  
 — atrophy of its tissues..... i. 625  
 — *Bibliog. and Refer.*..... i. 640  
 — changes of capacity of the i. 637

- Digestive canal, change of situation or positions of . . . . . i. 630  
 — congenital lesions of the . . . i. 639  
 — disorders of secretion and excretion . . . . . i. 623  
 — enlargement of its follicles . i. 627  
 — formations in, resulting from morbid nutrition in the . i. 636  
 — functional disorders of the . i. 621  
 — hyperemia of . . . . . i. 624  
 — hypertrophy of its tissues . . i. 626  
 — lesions of its tissues . . . . i. 624  
 — morbid appearances of . . . i. 619  
 — morbid formations in . . . . i. 636  
 — morbid secretions in the . . i. 634  
 — morbid sensibility of . . . . i. 623  
 — obliteration or strangulation of . . . . . i. 639  
 — perforations of . . . . . i. 632  
 — softening of its coats . . . . i. 629  
 — ulceration of . . . . . i. 630  
 — symptoms furnished by . . . 1075
- Digestive mucous surface, treatment of its diseased states in fevers . . . . . i. 1078
- Digestive organs, diseased, from causes acting on the . . . . i. 653  
 — morbid sympathies of, with brain, &c. . . . . i. 1040  
 — the relation of these diseases to cachectic nephritis . . ii. 745
- Digestive tube, intro-susceptibility of . . . . . i. 638  
 — complicated productions, &c. . . . . i. 636  
 — morbid productions in . . . i. 636
- Digitalis, appearances after death from . . . . . 395  
 — emulative effect of . . . . . 394  
 — grades of poisoning by . . . 393, 4  
 — symptoms of poisoning by . . 393  
 — treatment of poisoning by . . 395  
 — use of, in phthisis . . . . . 1269
- Dilatation of the cavities and orifices of the heart . . . . ii. 244  
 — signs and symptoms of . . . ii. 245, 6  
 — treatment of . . . . . ii. 246
- Discharges, excessive, to be restrained . . . . . 1130  
 — hemorrhoidal, described . . ii. 117  
 — treatment of . . . . . ii. 132
- Disease, etiology of . . . . . i. 644-658  
 — associations and complications of, their sources examined . . . . . 1036-55  
 — *Bibliog. and Refer.* . . . . i. 688  
 — blue, notice of . . . . . ii. 251  
 — of the causation and doctrine of . . . . . i. 641  
 — from causes acting on the functions . . . . . i. 651  
 — from causes affecting the respiratory organs . . . . . i. 652  
 — effect of, on the pulse . . . 602, 3  
 — exciting causes of . . . . . i. 651  
 — predisposing causes of . . . i. 645  
 — the general predisposing causes to . . . . . i. 649  
 — specific causes of . . . . . i. 656  
 — circumstances influencing its character and tendencies ought to be studied . . . . . 1132  
 — circumstances modifying the form, duration, and terminations of . . . . . i. 657  
 — with reference to climate . . i. 641  
 — consecutive and determining causes of . . . . . i. 657  
 — defined . . . . . i. 644  
 — doctrine of . . . . . i. 642  
 — benefited by change of climate . . . . . i. 408  
 — caused by cold . . . . . i. 422  
 — from causes acting on the digestive organs . . . . . i. 653  
 — from causes acting on organs of sense . . . . . i. 654  
 — the complications of . . . . i. 684  
 — enlemic, sources of . . . . . i. 848  
 — epidemic . . . . . i. 880  
 — exanthematous . . . . . i. 974  
 — feigning of . . . . . i. 1029  
 — those usually feigned . . . . i. 1030-8  
 — observed in the foetus . . . . i. 1238
- Disease, often followed by dropsies . . . . . i. 654  
 — produced by infection . . . ii. 410  
 — local and functional, incidental to the puerperal states . 532-7  
 — the metastasis of . . . . . i. 686  
 — general doctrine of . . . . . i. 658  
 — division of, into stages . . . i. 651  
 — its duration should always be considered . . . . . 1132  
 — favoured by temperature and humidity . . . . . i. 649  
 — of the fluids and solids originate in altered conditions of vital power . . . . . i. 666  
 — functional and organic, remarks as to the terms . . . i. 653  
 — of grades of morbid action in . . . . . i. 681  
 — influence of light and sunshine on . . . . . i. 650  
 — Pathogeny of, discussed . . . i. 658-666  
 — its pathogeny must be studied . . . . . 1133  
 — preliminary remarks respecting . . . . . i. 641  
 — to be resisted by opposing vital and nervous power . . 1142  
 — the successions of . . . . . i. 651  
 — terminations of . . . . . i. 683  
 — types and forms of . . . . . i. 682  
 — resulting from morbid conditions of the blood . . . . 1047, 8  
 — poisoning may occur or be produced during . . . . . 365  
 — prevention of domestic causes of . . . . . 263  
 — puerperal, severally considered . . . . . 541-594  
 — relations of . . . . . i. 654  
 — in relation to climate . . . . i. 404  
 — in relation to races . . . . . i. 404
- Diseases, secondary syphilitic . . 1466-9  
 — tertiary syphilitic . . . . . 1469-71
- Disguised or lurking gout . . . . ii. 43
- Disinfectants, the necessity of employing . . . . . 277  
 — notices of . . . . . 1148
- Disinfection, means for . . . . ii. 419
- Disorders of the organic functions in connection with insanity . . . . . ii. 537  
 — symptomatic of indigestion . ii. 380  
 — Displacement of the heart . . . ii. 262  
 — causes of . . . . . ii. 262  
 — of the ovum . . . . . ii. 1066  
 — of the uterus . . . . . 1387
- Dissolvents, alkaline, saline, &c. . 1145
- Distoma, characters of . . . . . 1536  
 — diagnosis of . . . . . 1537  
 — prognosis of . . . . . 1537  
 — systematic description . . . 1536
- Distomum hematobium, action of, on the liver . . . . . 1538  
 — alterations produced by, on the urinary organs and bladder . . . . . 1538  
 — characters of . . . . . 1537  
 — symptoms produced by . . . 1538  
 — systematic description of . . 1537  
 — treatment of . . . . . 1537
- Distomum hepaticum, action of, on the liver . . . . . 1538  
 — characters of . . . . . 1537  
 — diagnosis of . . . . . 1537  
 — prognosis of . . . . . 1538  
 — systematic description of . . 1537  
 — treatment of . . . . . 1537
- Distomum heterophyes, description of . . . . . 1538
- Distomum lanceolatum, systematic description of . . . . . 1538
- Distomum ophthalmobium, characters of . . . . . 1539
- Diuretics advised for dropsy . . i. 711  
 — arrangement and enumeration of . . . . . 1146  
 — remarks on the several kinds of, advised for dropsy . i. 711-14
- Doctrine, general, of disease . . i. 658
- Doctrines, unsound and specious, retard therapeutical knowledge . . . . . 1129
- Dreaming, of the phenomena of . 876  
 — remarks respecting . . . . . 41
- Drink, desire of, as a sign of disease . . . . . 1079  
 — advised in fevers . . . . . i. 1082
- Drink and food, as causing disease . . . . . i. 653
- Drinks and beverages for indigestion . . . . . ii. 395-8
- Dropsy of abdomen, appearances in fatal cases . . . . . i. 718  
 — *Bibliog. and Refer.* . . . . i. 723  
 — causes of . . . . . i. 716  
 — definition of . . . . . i. 716  
 — diagnosis of . . . . . i. 719  
 — different forms and states of . . . . . i. 716  
 — pathology of . . . . . i. 716  
 — the prognosis of . . . . . i. 720  
 — puerperal, described . . . . . i. 722  
 — treatment of . . . . . i. 723  
 — treatment of . . . . . i. 720  
 — of its acute states . . . . . i. 720  
 — of its symptomatic states . . . . . i. 721
- Dropsy, acute, active, or inflammatory, or sthenic . . . . . i. 694  
 — causes of . . . . . i. 694  
 — progress of . . . . . i. 695  
 — acute, treatment of . . . . . i. 702  
 — acute, in the head, stages and forms of . . . . . i. 753
- Dropsy of Amnion, definition of . i. 724  
 — pathology of . . . . . i. 724  
 — treatment of . . . . . i. 724
- Appearances observed after death from . . . . . i. 691  
 — appearances of the fluids effused in . . . . . i. 692  
 — asthenic or passive . . . . . i. 696  
 — treatment . . . . . i. 703  
 — *Bibliog. and Refer.* . . . . i. 715  
 — causes of . . . . . i. 691
- Dropsy of cellular tissue defined. See, also, Anasarca . . . . . i. 724
- of the cellular tissue described . . . . . i. 724  
 — partial, of cellular tissues described . . . . . i. 724
- Dropsy of the cavities of the chest . . . . . i. 731  
 — complicated with pulmonary disease, treatment of . . . i. 704  
 — congenital, noticed . . . . . i. 740  
 — *Bibliog. and Refer.* . . . . i. 743  
 — causes of . . . . . i. 742  
 — treatment of . . . . . i. 742  
 — of spinal membranes. See, also, Hydrops spine . . . . . i. 741
- Dropsy, definition of . . . . . i. 689  
 — deobstruents advised for . . . i. 709  
 — the diseases most frequently occasioning . . . . . i. 693  
 — from disease of the absorbent system, treatment of . . . i. 704  
 — from diseases of the blood-vessels . . . . . i. 697  
 — from disease of the heart . . i. 697  
 — treatment of . . . . . i. 703  
 — from disease of the kidneys . i. 700  
 — treatment of . . . . . i. 705  
 — from disease of the liver and spleen . . . . . i. 699  
 — as a sign of disease of the liver . . . . . ii. 699  
 — from disease of the liver and spleen, treatment of . . i. 704  
 — diuretics advised for . . . . . i. 711  
 — divisions of, into active and passive . . . . . i. 690
- Dropsy, encysted, *Bibliog. and Refer.* . . . . . i. 751  
 — definition of . . . . . i. 743  
 — causes of . . . . . i. 743  
 — of the kidneys . . . . . i. 750  
 — of the liver . . . . . i. 750  
 — prognosis of . . . . . i. 744  
 — situations of . . . . . i. 744  
 — treatment of . . . . . i. 744  
 — of the womb . . . . . i. 749  
 — of the Fallopian tubes . . . i. 749  
 — feigned . . . . . i. 1081  
 — in the head. See, also, Hydrocephalus . . . . . i. 752



- Dropsy in the head, acute, . . . . . i. 752  
— historical view of opinions  
as to the pathology of . . . . . i. 689  
— idiopathic or primary, treat-  
ment of . . . . . i. 702  
— iodine and its preparations  
first recommended for, by the  
author . . . . . i. 709  
— lesions of the viscera ob-  
served after . . . . . i. 692  
— medicines recommended for . . . . . i. 703  
Dropsy, ovarian, causes of, . . . . . i. 746  
— of the ovarium. See, also,  
Hydrops ovarii. *Definition* of . . . . . i. 745  
— diagnosis . . . . . i. 747  
— pathology of . . . . . i. 745  
— symptoms and prog-  
nosis . . . . . i. 746  
— prognosis of . . . . . i. 747  
— treatment of . . . . . i. 747  
— various means of cure . . . . . i. 748  
— pathology of . . . . . i. 689  
— chief pathological states  
causing . . . . . i. 693  
Dropsy of the pericardium. See,  
also, Hydrops pericardii . . . . . i. 732  
— *Bibliog. and Refer.* . . . . . i. 735  
— the causes of . . . . . i. 734  
— *definition* of . . . . . i. 732  
— diagnosis of . . . . . i. 734  
— pathology of . . . . . i. 732  
— treatment of . . . . . i. 734  
Dropsy of the peritoneum de-  
scribed. See Dropsy of abdo-  
men . . . . . i. 716  
Dropsy of pleural cavities. See,  
also, Hydrothorax . . . . . i. 736  
— primary or idiopathic . . . . . i. 694  
— prognosis of . . . . . i. 701  
— purgatives advised for . . . . . i. 710  
— refrigerants and antipho-  
logistic remedies for . . . . . i. 706  
— remedies advised for the  
treatment of . . . . . i. 707  
— sub-acute . . . . . i. 695  
— treatment of . . . . . i. 702  
— symptomatic or conse-  
cutive . . . . . i. 697  
— treatment of . . . . . i. 703  
— treatment of . . . . . i. 701  
— state of the urine in . . . . . i. 701  
— from uterine and ovarian  
disease, treatment of . . . . . i. 706  
— various forms of, conse-  
quent on scarlet fever . . . . . 739-41  
— various remedial means ad-  
vised for . . . . . i. 711  
Drunkennes, *Bibliog. and Ref.* . . . . . i. 791  
— definition and consequences  
of . . . . . i. 782  
— pathology of . . . . . i. 784  
— prognosis of . . . . . i. 789  
— symptoms and signs of . . . . . i. 782  
— prophylactic treatment of . . . . . i. 790  
— treatment of . . . . . i. 789  
Dumbness and deafness . . . . . ii. 182  
Duodenitis, consequences of . . . . . i. 794  
— treatment of . . . . . i. 796  
Duodenum, *Bibliog. and Refer.* . . . . . i. 797  
Duodenum, the diseases of . . . . . i. 792  
— functional disorders of . . . . . i. 792  
— their treatment . . . . . i. 793  
— inflammation of. See, also,  
Duodenitis . . . . . i. 793  
— acute inflammation of, its  
symptoms . . . . . i. 794  
— inflammation of, remarks  
on . . . . . i. 793  
— ulceration and perforation  
of . . . . . i. 795  
Dura mater, structural changes  
of . . . . . i. 254  
— symptoms of its lesions . . . . . i. 257  
— tumours in . . . . . i. 255  
— of spinal cord, alterations of  
— inflammation of . . . . . 966  
Dynamic states of vital action . . . . . i. 659  
Dysentery, acute, described . . . . . i. 799  
— treatment of . . . . . i. 823  
— anodynes in . . . . . i. 835  
— antiseptics in . . . . . i. 840  
— appearances after death . . . . . i. 816  
— aromatics and absorbents  
for . . . . . i. 835  
Dysentery, associated with in-  
testinal worms . . . . . i. 812  
— the asthenic forms of . . . . . i. 802  
— causes of . . . . . i. 802  
— contagious or infec-  
tious . . . . . i. 804  
— various remedies for . . . . . i. 826  
— symptoms of . . . . . i. 805  
— treatment of . . . . . i. 825  
— astringents in . . . . . i. 837  
— *Bibliog. and Refer.* . . . . . i. 843  
— bilious adynamic, described  
camphor in . . . . . i. 840  
— chronic, complications of . . . . . i. 814  
— symptoms of . . . . . i. 813  
— treatment of . . . . . i. 829  
— complications of chronic,  
treatment of . . . . . i. 830  
— with jaundice . . . . . i. 812  
— with disease of the  
liver . . . . . i. 810  
— with rheumatism . . . . . i. 813  
— with scurvy . . . . . i. 812  
— with diseased spleen . . . . . i. 811  
— with splenic and peri-  
odic diseases, treatment of . . . . . i. 827  
— descriptions of complica-  
tions of acute and chronic . . . . . i. 810-27  
— their treatment . . . . . i. 827  
— various complications,  
treatment of . . . . . i. 827  
— in the dark races . . . . . i. 807  
— in dark races, treatment of . . . . . i. 827  
— *definitions* of . . . . . i. 797  
— diagnosis of . . . . . i. 817  
— diaphoretics in . . . . . i. 837  
— diet and regimen for . . . . . i. 843  
— emollients and demulcents  
in . . . . . i. 835  
— epidemic, history of . . . . . i. 816  
— evacnants for . . . . . i. 834  
— external derivation for . . . . . i. 837  
— feigned . . . . . i. 1031  
— forms and symptoms of  
asthenic . . . . . i. 805  
— hepatic, described . . . . . i. 810  
— treatment of . . . . . i. 827  
— history of . . . . . i. 797  
— history of epidemics of . . . . . i. 806, 9  
— hyper-acute, symptoms, &c. . . . . i. 801  
— treatment of . . . . . i. 825  
— inflammatory form . . . . . i. 799  
— causes of . . . . . i. 799  
— symptoms of . . . . . i. 799  
— intestinal hemorrhage, &c.  
treatment of . . . . . i. 832  
— ipocatanha for . . . . . i. 839  
— lesions consequent upon . . . . . i. 816  
— malignant or putrid de-  
scribed . . . . . i. 805  
— of mercurials in . . . . . i. 838  
— methods of cure and reme-  
dies advised for by authors . . . . . i. 832-43  
— nervo-adynamic or typhoid,  
described . . . . . i. 805  
— of the operation of the  
causes of . . . . . i. 819, 20  
— of the pathological condi-  
tions constituting the several  
forms of . . . . . i. 820-23  
— pathological inferences re-  
specting . . . . . i. 819  
— prescriptions for . . . . . i. 841  
— prophylactic treatment of . . . . . i. 843  
— relapse of . . . . . i. 823  
— remedies recommended for  
— . . . . . i. 833-43  
— rhubarb in . . . . . i. 839  
— scorbutic, described . . . . . i. 812  
— causes of . . . . . i. 812  
— symptoms of . . . . . i. 812  
— treatment of . . . . . i. 828  
— sent and forms of . . . . . i. 797  
— the several forms of . . . . . i. 798  
— its simple states . . . . . i. 799  
— sthenic, acute form . . . . . i. 799  
— treatment of . . . . . i. 823  
— for . . . . . i. 824  
— sub-acute, described . . . . . i. 813  
— treatment of . . . . . i. 829  
— terolintinates in . . . . . i. 840  
— the terminations and prog-  
nosis of . . . . . i. 814  
Dysentery, tonics in . . . . . i. 839  
— treatment of various states  
and contingent alterations  
from . . . . . i. 831  
— of the type of . . . . . i. 809  
— various consequences and  
alterations from, treatment of . . . . . i. 832  
Dysmenorrhœa, complications of . . . . . ii. 974  
— treatment of congestive and  
inflammatory . . . . . ii. 975  
— *definition* of . . . . . ii. 972  
— description of . . . . . ii. 972  
— diagnosis of . . . . . ii. 973  
— irritable or neuralgic . . . . . ii. 972  
— treatment of neuralgic . . . . . ii. 974  
— obstructive . . . . . ii. 973  
— treatment of obstructive . . . . . ii. 975  
— pathology of . . . . . ii. 974  
— prognosis of . . . . . ii. 974  
— treatment of . . . . . ii. 974  
— treatment in the intervals . . . . . ii. 975  
Dyspepsia, description of. See  
also Indigestion . . . . . ii. 377  
Dysphagia, *definition* of . . . . . i. 561  
Dysphagia, *Bibliog. and Refer.* . . . . . i. 565  
— complications of . . . . . i. 562  
— diagnosis of . . . . . i. 563  
— idiopathic, described . . . . . i. 561  
— treatment of . . . . . i. 561  
— paralytic, or symptomatic  
of lesions of the brain or me-  
dulla oblongata, &c. . . . . i. 562  
— symptomatic and compli-  
cated . . . . . i. 562  
— symptomatic of spasm, flat-  
ulence, &c. . . . . i. 562  
— treatment of the compli-  
cated and symptomatic states  
of . . . . . i. 563  
— treatment of idiopathic and  
simple states of . . . . . i. 563  
Dyspnoea and cough during  
pregnancy . . . . . 503  
Dysuria described . . . . . 1353
- E
- Ear, deafness from various ie-  
sions of . . . . . ii. 182  
— diseases of the . . . . . ii. 144  
— diseases of, consequent upon  
scarlet fever . . . . . 741  
— acute inflammation of. See  
also Otitis . . . . . i. 47  
— inflammation of, *Bibliog.*  
and *Refer.* . . . . . i. 853  
— nervous affection of the . . . . . i. 845  
— noises in the . . . . . i. 844  
— causes of . . . . . i. 845  
— treatment of . . . . . i. 845  
— inflammation of the . . . . . i. 847  
— disease of, complicating  
scarlet fever . . . . . 734  
Ecarache, *defin'd* and described . . . . . i. 846  
— causes of . . . . . i. 846  
— treatment of . . . . . i. 846  
Echymosis of the brain . . . . . i. 277  
Echinococci, aetiology of . . . . . 1526  
— prognosis of . . . . . 1526  
— systematic and general de-  
scription of . . . . . 1523  
Echinococcus altricipariens, char-  
acters of . . . . . 1524  
— diagnosis of . . . . . 1525  
— prognosis of . . . . . 1525  
— scolex of, described . . . . . 1529  
— systematic description of . . . . . 1529  
Echinococcus scolicipariens, de-  
scription of . . . . . 1523  
— mature tenia of . . . . . 1523  
— scolex of, described . . . . . 1523  
— structure of . . . . . 1524  
— symptoms of . . . . . 1524  
— *synonyms* of . . . . . 1523  
— systematic description of . . . . . 1523  
Eclampsia. See also Convul-  
sions . . . . . i. 485  
Ecstasy, cataplectic, *definition* of . . . . . i. 946  
— treatment of . . . . . i. 948  
Ecthyma, acute . . . . . i. 855  
— causes of . . . . . i. 854  
— *definition* of . . . . . i. 853  
— diagnosis of . . . . . i. 854  
— chronic . . . . . i. 853  
— treatment of . . . . . i. 855

- Eezema, acute** ..... i. 856  
*Bibliog. and Refer.* ..... i. 860  
 — causes of ..... i. 858  
 — chronic ..... i. 856  
 — definition of ..... i. 858  
 — diagnosis of ..... i. 858  
 — prognosis of ..... i. 858  
 — specific form of ..... i. 857  
 — syphilitic ..... i. 857  
 — treatment of ..... i. 859
- Education, effects of, on insanity** ..... ii. 559  
 — physical ..... i. 860
- Effects, arrangement of medicines according to their special** ..... 1145
- Effusion from chronic pleurisy** ..... 309  
 — from chronic pleuritis, signs of its absorption ..... 311
- Eggs of tenia described** ..... 1275
- Egypt, climate of, advised for phthisis** ..... 1277, 81
- Electuarium Alkalinum-ferratum** ..... F. 79. *Ap. 7*  
 — Anthelminticum ..... F. 80. *Ap. 7*  
 — Antispasmodicum ..... F. 81. *Ap. 7*  
 — Aperiens ..... F. 82 and 83. *Ap. 7*  
 — Arnicæ Composit. .... F. 84. *Ap. 7*  
 — Bechicum ..... F. 85. *Ap. 7*  
 — Cinchonæ Aperiens. .... F. 86. *Ap. 7*  
 — Cinchonæ Comp. .... F. 87. *Ap. 7*  
 — Cinchonæ cum Ferro F. 88. *Ap. 7*  
 — Deobstruens F. 89, 790. *Ap. 8, 30*  
 — Febrifugum ..... F. 90. *Ap. 8*  
 — Febrifug. Hoffmanni F. 91. *Ap. 8*  
 — Febrif. Trilleri ..... F. 92. *Ap. 8*  
 — Ferri Ammonio-Chloridi Composit. .... F. 93. *Ap. 8*  
 — Ferri Potassio-Tartratis ..... F. 94. *Ap. 8*  
 — Ferri Sesqui-Oxidi F. 701. *Ap. 29*  
 — Nitril Camphoratum. .... F. 95. *Ap. 8*  
 — Purgans ..... F. 96. *Ap. 8*  
 — Scillæ Composit. .... F. 97. *Ap. 8*  
 — Sennæ Composit. .... F. 98. *Ap. 8*  
 — Terebinthinæ ..... F. 99. *Ap. 8*  
 — Terebinthinatum ..... F. 100. *Ap. 8*  
 — Valerianæ Composit. F. 101. *Ap. 8*  
 — Vermifugum ..... F. 102. *Ap. 8*
- Elephantia, Bibliog. and Refer.** ..... i. 863  
 — causes of ..... i. 860  
 — diagnosis of ..... i. 863  
 — pathology of ..... i. 861  
 — symptoms, &c. .... i. 861  
 — treatment of ..... i. 863
- Elephantiasis, Arabian** ..... i. 860
- Elevation, high above the ocean, considered with relation to phthisis** ..... 1277
- Elisir Aloes Compositum F. 103.** *Ap. 8*  
 — Pectoralis Wedellii F. 104. *Ap. 8*  
 — Proprietatis Rhuibarbarum ..... F. 105. *Ap. 8*  
 — Roborans ..... F. 106. *Ap. 8*
- Emaciation, feigned** ..... i. 1031  
 — as a sign of disease ..... 1064  
 — as a sign of phthisis ..... 1202
- Embrocations, rubefacient, those advised for phthisis** ..... 1287
- Embryo of taenia, described** ..... 1523
- Emetics, enumeration of** ..... 1146  
 — in cases of insanity ..... ii. 607  
 — of their use in phthisis ..... 1270  
 — in scarlet fever ..... 764  
 — choice of, for spasm ..... 981  
 — choice of, to produce vomiting ..... 1506
- Emigrations of intestinal worms described** ..... 1516-18
- Emmenagogues, arrangement and enumeration of** ..... 1147
- Emotions and desires predisposing to phthisis** ..... 1230  
 — of mind, as causing and influencing disease, to be studied — should be directed or excited so as to promote recovery ..... 1143  
 — the moral, as exciting insanity ..... ii. 562
- Emphysema, Bibliog. and Refer.** ..... i. 867  
 — definition of ..... i. 863  
 — diagnosis and prognosis ..... i. 866  
 — extrinsic ..... i. 865  
 — interlobular and sub-pleural ..... ii. 904
- Emphysema, intrinsic** ..... i. 864  
 — lesions causing ..... i. 865  
 — of the lungs ..... ii. 900  
 — treatment of ..... i. 866  
 — vesicular, of the lungs ..... ii. 901
- Emplastrum Ammoniac F. 107.** *Ap. 7*  
 — Anodynum Fortius F. 108. *Ap. 7*  
 — Antimonii Potassio-Tartratis ..... F. 792. *Ap. 39*  
 — Anticolicum ..... F. 109. *Ap. 8*  
 — Antihystericum ..... F. 110. *Ap. 8*  
 — Aromaticum Comp. F. 111. *Ap. 8*  
 — Belladonnæ ..... F. 112. *Ap. 8*  
 — Camphoræ ..... F. 113. *Ap. 8*  
 — Defensivum ..... F. 114. *Ap. 8*  
 — Deobstruens ..... F. 115. *Ap. 8*  
 — Picis ..... F. 116. *Ap. 8*  
 — Resolvens ..... F. 117. *Ap. 8*  
 — Roborans ..... F. 118. *Ap. 8*  
 — Rubefaciens ..... F. 119. *Ap. 8*  
 — Stibiatum ..... F. 120. *Ap. 8*
- Employments and amusements for the insane** ..... ii. 623
- Employments causing disease** ..... i. 137  
 — regimen, &c., favouring the occurrence of phthisis ..... 1128  
 — Emprosthotonos, defined ..... 1101  
 — Empyema, described ..... 313  
 — diagnosis of ..... 324  
 — operation advised for ..... 332-5  
 — perforations caused by ..... 322  
 — signs and symptoms of ..... 313  
 — treatment of ..... 331  
 — with ulceration and perforation of the pleura ..... 313
- Emulsio Amygdalo-Camphorata** ..... F. 121. *Ap. 9*  
 — Anticatarrhalis ..... F. 122. *Ap. 9*  
 — Camphorata ..... F. 123. *Ap. 9*  
 — Camphorata Anodyna ..... F. 124. *Ap. 9*  
 — Comp. .... F. 125. *Ap. 9*  
 — Nitro-Camphorata F. 126. *Ap. 9*  
 — Pectoralis ..... F. 127. *Ap. 9*  
 — Pro Tussi ..... F. 128. *Ap. 9*  
 — Sedativa ..... F. 129. *Ap. 9*
- Encephalitis, described** ..... i. 261  
 — causes of ..... i. 285  
 — definition of ..... i. 283  
 — diagnosis of ..... i. 285  
 — regimen for ..... i. 292  
 — states, forms, and complications of ..... i. 286  
 — symptoms of ..... i. 284  
 — terminations and prognosis of ..... i. 286  
 — treatment of its acute states ..... i. 287  
 — several means of treatment of acute ..... i. 289  
 — treatment of its complications ..... i. 290  
 — treatment of its sequelæ ..... i. 292  
 — treatment of its sub-acute and chronic states ..... i. 291  
 — treatment of its unfavourable and anomalous states ..... i. 290
- Encephalocoele, described** ..... i. 277
- Encephaloma, structure of** ..... 778
- Endemic diseases, causes of** ..... i. 868  
 — influences and diseases ..... i. 867  
 — influences, *Bibliog. and Refer.* ..... i. 877  
 — means of counteracting ..... i. 876  
 — diet and regimen during exposure to ..... i. 877  
 — diseases produced by ..... i. 870  
 — effects of ..... i. 870  
 — operation of, on the system ..... i. 814  
 — prevention of ..... i. 874  
 — sources of ..... i. 868
- Endocarditis, alterations caused by** ..... ii. 209  
 — in children ..... ii. 233  
 — complicated with rheumatism ..... 673  
 — remedies advised for ..... ii. 209  
 — successive lesions caused by ..... ii. 209  
 — symptoms of the first stage of the second and third stages ..... ii. 210  
 — treatment of acute ..... ii. 229  
 — of chronic ..... ii. 230
- Endocarditis, treatment of rheumatic or arthritic** ..... ii. 230
- Endo-metritis, description of** ..... 1371  
 — See, also, Metritis, internal .. 1379  
 — treatment of ..... 1379
- Enema Aloes et Asafetidae Comp.** ..... F. 130. *Ap. 9*  
 — Anthystericum ..... F. 131. *Ap. 9*  
 — Antispasmodicum ..... F. 132, 133. *Ap. 9*  
 — Asafetidae ..... F. 134. *Ap. 9*  
 — Asafetidae et Terebinthinæ ..... F. 135. *Ap. 9*  
 — Composit. .... F. 136. *Ap. 9*  
 — Belladonnæ ..... F. 137. *Ap. 9*  
 — Camphoræ Comp. .... F. 138. *Ap. 9*  
 — Camphoratatum ..... F. 139. *Ap. 9*  
 — Catharticum ..... F. 140. *Ap. 9*  
 — Colocyntidis Compos. .... F. 141. *Ap. 9*  
 — Commune ..... F. 794. *Ap. 30*  
 — Contra Spasmos ..... F. 142. *Ap. 9*  
 — Emolliens ..... F. 143. *Ap. 9*  
 — Emollio-Aperiens ..... F. 144. *Ap. 9*  
 — Ipecacuanhæ ..... F. 795. *Ap. 30*  
 — Opiatum ..... F. 145. *Ap. 9*  
 — Saponis ..... F. 146. *Ap. 9*  
 — Sedativum ..... F. 147. *Ap. 9*  
 — Camphoratum F. 148. *Ap. 9*  
 — Terebinthinatum ..... F. 149. *Ap. 9*  
 — Terebinthinæ ..... F. 150. *Ap. 9*  
 — Terebinthino-Camphoratatum ..... F. 151. *Ap. 9*  
 — Thebæicum ..... F. 152. *Ap. 9*  
 — Vernifugum ..... F. 153. *Ap. 9*
- Energy, nervous, to be restored or supported** ..... 1135-7
- England, climate of certain parts of** ..... i. 411
- England, the south and southwest coasts of, their climate** ..... i. 412
- Enteritis, acute, description of** ..... ii. 653  
 — acute follicular, remedies prescribed for ..... ii. 660  
 — in children ..... ii. 682  
 — acute follicular, treatment of ..... ii. 681  
 — for children ..... ii. 682  
 — appearances after death from the acute form ..... ii. 675  
 — indirect causes of ..... ii. 678, 9  
 — caused by medicinal substances ..... ii. 677  
 — causes, exciting, of ..... ii. 676  
 — causes, predisposing, of ..... ii. 676  
 — appearances after death from chronic ..... ii. 676  
 — chronic follicular, treatment of ..... ii. 682  
 — complications or associations of ..... ii. 670  
 — complications of, in children ..... ii. 670  
 — indications of cure in ..... ii. 679  
 — diagnosis of ..... ii. 671-3  
 — diagnosis of its complications ..... ii. 673  
 — diagnosis between, and peritonitis ..... 91  
 — diagnosis between, and poisoning ..... 372  
 — follicular, consequent on fevers ..... ii. 663  
 — acute in children ..... ii. 663  
 — chronic, in children ..... ii. 664  
 — several forms of, described ..... ii. 659-70  
 — glandular, described ..... ii. 661  
 — glandular or follicular, symptoms of ..... ii. 662-3  
 — lesions consequent upon ..... ii. 674  
 — Enteritis phlegmonodes, or inflammation of all the coats of the small intestines ..... ii. 664  
 — phlegmonoid, treatment of ..... ii. 683  
 — poisonous causes of ..... ii. 67  
 — pseudo-membraneous, described ..... ii. 660  
 — pseudo-membraneous, treatment of ..... ii. 683  
 — favourable terminations of ..... ii. 673  
 — terminations of ..... ii. 673  
 — unfavourable terminations of ..... ii. 673



- Enteritis, treatment of ..... ii. 679  
— treatment during convalescence from ..... ii. 684  
— causing ulceration of intestines ..... ii. 674-6
- Enterocolitis, follicular, treatment of ..... ii. 681
- Entozoa. See also, Worms. .... 1514  
— human, described ..... 1514  
— genesis of ..... 1515  
— remarks respecting ..... i. 679  
— in veins ..... 1317
- Ephelis, definition of ..... i. 878  
— diffused ..... i. 878  
— lenticular ..... i. 878  
— symptomatic ..... i. 879  
— treatment of ..... i. 879
- Ephemera, *Bibliog. and Refer.* ..... i. 1187  
— causes of ..... i. 1136  
— described ..... i. 1136  
— diagnosis of ..... i. 1136  
— symptoms of ..... i. 1136  
— treatment of ..... i. 1137
- Ephemera, puerperal, symptoms and treatment of ..... 514
- Ephemeral fever defined. See, also, Ephemera ..... i. 1136
- Eplan, description of ..... 1475
- Epidemic catarrh. See Influenza ..... ii. 489
- Epidemic diseases. See, also, Epidemics ..... i. 879  
— the causes of ..... i. 880-88  
— *Bibliog. and Refer.* ..... i. 880-88  
— conclusions as to their causation ..... i. 887  
— their occasional connexion with epizootics ..... i. 883  
— notices of some epidemic constitutions of authors ..... i. 891  
— historical notices of some ..... i. 891  
— general inferences respecting ..... i. 894  
— the influence of infection in their causation ..... i. 886  
— the opinions of the non-infectionists respecting, controverted ..... i. 880  
— justly viewed as pestilences ..... 105  
— the precursors of ..... i. 888
- Epigastrium, alterations of sensibility at the ..... i. 897  
— concussions and contusions of ..... i. 902  
— symptoms of ..... i. 902  
— treatment of ..... i. 903  
— distention, tumefaction, &c., at the ..... i. 897  
— examination of the states of pulsation at the, causes of ..... i. 898
- Epiglottitis, inflammation and ulceration of ..... ii. 701
- Epilepsy, from affection of the spinal cord ..... i. 912  
— appearances after death from ..... i. 915  
— asthenic, or adynamic, described ..... i. 911  
— *Bibliog. and Refer.* ..... i. 940  
— exciting causes of ..... i. 909  
— predisposing causes of ..... i. 908  
— from cardiac disease ..... i. 912  
— classes of remedies advised by authors for ..... i. 927  
— complications of ..... i. 915  
— various complications of ..... i. 915  
— treatment of complicated ..... i. 926  
— complicated with apoplexy ..... i. 914  
— treatment of the apoplectic complication of ..... i. 926  
— complicated with insanity ..... i. 914  
— treatment of, complicated with insanity ..... i. 926  
— complicated with paralysis ..... i. 914  
— treatment of paralytic complications ..... i. 926  
— consequences and terminations of ..... i. 907  
— and convulsions, complicating insanity ..... ii. 535  
— definition of ..... i. 904
- Epilepsy, description of ..... i. 904  
— diagnosis of ..... i. 919  
— from disorders of the digestive organs ..... i. 913  
— from disorders of the generative organs ..... i. 913  
— external means advised for ..... i. 936  
— feigned ..... i. 1031  
— imperfect seizures of ..... i. 906  
— the intervals between the fits ..... i. 907  
— treatment of, in the intervals ..... i. 921  
— nature of ..... i. 917  
— associated with palsy ..... 29  
— phenomena constituting the fit ..... i. 905  
— the stages of phenomena constituting the fit ..... i. 905  
— premonitory symptoms of ..... i. 904  
— prognosis of ..... i. 920  
— regimen and diet for ..... i. 940  
— remarks on remedies for, commended by authors ..... i. 927-40  
— remedies advised for the symptomatic varieties of ..... i. 923  
— remedies advised for, by authors, with practical remarks ..... i. 927-39  
— sanguineous, or ethenic, described ..... i. 911  
— simple, or idiopathic ..... i. 911  
— spinalis, described ..... i. 912  
— sympathetic, described ..... i. 912  
— treatment of the fit ..... i. 920  
— treatment of cerebral ..... i. 922  
— treatment of the symptomatic forms ..... i. 923  
— varieties of ..... i. 910  
— various modes of treatment advised by authors ..... i. 927-39
- Epistaxis, *Bibliog. and Refer.* ..... ii. 88  
— causes of ..... ii. 89  
— complicating scarlet fever ..... 734  
— pathology of ..... ii. 89  
— phenomena of ..... ii. 88  
— prognosis of ..... ii. 90  
— treatment of ..... ii. 90  
— treatment after the attack ..... ii. 92  
— local treatment of ..... ii. 91
- Epithelial cell, described ..... 775
- Epithelium in urine ..... 1337
- Epizootics, sometimes precede epidemics ..... i. 883
- Erectile tissue, lesions of ..... i. 942  
— *Bibliog. and Refer.* ..... i. 942
- Erethism, described ..... i. 942  
— mercurial ..... 454  
— symptoms of ..... i. 943  
— treatment of ..... i. 943
- Ergotism, description ..... i. 943  
— how produced ..... i. 943
- Erotomania, description of ..... ii. 516  
— treatment of ..... ii. 505
- Errhines, enumeration of ..... 1146
- Eruptions as a sign of disease. 1081
- Eruption, military. See, also, Malaria ..... ii. 992  
— herpetic, description of ..... ii. 267  
— pustular, described ..... 611  
— scaly, the pathology of ..... 526  
— treatment of ..... 526
- Eruptions, syphilitic, described. 1467  
— squamous, pathology of ..... 526  
— treatment of ..... 526-31
- Eruptive and other fevers, their relations to cachectic nephritis ..... ii. 748
- Erysipelas, *Bibliog. and Refer.* ..... i. 970  
— exciting causes of ..... i. 953  
— predisposing causes of ..... i. 953  
— with cephalic affection ..... i. 950  
— treatment of the cephalic complication ..... i. 902, 8  
— treatment of cephalic complication with turpentine, case of ..... i. 963  
— complicated, described ..... i. 948  
— complicated, treatment of the ..... i. 960  
— definition of ..... i. 944  
— description of ..... i. 944  
— of depletions, tonics, stimulants, and antiseptics for ..... i. 964  
— diagnosis of ..... i. 952
- Erysipelas, division of its forms ..... i. 946  
— epidemic ..... i. 954  
— of the face ..... i. 945  
— with gastro-bilious disorder ..... i. 950  
— treatment of gastro-bilious ..... i. 963  
— of infants, described ..... i. 953  
— in infants and children, treatment of ..... i. 966  
— infection of ..... i. 953  
— lesions in fatal case of ..... i. 952  
— modifications of the constitutional disturbance of ..... i. 940  
— modifications of the local affection ..... i. 946  
— nature of ..... i. 957  
— oedematous, described ..... i. 943  
— treatment of oedematous ..... i. 960  
— complications of ..... i. 963  
— phlegmonous, description of ..... i. 949  
— treatment of phlegmonoid ..... i. 961  
— prognosis of ..... i. 952  
— its connexion with puerperal fever ..... 582, 3  
— regimen and diet for ..... i. 970  
— complicating scarlet fever ..... 730  
— simple or mild, described ..... i. 947  
— treatment of simple or mild ..... i. 959  
— extending to the throat and larynx ..... i. 945  
— extending to the throat, pharynx, &c., treatment of ..... i. 963  
— treatment of ..... i. 958  
— treatment of diffusive and suppurative ..... i. 960-2  
— local treatment of ..... i. 964  
— various local means of treatment ..... i. 965  
— of ..... i. 947
- Erythema, causes of ..... i. 973  
— chronic ..... i. 973  
— definition of ..... i. 971  
— description of ..... i. 973  
— diagnosis of ..... i. 973  
— primary or idiopathic ..... i. 972  
— symptomatic ..... i. 972  
— treatment of ..... i. 973
- Ether, poisoning by inhalation ..... 407
- Euphorbia officinarum, poisoning by ..... 300
- Europe, dates of the first appearance of syphilis in various parts of ..... 1450
- Eustachian tube, &c., deafness from diseases of ..... ii. 185  
— treatment of ..... ii. 186
- Evacuants, arrangement and enumeration of ..... 1146
- Evacuations, alvine, with respect to the biliary secretion ..... 1084, 6  
— signs furnished by ..... 1084, 6  
— intestinal, as signs of disease ..... 1081
- Examination of the urine, mode of conducting ..... 1521, 2  
— of the abdomen ..... i. 1
- Exanthemata, general notice of the ..... i. 974  
— causing phthisis ..... 1239
- Excavations in the lungs, described ..... 1218  
— matters contained in them ..... 1218  
— parietes of, described ..... 1218
- Excitants, enumeration and arrangement of ..... 1147  
— nervous and muscular ..... 1147
- Excitement, consequences and terminations of ..... i. 664  
— excessive, should be moderated ..... 1140  
— indirect ..... i. 663  
— intensity and duration of ..... i. 664  
— primary forms of ..... i. 660  
— primary, of the several organs ..... i. 660  
— and reaction, states of ..... i. 659  
— secondary or consecutive ..... i. 663
- Excreescences, fungous or warty, described ..... 780
- Excretion, definition of ..... i. 975  
— excessive, should be moderated ..... 1139  
— of fatty matters ..... i. 978  
— necessity for promoting ..... 1137-9

- Excretion, the promotion of in fever. . . . . i. 1077  
 — of urine, diseased. . . . . 1353  
 Excretions, *Bibliog. and Refer.* i. 982  
 — biliary, described. . . . . i. 982  
 — the exhaled. . . . . i. 975  
 — fecal, &c. . . . . i. 980  
 — morbid, &c. . . . . i. 978  
 — natural, described. . . . . i. 975  
 — the secreted. . . . . i. 977  
 — and secretions during the puerperal states. . . . . i. 980  
 — urinary. . . . . i. 980  
 Exhalations from putrid animal matters, poisoning by. . . . . 444  
 — and secretions, morbid states of. . . . . i. 669  
 — and secretion, the simpler alterations of. . . . . i. 667  
 — transformations of. . . . . i. 670  
 Exhaustion, described. . . . . i. 551  
 — the prevention and removal of. . . . . 1142  
 Existences, invisible but organized, causing pestilences. . . . . 252  
 Exostosis, described. . . . . ii. 1054  
 Expectorants, arrangement and enumeration of. . . . . 1147  
 Expectoration, appearances, &c., of. . . . . i. 982  
 — bloody. . . . . i. 983  
 — purulent. . . . . i. 984  
 — various states of. . . . . i. 982, 4  
 — states of, as signs of disease. . . . . 1092-4  
 — states of, in the various diseases of the respiratory organs. . . . . 1094  
 — as a symptom of phthisis. . . . . 1200  
 Extractum Aloes Alkalinum Compositum. . . . . F. 154. Ap. 9  
 — Dulcamara. . . . . F. 155. Ap. 9  
 — Hellebori Nigri Backeri. . . . . F. 156. Ap. 10  
 Exudation, fibrinous, expectoration of. . . . . 1094  
 — inflammatory, described. . . . . ii. 436  
 — in pleuritis, organization of. . . . . 321  
 Eye, diseases of the. . . . . i. 984  
 — diseases of, *Bibliog. and Refer.* i. 1023, 4  
 — inflammations of the. See, also, Ophthalmia. . . . . i. 985  
 — gummy inflammation of the internal tissues of. . . . . i. 1020  
 — inflammation of anterior chamber of. . . . . i. 1015  
 — symptoms and terminations of. . . . . i. 1015  
 — treatment of. . . . . i. 1016  
 — inflammation of the choroid coat of. . . . . i. 1020  
 — treatment of. . . . . i. 1020  
 — inflammation of the external tissues. . . . . i. 986  
 — of the globe of. . . . . i. 1022  
 — symptoms of. . . . . i. 1022  
 — internal inflammation of, after fevers. . . . . i. 1021  
 — symptoms and treatment of. . . . . i. 1021  
 — inflammation of its internal tissues. . . . . i. 1019  
 — of the iris. See, also, Iritis. . . . . i. 1016  
 — of the retina of. . . . . i. 1019  
 — of the whole organ. . . . . i. 1022  
 — symptoms furnished by the. . . . . 1068, 70  
 Eyelids and eye, syphilitic affections of. . . . . 1469  
 F. . . . .  
 Face, paralysis of the muscles of. . . . . 14  
 — signs of disease furnished by the. . . . . 1057  
 — syphilitic affections of the. . . . . 1467  
 Fæcation, disorder of. . . . . i. 622  
 — obstructions to the functions of. . . . . 1082  
 Fæces, obstructions to the evacuation of. . . . . 1082  
 Fainting, causes of. . . . . i. 1025  
 — consequences and terminations of. . . . . i. 1025  
 Fainting, diagnosis of. . . . . i. 1027  
 — defined. . . . . i. 1024  
 — description of. . . . . i. 1025  
 — feigned. . . . . i. 1032  
 — pathological inferences respecting. . . . . i. 1026  
 — treatment of. . . . . i. 1027  
 — *Bibliog. and Refer.* i. 1028  
 Fat, deposit of, in the heart's structure in obese persons. . . . . ii. 997  
 — or oil in the urine. . . . . 1337  
 Fatty degeneration of the substance of the heart. . . . . ii. 250-2  
 — treatment of. . . . . ii. 252  
 — of the liver. . . . . ii. 870  
 — of the pancreas. . . . . 9  
 — or adipocercous degeneration of muscles. . . . . ii. 997  
 — formations in the uterus. . . . . 1402  
 — matters in coats of arteries. . . . . i. 133  
 — principles of morbid growths. . . . . 777  
 Fatuity, description of. . . . . ii. 533  
 — treatment of. . . . . ii. 602  
 Fauces, organic lesions of, treatment of. . . . . 1165  
 Favus. See also Tinea capitis. . . . . 1173-5  
 — treatment of. . . . . 1173  
 Feigned diseases, account of. . . . . i. 1030-38  
 — *Bibliog. and Refer.* i. 1038  
 Feigning disease. . . . . i. 1029  
 — objects of. . . . . i. 1029  
 Females, gonorrhœa of. . . . . 1455  
 — state of, at far-advanced pregnancy. . . . . 582  
 Fever, means of preventing the accession of. . . . . i. 1070  
 — removal of predominant states of morbid action in. . . . . i. 1075  
 — seats of alterations found after death from. . . . . i. 1050  
 — appearances after death from. . . . . i. 1050  
 — arrest of, at its commencement. . . . . i. 1071  
 — *Bibliog. and Refer.* i. 1083  
 — of blood-letting in. . . . . i. 1072  
 — means of resisting the exciting causes of. . . . . i. 1069  
 — proximate cause of. . . . . i. 1053  
 — author's views as to the proximate cause of. . . . . i. 1060  
 — remote causes of. . . . . i. 1053  
 — nature of the morbid changes observed after death from. . . . . i. 1050  
 — classification of its types. . . . . i. 1045  
 — the removal of congestion and local determinations of blood in. . . . . i. 1078  
 — doctrine of contamination of the blood in, by its cause, examined. . . . . i. 1059  
 — of convalescence from. . . . . i. 1083  
 — general course of. . . . . i. 1045  
 — indications of cure in. . . . . i. 1071  
 — definition of. . . . . i. 1035  
 — general description of. . . . . i. 1041  
 — diagnosis of. . . . . i. 1044  
 — inflammation of the eye after. . . . . i. 1021  
 — symptoms and treatment of. . . . . i. 1021  
 — food and drink in. . . . . i. 1082  
 — the forms or types of. . . . . i. 1048  
 — management and regimen of patients in. . . . . i. 1082  
 — milk, noticed. . . . . 536  
 — produced by the primary affection of organic nervous system. . . . . i. 1061  
 — doctrine of the primary affection of the nervous system in, examined. . . . . i. 1061  
 — connexion of gastro-enteric disorder with. . . . . ii. 31  
 — the pathology of. . . . . i. 1053-69  
 — general inference respecting the pathology of. . . . . i. 1069  
 — opinions of the ancients as to the pathology of. . . . . i. 1053, 5  
 — opinions of the moderns as to the pathology of. . . . . i. 1056-60  
 — opinions of the older writers on the pathology of. . . . . i. 1055-6  
 — prognosis of. . . . . i. 1051  
 — of refrigerants in. . . . . i. 1075  
 Fever, means for promoting the secretions and excretions in. . . . . i. 1077-8  
 — the promotion of the secretions and excretions a therapeutical principle in. . . . . i. 1077  
 — of relapses of. . . . . i. 1083  
 — stages of the course of. . . . . i. 1045  
 — cold stage of. . . . . i. 1046  
 — stage of decline. . . . . i. 1048  
 — stage of crisis. . . . . i. 1047  
 — stage of excitement. . . . . i. 1046  
 — the formation or precursor stage of. . . . . i. 1045  
 — stage of invasion. . . . . i. 1046  
 — the precursory or incubative stage. . . . . i. 1045  
 — stage of reaction. . . . . i. 1047  
 — terminations of. . . . . i. 1049  
 — curative treatment of. . . . . i. 1071  
 — general treatment of. . . . . i. 1069  
 — prophylactic treatment of. . . . . i. 1069  
 — the types or forms of. . . . . i. 1043  
 — the types of, classified. . . . . i. 1048  
 — means of moderating excessive vascular action in. . . . . i. 1072  
 — of vascular depletion in. . . . . i. 1072  
 — general view of. . . . . i. 1040  
 — of supporting vital power in. . . . . i. 1076  
 Fever, adynamic. See, also, Typhoid fever. . . . . i. 1163  
 — ardent, fevers comprised under. . . . . i. 1136  
 — bilio-gastric, definition of. . . . . i. 1150  
 — bilio-gastric, description of. . . . . i. 1150  
 — congestive or synchooid puerperal. . . . . 567-70  
 — the congestive, doctrine of, examined. . . . . i. 1060  
 Fever, continued, arrangements of, by authors. . . . . i. 1128-32  
 — classifications of. . . . . i. 1128-32  
 — remarks on the classification of. . . . . i. 1129, 32  
 — continued, definition of. . . . . i. 1128  
 — circumstances influencing the prognosis. . . . . i. 1135  
 — prognostic symptoms of. . . . . i. 1132-36  
 — ephemeral, after parturition. . . . . 548  
 — feigned. . . . . i. 1032  
 — gastric, after parturition, symptoms and treatment of. . . . . 548  
 Fever, gastro-bilious, *Bibliog. and Refer.* i. 1155  
 — gastro-bilious, causes of. . . . . i. 1153  
 — means of cure for. . . . . i. 1153  
 — description of. . . . . i. 1150  
 — diagnosis of. . . . . i. 1152  
 — duration and termination of. . . . . i. 1152  
 — prognosis of. . . . . i. 1153  
 — treatment of. . . . . i. 1153  
 Fever, hectic, defined. See also Hectic fever. . . . . i. 1123  
 — hectic, varieties of. . . . . i. 1124, 5  
 Fever, idiopathic, characters of. . . . . i. 1049  
 — description of its phenomena. . . . . i. 1049, 1  
 Fever, inflammatory or ardent, *Bibliog. and Refer.* i. 1150  
 — appearances after death from. . . . . i. 1141  
 — defined. . . . . i. 1137  
 — doctrines of, examined. . . . . i. 1061  
 — forms of. . . . . i. 1137  
 — treatment of. . . . . i. 1145  
 — during excitement. . . . . i. 1146  
 — during exhaustion. . . . . i. 1147  
 — mild form of. . . . . i. 1137  
 — complications of. . . . . i. 1138  
 — severe. . . . . i. 1139  
 — causes of. . . . . i. 1142  
 — duration of. . . . . i. 1142  
 — history of. . . . . i. 1140  
 — nature of. . . . . i. 1143  
 — terminations and prognosis. . . . . i. 1141  
 Fever, intermittent. See, also, Ague. . . . . i. 1085  
 — intestinal, after parturition, symptoms and treatment. . . . . 548  
 — low nervous. . . . . i. 1151



- Fever, malignant puerperal, appearances after death from . . . 575-8  
 — appearances after death from, as described by several writers . . . 578  
 — of the states of the blood in . . . 574  
 — causes of . . . 570  
 — inflammatory puerperal . . . 565-7  
 — pathological inquiries respecting puerperal . . . 579  
 — of the prominent states of . . . 572-4  
 — symptoms and states of . . . 570-5  
 — of certain symptoms of . . . 572-4  
 Fever, mucous, appearances after death from . . . 1157  
 — *Bibliog. and Refer.* . . . 1158  
 — causes of . . . 1157  
 — defined . . . 1156  
 — diagnosis of . . . 1156  
 — duration, termination, and prognosis . . . 1157  
 — symptoms of . . . 1156  
 — treatment of . . . 1157  
 Fever, rheumatic. See, also, Rheumatism. . . 604  
 — scarlet, pathological inferences respecting . . . 751  
 — severe or complicated continued . . . 1162  
 — simple continued . . . 1163  
 Fever, sweating, malignant or complicated . . . 1160  
 — *Bibliog. and Refer.* . . . 1162  
 — causes of . . . 1161  
 — definition of . . . 1158  
 — diagnosis of . . . 1160  
 — history of . . . 1158  
 — prognosis of . . . 1160  
 — symptoms of . . . 1159  
 — treatment of . . . 1161  
 Fever, symptomatic, characters of . . . 1044  
 Fever, synchoid, *defined*. See, also, Synchoid fever. . . 1162  
 — typhoid. See, also, Typhoid fever . . . 1168  
 Fever, typhus. See, also, Typhus. . . 1181  
 Fever yellow. See Pestilence hemagastic . . . 152  
 Fevers, malignant puerperal, symptoms and causes of . . . 570-8  
 — origins and symptoms of synchoid puerperal . . . 567  
 Fevers, periodic. See Agues and Intermittents. . . 1085  
 Fevers, puerperal, arrangement of their forms and states . . . 552-4  
 — author's arrangement of their forms and states . . . 553  
 — exciting causes of . . . 555  
 — predisposing causes of . . . 555  
 — commencing before delivery . . . 570  
 — diagnosis of their several states . . . 551-3  
 — their connexions with epidemic and endemic diseases . . . 561, 2  
 — their connexion with erysipelas . . . 559-61  
 — infections, nature of . . . 556-9  
 — author's inferences as to the prevention of . . . 561  
 — pathological inferences respecting . . . 584  
 — literary notices of . . . 550-2  
 — periods of commencement . . . 569  
 — periods of occurrence from parturition . . . 584  
 — prognosis of their different forms . . . 583, 4  
 — synonymes and definitions of . . . 549  
 — treatment of . . . 585-93  
 — their types and forms described . . . 562-4  
 Fevers, putro-adyamic, treatment of, in . . . 1211-14  
 — treatment of their complications . . . 1214  
 — treatment of their modifications . . . 1213  
 Fevers, remittent, *Bibliog. and Refer.* . . . 1121  
 Fevers, *defined* . . . 1100  
 — described. See, also, Remittents . . . 1100  
 Fibrous tissue, alterations of . . . 1230  
 — *Bibliog. and Refer.* . . . 1232  
 — inflammation of . . . 1233  
 Filaments and fibres of morbid growths described . . . 775  
 Filaria, systematic description of . . . 1542  
 Filaria Medicensis, history and localities of . . . 1548  
 — preventive treatment of . . . 1560  
 — symptoms and diagnosis of . . . 1542  
 — systematic description of . . . 1542  
 — *synonymes* of . . . 1543  
 — treatment, curative, of . . . 1560  
 Fingers and nails, alterations of, in phthisis . . . 1202  
 — and nails, signs of disease furnished by . . . 1067  
 Fish-diet in indigestion . . . 394  
 Fish poisons, sources of . . . 426  
 — symptoms of . . . 426  
 — treatment of . . . 427  
 Fish-skin disease described. See, also, Ichthyosis . . . 360  
 Fistula, gastro-colic, diagnosis of . . . 1508  
 — gastro-intestinal, diagnosis of . . . 1404  
 — of . . . 652  
 — complicating phthisis . . . 1214  
 Fistula, renal, remarks on . . . 763  
 Flaccidity of soft solids as a sign of disease . . . 1064  
 Flatulence in connexion with indigestion . . . 382  
 Flatulency, *Bibliog. and Refer.* . . . 1238  
 — of bowels, treatment of . . . 1237  
 — definition of . . . 1234  
 — of the intestines, symptoms and effects of . . . 1236  
 — of the stomach, causes and phenomena of . . . 1235  
 — as a symptom . . . 1081  
 — of stomach, treatment of . . . 1237  
 — symptomatic disorders consequent on . . . 1235  
 — treatment of . . . 1237  
 Flesh-meats in indigestion . . . 394  
 Flexions of the uterus . . . 1390  
 — treatment of . . . 1393  
 Flooding, during delivery, external . . . 132  
 — internal . . . 132  
 — remedies advised for . . . 180  
 — during labour, treatment of . . . 136  
 — treatment subsequently to . . . 138  
 — after delivery, treatment of . . . 138  
 Fluid, the cerebro-spinal, in connexion with palsy . . . 88  
 Fluids, the circulating, contamination of . . . 1041-50  
 — effused in dropsy, characters of . . . 692  
 Fœtus, *Bibliog. and Refer.* to diseases of . . . 1242  
 — death of the, causes of . . . 1239  
 — death of, from syphilis . . . 1481  
 — diseases causing death of . . . 1239  
 — diseases observed in the . . . 1238  
 — small-pox in the . . . 895  
 — syphilis in the . . . 1480-1  
 — syphilitic, infected from one or both parents . . . 1480-1  
 Fomites, of infection by . . . 408  
 Fomentum Camphoratum . . . F. 157. Ap. 10  
 Food, changes in the blood produced by . . . 1237  
 — desire of, &c., as a sign of disease . . . 1080  
 — in fever . . . 1082  
 — kinds of, advised for indigestion . . . 393, 7  
 — of man in relation to climate . . . 407  
 — in respect of the varieties of the species . . . 407  
 — its influence in disposing to phthisis . . . 1236  
 Food of the parents may cause scrofula in the offspring . . . 803  
 — and drink, as causing disease . . . 1563  
 — of the young in relation to scrofula . . . 804, 6  
 — poisons, symptoms and treatment of . . . 425, 9  
 Fool's-parsley, poisoning by . . . 474  
 Formations, parasitic and others, may be thrown off by promoting organic, nervous, and vital power . . . 1142  
 Formative period in infectious diseases . . . 411, 3  
 Forms and modifications of phthisis . . . 1203-5  
 Fotus Confi. . . F. 796. Ap. 30  
 Fragility of bones . . . 1057  
 France, climate of certain parts of . . . 413  
 Freckles, described . . . 1573  
 Fumigation, of its use in phthisis . . . 1276  
 Functional conditions consequent on age . . . 153  
 Function, impaired or lost, should be restored . . . 1142  
 Functions and mechanism of the spinal cord . . . 43  
 Fungi, poisonous, symptoms of poisoning by . . . 475-6  
 — appearances in fatal cases . . . 476  
 Fungo-hematoid tumour of the liver . . . 572  
 Fungo-hematoid disease of the pancreas . . . 10  
 Fungoid disease, complications of . . . 1245  
 — description of . . . 1243  
 — *Bibliog. and Refer.* . . . 1249  
 — causes of . . . 1246  
 — definition of . . . 1243  
 — diagnosis of . . . 1245  
 — origin of . . . 1247  
 — prognosis of . . . 1247  
 — progress and duration of . . . 1245  
 — treatment of . . . 1248  
 Furuncle, *Bibliog. and Refer.* . . . 1253  
 — asthenic, described . . . 1250  
 — treatment of . . . 1251  
 — sthenic, described . . . 1250  
 — treatment of . . . 1250  
 Furuncular eruptions, *defined* . . . 1249  
 Fusiform cells, described . . . 774  
 G.  
 Gall-bladder, of calculi in . . . 459  
 — diseases of . . . 11  
 — excessive distention of . . . 4  
 — diagnosis of . . . 5  
 — pathology of . . . 5  
 — treatment of . . . 6  
 — inaction of the . . . 2  
 — complications of torpor of . . . 3  
 — and ducts, causes of their torpor . . . 4  
 — diseases of, *Bibliog. and Refer.* . . . 11, 8  
 — accumulations of bile in . . . 2  
 — symptoms of . . . 3  
 — inflammation of, *defined* . . . 6  
 — alterations caused by . . . 6  
 — symptoms of . . . 6  
 — treatment . . . 8  
 — torpor of . . . 2  
 — treatment . . . 4  
 — ducts, disease of . . . 1  
 — inaction of the . . . 2  
 — spasm of . . . 3  
 — spasm, &c., of . . . 7  
 Gall-stones. See, also, Concretions biliary . . . 458-63  
 — notices of . . . 6, 7  
 — passage of, resembles poisoning by corrosive poisons . . . 371  
 Ganglia, agency of, in sympathies . . . 1080-35  
 Ganglionic nervous system, reflected actions of the . . . 40  
 — system, its influence on the blood and circulation . . . 1041-50  
 Ganglionic neuralgia . . . 1013  
 Gangrene, from various physical agents . . . 15

- Gangrene, from diseased or decomposed animal matters. . . . . ii. 17  
— from fibrinous and ossific formations in arteries. . . . . ii. 13  
— *Bibliog. and Refer.* . . . . ii. 28  
— of cellular tissue. . . . . ii. 10  
— from obstructed circulation from intense cold. . . . . ii. 16  
— constitutional symptoms of. . . . . ii. 23  
— constitutional treatment of indications of cure of. . . . . ii. 22  
— definition of. . . . . ii. 9  
— from vital exhaustion. . . . . ii. 12  
— of fibrous tissues. . . . . ii. 11  
— from disease of the heart. . . . . ii. 14  
— from excessive heat. . . . . ii. 16  
— Hospital, description of. . . . . ii. 18  
— treatment of. . . . . ii. 24, 6  
— from inflammation of internal coats of arteries. . . . . ii. 13  
— of the integuments. . . . . ii. 10  
— of the lungs. . . . . ii. 907  
— of mucous membranes. . . . . ii. 11  
— from extremes of temperature. . . . . ii. 16  
— from lesion of nerves. . . . . ii. 15  
— from obstruction of arteries from obstruction of veins. . . . . ii. 14  
— pathological relations of. . . . . ii. 9  
— of the phenomena connected with. . . . . ii. 10  
— from poisons. . . . . ii. 17  
— from animal poisons. . . . . ii. 19  
— symptoms caused by the several pathological states of. . . . . ii. 19-22  
— treatment of the several pathological states of. . . . . ii. 22  
— termination of. . . . . ii. 11  
— treatment of. . . . . ii. 22  
— local treatment of. . . . . ii. 26  
— regimen and diet for. . . . . ii. 27  
— complicating scarlet fever. . . . . 736  
— of serous membranes. . . . . ii. 11  
Gangrenous ergotism. . . . . ii. 17  
Gargarisma Acidi Hydrochlorici. . . . . F. 153. Ap. 10  
— Acidi Hydrochlorici Compositum. . . . . F. 159. Ap. 10  
— Antisepticum. . . . . F. 160. Ap. 10  
— Astringens. . . . . F. 161. Ap. 10  
— Astringens Zobeili. . . . . F. 162. Ap. 10  
— Bi-boratis Sodæ. . . . . F. 163. Ap. 10  
— Catechu Thebaicum. . . . . F. 174. Ap. 10  
— Capsici. . . . . F. 797. Ap. 30  
— Commune. . . . . F. 165. Ap. 10  
— Potasse Nitratis. . . . . F. 166. T. Ap. 10  
— cum Sodæ Chlorinatæ. . . . . F. 793. Ap. 30  
— Stimulans. . . . . F. 799. Ap. 30  
— Zinci Sulphatis. . . . . F. 800. Ap. 30  
Garrisons and camps, protection of, from pestilence. . . . . 272-3  
Gastric affections, feigned. . . . . i. 1032  
Gastritis, acute or phlegmonous. . . . . 1002  
— acute or severe states of, described. . . . . 1003-5  
— treatment of. . . . . 1007  
— appearances after death from. . . . . 1005  
— causes of. . . . . 1000  
— chronic, described. . . . . 1005  
— intentions of cure in. . . . . 1003  
— definition and synonyms of. . . . . 1000  
— description of. . . . . 1001  
— diagnosis of. . . . . 1006  
— diagnosis between and peritonitis. . . . . 91  
— diagnosis between and poisoning. . . . . 372  
— mild forms of. . . . . 1002  
— treatment of. . . . . 1007  
— prognosis of. . . . . 1007  
— seats and varieties of. . . . . 1001  
— sub-acute form described. . . . . 1003  
— treatment of. . . . . 1007  
— sub-acute and chronic, treatment of. . . . . 1008  
— treatment of pain and spasm of. . . . . 1008  
Gastrodynia, causes of. . . . . 998  
Gastrodynia, diagnosis of. . . . . 998  
— Sec, also, painful affections of the stomach. . . . . 998  
— prognosis of. . . . . 998  
— various remedies for. . . . . 999  
— symptoms of. . . . . 998  
— synonyms and definition of treatment of. . . . . 999  
Gastro-enteric disease. . . . . ii. 29  
— *Bibliography and Refer.* . . . . ii. 34  
— in connexion with fevers. . . . . ii. 31  
— with affections of the genito-urinary organs. . . . . ii. 33  
— with gout. . . . . ii. 32  
— with hepatic affections. . . . . ii. 32  
— with mesenteric disease. . . . . ii. 33  
— in its relation to diseases of the skin. . . . . ii. 33  
— therapeutical indications in. . . . . ii. 34  
Gastro-enteritis, described. . . . . ii. 29  
— morbid relations of. . . . . ii. 30  
— connected with cerebro-spinal affections. . . . . ii. 30  
— with disorders of the respiratory organs. . . . . ii. 30  
— in relation to increased vascular action. . . . . ii. 31  
— asthenic, complicating scarlet fever. . . . . 735  
Gastro-intestinal canal, morbid changes of. . . . . i. 619  
Generation, alternation of, in worms. . . . . 1522  
— of worms, circumstances favouring. . . . . 1520  
— considered. . . . . 1520  
— means preventing the. . . . . 1551  
Genesis of worms. . . . . 1420  
Genito-urinary organs, their disorders in connexion with gastro-enteric disorder. . . . . ii. 33  
Giddiness, described. See, also, Vertigo. . . . . 1495  
Girihood, remarks on. . . . . i. 49  
Glanders, *Bibliog. and Refer.* . . . . ii. 37  
— causes of. . . . . ii. 34  
— acute farcy in the human subject. . . . . ii. 35  
— chronic farcy. . . . . ii. 35  
— forms of. . . . . ii. 35  
— definition of. . . . . ii. 34  
— description of. . . . . ii. 34  
— associated with acute farcy. . . . . ii. 35  
— nature of. . . . . ii. 36  
— prevention of. . . . . ii. 36  
— prognosis of. . . . . ii. 36  
— simple acute, in the human subject. . . . . ii. 35  
— appearances after death from. . . . . ii. 35  
— treatment of. . . . . ii. 36  
Glands, bronchial, tuberculosis of. . . . . 1221, 2  
— tuberculosis of, in children. . . . . 1222  
— enlarged intestinal, notices of. . . . . 784  
— lymphatic. See, also, Lymphatics, &c. . . . . ii. 923  
— disease of, from absorption of morbid matters. . . . . ii. 926  
— mesenteric, diseases of the. . . . . ii. 983  
— See, also, Mesenteric disease. . . . . ii. 676  
— Peyer's, ulceration of. . . . . 739  
— diseases of, consequent upon scarlet fever. . . . . 867  
— affections of the sebaceous glands of the skin. . . . . 1453  
Gleet, treatment advised for. . . . . 1043-5  
Globules of the blood, their metamorphoses and waste. . . . . 1177  
Glossitis, acute, course and termination of. . . . . 1177  
— described. . . . . 1177  
— treatment of. . . . . 1179  
— asthenic acute, described. . . . . 1177  
— course and termination of. . . . . 1178  
— treatment of. . . . . 1180  
— causes of. . . . . 1178  
— chronic superficial, described. . . . . 1179  
— treatment of. . . . . 1181  
Glossitis, complicated and symptomatic. . . . . 1178  
— treatment of. . . . . 1181  
— partial, described. . . . . 1179  
— and superficial, treatment of. . . . . 1181  
— prognosis of the forms of. . . . . 1179  
— sthenic acute, treatment of. . . . . 1180  
— superficial, noticed. . . . . 1178  
Glottis, oedema of the. . . . . ii. 789  
— spasm of. See, also, Larynx, spasm of. . . . . ii. 777-84  
— hysterical spasm of. . . . . ii. 784  
— treatment of. . . . . ii. 784  
Goitre, described. See Bronchocoele. . . . . i. 323  
Gold, poisoning by the hydrochlorate, chloride, and iodide of. . . . . 385  
— treatment of. . . . . 386  
Gonorrhoea, antiquity of. . . . . 1458, 9  
— complications of. . . . . 1455  
— their treatment. . . . . 1457  
— diagnosis between and leucorrhoea. . . . . ii. 818, 23  
— in males, described. . . . . 1454  
— regimen and diet for. . . . . 1457  
— remedies advised for. . . . . 1456  
— symptoms of rheumatism, connected with. . . . . 672  
— secondary effects of. . . . . 1455  
— synonyms and definition of a distinct disease from syphilis. . . . . 1460  
— treatment of. . . . . 1455  
— in females. . . . . 1456  
— in males. . . . . 1456  
— abortive treatment of, disapproved. . . . . 1456  
— treatment of first stage of. . . . . 1456  
— of the second stage of. . . . . 1456  
— of its third, or chronic, stage. . . . . 1457  
— of the vulva. . . . . 1431  
Gonorrhoeal ophthalmia. See, also, Ophthalmia, gonorrhoeal. . . . . i. 1002  
Gout, acute, diagnosis of. . . . . ii. 44  
— history of. . . . . ii. 38  
— of the regular paroxysm of. . . . . ii. 38  
— prognosis of. . . . . ii. 45  
— the sequelæ of. . . . . ii. 40  
— treatment of. . . . . ii. 53  
— empirical treatment of. . . . . ii. 60  
— anomalous, or affections of. . . . . ii. 42  
— ten preceding. . . . . ii. 43  
— atonic or masked. . . . . ii. 43  
— author's opinion as to the pathology of. . . . . ii. 49  
— *Bibliog. and Refer.* . . . . ii. 70  
— causes of. . . . . ii. 46  
— exciting causes of. . . . . ii. 47  
— predisposing causes of. . . . . ii. 46  
— chronic, described. . . . . ii. 40  
— concomitants and consequences of. . . . . ii. 41  
— diagnosis of. . . . . ii. 45  
— prognosis of. . . . . ii. 46  
— treatment of. . . . . ii. 61  
— local treatment of. . . . . ii. 62  
— definition of. . . . . ii. 37  
— disguised or lurking. . . . . ii. 43  
— remedies prescribed for a fit of. . . . . ii. 54  
— local treatment of the fit. . . . . ii. 58, 9  
— treatment of, after the fit. . . . . ii. 59  
— its connexion with gastro-enteric disorder. . . . . ii. 47  
— of irregular. . . . . ii. 46  
— various terms used for. . . . . ii. 41  
— treatment of. . . . . ii. 63, 4  
— of mineral and thermal waters in. . . . . ii. 66  
— retrocedent or displaced. . . . . ii. 42  
— treatment of. . . . . ii. 63  
— opinions of authors on the pathology of. . . . . ii. 43, 52  
— pathological states constituting. . . . . ii. 48  
— prevention of. . . . . ii. 67  
— treatment of, advised by the ancients. . . . . ii. 52  
— treatment of, misplaced. . . . . ii. 64  
— treatment of the paroxysm of. . . . . ii. 54



- Grades of morbid action ..... i. 681  
 Grain, spilt, &c., injurious effects of ..... 476  
 Granular cell, compound, described ..... 774  
 Gravel in the urine, appearances of ..... 1339  
 — defined and explained ..... 1339  
 Greasy degeneration of the substance of the heart ..... ii. 250, i.  
 — signs and symptoms of ..... ii. 251  
 Green-sickness, described ..... i. 371  
 Growth. See, also, Tumours. 763  
 — cancerous, kinds of, degeneration of ..... 756  
 — canceroid and non-canceroid, described ..... 769-87  
 — cartilaginous canceroid, described ..... 782  
 — diagnosis of ..... 781  
 — epithelial canceroid, described ..... 779, 80  
 — diagnosis of ..... 791  
 — fatty-canceroid ..... 783  
 — fibrous-canceroid, described ..... 780  
 — diagnosis of ..... 791  
 — fungoid, or fungoid, in urine ..... 1339  
 — cystic, described ..... 780  
 — degeneration of cancerous and canceroid ..... 786  
 — mechanical and vital effects produced by ..... 789  
 — enlargement of, from blood-vessels ..... 787  
 — fibro-nucleated, described ..... 779  
 — malignant, *defined* ..... 769  
 — morbid, chemical composition of ..... 776  
 — elements of ..... 770-6  
 — mineral and pigmental principles of ..... 777  
 — non-cancerous, may they be transformed into cancerous? ..... 787, 8  
 — pathological relations of ..... 787  
 — non-malignant, described ..... 769-87  
 — of primary and secondary ..... 789  
 — scirrhous and other morbid, general anatomy of ..... 778  
 — *Bibliog. and Refer.* to ..... 796, 7  
 — diagnosis of ..... 789, 91  
 — pathological relations of ..... 784, 9  
 — prognosis of ..... 791  
 — tubercular, described ..... 783  
 Gualleum, of its use in syphilis ..... 1487  
 Gummat, tubercular syphilitic  
 Gums, signs of disease furnished by ..... 1075  
 Gums, of various medicinal, in phthisis ..... 1271  
 Gutta Indurata, described ..... i. 35  
 — Rosacea, described ..... i. 35  
 Gutta Acetatis Morphie F. 168. *Ap.* 10  
 — *Etheris* ..... F. 801. *Ap.* 30  
 — Terebinthinate ..... F. 169. *Ap.* 10  
 — *Etheris* Absinthii F. 802. *Ap.* 30  
 — Anodyne ..... F. 170. *Ap.* 10  
 — Antilemice ..... F. 171. *Ap.* 10  
 — Antispasmodice ..... F. 803. *Ap.* 30  
 — contra Spasmos ..... F. 172, 3. *Ap.* 10  
 — Nervine ..... F. 174. *Ap.* 10  
 — Odontalgie ..... F. 804. *Ap.* 30
- II.  
 Habits of life and profession, as predisposing to disease ..... i. 647  
 Hemagastic Pestilence. See, also, Pestilence, Hemagastic ..... 152-217  
 Hemapharmaca, enumeration of ..... 1147  
 Hematemesis, appearances after death from ..... ii. 113  
 — *Bibliog. and Refer.* ..... ii. 118  
 — of black matter ..... ii. 111  
 — exciting causes of ..... ii. 112  
 — predisposing causes of ..... ii. 111  
 — definition of ..... ii. 108  
 — diagnosis of ..... ii. 114  
 — from organic lesions ..... ii. 110, 11  
 Hematemesis pathological inferences as to ..... ii. 113  
 — pathology of ..... ii. 109  
 — pathognomonic symptoms of ..... ii. 112  
 — primary, or simple, described ..... ii. 109  
 — prognosis of ..... ii. 114  
 — regimen for ..... ii. 117  
 — from disease of viscera connected with the stomach ..... ii. 110  
 — from disease of the vessels of the stomach ..... ii. 111  
 — succedaneous, or vicarious ..... ii. 110  
 — premonitory symptoms of ..... ii. 112  
 — treatment of, during the attack ..... ii. 115-16  
 — after the attack ..... ii. 116  
 Hemato-cathartica, enumeration of ..... 1147  
 Hemato-globuline, the metamorphosis and waste of ..... 1044  
 Hematosin in urine ..... 1336  
 Hematuria, *Bibliog. and Refer.* ..... ii. 127  
 — causes of ..... ii. 123  
 — means of cure for ..... ii. 127  
 — definition of ..... ii. 122  
 — description of ..... ii. 123  
 — diagnosis of ..... ii. 125  
 — pathological states causing ..... ii. 124  
 — prognosis of ..... ii. 125  
 — regimen and diet for ..... ii. 127  
 — symptoms of ..... ii. 123  
 — treatment of ..... ii. 125  
 Hemoptysis, appearances after death from ..... ii. 97  
 — *Bibliog. and Refer.* ..... ii. 107  
 — exciting causes of ..... ii. 98  
 — predisposing causes of ..... ii. 98  
 — complications or associations of ..... ii. 99-101  
 — diverse means of cure for ..... ii. 103-7  
 — definition of ..... ii. 95  
 — diagnosis of ..... ii. 101  
 — causes of its frequency ..... ii. 96  
 — seat of the hæmorrhage in ..... ii. 98  
 — of inhalation for the cure of ..... ii. 107  
 — pathological relations of ..... ii. 99  
 — the prevention of ..... ii. 106  
 — prognosis of ..... ii. 101  
 — regimen during and after the attack ..... ii. 107  
 — premonitory signs of ..... ii. 96  
 — progress and course of ..... ii. 96  
 — complicating phthisis ..... 1211  
 — as a symptom of phthisis ..... 1197  
 — symptoms of ..... ii. 96  
 — treatment for the attack of ..... ii. 102-7  
 — history of its treatment ..... ii. 102  
 Hemorrhage, *Bibliog. and Refer.* ..... ii. 86  
 — alterations of the blood in ..... ii. 75  
 — exciting causes of ..... ii. 75  
 — remote causes of ..... ii. 77  
 — classification of its forms by the author ..... ii. 79  
 — of its varieties by various authors ..... ii. 79  
 — definition of ..... ii. 72  
 — diagnosis of ..... ii. 79  
 — its relations to irritation ..... ii. 75  
 — of the influence of organic, nervous, or vital power on ..... ii. 73  
 — prognosis of ..... ii. 79  
 — prophylaxis of ..... ii. 85  
 — regimen and diet for ..... ii. 88  
 — with reference to its seats ..... ii. 87  
 — symptoms attending ..... ii. 78  
 — symptoms preceding ..... ii. 78  
 — into areolar and other structures ..... ii. 143  
 — in the brain ..... i. 268  
 — from the serous membranes of brain and spinal cord ..... ii. 142  
 — into shut cavities ..... ii. 142  
 — into serous cavities, *Bibliog. and Refer.* ..... ii. 143  
 — treatment of, from interrupted circulation ..... ii. 82  
 — feigned, notices of ..... i. 1032  
 — intestinal, appearances after death by ..... ii. 121  
 — *Bibliog. and Refer.* ..... ii. 122  
 — remote causes of ..... ii. 122  
 Hemorrhage, intestinal, definition of ..... ii. 118  
 — diagnosis of ..... ii. 121  
 — pathological states causing ..... ii. 118  
 — prognosis of ..... ii. 121  
 — regimen and diet for ..... ii. 122  
 — symptoms of ..... ii. 121  
 — treatment of ..... ii. 121  
 — from the liver ..... ii. 843  
 — as indicative of diseased liver ..... ii. 874  
 — from mouth and throat ..... ii. 94  
 — symptoms and diagnosis ..... ii. 94  
 — treatment of ..... ii. 95  
 — *Bibliog. and Refer.* ..... ii. 95  
 — nasal, description of causes, and treatment of ..... ii. 88-93  
 — definition of. See, also, Epistaxis ..... ii. 88  
 — from the œsophagus ..... ii. 1049  
 — into the pericardium ..... ii. 142  
 — into the peritoneum ..... ii. 143  
 — from physical causes, treatment of ..... ii. 80  
 — into the pleura ..... ii. 142  
 — from the respiratory organs. See, also, Hemoptysis ..... ii. 95  
 — from the skin ..... ii. 87  
 — *Bibliog. and Refer.* ..... ii. 88  
 — causes and history of ..... ii. 87  
 — phenomena and treatment of ..... ii. 88  
 — in the spleen ..... 993  
 — from the stomach, *defined*. See, also, Hematemesis ..... ii. 105  
 — changes in the tissues, the seats of ..... ii. 74  
 — from the urinary organs. See, also, Hematuria ..... ii. 122  
 — uterine, *Bibliog. and Refer.* ..... ii. 141  
 — during delivery ..... ii. 142  
 — internal, after delivery ..... ii. 132  
 — after sixth month of pregnancy ..... ii. 131  
 — prognosis ..... ii. 132  
 — in the puerperal state ..... ii. 130-133  
 — remedies advised for ..... ii. 128, 141  
 — treatment of ..... ii. 133  
 — from the uterus, described. See, also, Menorrhagia ..... ii. 127  
 — changes in the vascular system causing ..... ii. 74  
 — treatment of, from lesions of vital power and vascular action ..... ii. 80-82  
 Hemorrhagic Congestion of the Mamma ..... ii. 933  
 Hemorrhoidal complaints, classification of ..... ii. 149  
 — discharges described ..... ii. 147  
 — treatment of ..... ii. 142  
 — tumours described ..... ii. 145, 7  
 — treatment of ..... ii. 133  
 Hemorrhoids, *Bibliog. and References* ..... ii. 145  
 — with fissures and rhagades of anus ..... ii. 148  
 — with ulceration of anus ..... ii. 149  
 — causes of ..... ii. 150  
 — various complications of ..... ii. 145  
 — treatment of the complications of ..... ii. 156, 7  
 — constitutional treatment of ..... ii. 145  
 — definition of ..... ii. 144  
 — diagnosis of ..... ii. 150  
 — of the propriety of arresting the discharge of ..... ii. 152  
 — pathology of ..... ii. 145  
 — prognosis of ..... ii. 151  
 — regimen and prophylaxis of ..... ii. 158  
 — remarks respecting ..... ii. 144  
 — suppressed, re-establishment of ..... ii. 158  
 — symptoms and character of ..... ii. 145  
 — treatment of ..... ii. 152  
 Hair, alterations of the ..... ii. 159  
 — alterations and loss of, *Bibliog. and Refer.* ..... ii. 144  
 — effects of syphilis upon ..... 1468

**Hair**, effects of removing the... ii. 159  
 — of excess of... ii. 160  
 — falling or matting of... ii. 161  
 — its growth in unusual situations... ii. 160  
 — loss and want of... ii. 162-4  
 — loss of colour of... ii. 161  
 — treatment of... ii. 162  
 — morbid states of... ii. 161  
 — pre-natural colour of... ii. 162  
 — trichomatose, *definition of*... ii. 164  
 — causes of... ii. 165  
 — treatment of... ii. 166  
*Bibliog. and Refer.*... ii. 167  
**Hands**, chronic rheumatism of... 669  
**Hautus Acidii Nitrici et Opilii**  
 F. 175, 6. *Ap.* 10  
 — Anodynus... F. 177. *Ap.* 10  
 — Contra Emesin... F. 178. *Ap.* 10  
 — Anti-Emeticus... F. 179. *Ap.* 10  
 — Aperiens... F. 180. *Ap.* 10  
 — Aperiens ex Jalapa et Aloe  
 F. 181. *Ap.* 10  
 — Aperiens ex Scammonia  
 F. 182. *Ap.* 10  
 — Arsenicalls... F. 806. *Ap.* 30  
 — Astringens... F. 183. *Ap.* 10  
 — Balsam Peruvianl. F. 807. *Ap.* 30  
 — Belladonna et Cinchona  
 F. 808. *Ap.* 30  
 — Boracicus... F. 184. *Ap.* 10  
 — cum Calumba et Ferro  
 F. 185. *Ap.* 10  
 — Camphore Comp. F. 186. *Ap.* 10  
 — Carminativus... F. 187. *Ap.* 10  
 — Chlorure... F. 805. *Ap.* 30  
 — Colchiel... F. 188. *Ap.* 10  
 — cum Colchico... F. 189. *Ap.* 10  
 — Conii... F. 190. *Ap.* 11  
 — Conii et Hyoscyami F. 191. *Ap.* 11  
 — Deobstruens et Roborans  
 F. 192. *Ap.* 11  
 — Diaphoreticus... F. 193. *Ap.* 11  
 — Diaphoreticus... F. 809. *Ap.* 30  
 — Diureticus... F. 194. *Ap.* 11  
 — Diureticus... F. 195, 6, 7. *Ap.* 11  
 — Emeticus excitans... F. 198. *Ap.* 11  
 — Emenagogus... F. 810. *Ap.* 3  
 — Guaiac Comp... F. 199. *Ap.* 11  
 — Hyoscyami et Anisi F. 811. *Ap.* 30  
 — Infusi Cinchona cum Acido  
 Hydrochlorico... F. 200. *Ap.* 11  
 — Infusi Casparie Composi-  
 tus... F. 201. *Ap.* 11  
 — Infusi Uvae Ursi Alkalinus  
 F. 202. *Ap.* 11  
 — Infusi Uvae Ursi Composi-  
 tus... F. 203. *Ap.* 11  
 — cum Iodinio... F. 204. *Ap.* 11  
 — Laxans... F. 205. *Ap.* 11  
 — Nervinus... F. 812. *Ap.* 30  
 — Pectoralis... F. 813. *Ap.* 30  
 — cum Plumbi Acetate  
 F. 206. *Ap.* 11  
 — Quassia et Ferri... F. 814. *Ap.* 30  
 — Quina et Zinci... F. 207. *Ap.* 11  
 — Salinus... F. 815. *Ap.* 30  
 — Aromaticus... F. 816. *Ap.* 30  
 — Demulcens... F. 817. *Ap.* 30  
 — Sedativus... F. 818. *Ap.* 30  
 — Sedativus... F. 208. *Ap.* 11  
 — Sedativus... F. 819. *Ap.* 30  
 — Emolliens... F. 209. *Ap.* 11  
 — cum Magnesia F. 820. *Ap.* 30  
 — et Refrigerans F. 821. *Ap.* 30  
 — contra Spasmos F. 210, 11. *Ap.* 11  
 — contra Spasmos cum Ph-  
 lula Camphore... F. 212. *Ap.* 11  
 — Stimulans... F. 213. *Ap.* 11  
 — Stomachicus... F. 214. *Ap.* 11  
 — Stomachicus Aperiens  
 F. 215. *Ap.* 11  
 — Terebinthinatus Aperiens  
 F. 216. *Ap.* 11  
 — Tonicus Alkalinus F. 822. *Ap.* 30  
 — cum Uvae Ursi... F. 217. *Ap.* 11  
**Headache**, *Bibliog. and Refer.*... ii. 181  
*definition of*... ii. 161  
*pathology of*... ii. 167  
*prognosis of*... ii. 175  
*remedies recommended for*  
 ii. 178-81  
 — treatment of... ii. 175  
 — arthritic, or gouty... ii. 173

**Headache**, arthritic, treatment  
 of... ii. 177  
 — congestive... ii. 169  
 — causes and symptoms  
 of... ii. 170  
 — treatment of... ii. 175  
 — dyspeptic or bilious... ii. 171-2  
 — causes of... ii. 172  
 — treatment of... ii. 176  
 — from vascular determina-  
 tion... ii. 170  
 — symptoms of... ii. 170  
 — intermittent... ii. 173  
 — nervous, symptoms of... ii. 169  
 — treatment of... ii. 175  
 — from organic lesions... ii. 172  
 — from organic or cerebral le-  
 sions, treatment of... ii. 177  
 — partial and neuralgic... ii. 174  
 — pericranial, treatment of... ii. 177  
 — from disease of the perios-  
 teum and cranial bones... ii. 172  
 — plethoric or inflammatory,  
 treatment of... ii. 176  
 — rheumatic, described... ii. 173  
 — treatment of... ii. 177  
 — topical remedies for... ii. 180  
 — varieties depending on patho-  
 logical states... ii. 169  
 — diagnosis of the pathologic-  
 al varieties... ii. 174  
 — various forms, treatment  
 of... ii. 175  
**Headaches**, during pregnancy  
 — treatment of... 504  
 — rheumatic, notices of... 673  
**Health**, *defined*... i. 644  
**Hearing**, impaired or lost... ii. 182  
 — symptoms furnished by... 1071  
**Heart**, actions of the... ii. 194  
 — arrangement of its diseases... ii. 200  
 — auscultation of... ii. 204  
 — morbid sounds of... ii. 205  
*Bibliog. and Refer.* to the  
 diseases of... ii. 203  
 — causes of its diseases... ii. 197  
 — communications between  
 the sides of the... ii. 260  
 — complication of its dis-  
 eases... ii. 201  
 — course, duration, and termi-  
 nation of its diseases... ii. 201  
 — dimensions and weight of,  
 in health and disease... ii. 194  
 — disease of, causing dropsy... i. 607  
 — lesions of, their influence  
 in complicating disease... ii. 1050  
 — alterations of its blood-ves-  
 sels... ii. 260  
 — alterations of its consist-  
 ence... ii. 249  
 — treatment of... ii. 250  
 — atrophy of the... ii. 195  
 — its characters... ii. 248  
 — its causes... ii. 248  
 — symptoms and treat-  
 ment of... ii. 248  
 — carcinoma, &c., in the... ii. 254  
 — contractions of the cavities  
 and orifices of... ii. 249  
 — treatment of... ii. 249  
 — cysts and hydatids in the... ii. 253  
 — dilatation of its cavities... ii. 244  
 — of its orifices... ii. 244  
 — treatment of... ii. 246  
 — causes producing dila-  
 tation of the cavities and ori-  
 fices of... ii. 244  
 — signs and symptoms  
 of... ii. 245  
 — progress, termination,  
 and prognosis of... ii. 246  
 — lesions of the orifices of... ii. 212  
 — lesions producing rupture  
 of the... ii. 258  
 — lesions of the valves of the... ii. 213  
 — local signs of its diseases... ii. 199  
 — intimate nature of its le-  
 sions... ii. 198  
 — nature of its diseases... ii. 200  
 — states of, affecting the pulse... 508  
 — morbid sympathies of... 1038  
 — pathological causes of its  
 diseases... ii. 198

**Heart**, prognosis of its diseases... ii. 201  
 — seat and anatomical char-  
 acters of its diseases... ii. 198  
 — of the natural sounds of  
 the... ii. 195  
 — of the morbid sounds of  
 the... ii. 195  
 — structure of the... ii. 193  
 — structural lesions of the, *de-  
 fined*... ii. 235  
 — symptoms and signs fur-  
 nished by... 1086  
 — general symptoms of its dis-  
 eases... ii. 199  
 — symptoms of disease of the  
 valves of... ii. 212-13  
 — treatment of its diseases... ii. 202  
 — treatment of organic dis-  
 eases of... ii. 203  
 — general view of diseases of  
 the... ii. 197  
 — increased action of the. See,  
 also, Palpitation... ii. 204  
 — impaired action of the... ii. 203  
 — treatment of... ii. 204  
 — irregular action of the... ii. 203  
 — treatment of... ii. 204  
 — dilatation of the cavities  
 and orifices of, when caused  
 by diseased valves... ii. 244, 6  
 — treatment of... ii. 246  
 — displacement of the... ii. 262  
 — causes of... ii. 262  
 — endocarditis, treatment of... ii. 229  
 — fatty degeneration of, signs  
 and symptoms of... ii. 251  
 — described... ii. 250  
 — treatment of... ii. 252  
 — fibrinous concretions in the  
 cavities of the... ii. 255  
 — from internal cardi-  
 tis... ii. 255  
 — from morbid matters  
 in the blood... ii. 255  
 — malignant formations in  
 the... ii. 253, 54  
 — functional disorders of the... ii. 203  
*Bibliog. and Refer.*... ii. 206  
 — gangrene of the... ii. 221  
 — hypertrophy of the... ii. 195, 235  
 — description of... ii. 236  
 — nature and causes of... ii. 237  
 — complications of... ii. 235  
 — diagnosis and symp-  
 toms... ii. 240  
 — influence of, on the ce-  
 rebral circulation... ii. 239  
 — on the pulmonary  
 circulation... ii. 240  
 — prognosis and termina-  
 tions of... ii. 242  
 — hypertrophy of the com-  
 partments, signs of... ii. 241  
 — treatment of... ii. 242, 3  
 — treatment of hypertrophy  
 from diseased valves... ii. 243  
 — induration of... ii. 250  
 — indurations, cartilaginous  
 and osseous, of the structure  
 of... ii. 222  
 — infiltration of blood in the  
 structure of... ii. 250  
 — of serum in the struc-  
 ture of... ii. 250  
 — inflammations of the. See,  
 also, Carditis... ii. 208  
*Bibliog. and Refer.*... ii. 234  
 — exciting causes of... ii. 225  
 — predisposing causes... ii. 224  
 — inflammation of, in chil-  
 dren... ii. 233  
 — complications of its inflam-  
 mations... ii. 227  
 — diagnosis of inflammations  
 of... ii. 227  
 — inflammations of, duration  
 and termination... ii. 228, 9  
 — inflammation of the endo-  
 cardium. See, also, Endocar-  
 ditis... ii. 209  
 — inflammations of, their  
 prognosis... ii. 228, 9  
 — their relapses... ii. 230, 31



- Heart, Inflammation of the substance of the. See, also, Carditis vera. . . . . ii. 220  
 — treatment of inflammations of. . . . . ii. 229-33  
 — of inflammatory diseases of the. . . . . ii. 202  
 — of inflammations of, in children. . . . . ii. 234  
 — neuralgic or painful affections of the. . . . . ii. 206  
 — causes of. . . . . ii. 207  
 — diagnosis of. . . . . ii. 207  
 — treatment of. . . . . ii. 250  
 — obesity of the. . . . . ii. 250  
 — treatment of. . . . . ii. 252  
 — adenoma of, described. . . . . ii. 250  
 — osseous and cartilaginous formations in the. . . . . ii. 222  
 — palpitations of, after parturition. . . . . 546  
 — during pregnancy. . . . . 503  
 — percussion of the region of the. . . . . ii. 197  
 — perforation of one of its cavities. . . . . ii. 222  
 — polypous formations in the cavities of the. . . . . ii. 254  
 — ruptures of the. . . . . ii. 257  
 — seat and history of. . . . . ii. 257  
 — rupture of the valves of. . . . . ii. 259  
 — causes of. . . . . ii. 259  
 — symptoms and diagnosis of. . . . . ii. 260  
 — partial rupture of. . . . . ii. 259  
 — inflammatory softening of the. . . . . ii. 221  
 — different kinds of softening of. . . . . ii. 221  
 — symptoms of inflammatory softening of. . . . . ii. 224  
 — non-inflammatory or chronic softening of the. . . . . ii. 249  
 — symptoms of. . . . . ii. 249  
 — tubercles in the. . . . . ii. 252  
 — tumours of various kinds in the. . . . . ii. 253  
 — ulceration of the. . . . . ii. 292  
 — unnatural positions of. . . . . ii. 292  
 — causes of. . . . . ii. 292  
 — of. . . . . i. 1032  
 Heart-affections, feigned. . . . . i. 1032  
 Heart and pericardium, adventitious formations in the. . . . . ii. 252  
 — signs of. . . . . ii. 252  
 — *Bibliog. and Refer.*. . . . . ii. 262-7  
 — diseases of the. . . . . ii. 193  
 — Introductory remarks on their diseases. . . . . ii. 193  
 Heartburn, described. . . . . ii. 380  
 Heartburn, &c., during pregnancy. . . . . 502  
 — treatment of. . . . . 502  
 Heat, its injurious effects, when excessive. . . . . 409  
 Hectic fever, *Bibliog. and Refer.*. . . . . i. 1128  
 — causes of. . . . . i. 1124  
 — defined. . . . . i. 1123  
 — description of. . . . . i. 1123  
 — nature, &c., of. . . . . i. 1126  
 — pathological causes of. . . . . i. 1124-5  
 — prognosis of. . . . . i. 1125  
 — regimen and diet in. . . . . i. 1128  
 — treatment of. . . . . i. 1127  
 — of the several varieties of. . . . . i. 1127  
 — varieties of. . . . . i. 1124, 5  
 Hellebore and Veratrum, poisoning by. . . . . 424  
 — treatment of. . . . . 425  
 Hemimelia, general description of. . . . . 1520-30  
 Hemeralopia, description of. . . . . ii. 1032  
 — treatment of. . . . . ii. 1033  
 — synonymies and phenomena of. . . . . ii. 1029  
 Hemiparesis, described. . . . . ii. 174  
 Hemiplegia, accession of, described. . . . . 16  
 — its connexion with apoplexy. . . . . 16  
 — description of. . . . . 16  
 — diagnosis of. . . . . 16  
 — states and sources of. . . . . 52  
 — consequent upon inflammatory softening, treatment of. . . . . 46  
 Hemiplegia, chronic, treatment of. . . . . 46  
 — intermittent, noticed. . . . . 17  
 Hemiplegic paralysis, treatment of. . . . . 45  
 Hemlock dropwort, poisoning by. . . . . 476  
 Hemlock, symptoms of poisoning by. . . . . 465  
 Henbane, diagnosis of poisoning by. . . . . 466  
 Hepatalgia, description of. . . . . ii. 838  
 Hepatic diseases, causes of, in different climates. . . . . ii. 830  
 — feigned. . . . . i. 1033  
 — their connexion with gastro-enteric affections. . . . . ii. 32  
 — influence of races on. . . . . ii. 833  
 Hepatic functions, sympathies of. . . . . 1036  
 Hepatic ileus, described. . . . . i. 428  
 Hepatitis, of blood-letting for. . . . . ii. 855  
 — complications of. . . . . ii. 853  
 — with dysentery, &c.. . . . ii. 853  
 — with fevers. . . . . ii. 853  
 — with gastritis. . . . . ii. 854  
 — consequences and terminations of. . . . . ii. 849-53  
 — definition of. . . . . ii. 844  
 — diagnosis of. . . . . ii. 855  
 — use of mercurials in. . . . . ii. 855-8  
 — relations of, &c.. . . . ii. 844  
 — relations as to climate and constitution. . . . . ii. 844  
 — prognosis in acute and sub-acute. . . . . ii. 854  
 — seats and symptoms of acute and sub-acute. . . . . ii. 845-7  
 — seats and forms of. . . . . ii. 844-5  
 — termination in abscess. . . . . ii. 849  
 — treatment of, in Europeans in warm climates. . . . . ii. 859  
 — of acute and sub-acute. . . . . ii. 855-64  
 — of the complications of acute. . . . . ii. 860  
 — chronic seats and symptoms of. . . . . ii. 848  
 — prognosis in. . . . . ii. 855  
 — treatment of. . . . . ii. 864  
 — chronic, of the nitro-muriatic acids in. . . . . ii. 865  
 Hereditary predisposition to insanity. . . . . ii. 555  
 — predispositions to disease, described. . . . . i. 645-51  
 Hernia cerebri, described. . . . . i. 277  
 — of the ovum. . . . . ii. 1066  
 Herpes circinatus, description of. . . . . ii. 268  
 — iris, described. . . . . ii. 269  
 — labialis, described. . . . . ii. 268  
 — phlyctenoides, description of. . . . . ii. 267  
 — preputialis, described. . . . . ii. 268  
 — zoster, description of. . . . . ii. 267  
 Herpetie eruptions, *Bibliog. and Refer.*. . . . . ii. 271  
 — causes of. . . . . ii. 269  
 — definition of. . . . . ii. 267  
 — diagnosis of. . . . . ii. 269  
 — treatment of. . . . . ii. 270  
 Hiccough, causes of. . . . . ii. 271  
 — diagnosis and prognosis of. . . . . ii. 272  
 — *Bibliog. and Refer.*. . . . . ii. 272  
 — definition of. . . . . ii. 271  
 — treatment of. . . . . ii. 272  
 Hip-joint, chronic rheumatism of. . . . . 667-9  
 Hippomane Mancinella, poisoning by. . . . . 390  
 History of early appearances of venereal diseases. . . . . 1459-63  
 — literary, of venereal diseases. . . . . 1459-63  
 Home-sickness, described. . . . . ii. 1033  
 Honey, poisonous, symptoms caused by. . . . . 430  
 Hooping-cough, *Bibliog. and Refer.*. . . . . ii. 291, 2  
 — causes of. . . . . ii. 288  
 — definition of. . . . . ii. 273  
 — diagnosis of. . . . . ii. 282  
 — appearances observed in fatal cases of. . . . . ii. 278  
 — literary history of. . . . . ii. 273  
 Hooping-cough, external means advised for. . . . . ii. 290  
 — plans and means of cure advised for. . . . . ii. 283-90  
 — opinions as to the nature and seat of. . . . . ii. 279-82  
 — prognosis of. . . . . ii. 283  
 — synonymies of. See, also, Pertussis. . . . . ii. 273  
 — treatment of. . . . . ii. 284  
 — specific modes of treatment advised by authors. . . . . ii. 286  
 — complicated with abdominal disorders. . . . . ii. 275  
 — with inflammatory irritation of the brain, or of its membranes. . . . . ii. 277  
 — with bronchitis. . . . . ii. 276  
 — description of complicated. . . . . ii. 275  
 — treatment of complicated. . . . . ii. 285  
 — of the bronchitic complication. . . . . ii. 285  
 — complicated with cerebral disease. . . . . ii. 275  
 — treatment. . . . . ii. 285  
 — complicated with intestinal disorder. . . . . ii. 277  
 — with phthisis. . . . . ii. 277  
 — with pneumonia. . . . . ii. 276  
 — treatment of, complicated with pneumonia or pleuritis. . . . . ii. 285  
 — description of simple. . . . . ii. 273  
 — treatment of simple. . . . . ii. 284  
 — various complications, treatment of. . . . . ii. 286  
 Hordeolum, described. . . . . i. 1250  
 Hospital gangrene, described. . . . . i. 13  
 — treatment of. . . . . ii. 24, 26  
 Human species, the relations of climate to the varieties of. . . . . i. 404  
 Hydatid cysts, description of. . . . . ii. 293  
 Hydatids, *Bibliog. and Refer.*. . . . . ii. 297  
 — in bones. . . . . ii. 1059  
 — remote and immediate causes of. . . . . ii. 296  
 — definition of. . . . . ii. 292  
 — in the heart. . . . . ii. 253  
 — of the liver. . . . . ii. 872  
 — seats of. . . . . ii. 296  
 — symptoms of. . . . . ii. 297  
 — treatment of. . . . . ii. 297  
 — in the urine. . . . . 1338  
 Hydrocephalec, or watery hernia of the brain. . . . . i. 277  
 Hydrocephalus, definition of. . . . . i. 752  
 — acutus, appearances after death. . . . . i. 756  
 — duration of. . . . . i. 756  
 — causes of. . . . . i. 760  
 — exciting causes of. . . . . i. 761  
 — predisposing causes of. . . . . i. 760  
 — definition of. . . . . i. 752  
 — diagnosis of. . . . . i. 757, 9  
 — forms and stages of. . . . . i. 753  
 — history of. . . . . i. 753  
 — literary history of its treatment. . . . . i. 763  
 — indications and means of cure. . . . . i. 764  
 — medicines and means recommended for. . . . . i. 764-8  
 — pathological inferences. . . . . i. 762  
 — pathological opinions respecting. . . . . i. 761  
 — prognosis of. . . . . i. 759  
 — prophylactic treatment of. . . . . i. 769  
 — treatment of. . . . . i. 763  
 — hyper-acute, described. . . . . i. 756  
 — treatment of. . . . . i. 768  
 — sub-acute, description of. . . . . i. 757  
 — appearances after death. . . . . i. 767  
 — treatment of. . . . . i. 768  
 — chronic, appearances after death. . . . . i. 773  
 — *Bibliog. and Refer.*. . . . . i. 759  
 — causes of. . . . . i. 771  
 — definition of. . . . . i. 771  
 — duration of. . . . . i. 773  
 — indications of treatment of. . . . . i. 775  
 — diverse remedies and means advised for. . . . . i. 775-80  
 — prognosis of. . . . . i. 774

- Hydrocephalus**, chronic, regimen and prophylactic treatment of ..... i. 750  
 — symptoms of ..... i. 772  
 — varieties of ..... i. 771  
 — congenital, described ..... i. 740  
**Hydrocyanic acid**, its use in phthisis ..... 1267  
**Hydrometra**, described ..... i. 749  
**Hydrophobia**. See, also, Rabies. 618-42  
**Hydro-pneumony**, described ..... i. 736  
**Hydro-pneumitis**, described ..... i. 736  
**Hydrops**, *definition of*. See, also, Dropsy. i. 689  
 — Abdominis, described. i. 716  
 — Ovarii. See, also, Dropsy, Ovarian. i. 745  
 — Sacculus. See, also, Dropsy, encysted. i. 743  
 — Spinae, described. i. 741  
 — pathology of. i. 741  
 — Tubalis. i. 740  
**Hydrorachis**, described. i. 740  
**Hydrothorax**, appearances after death from ..... i. 737  
 — acute and sub-acute ..... i. 736  
 — *Bibliog. and Refer.* ..... i. 739  
 — diagnosis of ..... i. 737  
 — description of ..... i. 736  
 — remedies and prescriptions advised for ..... i. 739  
 — symptomatic or complicated ..... i. 737  
 — treatment of ..... i. 738  
**Hygienic agents**, arrangement of ..... 1144  
 — inferences, as regards the infection of puerperal fevers. 561  
**Hyoseyanus**, diagnosis of poisoning by ..... 466  
**Hypertrophy**, causes and origin. ii. 299  
 — characters of ..... ii. 300  
 — description of ..... ii. 298  
 — effects of ..... ii. 300  
 — nature of ..... ii. 299  
 — treatment of ..... ii. 300  
 — *Bibliog. and Refer.* ..... ii. 300  
 — varieties of ..... ii. 298  
**Hypertrophy of the brain** ..... i. 269  
 — of the heart, causes and nature of ..... ii. 237-8  
 — its influence on the cerebral circulation ..... ii. 239  
 — on the pulmonary circulation ..... ii. 240  
 — complications of ..... ii. 238  
 — defined ..... ii. 235  
 — diagnosis and symptoms of ..... ii. 240  
 — prognosis and terminations of ..... ii. 242  
 — treatment of ..... ii. 242-4  
 — treatment of, from diseased valves ..... ii. 243  
 — of the liver ..... ii. 867-8  
 — of the mamma ..... ii. 933  
 — of the muscles ..... ii. 996  
 — of the pancreas ..... 8  
 — of adipose tissue ..... i. 44  
 — of the tissues of the digestive canal ..... i. 626  
 — of the body of the uterus ..... 1374  
 — of the neck of the uterus ..... 1367  
 — treatment of ..... 1383-4  
**Hypnotics**, enumeration of ..... 1147  
 — poisoning by ..... 460-74  
**Hypochondriacal monomania** ..... ii. 521  
**Hypochondriasis**, *Bibliog. and Refer.* ..... ii. 313  
 — exciting causes of ..... ii. 305  
 — predisposing causes of ..... ii. 303  
 — complications of ..... ii. 302  
 — *definition of* ..... ii. 301  
 — degrees or grades of ..... ii. 301  
 — description and history of ..... ii. 301  
 — diagnosis of ..... ii. 304  
 — duration and progress of ..... ii. 303  
 — medicinal treatment of ..... ii. 309  
 — pathology of ..... ii. 306  
 — during pregnancy ..... 504  
 — treatment of ..... 504  
 — prognosis of ..... 507  
 — regimen advised for ..... ii. 308  
 — remedies advised for ..... ii. 309-12  
**Hypochondriasis**, restorative means advised for ..... ii. 311  
 — structural changes observed after death from ..... ii. 303  
 — terminations of ..... ii. 303  
 — its treatment, and author's indications and intentions for ..... ii. 308  
 — moles of treatment advised by other authors ..... ii. 312  
**Hysterical**, notices of ..... ii. 1013  
 — after parturition ..... 546  
 — treatment of ..... 546  
**Hysteria**, *Bibliog. and Refer.* ..... ii. 340  
 — causes of ..... ii. 325  
 — exciting causes of ..... ii. 327  
 — predisposing causes of ..... ii. 325  
 — complications of ..... ii. 323  
 — *definition of* ..... ii. 314  
 — diagnosis of ..... ii. 314  
 — duration of ..... ii. 323  
 — feigned ..... i. 1033  
 — anomalous forms of ..... ii. 317  
 — irregular forms of ..... ii. 317  
 — milder and more regular forms of ..... ii. 314  
 — more severe forms of ..... ii. 315-16  
 — local manifestations of ..... ii. 317-322  
 — relations to various nervous complaints ..... ii. 317-322  
 — paroxysm or fit of described ..... ii. 314  
 — painful affections of ..... ii. 318-20  
 — complicated with palsy ..... 32  
 — after parturition ..... 546  
 — treatment of ..... 547  
 — pathology of ..... ii. 327  
 — pathological opinions as to ..... ii. 328  
 — pathological inferences ..... ii. 329  
 — regimen and diet of ..... ii. 329  
 — sympathetic phenomena of ..... ii. 329  
 — terminations of ..... ii. 328  
 — treatment of ..... ii. 330  
 — of the digestive functions in ..... ii. 333  
 — especially in the intervals ..... ii. 331  
 — of the irregular and complicated forms of ..... ii. 333  
 — of nervous states in ..... ii. 332  
 — prophylactic ..... ii. 338  
 — of the seizure ..... ii. 331  
 — of the vascular states ..... ii. 332  
**Hysterical affections**. See, also, Hysteria ..... ii. 314  
**Hysterical affections complicated with insanity** ..... ii. 536  
 — affections, treatment of various ..... ii. 334-37  
 — pains, etc., treatment of ..... ii. 333-36  
 — paralysis described ..... ii. 321  
**Hysteritis**, symptoms of in pregnancy ..... 500  
 — treatment of ..... 500  
 — puerperal, described ..... 505  
 — course and termination of ..... 565  
 — treatment of ..... 535  

**I.**

**Iatrophica Curas**, poisoning by ..... 390  
**Ichthyosus** pus, its expectoration as a sign of disease ..... 1093  
**Ichthyosis**, anatomical changes constituting ..... ii. 361  
 — *Bibliog. and Refer.* ..... ii. 363  
 — causes of ..... ii. 362  
 — *definition of* ..... ii. 361  
 — description of ..... ii. 360  
 — diagnosis of ..... ii. 361  
 — forms of ..... ii. 360  
 — treatment of ..... ii. 362  
**Idiotism**, causes of ..... ii. 627  
 — complications of ..... ii. 627  
 — description of ..... ii. 625  
 — feigned ..... i. 1033  
 — associated with palsy ..... 30  
 — pathology of ..... ii. 628  
 — treatment of ..... ii. 628  
**Ileo-colitis** of hot countries ..... ii. 667  
 — acute, symptoms of ..... ii. 667  
 — chronic, symptoms of ..... ii. 668  
 — sub-acute, symptoms of ..... ii. 668  
**Ileus**, appearances in, after death ..... i. 433  
**Ileus**, *Bibliog. and Refer.* ..... i. 448  
 — *definition of* ..... i. 432  
 — diagnosis of ..... i. 434  
 — history and symptoms of ..... i. 433  
 — from intussusception of the bowels ..... i. 434  
 — remarks on its pathology ..... i. 435  
 — the prognosis of ..... i. 436  
 — remedies recommended for ..... i. 443  
 — treatment of ..... i. 442  
 — treatment of convalescence from ..... i. 446  
**Imbecility**, causes of ..... ii. 627  
 — pathological causes of ..... ii. 628  
 — described ..... ii. 625  
 — treatment of ..... ii. 628  
**Impetiginous affections described**. See, also, Impetigo. ..... ii. 368  
**Impetigo**, *Bibliog. and Refer.* ..... ii. 369  
 — causes of ..... ii. 367  
 — *definition of* ..... ii. 363  
 — diagnosis of ..... ii. 366  
 — prognosis of ..... ii. 367  
 — treatment of ..... ii. 367, 369  
 — local treatment of ..... ii. 365  
 — complicated, described ..... ii. 365  
 — eczematosa, described ..... ii. 365  
 — erysipelatodes ..... ii. 366  
 — favosa, described ..... ii. 365  
 — figurata, described ..... ii. 364  
 — simplex, described ..... ii. 364  
 — sparsa, described ..... ii. 365  
**Impotence**, *Bibliog. and Refer.* ..... ii. 376  
 — causes of ..... ii. 370-74  
 — caused by functional disorder ..... ii. 370  
 — by mental influences ..... ii. 370  
 — by organic lesions ..... ii. 371  
 — *definition of* ..... ii. 369  
 — in the female. See Sterility, causes of ..... ii. 373  
 — pathology of ..... ii. 370-373  
 — treatment of ..... ii. 374  
**Incendiarism**, a form of partial insanity ..... ii. 517  
**Incoherency**, description of ..... ii. 530  
**Incubation of infectious agents** ..... ii. 411  
 — stage of, in fevers ..... i. 1045  
**Indications of cure**, remarks on ..... 1133  
 — for a recourse to emetics ..... 1505  
 — for treating fevers ..... i. 1071  
 — of infection ..... ii. 413  
**Indigestion**, *Bibliog. and Refer.* ..... ii. 393  
 — exciting causes of ..... ii. 384  
 — predisposing causes of ..... ii. 383  
 — consequences of ..... ii. 382  
 — treatment of the consequences of ..... ii. 392  
 — *definition of*. See, also, Dyspepsia. ii. 377  
 — diet and regimen for ..... ii. 393  
 — disorders symptomatic of ..... ii. 351  
 — drinks and beverages in ..... ii. 395-398  
 — pathology of ..... ii. 386-388  
 — remedies advised for ..... ii. 389-392  
 — of certain symptoms of ..... ii. 380  
 — treatment of symptomatic affections of ..... ii. 392, 393  
 — terminations of ..... ii. 382, 383  
 — acute ..... ii. 373  
 — states, treatment of the ..... ii. 390  
 — chronic ..... ii. 379  
 — states, treatment of the ..... ii. 391  
 — chronic, of the evacuations during ..... ii. 380  
 — inflammatory, described ..... ii. 379  
 — states of, treatment of the ..... ii. 390  
 — complicating phthisis ..... 1213  
 — simple asthenic ..... ii. 373  
 — treatment of the more simple states of ..... ii. 390  
 — of the urine of ..... ii. 381  
 — from vascular irritation ..... ii. 379  
 — of the digestive and associated viscera, during ..... ii. 381  
**Induration of structures**, pathology of ..... ii. 400  
 — treatment of ..... ii. 400  
**Induration of the brain** ..... i. 271  
 — causes of ..... i. 272



- Induration, etc. of the heart's structure ..... ii. 250
- Induration, thickening, etc., from inflammation ..... ii. 338
- of the liver ..... ii. 369
- of the pancreas ..... 8
- of neck of uterus, described ..... 1367
- treatment of ..... 1383
- Infancy, described ..... i. 47
- the diseases of ..... i. 47
- its first epoch ..... i. 47
- its second period ..... i. 48
- Infants, apoplexy of new-born ..... i. 119
- asphyxy of new-born, treatment of ..... i. 175
- choleric fever of ..... i. 382
- convulsions in ..... i. 484
- paralysis of ..... 24, 25
- Infected, importance of separating the healthy from ..... ii. 417
- Infected localities, restrictions respecting ..... 274
- Infection, agents producing ..... ii. 404
- agents for preventing or counteracting ..... ii. 417, 418
- alterations of the tissues consequent upon ..... ii. 416
- by animal effluvia ..... ii. 406
- *Bibliog. and Refer.* ..... ii. 423, 426
- shown to be the cause of choleric pestilence ..... 113-131
- circumstances favouring or retarding ..... ii. 413
- circumstances which favour ii. 416
- circumstances proving ..... ii. 407
- classification of agents causing ..... ii. 402
- of the duration of the power of, by an infectious disease ..... ii. 418
- effects of, or diseases caused by ..... ii. 410
- by specific emanations ..... ii. 407
- by means of food ..... ii. 405
- indications and symptoms of ..... ii. 413
- manner in which the system is invaded by it ..... ii. 414
- means which protect from ..... ii. 417
- media or means conveying ..... ii. 408-410
- medical means required to prevent the development of ..... ii. 422
- moral aids against ..... ii. 421
- morbid impression made by ..... ii. 416
- the necroscopic poison, productive of ..... 441
- pathological relations of ..... ii. 401
- of the period elapsing from, until disease is developed ..... ii. 411-413
- periods elapsing between its production and the impression of its causes ..... ii. 411
- of its precursory period ..... ii. 411
- of phthisis, considered ..... 1228
- precautions against, described ..... ii. 420
- proofs of ..... ii. 407
- of the prevention of, in puerperal diseases ..... 594
- a chief cause of puerperal fevers ..... 555-561
- by self-contaminating agents or morbid matters ..... ii. 406
- sources of, noticed ..... ii. 404
- transmission of ..... ii. 408-10
- treatment when symptoms of, first appear ..... ii. 422
- Infectious diseases may be aggravated by superadded causes ..... ii. 411
- Infectious nature of hæmagnetic pestilence demonstrated ..... 171-192
- Inferences, pathological, respecting ..... 632
- as to puerperal fevers ..... 579
- respecting scarlet fever ..... 751
- as to the origin, propagation, varieties, and pathology of syphilis ..... 1481
- Inflammation, of absorption in the seat of ..... ii. 469
- *Bibliog. and Refer.* ..... ii. 487-489
- of the states of the blood in the capillaries of the seats of ..... ii. 469
- Inflammation, the capillaries and blood early affected in ..... ii. 463, 4
- exciting causes of ..... ii. 450-452
- causes, mental, constitutional, etc. .... ii. 449
- constitutional and predisposing causes of ..... ii. 448
- specific causes of ..... ii. 452
- diffusive, of cellular tissues ..... i. 355
- considerations which should guide the treatment of ..... ii. 470
- definition of ..... ii. 426
- diet and regimen of ..... ii. 486
- causing induration, thickening, etc. .... ii. 428
- in relation to irritation ..... ii. 702
- local means of cure ..... ii. 480-82
- diagnosis of changes after death ..... ii. 447
- diagnosis between, and various other diseases ..... ii. 446, 7
- external means of treatment ..... ii. 477-50
- modifications and varieties of ..... ii. 438
- modifications of, by structure ..... ii. 445
- opinions of its nature ..... ii. 457-462
- the organic nervous endowment of the part primarily affected in ..... ii. 402-404
- pathology of ..... ii. 462-469
- of the phenomena constituting ..... ii. 426
- prognosis of ..... ii. 455
- circumstances influencing the prognosis of ..... ii. 455
- various remedies advised for ..... ii. 473-482
- of reparation of the consequences of ..... ii. 460
- different states of capillary tone in the same seat of ..... ii. 468
- causing suppuration ..... ii. 457
- theory or nature of ..... ii. 456-457
- various grades and states of, treatment of ..... ii. 485
- causing ulceration ..... ii. 438
- of the venous circulation in the seat of ..... ii. 468
- the development of new vessels in ..... ii. 464
- acute sthenic appearances after death ..... ii. 430
- of the coagulation of the blood ..... ii. 432
- changes of the blood in ..... ii. 431
- remarks on the characters of ..... ii. 426, 430
- local characters of ..... ii. 426
- constitutional symptoms of ..... ii. 430
- asthenic, local characters of ..... ii. 439
- complications of ..... ii. 443
- consequences of ..... ii. 443
- the basis of indications of cure of ..... ii. 482
- local means advised for ..... ii. 484, 485
- means to mitigate urgent symptoms ..... ii. 484
- nature of the states of ..... ii. 465, 467
- progress and duration of ..... ii. 442
- depurating and supporting remedies advised for ..... ii. 484
- the remedies advised for supporting vital resistance to the extension of ..... ii. 483
- constitutional symptoms of ..... ii. 440-442
- terminations of ..... ii. 443
- principles of treatment of ..... ii. 482, 483
- the necessity of supporting vital power ..... ii. 483
- chronic, local signs ..... ii. 434
- constitutional symptoms of ..... ii. 434
- specific states of ..... ii. 453
- treatment of the ..... ii. 486
- sthenic, complications of ..... ii. 435
- consequences of ..... ii. 435
- Inflammation, sthenic, exudation caused by ..... ii. 436
- means of cure of ..... ii. 470-482
- nature of the forms of ..... ii. 462
- progress and duration of ..... ii. 434
- softening caused by ..... ii. 437
- terminations of ..... ii. 435
- indications of treatment of ..... ii. 470
- of the uterine appendages after parturition ..... 566
- course and terminations ..... 563
- Inflammations, consecutive, described ..... ii. 453
- from absorbed morbid matters ..... ii. 453
- from morbid matters circulating in the blood ..... ii. 453
- secondary, described ..... ii. 453
- causes and mode of their production ..... ii. 453, 454
- Influences, mental, remedial ..... 1144
- of the mutual, exerted by the mind on organization, and by the latter on the former ..... ii. 587
- Influenza, appearances in fatal cases ..... ii. 496
- *Bibliog. and Refer.* ..... ii. 499
- remote causes of ..... ii. 496
- complications of ..... ii. 492
- definition of ..... ii. 489
- diagnosis of ..... ii. 445
- history of ..... ii. 498
- nature of ..... ii. 498
- prognosis and duration of ..... ii. 495
- remedies advised for ..... ii. 498
- sequelæ of ..... ii. 495
- symptoms of ..... ii. 499
- treatment of ..... ii. 498
- complicated with bronchitis ..... ii. 493
- with disease of the heart or pericardium ..... ii. 494
- with diseases of the lungs ..... ii. 493
- with pneumonia ..... ii. 493
- treatment of its complications ..... ii. 498
- Infusoria, notices of ..... 1519
- Infusum Amarum ..... F. 218. Ap. 11
- Angelicæ Comp. ..... F. 219. Ap. 12
- Angelicæ sylvestris ..... F. 823. Ap. 31
- Anisi Comp. .... F. 824. Ap. 31
- Antemidisi Comp. F. 220. Ap. 12
- Arnica Comp. .... F. 221. Ap. 12
- Arnicæ ..... F. 222. Ap. 12
- Arnicæ Comp. .... F. 223. Ap. 12
- Artemisiæ vulgaris Comp. .... F. 224. Ap. 12
- Barberis ..... F. 225. Ap. 12
- Calami aromatici ..... F. 226. Ap. 12
- Calami aromatici Comp. F. 227. Ap. 12
- Caryophylli Comp. F. 228. Ap. 12
- Cinchonæ eum Quinæ Sulphate ..... F. 229. Ap. 12
- Conii ..... F. 230. Ap. 12
- Diosmæ crenate ..... F. 230. Ap. 12
- Gallæ ..... F. 825. Ap. 31
- Gentianæ Alkalinæ Comp. F. 232. Ap. 12
- Guaiaci Comp. .... F. 233. Ap. 12
- Glechomæ hederacæ eum Acido Hydrocyanico ..... F. 234. Ap. 12
- Juniperi ..... F. 235. Ap. 12
- et Mistrina Juniperi ..... F. 236. Ap. 12
- Marrubii ..... F. 237. Ap. 12
- Mollissæ Comp. .... F. 238. Ap. 12
- Menthæ et Caryophylli ..... F. 239. Ap. 12
- Menthæ Comp. F. 240. Ap. 12
- Menyanthis ..... F. 242. Ap. 12
- Millefolii Comp. .... F. 243. Ap. 12
- Putoriæ ..... F. 244. Ap. 12
- Quassia Comp. .... F. 246. Ap. 12
- Quassia eum Aqua Calcis ..... F. 247. Ap. 13
- Rhataniæ ..... F. 248. Ap. 13
- Rhei ..... F. 249. Ap. 13
- Rhei Alkalini F. 250. Ap. 13
- Rhei Comp. .... F. 252. Ap. 13

- Infusum Rosæ et Anrantii Compositum**.....F. 253. *Ap.* 13  
 — **Rutæ Comp.**.....F. 254. *Ap.* 13  
 — **Salviæ Comp.**.....F. 255. *Ap.* 13  
 — **Sambuci cum Anthi. Tar-**  
**tarizati.**.....F. 256. *Ap.* 13  
 — **Santonice Seminum Comp.**  
     F. 257. *Ap.* 13  
 — **Sarzæ Alkalinum.**.....F. 258. *Ap.* 13  
 — **Senegæ et Serpentariæ**  
**Comp.**.....F. 259. *Ap.* 13  
 — **Sennæ Comp.**.....F. 260. *Ap.* 13  
 — **Sennæ cum Manna F.** 261. *Ap.* 13  
 — **Serpentariæ.**.....F. 262. *Ap.* 31  
 — **Serpentariæ Comp. F.** 262. *Ap.* 31  
 — **et Haustus Scoparii Com-**  
**positum.**.....F. 263. *Ap.* 13  
 — **Spigeliæ Comp.**.....F. 264. *Ap.* 13  
 — **Tiliæ Comp.**.....F. 265. *Ap.* 13  
 — **et Mistura Tonico-Aperients**  
     F. 266. *Ap.* 13  
 — **Turionum Pini Abietis**  
     F. 267. *Ap.* 31  
 — **Uvæ Ursi.**.....F. 267. *Ap.* 13  
 — **Valerianæ.**.....F. 268. *Ap.* 13  
 — **Valerianæ Comp. F.** 269. *Ap.* 13  
 — **Valerianæ et Serpentariæ**  
**Comp.**.....F. 270. *Ap.* 13  
 — **Zingiberis.**.....F. 271. *Ap.* 13
- Inhalation for the cure of hæmop-**  
**ty sis**.....ii. 107  
 — in the treatment of chronic  
   bronchitis.....i. 318-20  
 — substances advised for.....i. 319  
 — of its use in phthisis.....1275
- Injectio Aceti Pyrolignei F.** 272. *Ap.* 13  
 — **Argenti Nitratis.**.....F. 273. *Ap.* 13  
 — **Astringens.**.....F. 274. *Ap.* 13  
 — **Astringens.**.....F. 275. *Ap.* 31  
 — **Boraciæ.**.....F. 275. *Ap.* 14  
 — **Zinci Acetatis Composi-**  
**ta.**.....F. 276. *Ap.* 14
- Inland climates in disease**.....i. 417  
 — in tubercular con-  
   sumption.....1254, 1281
- Inoculation of putrid animal**  
**matters, effects of**.....445  
 — treatment of.....445  
 — of small-pox.....905-10  
 — reasons against and in  
   favour of.....907-9  
 — is it indispensable to the  
   production of rabies?.....629  
 — of syphilis, modes of per-  
   forming.....1489  
 — as a means of preven-  
   tion and cure.....1489  
 — of a specific virus, the com-  
   mon cause of rabies.....627
- Inquiries as to the pathology of**  
**puerperal fevers**.....579-81
- Inane, selection of attendants**  
**on the**.....ii. 625
- Inane patients, their classifica-**  
**tion**.....ii. 624  
 — employments and amuse-  
   ments for.....ii. 623  
 — visits of friends to the.....ii. 624  
 — of the seclusion of the.....ii. 591
- Insania (Gravidarum, described.** ii. 623  
 — treatment of.....ii. 633  
 — **Lactantium, described**.....ii. 630  
 — treatment of.....ii. 635  
 — post partum, described.....ii. 629  
 — treatment of.....ii. 635
- Insanity, necessary symptoms in** ii. 509  
 — arrangements of the states  
   of.....ii. 510-12  
 — author's classification of its  
   states.....ii. 513  
 — **Bibliog. and Refer.**.....ii. 635  
 — of bleeding in.....ii. 603-4  
 — of general and local bleed-  
   ing in.....ii. 603-6  
 — causes.....ii. 555, 573  
 — causes and modes of fatal  
   termination of.....ii. 543  
 — exciting or productive causes  
   of.....ii. 561  
 — physical causes of.....ii. 566  
 — causes predisposing to.....ii. 535  
 — definition of.....ii. 500  
 — remarks on its definition.....ii. 500  
 — delusions in.....ii. 503
- Insanity, delusions in, sources**  
 of.....ii. 519-21  
 — duration of.....ii. 538  
 — false perceptions in.....ii. 502  
 — fatal terminations of.....ii. 543  
 — feigned.....i. 1033  
 — how to be detected.....i. 1033  
 — of the forms of.....ii. 513  
 — hereditary predisposition to.....ii. 555  
 — intellectual, treatment of.....ii. 620  
 — during or after lactation.....ii. 625  
 — lesions causing a fatal issue  
   in.....ii. 543, 47  
 — of the brain in.....ii. 549-51  
 — observed in the head  
   in.....ii. 549-53  
 — of structure in cases  
   of.....ii. 549-55  
 — of the abdominal vis-  
   cera in.....ii. 554  
 — of the thoracic viscera  
   in.....ii. 553  
 — the moral emotions and  
   passions as causes of.....ii. 562  
 — mortality in lunatics.....ii. 547  
 — organic functions, states of,  
   in.....ii. 508  
 — in relation to phrenology ii. 573-84  
 — the physiological pathology  
   of.....ii. 573-90  
 — prognosis of.....ii. 537  
 — circumstances influencing  
   the prognosis of.....ii. 538, 40  
 — proportions of recurrence of ii. 543  
 — regimen and diet for.....ii. 594  
 — relapses and recurrences of ii. 542  
 — the prevention of, and of  
   relapses.....ii. 595  
 — caused by religious appre-  
   hensions and impressions.....ii. 563-6  
 — religious consolation in.....ii. 622  
 — remedies advised for.....ii. 603-19  
 — review of remedies advised  
   for.....ii. 603  
 — signs and symptoms of.....ii. 502  
 — symptoms furnished by the  
   locomotive organs in.....ii. 507  
 — moral, intellectual, and  
   instinctive, in.....ii. 505  
 — indicating recovery  
   from.....ii. 541  
 — of, furnished by the  
   sensitivity.....ii. 502  
 — in relation to social and po-  
   litical conditions and commo-  
   tions.....ii. 572  
 — terminations of.....ii. 537  
 — general remarks on the  
   treatment of.....ii. 590  
 — treatment of, review of the  
   of convalescence from ii. 594  
 — of, should be based on  
   a knowledge of the causes.....ii. 593  
 — of the specific forms  
   of.....ii. 595  
 — moral, during conva-  
   lescence from.....ii. 622  
 — from partial disorder of the  
   understanding.....ii. 519  
 — demonomaniacal, causes of,  
   described.....ii. 524  
 — chronic, described.....ii. 530  
 — complicated.....ii. 533-7  
 — treatment of.....ii. 603  
 — with apoplexy.....ii. 536  
 — treatment of.....ii. 603  
 — with epilepsy.....ii. 535  
 — treatment of.....ii. 603  
 — with hysterical and  
   cataleptic affections.....ii. 536  
 — with paralysis.....30  
 — with general paraly-  
   sis.....ii. 534  
 — treatment of.....ii. 603  
 — connate, defined.....ii. 625  
 — connected with vertigo.....ii. 535  
 — after delivery.....ii. 629  
 — treatment of.....ii. 633  
 — demonomaniacal, noticed.....ii. 524  
 — fatuous, treatment of.....ii. 602  
 — general, described.....ii. 526  
 — treatment of.....ii. 599  
 — homicidal, described.....ii. 517  
 — treatment of.....ii. 596
- Insanity, idiotic, described**.....ii. 626  
 — incoherent, description of.....ii. 530  
 — treatment of.....ii. 602  
 — with propensity to intox-  
   ication, noticed.....ii. 517  
 — maniacal. See, also, Ma-  
   nia.....ii. 526  
 — remedies advised for  
   ii. 599-602  
 — treatment of.....ii. 599-602  
 — melancholic, treatment of.....ii. 596  
 — milder forms of.....ii. 513  
 — misanthropic, noticed.....ii. 526  
 — monomaniacal, forms of ii. 519-25  
 — treatment of.....ii. 595-7  
 — moral, the several states  
   of.....ii. 513-17  
 — treatment of.....ii. 595  
 — the moral treatment of.....ii. 619  
 — organic functions, disorders  
   of, connected with.....ii. 536  
 — associated with general pa-  
   ralysis.....ii. 534  
 — partial forms of.....ii. 513  
 — partial disorder of intellect  
   in.....ii. 519  
 — general view of.....ii. 519  
 — treatment of.....ii. 595  
 — during pregnancy.....ii. 623  
 — treatment of.....ii. 633  
 — puerperal, causes of.....ii. 631  
 — defined.....ii. 623  
 — treatment of.....ii. 633  
 — diagnosis of.....ii. 630  
 — treatment of.....ii. 633  
 — pathology of.....ii. 633  
 — remedies advised for.....ii. 634  
 — prognosis of.....ii. 631  
 — regimen and diet in.....ii. 635  
 — treatment of.....ii. 633  
 — senile, described.....ii. 516  
 — suicidal, described. See,  
   also, Suicide.....ii. 636  
 — causes and occasions of ii. 636  
 — theomaniacal, described.....ii. 524  
 — treatment of general.....ii. 599  
 — various predispositions to  
   ii. 555-61
- Insects, poisonous, notices of**.....4-1  
**Insomnia, partial, noticed**.....879  
 — treatment of.....880  
**Inspection of abdomen**.....i. 1  
**Integuments, syphilitic disease**  
 of the.....1467  
**Intellect, connate deficiency of** ii. 625  
**Intemperance in food and drink,**  
 as predisposing to disease.....i. 649  
**Intermarriages, when frequent,**  
 cause scrofula.....803  
**Intermissions of ague, described** i. 1086  
 — treatment during.....i. 1094, 6  
**Intermittents, chronic or ob-**  
**senre, described**.....i. 1113  
 — regimen in.....i. 1115  
 — treatment of.....i. 1115  
 — advised by Dr. Ste-  
   vens.....i. 1109  
 — when they change.....i. 1109  
**Intestinal hæmorrhage**.....ii. 113  
**Intestines, diseases of, Bibliog.**  
**and Refer.**.....ii. 689  
 — carcinoma of.....ii. 687  
 — contraction or constriction  
   of, with thickening.....ii. 687  
 — hæmorrhage from.....ii. 118-22  
 — causes of inflammation of.....ii. 676  
 — large, inflammation of See,  
   Colitis.....ii. 665  
 — small, inflammation of their  
   glands.....ii. 661  
 — inflammation of the mucous  
   coat of small. See, also, Muc-  
   Enteritis.....ii. 659  
 — treatment of.....ii. 679  
 — pseudo-membraneous in-  
   flammation of.....ii. 669  
 — small, inflammation of See,  
   also, Enteritis.....ii. 658  
 — inflammation of all the coats  
   of the small.....ii. 664  
 — inflammation of both small  
   and large, or ileo-colitis.....ii. 667  
 — in hot countries.....ii. 667



- Intestines, lesions of, diagnosis of ..... 369  
 of ..... diagnosis of, by poi-  
 sons ..... 371, 3  
 — paralysis of, the symptoms  
 of ..... ii. 686  
 — treatment of ..... ii. 686  
 — disease of, complicating  
 phthisis ..... 1213  
 — rupture of the ..... ii. 687  
 — scirrhus of a portion of ..... ii. 687  
 — symptoms of scirrhus, &c.,  
 of ..... ii. 687  
 — treatment of scirrhus, &c., ii. 688  
 — softening of the mucous  
 coat of the ..... ii. 688  
 — causes of ..... ii. 688  
 — diagnosis of ..... ii. 688  
 — nature of ..... ii. 688  
 — symptoms of ..... ii. 688  
 — treatment of ..... ii. 689  
 — spasm of, its causes ..... ii. 688  
 — remarks on ..... ii. 684  
 — symptoms of ..... ii. 684  
 — treatment of ..... ii. 685  
 — thickening of the ..... ii. 687  
 — ulceration of ..... ii. 674, 6  
 Intoxicating agents productive  
 of insanity ..... ii. 568  
 Intoxication, *defined*. See, also,  
 Drunkenness ..... i. 782  
 — diagnosis of ..... i. 789  
 Intro-insepticus of the digestive  
 canal ..... i. 638  
 — ileus caused by ..... i. 434  
 Invagination of the digestive  
 tube ..... i. 638  
 — of intestines causing ileus ..... i. 434  
 Invasion, stage of, in fevers ..... i. 1046  
 Inversion of the uterus, symp-  
 toms and diagnosis ..... 1394  
 — treatment of ..... 1395  
 Invisible organized existences  
 causing pestilences (?) ..... 252  
 Involution of uterine described ..... 1894  
 Iodides, of their use in phthisis  
 Iodidum Hydrargyri ..... F. 277. Ap. 14  
 — Plumbi ..... F. 278. Ap. 14  
 Iodine and Bromine, poisoning  
 by ..... 882  
 Iodine and its compounds, pois-  
 oning by ..... 452  
 — symptoms caused by ..... 352  
 — treatment of poison-  
 ing by ..... 352  
 — preparations of, advised for  
 scrofula ..... 831  
 — advised for constitu-  
 tional syphilis ..... 1483  
 — first prescribed for  
 syphilis by the author ..... 1483  
 Ipecacuanha, poisoning by ..... 410  
 — treatment of ..... 410  
 Iris, inflammation of. See, also,  
 Iritis ..... i. 1016  
 Iritis, *definition* and description  
 of ..... i. 1016  
 — Idiopathic, description of ..... i. 1016  
 — terminations and diag-  
 nosis of ..... i. 1017  
 — treatment of ..... i. 1818  
 — sympathetic, description  
 and forms of ..... i. 1018  
 — diagnosis and treat-  
 ment of ..... i. 1018  
 — varieties ..... i. 1018  
 Iron, preparations of, for scrofu-  
 la ..... 832  
 Irritability, *Bibliog. and Refer.* ..... ii. 696  
 — of the influence of the blood  
 upon ..... ii. 695  
 — conditions requisite to the  
 healthy manifestation of ..... ii. 694  
 — *definition* of ..... ii. 690  
 — the dependence and source  
 of ..... ii. 690-93  
 — connexion of, with ganglial  
 nervous influence ..... 1082-3  
 — of the grades of ..... ii. 693  
 — various grades of, described ..... ii. 693  
 — Insensible organic contrac-  
 tility, its lowest grade ..... ii. 694  
 — depends upon the organic  
 nervous system ..... ii. 694  
 Irritability, relation of, to the  
 nervous systems ..... 1082-3  
 — the sources of it shown ..... ii. 690  
 — of the uterus, noticed ..... 1361  
 Irritant and alterant poisons ..... 447  
 Irritants, mineral, vegetable,  
 and animal ..... 1145  
 Irritation, examination of the  
 agents producing ..... ii. 707-10  
 — *Bibliog. and Refer.* ..... ii. 716  
 — its effects on the blood ..... ii. 703  
 — exciting causes of ..... ii. 708-9  
 — of the cause of the perio-  
 diety or recurrence of its ef-  
 fects ..... ii. 707  
 — constitutional, effects of ..... ii. 706  
 — treatment of ..... ii. 711  
 — *definition* of ..... ii. 696  
 — duration of ..... ii. 707  
 — effects of, may be either di-  
 rect or reflected ..... ii. 706  
 — the influence of its agents or  
 causes on the states of ..... ii. 707  
 — limitation and extension  
 of ..... ii. 697  
 — manifestation of its effects ..... ii. 706  
 — means applicable to the seat  
 of ..... ii. 712  
 — sources and causes of, occa-  
 sioning neuralgia ..... ii. 1015-18  
 — In relation to morbid nutri-  
 tion ..... ii. 702  
 — pathological relations of  
 — ..... ii. 697-702  
 — physiological relations of  
 — ..... ii. 698-700  
 — relation of the cerebro-  
 spinal nervous system to ..... ii. 698  
 — relation of, to hemorrhage  
 and serous effusion ..... ii. 702  
 — to the states of inflam-  
 mation ..... ii. 702  
 — to irritability ..... ii. 696  
 — to the nervous sys-  
 tems ..... ii. 697  
 — preliminary remarks on ..... ii. 696  
 — its indirect or reflected  
 transmission ..... ii. 698  
 — of predisposition to ..... ii. 707  
 — of the propagation of ..... ii. 708  
 — of the reflection of ..... ii. 703  
 — regimen and diet in ..... ii. 716  
 — sensation, intellectual ex-  
 ertion, and moral emotions,  
 as causes of ..... ii. 709  
 — sympathetic, causing retch-  
 ing and vomiting ..... 1508  
 — terminations of ..... ii. 706  
 — its direct transmissions ..... ii. 698  
 — treated by anti-spasmod-  
 ics ..... ii. 713  
 — by alteratives and de-  
 obstruents ..... ii. 714  
 — by depurants ..... ii. 714  
 — by derivatives ..... ii. 712  
 — by general or constitu-  
 tional means ..... ii. 711  
 — by local means ..... ii. 711  
 — by sedatives, narcot-  
 ics, &c. ..... ii. 713  
 — by tonics, &c. ..... ii. 713  
 — treatment of, with reference  
 to removal of the causes of ..... ii. 710  
 — indications of treatment ..... ii. 710  
 — varieties of reflected ..... ii. 704-5  
 — continued and periodic ef-  
 fects of ..... ii. 706  
 — morbid, should be allayed ..... 1141  
 — spinal, described ..... 945, 6  
 — treatment of ..... 948-51  
 — reactive or sympathetic ..... ii. 705  
 — simple or direct ..... ii. 703  
 Ischuria, described ..... 1353  
 Issues and setons advised for  
 phthisis ..... 1276  
 Itch, *Bibliog. and Refer.* ..... ii. 721  
 — causes of ..... ii. 718  
 — complications of ..... ii. 717  
 — *definition* of ..... ii. 716  
 — description of ..... ii. 717  
 — diagnosis of ..... ii. 718  
 — duration of ..... ii. 718  
 — treatment of ..... ii. 719  
 — forms or varieties of ..... ii. 717  
 Jaundice from arrest of biliary  
 secretion ..... ii. 343  
 — *Bibliog. and Refer.* ..... ii. 350  
 — from biliary exhalence ..... ii. 346  
 — treatment of ..... ii. 353  
 — cachectic ..... ii. 351  
 — from calculi in the ducts ..... ii. 348  
 — treatment of ..... ii. 355  
 — exciting causes of ..... ii. 344  
 — predisposing causes of ..... ii. 343  
 — remote causes of ..... ii. 352  
 — complicated ..... ii. 349  
 — from compression of the  
 ducts by tumours ..... ii. 348  
 — treatment of ..... ii. 355  
 — from congestion of liver ..... ii. 346  
 — treatment of ..... ii. 354  
 — *definition* of ..... ii. 341  
 — from disease of the ducts  
 and gall-bladder ..... ii. 347  
 — treatment of ..... ii. 355  
 — from disease of the duode-  
 num ..... ii. 348  
 — distinctions of, by authors ..... ii. 351  
 — duration of ..... ii. 342  
 — feigned ..... i. 1033  
 — forms and states of ..... ii. 343  
 — green or black ..... ii. 349  
 — treatment of ..... ii. 355  
 — from hepatitis and hepatic  
 abscess ..... ii. 346  
 — treatment of ..... ii. 353  
 — infantile, described ..... ii. 350  
 — from structural lesions of  
 the liver ..... ii. 346  
 — treatment of ..... ii. 354  
 — morbid appearances in ..... ii. 344  
 — in organic diseases of the  
 liver ..... ii. 374  
 — pathological relations of ..... ii. 346  
 — causes of ..... ii. 343  
 — precursory symptoms of ..... ii. 341  
 — during pregnancy ..... 502  
 — prognosis of ..... ii. 352  
 — of remedies recommended  
 for, by authors ..... ii. 356, 9  
 — spurious, described ..... ii. 351  
 — treatment of ..... ii. 355  
 — symptoms of ..... ii. 341  
 — termination of ..... ii. 342  
 — from torpor of the liver, de-  
 scribed ..... ii. 347  
 — treatment of ..... ii. 354  
 — traumatic, described ..... ii. 350  
 — treatment of ..... ii. 355  
 Jealousies and contentions re-  
 tard therapeutical knowledge ..... 1131  
 Jews, introduction of syphilis  
 into Europe ascribed to ..... 1461-2  
 Joints, chronic rheumatism of ..... 667  
 — nodosities of the ..... 668-9  
 — and ligaments, signs of dis-  
 ease furnished by ..... 1066-67  
 — syphilitic disease of ..... 1471  
 — disease of, caused by urea  
 and its combinations in the  
 blood ..... i. 238, 40  
 Juleps Sedativus ..... F. 279. Ap. 14  
 K.  
 Kamala-powder, recommended  
 against worms ..... 1555  
 Kidney, abscess or suppuration  
 of ..... ii. 725  
 Kidneys, affections of the nerves  
 of the ..... ii. 779  
 — affection of, consequent on  
 scarlet fever ..... 737-9  
 — alterations of their blood-  
 vessels ..... ii. 770  
 — alterations observed after  
 inflammation of the ..... ii. 727  
 — anemia of the ..... ii. 766  
 — atrophy of the ..... ii. 766  
 — *Bibliog. and Refer.* ..... ii. 771  
 — cachectic inflammation of  
 the, description of ..... ii. 736-41  
 — the stages and forms  
 of organic lesions in ..... ii. 741-4  
 — congestion or hyporenia of ..... ii. 766  
 — cysts, simple serous, in the ..... ii. 767  
 — the diseases of ..... ii. 721

Kidneys, diseases of the, causing dropsy	i. 700
— disease of the, causing anasarca	i. 732
— displacement of, symptoms and treatment of	ii. 771
— dropsy from disease of the, treatment	i. 705
— encysted dropsy of	i. 750
— fatty deposits in the	ii. 767
— granular deposits in the	ii. 767
— granular disease of the. See, also, Nephritis, Cachectic	ii. 736
— of hæmorrhage in, or from the	ii. 765
— hydatids in the	ii. 768
— hypertrophy of the	ii. 766
— inflammation of, described and defined. See, also, Nephritis	ii. 722
— inflammation of the pelvis and calices of. See, also, Pyelitis	ii. 757
— inflammation of the structure, pelvis, and calices of. See, also, Pyelo-Nephritis	ii. 762
— inflammation of the tissues surrounding the	ii. 763
— influence of inflammation of, in causing other diseases	ii. 732
— lesions in the pelvis, calices, and ureters of the	ii. 770
— organic lesions of the	ii. 765
— morbid condition of, in scarlet fever	783
— morbid secretions in the substance of the	ii. 767
— morbid sympathies between, and other organs	1037
— softening and induration of	ii. 767
— depuration by, requisite to health	i. 238, 40
— tubercles in the	ii. 769
— unnatural situations of the	ii. 771
— various morbid deposits in the, described	ii. 767-69
Kousso, methods of treating tænia by	1554

L.

Laburnum, poisoning by	476
Laceration of the brain	i. 277
Lactation, <i>Bibliog. and Refer.</i>	ii. 776
— influence of menstruation and pregnancy on	ii. 773
— slighter disorders of	ii. 772
— undue or improper	ii. 774
— treatment of	ii. 774
— termination of the period, remarks on	ii. 776
Lactal system noticed	ii. 918
Lactiferous tubes, chronic inflammation of the	ii. 932
— symptoms and treatment of inflammation of	ii. 932
Lameness, feigned	i. 1034
Laryngeal suffocation, description of	ii. 777-83
Laryngismus Stridulus. See, also, Larynx, spasms of	ii. 777
Laryngitis, <i>definition of</i>	ii. 786
— causes of acute	ii. 795
— acute, complicated with pharyngitis, &c.	ii. 788
— description of the several states and varieties of	ii. 786-91
— diagnosis of the acute	ii. 793
— of the chronic	ii. 794
— of the complicated forms	ii. 794
— prognosis of acute	ii. 795
— of chronic	ii. 795
— treatment of acute asthenic	ii. 799
— of the asthenic complicated states	ii. 799
— appearances after death from acute asthenic	ii. 792
— asthenic acute, described	ii. 786
— treatment of	ii. 796
— of the complicated states of	ii. 798
— syphilitic chronic	ii. 791
— treatment of	ii. 803
— asthenic acute	ii. 759

Laryngitis, asthenic acute, complicated states of	ii. 789
— asthenic, complicating scarlet fever	784
— catarrhal, described	ii. 786
— chronic, described	ii. 790
— causes of	ii. 796
— complicated with chronic disease of the lungs	ii. 791
— with tracheitis	ii. 791
— inhalations, &c., for	ii. 800
— local means for	ii. 800, 1, 2
— topical means advised for	ii. 800-1
— appearances after	ii. 792
— primary chronic, described	ii. 790-1
— treatment of	ii. 799
— complicated and consecutive chronic	ii. 791
— consecutive or complicated asthenic	ii. 789
— consecutive or complicated sthenic	ii. 788
Larynx, closure of, by enlarged thymus gland	ii. 779
— hysterical spasm of	ii. 784
— treatment of	ii. 784
— inflammation of. See, also, Laryngitis	ii. 786
— nervous and sympathetic affections of the	ii. 776
— paralysis of, <i>definition. See, also, Aphonia</i>	ii. 784
— paralytic states of	ii. 784
— spasm of, in adults	ii. 783
— sources of	ii. 783
— treatment of	ii. 784
— causes of	ii. 778
— spasm of, in children, synonyms of	ii. 777
— <i>definition and symptoms of</i>	ii. 777
— diagnosis	ii. 778
— indications of cure for	ii. 782
— nature of the	ii. 788
— pathology of	ii. 778
— treatment of	ii. 782
— stridulous suffocation of, in children	ii. 777
— prognosis of stridulous affections of the	ii. 782
— syphilitic ulceration of	1469
Larynx and trachea, <i>Bibliog. and Refer.</i>	ii. 807
— diseases of	ii. 776
— foreign bodies in the	ii. 806
— diagnosis of	ii. 804, 5
— prognosis of	ii. 806
— treatment of	ii. 806
— disease of, complicating phthisis	1212
— of tumours compressing the	ii. 806
— diagnosis	ii. 807
Laughing and weeping, as symptoms	1005
Laurel water, &c., poisoning by	403
Lead, appearances after death from	397
— injurious effects of	i. 158
— modus operandi of poisons of	398
— palsy from, described	26
— poisoning by acetate of	395
— by carbonate of	396
— by the iodide of	397
— by the oxides of	397
— by its preparations, treatment of	398
— prevention of its injurious effects	i. 161
Lead-colic described	i. 430
— treatment of	i. 439
— its sequelæ	i. 442
Leprosy, <i>definition and synonyms. See, also, Leprosy</i>	ii. 807
— Alphodes, described	623
— Anæsthesia, described	ii. 809
— Jndaca, noticed	ii. 810
— Nigricans	ii. 804
— Taurica, noticed	ii. 809
— Vulgaris, described	623
Leprosia, <i>Bibliog. and Refer.</i>	531

Leprosia, classification of the forms of	520
— <i>definition and synonyms. See, also, Psoriasis</i>	519
— pathology of	526
— treatment of	526-9
— regimen and diet in	531
— syphilitica	524
Leprosy, appearances after death from	ii. 809
— <i>Bibliog. and Refer.</i>	ii. 815
— causes of	ii. 812, 13
— <i>definition and synonyms. See, also, Leprosy</i>	ii. 807
— description of	ii. 808
— diagnosis of	ii. 811
— Jewish, noticed	ii. 810
— maladies allied to	ii. 809
— treatment of	ii. 813
— tubercular. See, also, Leprosy	ii. 807
Lesions, congenital and organic, causing amenorrhœa	ii. 966, 7
— treatment of	ii. 967
— organic, their connexion with states of the blood	i. 680
— causing vomitings	1507
— of structure found after phthisis	1215-21
— of viscera after dropsy	i. 692
Lethargy described	i. 453
Leucorrhœa, <i>Bibliog. and Refer.</i>	ii. 826
— <i>definition of</i>	ii. 816
— diagnosis between, and gonorrhœa	ii. 818, 823
— <i>synonyms of</i>	ii. 816
— oris et cervicis uteri	ii. 820
— causes and symptoms of	ii. 820
— treatment of	ii. 820
— in connexion with pregnancy	498
— treatment of	498
— uterine, acute	ii. 822
— chronic and sub-acute	ii. 822
— diagnosis of	ii. 823
— nature of	ii. 824
— terminations of	ii. 824
— treatment of	ii. 824
— regimen and diet	ii. 825
— vagina, causes of	ii. 818
— local means of cure for	ii. 819
— acute, diagnosis of	ii. 818
— symptoms of	ii. 818
— treatment of	ii. 819
— chronic diagnosis of	ii. 818
— symptoms of	ii. 818
— treatment of	ii. 819
— vulvæ, description of	ii. 817
— treatment of	ii. 817
Lichen, <i>Bibliog. and Refer.</i>	ii. 829
— causes of	ii. 828
— <i>definition of</i>	ii. 826
— description of its several varieties	ii. 826
— diagnosis of	ii. 828
— treatment of	ii. 828
— islandicus, of its use in phthisis	1270
Lientery, description of	i. 605
Life, neglect of the doctrine of, retarding the progress of therapeutics	1120
— powers of, to be closely observed	1134
— should be supported	1135, 7
Light and sunshine, as causing disease	i. 650
Lime, oxalate of, in urine. See, also, Oxaluria	1325
Linctus Acid Hydrochlorici	F. 280. Ap. 14
— rici	F. 281. Ap. 14
— Boracicus	F. 282. Ap. 14
— Chloroformicus	F. 283. Ap. 14
— Camphoratus	F. 284, 5. Ap. 14
— Demulcens	F. 285. Ap. 14
— Emolliens (Breudellii)	F. 287. Ap. 14
— cum Ipecacuanha	F. 289. Ap. 31
— Myrrina et Ipecacuanha	F. 290. Ap. 14
— Oleosus	F. 290, 98. Ap. 14



- Linctus Opiatus* ..... F. 291. *Ap.* 14  
*Opiatus cum Scilla* F. 292. *Ap.* 14  
*Pectoralis* ..... F. 293. *Ap.* 14  
*Potassae Nitratls* ..... F. 294. *Ap.* 14  
*Refrigerans* ..... F. 296. *Ap.* 31  
*Terebinthinae* ..... F. 281. *Ap.* 31  
*Linctum Ammoniae cum Oleo*  
*Terebinthinae* ..... F. 295. *Ap.* 14  
*Ammoniae et Terebinthinae*  
*Comp.* ..... F. 296. *Ap.* 14  
*Anodynum* ..... F. 297. *S.* *Ap.* 14  
*Camphore Fortis* F. 299. *Ap.* 14  
*Cantharidum Comp.* F. 300. *Ap.* 14  
*Febriifugum* ..... F. 301. *Ap.* 14  
*Iodidum* ..... F. 302. *Ap.* 14  
*Opiatum* ..... F. 302. *Ap.* 31  
*Phosphoratum* ..... F. 303. *Ap.* 14  
*Pyrethri* ..... F. 304. *Ap.* 14  
*Rubefaciens* ..... F. 305. *Ap.* 14  
*Saponis et Camphorae Compositum* ..... F. 306. *Ap.* 14  
*contra Spasmos* ..... F. 307. *Ap.* 14  
*Stimulans* ..... F. 308. *Ap.* 14  
*Sulphuro-Saponaceum*  
*F.* 309. *Ap.* 14  
*Tabaci* ..... F. 310. *Ap.* 15  
*Terebinthinae Compos-*  
*itum* ..... F. 311. *Ap.* 15  
*Terebinthino-Phosphora-*  
*tum* ..... F. 312. *Ap.* 15  
*Thebaicum Compos-*  
*itum* ..... F. 313. *Ap.* 15  
*Volatile* ..... F. 314. *Ap.* 15  
*Lips and mouth, signs of disease*  
*furnished by* ..... 1058  
*Liquor Acetatis Potassae* F. 315. *Ap.* 15  
*Antimonii Potassio-Tartra-*  
*tis* ..... F. 316. *Ap.* 15  
*Balsamico-Aromaticis*  
*F.* 317. *Ap.* 15  
*Bi-boratis Sodae Compositus*  
*F.* 318. *Ap.* 15  
*Calci Chloridi* ..... F. 319. *Ap.* 15  
*Camphore Aethereus*  
*F.* 320. *Ap.* 15  
*Ferri Oxygenati* ..... F. 321. *Ap.* 15  
*Hydrargyri Bichloridi*  
*F.* 322. *Ap.* 15  
*Potassii Iodidi* ..... F. 323. *Ap.* 15  
*Potassii Iodidi Ioduretus*  
*F.* 324. *Ap.* 15  
*Morphiae Citratis* ..... F. 325. *Ap.* 15  
*Plumbi Acetatis Dilutus*  
*F.* 326. *Ap.* 15  
*Potassae Chloratis* F. 327. *Ap.* 15  
*Potassii Iodidi Ioduretus*  
*Concentratus* ..... F. 328. *Ap.* 15  
*Potassii Iodidi Ioduretus*  
*Dilutus* ..... F. 329. *Ap.* 15  
*Zinci Acetatis* ..... F. 330. *Ap.* 15  
*Lithic acid, source and quantity*  
*of* ..... 1310  
*Liver, abscess of the* ..... ii. 849  
*treatment of* ..... ii. 861-4  
*of the different kinds* ..... ii. 867  
*increased action of the* ..... ii. 836  
*Bibliog. and Refer.* ..... ii. 877  
*cancer of the* ..... ii. 871  
*causes of its diseases* ..... ii. 830-34  
*chronic inflammation of*  
*treatment of* ..... ii. 864-6  
*of the circulation in the* ..... ii. 839, 40  
*cirrhotis of the* ..... ii. 869  
*influence of climate on the* ..... ii. 830  
*congestion, partial, of the* ..... ii. 839  
*consequences and termina-*  
*tions of inflammation of* ..... ii. 849-66  
*serous cysts in the* ..... ii. 872  
*the diseases of the* ..... ii. 829  
*disease of, causing dropsy* ..... i. 699  
*encysted dropsy of* ..... i. 750  
*enlargement of the* ..... ii. 852  
*described* ..... ii. 867, 9  
*diagnosis of* ..... ii. 852  
*fatty disorganization of* ..... ii. 870  
*functional disorders of the* ..... ii. 834  
*fungo-hematoid tumour of*  
*the* ..... ii. 872  
*of gangrene of the* ..... ii. 867  
*causes of hepatic disease*  
*in Europeans in hot coun-*  
*tries* ..... ii. 830-34  
*hemorrhage of the* ..... ii. 843  
*Liver, hydatids in the* ..... ii. 872  
*impaired action of the* ..... ii. 835  
*treatment of* ..... ii. 836  
*treatment of morbid secre-*  
*tion of bile* ..... ii. 838  
*induration of the* ..... ii. 869  
*inflammation of the* See,  
*also, Hepatitis* ..... ii. 845  
*of its substance* ..... ii. 844  
*of its surfaces* ..... ii. 847  
*influences producing dis-*  
*eases of the* ..... ii. 830-4  
*of diet, regimen, etc.*  
*on the* ..... ii. 831  
*of other diseases on*  
*the functions and diseases of*  
*the* ..... ii. 832, 3  
*of races on diseases of*  
*the* ..... ii. 883  
*of iodide of potassium in or-*  
*ganic diseases of the* ..... ii. 875  
*melanosis of the* ..... ii. 872  
*morbid sympathies between*  
*the, and other organs* ..... 1051  
*neuralgic states of the* ..... ii. 838  
*means of cure advised for*  
*organic diseases of* ..... ii. 875, 6  
*of organic lesions of the* ..... ii. 866  
*consequent on inflam-*  
*mation* ..... ii. 866  
*from impairment of*  
*vital power, and depravation*  
*of the blood* ..... ii. 870  
*organic diseases of the, di-*  
*agnosis of* ..... ii. 873  
*indications of cure for* ..... ii. 875  
*treatment of* ..... ii. 875  
*pathological causes of its*  
*diseases* ..... ii. 830-33  
*portal congestion of the* ..... ii. 840  
*lesions of, complicating*  
*phthisis* ..... 1214  
*regimen and diet for dis-*  
*eases of the* ..... ii. 876  
*scirrhus of the* ..... ii. 871  
*sanguineous congestion of*  
*the, symptoms of* ..... ii. 842  
*treatment of* ..... ii. 843  
*softening of the structure*  
*of the* ..... ii. 866  
*suppuration of the* ..... ii. 867  
*influence of high ranges of*  
*temperature on the* ..... ii. 830  
*torpor of the* ..... ii. 835  
*treatment of* ..... ii. 836  
*treatment of the several*  
*modes in which abscess of the,*  
*may open* ..... ii. 861-4  
*tubercles in the* ..... ii. 870  
*malignant tumours of the* ..... ii. 871, 2  
*venous congestion of the* ..... ii. 840  
*and spleen, treatment of*  
*dropsy caused by disease of* ..... i. 704  
*Living, habits of, disposing to*  
*urinary calculi* ..... 1345  
*Lobelia inflata, poisoning by* ..... 445  
*Localities, considered with refer-*  
*ence to the cure of disease* ..... i. 411  
*infected, restrictions re-*  
*specting* ..... 275  
*inland, considered in rela-*  
*tion to phthisis* ..... 1277, 8  
*Lochia, states of, after delivery*  
*morbid states of, means ad-*  
*vised for* ..... 538  
*Locomotive organs, disorder of*  
*in insanity* ..... ii. 607  
*Lolium temulentum, poisoning*  
*by* ..... 477  
*Lopulus defectus, described* ..... 1500  
*Lotio Acidi Hydrocyanici*  
*F.* 331. *Ap.* 15  
*Acidi Hydrocyanici F.* 333. *Ap.* 31  
*Acidi Nitro-Hydrochlorici*  
*F.* 334. *Ap.* 31  
*Antiphlogistica* ..... F. 332. *Ap.* 15  
*Antipsorica* ..... F. 333. *Ap.* 15  
*Boracia* ..... F. 334. *Ap.* 15  
*Evaporans* ..... F. 335. *Ap.* 15  
*Evaporans Astringens*  
*F.* 336. *Ap.* 15  
*Flava* ..... F. 337. *Ap.* 15  
*Hydrargyri Camphorata*  
*F.* 338. *Ap.* 15  
*Lotio Sedativa* ..... F. 339. *Ap.* 15  
*Terebinthinae et Campho-*  
*re* ..... F. 340. *Ap.* 15  
*Terebinthinata* ..... F. 341. *Ap.* 15  
*Lues Aethiopica, described* ..... 1473  
*Venerica, nature and cure*  
*of. See, also, Syphilis* ..... 1454  
*Lumbago, description of* ..... 671  
*diagnosis of, from nephritis* ..... ii. 729  
*feigned* ..... i. 1086  
*Lumbricus teres described. See,*  
*also, Worms* ..... 1545  
*symptoms of* ..... 1546  
*treatment of* ..... 1559  
*Lungs, perforating abscess of the* ..... ii. 907  
*of absorption from* ..... i. 27  
*atrophy of* ..... ii. 907  
*Bibliog. and Refer. to their*  
*diseases* ..... ii. 912  
*collapse of the* ..... 1219  
*concretions in tuberculated,*  
*their formation* ..... ii. 901  
*dilatation of the air cells* ..... ii. 901  
*diseases of the* ..... ii. 873  
*emphysema of, described* ..... ii. 900, 1  
*vesicular emphysema of* ..... ii. 901  
*causes of* ..... ii. 902  
*progress and prognosis*  
*of* ..... ii. 903  
*treatment of* ..... ii. 905  
*symptoms and diagno-*  
*sis of* ..... ii. 902  
*fungo-hematoid disease of*  
*the* ..... ii. 910  
*gangrene of the* ..... ii. 907  
*symptoms of* ..... ii. 909  
*treatment of* ..... ii. 909  
*hemorrhage into the* ..... ii. 911  
*hypertrophy of* ..... ii. 906  
*inflammation of the. See,*  
*also, Pneumonia* ..... ii. 873  
*complicating phthisis* ..... 1212  
*intercurrent and secondary*  
*inflammation of, in phthisis* ..... 1215  
*lesions of the, associated*  
*with tubercles* ..... 1216, 17  
*interlobular and subpleural*  
*emphysema of the* ..... ii. 904  
*symptoms and diag-*  
*nosis of* ..... ii. 904  
*treatment of* ..... ii. 905  
*malignant structures of the* ..... ii. 910  
*melanosis of* ..... ii. 910  
*morbid sympathies of* ..... 1038  
*spurious melanosis of* ..... ii. 911  
*oedema of described* ..... ii. 905  
*symptoms of* ..... ii. 906  
*treatment of* ..... ii. 906  
*pulmonary hemorrhage* ..... ii. 911  
*tubercles of the. See Tu-*  
*bercular Consumption* ..... 1188  
*seats of tubercles in the* ..... 1215  
*distribution of tubercles in*  
*the* ..... 1215  
*Lupus, Bibliog. and Refer.* ..... ii. 917  
*causes of* ..... ii. 916  
*means of cure advised for* ..... ii. 916  
*definition and synonym. of* ..... ii. 913  
*diagnosis of* ..... ii. 913  
*treatment of* ..... ii. 916  
*local treatment of* ..... ii. 917  
*phagedenicus, described* ..... ii. 914  
*superficialis, described* ..... ii. 914  
*Lymphadenitis. See, also, In-*  
*flammation of Lymphatic*  
*Glands* ..... ii. 928  
*Lymphangitis, appearances on*  
*dissection* ..... ii. 920  
*causes of* ..... ii. 919  
*description of acute* ..... ii. 919  
*of chronic* ..... ii. 920  
*indications of cure* ..... ii. 921  
*definition of* ..... ii. 918  
*prognosis and terminations*  
*of* ..... ii. 920  
*treatment of* ..... ii. 921  
*Lymphatic glands, consequence*  
*of their diseases. See Tu-*  
*berculosis* ..... ii. 925  
*enlargement of* ..... ii. 923  
*inflammation of* ..... ii. 923  
*causes of* ..... ii. 924  
*treatment of* ..... ii. 925  
*specific inflammation of* ..... ii. 924  
*treatment of* ..... ii. 925

- Lymphatic glands, symptoms of acute inflammation of . . . ii. 923  
 — symptoms of chronic inflammation of . . . ii. 924  
 — malignant diseases of the . . ii. 927  
 — morbid deposits in . . . ii. 926, 7  
 — pestilential disease of . . . ii. 926  
 — scrofulous enlargement of . . ii. 925  
 — structural lesions of . . . ii. 925  
 — tubercular deposits in . . . ii. 926
- Lymphatic system, signs of disease furnished by . . . 1088
- Lymphatic and lacteal systems. ii. 918  
 — *Bibliog. and Refer.* . . . ii. 928
- Lymphatics, constriction and obliteration of . . . ii. 922  
 — disease of, causing dropsy . i. 697  
 — inflammation of. See Lymphangitis . . . ii. 918  
 — structural lesions of . . . ii. 921  
 — malignant diseases of . . . ii. 922  
 — varicose states of . . . ii. 921
- M.  
 Madeira, climate of . . . i. 414  
 Madness, description of . . . ii. 526  
 Madrid colic, treatment of . . i. 439  
 Maggot-pimple described . . . i. 36  
 Maladies, epidemic, considered pestilential . . . 105  
 Malaria, means of counteracting . i. 576  
 — See, also, Endemic Infe-  
 — ences . . . i. 867  
 — of the prevention of the generation of . . . i. 874  
 — treatment and regimen when exposed to . . . i. 877
- Male-Fern, ethereal oil of, for treating tænia . . . 1551  
 — extract of, for treating tænia . . . 1551  
 — formula of, for treating tænia . . . 1550  
 — methods with, for treating tænia . . . 1549  
 — and pomegranate-bark combined, for treating tænia . . 1553
- Malignant characters in measles . ii. 942  
 Malignant formations in the heart . . . ii. 253, 4  
 Malignant puerperal fever, history, course, and termination of . . . 570-80  
 — remarks on several means of cure . . . 590-93  
 — pathological doctrine of . . 579-84  
 — treatment of . . . 583-93
- Mamma, adipose tumour of the . ii. 934  
 — atrophy of the . . . ii. 933  
 — *Bibliog. and Refer.* to its diseases . . . ii. 935  
 — cartilaginous or osseous tumour of the . . . ii. 936  
 — cystic and hydatidic tumours of the . . . ii. 936  
 — diagnosis of . . . ii. 938  
 — diseases of the . . . ii. 928  
 — functional and painful affections of the . . . ii. 929  
 — hemorrhagic congestion of the . . . ii. 933  
 — hypertrophy of the . . . ii. 933  
 — treatment of . . . ii. 934  
 — Inflammation of the. See, also, Mastitis . . . ii. 930  
 — acute inflammation of . . . ii. 931  
 — causes of . . . ii. 931  
 — treatment of . . . ii. 931  
 — chronic inflammation of . . ii. 932  
 — treatment of . . . ii. 932  
 — organic lesions of the . . . ii. 933  
 — painful affections of the . . ii. 929  
 — diagnosis of . . . ii. 929  
 — treatment of . . . ii. 930  
 — painful tumour of the . . . ii. 935  
 — treatment of . . . ii. 936  
 — scrofulous tumours of . . . ii. 934  
 — painful puerperal affections of . . . 504  
 — treatment of . . . 504  
 — states of, after parturition . 536  
 Mammary tumour, chronic, described . . . ii. 934  
 — treatment of . . . ii. 935
- Man, the influence of climate on i. 404  
 Mania, causes of . . . ii. 530  
 — course and duration of . . . ii. 529  
 — diagnosis of . . . ii. 530  
 — illusions and delusions of . . ii. 529  
 — medical treatment of . . . ii. 600, 2  
 — prognosis of . . . ii. 529  
 — regimen and diet in . . . ii. 599  
 — remedies advised for . . . ii. 599-602  
 — treatment of . . . ii. 599  
 — acute, described . . . ii. 526  
 — chronic, or protracted states of . . . ii. 528  
 — puerperalis, described . . . ii. 628  
 — sub-acute, states of . . . ii. 527
- Manifestations of disease, arrangements of . . . ii. 1059  
 — of mind, classification of . . ii. 512-513
- Marasmus, description of. See, also, Tabes . . . 1100
- Masticatories, enumeration of . . 1146
- Mastodynia, symptoms and treatment of . . . 504
- Mastitis, symptoms and treatment of . . . ii. 930-31
- Masturbation, described. See, also, pollution, voluntary . 485-90  
 — a productive cause of insanity . . . ii. 568  
 — of phthisis . . . 1230  
 — signs of . . . 486
- Materialism, modern, in relation to insanity . . . ii. 576
- Meadow-saffron, poisoning by . . 424  
 — treatment of . . . 424
- Means of cure, recommendations as to their adoption . . . 1133  
 — should be employed appropriately to inferred pathological states . . . 1133, 5  
 — should be selected with strict reference to their known operation . . . 1134  
 — advised for phthisis by authors . . . 1240-50
- Means, external, advised for phthisis . . . 1276, 7  
 — various, advised for phthisis . 1275
- Measles, appearances in fatal cases of . . . ii. 945, 46  
 — *Bibliog. and Refer.* . . . ii. 951  
 — causes of . . . ii. 947  
 — description of . . . ii. 958  
 — diagnosis of . . . ii. 946  
 — history of . . . ii. 939  
 — modifications of . . . ii. 940  
 — period of precursory fever . ii. 939  
 — prognosis of . . . ii. 947  
 — regular form of . . . ii. 939  
 — sequelæ . . . ii. 943  
 — stage of desquamation . . . ii. 940  
 — of eruption of . . . ii. 939  
 — of florescence of . . . ii. 940  
 — *synon. and definition* of . . ii. 938  
 — terminations of . . . ii. 943  
 — in death . . . ii. 945  
 — in other diseases . . . ii. 943, 44  
 — tissues most uniformly affected in . . . ii. 946  
 — treatment of . . . ii. 949  
 — of its several types and states . . . ii. 949, 51  
 — complications of, treatment advised for . . . ii. 950-1  
 — without catarrhal symptoms . . . ii. 943  
 — without the eruption . . . ii. 943  
 — with gastric and bilious disorder . . . ii. 941  
 — in connexion with whooping-cough . . . ii. 943  
 — with inflammatory complications . . . ii. 940  
 — inflammatory states of the, treatment of . . . ii. 949  
 — with intestinal affection . . . ii. 941  
 — of certain irregularities of . ii. 942  
 — with nervous disorder . . . ii. 942  
 — with malignant characters . ii. 942  
 — nervous and malignant forms, treatment of . . . ii. 950  
 — symptoms of the various sequelæ of . . . ii. 944
- Measures, preservative against pestilence . . . 261-77
- Meats, poisonous, various kinds of . . . 427, 8
- Mechanism and functions of the spinal cord . . . 43
- Mediastinitis, course and terminations of . . . ii. 952  
 — *definition* and symptoms of . . . ii. 951, 2  
 — treatment of . . . ii. 952
- Mediastinum, abscess in the . . ii. 952  
 — treatment of . . . ii. 953  
 — *Bibliog. and Refer.* . . . ii. 953  
 — inflammation of . . . ii. 951  
 — organic lesions of the . . . ii. 953
- Medicines, the actions of, considered . . . 1144  
 — alterative and irritant . . 1147  
 — the channels through which they act . . . 1144-45  
 — classified according to their special action . . . 1144-8  
 — recommended for dropsy . i. 706  
 — general effects of . . . 1145  
 — modes of their exhibition . . 1144  
 — irritating and depressant . . 1147  
 — those calculated to protect from pestilence . . . 276  
 — remarks on those advised in phthisis . . . 1267-77  
 — physiological action of . . 1143-43  
 — several, advised for scrofula and tuberculosis . . . 830-7  
 — wrong estimates of their efficacy retard therapeutical knowledge . . . 1130
- Medulla oblongata, state of, after rabies . . . 624  
 — spinalis, different columns of, influence the sensitive and motive powers . . . 43
- Melæna, *Bibliog. and Refer.* . . ii. 955  
 — *definition* and *synon.* . . . ii. 953  
 — described . . . ii. 120  
 — diagnosis of . . . ii. 954  
 — forms of . . . ii. 954  
 — pathological states occasioning . . . ii. 120  
 — prognosis of . . . ii. 954  
 — sources of . . . ii. 954  
 — treatment of . . . ii. 954  
 — varieties of . . . ii. 120
- Melancholia, causes of . . . ii. 523  
 — characters of . . . ii. 521  
 — delusions in . . . ii. 522  
 — diagnosis of . . . ii. 523  
 — hygienic and medical treatment of . . . ii. 527, 599  
 — visceral disorders in . . . ii. 523  
 — Melancholic monomania . . ii. 521
- Melanosis, anatomical relations of . . . ii. 956  
 — *Bibliog. and Refer.* . . . ii. 955  
 — causes of . . . ii. 957  
 — chemical and physical constitution of . . . ii. 957  
 — *definition* of . . . ii. 955  
 — forms of true . . . ii. 955  
 — liquiform . . . ii. 956  
 — of the liver . . . ii. 572  
 — of the lungs . . . ii. 910  
 — origin and nature of . . . ii. 957  
 — progress of . . . ii. 957  
 — seat of . . . ii. 955  
 — symptoms and diagnosis of . ii. 957  
 — treatment of . . . ii. 953  
 — punctiform . . . ii. 956  
 — purpuric, described . . . ii. 953  
 — striatiform . . . ii. 956  
 — tuberiform . . . ii. 956
- Membranes of brain, lesions of . i. 254  
 — examination of . . . ii. 950  
 — serous and synovial . . . 853  
 — of spinal cord, causes of their diseases . . . 935-33  
 — inflammation of. See, also, Rachialgitis . . . 956
- Meningitis, *defined.* . . . i. 250  
 — duration, organic changes, &c. . . . . i. 252  
 — symptoms of acute . . . i. 250  
 — symptoms of chronic . . . i. 251  
 — cerebro-spinal, described . . 958



- Meningitis, spinalis, *definition of* ..... 957  
     *diagnosis of, from my-*  
     *elitis* ..... 963  
     *prognosis of* ..... 963  
     *treatment of compli-*  
     *cations of* ..... 965  
     *acutus, appearance af-*  
     *ter death* ..... 958  
     *described* ..... 958  
     *treatment of* ..... 964  
     *chronicus, described* ..... 959, 60  
     *treatment of* ..... 965  
     *associated with cere-*  
     *bral meningitis* ..... 958  
 Menorrhagia, *Bibliog. and Ref.* ..... 111  
     *causes of* ..... 112  
     *exciting causes of* ..... 118  
     *predisposing causes of* ..... 112  
     *at the cessation of the cata-*  
     *menia* ..... 112  
     *definition of* ..... 112  
     *diagnosis of* ..... 117  
     *congestive* ..... 117  
     *diagnosis of* ..... 112  
     *hemorrhagic* ..... 117  
     *diagnosis between, and abor-*  
     *tion* ..... 117  
     *between, and organic*  
     *uterine disease* ..... 117  
     *treatment of* ..... 113, 978  
     *acute hemorrhagic, or in-*  
     *flammatory* ..... 117  
     *during pregnancy, treat-*  
     *ment of* ..... 113  
     *after sixth month* ..... 113  
     *previously to sixth month* ..... 113  
     *prognosis of* ..... 117  
     *remedies advised for* ..... 113, 140  
     *symptoms and progress of* ..... 112  
     *treatment of* ..... 117  
     *of organic* ..... 112  
     *of passive or chronic* ..... 112  
     *puerperal* ..... 113  
     *true, or the discharge being*  
     *natural* ..... 117  
     *treatment of* ..... 117  
 Menses, absent and retained.  
     *See, also, Amenorrhœa* ..... 112  
     *inflammation of cervix ute-*  
     *ri after cessation of* ..... 117  
     *and menstruation* ..... 112  
     *suppression of the* ..... 112  
     *prognosis of* ..... 112  
     *treatment of* ..... 112  
 Menstrual period, of the first ap-  
     *pearance of* ..... 112  
     *management of the* ..... 112  
 Menstruation, absent and re-  
     *tained* ..... 112  
     *Bibliog. and Refer.* ..... 112  
     *the final cessation of* ..... 112  
     *medical management*  
     *of* ..... 112  
     *symptoms indicating* ..... 112  
     *duration of the function of* ..... 112  
     *difficult*. *See, also, Dys-*  
     *menorrhœa* ..... 112  
     *excessive*. *See, also, Men-*  
     *orrhœgia* ..... 112  
     *irregular, and its complica-*  
     *tions* ..... 112  
     *treatment of* ..... 112  
     *of certain irregularities of* ..... 112  
     *offensive, described* ..... 112  
     *treatment of* ..... 112  
     *phenomena of* ..... 112  
     *suppressed, described* ..... 112  
     *diagnosis of* ..... 112  
     *treatment of acute sup-*  
     *pressed* ..... 112  
     *chronic suppressed* ..... 112  
 Mentagra. *See, also, Sycois* ..... 1024  
 Mental manifestations, in insan-  
     *ity* ..... 1105  
     *as symptoms of disease* ..... 1075  
 Mercurial cachexy, described, &c.  
     *disease, described* ..... 453-56  
     *erethism, described* ..... 454  
     *fever, noticed* ..... 453  
     *disease, fumes productive*  
     *of* ..... 454  
     *palsy, noticed* ..... 1134  
     *purging, noticed* ..... 454  
     *salivation, diagnosis of* ..... 456-7  
 Mercurials, physiological action of  
     *in syphilis* ..... 457  
     *various affections caused by*  
     *of death from small doses of*  
     *for inflammation* ..... 457  
     *intolerance of* ..... 455  
     *of their use in phthisis* ..... 456  
     *resistance of their operation*  
     *poisoning by* ..... 453-59  
     *treatment of acute poison-*  
     *ing by* ..... 458  
     *of chronic poisoning by*  
     *certain, advised for scrofula*  
     *Mercury, in the treatment of*  
     *syphilis* ..... 1484-5  
     *bi-chloride of, poisoning by*  
     *symptoms and appear-*  
     *ances after death from* ..... 386, 7  
     *treatment for* ..... 387  
     *in cases of insanity* ..... 11609  
     *preparations of, their op-*  
     *eration and effects* ..... 453-59  
     *poisoning by its prepara-*  
     *tions* ..... 386  
     *of its use in constitutional*  
     *syphilis* ..... 1484  
     *in primary syphilis* ..... 1481  
 Mesenteric disease, appearances  
     *after death* ..... 11981  
     *Bibliog. and Refer.* ..... 11981  
     *complications of* ..... 11986  
     *diagnosis of* ..... 11987  
     *between, and various*  
     *other diseases* ..... 11987, 8  
     *between, and infantile*  
     *remittent fever* ..... 11987  
     *exciting causes of* ..... 11985  
     *predisposing causes of* ..... 11984  
     *consequences of* ..... 11987  
     *indication of cure in* ..... 11989  
     *in connexion with gastro-*  
     *enteritis* ..... 11983  
     *nature of* ..... 11988  
     *prognosis of* ..... 11988  
     *regimen and diet for* ..... 11991  
     *remedies advised for* ..... 11989, 1  
     *stages and duration of* ..... 11988, 6  
     *symptoms of* ..... 11985  
     *symon, and definition of* ..... 11983  
     *treatment of* ..... 11989  
     *acute, described* ..... 11984  
     *chronic, described* ..... 11984  
 Mesentery and its glands ..... 11983  
     *acute inflammation of* ..... 11983  
     *chronic inflammation of* ..... 11983  
     *consequences of inflamma-*  
     *tion of* ..... 11983  
     *treatment of inflammation*  
     *of* ..... 11983  
 Metamorphoses of tissues ..... 11671  
 Metamorphosis and waste of the  
     *globules of the blood* ..... 1043-5  
     *of the tissues during*  
     *disease* ..... 1127, 671-80  
 Metastasis of diseases ..... 11686  
     *different forms of* ..... 11687  
     *of rheumatism* ..... 11673, 5  
 Metritis, *definition of* ..... 11384  
     *complications, &c., of* ..... 11385  
     *treatment of* ..... 11387  
     *acute, described* ..... 11379  
     *seat and symptoms of*  
     *treatment of* ..... 11380  
     *chronic, treatment of* ..... 11385  
     *internal, description of* ..... 11365  
     *puerperal, described* ..... 11365  
     *course and termination*  
     *non-puerperal, described* ..... 11371  
     *diagnosis and prog-*  
     *nosis of* ..... 11378  
     *sub-acute and chronic, di-*  
     *agnosis, &c.* ..... 11374  
     *and chronic non-puer-*  
     *peral, symptoms of* ..... 11373  
 Metro-phlebitis, treatment of  
     *puerperal* ..... 11587  
 Millarin, *Bibliog. and Refer.* ..... 11993  
     *definition of* ..... 11992  
     *diagnosis of* ..... 11993  
     *prognosis of* ..... 11993  
     *symptoms of* ..... 11992  
     *treatment of* ..... 11993  
 Miliary eruption. *See, also, Mi-*  
     *liaria* ..... 11992  
 Miliary fever described ..... 11158  
 Milk, deficiency or suppression  
     *of the* ..... 11929  
     *excessive secretion of* ..... 11774  
     *treatment of* ..... 11774  
     *suppression of the* ..... 11775  
     *treatment of* ..... 11775  
 Milk-fever, described ..... 11773  
     *treatment of* ..... 11774  
 Milk, poisonous, noticed ..... 430  
 Mind, intellectual affections of,  
     *as remedial agents* ..... 11144  
     *moral affections of, as re-*  
     *medial agents* ..... 11144  
     *sensual affections of, as*  
     *remedial agents* ..... 11144  
     *influencing the organiza-*  
     *tion of the brain* ..... 11587-590  
     *of the connexion of, and*  
     *the nervous system* ..... 11584-588  
     *emotions of, their influences*  
     *on the pulse* ..... 603  
     *its emotions might to be di-*  
     *rected and excited so as to aid*  
     *recovery* ..... 11143  
     *exertion and exhaustion of,*  
     *a cause of phthisis* ..... 11230  
     *manifestations of their ori-*  
     *gin and relations* ..... 11587-590  
     *and organization in rela-*  
     *tion to insanity* ..... 11573  
 Mineral acids, acid vapours, ef-  
     *fects of* ..... 11166  
     *molecules, productive of*  
     *disease* ..... 11154  
     *waters and baths for rheu-*  
     *matism* ..... 695  
     *advised for scrofula* ..... 835  
 Misanthropic monomania, de-  
     *scribed* ..... 11526  
 Mistura Acetatis Morphie  
     *F. 342. Ap. 15*  
     *Acidi Boracici* ..... F. 343. Ap. 15  
     *Acidi Hydrocyanici Com-*  
     *posita* ..... F. 344. Ap. 16  
     *Acidi Hydrochlorici F. 345. Ap. 16*  
     *Acidi Nitrici Composita*  
     *F. 346. Ap. 16*  
     *Alkalina Anodyna F. 347. Ap. 16*  
     *Alkalina Anodyna F. 348. Ap. 31*  
     *Alkalina Cardiacæ F. 348. Ap. 16*  
     *Aloes et Guaiaci Compos-*  
     *ita* ..... F. 349. Ap. 16  
     *Ammoniaci Composita*  
     *F. 350-1. Ap. 16*  
     *Ammoniaci et Conil*  
     *F. 336. Ap. 31*  
     *Ammoniaci Hydrochloratis*  
     *F. 362. Ap. 16*  
     *Anodyna* ..... F. 353. Ap. 16  
     *Anodyna* ..... F. 357. Ap. 31  
     *Anodyna (Infantis) F. 354. Ap. 16*  
     *Anodyna Acetosa F. 355. Ap. 16*  
     *Anodyna cum Zinco F. 356. Ap. 16*  
     *Anti-Cardiacæ F. 358. Ap. 31*  
     *Anti-Dysentericæ*  
     *F. 339-40. Ap. 31*  
     *Anti-Emeris* ..... F. 357. Ap. 16  
     *Anti-Ictericæ F. 341. Ap. 31*  
     *Antiphlogistica F. 359-9. Ap. 16*  
     *Antiepileptica F. 360. Ap. 16*  
     *Aperiens* ..... F. 361. Ap. 16  
     *Aperiens Salina F. 362. Ap. 16*  
     *Aromatica* ..... F. 363. Ap. 16  
     *Arsenicals* ..... F. 364. Ap. 16  
     *Arsen. cum Opio. F. 365. Ap. 16*  
     *Asafetide F. 366. Ap. 16*  
     *Asafetide Composita*  
     *F. 367. Ap. 16*  
     *Asafetide et Conil F. 342. Ap. 31*  
     *Asafetide et Valeriane*  
     *F. 368. Ap. 16*  
     *Balsami Peruviani F. 369. Ap. 16*  
     *Balsami Peruviani Compos-*  
     *ita* ..... F. 383. Ap. 31  
     *Balsami Tolutani F. 370. Ap. 16*  
     *Bechica* ..... F. 371. Ap. 16  
     *Belladonnæ* ..... F. 344. Ap. 31  
     *Camphoræ F. 372. Ap. 16*  
     *Camphore Ammoniata*  
     *F. 345. Ap. 31*  
     *Camphore Composita*  
     *F. 373. Ap. 16*  
     *Camphorata* ..... F. 374-5. Ap. 16

- Mistura Cardiaca* ..... F. 846. Ap. 31  
 — *Carminativa* ..... F. 376. Ap. 17  
 — *Carminativa Deobstruens* ..... F. 377. Ap. 17  
 — *Cathartica* ..... F. 378. Ap. 17  
 — *Cathartica Ammonica* ..... F. 379. Ap. 17  
 — *Chloratis Potassæ et Sodæ* ..... F. 847. Ap. 31  
 — *Cinchonæ* ..... F. 330. Ap. 17  
 — *Cinchonæ cum Acido* ..... F. 848. Ap. 31  
 — *Cinchonæ et Acidi Sulphurici* ..... F. 849. Ap. 31  
 — *Cinchonæ Alkalina* F. 381. Ap. 17  
 — *Cinchonæ Aperiens* F. 382. Ap. 17  
 — *Cupibæ* ..... F. 850. Ap. 31  
 — *Conii Composita* ..... F. 383. Ap. 17  
 — *Cydoniæ Infusi Composita* ..... F. 851. Ap. 31  
 — *Cretæ Comp.* ..... F. 384. Ap. 17  
 — *Decocti Cinchonæ* ..... F. 852. Ap. 31  
 — *Decocti Cinchonæ Ammoniaci* ..... F. 385. Ap. 17  
 — *Decocti Cinchonæ Composita* ..... F. 386. 7. Ap. 17  
 — *Decocti Cinchonæ cum Aëre* ..... F. 853. Ap. 17  
 — *Decocti Genistæ* ..... F. 853. Ap. 31  
 — *Demulcens* ..... F. 389. Ap. 17  
 — *Deobstruens* ..... F. 390-2. Ap. 17  
 — *Diaphoretica* ..... F. 393. Ap. 17  
 — *Diaphoretica* ..... F. 854. Ap. 31  
 — *Diaphoretica Anodyna* ..... F. 394. Ap. 17  
 — *Diaphoretica Anodyna cum Digitali Kerm. Miner.* ..... F. 856. Ap. 31  
 — *Digitalis et Colicidii Comp.* ..... F. 395. Ap. 17  
 — *Diosmæ erenata* ..... F. 396. Ap. 17  
 — *Duretica* F. 397, 8, 9. Ap. 17  
 — *Emetica excelsa* ..... F. 402, 3. Ap. 17  
 — *Expectorans* ..... F. 404. Ap. 17  
 — *Expectorans* ..... F. 857. Ap. 32  
 — *Febrifuga* ..... F. 405, 7. Ap. 18  
 — *Febrifuga (Peysson)* F. 408. Ap. 18  
 — *Febrifuga Nervina* F. 409. Ap. 18  
 — *Guaiaia Ammoniata* F. 410. Ap. 18  
 — *Guaiaia Comp.* ..... F. 411. Ap. 18  
 — *cum Hydrargyri Bichlorido* ..... F. 412. Ap. 18  
 — *Hydrochlor. Ammoniac* ..... F. 861. Ap. 32  
 — *contra Hydropem* ..... F. 859. Ap. 32  
 — *Infusi Anthemidis Composita* ..... F. 860. Ap. 32  
 — *Infusi Calumbæ et Hyocyami* ..... F. 861. Ap. 32  
 — *Infusi Calumbæ Composita* ..... F. 862. Ap. 32  
 — *Infusi Cuspariæ Composita* ..... F. 413. Ap. 18  
 — *Infusi Salicis Composita* ..... F. 414. Ap. 18  
 — *Infusi Senegæ Composita* ..... F. 415. Ap. 18  
 — *Infusi Serpentariæ Composita* ..... F. 416, 7. Ap. 18  
 — *Infusi Uvæ Ursi* ..... F. 418. Ap. 18  
 — *Infusi Uvæ Ursi Composita* ..... F. 419. Ap. 18  
 — *Infusi Valerianæ* ..... F. 863. Ap. 32  
 — *Laxans* ..... F. 420. Ap. 18  
 — *Macilaginis Anodyna* ..... F. 421. Ap. 18  
 — *Merrhæ* ..... F. 422. Ap. 18  
 — *Nervina* ..... F. 423, 4. Ap. 18  
 — *Oleosa* ..... F. 425. Ap. 18  
 — *Pectoralis* ..... F. 426, 7. Ap. 18  
 — *Phosphorata* ..... F. 428. Ap. 18  
 — *cum Potassæ Iodido et Acid. Hydrocyanico* ..... F. 858. Ap. 32  
 — *Purgans* ..... F. 429, 30. Ap. 18  
 — *Refrigerans* ..... F. 431. Ap. 18  
 — *Resolvens* ..... F. 432. Ap. 18  
 — *Rhei Comp.* ..... F. 433. Ap. 18  
 — *Rhodii Comp.* ..... F. 434, 5. Ap. 18  
 — *Salina* ..... F. 436. Ap. 18  
 — *Salina Antiseptica* ..... F. 437, 8, 9. Ap. 18  
 — *Salina Febrifuga* F. 440, 1. Ap. 18  
 — *Salina Sedativa* ..... F. 865. Ap. 32  
 — *Mistura Sedativa* ..... F. 442. Ap. 18  
 — *Sedativa* ..... F. 866. Ap. 32  
 — *cum Sodæ Bichloride* ..... F. 867. Ap. 32  
 — *cum Sodæ Potassio-Tartrato* ..... F. 868. Ap. 32  
 — *Stomachica* ..... F. 869, 70. Ap. 32  
 — *Strychninæ* ..... F. 443. Ap. 19  
 — *contra Tenesum* F. 871. Ap. 32  
 — *Terebinthinæ Venetæ (Closius)* ..... F. 444. Ap. 19  
 — *Tonica* ..... F. 445, 6. Ap. 19  
 — *Tonica-Aperiens* ..... F. 872. Ap. 32  
 — *Tonico-Deobstruens* ..... F. 873. Ap. 32  
 — *Vermifuga* ..... F. 447. Ap. 19  
 — *Vinosa* ..... F. 448. Ap. 19  
 — *Zinci Composita* ..... F. 874. Ap. 32  
 — *Zinci Opilata* ..... F. 875. Ap. 32  
 — *Modes of exhibiting medicines* ..... 1144  
 — *of treatment advised for phthisis by authors* ..... 1266-77  
 — *Moisture, as predisposing to disease* ..... 1. 649  
 — *Molecules, animal, injurious effects of* ..... 1. 166  
 — *means of preventing injurious effects from mineral, vegetable, and animal* ..... 1. 168  
 — *Monordia Platerium, poisoning by* ..... 391  
 — *Monkshead, poisoning by* ..... 415  
 — *treatment of* ..... 417  
 — *Monomania, demoniacal, described* ..... 11. 524  
 — *misanthropic* ..... 11. 526  
 — *hypocondriacal* ..... 11. 521  
 — *treatment of* ..... 11. 526  
 — *melancholic, described* ..... 11. 521  
 — *treatment of* ..... 11. 526  
 — *Monostoma, synonyms of* ..... 1517  
 — *systematic description of* ..... 1517  
 — *Moors and Jews, of the introduction of syphilis into Europe by* ..... 1465  
 — *Moral treatment of insanity* ..... 11. 619  
 — *Morbid action, principal states of, described* ..... 1. 658  
 — *Morbid actions, their connexion with states of the blood* ..... 1. 680  
 — *the removal of predominant, in fever* ..... 1. 1078  
 — *Morbid appearances in the heads of the insane* ..... 11. 549-53  
 — *Morbid secretions susceptible of organization* ..... 1. 677  
 — *Morbus Gallicus, described. See, also, Syphilis* ..... 1459  
 — *Niger of the ancients* ..... 11. 111, 118  
 — *Venericus, described. See, also, Syphilis* ..... 1464  
 — *Morpha, opium, and their preparations, operation and effects of* ..... 467  
 — *and its salts, poisoning by* ..... 470  
 — *treatment of* ..... 472  
 — *Mortality, rate of, in the insane* ..... 11. 545  
 — *in hæmagastric pestilence* ..... 167  
 — *in plague* ..... 254  
 — *Motion, paralysis of, described* ..... 13  
 — *Motor and sensitive powers, influenced by different columns of the spinal medulla* ..... 38  
 — *Mouth, hæmorrhage from* ..... 11. 94  
 — *Inflammation of the. See, also, Stomatitis* ..... 1018  
 — *symptoms furnished by the* ..... 1075  
 — *Muco-cystitis, consequences and terminations of* ..... 1201  
 — *diagnosis of* ..... 1206  
 — *synonymes and definition of* ..... 1300  
 — *acute, described* ..... 1301  
 — *treatment of* ..... 1308  
 — *chronic, described* ..... 1301  
 — *treatment of* ..... 1309-10  
 — *Muco-enteritis, description of, in children* ..... 11. 660  
 — *treatment of* ..... 11. 670  
 — *acute, symptoms of* ..... 11. 659  
 — *treatment of* ..... 11. 670  
 — *in children* ..... 11. 680  
 — *chronic, symptoms of* ..... 11. 660  
 — *Muco-enteritis, chronic, treatment of* ..... 11. 680  
 — *in children* ..... 11. 680  
 — *Mucous surfaces, syphilitic affections of* ..... 1469  
 — *Mucus, expectoration of, as a symptom* ..... 1092  
 — *in urine, appearances of* ..... 1337  
 — *Muscles, adipoceros or fatty degeneration of* ..... 11. 997  
 — *alterations of their consistence* ..... 11. 996  
 — *motion and sensation of* ..... 11. 993  
 — *their structure* ..... 11. 996, 8  
 — *atrophy of* ..... 11. 996  
 — *Bibliog. and Refer. to* ..... 11. 998  
 — *changes of colour of* ..... 11. 996  
 — *effects of cold on* ..... 1. 420  
 — *of the contractility of* ..... 11. 993  
 — *causes affecting the contractility of* ..... 11. 993  
 — *division of* ..... 11. 993  
 — *morbid contractile of* ..... 11. 996  
 — *gangrene of* ..... 11. 996  
 — *hardening of* ..... 11. 996  
 — *hypertrophy of* ..... 11. 996  
 — *inflammation of* ..... 11. 995  
 — *causes of* ..... 11. 995  
 — *consequences of* ..... 11. 995  
 — *symptoms of* ..... 11. 995  
 — *treatment of* ..... 11. 996  
 — *lesions of their sensibility* ..... 11. 995  
 — *softening of* ..... 11. 995  
 — *suppuration of* ..... 11. 995  
 — *Muscular motion, signs of disease furnished by* ..... 1065-6  
 — *structure, diseases of. See, also, Muscles* ..... 11. 993  
 — *Mushrooms, poisonous, operations and effects of* ..... 474, 6  
 — *appearances in fatal cases* ..... 476  
 — *treatment of* ..... 476  
 — *Myalgia, described. See, also, Muscles, pain of* ..... 11. 995  
 — *Myelitis, described. See, also, Inflammation of the Spinal Cord* ..... 961  
 — *appearances after death from* ..... 962  
 — *complications of* ..... 963  
 — *diagnosis of* ..... 963  
 — *between, and spinal meningitis* ..... 963  
 — *prognosis of* ..... 963-4  
 — *neuritis, described* ..... 961, 2  
 — *treatment of* ..... 964  
 — *chronic, described* ..... 964  
 — *treatment of* ..... 964  
 — *Myomalaxia, or softening of Muscles* ..... 11. 997  
 — *Myositis. See Muscles, Inflammation of the* ..... 11. 995  
 — *N.*  
 — *Nails, affections of the* ..... 868  
 — *Narcotic and irritant poisons* ..... 474  
 — *Narcotics, enumeration of* ..... 1147  
 — *in cases of insanity* ..... 11. 610  
 — *of the operation of* ..... 460  
 — *poisoning by* ..... 460-74  
 — *Nausea during pregnancy* ..... 501  
 — *treatment of* ..... 501  
 — *as a symptom* ..... 1080  
 — *Neck, rheumatism of the* ..... 672  
 — *Necroscopic poison, appearances after death from* ..... 440  
 — *indications and means of cure for its effects* ..... 443, 4  
 — *diagnosis of its operation* ..... 439  
 — *causes of disease caused by* ..... 438, 43  
 — *diseases which impart this poison* ..... 437, 9  
 — *nature of the distemper caused by* ..... 441-3  
 — *effects, &c., of, described* ..... 437-41  
 — *inferences as to the nature of its effects* ..... 441, 3  
 — *predisposing causes to infection by* ..... 441  
 — *symptoms produced by* ..... 438  
 — *treatment of the effects caused by* ..... 443, 4  
 — *Necrosis, causes of* ..... 1055  
 — *or mortification of bone* ..... 1055



- Necrosis, symptoms of ..... ii. 1056  
 Nematechnia, definition of ..... 1537  
 Nematodea, definition of ..... 1537  
 Nephralgia, description and causes of ..... ii. 770  
 — treatment of ..... ii. 770  
 — notices of ..... ii. 1013  
 Nephritis, appearances after death from ..... ii. 727  
 — causes exciting, concurring with, and predisposing to ..... ii. 722  
 — consecutive or symptomatic states of ..... ii. 730  
 — of the absorption of purulent or sanious matters ..... ii. 731  
 — of disease of the bladder, prostate gland, and urethra ..... ii. 732  
 — of paraplegia ..... ii. 732  
 — of scarlet fever and other eruptive fevers ..... ii. 731  
 — of typhoid fevers ..... ii. 731  
 — consequences and terminations of ..... ii. 725  
 — complications of ..... ii. 733  
 — definition of ..... ii. 722  
 — description of ..... ii. 723  
 — diagnosis between, and the passage of a calculus ..... ii. 729  
 — between rheumatism and lumbago ..... ii. 729  
 — of its more simple states ..... ii. 728  
 — in the female ..... ii. 725  
 — prognosis of ..... ii. 733  
 — consecutive and complicated states of ..... ii. 730-32  
 — modified states of ..... ii. 729  
 — and consecutive, treatment of ..... ii. 735  
 — description of simple acute ..... ii. 723  
 — of sub-acute ..... ii. 724  
 — sub-acute and chronic, treatment of ..... ii. 734  
 — arthritic, symptoms of ..... ii. 729  
 — asthenic, described ..... ii. 730  
 — cachectic, appearances after death from ..... ii. 741  
 — exciting causes of ..... ii. 733  
 — remote causes of ..... ii. 732  
 — consequences of ..... ii. 737-41  
 — complications and relations of ..... ii. 744-50  
 — treatment of its various complications ..... ii. 755, 6  
 — definitions of ..... ii. 736  
 — synonyms of ..... ii. 736  
 — description of ..... ii. 736  
 — diagnosis of ..... ii. 744  
 — duration of ..... ii. 741  
 — medicines advised for ..... ii. 733  
 — nature of ..... ii. 750  
 — relations to other diseases ..... ii. 744-50  
 — treatment of ..... ii. 753  
 — acute, symptoms of ..... ii. 736  
 — chronic ..... ii. 737  
 — causes of ..... ii. 753  
 — gouty, appearances after death from ..... ii. 730  
 — in the gouty diathesis ..... ii. 729  
 — treatment of gouty and rheumatic ..... ii. 735  
 — rheumatic, remarks on ..... ii. 730  
 — treatment of primary and simple ..... ii. 734  
 — of secondary ..... ii. 735  
 Nerves, *Bibliog. and Refer.* ..... ii. 1005, 6  
 — diseases of ..... ii. 998  
 — effects of cold on ..... i. 420  
 — ganglionic, agency of, in the several healthy and morbid sympathies ..... 1031-3  
 — the organic or ganglionic, their direct effect on the blood ..... i. 243, 6  
 — inflammation of, described. See, also, Neuritis ..... ii. 1001  
 — lesions of sensibility, and function of ..... ii. 1005  
 — structural changes of ..... ii. 998  
 — tumours of the ..... ii. 1003, 4  
 Nervous affections resembling chorea, described ..... i. 390  
 — from mercurials ..... 454  
 Nervous centres, conditions of, occasioning paralysis ..... 36-40  
 — influence, organic, on the states of the blood ..... i. 243  
 — system, in connexion with mind ..... ii. 584-90  
 — disorders of, during pregnancy ..... 503  
 Neuralgia, alternatives and deobstruents advised for ..... ii. 1022  
 — *Bibliog. and Refer.* ..... ii. 1028, 9  
 — exciting causes of ..... ii. 1015  
 — predisposing causes of ..... ii. 1015  
 — general character of ..... ii. 1006  
 — complications ..... ii. 1015  
 — intentions of cure for ..... ii. 1021  
 — definition of ..... ii. 1006  
 — diagnosis of ..... ii. 1014  
 — evacuants, emetics, and purgatives for ..... ii. 1021, 22  
 — of the extremities ..... ii. 1011  
 — facial, described ..... ii. 1008  
 — division of ..... ii. 1009  
 — symptoms of ..... ii. 1008  
 — duration of ..... ii. 1002  
 — appearances in fatal cases ..... ii. 1019  
 — feigned ..... i. 1034  
 — femoral or crural ..... ii. 1012  
 — frontal ..... ii. 1009  
 — of the ganglia ..... ii. 1013  
 — in gouty, hypochondriacal, and hysterical persons ..... ii. 1014  
 — infra-orbital, described ..... ii. 1009  
 — sources and causes of irritation producing, particularized ..... ii. 1015-18  
 — of the liver ..... ii. 838  
 — local means for ..... ii. 1026  
 — various medicines advised for ..... ii. 1022-6  
 — mental ..... ii. 1009  
 — of muscular and membranous parts ..... ii. 1012  
 — diagnosis between, and rheumatism ..... ii. 1012  
 — nature of ..... ii. 1019  
 — of the neck and trunk ..... ii. 1010  
 — of nerves of association ..... ii. 1013, 14  
 — of the cervical nerves ..... ii. 1010  
 — of the intercostal nerves ..... ii. 1010  
 — of lumbar nerves ..... ii. 1011  
 — special notices of ..... ii. 1007  
 — paroxysms of, described ..... ii. 1006  
 — duration and return of the paroxysms of ..... ii. 1007  
 — pathological causes of ..... ii. 1015, 16  
 — of the periosteum ..... ii. 1013  
 — differences between, and rheumatism ..... 677  
 — sciatic, described ..... ii. 1012  
 — terminations and prognosis of ..... ii. 1018  
 — treatment of ..... ii. 1021  
 — of the tongue, described ..... 1176  
 — treatment of ..... 1176  
 — of the viscera ..... ii. 1013  
 — uterine, causes of ..... 1362  
 — described ..... 1362  
 — diagnosis and prognosis of ..... 1362  
 — treatment of ..... 1364  
 Neuralgic affections. See, also, Neuralgia ..... ii. 1006  
 — various remedies advised for ..... ii. 1022-26  
 — treatment of ..... ii. 1021  
 Neuritis, causes of ..... ii. 1004  
 — definition of ..... ii. 1001  
 — prognosis of ..... ii. 1004  
 — treatment of ..... ii. 1005  
 — varieties of ..... ii. 1002  
 — acute, described ..... ii. 1001  
 — symptoms of chronic ..... ii. 1002  
 Neuroma, description of ..... ii. 1003  
 — diagnosis of ..... ii. 1003  
 — treatment of ..... ii. 1005  
 New-born infants, apoplexy of ..... i. 119  
 Nice, climate of, noticed ..... i. 413  
 Night-blindness. See, also, Nyctalopia ..... ii. 1029  
 — causes of ..... ii. 1030  
 — pathological states of ..... ii. 1031  
 — phenomena of ..... ii. 1030  
 — prognosis of ..... ii. 1031  
 Night-blindness, treatment of ..... ii. 1031  
 Nipple, inflammation of the ..... ii. 930  
 — causes of ..... ii. 930  
 — treatment of ..... ii. 930  
 Nitric and muriatic acids in hepatic diseases ..... ii. 865, 6  
 Nodosities of joints, rheumatic and gouty ..... 667-69  
 Noli me tangere, described ..... ii. 914-16  
 Noma, description of ..... 1022  
 — of the vulva ..... 1433  
 Nose, signs of disease furnished by ..... 1053  
 — syphilitic disease of its bones ..... 1469  
 — syphilitic affections of ..... 1469  
 — and palate, syphilitic ulcerations of the ..... 1469  
 Nostalgia, *Bibliog. and Refer.* ..... ii. 1034  
 — causation of ..... ii. 1033  
 — appearances in fatal cases ..... ii. 1034  
 — diagnosis between real and feigned ..... ii. 1034  
 — symptoms of ..... ii. 1034  
 — synonyms and definition of ..... ii. 1033  
 Nostomania. See, also, Nostalgia ..... ii. 1034  
 Nostrils, hemorrhage from ..... ii. 85-90  
 Nubia, the climate of, advised for phthisis ..... 1275  
 Nuclei, naked, of morbid growths ..... 771  
 Nutrition, metamorphosed or transformed ..... i. 671  
 — of the body as a sign of disease ..... 1064  
 — transformations of ..... ii. 671  
 Nux vomica, poisoning by ..... 411  
 Nyctalopia, *synonymes* and phenomena of ..... i. 1029  
 Nyctalopia and hemeralopia, *Bibliog. and Refer.* ..... ii. 1033  
 O.  
 Obesity, amount of, notices of ..... ii. 1036  
 — *Bibliog. and Refer.* ..... ii. 1039  
 — causes of ..... ii. 1036  
 — characters of ..... ii. 1035  
 — of the chemical doctrine of ..... ii. 1037, 38  
 — of the heart ..... ii. 520  
 — partial and general ..... ii. 1035  
 — pathology of ..... ii. 1037  
 — synonyms and definition ..... ii. 1035  
 — treatment of ..... ii. 1033  
 Obliteration of arteries ..... i. 133  
 — of the canal of portion of intestines ..... i. 638  
 — of vena cava ..... 1442  
 Obetipation. See, also, Constipation ..... i. 471  
 Odontalgia, forms of ..... ii. 1009  
 Odour of the breath as a sign of disease ..... 1002  
 Oedema, description of ..... i. 724  
 — treatment of ..... i. 728  
 — of the glottis, described ..... i. 759  
 — of the heart ..... ii. 250  
 — of the lungs, described ..... ii. 905  
 — synonyms and definition ..... ii. 1039  
 — active, described ..... ii. 1040  
 — diagnosis of ..... ii. 1040  
 — passive, described ..... ii. 1039  
 — appearances after death ..... ii. 1039  
 — treatment of ..... ii. 1040  
 Oesophagitis, causes of ..... ii. 1043  
 — definition of ..... ii. 1042  
 — prognosis of ..... ii. 1047  
 — in children, treatment of ..... ii. 1048  
 — acute, symptoms of ..... ii. 1043  
 — terminations of ..... ii. 1044  
 — treatment of ..... ii. 1048  
 — chronic and sub-acute ..... ii. 1045  
 — treatment of ..... ii. 1049  
 — complicated, treatment of ..... ii. 1048  
 Oesophagus, *Bibliog. and Refer.* ..... ii. 1052  
 — diseases of the ..... ii. 1041  
 — foreign bodies in the ..... ii. 1052  
 — treatment of ..... ii. 1052  
 — structural changes of ..... ii. 1041, 2  
 — gangrenous ..... ii. 1044  
 — hemorrhage from ..... ii. 1049

- Esophagus, hæmorrhage from,**  
treatment of ..... ii. 1050  
inflammation of the. See  
**Esophagitis** ..... ii. 1042  
organic lesions of ..... ii. 1041, 2  
paralysis of the ..... ii. 1051  
— diagnosis of ..... ii. 1051  
— treatment of ..... ii. 1052  
perforations of the ..... ii. 1042  
scirrhus of the ..... ii. 1047  
spasm of the ..... ii. 1050  
— causes of ..... ii. 1050  
— symptoms of ..... ii. 1050  
— treatment of ..... ii. 1051  
stricture of the ..... ii. 1045  
— stricture and ulceration of,  
treatment of ..... ii. 1049  
— permanent stricture of, diag-  
nosis of ..... ii. 1046  
suppuration of ..... ii. 1044  
thickening and induration  
of ..... ii. 1045  
— symptoms of thickening ..... ii. 1045  
— fibro-cartilaginous tumours  
of ..... ii. 1045  
— ulceration of the ..... ii. 1046  
— symptoms of ..... ii. 1047
- Oil of bitter almonds, poisoning  
by** ..... 398  
— cod-liver, its use in phthisis  
— advised for scrofula  
and tuberculosis ..... 334  
— male-fern, for the treat-  
ment of tænia ..... 1551
- Oils, empyreumatic, poisoning  
by** ..... 474  
— of their use in phthisis ..... 1271
- Old-age, described** ..... i. 56
- Oleum Camphoræ** ..... F. 449. *Ap.* 19
- Omentitis, description of** ..... 75
- Onychia, syphilitic, described** ..... 1469
- Ophthalmia, Bibliog. and Refer.**  
to ..... i. 1023, 4  
— causes of ..... i. 985  
— definition of ..... i. 985  
— forms of ..... i. 986  
— feigned ..... i. 1035  
— arthritica externa ..... i. 1012  
— arthritica interna, symp-  
toms and treatment of ..... i. 1021  
— erysipelatous ..... i. 1010  
— exanthematous, causes and  
forms of ..... i. 1009  
— treatment of ..... i. 1009  
— gonorrhœal, symptoms of  
acute ..... i. 1002  
— causes of ..... i. 1003  
— diagnosis and prog-  
nosis of ..... i. 1002  
— treatment of ..... i. 1003  
— symptoms and treatment of  
the mild ..... i. 1005  
— interna, definition of ..... i. 1015  
— of internal parts, de-  
scribed ..... i. 1015, 22  
— of the internal coats, de-  
scribed ..... i. 1019  
— intermittent ..... i. 1023  
— morbillous ..... i. 1010  
— purulent ..... i. 988  
— of infants ..... i. 988  
— causes of ..... i. 988  
— symptoms and  
progress of ..... i. 989  
— terminations and  
prognosis of ..... i. 989  
— treatment of ..... i. 990  
— in adults ..... i. 991  
— causes of ..... i. 992  
— contagion of ..... i. 992  
— symptoms and  
prognosis of ..... i. 994  
— terminations and  
diagnosis of ..... i. 995  
— treatment of ..... i. 996  
— local ..... i. 998  
— various means of  
cure ..... i. 998  
— pustular, symptoms and  
treatment of ..... i. 1005, 6  
— rheumatica, symptoms and  
treatment of ..... i. 1012, 13  
— scarlatinous ..... i. 1010  
— scrofulous, causes of ..... i. 1016
- Ophthalmia, scrofulous, symp-  
toms and progress of** ..... i. 1006  
— terminations and diag-  
nosis of ..... i. 1006, 7  
— treatment and regi-  
men ..... i. 1007, 8  
— — local, of ..... i. 1009  
— sclerotica, diagnosis and  
prognosis of ..... i. 1011  
— symptoms and termi-  
nations of ..... i. 1010  
— treatment of ..... i. 1011  
— — local, of ..... i. 1011  
— universalis, description of ..... i. 1022  
— terminations and diag-  
nosis of ..... i. 1022  
— treatment of ..... i. 1022  
— variolous, described ..... i. 1009  
— treatment of ..... i. 1009
- Ophthalmotonos, defined** ..... 1101
- Opium and its preparations, ap-  
pearances after death from  
poisoning by** ..... 471  
— antidotes for ..... 472  
— its modes of operation ..... 471  
— morphia, and their prepara-  
tions, operation and effects of  
— and opiates, their use in  
phthisis ..... 1271  
— poisoning by, diagnosis of ..... 409  
— treatment of ..... 472  
— cold affusion for ..... 472  
— and by its prepara-  
tions, symptoms of ..... 467  
— appearances after death  
from ..... 471  
— smoking, effects of ..... 468
- Organic functions, disorders of,  
connected with insanity** ..... ii. 536  
— states of, in insanity ..... ii. 508  
— nervous system, influence  
on the blood ..... i. 243  
— influence exerted on  
the secretions by the ..... i. 667  
— or vital power, its in-  
fluence on hæmorrhage ..... ii. 73  
— or ganglionic nervous sys-  
tem, its influence in associat-  
ing or complicating disorders  
1030, 47, 49  
— its influence on the  
blood and circulation ..... 1030, 47, 49  
— nervous system, primarily  
affected by the efficient causes  
of fever ..... i. 1061  
— the source of irrita-  
bility ..... ii. 691, 3
- Organization of the brain, influ-  
encing the mind** ..... ii. 587, 8  
— and mind, in relation to in-  
sanity ..... ii. 573
- Organized parts, destruction of** ..... i. 679
- Organs, diseased, absorption  
from** ..... i. 29  
— hæmorrhage into the struc-  
ture of ..... ii. 143  
— of reproduction, sympa-  
thies with ..... 1055  
— of respiration, diseases of,  
causing phthisis ..... 1235  
— of sense, morbid sympa-  
thies of ..... 1040
- Orifices of the heart, dilatation  
of** ..... ii. 244  
— causes of ..... ii. 244
- Osseous formations in the heart** ..... ii. 222
- Osseous system, Bibliog. and  
Refer.** ..... ii. 1060  
— diseases of ..... ii. 1053
- Ossification of arteries of the  
heart** ..... ii. 260
- Ossific deposits in arteries** ..... i. 134  
— transformations ..... i. 673
- Osteitis, causes of** ..... ii. 1054  
— local causes of ..... ii. 1054  
— consequences and termina-  
tions of ..... ii. 1054  
— definition of ..... ii. 1053  
— symptoms of ..... ii. 1054  
— seat and anatomical changes  
of ..... ii. 1053  
— treatment of ..... ii. 1053
- Osteomalacia, described** ..... ii. 1057
- Osteosarcoma, described** ..... ii. 1059
- Otaigia. See, also, Earache** ..... i. 846
- Otitis, causes of** ..... i. 851  
— defined. See, also, Ear, In-  
flammation of ..... i. 847  
— acutus, defined ..... i. 847  
— symptoms of ..... i. 847  
— terminations and con-  
sequences of ..... i. 848  
— treatment of ..... i. 851  
— chronic, consequences and  
lesions from ..... i. 849, 50  
— described ..... i. 849  
— treatment of ..... i. 852  
— external, symptoms ..... i. 847  
— internal, symptoms ..... i. 848
- Otorrhœa, consequences and  
structural changes from** ..... i. 849, 50  
— purulent, described ..... i. 849
- Ovaria, abscess of, treatment  
of** ..... ii. 1064  
— Bibliog. and Refer. to ..... ii. 1067  
— diseases of the ..... ii. 1061  
— effusions, &c., into the ..... ii. 1063  
— functional disorders of the ..... ii. 1061  
— inflammation. See, also,  
Ovaritis ..... ii. 1061  
— inflammation of, after par-  
turbation ..... 566  
— organic lesions of ..... ii. 1064  
— symptoms of organic lesions  
of the ..... ii. 1064  
— treatment of organic dis-  
eases of the ..... ii. 1065  
— rheumatism of ..... 675  
— scirrhus of the ..... ii. 1065  
— suppuration of ..... ii. 1063  
— encysted and other tumours  
of the ..... ii. 1065  
— malignant and other tu-  
mours of the ..... ii. 1065
- Ovarian dropsy, described** ..... i. 745
- Ovaritis, cases of** ..... ii. 1062  
— causes of ..... ii. 1062  
— definition and synonyms ..... ii. 1061  
— symptoms of ..... ii. 1062  
— terminations and conse-  
quences of ..... ii. 1063  
— treatment of ..... ii. 1063  
— puerperal, notices of ..... 566
- Ovary, of extirpation of the** ..... ii. 1066  
— hernia or displacement of the ..... ii. 1066
- Oxalic acid, poisoning by** ..... 378  
— treatment of ..... 580
- Oxaluria, causes of** ..... 1330  
— characters of urine con-  
taining oxalate of lime ..... 1328  
— source of ..... 1329  
— symptoms attending ..... 1330  
— treatment of ..... 1330
- Oxyuris, systematic description  
of the genus** ..... 1519  
— vermicularis, systematic de-  
scription of ..... 1539  
— diagnosis of ..... 1521  
— locality of ..... 1520  
— symptoms of ..... 1520  
— various remedies for ..... 1536  
— treatment of ..... 1535-6
- Ozœna, definition of** ..... ii. 1067  
— causes and progress of ..... ii. 1067  
— prognosis of ..... ii. 1067  
— treatment of ..... ii. 1067

P.

- Pain or aching in the region of  
the liver indicative of organic  
disease of** ..... ii. 873  
— as a symptom of disease ..... 1074  
— kinds of, as symptoms ..... 1074  
— as a symptom of phthisis ..... 1201
- Palate, Bibliog. and Refer.** ..... 3  
— inflammation of the ..... 1  
— causes of ..... 1  
— symptoms of ..... 2  
— treatment of ..... 3  
— relaxation of the ..... 1  
— ulceration of the ..... 3  
— syphilitic ulcerations of the ..... 1469
- Palatitis, complications of** ..... 2  
— description of ..... 1, 2  
— prognosis of ..... 3  
— treatment of ..... 3
- Palpitations, causes of** ..... ii. 204  
— course and duration of ..... ii. 205



- Palpitations, diagnosis of ..... H. 205  
   — treatment of ..... H. 205, 6  
   — *definition* of ..... H. 204  
   — as signs of disease ..... 1086  
   — treatment of hysterical ... H. 206  
   — *Bibliog. and Refer.* ..... H. 206  
   — of the heart, during pregnancy ..... 503  
     — treatment of ..... 503  
 Palsy, associated with apoplexy ..... 29  
   — associations and complications of ..... 29  
   — *Bibliog. and Refer.* ..... 54  
   — blood-letting for ..... 50  
   — physical conditions of the brain in ..... 57  
     — predisposing causes of ..... 35  
       — from arsenic ..... 27  
     — cerebro-spinal fluid in connexion with ..... 35  
     — external means of cure advised for ..... 52  
     — disorders preceding and attending ..... 27  
       — associated with epilepsy .. 29  
       — of evacuates and alteratives for ..... 50  
       — general history of ..... 27  
       — complicated with disease of the heart ..... 31  
       — with hysteria ..... 32  
       — with inflammation of the brain ..... 30  
       — with insanity, description of ..... 30  
       — complications of, their treatment ..... 48  
       — from lead, described ..... 26  
       — of the lower half of the body. See, also, Paraplegia ..... 28  
       — from mercury ..... 52  
       — from narcotics ..... 27  
       — shown to arise from two distinct conditions of the nervous centres ..... 30-9  
       — on the pathology of ..... 30  
       — remote causes of ..... 34  
       — topics connected with the pathology of ..... 30-41  
       — regimen and diet for ..... 53  
       — with rheumatism ..... 31  
       — shaking, described ..... 31  
       — of the sphincters ..... 16  
       — states of the sphincters in ..... 44  
       — of stimulants, tonics, &c., for ..... 51  
       — premonitory symptoms of ..... 27  
       — treatment of ..... 45  
       — of the urinary bladder ..... 16  
 Pancreas, suppuration and abscess of ..... 6  
   — symptoms of abscess of ..... 6  
   — increased action of the ..... 4  
   — atrophy of the ..... 7  
   — *Bibliog. and Refer.* ..... 11  
   — chronic and organic diseases of, treatment of ..... 8  
   — concretions in the ..... 8  
   — diseases of the ..... 9  
   — fatty degeneration of ..... 9  
   — functional disorders of ..... 10  
   — fungo-hæmatoid disease of ..... 6  
   — gangrene of ..... 6  
   — hypertrophy of ..... 8  
   — induration of ..... 8  
   — inflammation of. See, also, Pancreatitis ..... 5  
   — Pancreatitis ..... 5  
     — organic lesions of, non-inflammatory ..... 7  
     — symptoms of organic diseases of ..... 9  
     — scirrhus and carcinoma of ..... 9  
     — softening of the ..... 8  
     — torpor of the ..... 4  
 Pancreatitis, *definition* and symptoms of acuto ..... 6  
   — causes of ..... 6  
   — complications of ..... 6  
   — chronic, notices of ..... 6  
   — terminations of ..... 5  
   — treatment of ..... 7  
 Papule, syphilitic, noticed ..... 1467
- Paracentesis thoracis, for empyema ..... 331  
   — manner of performing ..... 333, 5  
 Paralysis, consequences of ..... 33  
   — *definitions* of ..... 12  
   — diagnosis of ..... 32  
   — pathological states occasioning ..... 36  
     — diagnosis of the ..... 32  
     — physical agents producing ..... 35  
     — prognosis of ..... 34  
     — appreciation and appropriation of remedies for ..... 50, 3  
     — terminations of ..... 33  
     — treatment of various complications of ..... 48-50  
       — agitated, described ..... 25  
       — treatment of ..... 48  
       — in connexion with apoplexy ..... 1. 93  
       — passing into apoplexy ..... 1. 95  
       — of the urinary bladder ..... 1297, 9  
       — treatment of ..... 1299  
       — in children, treatment of ..... 48  
       — associated with disease of the cranial and vertebral bones ..... 30  
       — of the facial muscles ..... 14  
       — local forms of ..... 13  
       — general, described ..... 20  
       — states and sources of ..... 20, 21, 2  
       — associated with insanity ..... H. 534  
       — pathological states producing ..... 20, 21, 2  
       — symptoms of, described ..... 23  
       — treatment of ..... 47  
       — complicated with hysteria, treatment of ..... 49  
       — complicated with idioey ..... 30  
       — infantile, forms of ..... 25  
       — of infants and children ..... 24, 5  
       — complicating insanity, described ..... H. 534  
       — complicated with insanity, treatment of ..... 49  
       — with disease of the kidneys ..... 31  
       — local or partial treatment of ..... 45  
       — of motion, described ..... 13  
       — treatment of ..... 45  
       — particular muscles ..... 14  
       — of the œsophagus ..... H. 1051  
       — from poisons, descriptions of ..... 26  
       — treatment of ..... 48  
       — of the rectum and anus ..... 645  
       — symptoms and treatment of ..... 645  
       — complicated with rheumatism ..... 674  
       — of sensation, described ..... 12  
       — treatment of ..... 35  
       — of the sense of smell ..... 12  
       — of one side of the body ..... 16  
       — sympathetic effects of ..... 40  
       — of the sense of taste ..... 12  
       — of the tongue ..... 1176  
       — treatment of ..... 1176  
       — of the sense of touch ..... 13  
       — complicated with disease of the urinary organs, treatment of ..... 49  
 Paralytic apoplexy, lesions producing ..... 1. 97  
 Paralyzed parts, temperature of ..... 28  
 Paraplegia, consequences of ..... 10  
   — description of ..... 6  
   — diagnosis of ..... 6  
   — lesions occasioning ..... 8  
   — symptoms of ..... 15  
   — terminations of ..... 18-19  
   — treatment of ..... 46  
   — causing affections of the urinary organs ..... 19  
   — puerperal, noticed ..... 547  
   — treatment of ..... 547  
 Parasites, animal, *definition* of ..... 1514  
   — the origin of ..... 1515  
   — human, first class of, noticed ..... 1519  
     — second class of, described ..... 1520  
     — or intestinal. See, also, Worms ..... 1514  
   — to be thrown off by promoting organic nervous power .. 1142
- Parents, disorders of, predilecting to phthisis ..... 126-29  
   — habits of living of, predilecting to phthisis ..... 1227, 8  
   — transmission of phthisis from ..... 1225, 6  
 Parietes of abscess, described ..... 16-17  
   — of abscesses of the brain, described ..... 1. 262  
 Parotid gland, diseases of ..... 55  
   — functional disorder of ..... 55  
   — inflammation of. See, also, Parotitis ..... 55  
 Parotitis ..... 55  
   — suppuration of ..... 56  
 Parotids, *Bibliog. and Refer.* ..... 59  
   — chronic enlargement of ..... 53  
   — organic lesions of the ..... 53  
   — affection of, consequent on scarlet fever ..... 739  
 Parotitis, causes of ..... 55  
   — *definition* of ..... 55  
   — metastasis of, noticed ..... 56  
   — states or varieties of ..... 57  
   — symptoms of ..... 56  
   — treatment of ..... 57  
   — chronic, treatment of ..... 57  
   — epidemic and epidemic ..... 55  
   — epidemic, treatment of ..... 57  
   — scrofulous, treatment of ..... 57  
 Paroxysms of ague described ..... 1. 1085  
   — treatment of ..... 1. 1093  
   — of epilepsy, description of ..... 1. 905  
   — duration of ..... 1. 906  
   — of hysteria, described ..... H. 314, 15  
 Parturient, changes during, occasioning disease ..... 532  
   — changes subsequent to, causing disease ..... 534  
 Parturient process independent of the cerebro-spinal nervous influence ..... 533  
 Parturificients, enumerated ..... 1148  
 Parturition, not dependent upon the cerebro-spinal nervous influence ..... 533  
   — changes consequent upon, favouring disease ..... 534  
   — of convalescence after ..... 535  
   — the management of convalescence after ..... 537  
   — inflammation of the cervix uteri after ..... 1365  
   — sinking, &c., after ..... 547  
   — treatment of ..... 547  
   — treatment of the several deviations from the natural course of convalescence from ..... 537  
 Passions of the mind causing insanity ..... H. 562  
   — and sentiments as causing disease ..... 1. 655  
 Pathogeny of disease must be studied ..... 1133  
 Pathological conditions constituting gout ..... H. 48  
 Pathology of disease ..... 1. 658  
   — necessity for its study ..... 1133  
   — of apoplexy ..... 1. 107  
   — of fever, general inferences respecting ..... 1. 1069  
   — old and modern opinions of the ..... 1. 1063-1069  
   — of insanity ..... H. 573-578  
 Patients, prejudices, &c., of, retard therapeutical knowledge ..... 1131  
 Pectoriloquy, described ..... 1. 204  
 Pellagra, *Bibliog. and Refer.* ..... 61  
   — causes of ..... 62  
   — diagnosis of ..... 62  
   — appearances of fatal cases ..... 61  
   — history of ..... 60  
   — prognosis of ..... 62  
   — symptoms of ..... 60  
   — *synon. and definit.* ..... 60  
   — treatment of ..... 61  
   — Asturian, description of ..... 61  
 Pemphigus, *Bibliog. and Refer.* ..... 65, 66  
   — complications of ..... 64  
   — description of ..... 64  
   — diagnosis of ..... 67  
   — prognosis of ..... 67  
   — *synon. and definit.* ..... 64  
   — treatment of ..... 68

- Pemphigus, local treatment of. . . 69  
 — acute, symptoms of. . . 64  
 — chronic, symptoms of. . . 66  
 Perceptions, false, in insanity. . . ii. 502  
 Percussion of abdomen. . . i. 4  
 Perforation of one of the cavities of the heart. . . ii. 222  
 — ulceration, and rupture of the œsophagus. . . ii. 1046  
 Perforations of the digestive tube. . . i. 632  
 — consequent upon pyæmia. . . 313  
 — of vagina. . . 1430  
 Pericæcal tissue, inflammation of. . . i. 333  
 Pericarditis, adhesions of the opposite surfaces of pericardium. . . ii. 216  
 — causes of. . . ii. 224  
 — characters of. . . ii. 214  
 — in children. . . ii. 234  
 — causes of. . . ii. 234  
 — complications of. . . ii. 227  
 — diagnosis of. . . ii. 216, 17  
 — of its complications. . . ii. 227  
 — prognosis of. . . ii. 228  
 — progress and duration of. . . ii. 228  
 — complicated with rheumatism. . . 673  
 — signs and symptoms of. . . ii. 216-20  
 — structural lesions in the acute. . . ii. 214  
 — in chronic. . . ii. 215  
 Pericardium, adhesions between its surfaces. . . ii. 216  
 — of the diaphragm of. . . ii. 193  
 — ossific formations in the. . . ii. 252  
 — hæmorrhage into. . . ii. 142  
 — inflammation of the. See, also, Pericarditis. . . ii. 214  
 — causes of its inflammation. . . ii. 224  
 — morbid sounds from diseases of the. . . ii. 217  
 Pericranium, lesions of the. . . i. 254  
 — syphilitic disease of. . . 1471  
 Perineum, laceration of the. . . 542  
 — prevention and treatment. . . 542  
 Peri-nephritis, consequences and terminations of. . . ii. 763  
 — description of. . . ii. 763  
 Periodic fevers. See Agues and Intermittents. . . 1085  
 Periodicity, characteristic of the effects of irritation. . . ii. 706  
 Periosteitis, successive alterations during. . . 70  
 — associations of. . . 70  
 — *Bibliog. and Refer.*. . . 72  
 — causes of. . . 71  
 — definition of. . . 69  
 — diagnosis of. . . 71  
 — suppuration from. . . 70  
 — suppurative, treatment of. . . 72  
 — treatment of. . . 69  
 — acute, symptoms of. . . 72  
 — chronic, symptoms of. . . 70  
 — treatment of. . . 72  
 — specific, &c., treatment of. . . 72  
 Periosteum, inflammation of. See, also, Periosteitis. . . 69  
 — affection of, in rheumatism and bones, syphilitic disease of. . . 1471  
 — syphilitic disease of. . . 1471  
 Peripneumonia. See, also, Pneumonia. . . ii. 878  
 — notha, or Asthenic Bronchitis. . . i. 304  
 Peritoneum, *Bibliog. and Refer.*. . . 105  
 — diseases of the. . . 73  
 — encysted dropsy of the. . . i. 749  
 — hæmorrhage into. . . ii. 143  
 — inflammation of. See, also, Peritonitis. . . 73  
 — inflammation of, associated with inflammation of the viscera it invests. . . 84  
 — organic lesions of, consequent on its inflammation. . . 84-89  
 — malignant formations in. . . 101  
 — non-inflammatory, organic lesions of. . . 100-3  
 — causes of. . . 104  
 — symptoms of. . . 103, 4  
 — treatment of. . . 104  
 Peritoneum, substances foreign to it found within the. . . 102  
 — tubercles and scrofulous tumours of. . . 101  
 — appearances after death. . . 84  
 — causes of. . . 93  
 — in children, forms and symptoms of. . . 82  
 — treatment of. . . 100  
 — structural changes consequent upon. . . 84-89  
 Peritonitis, chronic tubercular, described. . . 80  
 — complications of. . . 83, 4  
 — complicated with inflammations of viscera invested by the peritoneum. . . 84  
 — treatment of its complications. . . 98, 9  
 — with inflammations of abdominal organs. . . 98, 9  
 — management of convalescence from. . . 100  
 — diagnosis of. . . 91  
 — between, and gastritis, and enteritis. . . 91  
 — from paracentesis abdominalis. . . 77  
 — prognosis of. . . 93  
 — progress, duration, and terminations of acute and chronic, in children. . . 82, 3  
 — in connection with rheumatism. . . 675  
 — complicating scarlet fever. . . 756  
 — *synonymes and definition* of. . . 73  
 — in synchoid puerperal fever. . . 568  
 — terminating in adhesions. . . 77  
 — in effusion. . . 78  
 — fatally. . . 77  
 — indications of treatment for acute, description of. . . 75  
 — in children. . . 82  
 — modifications of. . . 76  
 — terminations of acute general. . . 77  
 — acute, appearances after. . . 84  
 — exudations from. . . 56, 6  
 — false membranes, and morbid formations from. . . 56, 7  
 — remedial means advised for. . . 95  
 — symptoms of. . . 73  
 — treatment of. . . 95  
 — chronic, in children. . . 73, 81  
 — described. . . 78  
 — literary history of. . . 87  
 — lesions caused by. . . 80  
 — symptoms of. . . 81  
 — terminations and consequences of. . . 83  
 — tubercular, in children. . . 98  
 — treatment of. . . 87  
 — lesions constituting. . . 87  
 — asthenic acute, lesions consequent upon. . . 87  
 — treatment of. . . 97  
 — general, description of. . . 75  
 — asthenic, described. . . 76  
 — from perforation of the digestive canal. . . 76  
 — course of. . . 77  
 — hæmorrhagic, described. . . 77  
 — latent, noticed. . . 77  
 — omental, described. . . 75  
 — partial, symptoms of its several forms. . . 74  
 — treatment of. . . 98  
 — chronic. . . 80  
 — puerperal, described. . . 564  
 — course and terminations of. . . 564, 5  
 — treatment of. . . 535  
 Perspiration, changes in, as to amount and quantity. . . 803-4  
 — states of, as signs of disease. . . 1062-4  
 — morbid states of. . . 864  
 — state of, in rheumatism and sweats, in phthisis. . . 1203  
 — treatment of, in second stage of phthisis. . . 1205  
 Pertussis, *definition* of. See, also, Whooping-Cough. . . ii. 273  
 Pern, climate of, as respects phthisis. . . 1233  
 Perverted states of vital power. . . i. 665  
 Pestilence, of its arrest, when introduced or prevailing under. . . 271  
 — maladies comprised under this term. . . 105  
 — measures against, when introduced into a town or camp. . . 271  
 — when it appears in transports, ships of war, &c. . . 273  
 — when introduced among troops, armies, or in garrison. . . 272  
 — prevention of foreign. . . 267-71  
 — by quarantine. . . 267-70  
 — promoted by want of ventilation. . . 266  
 — its chief source commented on. . . 106  
 — choleric, *Bibliog. and Refer. to*. . . 151, 2  
 — conclusions as to its causation and propagation. . . 134  
 — causes and nature of. . . 118-124  
 — diagnostic characters of. . . 116  
 — convalescence from, treatment of. . . 149  
 — *definitions* of. . . 107  
 — description of. . . 111  
 — modus operandi of its exciting cause. . . 134  
 — synopsis of the forms and stages of. . . 139  
 — grades and stages of with reference to treatment. . . 137  
 — shown to be propagated by infection. . . 118-134  
 — proofs of its infectious nature. . . 118-134  
 — morbid appearances after death from. . . 114, 115  
 — consecutive phenomena of. . . 113  
 — progress and mortality of. . . 109  
 — relations of, &c. . . 134  
 — introductory remarks respecting. . . 107  
 — various remedies advised for. . . 149-148  
 — fully developed symptoms of. . . 112  
 — invading and preliminary symptoms of. . . 111  
 — prognostic symptoms of. . . 114  
 — *synonymes*. . . 107  
 — treatment of. . . 137  
 — adopted by the author. . . 142  
 — notices of modes of, adopted in different countries. . . 139-142  
 — of the severer grades of. . . 145  
 — of the third or most intense grade of. . . 146  
 — of its invasion. . . 137  
 — of the mildest forms and earlier periods. . . 143  
 — of the advanced stages. . . 147  
 — of the stage of collapse. . . 148  
 — turpentine, &c., advised for. . . 147  
 — glandular. See Pestilence, Septic. . . 217  
 Pestilence, hæmagastic, of antiseptics for. . . 209  
 — appearances after death from. . . 160  
 — *Bibliog. and Refer.*. . . 215, 17  
 — of blood-letting in. . . 207  
 — exciting causes of. . . 169  
 — predisposing causes of. . . 168, 9  
 — remarks on various means of cure. . . 207-211  
 — *definition* of. . . 152  
 — description of. . . 154  
 — diagnosis of. . . 162



- Pestilence, hæmagastic, diagnosis of, from its course, duration, and termination..... 162-5
- between, and remittent or periodical fevers... 146
- description of its mildest form..... 154
- treatment of..... 205
- description of its severer forms..... 154
- treatment of..... 204
- pathological inferences as to..... 200-3
- external means advised for..... 210
- of mercurials in..... 207
- modifications of its characters..... 155-7
- rate of mortality in..... 167
- nature of..... 199
- infectious nature of, demonstrated..... 174-192
- origin of..... 195, 199
- questions as to the origin of, investigated..... 195-9
- prognoses of..... 165
- of quarantine against..... 269
- sequelæ of..... 158
- source of..... 193
- of its several stages..... 158
- division of its course into stages..... 158
- treatment of its advanced stages..... 206
- of convalescence from..... 211
- of its early stages..... 204
- *synonymes*..... 152
- of tonics and antiseptics in..... 208
- treatment of..... 208
- by various means..... 207-211
- advised by Dr. Stevens..... 210
- of turpentine in..... 206-8
- Pestilence, septic, arguments used by the anti-infectionists..... 244-7
- appearances after death from..... 225
- modified attacks of..... 223
- *Bibliog. and Refer.*..... 260, 1
- carbuncles and buboes of..... 222, 3
- causes of..... 228
- conclusions as to its causes and propagation..... 252
- local causes predisposing to..... 249
- caused and propagated by contagion..... 223-249
- definitions of..... 218
- diagnosis of..... 226
- diet and regimen in..... 259
- duration of..... 225
- of invisible organized existences in causing..... 251
- most intense, or first form of..... 221
- less intense, or second form or grade of..... 221
- less severe forms of..... 223
- of its generation de novo..... 241
- grades or states of..... 221
- the hypothesis of insect life, as a cause of..... 251
- circumstances predisposing to, and counteracting, the infection of..... 248-51
- local and other means for..... 259
- modifications of..... 223
- rate of mortality from..... 254
- nature of..... 254
- its infectious nature discussed..... 228-49
- proofs of its infectious nature..... 228-50
- proofs furnished by contemporary writers of its infectious nature..... 235-50
- objections of non-infectionists answered..... 244-48
- Pestilence, septic, historical notices of..... 218-221
- oleum terebinthine advised for..... 257
- of the origin of..... 241-44
- period of crisis of..... 225
- of decrement of..... 224
- of eruption of..... 224
- of incubation of..... 225
- of invasion of..... 225
- prognosis of..... 226, 8
- protection furnished by an attack of..... 241
- influence of race in predisposing to..... 251
- remedies advised for..... 256, 9
- modes of sepulture predisposing to..... 250
- symptoms of..... 221
- *synonymes* of..... 217
- treatment of..... 225
- convalescence from..... 259
- Pestilence, typhoid, symptoms consecutive upon..... 113-14
- Pestilences, remedial means and medicines against..... 276
- Pestilences, &c., arrangement of protective means from..... 261
- the prevention of..... 262
- prevention of, as regards burying-places..... 265
- prevention of domestic causes of..... 263
- prevention of the generation of..... 263
- protection from, by means which will resist their infection..... 263
- *Bibliography and References*..... 270
- of the community from..... 261
- of individuals, families, &c., from..... 274
- by seclusion, during..... 275
- regimen and diet, physical and moral, against..... 275
- restrictions on persons from seats of..... 275
- Pestilential cholera. See, also, Pestilence, choleric.
- Petechiæ of plague, described..... 107
- Phallorrhœa virulenta, described..... 223
- Pharyngitis, causes of..... 1454
- definition of..... 1153
- description of..... 1154
- terminations of..... 1154
- asthenic, complicating scarlet fever..... 734
- chronic, description of..... 1155
- Pharynx, inflammation of. See, also, Pharyngitis.
- inflammation and organic lesions, treatment of..... 1165
- and parts adjoining affected in scarlet fever..... 734
- tumours and foreign bodies in the..... 1165
- syphilitic ulceration of..... 1469
- Phenomena, morbid, procession of..... i. 681
- Phlebitis, alterations produced by..... 1437
- causes of..... 1437
- definition of..... 1437
- diagnosis of..... 1442
- appearances of, on dissection..... 1441
- duration of..... 1442
- of the extension of..... 1440
- different pathological conditions of..... 1440
- pathological inferences respecting..... 1442
- prognosis of..... 1441
- remedies advised for the local stage of..... 1445
- regimen advised for..... 1446
- seats of..... 1441
- treatment of..... 1442
- advised by the author..... 1444
- preventive, of..... 1444
- advised for the first or local stages of..... 1445
- of second stage of..... 1446
- Phlebitis, view of treatment advised for..... 1443
- of the brachial veins..... 1441
- of the crural veins..... 1441
- poisoned, or asthenic, described..... 1440
- asthenic, symptoms of..... 1439
- of the stage of infection of..... 1439
- of its local stage..... 1439
- suppurative, described..... 1440
- puerperal, treatment of..... 587, 5
- uterine, notice of..... 1440
- consecutive affections of..... 570
- in the puerperal state..... 568
- symptoms of..... 569
- terminations of..... 570
- Phlegmasia alba dolens, *synonymes* of..... 270
- dolens, appearances after death..... 283
- *Bibliog. and Refer.*..... 291
- causes of..... 284
- indications of cure in..... 288
- definition of..... 288
- description of..... 281
- history of..... 280
- means advised for..... 280
- nature of..... 286
- pathological inferences respecting..... 287
- puerperal states of..... 281
- unconnected with the puerperal states..... 285
- remedial measures advised for..... 288, 0
- symptoms characterizing..... 281
- terminations of..... 283
- treatment of..... 287, 9
- Phosphates in urine, diagnosis of..... 1330, 31
- pathological relations of..... 1330-34
- Phosphorus, poisoning by..... 383
- appearances after..... 384
- treatment of..... 384
- Phrenitis, or Periphrēntis, described..... i. 280
- Phrenology, examination of, in relation to insanity..... ii. 578-5-4
- Phtisis, complicated with abdominal disease, treatment of..... 1266
- beverages advised for..... 1285
- *Bibliog. and Refer.*..... 1285, 7
- of the states of the blood in..... 1209
- complicated with bronchitis the succession of morbid phenomena in the causation of..... 1240
- caused by previous disease of respiratory organs..... 1235
- causes of, described..... 1223-39
- causes of..... 1238, 9
- classification of its causes..... 1224
- causes of, acting during and after puberty..... 1229
- general results from the concurrent operation of several of its causes..... 1240
- causes of, appertaining to the parent..... 1225
- numerous predisposing causes of, described..... 1223-39
- causes of, acting chiefly before puberty..... 1228, 9
- description of cavities and vomica in the lungs in..... 1218
- in children, states of lungs in..... 1220
- circumstances and influences aiding to occasion..... 1230-39
- complications of, described..... 1211-15
- treatment of..... 1263
- cough, as a symptom of..... 1199
- treatment of..... 1264
- description of..... 1191-96
- external means of cure for..... 1254-5
- diet advised for..... 1284, 5
- diagnostic signs and symptoms of..... 1197-1208
- states of digestion in..... 1202
- duration of..... 1222
- climate of Egypt advised for..... 1277-81, 4

- Phthisis, emaciation a sign of. . . . . 1202  
 — expectoration in. . . . . 1200, 1  
 — fingers and nails, appearances of, in. . . . . 1202  
 — complicated with fistula in ano. . . . . 1214  
 — forms and modifications of 1203-9  
 — the common form of. . . . . 1191-1196  
 — its treatment. . . . . 1252  
 — fumigations advised for. . . . . 1276  
 — complicated with hæmoptysis. . . . . 1211  
 — treatment of. . . . . 1263, 4  
 — of hæmoptysis as a symptom of. . . . . 1197  
 — in infants and children. . . . . 1207  
 — treatment of. . . . . 1263  
 — of infection from. . . . . 1228  
 — intercurrent or secondary inflammation of lungs in. . . . . 1215  
 — of inhalation in its treatment. . . . . 1275  
 — complicated with disease of the intestines. . . . . 1213  
 — of larynx and trachea. . . . . 1212  
 — with laryngeal and tracheal affections, treatment of. . . . . 1265  
 — with lesions of the liver. . . . . 1214  
 — with lesions of the lungs. . . . . 1215  
 — tubercular and other lesions found after death from. . . . . 1215-1222  
 — remarks on the means advised for. . . . . 1267  
 — mineral waters in the treatment of. . . . . 1274, 5  
 — origin, &c., of, considered. . . . . 1190  
 — in the scrofulous diathesis. . . . . 1190  
 — pain as a symptom of. . . . . 1201  
 — parents, diseases of, causing. . . . . 1225-8  
 — habits of, causing. . . . . 1227, 8  
 — pathological anatomy of. . . . . 1215-21  
 — perspirations and sweats in. . . . . 1203  
 — complicated with pleuritis. . . . . 1213  
 — with pneumonia. . . . . 1212  
 — treatment of. . . . . 1264  
 — the means of prevention advised for. . . . . 1250, 1  
 — conditional means of prevention. . . . . 1251  
 — efficient means of prevention. . . . . 1251  
 — states of the pulse in. . . . . 1202  
 — in the dark races. . . . . 1205, 63  
 — in different races and countries. . . . . 1293  
 — quick respiration a symptom of. . . . . 1200  
 — of seasons and climates as respects. . . . . 1232, 6  
 — of the spirometer in the diagnosis of. . . . . 1197  
 Phthisis, its first stage, of bleeding in, and when required. . . . . 1354  
 — of chalybeates in. . . . . 1235  
 — change of air, voyaging in. . . . . 1253  
 — described. . . . . 1191  
 — of terebinthinate embrocations in. . . . . 1257  
 — of external medication in. . . . . 1256, 7  
 — food and regimen in. . . . . 1253  
 — of inhalation of medicated vapours in. . . . . 1257  
 — internal medical means advised in. . . . . 1254, 6  
 — of issues, setons, &c. . . . . 1257  
 — physical signs of. . . . . 1192, 4  
 — treatment of. . . . . 1252-7  
 — medical. . . . . 1254-6  
 — its second stage, described 1194, 6  
 — diet and regimen in. . . . . 1260  
 — means advised for the. . . . . 1253-9  
 — physical signs of. . . . . 1192  
 — treatment of. . . . . 1257  
 — its third stage described. . . . . 1196  
 — several medicines advised for. . . . . 1261  
 — means advised for. . . . . 1260, 1
- Phthisis, its third stage, treatment of. . . . . 1260, 1  
 — intercurrent affections in. . . . . 1260, 1  
 — of diarrhoea in. . . . . 1260  
 — complicated with disease of the stomach. . . . . 1213  
 — synon. and definit. of. . . . . 1188  
 — temperaments and constitutions in which it originates. . . . . 1190-91  
 — of the transmission of. . . . . 1225  
 — treatment of. . . . . 1240-63  
 — historical sketch of, advised by authors. . . . . 1240-50  
 — advised when it is threatened. . . . . 1252  
 — healing processes of tubercles in. . . . . 1219  
 — of a winter residence for. . . . . 1254  
 — acute or rapid form, its treatment. . . . . 1262  
 — consecutively acute, described. . . . . 1266  
 — treatment of. . . . . 1262  
 — primary acute or rapid, described. . . . . 1204, 5  
 — lesions of structure after. . . . . 1206  
 — bronchial glandular, described. . . . . 1221, 22  
 — in children. . . . . 1222  
 — bronchial and tracheal complications, of treatment of. . . . . 1264  
 — dyspeptic, noticed. . . . . 1211  
 — latent form, described. . . . . 1203, 4  
 — its treatment. . . . . 1261, 2  
 — protracted, description of. . . . . 1206, 7  
 — treatment of. . . . . 1263  
 — pulmonalis, described, &c. See, also, Phthisis. . . . . 1188-1277  
 Phymosis, treatment of. . . . . 1485  
 Physical conditions constituting a climate. . . . . I. 398  
 — relations of climate. . . . . I. 398  
 — causes of insanity. . . . . II. 555  
 — disorders causing insanity. . . . . II. 555-7  
 — Physicians, in what they retard therapeutical knowledge. . . . . 1130  
 Physiological pathology of insanity. . . . . II. 578-8  
 Pia mater, morbid structure of. . . . . I. 253  
 — tubercles in the. . . . . I. 259  
 — of spinal cord, inflammation of. . . . . 957  
 Plan, described. See, also, Yaws. . . . . 1475  
 Piles, described. See, also, Hæmorrhoids. . . . . II. 144  
 Pilule Alkaline. . . . . F. 876. Ap. 32  
 — Aloes cum Ferro. F. 450. Ap. 19  
 — Aloes cum Ferro Compositæ. . . . . F. 451. Ap. 19  
 — Aloes cum Ferro Compositæ. . . . . F. 877. Ap. 32  
 — Aloes et Ferri. . . . . F. 452. Ap. 19  
 — Aloes et Moschi Compositæ. . . . . F. 453. Ap. 19  
 — Aloes et Scammonie Compositæ. . . . . F. 454. Ap. 19  
 — Alterative. . . . . F. 455, 6. Ap. 19  
 — Ammoniac Compositæ. . . . . F. 457. Ap. 19  
 — Ammoniac et Anthemidis. . . . . F. 458. Ap. 19  
 — Ammonio-Sulphatis Cupri Comp. . . . . F. 459. Ap. 19  
 — Anodyne. . . . . F. 460. Ap. 19  
 — Anodyne. . . . . F. 878. Ap. 33  
 — Anodyne-Alterative. . . . . F. 879. Ap. 33  
 — Anodyne-Aperientes. . . . . F. 462. Ap. 18  
 — Antimonii Alterative. . . . . F. 464. Ap. 18  
 — Antimonii et Gualiaci Comp. . . . . F. 465. Ap. 20  
 — Antimonii Oxysulphureti Comp. . . . . F. 466, 7. Ap. 20  
 — Antispasmodicæ. . . . . F. 468. Ap. 20  
 — Antispasmodicæ Pierquinii. . . . . F. 469. Ap. 20  
 — Aperientes. . . . . F. 880. Ap. 33
- Pilulæ Aperientes Compositæ. . . . . F. 470. Ap. 20  
 — Aperientes Alterative. . . . . F. 471. Ap. 20  
 — Aperientes eum Hyoscyamo. . . . . F. 881. Ap. 33  
 — Argenti Nitratis et Belladonnæ. . . . . F. 472. Ap. 20  
 — Argenti Nitratis Compositæ. . . . . F. 473. Ap. 20  
 — Argenti Nitratis et Gentianæ. . . . . F. 474. Ap. 20  
 — Argenti Nitratis Oplatiæ. . . . . F. 475. Ap. 20  
 — Arsenicales. . . . . F. 476, 7. Ap. 20  
 — Arsenitis Ferri. . . . . F. 478. Ap. 20  
 — Asafœtidæ cum Cinchonæ. . . . . F. 479. Ap. 20  
 — Asafœtidæ Compositæ. . . . . F. 480. Ap. 20  
 — Asafœtidæ eum Fello. . . . . F. 481. Ap. 20  
 — Asafœtidæ et Valerianæ Comp. . . . . F. 482. Ap. 20  
 — Astringentes. . . . . F. 483. Ap. 20  
 — Balsamicæ. . . . . F. 882. Ap. 33  
 — Balsamæ Comp. . . . . F. 484. Ap. 20  
 — Balsamicæ. . . . . F. 485, 6. Ap. 20  
 — Balsamicæ Camphoratæ. . . . . F. 487. Ap. 20  
 — Belladonnæ. . . . . F. 488. Ap. 20  
 — Belladonnæ Extracti et Cinchonæ. . . . . F. 883. Ap. 33  
 — Benzoini et Terebinthinæ Comp. . . . . F. 489. Ap. 20  
 — Bianthi. . . . . F. 490. Ap. 20  
 — Bruceæ. . . . . F. 491. Ap. 50  
 — Calcii Chloridi et Conii. . . . . F. 904. Ap. 33  
 — Cambogiæ, Aloes, et Ammoniaci. . . . . F. 885. Ap. 33  
 — Cambogiæ Compositæ. . . . . F. 492. Ap. 20  
 — Camphoræ et Ammoniaci. . . . . F. 885. Ap. 33  
 — Camphoræ et Antimonii Thebaicæ. . . . . F. 493. Ap. 20  
 — Camphoræ Compositæ. . . . . F. 494. Ap. 20  
 — Camphoræ et Ipecacuanhæ. . . . . F. 495. Ap. 20  
 — Camphoræ et Nitri. . . . . F. 496. Ap. 20  
 — Camphoræ et Opil. F. 886. Ap. 33  
 — Camphoræ et Quinina. . . . . F. 887. Ap. 33  
 — Castorei Thebaicæ. . . . . F. 497. Ap. 20  
 — Catharticæ. . . . . F. 498, 9. Ap. 21  
 — Chalybeate. . . . . F. 883. Ap. 33  
 — Colocynthis Compositæ. . . . . F. 500. Ap. 21  
 — Colocynthis extr. et Hyoscyami. . . . . F. 890. Ap. 33  
 — Colocynthis cum Hydragyro. . . . . F. 501. Ap. 21  
 — Colocynthis eum Sulphure. . . . . F. 889. Ap. 33  
 — Cupri Sulphatis eum Opio. . . . . F. 502. Ap. 21  
 — Deobstruentes. . . . . F. 503-10. Ap. 21  
 — Diaphoreticæ. . . . . F. 891-2. Ap. 33  
 — Biniodidi Hydragryi. . . . . F. 511. Ap. 21  
 — Diaphoreticæ. . . . . F. 512. Ap. 21  
 — Diaphoreticæ Sedative. . . . . F. 513. Ap. 21  
 — Digitalis et Camphoræ Comp. . . . . F. 514. Ap. 21  
 — Digitalis et Myrrhæ Compositæ. . . . . F. 515. Ap. 21  
 — Diureticæ. . . . . F. 516. Ap. 21  
 — Diureticæ Alterative. . . . . F. 517. Ap. 21  
 — Diureticæ Antispasmodicæ. . . . . F. 503. Ap. 33  
 — Diureticæ eum Hydragyro. . . . . F. 894. Ap. 33  
 — Dulcamaræ et Antimonii. . . . . F. 518. Ap. 21  
 — Emmenagoræ. . . . . F. 519. Ap. 21  
 — Expectorantes. . . . . F. 895. Ap. 33  
 — Extr. Gentianæ et Humuli Comp. . . . . F. 520. Ap. 21



- Pilula Ferri Ammonio-Chloridi* F. 521, 2. *Ap.* 21  
 — *Ferri Aperientes* F. 523, 4. *Ap.* 21  
 — *Gentianae et Aloes* F. 526. *Ap.* 33  
 — *Guaiaci et Acetuli* F. 527. *Ap.* 33  
 — *Guaiaci Compositae* F. 525, 6, 7. *Ap.* 21  
 — *Guaiaci et Antimonii* F. 528. *Ap.* 22  
 — *Compositae* F. 528. *Ap.* 22  
 — *Hellebori et Aloes Compositae* F. 529. *Ap.* 22  
 — *Humuli Comp.* F. 530. *Ap.* 33  
 — *Hydrargyri Anodyna* F. 530. *Ap.* 22  
 — *Hydrargyri Bichloridi* F. 531. *Ap.* 22  
 — *Hydrargyri Compositae* F. 531. *Ap.* 22  
 — *Hydrargyri Phosphatis Comp.* F. 532. *Ap.* 22  
 — *Hydrargyri et Sella* F. 533. *Ap.* 22  
 — *Hydrargyri Chloridi Compositae, seu Pilula Plummeri* F. 534. *Ap.* 22  
 — *Ipecacuanha Compositae* F. 535. *Ap.* 33  
 — *Ferri Iodidi* F. 535. *Ap.* 22  
 — *Kino Compositae* F. 536. *Ap.* 22  
 — *Morphiae cum Digitali* F. 537. *Ap.* 22  
 — *Morphiae et Ferri Sulphatis* F. 538. *Ap.* 33  
 — *Myrrhae et Balsami Compositae* F. 538. *Ap.* 19  
 — *Morphiae Hydrochloratis* F. 539. *Ap.* 33  
 — *Moschi Compositae* F. 540. *Ap.* 33  
 — *Nervinae (Stoll.)* F. 539. *Ap.* 22  
 — *Nervinae* F. 540, 6. *Ap.* 33  
 — *Nervinae Antimoniatæ* F. 540. *Ap.* 22  
 — *Nucis Vomicae* F. 541. *Ap.* 22  
 — *Nucis Vomicae et Aloes* F. 541. *Ap.* 33  
 — *Nucis Vomicae Compositae* F. 542. *Ap.* 22  
 — *cum Oleo Crotonis* F. 543. *Ap.* 22  
 — *Plumbi Acetatis et Digitalis* F. 544. *Ap.* 22  
 — *Plumbi Acetatis et Colicli* F. 545. *Ap.* 22  
 — *Plumbi Acetatis* F. 546. *Ap.* 22  
 — *Purgantes* F. 547. *Ap.* 22  
 — *Rhei Resolventes* F. 548. *Ap.* 22  
 — *Rhei Balsamicae* F. 549. *Ap.* 22  
 — *Sarzae Compositae* F. 549. *Ap.* 33  
 — *Scammoniae* F. 550. *Ap.* 22  
 — *Sella Compositae* F. 551. *Ap.* 22  
 — *Sella et Galbani Compositae* F. 551. *Ap.* 33  
 — *Sella cum Ipecacuanha* F. 552. *Ap.* 22  
 — *Sedativa* F. 553, 4, 5. *Ap.* 22  
 — *Sesqui-sulphureti Antimonii* F. 554. *Ap.* 33  
 — *Soda cum Rheo et Hyoscyamo* F. 555. *Ap.* 33  
 — *Soda Sesqui-carbonatis cum Hyoscyamo* F. 556. *Ap.* 22  
 — *Stahlil* F. 557. *Ap.* 22  
 — *Stomachicae* F. 558, 9, 60, 1, 2. *Ap.* 22  
 — *Stomachicae* F. 558, 9. *Ap.* 33  
 — *Stomachicae Aperientes* F. 559. *Ap.* 22  
 — *Stramonii* F. 560. *Ap.* 22  
 — *Strychniae* F. 561. *Ap.* 22  
 — *Strychniae Compositae* F. 562. *Ap.* 22  
 — *Sudorificae* F. 563, 8. *Ap.* 22  
 — *Sulphatis Strychniae* F. 564. *Ap.* 22  
 — *Terebinthinatæ* F. 565. *Ap.* 22  
 — *Terebinthinatæ et Camphorae cum Opio* F. 566. *Ap.* 22  
 — *Thebalaee Compositae* F. 567. *Ap.* 33  
 — *Tonicae* F. 568. *Ap.* 33  
 — *Tonicae Aperientes* F. 569. *Ap.* 33  
 — *Tonicae cum Cupro* F. 570. *Ap.* 22  
 — *Tonicae cum Sulphate Zinci* F. 571. *Ap.* 22
- Pilula Tonico-Emmenagogue* F. 572. *Ap.* 22  
 — *Uvae Ursi et Rhei* F. 573. *Ap.* 22  
 — *Uvae Ursi et Soda* F. 574. *Ap.* 22  
 — *Valerianae Compositae* F. 575. *Ap.* 22  
 — *Valerianae et Zinci* F. 576. *Ap.* 23  
 — *Zinci et Myrrhae* F. 577. *Ap.* 23  
 — *Zinci cum Myrrha et Ipecacuanha* F. 578. *Ap.* 23  
 — *Zinci Sulphatis Compositae* F. 579. *Ap.* 23  
 — *Milurum Anodynarum Mas-* F. 580. *Ap.* 23  
 — *sa.* F. 581. *Ap.* 23  
 — *Pitting from small-pox, prevention of* F. 582. *Ap.* 17  
 — *Pityriasis, Bibliog. and Refer.* F. 583. *Ap.* 296  
 — *general, described* F. 584. *Ap.* 296  
 — *causes of* F. 585. *Ap.* 296  
 — *complications of* F. 586. *Ap.* 296  
 — *course and progress of* F. 587. *Ap.* 296  
 — *definition and synonyms* F. 588. *Ap.* 296  
 — *diagnosis of* F. 589. *Ap.* 296  
 — *mineral waters advised for* F. 590. *Ap.* 296  
 — *prognosis of* F. 591. *Ap.* 296  
 — *varieties of, described* F. 592. *Ap.* 296  
 — *treatment of its local varieties* F. 593. *Ap.* 296  
 — *capitis, described* F. 594. *Ap.* 296  
 — *palmaris, described* F. 595. *Ap.* 296  
 — *treatment of general* F. 596. *Ap.* 296  
 — *Plague. See, also, Pestilence, Septic.* F. 597. *Ap.* 219  
 — *Bibliog. and Refer.* F. 598. *Ap.* 260, 1  
 — *conclusions respecting the causes and propagation of* F. 599. *Ap.* 252  
 — *caused and propagated by contagion* F. 600. *Ap.* 250-248  
 — *nature of* F. 601. *Ap.* 254  
 — *treatment of* F. 602. *Ap.* 255  
 — *Platyelmia, first order of Worms, described* F. 603. *Ap.* 1521  
 — *Plethora, causes of* F. 604. *Ap.* 1. 215  
 — *treatment of* F. 605. *Ap.* 1. 216  
 — *general* F. 606. *Ap.* 1. 214  
 — *local* F. 607. *Ap.* 1. 216  
 — *Pleura, Bibliog. and Refer.* F. 608. *Ap.* 340  
 — *diseases of the* F. 609. *Ap.* 297  
 — *effusions into* F. 610. *Ap.* 387  
 — *consequent upon inflammation* F. 611. *Ap.* 319-22  
 — *cancerous formations in* F. 612. *Ap.* 388  
 — *cartilaginous and osseous formations in the* F. 613. *Ap.* 387  
 — *tubercular formations in the* F. 614. *Ap.* 388  
 — *gangrene of, noticed* F. 615. *Ap.* 387  
 — *gaseous fluids in* F. 616. *Ap.* 337  
 — *hemorrhages into* F. 617. *Ap.* 337; ii. 142  
 — *inflammation of. See, also, Pleuritis.* F. 618. *Ap.* 297  
 — *the diverse organic changes during inflammation of the* F. 619. *Ap.* 318-322  
 — *symptoms and signs of structural changes of the* F. 620. *Ap.* 338  
 — *structural changes of, not resulting from inflammation* F. 621. *Ap.* 336, 8  
 — *treatment of organic lesions of the* F. 622. *Ap.* 339  
 — *ulceration and perforation of* F. 623. *Ap.* 337  
 — *Pleurisy. See, also, Pleuritis.* F. 624. *Ap.* 297  
 — *associated with pneumonia in children, diagnosis* F. 625. *Ap.* 326  
 — *complications of* F. 626. *Ap.* 314-316  
 — *diagnosis from condensation of lung* F. 627. *Ap.* 324  
 — *from pleurodynia* F. 628. *Ap.* 323  
 — *from tuberculous disease of lung* F. 629. *Ap.* 324  
 — *in dark races* F. 630. *Ap.* 316  
 — *chronic, described* F. 631. *Ap.* 308  
 — *recovery with contraction of side* F. 632. *Ap.* 311, 13  
 — *treatment of* F. 633. *Ap.* 331  
 — *circumscribed* F. 634. *Ap.* 307  
 — *double, described* F. 635. *Ap.* 308  
 — *treatment of* F. 636. *Ap.* 331  
 — *dry, description of* F. 637. *Ap.* 304  
 — *physical conditions of* F. 638. *Ap.* 305  
 — *partial, described* F. 639. *Ap.* 307  
 — *symptoms of sthenic acute Pleuritis, appearance of the blood in* F. 640. *Ap.* 317  
 — *analysis of the blood in* F. 641. *Ap.* 317
- Pleuritis of both sides* F. 642. *Ap.* 309  
 — *complicated with bronchitis* F. 643. *Ap.* 315  
 — *causes of, exciting* F. 644. *Ap.* 298  
 — *pathological* F. 645. *Ap.* 299  
 — *changes of structure constituting* F. 646. *Ap.* 299  
 — *successive structural, during* F. 647. *Ap.* 318-323  
 — *in children, lesions consequent on* F. 648. *Ap.* 323  
 — *complications of* F. 649. *Ap.* 314-16  
 — *treatment of* F. 650. *Ap.* 323  
 — *cure, means of, advised for* F. 651. *Ap.* 327, 9  
 — *description of* F. 652. *Ap.* 299  
 — *diagnosis of* F. 653. *Ap.* 323  
 — *between effusion from, and Hydrothorax* F. 654. *Ap.* 325  
 — *complicated with exanthematous and other fevers* F. 655. *Ap.* 315  
 — *with scarlet fever* F. 656. *Ap.* 736  
 — *with hepatitis* F. 657. *Ap.* 315  
 — *the friction sounds of* F. 658. *Ap.* 305  
 — *in infants and children* F. 659. *Ap.* 310  
 — *complications of* F. 660. *Ap.* 317  
 — *treatment of* F. 661. *Ap.* 336  
 — *pathological anatomy of* F. 662. *Ap.* 318-323  
 — *complicated with peritonitis* F. 663. *Ap.* 315  
 — *with phthisis* F. 664. *Ap.* 1213  
 — *with tubercular consumption* F. 665. *Ap.* 315  
 — *with pneumonia* F. 666. *Ap.* 314  
 — *pleuro-pneumonia* F. 667. *Ap.* 314  
 — *with chronic tubercular pneumonia* F. 668. *Ap.* 815  
 — *physical signs of* F. 669. *Ap.* 301-3  
 — *prognosis of* F. 670. *Ap.* 325  
 — *treatment of, in the dark races* F. 671. *Ap.* 335  
 — *regimen and diet in* F. 672. *Ap.* 336  
 — *in connection with rheumatism* F. 673. *Ap.* 674  
 — *signs and symptoms of* F. 674. *Ap.* 300  
 — *states and varieties of* F. 675. *Ap.* 293  
 — *synon and definit. of* F. 676. *Ap.* 297  
 — *treatment advised for, by author* F. 677. *Ap.* 329, 330  
 — *history of its* F. 678. *Ap.* 327, 9  
 — *Pleuritis, acute sthenic, consecutive changes in* F. 679. *Ap.* 304  
 — *conclusions as to* F. 680. *Ap.* 300  
 — *symptoms of* F. 681. *Ap.* 304  
 — *terminations of* F. 682. *Ap.* 304  
 — *treatment of* F. 683. *Ap.* 327, 9  
 — *asthenic, described* F. 684. *Ap.* 306  
 — *treatment of* F. 685. *Ap.* 330  
 — *cachectic, described* F. 686. *Ap.* 306  
 — *chronic, described* F. 687. *Ap.* 308  
 — *effusions in* F. 688. *Ap.* 300  
 — *signs of absorption of effusion* F. 689. *Ap.* 314  
 — *physical signs of* F. 690. *Ap.* 310  
 — *symptoms of* F. 691. *Ap.* 300  
 — *terminations of* F. 692. *Ap.* 314  
 — *treatment of* F. 693. *Ap.* 331  
 — *circumscribed, treatment of* F. 694. *Ap.* 331  
 — *diaphragmatic, described* F. 695. *Ap.* 307  
 — *latent, described* F. 696. *Ap.* 306  
 — *treatment of* F. 697. *Ap.* 330  
 — *mediastinal, noticed* F. 698. *Ap.* 307  
 — *partial, described* F. 699. *Ap.* 307  
 — *with effusion* F. 700. *Ap.* 307
- Pleurodynia. See, also, Neuralgia of intercostal nerves.* F. 701. *Ap.* 1010  
 — *causes of* F. 702. *Ap.* 541  
 — *causes predisposing to* F. 703. *Ap.* 300  
 — *definition and synonym. of* F. 704. *Ap.* 340  
 — *description of* F. 705. *Ap.* 341  
 — *diagnosis of* F. 706. *Ap.* 341  
 — *treatment of* F. 707. *Ap.* 342
- Pleuro-pneumonia, properly so called* F. 708. *Ap.* 326  
 — *described* F. 709. *Ap.* ii. 888  
 — *states of, described* F. 710. *Ap.* 326  
 — *symptoms of* F. 711. *Ap.* ii. 888  
 — *treatment of* F. 712. *Ap.* ii. 898  
 — *Pneurothotonos, defined* F. 713. *Ap.* 1101  
 — *Plica Polonica, described* F. 714. *Ap.* ii. 164  
 — *causes of* F. 715. *Ap.* ii. 165  
 — *treatment of* F. 716. *Ap.* ii. 166  
 — *Bibliog. and Refer.* F. 717. *Ap.* ii. 167
- Pneumothorax, Bibliog. and Refer.* F. 718. *Ap.* 346  
 — *causes of* F. 719. *Ap.* 343  
 — *consecutive effects of* F. 720. *Ap.* 343

- Pneumothorax, *definition of* . . . 342  
 — *pathology of* . . . 342  
 — *prognosis of* . . . 345  
 — *symptoms and signs of* . . . 343  
 — *physical signs of* . . . 344  
 — *treatment of* . . . 345
- Pneumonia, of abscess from ii. 882-895  
 — in the aged, *treatment of* . . . ii. 896  
 — of bleeding in . . . ii. 893  
 — complicated with bronchitis. See, also, Broncho-pneumonia. . . . .  
 — *causes of* . . . ii. 887  
 — in children, *treatment of* . . . ii. 899  
 — complications of . . . ii. 886  
 — complicating phthisis . . . 1212  
 — pleuritis . . . ii. 888  
 — *definition of* . . . ii. 878  
 — *physical diagnosis of* . . . ii. 884, 6  
 — of diaphoretics, and other means of cure for . . . ii. 895  
 — diet and regimen in . . . ii. 899  
 — duration of . . . ii. 892  
 — forms of, noticed . . . ii. 879  
 — of mercury and opium in . . . ii. 894  
 — prognosis of . . . ii. 892  
 — several stages of . . . ii. 881  
 — in the dark races, *treatment of* . . . ii. 899  
 — *treatment of the third stage of* . . . ii. 895  
 — structural changes in the several stages of . . . ii. 881, 2  
 — of tartarized antimony in . . . ii. 894  
 — terminations of . . . ii. 892  
 — circumstances influencing the *treatment of* . . . ii. 895  
 — *treatment of complicated* . . . ii. 897  
 — varieties of . . . ii. 886
- Pneumonia, primary acute, described . . . ii. 879  
 — *diagnosis of simple acute* . . . ii. 883, 4  
 — acute atrophic, described . . . ii. 879  
 — *treatment of* . . . ii. 893  
 — asthenic or congestive . . . ii. 886  
 — means of cure for . . . ii. 896, 7  
 — *physical signs of* . . . ii. 886  
 — complicating scarlet fever . . . 736  
 — terminations of . . . ii. 887  
 — *treatment of* . . . ii. 896  
 — chronic, description of . . . ii. 900  
 — *treatment of* . . . ii. 900  
 — complicated, the *treatment of* . . . ii. 897  
 — of endemic . . . ii. 891  
 — of epidemic . . . ii. 891  
 — nervous or typhoid . . . ii. 886  
 — sthenic or pure . . . ii. 879
- Pneumonitis. See Pneumonia. . . . .  
 — *chronic, described* . . . ii. 900  
 — *treatment of* . . . ii. 900
- Poison, counteraction of the operation of . . . 367  
 — imbibed from recently dead bodies . . . 437-444  
 — of resisting the progressive effect of, and the tendency to death from . . . 368  
 — necroscopic, *definition of*. See, also, Necroscopic poison. 437-444  
 — *nature and source of* . . . 437-443
- Poisoned, appearances after death, of having been . . . 362-5  
 — circumstances and symptoms indicating having been . . . 358, 60  
 — *diagnosis by chemical experiments, of having been* . . . 364, 5
- Poisoning has been referred to acute diseases of the digestive organs . . . 366  
 — circumstances under which it may occur or be produced during disease . . . 365, 6  
 — *diagnosis of, during disease* . . . 365, 6  
 — general . . . 361  
 — by post-mortem research . . . 362  
 — of the duration of . . . 361  
 — modes in which it takes place . . . 347  
 — time of death after first symptoms of . . . 361
- Poisoning, matters requiring attention on suspicions of . . . 359  
 — general principles of treatment of . . . 366  
 — by acetic acid . . . 373  
 — *treatment of* . . . 373  
 — appearances after death from . . . 373  
 — by aconite, aconitina, &c. . . 415  
 — by acid and corrosive poisons, symptoms and diagnosis of . . . 369  
 — by alcohol, symptoms of . . . 405  
 — *treatment of* . . . 407  
 — appearances after death from . . . 406  
 — by alkalies, symptoms of . . . 380  
 — *treatment of* . . . 381  
 — by alkaline sulphurets . . . 436  
 — *treatment of* . . . 436  
 — by the species of anemone . . . 388  
 — by animal food, appearances after death from . . . 429  
 — by putrid animal matter . . . 444  
 — by exhalations from putrid animal matters . . . 444  
 — *treatment of* . . . 445  
 — by animal meats, *treatment of* . . . 431  
 — by animal substances . . . 428, 9  
 — by diseased animal substances . . . 429  
 — symptoms produced by *treatment of* . . . 431  
 — by antimonial preparations *treatment of* . . . 432  
 — appearances after death from . . . 432  
 — by chloride of antimony, symptoms of . . . 382  
 — *treatment of* . . . 382  
 — appearances after death from . . . 382  
 — by external applications . . . 348  
 — by applications to the surface, denuded of its cuticle . . . 348  
 — by the external application of arsenic . . . 419  
 — by administering arsenic in enemata . . . 420  
 — by arsenic, *diagnosis of* . . . 420  
 — lesions produced by *treatment of* . . . 422  
 — of convalescence from introduced into the vagina . . . 420  
 — acute form of . . . 417  
 — chronic or slow form of . . . 418  
 — by arsenical fumes . . . 420  
 — by Arum maculatum . . . 389  
 — by baryta and its salts . . . 432  
 — *treatment of* . . . 433  
 — by belladonna, appearances after death . . . 448  
 — *diagnosis of* . . . 449  
 — by sub-nitrate of bismuth, *treatment of* . . . 385  
 — by bitter apple . . . 389  
 — by bromine . . . 388  
 — by brucia . . . 411  
 — by bryony . . . 389  
 — by Caltha palustris . . . 391  
 — by cambo . . . 408  
 — by camphor . . . 409  
 — *treatment of* . . . 450  
 — by cantharides . . . 451  
 — *treatment of* . . . 451  
 — appearances after death from . . . 451  
 — by carbonic acid gas, symptoms of . . . 461  
 — *treatment of* . . . 463  
 — by an admixture of carbonic acid and sulphurous acid gases . . . 462  
 — *treatment of* . . . 463  
 — by carburetted hydrogen gas . . . 463  
 — *treatment of* . . . 464  
 — appearances after death from . . . 464  
 — by celadine . . . 389  
 — by chlorine and chlorides . . . 451
- Poisoning by chlorine and chlorides, *treatment of* . . . 451  
 — by Cicuta virosa . . . 465  
 — by coelestin indicus . . . 414  
 — by colchicum . . . 423  
 — symptoms of . . . 424  
 — *treatment of* . . . 424  
 — by preparations of conium . . . 465, 6  
 — by copper and its compounds . . . 433  
 — symptoms and appearances . . . 385  
 — *treatment of* . . . 385  
 — by Coriaria myrtifolia . . . 414  
 — by Croton Tiglium . . . 389  
 — by Cyamelum europaeum . . . 390  
 — by Daphne Guldium and Daphne Mezereum . . . 390  
 — by Delphinium Staphisagria . . . 390  
 — by digitalis, first grade of . . . 393  
 — second grade of . . . 394  
 — third grade of . . . 394  
 — *treatment of* . . . 395  
 — by empyreumatic oils . . . 474  
 — by elaterium . . . 391  
 — by inhaling ether . . . 407  
 — by euphorbia officinarum . . . 390  
 — by the ferro-cyanates . . . 402  
 — by fish . . . 425  
 — *treatment of* . . . 427  
 — by fool's parsley . . . 475  
 — by preparations of gold . . . 385  
 — *treatment of* . . . 386  
 — by hellebore . . . 424  
 — *treatment of* . . . 425  
 — by hemlock dropwort . . . 476  
 — by hyocyamus . . . 466  
 — by the hydrocyanates . . . 402  
 — by Indian nut . . . 390  
 — by iodine, described . . . 382  
 — *treatment of* . . . 383  
 — appearances after death from . . . 383  
 — by iodine and its compounds . . . 452  
 — *treatment of* . . . 452  
 — by Ipecacuanha and emetia . . . 410  
 — *treatment of* . . . 410  
 — by laburnum . . . 476  
 — by laurel water, &c. . . 403  
 — by acetate of lead . . . 395  
 — by carbonate of lead . . . 396  
 — by iodide of lead . . . 397  
 — by the oxides of lead . . . 397  
 — by preparations of lead, mode of operation of . . . 398  
 — *treatment of* . . . 398  
 — appearances after death from . . . 397  
 — by lime . . . 383  
 — *treatment of* . . . 383  
 — by Lobelia inflata . . . 445  
 — by Lolium temulentum . . . 477  
 — by the Manchinel-tree . . . 390  
 — by mercurials . . . 453-9  
 — symptoms and appearances in . . . 386, 7  
 — antidotes useful in . . . 387  
 — *treatment of* . . . 387, 8  
 — by metallic salts . . . 384  
 — by mineral acids . . . 373-6  
 — *treatment of* . . . 377, 8  
 — by substances taken by the mouth . . . 347  
 — by mushrooms, symptoms of . . . 475  
 — *treatment of* . . . 476  
 — by narcotics . . . 461-74  
 — by nux vomica . . . 411  
 — by oil of bitter almonds, symptoms of . . . 403  
 — by opium, morphia, and their preparations . . . 467-73  
 — appearances after death from . . . 471  
 — antidotes for . . . 472  
 — by oxalic acid . . . 378, 435  
 — *treatment of* . . . 380  
 — appearances after death from . . . 379  
 — by peach-blossom . . . 404  
 — by the bichromate of potash . . . 384  
 — by nitrate of potash . . . 435



- Poisoning by sub-nitrate of potash..... 435  
 — appearances after..... 435  
 — by oxalate of potash..... 435  
 — by binoxalate of potash..... 884  
 — by sulphate of potash..... 435  
 — by cyanide of potassium..... 403  
 — by prussic acid, appearances after death from..... 400  
 — combinations of..... 402-4  
 — diagnosis and operation of..... 401-2  
 — the treatment of, first advised by the author..... 404  
 — and the cyanides, &c..... 398-404  
 — by the species of ranunculus..... 391  
 — by Rhus Toxicodendron..... 391  
 — by savine..... 390  
 — by nitrate of silver..... 388  
 — treatment of..... 388  
 — by strychnia or strychnine..... 411  
 — treatment of..... 413  
 — appearances after death from..... 413  
 — by the species of strychnos..... 411  
 — by sulphureted hydrogen, symptoms of..... 473  
 — appearances after death by tartaric acid..... 474  
 — by chlorides of tin..... 388  
 — by tobacco, described..... 445  
 — treatment of..... 447  
 — appearances after death by vegetable acids..... 388  
 — by vegetable acro-sedatives by injection of the veins..... 348  
 — by veratria..... 424  
 — treatment of..... 425  
 — by wounds..... 348  
 — by chloride and sulphate of zinc..... 388  
 — by oxide of zinc..... 405  
 Poisoning, acute or rapid..... 361  
 — chronic or slow..... 361  
 — slow, by acetic acid..... 392  
 — by alkalies..... 393  
 — duo consideration of..... 362  
 — by mineral acids..... 392  
 Poisonous food, symptoms and treatment of..... 425-9  
 — insects and reptiles, injuries from..... 451  
 — treatment of..... 452  
 — meats, kinds of..... 427  
 — serpents, their effects, &c..... 478  
 — treatment of their bites and effects..... 480, 1  
 Poisons, acid and corrosive..... 369  
 — acro-alterant, described..... 447-58  
 — circumstances modifying the action of..... 357, 8  
 — of prevention of the action of..... 367  
 — of their actions..... 349  
 — action of, on the organic nervous system..... 349-51  
 — chemical actions of..... 351  
 — of their local and primary action..... 349  
 — nature of the local and primary action of..... 350  
 — of their remote and consecutive actions..... 349  
 — producing a septic action..... 354  
 — alterative effects of many..... 353  
 — astringent the tissues..... 356  
 — augmenting the secretions and excretions..... 356  
 — *Bibliog. and Refer.*..... 483, 5  
 — classification of..... 368, 9  
 — synopsis of..... 482, 3  
 — poisoning, and poisoned, definitions of..... 346  
 — corrosive, diagnosis of..... 369-73  
 — depressing and paralyzing..... 392-405  
 — depressing effects of certain..... 352  
 — exhausting effects of certain..... 352  
 Poisons, general effects of..... 352  
 — special effects and treatment..... 369  
 — exciting or stimulating..... 352  
 — exciting and constricting..... 410-14  
 — exciting and exhausting..... 405-10  
 — injection of, into the bowels..... 348  
 — Into the sexual and urinary organs..... 348  
 — irritant, &c..... 356  
 — irritating and depressing..... 415-47  
 — described..... 431-47  
 — the media or channels by which they act..... 350  
 — narcotic-acrid..... 474  
 — sedative, operation of certain..... 392  
 — paralyzing and depressing..... 353  
 — paralyzing irritability and voluntary motions..... 354  
 — sensibility..... 353  
 — paralysis from..... 26  
 — special operation of..... 353  
 — sympathetic operation of..... 351  
 — removal of, by the stomach pump..... 367  
 — refrigerating and sedative..... 353  
 — septic or putro-facient..... 477  
 — operation and effects of..... 477, 8  
 — source and nature of..... 434, 8  
 — stimulating the nervous systems..... 354, 5  
 — symptoms caused by, should be carefully distinguished from diseases..... 360  
 — synopsis of the topics comprised under..... 346, 7  
 Pollution, definition of..... 485  
 — symptoms and signs of..... 486  
 — *synonymes*..... 485  
 — involuntary, causes of. See, also, Spermatorrhœa..... 488  
 — treatment of..... 490  
 — voluntary, causes and occasions of..... 485  
 — bad consequences of..... 488  
 — effects of, vary with the period of commencement..... 486  
 — treatment of..... 489  
 — *Bibliog. and Refer.*..... 497  
 Polyp, described..... 780  
 — cardiac, signs of..... ii. 256  
 — treatment of..... ii. 256  
 — of the cavities of the heart..... ii. 254  
 — of the uterus, described..... 1396  
 — treatment of..... 1396  
 — fibrous, of the uterus, description of..... 1396  
 — treatment of..... 1397  
 Pomegranate-bark, preparations advised for Tœnia..... 1552-3  
 — methods of prescribing for Tœnia..... 1552-3  
 — and the male-fern combined for Tœnia..... 1553  
 Pork, poisonous effects from..... 427  
 Porrigo. See, also, Tinea capitis..... 1171  
 Positions of the heart, unnatural..... ii. 262  
 — causes of..... ii. 262  
 Potash, the hydriodate of, and potash advised for rheumatism..... 689-90  
 — nitrate of, poisoning by..... 435  
 — symptoms and lesions caused..... 435  
 — oxalate of, poisoning by..... 435  
 — salts of, poisoning by..... 434  
 — sulphate of, poisoning by..... 435  
 Potus Antiphlogisticus Diureticus..... F. 588. Ap. 23  
 — Aperiens..... F. 915. Ap. 23  
 — Decocti Sarzæ Comp. (Tisanæ de Feltz)..... F. 589. Ap. 23  
 — Diureticus..... F. 590. 1. Ap. 23  
 — Febrifugus..... F. 592. 3. Ap. 23  
 — Mannæ et Tamarindorum..... F. 594. Ap. 23  
 — Refrigerans..... F. 595. Ap. 23  
 — Tamarindorum Compositus..... F. 916. Ap. 33  
 Precepts, general therapeutical..... 1133  
 Predisposing causes to disease..... i. 645  
 — to insanity..... ii. 555  
 Predominant states of morbid action, of the removal of, in fevers..... i. 1078  
 Pregnancy, local and sympathetic changes consequent on..... 497  
 — Influences of, on the course and treatment of chronic diseases..... 505  
 — discharges from the vagina during..... 498  
 — treatment of..... 499  
 — diseases incident to, *Bibliog. and Refer.* to..... 506  
 — disorders incident to..... 497  
 — feigned, notice of..... i. 1035  
 — hysteritis during..... 500  
 — treatment of..... 500  
 — influences of, on the course and treatment of acute diseases..... 505, 6  
 — inflammation of the cervix uteri during..... 1370  
 — menorrhagia during..... ii. 180  
 — disorders of the nervous system during..... 503  
 — affections of the sexual organs caused by..... 498  
 — treatment of..... 498  
 — small-pox during..... 505  
 — state of the female at the full period of..... 532  
 — sympathetic affections during..... 501-4  
 — spasm, pain, &c., of the uterus during..... 499  
 — treatment of..... 500  
 — and puerperal states as predisposing to disease..... i. 648  
 Prevention of pestilence, &c., means of..... 262  
 Principles of therapeutics..... 1131, 2  
 — general, of therapeutics..... 1133-5  
 — special therapeutical..... 1135-43  
 Procession of morbid phenomena, described..... i. 681  
 Procidencia uteri, described..... 1380  
 — treatment of..... 1389  
 Proctitis, causes of..... 648  
 — definition of..... 646  
 — forms of, described..... 646-8  
 — symptoms of..... 646  
 — treatment of its several forms..... 649  
 Proctitis, acute atonic, described..... 646  
 — terminations of..... 647  
 — asthenic acute, history of..... 647  
 — chronic and sub-acute..... 647  
 — terminations of..... 647  
 — syphilitic and gonorrhœal..... 648  
 Productions and secretions adventitious to the œconomy..... i. 674  
 Professions and employments as predisposing to insanity..... ii. 560  
 Proglottis, or mature Tœnia, described..... 1522  
 Prognosis of disease, &c..... 1056-99  
 Prognostic symptoms in continued fevers..... i. 1132-6  
 Prolapse of the uterus, described..... 1397  
 Prominence, lateral, of the ribs..... i. 367  
 Proofs of the infectious nature of puerperal fevers..... 556-61  
 — of the pestilences..... 118 et pluribus  
 Prophylactics of scarlet fever..... 753-5  
 — of fevers..... i. 1069  
 Prostate gland, *Bibliog. and Ref.*..... 512  
 — calculi in the..... 511  
 — diagnosis of..... 512  
 — treatment of..... 512  
 — cancerous diseases of..... 511  
 — forms of..... 511  
 — concretions in the veins in or near the..... 512  
 — diseases of the..... 506  
 — complications of its diseases..... 512  
 — hæmorrhage from..... 510  
 — inflammation of. See, also, Prostatitis..... 506

- Prostate gland, organic lesions  
of the ..... 509  
— enlargement of, ..... 509  
— treatment of, ..... 510  
— tubercular deposits in, ..... 510  
— ulceration of, ..... 510
- Prostatitis, appearances on dis-  
section ..... 508  
— causes of, ..... 506  
— diagnosis of, ..... 508  
— complications of, ..... 509  
— definition of, ..... 506  
— prognosis of acute ..... 508  
— of chronic, ..... 509  
— acute, symptoms of, ..... 507  
— treatment of, ..... 509  
— chronic, symptoms of, ..... 507  
— treatment of, ..... 509
- Protection from pestilences, &c.,  
means of ..... 261  
— Individual measures  
for, ..... 274
- Proximate cause of fever, au-  
thor's views as to ..... i. 1060-69
- Proximity of position a cause of  
sympathy ..... 1037
- Prurigo, *Bibliog. and Refer.* ..... 515  
— causes of, ..... 514  
— definition and *synonymes* ..... 512  
— description of its forms, ..... 512, 13  
— diagnosis of, ..... 513  
— local forms of, ..... 513  
— prognosis of, ..... 514  
— treatment of, ..... 514  
— its varieties, ..... 514, 15
- Pruritis, definition of, ..... 515  
— diagnosis of, ..... 516  
— forms and states of, ..... 515  
— treatment of, ..... 516  
— of the vulva, described, ..... 498  
— treatment of, ..... 498
- Prussic acid, poisoning by ..... 398  
— symptoms of, ..... 399  
— treatment of, ..... 404  
— diagnosis of, ..... 401  
— modus operandi of, ..... 402  
— period of death from ..... 401  
— appearances after death  
from ..... 400  
— relation between its effects  
and the quantity of the poison  
quantity of, requisite to de-  
stroy life ..... 401  
— and its compounds, treat-  
ment of poisoning by, ..... 404
- Pseudo-hydatis or vesicles, de-  
scribed, ..... ii. 295
- Pseudo-jaundice, described, ..... ii. 348  
— treatment of, ..... ii. 353
- Psoæ muscles, inflammation and  
suppuration of. See Psoriasis.
- Psoriasis, *Bibliog. and Refer.* ..... 516  
— causes of, ..... 519  
— definition of, ..... 516  
— diagnosis of, ..... 517  
— prognosis of, ..... 517  
— symptoms of, ..... 516  
— treatment of, ..... 517-18
- Psora, definition of. See, also,  
Ith.
- Psoriasis, *Bibliog. and Refer.* ..... ii. 716  
— &c., causes of, ..... 531-2  
— classification of its forms, ..... 519  
— definition and *synonymes* ..... 519  
— description of, ..... 521  
— forms of, ..... 521-4  
— diagnosis of, ..... 525, 6  
— pathology of, ..... 526  
— prognosis of, ..... 526  
— treatment of, ..... 526  
— regimen and diet in ..... 531  
— remedies advised for, ..... 527-9  
— local states of, ..... 522  
— Psoriasis diffusa, described ..... 521  
— guttata, described, ..... 521  
— inveterata, described, ..... 521  
— lepraformis, *synonymes* ..... 523  
— syphilitica, described, ..... 524  
— treatment of, ..... 529
- Ptyalism, mercurial, diagnosis of ..... 456, 7
- Puberty, causes of phthisis act-  
ing during and after ..... 1229  
— causes of phthisis acting  
previously to ..... 1228, 9
- Puerperal convulsions, described i. 486  
— treatment of ..... i. 502  
— diarrhoea, described, ..... 1605  
— diseases and fevers, *Bib-  
liog. and Refer.* ..... 504, 5  
— the causation of, ..... 538, 40  
— causes of the danger-  
ous and fatal tendencies of, ..... 540  
— described ..... 532-94  
— influences and agents  
predisposing to and exciting ..... 538  
— of the prevention of, ..... 540  
— prophylactic measures  
against, ..... 593  
— females, treatment of small-  
pox in, ..... 916
- Puerperal fever, congestive  
symptoms and local origins of ..... 567-9  
— Inflammatory symptoms of ..... 564-6  
— malignant, symptoms and  
course of, ..... 570-9  
— synchoid, consecutive af-  
fections of, ..... 570  
— origins and symptoms  
of, ..... 567
- Puorperal fevers, their infectious  
nature ..... 556-61  
— diagnosis of their several  
states ..... 582, 4  
— pathological inferences re-  
specting, ..... 584  
— inquiries as to their pathol-  
ogy ..... 579-81  
— periods of their occurrence  
after delivery, ..... 584  
— prognosis of their different  
forms, ..... 583, 4  
— treatment of their inflam-  
matory forms, ..... 585  
— of their malignant  
states, ..... 588  
— by turpentine, ..... 589  
— synchoid or interme-  
diate forms of, ..... 586-8  
— with turpentine, ..... 586-8
- Puerperal uterine hemorrhage,  
description of, ..... ii. 130-33  
— mania, described, ..... ii. 628  
— treatment of, ..... ii. 633  
— state, nervous and spasmod-  
ic affections of, ..... 546, 7  
— pathology of, ..... 532  
— secretions and excre-  
tions during, ..... 536  
— of small-pox in, ..... 895
- Pulmonary disease, feigned, ..... i. 1035
- Pulsation, nervous, of aorta, ..... i. 79
- Pulsations at the epigastrium,  
causes of, ..... i. 895
- Pulse, of acceleration of the, ..... 602  
— *Bibliog. and Refer.* ..... 603  
— in relation to the states of  
the blood, ..... 596, 8  
— constricted or contracted,  
&c. .... 600  
— state of, after delivery, to  
be attended to, ..... 536  
— states of development of the  
greatly affected by disease, ..... 602, 3  
— full, large, broad, open, &c.  
hard, firm, or sthenic, ..... 600  
— in connection with the states  
of the heart ..... 595  
— historical notices as to the, ..... 595  
— of inequality and irregular-  
ity of, ..... 602  
— intermissions of the, ..... 603  
— influences of emotions of  
mind upon, ..... 1202  
— states of, in phthisis ..... 596  
— physiological pathology of  
the ..... 601  
— positions of the body, influ-  
enced by, ..... 600  
— precipitate, rapid, quick,  
sharp, vibrating, &c., ..... 601  
— rhythm, or frequency of, ..... 599  
— æmological notices of the  
influence of sex on the, ..... 601  
— influenced by sleep ..... 602  
— small, soft, compressible,  
feeble, ..... 600  
— effects of temperament and  
diathesis on the, ..... 601
- Pulse, undulating, languid, &c. 601  
— vital or organic nervous  
force, influencing the, ..... 596, 8  
— vital power, depression of,  
influencing the, ..... 598  
Pulveres Tonici, ..... F. 663. Ap. 26  
— Tonici-Aperientes, F. 644. Ap. 25  
Pulvis Acidæ Benzoei et Cam-  
phoræ, ..... F. 596. Ap. 24  
— Alumine et Quinæ F. 597. Ap. 24  
— Ammoniaco-Camphoratus  
F. 917. Ap. 24  
— Anticatarhalis, F. 918. Ap. 33  
— Antihydropsicus, F. 599. Ap. 24  
— Antimonii et Camphoræ  
F. 600. Ap. 24  
— Antimonialis Compositus  
F. 601. Ap. 24  
— Antiphlogisticus, F. 602. Ap. 24  
— Antispasmodicus (Stahlii)  
F. 603. Ap. 24  
— Aperients, F. 604. Ap. 24  
— Aperiens, F. 919. Ap. 33  
— Asari Comp., F. 605. Ap. 24  
— Belladonnæ, F. 606. Ap. 24  
— Belladonnæ Compositus  
F. 607. Ap. 24  
— Belladonnæ Compositus  
(Hecker) ..... F. 608. Ap. 24  
— Bismuthi, F. 609. Ap. 24  
— Bismuthi Comp., F. 610. Ap. 24  
— Boracis et Sabinae, F. 611. Ap. 24  
— Calamelanos eum digitale  
F. 612. Ap. 24  
— Calumbæ Comp., F. 613. Ap. 24  
— Calumbæ et Ferri, F. 920. Ap. 33  
— Camphoræ, F. 614. Ap. 24  
— Camphoræ et Antimonii  
F. 921. Ap. 33  
— Camphoræ et Zinci, F. 617. Ap. 24  
— Carminativus, F. 616, 17, 18. Ap. 24  
— Catharticus, F. 619. Ap. 24  
— Cinchonæ Comp., F. 620. Ap. 24  
— Cinchonæ cum Soda  
F. 621. Ap. 24  
— Corticis Cuspariæ Composi-  
tus, ..... F. 622. Ap. 24  
— Crete et Rhei Compositus  
F. 633. Ap. 25  
— Cretacus, F. 624. Ap. 24  
— Cupri Ammonio-Sulphatis  
cum Zinco, F. 598. Ap. 24  
— Cyanidæ Zinci, F. 625. Ap. 24  
— Deobstruens, F. 626. Ap. 25  
— Diaphoreticus, F. 922. Ap. 24  
— Diureticus, F. 627, 8. Ap. 25  
— Ecceprocticus, F. 629. Ap. 25  
— Ephræcticus, F. 630, 1. Ap. 25  
— Excitans, F. 632. Ap. 25  
— Infantilis, F. 633. Ap. 25  
— Ipecacuanhæ eum Calo-  
melano, F. 634. Ap. 25  
— Jalapæ Compositus, F. 635. Ap. 25  
— Jalapæ et Calamelanos  
F. 636. Ap. 25  
— Kermis Mineralis, F. 637. Ap. 25  
— Kermis Mineralis et Cam-  
phoræ, ..... F. 638. Ap. 25  
— Kermis Mineralis Camphor-  
atus, ..... F. 639. Ap. 25  
— Lenitivus Hypochondriacus  
F. 640. Ap. 25  
— Lientericus, F. 923. Ap. 34  
— Lientericus, F. 641. Ap. 25  
— Moschi Compositus, F. 924. Ap. 34  
— Myrrhæ et Ipecacuanhæ  
F. 925. Ap. 34  
— Nitro-Opiatus Ipecacuanhæ  
vel Pulvis Doveri, F. 642. Ap. 25  
— Purgans, F. 643. Ap. 25  
— Pro Tornicibus, F. 926. Ap. 34  
— Refrigerans, F. 644, 5. Ap. 25  
— Resolvens, vel Deobstruens  
F. 646. Ap. 25  
— Resolvens (Stahl) F. 927. Ap. 34  
— Rhei Compositus, F. 647. Ap. 25  
— Rhei et Magnesiæ, F. 648. Ap. 25  
— Rhei et Sulph. Potassæ  
F. 649. Ap. 25  
— Salinus, ..... F. 928. Ap. 34  
— Scammonie cum Calo-  
melano, F. 650. Ap. 25  
— Scammonie et Jalapæ  
F. 652. Ap. 25



- Pulvis Sedativus.....F. 653. *Ap.* 25  
 — Senegæ et Camphoræ.....  
     F. 654. *Ap.* 25  
 — Sodæ Compositus.....F. 655. *Ap.* 25  
 — Sodæ cum Hydrargyro.....  
     F. 656. *Ap.* 25  
 — Sodæ Nitratis Compositus.....  
     F. 929. *Ap.* 34  
 — Specificus Stomachicus.....  
     F. 657. *Ap.* 25  
 — Sulphatis Potassæ et Ferri.....  
     F. 658. *Ap.* 26  
 — Sulphatis Quinæ Antimonii.....  
     F. 659. *Ap.* 26  
 — Sulphatis Quinæ et Morphæ.....  
     F. 660. *Ap.* 26  
 — Sulphureti Aurenti Antimonii, *vel* Deuto-Sulphuret. Antimo. ....  
     F. 661. *Ap.* 26  
 — Tonicus.....F. 662. *Ap.* 26  
 — Valerianæ Compositus.....  
     F. 930. *Ap.* 26  
 — Valerianæ et Zinci F. 665. *Ap.* 26  
 — Zinci Oxydi Compositus.....  
     F. 666. *Ap.* 26  
 — Zinci Sulphatis Compositus.....  
     F. 667. *Ap.* 26
- Purgatives, arrangement and enumeration of.....1146  
 — recommended for dropsy.....i. 710  
 — &c., for inflammations.....ii. 474  
 — in cases of insanity.....ii. 697  
 — advised for tænia.....1554
- Purpura, appearances after death from.....607  
 — *Bibliog. and Refer.*.....610  
 — appearances of the blood and urine in.....607  
 — complications of with fever.....606  
 — with visceral disease.....606  
 — treatment of.....609  
 — description of.....605  
 — diagnosis of.....607  
 — pathological relations of.....604, 5  
 — prognosis of.....607  
 — regimen and diet for.....609  
 — *synonymes and definitions*.....604  
 — treatment of.....609  
 — varieties of.....604  
 — hæmorrhagica, described.....605  
 — senilis, descriptions of.....606  
 — simplex, description of.....605  
 — urticaria, described.....606
- Purpurine, pathological relations of.....1326
- Purulent collections, of the absorption and diminution of.....i. 24  
 — expectoration, as a sign of disease.....1092
- Pus, recent, *Bibliog. and Refer.*.....611  
 — characters of.....i. 675  
 — or purulent matter described.....ii. 438  
 — microscopic appearances of.....610  
 — different opinions of microscopists on the development and forms of.....437  
 — in diffusive or æsthenic abscess.....i. 17  
 — in chronic abscess.....i. 18  
 — contained in æsthenic abscess.....i. 16  
 — expectoration of, as a sign of disease.....1093  
 — in urine, appearances of.....1336  
 — formed in veins.....1447  
 — cells, described.....774
- Pustule, malignant, appearances after death.....613  
 — *Bibliog. and Refer.*.....615  
 — causes of.....612  
 — definition of.....612  
 — diagnosis of.....614  
 — forms of.....613  
 — prognosis of.....614  
 — symptoms of.....613  
 — treatment of.....614
- Pustules, description of.....611
- Putrid animal matters, effects of inoculation by.....445  
 — poisoning by.....445
- Putro-ædymic fever, described i. 1173  
 — treatment of.....i. 1211
- Putro-ædymic puerperal fever, course and terminations of.....i. 670-83
- Putro-ædymic puerperal fever, treatment of.....588-94
- Pyelitis, complicated with diseased bladder, prostate, &c.....ii. 761  
 — from calculi or gravel.....ii. 758  
 — complications of.....ii. 761  
 — diagnosis of.....ii. 759, 61  
 — prognosis of.....ii. 761  
 — several states of.....ii. 759  
 — treatment of, when caused by renal calculi.....ii. 764  
 — with tumour from collection of matter in the pelvis of the kidney, treatment of.....ii. 765
- Pyelitis, acute, description of.....ii. 758  
 — treatment of.....ii. 763  
 — chronic, description of.....ii. 758  
 — treatment of.....ii. 764
- Pyelo-nephritis, or inflammation of the pelvis, calices, and substance of the kidneys.....ii. 762  
 — description of.....ii. 762
- Pyrosis, *Bibliog. and Refer.*.....618  
 — causes of.....616  
 — complications of.....616  
 — diagnosis of.....616  
 — indications and means of cure.....617  
 — nature of.....617  
 — symptoms of.....615  
 — *synonymes and definition* of.....615  
 — treatment of.....617
- Q.  
 Quarantine, importance of.....ii. 417  
 — for preventing pestilence.....267-71  
 — success of, in the United States.....267-71
- R.  
 Rabies, appearances after death from.....623  
 — *Bibliog. and Refer.*.....640-42  
 — causes of.....627  
 — the specific cause of, examined.....627  
 — can it be communicated otherwise than by the bite of a rabid animal?.....629  
 — can it be communicated otherwise than by inoculation?.....629  
 — curative means (?) advised for.....637-9  
 — description of.....619, 20  
 — diagnosis of.....625  
 — literary history of.....619  
 — medulla oblongata and spinal cord in.....624  
 — nature of, inquired into.....630  
 — pathological inferences and remarks respecting.....632-3  
 — several means advised for preventing.....634-37  
 — prognosis as respects the bite of a rabid animal.....626  
 — when the disease has declared itself.....626  
 — by what secretions of the infected animal is the disease communicated?.....630  
 — symptoms of, in the canine race.....623, 632  
 — in the lower animals.....623  
 — its stages.....620  
 — *synonymes and definition* of.....618  
 — treatment of, advised by the author.....640  
 — curative (?).....637-40  
 — prophylactic.....633-37  
 — the animals capable of generating, de novo, the virus of.....629  
 — in what manner does the virus causing, act?.....631  
 — of the origin of the virus causing.....628
- Race, human, considered in respect of phthisis.....1208  
 — influence of, on small-pox.....896
- Races, the influence of climate on.....i. 404
- Races, prevailing diseases in.....i. 405  
 — dark, the relations of climate to.....i. 406  
 — phthisis in the.....1236  
 — pleurisy in the.....316  
 — white, the relations of climate to.....i. 406
- Rachialgia, causes of.....947  
 — definition of.....944  
 — diagnosis of.....946  
 — nature of.....948  
 — prognosis of.....947  
 — treatment of.....945-50  
 — hysterical, noticed.....945  
 — treatment of.....945-50  
 — rheumatic, gonty, and other forms of.....946  
 — treatment of.....945-50
- Rachialgitis, definition of.....976
- Radesyge, notice of.....ii. 811
- Ramollissement of brain.....i. 292
- Ranunculus, species of, poisoning by.....891
- Reaction, stage of, in fevers.....i. 1046  
 — and excitement, states of, described.....i. 659
- Rectum, abscess of, treatment of.....658  
 — fistula in, treatment of.....653  
 — foreign bodies in the.....648  
 — cancer or carcinoma of.....661  
 — causes of.....662  
 — symptoms of.....662  
 — treatment of.....662  
 — concretions in the.....644  
 — treatment of.....644  
 — fistula of the, described.....652  
 — inaction of the, symptoms of.....645  
 — treatment of.....645  
 — invagination of upper portion of the.....660  
 — symptoms of.....661  
 — treatment of.....661  
 — lacerations of the.....644  
 — treatment of.....644  
 — malformations of the.....643  
 — polyp in the.....657  
 — symptoms of.....658  
 — treatment of.....658  
 — prolapse of, causes of.....656  
 — in children.....655  
 — treatment of.....657  
 — the forms of.....655, 6  
 — complicated with hæmorrhoids.....656  
 — treatment of.....657  
 — strictures of the.....658  
 — organic or permanent stricture of the.....659  
 — causes of.....660  
 — diagnosis of.....659  
 — symptoms of.....659  
 — treatment of.....660  
 — spasmodic stricture of the.....658  
 — treatment.....652  
 — ulceration of.....652  
 — causes of.....652  
 — symptoms of.....652  
 — treatment of.....653
- Rectum and anus, *Bibliog. and Refer.*.....663  
 — abscess of, described.....650, 1  
 — symptoms of.....661  
 — diseases of the.....642  
 — functions of.....643  
 — their inaction, causes of.....645  
 — symptoms of.....645  
 — treatment of.....645  
 — of complicated cases.....646  
 — inflammation of. See, also, Proctitis.....646  
 — relaxation of.....645  
 — complications.....645  
 — sympathies of.....643  
 — syphilitic ulceration of the.....652
- Reflected actions and sympathies divided into psychical, animal, and organic or vital.....41
- Reflex actions and sympathies of the brain and spinal cord.....40, 41  
 — contractions, or reflex irritation, respecting.....ii. 698, 701

- Reflex sympathy, note on ..... i. 913
- Refrigerants, external and internal ..... 1145
- in fever, prescribed ..... i. 1075
- for inflammation ..... ii. 475
- Regimen of patients in fevers ..... i. 1052
- physical and mental, protective against pestilences ..... 276
- Regimen and diet in the several forms of indigestion ..... ii. 393-397
- Relapses of fever, noticed ..... i. 1038
- Relations of mind to the nervous system ..... ii. 534-539
- Relaxation of the palate ..... 1
- treatment of ..... 1
- Religious apprehensions, as causes of insanity ..... ii. 563
- consolation in insanity ..... ii. 622
- Remedial means, and medicines to be taken, against pestilences ..... 276
- Remedies, neglect of their physiological action retards therapeutical knowledge ..... 1131
- notices of many, advised for rabies ..... 634-40
- various, for scarlet fever ..... 763-767
- Remittent, treatment of complicated states of ..... i. 1108
- Remittent of children, causes of ..... i. 1115
- characterized ..... i. 1115
- description of ..... i. 1116
- diagnosis ..... i. 1117
- nature of ..... i. 1118
- regimen and diet ..... i. 1119
- terminations and prognosis ..... i. 1117
- treatment of ..... i. 1118
- acute, described ..... i. 1116
- adynamic, described ..... i. 1116
- chronic, description of ..... i. 1117
- Remittent fevers, appearances after death from ..... i. 1104
- *Bibliog. and Refer.* ..... i. 1121-2
- causes of ..... i. 1100
- complications observed in ..... i. 1103
- diagnosis of ..... i. 1104
- between, and hæmagastric or true yellow fever ..... i. 1104
- terminations of ..... i. 1108
- adynamic, and malignant ..... i. 1102
- treatment of ..... i. 1107
- bilio-inflammatory ..... i. 1102
- complicated ..... i. 1103
- inflammatory ..... i. 1101
- treatment of the inflammatory and bilio-inflammatory forms ..... i. 1106, 1107
- mild, described ..... i. 1101
- treatment of ..... i. 1106
- Remittents, causes of ..... i. 1100
- described ..... i. 1100
- Repair of the consequences of inflammation ..... ii. 499
- Reptiles, poisonous, notices of ..... 475
- Respiration, auscultation of ..... i. 200
- modes and states of, as signs of disease ..... 1080-92
- morbid, sympathies of ..... 1083, 9, 40
- symptoms afforded by ..... 1088
- quickness of, symptomatic of phthisis ..... 1200
- Respiratory functions, effects of cold on ..... i. 420
- Respiratory organs, the relations of their diseases to cachectic nephritis ..... ii. 746
- diseases from causes acting on the ..... i. 652
- disorders of, connected with gastro-enteritis ..... ii. 30
- of expectoration in their diseases ..... 1094
- diseased states in fever, treatment of ..... i. 1080
- hemorrhage from ..... ii. 95-107
- signs and symptoms furnish by ..... 1088
- Restrictions on localities afflicted with pestilence ..... 275
- Retardings, viewed as a symptom and veniting, considered ..... 1505
- Retina, inflammation of ..... i. 1019
- Retinitis, symptoms and course of ..... i. 1019
- Retinitis, treatment of ..... i. 1020
- Retrocedent, or displaced, gout ..... ii. 42
- Retroflexion of uterus ..... 1391
- treatment of ..... 1393
- Revaccination, remarks and facts respecting ..... 1420
- report of the Academy of Sciences respecting ..... 1421
- Revulsion, means of causing ..... i. 218
- Rheumatic arthritis, *synonymes* of ..... 667
- Rheumatic gout, chronic, symptoms of ..... 667
- Rheumatism, *Bibliog. and Ref.* ..... 700, 2
- of the blood in ..... 675, 6
- of blood-letting in ..... 654
- relation of, to cachectic nephritis ..... ii. 749
- exciting causes of ..... 679
- predisposing causes of ..... 678
- its connection with chorea ..... 674
- of cinchona and various other medicines in ..... 687
- cinchona, and the alkalies advised for ..... 688
- complications and extension of ..... 673-675
- complicated with catarrhal fever, influenza, &c. .... 675
- treatment of its complications ..... 696
- indications or intentions of care in ..... 683
- complicated with diaphragmitis ..... 672
- when complicated with affection of the diaphragm, or of the pleura or peritonæum, the treatment of ..... 698
- complicated with endocarditis ..... 673
- description of ..... 664
- diagnosis of ..... 677
- from, and connexion with, neuralgia ..... 677
- from scrofulous disease of joints ..... 678
- from secondary syphilis ..... 678
- of diaphoretics in ..... 685
- of emetics and purgatives for ..... 685
- states of the excretions in ..... 675
- of the face ..... 672
- complicated with affections of the head ..... 673
- with disease of the heart or pericardium, treatment of ..... 697, 8
- with influenza or catarrhal fever ..... 699
- with disease of the cerebro-spinal membranes ..... 674
- with disease of the membranes of the brain or spinal cord, treatment of ..... 696, 9
- complicated with paralysis ..... 674
- pericarditis ..... 673
- with peritonitis ..... 675
- with pleuritis ..... 674
- of the fibrous tissues of the lungs and back ..... 671
- external means advised for ..... 693-696
- in connexion with disorder of menstruation ..... 675
- of mercurials in ..... 685
- metastasis of ..... 673
- nature of ..... 680, 2
- of the neck ..... 672
- of the fibrous envelopes of nerves ..... 671
- complicated with disease of the sexual organs ..... 675
- associated with affections of the sexual organs, treatment of ..... 698
- inferences as to the pathology of ..... 682
- regimen and diet in ..... 700
- remedies recommended for ..... 689-93
- of the special seats of ..... 669
- the structures chiefly affected in ..... 669, 70
- Rheumatism, *synonymes* and definition of ..... 663
- synovial membrane of the joints chiefly affected in acute and sub-acute ..... 670
- treatment of, advised by the author ..... 688, 9
- acute, symptoms of ..... 664
- prognosis of ..... 678
- sub-acute, symptoms of ..... 666
- treatment of acute and sub-acute ..... 684
- cervical, described ..... 672
- chronic, of the hands ..... 669
- of hip-joint ..... 669
- symptoms of ..... 667
- treatment of ..... 689
- prognosis of chronic and sub-acute ..... 678
- feligned ..... i. 1036
- gonorrhœal, description of ..... 672
- treatment of ..... 698
- periosteal, described ..... 671
- Rhus Toxicodendron, poisoning by ..... 391
- Rhythm, or frequency, of pulse ..... 601
- Ribs, lateral depression of ..... i. 367
- prominence of ..... i. 367
- Rickets in adults, described ..... 711
- appearances after death from ..... 706, 7
- *Bibliog. and Refer.* ..... 711
- causes of ..... 707
- complications of ..... 703
- description of ..... 702-703
- diagnosis of ..... 707
- nature of ..... 708
- prognosis of ..... 707
- *synonymes* and definition of ..... 702
- prophylactic treatment of ..... 700
- treatment of ..... 709
- with reference to the state of the urine ..... 709
- of the urine in ..... 705
- Ringworm, description of ..... ii. 263
- Roscola. See, also, Rose-rash ..... 712-714
- Rose-rash, *Bibliog. and Refer.* ..... 714
- causes of ..... 714
- description of ..... 712, 13
- diagnosis of ..... 713
- forms or species of ..... 712-713
- *synonymes* and definition of ..... 721
- treatment of ..... 714
- Rottlera tinctoria, the powder of its capsules, a remedy against tania. See, also, Kamala-powder ..... 1555
- Rubeola, *Bibliog. and Refer.* ..... 716
- description of ..... 715
- relations of, to measles and scarlet fever ..... 715
- nature of ..... 716
- *synonymes* and definition of ..... 714
- treatment of ..... 716
- Rumination, human, *Bibliog. and Refer.* ..... 719-20
- causes of ..... 719
- literary history of ..... 716, 18
- symptoms of ..... 718
- treatment of ..... 719
- *synonymes* and definition of ..... 716
- Rupia, causes of ..... 720
- description of ..... 720
- diagnosis of ..... 720
- prognosis of ..... 721
- treatment of ..... 721
- varieties of, described ..... 720
- Rupture of coats of aorta ..... i. 87
- of the brain ..... i. 277
- congenital ..... i. 277
- of the heart ..... ii. 257
- lesions producing ..... ii. 258
- partial, of the heart ..... ii. 259
- of valves of the heart ..... ii. 259
- causes and symptoms of ..... ii. 259
- S. Salines, of their use in phthisis ..... 1272
- Salivary secretion, as a symptom of disease ..... 1078
- Salivation from mercurialis ..... 453



- Salivation, diagnosis of. . . . . 456, 457  
— treatment of. . . . . 458, 9  
Salts, corrosive alkaline, poison-  
ing by. . . . . 384  
— earthy, in urine, patholog-  
ical relations of. . . . . 1332  
— metallic, poisoning by. . . . . 384  
Sanitary measures, objects of. . . . . 263  
Santonine of soda, advised for  
Ascaris lumbricoides. . . . . 1554  
Santonine, recommended for As-  
caris lumbricoides. . . . . 1554  
Sapo Olei Crotonis Tiglli, F. 668, *Ap.* 26  
— Terebinthine, . . . . F. 669, *Ap.* 26  
— Terebinthinata, . . . . F. 670, *Ap.* 26  
Sarcina ventriculi, vomitings at-  
tended by. . . . . 1487  
Sarsaparilla, of its use in syph-  
ilis. . . . . 1457  
Sausages, poisonous effects of. . . . . 428  
Savine, poisoning by. . . . . 890  
Sculp, lesions of the. . . . . l. 608  
— syphilitic affection of. . . . . 1468  
— secondary syphilitic affec-  
tions of. . . . . 1468  
Scarlatina maligna, treatment  
of. . . . . 758, 9  
Scarlatina rheumatica, *Bibliog.*  
and *Refer.* . . . . 724  
— causes of. . . . . 723  
— in children. . . . . 723  
— description of. . . . . 722, 3  
— modifications of. . . . . 723  
— nature of. . . . . 724  
— stages of. . . . . 722  
— *synon.* and *definit.* of. . . . . 721  
— treatment of. . . . . 724  
Scarlet fever, followed by ana-  
sarcia. . . . . 739, 40  
— appearances after death  
from. . . . . 742  
— *Bibliog.* and *Refer.* . . . . 767, 8  
— of the blood in. . . . . 741  
— causes of. . . . . 746  
— predisposing causes of. . . . . 748-50  
— complications of. . . . . 738  
— complicated with convul-  
sions or coma. . . . . 734  
— intentions of cure for. . . . . 735  
— diagnosis of. . . . . 744  
— diseases consequent upon. . . . . 737-41  
— followed by dropsy. . . . . 739-40  
— — by diseases of the ear. . . . . 738  
— complicated with extension  
of disease to the ears. . . . . 734  
— with epistaxis. . . . . 734  
— with erysipelas, gan-  
grene, &c. . . . . 736  
— with asthenic gastro-  
enteritis. . . . . 735  
— with disease of kid-  
neys. . . . . 733  
— with peritonitis. . . . . 736  
— with asthenic pharyn-  
gitis. . . . . 734  
— with disease of the  
pharynx and adjoining parts. . . . . 738  
— with diffusive inflam-  
mation of the cellular tissue. . . . . 735  
— with pleuritis, peri-  
carditis, &c. . . . . 736  
— with asthenic pneu-  
monia. . . . . 736  
— treatment of its complica-  
tions. . . . . 760, 1  
— absence of the eruption of. . . . . 728  
— the appearances of the  
eruption of. . . . . 731  
— without eruption. . . . . 731  
— forms of, depending upon  
states of vital power. . . . . 729  
— literary history of. . . . . 725  
— of the period of incubation of  
followed by disease of the  
kidneys, &c. . . . . 739-40  
— complicated with asthenic  
laryngitis. . . . . 734  
— followed by disease of the  
parotids. . . . . 741  
— specific poisons of. . . . . 746, 7  
— prognosis of. . . . . 745  
— of the propagation of. . . . . 747, 8  
— remarks on remedies ad-  
vised for. . . . . 763-766  
Scarlet fever, immunity from  
second attacks of. . . . . 750  
— the sequelæ of. . . . . 737  
— treatment of. . . . . 753-763  
— of its sequelæ. . . . . 762, 3  
— curative. . . . . 755  
— preservative. . . . . 753  
— types and irregular forms  
of. . . . . 727  
— treatment of the irregular  
forms of. . . . . 750, 60  
— state of the urine in. . . . . 741  
— with suppression of urine. . . . . 732  
— *synon.* and *definit.* of. . . . . 725  
— anginose or inflammatory,  
described. . . . . 729  
— treatment of. . . . . 756, 7  
— latent or masked. . . . . 732  
— malignant, described. . . . . 730  
— treatment of. . . . . 758, 9  
— mild form of. . . . . 729  
— treatment of. . . . . 755  
— description of regular. . . . . 726  
— of the several stages of. . . . . 726, 7  
Scherlievo, syphilis of. . . . . 1475  
Sciatica, *synonymes* and *descrip-  
tion* of. . . . . ll. 1012  
Scirrhus-cancer, described. . . . . 769-779  
Scirrhus-canceroid growths, varie-  
ties of. . . . . 769  
Scirrhus stage of cancer. . . . . l. 327  
Scirrhus and other morbid  
growths, diagnosis of. . . . . 789, 791  
— and other tumours, *defined*. . . . . 769  
Scirrhus, or occult cancer. . . . . l. 836  
— *defined*. . . . . 769  
— of the liver. . . . . ll. 871  
— structure of. . . . . 778  
— treatment of. . . . . i. 340  
Scleritis. See Ophthalmia  
scleroticæ. . . . . l. 1010  
— arthritis, described. . . . . l. 1013  
— rheumatica. . . . . i. 1012  
Scolex, *definition* of. . . . . 1521  
— of Tænia, passing into ac-  
tivity. . . . . 1525  
— of Bothriocephalus latus,  
described. . . . . 1526  
— of Tænia solium, described. . . . . 1528  
Scorbutus. See, also, Scurvy. 839-856  
Scrofula. See, also, Tubercles 797-837  
— causes of, acting chiefly  
during early life. . . . . 803-810  
— associated alterations with  
relation of, to cachectic  
nephritis. . . . . ll. 749  
— concurrent causes. . . . . 810  
— climate, occupations, &c.,  
causes of. . . . . 809  
— chemical composition of its  
structure. . . . . 816  
— the several means of cure  
advised for. . . . . 830-5  
— of the diathesis or taint of  
diseases allied to, attacking  
the scrofulous diathesis. . . . . 821  
— transmission of, to the foetus  
caused by defective food  
and air. . . . . 803-807  
— hereditary nature of. . . . . 807  
— diseases of parents causing  
causes of, appertaining to  
one or both parents. . . . . 800  
— gouty and aged parents be-  
getting scrofulous children. . . . . 802  
— mercurial cachexia of the  
parent causing. . . . . 802  
— pathogenesis of. . . . . 817  
— of the pathology of. . . . . 811-817  
— Is it more prevalent now  
than formerly? . . . . . 826  
— prevention of. . . . . 826  
— causes of the taint of. . . . . 799-810  
— chief characters of its taint  
syphilitic taint of the pa-  
rent causes. . . . . 802  
— treatment of its developed  
forms. . . . . 829  
— hygienic. . . . . 826, 28  
— local. . . . . 835  
— medicinal. . . . . 828  
— mesenterica. See, also, Me-  
senteric disease. . . . . ll. 953  
Scrofula and tubercles, of their  
identity. . . . . 820  
— and tubercles, *synon.* and  
*definit.* of. . . . . 797  
— *Bibliog.* and *Refer.* . . . . 837, 9  
— and tuberculosis, regimen  
and diet in. . . . . 836  
Scrofulous taint influences the  
course, &c., of other diseases. . . . . 822  
— treatment of. . . . . 825, 30  
Scurvy, appearances on dissec-  
tion. . . . . 843  
— *Bibliog.* and *Refer.* . . . . 856, 8  
— chemical analysis of the  
blood in. . . . . 843  
— exciting causes of. . . . . 848  
— predisposing causes of. . . . . 845-8  
— complications of. . . . . 844  
— description of. . . . . 841  
— diagnosis of. . . . . 844  
— complicated with diarrhoea  
and dysentery. . . . . 844  
— historical sketch of. . . . . 839  
— nature of. . . . . 850  
— of old age, described. . . . . 606  
— means for the prevention  
of. . . . . 850-54  
— prognosis of. . . . . 845  
— *synon.* and *definit.* of. . . . . 839  
— treatment of. . . . . 854, 6  
Sea-coast, considered in relation  
to phthisis. . . . . 1277, 82  
Sea-shore, its climate in dis-  
eases. . . . . l. 417  
Sea-sickness, description of. . . . . 1509  
— nature of. . . . . 1569  
— pathology of. . . . . 1509  
— prognosis of. . . . . 1509  
— the remedial influence of. . . . . 1510  
— treatment of. . . . . 1512  
Sea-voyaging advised for phthi-  
sis. . . . . 1277  
Seasons and weather disposing  
to phthisis. . . . . 1292  
Secale cornutum, effects of. . . . . 476  
Seclusion of the insane, how  
should it be carried out? . . . . . ll. 592  
— necessity of. . . . . ll. 591  
Seclusion or quarantine, advan-  
tages of, during pestilences. . . . . 275  
Secondary syphilitic eruptions  
described. . . . . 1467  
— — disease, diagnosis of. . . . . 1468  
Secretion and excretion, when  
excessive, causes of phthisis. . . . . 1230  
— when excessive must be re-  
strained. . . . . 1139  
Secretions and productions, ad-  
ventitious to the economy. . . . . l. 674  
— adventitious to the situa-  
tion. . . . . l. 670  
— alterations of, depending  
upon organic nervous influ-  
ence. . . . . l. 667  
— excrementitious, are under  
the influence of the organic  
nervous system. . . . . l. 668  
— of promoting the, in fever. . . . . l. 1077  
— misplaced. . . . . l. 670  
— morbid, susceptible of or-  
ganization. . . . . l. 677  
— excrementitious, under the  
influence of the organic nerv-  
ous system. . . . . l. 667  
— and exhalations, transfor-  
mations of. . . . . l. 669  
Sedatives, mental and physical,  
enumerated. . . . . 1145  
— in cases of insanity. . . . . ll. 612  
Sedentary habits and occupa-  
tions cause disease. . . . . l. 144  
Sensation, paralysis of. . . . . 12  
— and sensibility, signs of dis-  
ease furnished by. . . . . 1072  
— various perversions of. . . . . 1072, 3  
Sense, organs of, causes of dis-  
ease acting on. . . . . l. 654  
Senses, symptoms furnished by. . . . . 1067  
Sensibility, conscious or active. . . . . 41  
— forms and modes of. . . . . 41  
— inconscious or passive. . . . . 41  
— organic, active, and passive. . . . . 41  
— lesions of, in insanity. . . . . ll. 502-505  
— morbid, of the uterus. . . . . 1461

- Sensibility and sensation, their sympathies, &c. .... 1052
- Sensitive and motor powers, influenced by different columns of the medulla spinalis. .... 39
- Sentiments and feelings, as causing disease. .... i. 655
- Septic Pestilence. See Pestilence, Septic. .... 217
- Septulæ, viewed as productive of pestilence and disease. .... 107
- Sequelæ of measles described. .... ii. 943
- of scarlet fever described. .... 737
- treatment of. .... 762
- Sero-enteritis. See Enteritis, description of. .... ii. 664
- Serous and synovial membranes — surfaces, adhesions of. .... i. 42
- Serpents, poisoning by, symptoms of. .... 478, 80
- antidotes and treatment of. .... 480, 1
- Serum infiltrated into the textures of the heart. .... ii. 250
- in the urine. .... 1335
- Sex, as predisposing to disease. .... i. 646
- influence of, on the pulse. .... 601
- Sexes, comparative liability of the, to tuberculosis. .... 825
- Sexual organs, signs and symptoms furnished by the. .... 1007
- of female, signs furnished by sympathies evolved by. .... 1053, 55
- Shaking-palsy, description of. .... 25
- treatment of. .... 48
- Sheath of nerves, rheumatism of Shingles, description of. .... ii. 267
- Ships of war, protection of, from pestilence. .... 273
- Shock, *Bibliog. and Refer.* .... 863
- causes and phenomena of. .... 550, 60
- description of. .... 859
- diagnosis of. .... 861
- forms of. .... 850, 60
- of the nervous system caused by parturition. .... 535
- treatment of. .... 537
- prognosis of. .... 861
- treatment of. .... 862
- vital or nervous, *defined*. .... 858
- Shlogogones, enumeration of. .... 1146
- Sibbens, description of. .... 1478
- Sighing, as a symptom. .... 1095
- Sight, defects of, feigned. .... i. 1036
- Signs and symptoms furnished by the attitude and countenance. .... 1057
- by the appearance of the body. .... 1057
- Silver, nitrate of, poisoning by. .... 388
- Singultus, description of. See Hicough. .... ii. 271
- Sinking after parturition. .... 546
- Sinuses of the brain, lesions of. .... i. 260
- of dura mater, inflammation of. .... 1441
- of the vertebrae, effects of congestion of. .... 40
- Sites of tumours and morbid formations, respecting the. .... 789
- Sivvens, description of. .... 1473
- Sketch, historical, of treatment advised by authors for phthisis. .... 1240-50
- Skin, of absorption from. .... i. 27
- alterations of its appearances and structure. .... 864
- bronzing of, connected with lesions of the supra-renal bodies. .... 1565-71
- changes of the colour of. .... 865
- changes in the texture of. .... 865
- affections of the cuticle and nails in diseases of. .... 568
- diseases of the, *Bibliog. and Refer.* .... 874
- natural methodic arrangement of diseases affecting the. .... 865-72
- classification of the diseases of the. .... 863-74
- by Dr. J. H. Bennett. .... 874
- by M. R. Mayer. .... 873
- diseases of, in connexion with gastro-enteric disorders. .... ii. 33
- Skin, functional alterations of. .... 863
- functions of, as signs of disease. .... 1062-4
- affections of the sebaceous glands of the. .... 867
- hæmorrhage from the. .... ii. 87
- causes and history of. .... ii. 87
- phenomena and treatment of. .... ii. 88
- organic lesions of the. .... 864, 8
- Sleep, accession of, may be attended by morbid phenomena causes and accession of. .... 878, 8
- circumstances favourable and unfavourable to. .... 877
- definition of. .... 875
- of excessive. .... 878
- phenomena often attending awakening from. .... 878
- influences the pulse. .... 602
- Sleeplessness, *Bibliog. and Ref.* .... 883
- definition of. .... 875
- during pregnancy. .... 504
- treatment of. .... 504
- treatment of. .... 880
- complete, noticed. .... 880
- partial, noticed. .... 879
- Sleep-waking, remarks respecting. .... 41
- Small-pox, with various abdominal complications. .... 984
- of second attacks of. .... 905
- *Bibliog. and Refer.* .... 920-22
- efficient causes of. .... 901, 2
- predisposing causes of. .... 902
- characters of the local affection and fever of. .... 896
- with contamination of the circulating fluids. .... 892, 3
- complicated with cerebral affection. .... 893
- complications of. .... 891-5
- with bronchial and pulmonary complications. .... 893, 4
- with pleuritic and cardiac complications. .... 915
- treatment of the complications. .... 900
- causes of death from. .... 897
- diagnosis of. .... 897
- appearances of, on dissection. .... 897
- epidemic prevalences of. .... 904
- without eruption. .... 880
- treatment during the progress of eruption. .... 913
- of the secondary fever of. .... 913
- in the fetus. .... 895
- historical sketch of. .... 883
- circumstances which favour and which oppose the infection of. .... 903, 4
- infectious and contagious influences of. .... 901-3
- treatment of the infiltratory fever of. .... 911
- inoculated, course of. .... 910
- treatment of. .... 917
- inoculation of the. .... 905-910
- associated with other exanthematous maladies. .... 895
- complicated with affection of the mucous surfaces. .... 891
- with ophthalmia. .... 892
- prevention of pitting by. .... 916, 17
- prognosis of. .... 899
- circumstances influencing. .... 899
- pustule, described. .... 888
- treatment of petechial states. .... 915
- of the confluent states of. .... 914
- in the pregnant and puerperal states. .... 895
- in puerperal states, treatment of. .... 916
- *synonymes and definition* of. .... 883
- with affection of the cellular tissue. .... 801
- treatment of. .... 910
- confluent, symptoms of. .... 889
- Small-pox, semi-confluent. .... 890
- discrete, eruption of, described. .... 883
- modifications of. .... 889
- distinct, or benign, description of. .... 885
- distinct, the successive stages of. .... 886-3
- description of natural. .... 885
- after vaccination. .... 890
- notices respecting. .... 1424
- Smell, symptoms furnished by. .... 1071
- Smoking opium, effects of. .... 468
- tobacco, injuries effects of. .... 446
- Snakes, poisonous, their effects. .... 478, 80
- antidotes and treatment. .... 480, 81
- Snoring, as a symptom. .... 1096
- Snuff, hurtful effects of. .... 446
- Social conditions causing insanity. .... ii. 572
- Softening of bones. .... ii. 1057
- treatment of. .... ii. 1057
- of the brain. .... i. 292
- of the digestive canal. .... i. 629
- of the heart, various kinds of. .... ii. 221
- consequent on inflammation. .... ii. 444
- of the pancreas. .... 8
- of structures. .... 922
- *Bibliog. and Refer.* .... 925
- grades and extent of. .... 922, 3
- pathological causes. .... 923
- pathology of. .... 923-5
- therapeutical indications as to. .... 925
- Sol-lunar influence on disease. .... i. 650
- Solutio Belladonnæ Extracti. .... F. 931. Ap. 34
- Gambogiæ Alkalina. .... F. 932. Ap. 34
- Hydro-Sulphatis Calciæ. .... F. 933. Ap. 34
- Iodini (Lugol). .... F. 671. Ap. 26
- Iodini Caustici (Lugol). .... F. 672. Ap. 26
- Iodini Rubefaciens (Lugol). .... F. 673. Ap. 26
- Morphiæ Hydrochloratis. .... F. 674. Ap. 26
- Morphiæ Sulphatis. .... F. 675. Ap. 26
- Refrigerans. .... F. 934. Ap. 34
- Somnambulism, remarks respecting. .... 41
- Somnolency and sopor, feigned. .... i. 1036
- Sporifides in cases of insanity. .... ii. 609
- Sporifides, enumeration of. .... 1148
- Sounds, vocal, remarks respecting. .... 1499
- Southeast of France, climate of. .... i. 413
- Southwest coast of England, climate of. .... i. 412
- Spain, climate of south of, advised for phthisis. .... 1273
- Spasm, *Bibliog. and Refer.* .... 933
- cautions against blood-letting for. .... 931
- efficient causes of. .... 928
- exciting causes of. .... 928
- predisposing causes of. .... 928
- congestive states of, their treatment. .... 930
- definition of. .... 926
- diagnosis of. .... 929
- choice of emetics for. .... 931
- inflammatory, treatment of. .... 931
- of intestines, symptoms of. .... ii. 684
- of involuntary and voluntary muscles. .... 928
- of involuntary structures. .... 927
- of the œsophagus, described. .... ii. 1050
- prognosis of. .... 929
- of purgatives for. .... 931
- treatment of. .... 930-32
- with reference to pathological causes. .... 932, 3
- varieties of, described. .... 926
- of voluntary muscles. .... 927
- See, also, Convulsions. .... i. 479
- as signs of disease. .... 1066
- Specific causes of disease. .... i. 656
- their mode of action. .... i. 657



- Spedalskied, notice of.....ll. 811  
 Speech, defects and loss of..... 1501  
 — hesitations of..... 1500  
 — impediments of, described..... 1500  
 — treatment of..... 1503  
 Speech and voice, disorders of..... 15  
 — treatment of the af-  
 fections of..... 1503  
 Spermatorrhoea, causes of..... 488  
 — consequences of..... 489  
 — symptoms of..... 488  
 — treatment of..... 490-92  
 Spermatozoa in urine, appear-  
 — ances of..... 1837  
 — pathological indica-  
 — tions of..... 1337  
 Sphincter ani, spasm of..... ll. 149  
 Sphincters, palsy of..... 16  
 — their states in palsy..... 44  
 Spinal column, diseases of..... 938-66  
 — causes of..... 938-8  
 — examination of..... 938  
 — inflammation and caries of..... 952-6  
 — treatment of..... 955-6  
 — nervous or painful af-  
 — fections of. See, also, Rachi-  
 — pathological relations of..... 938-5  
 Spinal column and cord, *Bibliog.*  
 — and *Refer.*..... 973-6  
 Spinal cord, apoplexy of the..... 968, 9  
 — prognosis of..... 969  
 — treatment of..... 969  
 — compression of, symptoms of..... 951  
 — lesions produced by..... 951  
 — treatment of..... 951  
 — the functions of..... 956  
 — hemorrhage in or upon the  
 — inflammation of. See, also,  
 Myelitis..... 961  
 — appearances caused by in-  
 — flammation of..... 962  
 — inflammation of its mem-  
 — branes. See, also, Meningitis  
 Spinaia..... 957-61  
 — chronic inflammation of its  
 — membranes..... 959, 60  
 — following the acute..... 960  
 — illustrative cases of..... 960  
 — structural lesions of..... 966  
 — of dura mater of..... 966  
 — of its membranes..... 966  
 — mechanism and functions  
 — of..... 43  
 — states of, in rabies..... 624  
 — reflex actions and sym-  
 — pathies of..... 40  
 — tumours of various kinds  
 — affecting the..... 969  
 — diagnosis and progno-  
 — sis of..... 972, 3  
 — symptoms caused by..... 971  
 — treatment of..... 973  
 Spinal curvatures, described..... 938-40  
 — treatment of..... 940  
 Spinal irritation, described..... 945, 6  
 — treatment of..... 948-50  
 Spinal meningitis, described..... 957, 8  
 — chronic, described..... 959  
 — symptoms of..... 959  
 — treatment of..... 964  
 Spinal nerves, effects of pres-  
 — sure on the roots of the..... 40  
 Spinal neuralgia, described..... 945  
 — treatment of..... 948  
 Spina Ventosa, noticed..... ll. 1060  
 Spine. See, also, Spinal Column  
 — pathological relations of..... 938-5  
 — curvature of the, described..... 938-40  
 — causes of..... 940  
 — consequences of..... 939  
 — prognosis of..... 940  
 — curvatures of, of couches  
 — and instruments for..... 943, 4  
 — treatment of..... 940-43  
 — treatment advised..... 942  
 — history of their treat-  
 — ment..... 940  
 — hygienic treatment ad-  
 — vised for..... 943  
 — anterior curvature of..... 939  
 — lateral curvature of..... 939  
 — treatment..... 941  
 — posterior curvature of..... 938  
 — inflammation and caries of..... 952-4  
 Spiritus Ætheris Hydro-  
 chlorici..... F. 676. Ap. 26  
 — Ammonie Ansatui F. 677. Ap. 26  
 — Castorei Ammonia-  
 — tis..... F. 678. Ap. 26  
 — Castorei Comp..... F. 679. Ap. 26  
 — Terobinthiatus..... F. 680. Ap. 26  
 — Comp..... F. 681. Ap. 26  
 Spirometer, of the use of the, in  
 — diagnosis of phthisis..... 1197  
 Spleen, abscess of..... 982  
 — alterations of its colour..... 992  
 — fibrous structure..... 990  
 — apoplexy of the..... 993  
 — atrophy of..... 992  
 — *Bibliog. and Refer.*..... 995  
 — congestion of the..... 980  
 — cystic formations in the..... 995  
 — diseases of the..... 976-95  
 — causes of..... 978  
 — change of air, &c., for  
 — diet and regimen for..... 995  
 — enlargement of..... 991  
 — hemorrhage in the..... 993  
 — hypertrophy of..... 991  
 — induration of..... 991  
 — purulent infiltration of..... 992  
 — inflammation of, *synonymes*  
 — and *definition* of. See, also,  
 Splenitis..... 981  
 — morbid formations in..... 992  
 — organic lesions of the..... 990-94  
 — their causes..... 990  
 — proximate causes of  
 — the..... 993  
 — diagnosis of..... 994  
 — prognosis of..... 994  
 — their treatment..... 994  
 — physiological pathology of..... 977  
 — painful affection of..... 980  
 — softening of the..... 991  
 — structure and functions of..... 976  
 — tubercular matter in..... 993  
 — tumours of..... 992  
 — turgescence of the..... 980  
 — *definition* and *syn-*  
 — *onyms* of..... 980  
 — treatment of..... 981  
 Splenalgia, *definition* and *syn-*  
 — *onyms* of..... 980  
 — treatment of..... 980  
 Splenitis, causes of..... 981  
 — in children..... 984  
 — complications of..... 985  
 — treatment of..... 988  
 — *definition* of..... 981  
 — diagnosis of..... 985  
 — prognosis of..... 985  
 — remedies advised for..... 986-8  
 — sequelae, treatment of..... 987  
 — treatment advised by pre-  
 — vious writers..... 987  
 — chronic, described..... 983  
 — terminations of..... 984  
 — treatment of..... 987  
 — and sub-acute, treat-  
 — ment of..... 987  
 — asthenic or consecutive, de-  
 — scription of..... 988  
 — acute, appearances after  
 — death..... 982  
 — symptoms of..... 982  
 — terminations of..... 983  
 — treatment of..... 986, 7  
 Spurred Rye, injurious effects of  
 Sputa, signs according to their  
 — states..... 1094  
 Squamous eruptions, classifica-  
 — tion of..... 520  
 — pathology of..... 526  
 — treatment of..... 526-30  
 Stammering, causes of..... 1501  
 — considered..... 1504  
 — described..... 1503  
 — treatment of..... 1506  
 States of morbid action..... i. 659  
 Statistics, fallacious, of vaccina-  
 — tion..... 1424  
 Sterility, causes of..... ll. 373  
 — *definition* of..... ll. 369  
 — pathology of..... ll. 373  
 — treatment of..... ll. 374  
 — *Bibliog. and Refer.*..... ll. 376  
 Sternum, depression of..... i. 367  
 Sthenic Inflammation de-  
 — scribed..... ll. 426-38  
 — nature of..... ll. 462  
 Stimulants, enumeration and ar-  
 — rangement of..... 1146  
 — and antispasmodics in lu-  
 — sanity..... ll. 613  
 Stomach, alterations of its capa-  
 — city..... 1016  
 — *Bibliog. and Refer.*..... 1017, 18  
 — cancerous disease of the,  
 — symptoms of..... 1013  
 — treatment of..... 1014  
 — catarrh of..... ll. 3-0  
 — diseases of the..... 996-1017  
 — complicating phthisis..... 1211  
 — disorganization of..... 1010  
 — foreign bodies in..... 1017  
 — hemorrhage from..... ll. 105-113  
 — hypertrophy of its coats..... 1016  
 — inflammation of. See, also,  
 Gastritis..... 1000  
 — causes of..... 1000  
 — organic lesions of, described  
 — painful affections of the.  
 — See, also, Gastrodynia..... 997  
 — perforation and rupture of  
 — the, from corrosive poisons,  
 — diagnosis of..... 370  
 — perforation from ulceration  
 — of, described..... 1008  
 — treatment of..... 1010  
 — rupture or ulceration of its  
 — coats..... 1016  
 — softening of, treatment of..... 1011  
 — appearances after death  
 — described..... 1010  
 — its symptoms..... 1010  
 — ulceration of, described..... 1008  
 — symptoms of..... 1009  
 — treatment of..... 1010  
 — wounds of..... 1016  
 Stomatitis, *Bibliog. and Refer.*..... 1024  
 — *definition* and *synonymes*..... 1018  
 — phagedenica, described..... 1022  
 — literary history of..... 1022  
 — symptoms and diag-  
 — nosis of..... 1022, 3  
 — treatment of..... 1023, 4  
 — mercurialis, described..... 1020  
 — pseudo-membranacea, de-  
 — scription and diagnosis of..... 1019  
 — causes of..... 1020  
 — treatment of..... 1020  
 — simplex, described..... 1018  
 — treatment of..... 1019  
 — ulcerata, described..... 1021  
 — treatment of..... 1021  
 Stomatorrhagia. See, also, Hæm-  
 — orrhage from the mouth..... ll. 94  
 Stone-pock, described..... l. 35  
 Stools, biliary, &c..... 1085  
 — blood discharged in..... 1085  
 — signs of disease furnished  
 — by..... 1084-6  
 — serous, puriform, fatty, &c. 1085, 6  
 Strabismus, description of..... 14  
 Stramonium, poisoning by..... 450  
 — treatment of..... 468  
 Strangulation of the intestines..... i. 698  
 Strangury, described..... 1353  
 Strobila of *Tenia solium* de-  
 — scribed..... 1528  
 Strobila of tape-worm described..... 1526  
 Strongylus, systematic descrip-  
 — tion of the genus..... 1536  
 — gigas, systematic descrip-  
 — tion of..... 1536  
 — symptoms of..... 1536  
 — treatment of..... 1551  
 Structural changes produced by  
 — age..... l. 51  
 — Structure, softening of..... 922  
 — of tape-worms described..... 1526  
 Structures, areolar and others,  
 — hemorrhage into..... ll. 143  
 — their contamination from  
 — absorption of morbid matters  
 — into the blood..... l. 28  
 — diseased, absorption from..... l. 29  
 — morbid states of, ought to  
 — be altered, &c..... 1141  
 Struma. See, also, Scrofula..... l. 797-837

- Strychnia, appearances after death from ..... 413
- Strychnine, symptoms of poisoning by ..... 411
- Stuttering, considered ..... 1301
- treatment of ..... 1506
- Stye described ..... i. 1250
- Sub-acute, acceptance of ..... i. 683
- Succession of the trunk as a means of diagnosis ..... 1024
- Suckling. See, also, Lactation. ii. 772
- Suicidal insanity described. ii. 636-48
- Suicidal monomania. ii. 650
- *Bibliog. and Refer.* ..... ii. 655
- causes of its frequency ..... ii. 644
- exciting causes of ..... ii. 648
- circumstances and occasions of ..... ii. 636
- predisponent circumstances of ..... ii. 643
- indications of cure in ..... ii. 652
- physical means of cure of ..... ii. 652
- described. See, also, Insanity, Suicidal ..... ii. 636
- causes and occasions of ..... ii. 636
- epidemic occurrences of ..... ii. 640
- in connexion with mental disease ..... ii. 637-43
- pathology of ..... ii. 649
- physiological ..... ii. 649
- influence of systems of philosophy in causing ..... ii. 644
- prevention and repression of ..... ii. 654, 5
- prognosis of ..... ii. 651
- simulated ..... ii. 648
- statistics of ..... ii. 646, 8
- surveillance and restraint. ii. 673
- treatment of ..... ii. 652
- Suicide, interesting case of attempted ..... ii. 641
- modes of committing ..... ii. 647
- by murderers ..... ii. 642
- mutual or associated ..... ii. 642
- Sulphur, of its combinations in phthisis ..... 1273
- with magnesia recommended for rheumatism ..... 691
- Sulphureted hydrogen gas, symptoms of poisoning by ..... 473
- Sulphurets, alkaline, poisoning by ..... 436
- treatment of ..... 436
- Suppositorium Oplatum F. 682. *Ap. 26*
- Plumb Comp. .... F. 683. *Ap. 26*
- Suppressed hemorrhoids, re-establishment of ..... ii. 155
- Suppression of the menses ..... ii. 968
- of urine, described ..... 1353
- symptoms of ..... 1354
- treatment of ..... 1355
- Suppuration. See, also, Abscess ..... i. 15
- in the brain ..... i. 262
- the result of inflammation. ii. 437
- in the liver, description of ..... ii. 850-2
- consequences and terminations of ..... ii. 850-2
- Supra-renal bodies, *Bibliog. and Refer.* ..... 1572
- functions of ..... 1560
- diseases of, definition of ..... 1561
- prognosis of ..... 1562
- structural ..... 1560
- symptoms and diagnosis of ..... 1561
- lesions of, enumerated and described ..... 1565
- connected with bronzing of the skin ..... 1562
- structure of, described ..... 1565
- table of cases illustrating organic diseases of ..... 1568
- treatment of ..... 1572
- Surface of the body, appearances of, in disease ..... 1059
- Swelling indicates organic disease in the region of the liver. ii. 873
- Swooning. See, also, Fainting. i. 1024
- feigned ..... i. 1082
- Sycosis, causes of ..... 1026
- definition and synonyms ..... 1024
- description of ..... 1025
- Sycosis, diagnosis and symptoms of ..... 1025
- treatment of ..... 1026, 7
- Sympathetic associations of disorders, arrangement of ..... 1029, 30
- described, &c. See, also, Sympathy ..... 1027-53
- disorders of animal motion ..... 1053
- of sensation ..... 1052
- Sympathies influenced by age ..... 1035
- circumstances influencing ..... 1035
- healthy and morbid classification of ..... 1029, 30
- agency of ganglionic nerves in ..... 1030-33
- direct nervous ..... 1034
- the media or channels of ..... 1030-35
- depending on the sexual organs ..... 1053, 5
- influenced by physical power, occupations, &c. .... 1035
- by race ..... 1035
- of sensation and sensibility ..... 1052, 3
- influenced by sex ..... 1035
- by temperament, &c. .... 1035
- morbid, arrangement of ..... 1029, 30
- of the brain and digestive organs ..... 1040
- of circulation ..... 1038
- special consideration of ..... 1036
- defined ..... 1030
- of the heart and lungs ..... 1038
- media of ..... 1033
- of the digestive organs, &c. .... 1038
- implicating the digestive and assimilating organs ..... 1036
- of the hepatic organs and functions ..... 1036-7
- of the urinary organs and functions ..... 1037
- of respiration ..... 1038, 39, 40
- reflex, remarks respecting ..... 40, 1034
- definition and synonyms ..... 1027
- from morbid states of the circulation ..... 1034
- from contiguity ..... 1034
- from continuity of surface or tissue ..... 1034
- kinds of, described ..... 1028
- from indirect modes or media ..... 1034
- from vascular communications ..... 1034
- direct and reflex, described ..... 1027, 8
- reflected ganglionic ..... 1034
- reflected by spinal nerves from ganglionic irritation ..... 1034
- reflected phenomena of mind ..... 1034
- reflected from the organs of sense by the cerebro-spinal system ..... 1034
- of reflex, note on ..... i. 918
- and sympathetic associations of disease, *Bibliog. and Refer.* ..... 1055
- Symptomatic abscess ..... i. 18
- Symptomatology, &c. .... 1056-99
- *Bibliog. and Refer.* ..... 1099, 1100
- classification of ..... 1057
- Symptoms of disease, history of ..... 1056-99
- caused by organic lesions of heart ..... 1056, 7
- furnished by the female sexual organs ..... 1098
- by the male sexual organs ..... 1097
- prognostic of continued fevers ..... i. 1132-36
- prominent, in fever, of their treatment ..... i. 1077-79
- when urgent or distressing ought to be palliated ..... 1143
- Syncope described. See, also, Fainting ..... i. 1024
- treatment of, described ..... i. 1027
- Synchochoid fever, causes of ..... i. 1184
- exciting causes of ..... i. 1167
- predisposing causes of ..... i. 1166
- Synchochoid fever, with bronchial complication ..... i. 1163
- with cerebral complication ..... i. 1164
- with enteric complication ..... i. 1165
- with gastric complication ..... i. 1165
- treatment of its complication ..... i. 1203
- definition of ..... i. 1162
- description of ..... i. 1162
- circumstances influencing or modifying ..... i. 1168
- determining influences of ..... i. 1168
- mortality in ..... i. 1167
- prognosis and terminations of ..... i. 1185
- severe or complicated ..... i. 1163
- terminations of ..... i. 1186
- treatment of ..... i. 1202
- mild or simple ..... i. 1162
- Synchochoid puerperal fever, origin and symptoms of ..... 567
- Synchochoid and typhoid fevers, organic lesions from ..... i. 1188-90
- pathological conclusions as to ..... i. 1190
- Synopsis of classification of poisons ..... 482, 3
- Synovial-membrane affected in acute and sub-acute rheumatism ..... 669-70
- Syphilis, its antiquity contended for ..... 1450
- dates of its first appearance in various parts of Europe ..... 1460
- *Bibliog. and Refer.* ..... 1492
- concurring, aiding, or determining causes of ..... 1479
- efficient cause of ..... 1478
- predisposing causes of ..... 1479
- in children ..... 1472
- diagnosis of ..... 1476
- history of ..... 1459
- immunity from, produced by its inoculation ..... 1480
- its importation from Africa into Spain ..... 1460
- from America asserted and disproved ..... 1450
- of infants and children, treatment of ..... 1480
- inferences as to its origin, propagation, varieties, and pathology ..... 1481
- of its introduction into Europe by the Moors and Jews ..... 1460
- the use of iodine in, first prescribed by the author ..... 1483
- literary history of ..... 1450
- the origin of, independently of gonorrhœa ..... 1461
- testimonies in support of its origin in Europe ..... 1451
- the prevention of its constitutional contamination ..... 1483
- prognosis of ..... 1477
- synonyms and definition ..... 1451
- treatment of ..... 1486
- history of ..... 1482
- by inoculation ..... 1489
- varieties of, described ..... 1473
- African, described ..... 1474
- Ethiopian, described ..... 1474
- congenital, described ..... 1480
- author's experience respecting ..... 1481
- constitutional, diagnosis of ..... 1476
- of iodine for ..... 1483
- treatment of ..... 1483
- hereditary, described ..... 1472
- primary, description of ..... 1465
- diagnosis of ..... 1465
- of mercury in ..... 1483
- treatment of ..... 1483
- non-mercurial ..... 1485
- secondary, described ..... 1466
- diagnosis of ..... 1472
- effects of ..... 1466
- symptoms of described ..... 1467
- treatment of ..... 1485
- local ..... 1487
- tertiary, diagnosis of ..... 1472
- symptoms of described ..... 1472
- treatment of ..... 1487
- Syphilitic eruptions described .. 1466



- Syphilitic squamous eruptions, treatment of..... 1467  
 — ulcers in the female..... 1465  
 Syphilization, its history and description..... 1489  
 — as a preventivo and cure..... 1489  
 Syphiloid affections described. See also varieties of Syphilis. 1467-8  
 Syrupus Antimonialis. F. 935. Ap. 34  
 — Belladonnae..... F. 684. Ap. 26  
 — Morphia Acetatis. F. 685. Ap. 26  
 — Morphia Sulphatis F. 686. Ap. 26  
 — Papaveris..... F. 687. Ap. 26  
 — Potassii Sulphureti F. 688. Ap. 26  
 — Quinae..... F. 689. Ap. 26  
 — Rhel Compositus. F. 690. Ap. 26  
 — Senna et Mannæ. F. 691. Ap. 26  
 — Sulphureti Sodii. F. 692. Ap. 26
- T.  
 Tabes, definition of..... 1100  
 — dorsalis, description of..... 1100  
 — treatment of..... 1101  
 — mesenterica. See, also, Mesenteric disease..... ii. 983  
 Tania, inferences respecting the treatment of..... 1544  
 — kamala-powder, &c., a remedy against..... 1555  
 — male fern and pomegranate-bark combined for..... 1553  
 — various anthelmintic medicines advised for..... 1554  
 — methods of treating with kousso..... 1554  
 — with male fern..... 1551  
 — with pomegranate-bark..... 1552  
 — with oil of turpentine..... 1553  
 — various drastic purgatives advised for..... 1554  
 — symptoms of..... 1546  
 — treatment of, with pomegranate-bark and male fern combined..... 1552  
 — preliminary treatment advised for..... 1552  
 — cysticercal stage of, described..... 1527  
 — development of..... 1525  
 — eggs of, notices of..... 1526  
 — embryos of, described..... 1525  
 — their generation and growth..... 1526  
 — nature, origin, and development of..... 1526  
 — experiments with various medicines on..... 1550  
 — metamorphosis of..... 1526  
 — six-hooked brood of..... 1525  
 — description of their structure..... 1528  
 — symptoms and diagnosis of..... 1533  
 — of their treatment..... 1550  
 — vesicular condition of..... 1525  
 Tania lata, description of. See, also, Worms..... 1530  
 — systematic description of..... 1529  
 — ova and embryos of..... 1529  
 — physiological relations of..... 1530  
 — of its production in man..... 1530  
 Tania medicanelata, systematic description of..... 1532  
 — structure of..... 1533  
 — variety of, from the Cape of Good Hope..... 1532  
 Tania nana, description of..... 1533  
 — serrata, noticed..... 1527  
 Tania solium, proofs of the conversion of the brood of, contained in its eggs, into Cysticercus cellulosa..... 1531  
 — description of..... 1531  
 — systematic description of..... 1530  
 — stages of its development..... 1530  
 — the mature state of, described..... 1528  
 — synonyms of..... 1528  
 Tape-worm colony, or strobila, described..... 1526  
 Tape-worms, treatment of. See, also Tania..... 1550  
 — described. See, also, Tania..... 1526  
 — development of..... 1526
- Tape-worms, generation and growth of..... 1526  
 — of their treatment..... 1550  
 Tartar-emetic, poisoning by..... 431  
 Tartaric acid, poisoning by..... 436  
 — treatment of..... 436  
 Taste, symptoms furnished by..... 1071  
 Taxus baccata, poisoning by..... 477  
 Teeth, signs of disease furnished by..... 1075  
 — by..... 1075  
 Teething, symptoms of..... i. 48  
 Temperament and diathesis, as predisposing to disease..... i. 647  
 — to insanity..... ii. 537  
 — affecting the pulse..... 601  
 Temperature, as predisposing to disease..... i. 649  
 — very high, as a disinfectant..... 275  
 — of respired air, as a sign of disease..... 1092  
 — of the surface of the body in disease..... 1060  
 — of paralyzed parts..... 28  
 — and humidity of climates..... i. 398  
 — cause diseases..... i. 151  
 Tenderness, as a symptom of disease..... 1074  
 Testes, syphilitic affections of the..... 1470  
 — rheumatism of the..... 675  
 Tetanus, appearances after death from..... 1106  
 — in the spinal cord in fatal..... 1107  
 — exciting causes of..... 1113  
 — predisposing causes of..... 1112  
 — of the cerebro-spinal system and membranes in..... 1107  
 — description of..... 1101  
 — diagnosis of..... 1108, 12  
 — from spinal arachnitis..... 1108  
 — from hysteria..... 1108  
 — from rabies..... 1108  
 — of the ganglia and sympathetic nerves in..... 1106  
 — duration of..... 1106  
 — states of injuries causing..... 1113  
 — external means of treating..... 1115, 9  
 — of various internal means for..... 1120, 4  
 — internal and constitutional means of treatment of..... 1119-23  
 — of successive and combined measures..... 1124-26  
 — pathological inferences and remarks respecting..... 1115, 16  
 — period between the infliction of its cause, and appearance of the malady..... 1114  
 — prognosis of..... 1114  
 — of sedatives, narcotics, &c., for..... 1120-23  
 — terminations of..... 1105  
 — treatment of convalescence from..... 1126  
 — local..... 1117, 18  
 — prophylactic..... 1120  
 Tetanus, acute, described..... 1102, 7  
 — of the pulse in..... 1104  
 — spasms of, described..... 1103  
 — the symptoms during..... 1102, 5  
 Tetanus infantum, appearances in fatal cases of..... 1100  
 — causes of..... 1110  
 — description of..... 1109  
 Tetanus, sub-acute or mild..... 1103  
 Tetanus and Trismus, *Bibliog. and Refer.*..... 1126  
 — definition of..... 1101  
 — relations of, to other diseases..... 1110, 12  
 — treatment of..... 1116  
 — general remarks on the treatment of..... 1116, 17  
 Theomania, described..... ii. 324  
 Therapela generalis, a sketch of..... 1128-48  
 Therapeutic agents, classification of..... 1144-5  
 Therapeutics of climate..... i. 411  
 — circumstances retarding the progress of..... 1129-31  
 — principles of..... 1131, 33  
 — *Bibliog. and Refer.*..... 1149, 50
- Therapeutics, principles of, fundamental..... 1131, 33  
 — general..... 1128-48  
 — special..... 1135-44  
 Thoracic duct, lesions of..... ii. 1041  
 Thorax, examination of. See Chest..... i. 865  
 Thorn-apple, poisoning by..... 459  
 — appearances after death from..... 460  
 Thread-worm, description of..... 1537  
 — forms, sex, &c., of..... 1537  
 — symptoms of..... 1537  
 Throat, *Bibliog. and Refer.*..... 1166, 7  
 — structural changes of..... 1163  
 — diseases of the..... 1150-66  
 — hemorrhage from..... ii. 94  
 — inflammation of, diet and regimen for..... 1163  
 — treatment of inflammation of..... 1160-3  
 — inflammation of, with plastic exudation..... 1155  
 — organic lesions, treatment of..... 1165  
 Throat and fauces, signs of disease furnished by..... 1078  
 Throat, relaxed sore..... 1  
 — treatment of..... 1  
 — syphilitic affections of, described..... 1469  
 — syphilitic ulceration of..... 1469  
 Thrush, *Bibliog. and Refer.*..... 1171  
 — causes of..... 1167  
 — definition of..... 1167  
 — forms of..... 1167  
 — history and appearances of..... 1168, 9  
 — symptoms of..... 1167  
 — treatment of..... 1169  
 Thymic asthma described..... ii. 779  
 Tie douloureux described..... ii. 1008  
 Tinæ method of prescribing, for Tania..... 1549  
 — chlorides of, poisoning by..... 888  
 Tinea capitis, *Bibliog. and References*..... 1175  
 — causes of..... 1173  
 — means of cure advised for..... 1174  
 — definition of..... 1171  
 — its forms described..... 1172, 3  
 — treatment of..... 1174  
 Tinea decalvans, &c., described..... 1173  
 Tinea favosa, &c., described..... 1172  
 Tinea tonsurans, description of..... 1172  
 Tinctura Acetatis Ferri Composita..... F. 693. Ap. 27  
 — Acetatis Morphia Composita..... F. 694. Ap. 27  
 — Ætherea Valeriana..... F. 695. Ap. 27  
 — Aloetica Alkalina (Saxon Ph.)..... F. 696. Ap. 27  
 — Alkalina Potassæ. F. 697. Ap. 27  
 — Alkalina Stibiata. F. 698. Ap. 27  
 — Amara..... F. 699. Ap. 27  
 — Ammoniaca Alkalina..... F. 700. Ap. 27  
 — Astringens..... F. 956. Ap. 34  
 — Balsamica..... F. 701, 2. Ap. 27  
 — Balsami Tolutani. F. 703. Ap. 27  
 — Belladonnæ..... F. 704. Ap. 27  
 — Benzoica Anodyna F. 705. Ap. 27  
 — Brucie..... F. 706. Ap. 27  
 — Calami..... F. 707. Ap. 27  
 — Camphore Thibaiacea..... F. 708. Ap. 27  
 — Caryophyllorum..... F. 709. Ap. 27  
 — Cascarille Alkalina..... F. 710. Ap. 27  
 — Castorei Alkalina. F. 711. Ap. 27  
 — Centaurii cacuminum..... F. 712. Ap. 27  
 — Cinchonæ Sulphatis..... F. 713. Ap. 27  
 — Conii..... F. 714. Ap. 27  
 — Digitalis Ætherea F. 715. Ap. 27  
 — Diosmea crenata..... F. 716. Ap. 27  
 — Diuretica..... F. 717. Ap. 27  
 — Ferri Ætherea..... F. 718. Ap. 27  
 — Fructus Vanilla..... F. 719. Ap. 27  
 — Galbani Composita F. 720. Ap. 27  
 — Gallæ..... F. 721. Ap. 27  
 — Iodini Fortior..... F. 722. Ap. 27  
 — Iodini Mitior..... F. 723. Ap. 27

- Tinctura Lobeliae inflato* . . . . . F. 724. Ap. 27  
 — *Myrrhæ Aikalina* . . . . . F. 725. Ap. 28  
 — *Nervosa* (Riemerl) . . . . . F. 726. Ap. 28  
 — *Nucis Vomice* . . . . . F. 727. Ap. 28  
 — *Opil Camphorata* . . . . . F. 728. Ap. 28  
 — *Opil Composita* . . . . . F. 729. Ap. 28  
 — *Phellandril* . . . . . F. 730. Ap. 28  
 — *Quinae Sulphatis* . . . . . F. 731. Ap. 28  
 — *Quinae Sulphatis Acid.* . . . . F. 732. Ap. 28  
 — *Rhatanis* . . . . . F. 733. Ap. 28  
 — *Rhatania Aromatica* . . . . . F. 734. Ap. 28  
 — *Rhel Anisata* . . . . . F. 735. Ap. 28  
 — *Rhodil* . . . . . F. 736. Ap. 28  
 — *Sabinae Aikalina* . . . . . F. 737. Ap. 28  
 — *Senna Amara* . . . . . F. 738. Ap. 28  
 — *Stramonil* . . . . . F. 739. Ap. 28  
 — *Strachale* . . . . . F. 740. Ap. 28  
 — *Tabychi* . . . . . F. 741. Ap. 28  
 — *Tabaci Composita* . . . . . F. 742. Ap. 28  
*Tissue*, fibrous, structural changes of . . . . . i. 1230-2  
 — inflammation of . . . . . i. 1233  
*Tissues*, chondroid fibrous, described . . . . . 782  
 — chiefly affected in measles . . . . . i. 946  
 — metamorphosis or transformation of . . . . . i. 671  
 — mutations of . . . . . i. 671  
 — various transformations of, described . . . . . i. 672, 4  
*Tobacco*, poisoning by, described . . . . . 445  
 — *Virginian*, poisoning by . . . . . 446  
*Tongue*, diseases of the . . . . . 1176-84  
 — diseases of, *Bibliog. and Refer.* . . . . . 1184  
 — symptoms furnished by the . . . . . 1075-8  
 — organic lesions of the . . . . . 1181  
 — cancer of the . . . . . 1182  
 — cancer of, diagnosis . . . . . 1182  
 — treatment of . . . . . 1182  
 — enlargement of the . . . . . 1183  
 — treatment of . . . . . 1184  
 — hæmorrhage from . . . . . 1183  
 — treatment of . . . . . 1183  
 — induration of the . . . . . 1183  
 — treatment of . . . . . 1183  
 — inflammation of, defined . . . . . 1176  
 See, also, Glossitis . . . . . 1176  
 — neuralgia of . . . . . 1176  
 — treatment of . . . . . 1176  
 — paralysis of, described . . . . . 1176  
 — treatment of . . . . . 1176  
 — ulceration of the . . . . . 1181  
 — treatment of . . . . . 1182  
*Tongue* and muscles of speech, palsy of . . . . . 15  
*Tonicity* in connexion with irritability . . . . . ii. 694  
*Tonics* in insanity . . . . . ii. 614  
 — various, advised in scarlet fever . . . . . 764  
 — vegetable, mineral, and saline . . . . . 1145  
*Tonsils*, enlargement of the, &c. . . . . 1152  
 — inflammation of. See, also, Tonsillitis . . . . . 1150-52  
 — signs of disease furnished by . . . . . 1079  
 — structural lesions of the . . . . . 1163  
 — syphilitic affections of . . . . . 1469  
*Tonsillitis*, causes of . . . . . 1151  
 — duration of . . . . . 1151  
 — definition of . . . . . 1150  
 — means of cure advised for . . . . . 1160  
 — symptoms of . . . . . 1151  
 — treatment of . . . . . 1160  
*Toothache*, causes and pathology of . . . . . ii. 1009  
 — described. See, also, Odontalgia . . . . . ii. 1009  
 — varieties of . . . . . ii. 1009  
*Torula* in urine . . . . . 1938  
*Torula cerevisia* in urine . . . . . 1938  
*Touch*, symptoms furnished by the sense of . . . . . 1072  
*Towns* and cities, protection of, from pestilences . . . . . 271, 2  
*Trachea* and larynx, diseases of . . . . . ii. 770  
*Trachea* and larynx, disease of, complicating phthisis . . . . . 1212  
*Tracheitis* infantum. See, also, Croup . . . . . i. 519  
*Trades*, employments, and conditions predisposing to phthisis . . . . . 1229  
*Transformations* of the exhalations and secretions . . . . . i. 669  
 — of tissues . . . . . i. 671  
*Transmission*, direct and reflex, of irritation . . . . . ii. 698  
*Transports*, emigrant vessels, &c., protection of, from pestilence . . . . . 273  
*Travelling*, in first stage of phthisis . . . . . 1253  
*Trematodes*, definition of . . . . . 1540  
*Trembling*, description of. See, also, Tremor . . . . . 1185  
*Trembling-palsy* described . . . . . 25  
*Tremor*, *Bibliog. and Refer.* . . . . 1188  
 — causes of . . . . . 1185  
 — definition of . . . . . 1185  
 — description of . . . . . 1185  
 — diagnosis . . . . . 1187  
 — of drunkards . . . . . 1186  
 — forms of . . . . . 1185  
 — nature of . . . . . 1186  
 — connected with palsy . . . . . 25  
 — prognosis of . . . . . 1187  
 — as a sign of disease . . . . . 1065  
 — treatment of . . . . . 1187  
 — from intestinal worms . . . . . 1186  
 — hysterical, noticed . . . . . 1186  
 — inflammatory . . . . . 1186  
 — metallic, &c. . . . . 1186  
 — paralytic, treatment of . . . . . 48  
 — senile and paralytic . . . . . 1186  
*Trichina spiralis*, the brood of *Tricocephalus dispar* . . . . . 1538  
 — cysts containing, described . . . . . 1537  
 — description of . . . . . 1536  
 — development and seat of . . . . . 1537  
*Trichomonas vaginalis*, described . . . . . 1519  
*Tricocephalus*, *synonymes* of . . . . . 1537  
 — systematic description of . . . . . 1537  
*Tricocephalus dispar*, *synonymes* of . . . . . 1538  
 — systematic description of . . . . . 1538  
*Trismus*, definition of . . . . . 1101  
 — internal treatment of . . . . . 1119  
*Trismus nascentium*, description of . . . . . 1100  
*Trochisci Nitro-Camphorati* . . . . . F. 746. Ap. 28  
*Trochiscus Astringens* . . . . . F. 937. Ap. 34  
 — *Catechu Extracti* . . . . . F. 748. Ap. 28  
 — *Ipecacuanha* . . . . . F. 744. Ap. 28  
 — *Lactuce* . . . . . F. 745. Ap. 28  
 — *Potasse Nitratis* . . . . . F. 747. Ap. 28  
 — *Zinci Sulphatis* . . . . . F. 748. Ap. 28  
*Troops* and armies, protection of, from pestilence . . . . . 272-3  
*Tubercle*, notice of . . . . . i. 676  
*Tubercles*. See, also, Scrofula . . . . . 797-837  
 — alterations associated with . . . . . 823  
 — their chemical composition . . . . . 816  
 — growth and progress of . . . . . 813-15  
 — pathogenesis of . . . . . 817  
 — the pathology of . . . . . 811-17  
 — structure of, described . . . . . 811-13  
 — displayed by the microscope . . . . . 815, 16  
 — of the vascular action causing . . . . . 818  
 — in the brain . . . . . i. 273  
 — in brains of children . . . . . i. 274  
 — in the heart . . . . . ii. 252  
 — in the liver . . . . . ii. 870  
 — in the lungs, distribution of . . . . . 1215  
 — healing process presented by . . . . . 1219  
 — seats of . . . . . 1215  
 — softened and liquefied . . . . . 1217  
 — in the pia-mater . . . . . i. 259  
 — in the pia-mater and arachnoid . . . . . i. 259  
 — in the uterus . . . . . 1402  
*Tubercles* and *Scrofula*, of their identity . . . . . 820  
*Tubercular* constitution predisposes to and influences other maladies . . . . . 822  
*Tubercular* formations in bones . . . . . ii. 1058  
*Tubercular*, syphilitic, eruptions . . . . . 1467  
*Tuberculosis*, means of cure advised for . . . . . 830-5  
 — relative frequency of, at different periods of life . . . . . 825  
 — comparative liability of the sexes to . . . . . 825  
 — comparative manifestations of, in different organs . . . . . 824  
 — prevention of . . . . . 826  
 — treatment of its developed forms . . . . . 829  
 — hygienic . . . . . 826-8  
 — local . . . . . 835  
 — medicinal . . . . . 828-35  
*Tubes*, Fallopian, non-puerperal inflammation of . . . . . 1375  
*Tumefied* leg, feigned . . . . . i. 1036  
*Tumour*, fibrous, described . . . . . 763  
 — chronic mammary . . . . . ii. 934  
 — treatment of . . . . . ii. 935  
 — malignant, of bones . . . . . ii. 1059  
*Tumours*. See, also, Growths . . . . . 769  
 — changes in, during their growth . . . . . 788  
 — effects produced by . . . . . 789  
 — course and progress of . . . . . 790  
 — or growths, reproduction of . . . . . 788  
 — seats or localizations of . . . . . 789  
 — in the brain . . . . . i. 273  
 — of various kinds . . . . . i. 274  
 — sanguineous, in bones . . . . . ii. 1058  
 — in the heart . . . . . ii. 253  
 — in the region of the liver, &c. . . . . ii. 872, 3  
 — of the mamma, adipose . . . . . ii. 934  
 — scrofulous . . . . . ii. 934  
 — cartilaginous or osseous . . . . . ii. 936  
 — cystic and hydatidic . . . . . ii. 936  
 — of the ovaria, encysted and other . . . . . ii. 1065  
 — malignant . . . . . ii. 1065  
 — of nerves . . . . . ii. 1003, 4  
 — various, affecting the spinal cord . . . . . 969  
 — symptoms of . . . . . 971  
 — of the uterus, described . . . . . 1396  
 — diagnosis and symptoms of . . . . . 1399  
 — treatment of . . . . . 1399  
 — atheromatous, described . . . . . i. 45  
 — various means advised for cancerous . . . . . 792-96  
 — desmoid fibrous, described . . . . . 782  
 — fatty, diagnosis of . . . . . 791  
 — fibrous canceroid, described . . . . . 781  
 — hæmorrhoidal, described . . . . . ii. 145-7  
 — treatment of . . . . . ii. 153  
 — malignant and non-malignant, described . . . . . 769-84  
 — melanoid . . . . . i. 45  
 — melicerous . . . . . i. 45  
 — neuromatous fibrous, described . . . . . 782  
 — non-cancerous, prognosis of . . . . . 792  
 — treatment . . . . . 794  
 — scirrhous and others, anatomy of . . . . . 778  
 — defined . . . . . 769  
 — pathological relations . . . . . 784  
 — regimen and diet for . . . . . 795  
 — treatment of . . . . . 792, 6  
 — steatomatous . . . . . i. 45  
 — sarcomatous, described . . . . . 781  
 — syphilitic, noticed . . . . . 1470  
*Turpentine* advised for chorea . . . . . i. 393  
 — spirits of, advised in hæmorrhagic fever . . . . . 204-209  
 — prescribed in hæmorrhages, &c. See *Hæmorrhage, pluries* . . . . . ii. 81  
 — for inflammation . . . . . ii. 475  
 — advised for the several states of puerperal fevers . . . . . 587-98  
 — spirits of, in malignant puerperal fevers . . . . . 588, 9  
 — methods of treating *Tænia* with the oil of . . . . . 1553  
*Turpentine*, of their use in phthisis . . . . . 1273  
 — their use in typhoid fevers . . . . . i. 1211, 24



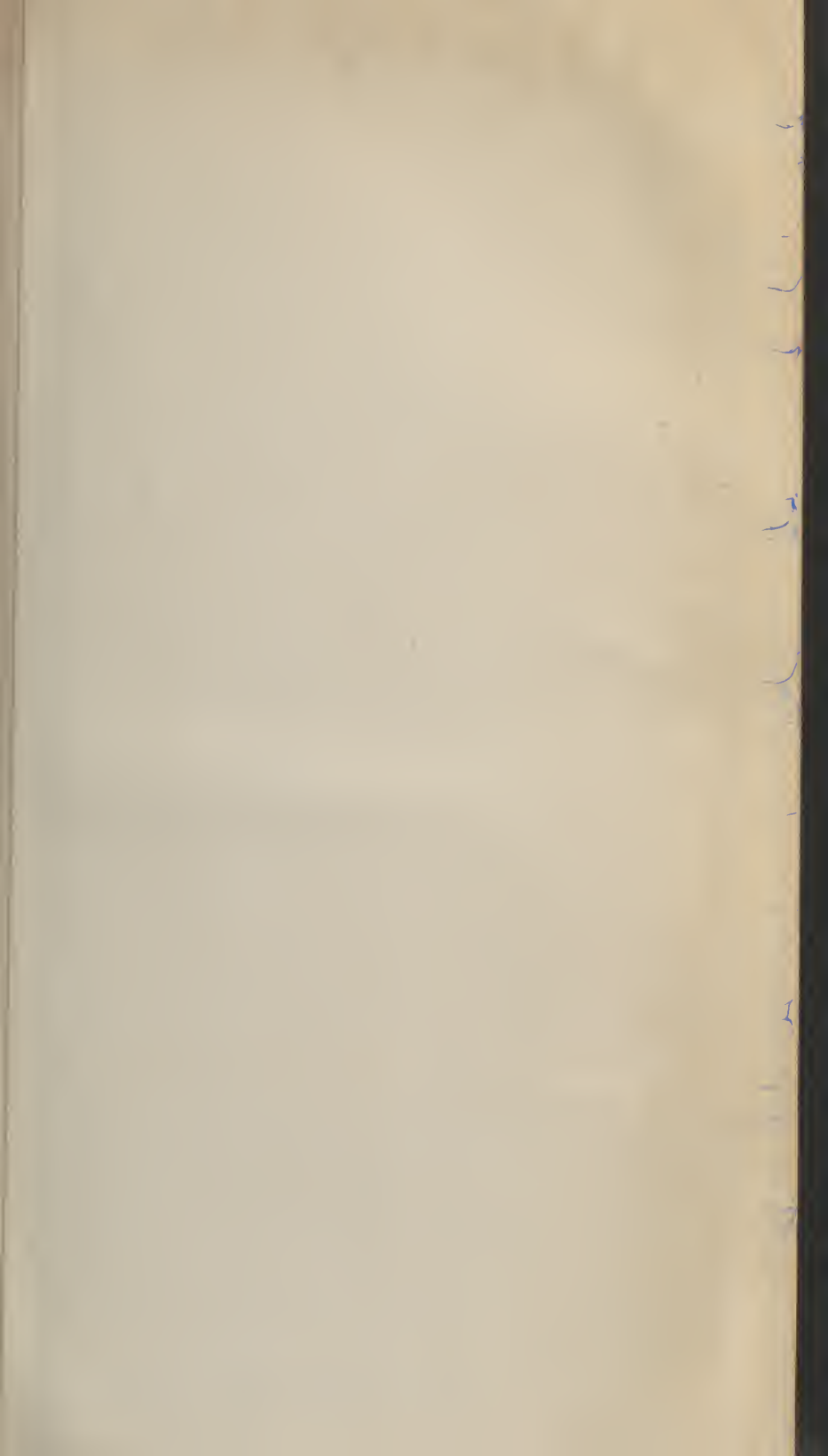
Tusk and cod-liver oil, first recommended by the author for chorea . . . . .	i. 393	Typhoid fever, of certain medicines in the treatment of . . . . .	i. 1205	Urinary Calculi, <i>Bibliog. and Refer.</i> . . . .	1355
Tympanum, deafness from disease of the cavity of, . . . . .	ii. 185	— treatment of the pulmonary complication of . . . . .	i. 1215	— from foreign bodies . . . . .	1347
— from diseases of, . . . . .	ii. 182, 5	— rational . . . . .	i. 1206	Urinary deposits, of the formation, &c. See, also, Deposits, urinary . . . . .	1321-3
Tympanitis, appearances in fatal cases . . . . .	1291	— saline . . . . .	i. 1220	Urinary disorders, feigned . . . . .	i. 1037
— <i>Bibliog. and Refer.</i> . . . .	1292	— appropriate to the stages, . . . . .	i. 1207	Urinary organs, affections of, caused by paraplegia . . . . .	19
— causes of . . . . .	1290	— of tympanitic distention in . . . . .	i. 1211	— hæmorrhage from . . . . .	ii. 122-7
— pathology of . . . . .	1289	— complicated, described . . . . .	i. 1170	— morbid sympathies of . . . . .	1037
— signs and symptoms of . . . . .	1291	— congestive . . . . .	i. 1170	Urine, acids contained in . . . . .	1319, 21
— <i>synonymes and definition of</i> . . . . .	1289	— treatment of its complications . . . . .	i. 1208	— albumen and serum in . . . . .	1325
— treatment of . . . . .	1291	— mild, described . . . . .	i. 1169	— albuminous, after and during scarlet fever . . . . .	741, 2
Tympanitic and emphysematous affections, feigned . . . . .	i. 1036	— nervous, state of . . . . .	i. 1170	— and its deposits, <i>Bibliog. and Refer.</i> . . . .	1357
Types and forms of disease . . . . .	i. 682	— treatment of nervous complication . . . . .	i. 1207	— blood and its elements in the . . . . .	1335
Types of agne described . . . . .	i. 1086	— treatment in the nervous stage . . . . .	i. 1209	— blood-globules in . . . . .	1335
Typhus, causes of, . . . . .	i. 1184	— severe or low . . . . .	i. 1170	— bloody, pathology and treatment of . . . . .	ii. 123-7
— concurring and determining causes of . . . . .	i. 1184, 5	— treatment of the varieties of . . . . .	i. 1208	— calculi or concretions in, described . . . . .	1339-45
— of chlorates, chlorides, &c., in . . . . .	i. 1218	Typhoid fevers, of the use of wine and other stimulants in . . . . .	i. 1222	— chylous, described . . . . .	1337
Typhus fever, description of . . . . .	i. 1182	— U. . . . .	1401	— colouring matter of . . . . .	1320
— exanthematic, described . . . . .	i. 1182	Ulcer, corroding, of the os uteri . . . . .	1401	— the chemical composition of the . . . . .	1318-21
— contagious . . . . .	i. 1181	— sloughing syphilitic, of the throat . . . . .	1469	— and its deposits described . . . . .	1314-38
— modifications and complications of . . . . .	i. 1183	Ulceration of the brain . . . . .	i. 265	— of blue and black matters in the . . . . .	1335
— mortality in . . . . .	i. 1185, 7	— of the digestive canal . . . . .	i. 630	— of organic matters in the . . . . .	1335
— organic lesions from . . . . .	i. 1188-90	— of the heart . . . . .	ii. 222	— states of, in dropsy . . . . .	i. 501
— pathological conclusions . . . . .	i. 1190	— resulting from inflammation . . . . .	ii. 438	— of epithelium in . . . . .	1337
— prognosis, terminations, &c., of . . . . .	i. 1185	— of the intestines from enteritis . . . . .	ii. 673, 6	— diseased excretion of the . . . . .	1353
— of purgatives, &c., in . . . . .	i. 1216	— of the neck of the uterus . . . . .	1367	— of the clinical examination of . . . . .	1321, 2
— stages of . . . . .	i. 1182, 3	— syphilitic, described . . . . .	1464	— gravel in, defined and explained . . . . .	1330
— treatment of the several stages of . . . . .	i. 1214, 15	— of vagina . . . . .	1430	— of the specific gravities of . . . . .	1316
— of stimulants in . . . . .	i. 1217	Ulcers, syphilitic . . . . .	i. 1037	— confervoid and fungoid growth in . . . . .	1338
— of turpentine in . . . . .	i. 1214	— syphilitic, in the female . . . . .	1465	— hamatous in the . . . . .	1336
— terminations of . . . . .	i. 1186	— primary syphilitic, described . . . . .	1464	— hydatids in the . . . . .	1328
— of tonics, &c., in . . . . .	i. 1217	Umbilical vein, inflammation of	1441	— containing oxalate of lime . . . . .	1285
— of antiphlogistic treatment in . . . . .	i. 1215	Unguents	F. 938, Ap. 34	— mellitic. See, also, Diabetes . . . . .	i. 783
— of certain medicines in the treatment of . . . . .	i. 1215-24	Unguentum Antimonii Potassio Tartratis, vel Ferbrifugum . . . . .	F. 749, 50, 1. Ap. 25	— morbid, feigned . . . . .	i. 1037
— treatment of the premonitory and invading stages . . . . .	i. 1214	— Argenti Nitratii . . . . .	F. 752, Ap. 25	— mucous in, its appearances . . . . .	1337
— treatment of irregular forms of . . . . .	i. 1214	— Balsami Peruviani F. 753, Ap. 28		— of oily or fatty matter in . . . . .	1337
Typhus gravior, or true . . . . .	i. 1181	— Belladonnæ . . . . .	F. 754, 5, Ap. 28	— states of, in organic diseases of the liver . . . . .	ii. 874
Typhoid fevers and typhus, <i>Bibliog. and Refer.</i> . . . .	i. 1228, 80	— Calomelanos et Camphoræ . . . . .	F. 756, Ap. 28	— pathological relations of blood, or its elements, in the . . . . .	1335, 6
Typhoid fevers, of chlorides, &c., in . . . . .	i. 1218	— Calomelanos cum Camphorâ . . . . .	F. 757, Ap. 28	— original views of author as to the pathology of . . . . .	1314-16
— of cinchona and quinine in . . . . .	i. 1217	— Camphoræ Compositum . . . . .	F. 758, Ap. 28	— physiological and pathological relations of the . . . . .	1314-18
— defined . . . . .	i. 1168	— Comitissæ . . . . .	F. 759, Ap. 28	— containing the phosphates, characters of . . . . .	1330, 32
— of external means for . . . . .	i. 1224	— Cupri Acetatis . . . . .	F. 760, Ap. 28	— phosphatic, from diseased bladder . . . . .	1334
— of the use of fermented liquors in . . . . .	i. 1223	— Decobtruenæ . . . . .	F. 761, 2, Ap. 29	— pathological states and relations of . . . . .	1332-4
— of the use of opium in . . . . .	i. 1222	— Gallæ Opilatum . . . . .	F. 763, Ap. 29	— therapeutical indications from . . . . .	1334-5
— of petechiæ and exanthematic eruptions in . . . . .	i. 1172	— Gallæ Opio-Camphoratæ . . . . .	F. 764, Ap. 29	— purulent matter in, its appearances . . . . .	1336
— of purgatives in . . . . .	i. 1216	— Hypochloridis Sulphuris . . . . .	F. 765, Ap. 29	— state of, in rheumatism . . . . .	676
— of regimen and diet in . . . . .	i. 1214	— Iodini . . . . .	F. 767, Ap. 29	— in rickets . . . . .	765
— treatment of . . . . .	i. 1202	— Iodini Opilatum . . . . .	F. 768, Ap. 29	— salts contained in . . . . .	1320
Typhoid fever, with cerebro-spinal complication . . . . .	i. 1170	— Iodidi Hydrargyri . . . . .	F. 769, Ap. 29	— appearances of the, in scarlet fever . . . . .	741
— treatment of . . . . .	i. 1209	— Iodidi Plumbi . . . . .	F. 770, Ap. 29	— serous or albuminous . . . . .	1335
— with congestive complications . . . . .	i. 1174	— Nervinum . . . . .	F. 771, Ap. 29	— signs furnished by . . . . .	1096
— with gastric and enteric complications . . . . .	i. 1170	— Populeum . . . . .	F. 772, Ap. 29	— furnished by its excretion . . . . .	1096
— with malignant characters . . . . .	i. 1175	— Populeum Compositum . . . . .	F. 773, Ap. 29	— quantity of solid materials in . . . . .	1317
— with petechiæ . . . . .	i. 1173	— ad Porriginem . . . . .	F. 774, 5, Ap. 29	— spermatozoa in, appearances of . . . . .	1337
— with putro-adyamic characters . . . . .	i. 1173	— Sulphureti Iodini . . . . .	F. 776, Ap. 29	— pathological relations and indications of . . . . .	1337
— treatment of . . . . .	i. 1211	— Zinci Iodatis . . . . .	F. 777, Ap. 29	— suppression of . . . . .	1352
— complicated with affection of the respiratory organs . . . . .	i. 1170	Unnatural positions cause disease . . . . .	i. 150	— symptoms of . . . . .	1354
— of the antiphlogistic treatment of . . . . .	i. 1216	Urea, sources, quantity of the . . . . .	1318	— in scarlet fever . . . . .	738
— treatment of enteric complication . . . . .	i. 1210	Urea, uric acid and urates in the blood productive of disease of joints . . . . .	i. 238-40	— treatment of . . . . .	1356
— in the stage of excitement . . . . .	i. 1207	Uric acid, source, &c., of . . . . .	1319	— of the tints of the . . . . .	1317
— of the intestinal complication . . . . .	i. 1209	— and its combinations, diagnosis of . . . . .	1322, 3	— containing uric acid and its combinations . . . . .	1422
		— pathological relations of . . . . .	1324, 5	— worms in the . . . . .	1338
		Urinary bladder, diseases of. See Bladder . . . . .	1293-1313	Uro-cystitis, <i>definition of</i> . . . . .	1300
		— palsy of . . . . .	16	Urticaria, causes of . . . . .	1359

- Urticaria, complications of. .... 1350  
   description of. .... 1358  
   diagnosis and prognosis of. .... 1359, 60  
   treatment of. .... 1360  
   varieties of. .... 1358  
 Uterine appendages, their inflammation after parturition. .... 566  
   sometimes the origin of syn-  
   chooid puerperal fevers. .... 567  
   diseases, feigned. .... 1. 1029  
   hemorrhage during deliv-  
   ery. .... ii. 132  
   In the puerperal states. .... 130-3  
   phlebitis, symptoms and  
   history of, in the puerperal  
   state. .... 568-70  
 Uterus, *Bibliog. and Refer.* .... 1412  
   cancer of, causes of. .... 1402-7  
   forms of, described. .... 1403  
   symptoms of. .... 1405  
   treatment of. .... 1407  
   changes in, after parturition  
   tubercular degeneration of  
   descent of the. .... 1402  
   deviations of, symptoms of  
   treatment of. .... 1393  
   displacements of the. .... 1387  
   enlargement of the body of  
   fatty formations of the. .... 1402  
   flexions of the. .... 1391  
   treatment of. .... 1393  
   hemorrhage from. .... ii. 127-10  
   hypertrophy of its neck. .... 1367  
   treatment of hypertrophy  
   and induration of its neck. .... 1381  
 Uterus, inflammations of. See,  
 also, Metritis. .... 1365  
   complications of the. .... 1379  
   treatment of. .... 1380  
   of its body. See, also,  
 Metritis, non-puerperal. .... 1371  
   of its cervix in ad-  
   vanced life. .... 1370  
   after parturition  
   or abortion. .... 1370  
   during pregnan-  
   cy. .... 1370  
   in the unmarried  
   of its cervix and os,  
   described. .... 1365  
   gonorrhoeal inflammation of  
   treatment of. .... 1386  
   inflammation of its neck,  
   changes consequent on. .... 1367  
   constitutional symp-  
   toms of. .... 1369  
   treatment of. .... 1379-81  
   during and after  
   pregnancy. .... 1381  
   inflammation of the neck  
   and mouth of, lesions conse-  
   quent upon. .... 1366  
   causes of. .... 1366  
   symptoms of. .... 1366  
   inflammation of its inter-  
   nal surface. .... 1371  
   treatment of. .... 1384  
   inflammation of, during  
   pregnancy. .... 500  
   treatment of. .... 500  
   specific inflammations of. .... 1386  
 Uterus, inversion of the. .... 545  
   causes of. .... 545  
   symptoms and diagno-  
   sis of. .... 1394-5  
   treatment of. .... 545, 1395  
   involution of. .... 1375  
   irritable, described. .... 1361  
   symptoms of. .... 1361  
   nature of. .... 1363  
   treatment of. .... 1364  
   neuralgia of, causes of. .... 1362  
   described. .... 1362  
   diagnosis and progn-  
   sis of. .... 1362  
   its treatment. .... 1364  
   non-puerperal diseases of  
   the. .... 1361  
   morbid sensibility of. .... 1361  
   polypi of, symptoms. .... 1396  
   treatment of. .... 1398  
   fibrous polyp of. .... 1398  
   symptoms. .... 1399  
 Uterus, follicular polypi. .... 1397  
   mucous polyp of. .... 1397  
   complex polypus of. .... 1398  
   treatment of. .... 1398  
   retroflexions of. .... 1391  
   treatment of. .... 1393  
   rupture of the. .... 542  
   cause of. .... 542  
   symptoms of. .... 543  
   terminations of. .... 544  
   treatment of. .... 544  
   spasm, pain, etc., of the,  
   during pregnancy. .... 499  
   treatment of. .... 500  
   sometimes the origin of  
   synchooid puerperal fevers. .... 567  
   tumours of the, described. .... 1398  
   symptoms of. .... 1399  
   treatment of. .... 1400  
   diagnosis. .... 1399  
   ulceration of the neck of the  
   syphilitic ulceration of the  
   neck of. .... 1267  
   treatment of. .... 1267  
 Uvula, elongation of the. .... 1  
   treatment. .... 1  
   relaxation of the. .... 1  
   treatment. .... 1  
 V.  
 Vaccination, its benefits some-  
   what over estimated. .... 905  
   *Bibliog. and Refer.* .... 1427  
   description of. .... 1414  
   decadence of the protective  
   influence of. .... 1421  
   fallacious statistics of. .... 1416  
   history of. .... 1415  
   imperfect. .... 1422  
   operative measures for. .... 1425  
   the protection from, not  
   always persistent. .... 905  
   partial protection of. .... 1422  
   of revaccinating. .... 1423  
   notices of small-pox after. .... 1422  
 Vaccine-lymph, of its preserva-  
   tion. .... 1423  
 Vaccinia, defined and described  
   history, &c., of. .... 1414  
   nature of. .... 1415  
   inferences as to. .... 1420  
   protective influence of. .... 1420  
 Vagina, *Bibliog. and Refer.* .... 1420  
   contraction and obliteration  
   of. .... 1430  
   discharges from, during  
   pregnancy. .... 499  
   treatment of. .... 499  
   diseases to which it is lia-  
   ble. .... 1429  
   gangrene of the. .... 545  
 Vagina, inflammation of, de-  
   scribed. See, also, Vaginitis. .... 1423  
   symptoms of. .... 541  
   terminations of. .... 544  
   treatment of. .... 545  
   chronic inflammation of the  
   perforations of the. .... 1430  
   rupture of the. .... 542  
   symptoms of. .... 543  
   treatment of. .... 544  
   ulcerations of, described. .... 1431  
 Vagina and Vulva, diseases of,  
   described. .... 1428  
 Vaginitis, causes of. .... 1429  
   complications of. .... 1430  
   consequences of. .... 1429  
   defined and described. .... 1428  
   treatment of. .... 1430  
   acute, described. .... 1429  
   asthenic, described. .... 1429  
   treatment of. .... 1431  
   chronic, described. .... 1430  
   gonorrhoeal, noticed. .... 1429  
   treatment of. .... 1431  
   phlegmonous, described. .... 1429  
 Valves of the heart, rupture of  
   the. .... ii. 250  
   causes of. .... ii. 250  
   symptoms of their disease. .... ii. 212, 13  
   treatment of hypertrophy  
   from diseased. .... ii. 243  
 Varicella, description of. .... i. 369  
 Variola. See, also, Small-pox. .... 883  
   discreta, described. .... 885  
   sine eruptione. .... 888  
 Vascular action, the states of, to  
   be closely observed in connex-  
   ion with vital power. .... 1134  
 Vascular system, the relations  
   of its diseases to cachectic ne-  
   phritis. .... ii. 747  
   severe disorder of, in rela-  
   tion to gastro-enteritis. .... ii. 31  
   changes in, causing hemor-  
   rhage. .... ii. 74  
 Vegetable acids, poisoning by. .... 388  
 Vegetable molecules, injurious  
   effects of. .... i. 163  
 Veins, alterations of their calibre  
   cancer of the. .... 1442  
   diseases of the. .... 1436  
   entozoa in. .... 1451  
   fatty, suety, or atheroma-  
   tous deposits in. .... 1451  
   gaseous fluids in. .... 1451  
   inflammations of the. See,  
   also, Phlebitis. .... 1437  
   treatment of. .... 1442  
   lesions of their coats. .... 1450  
   lymph found in. .... 1448  
   obliterations and contrac-  
   tions of. .... 1450  
   ossific deposits in. .... 1451  
   perforation and ulceration  
   of. .... 1450  
   pus found in. .... 1448  
   structural lesions of, de-  
   scribed. .... 1447  
   symptoms furnished by. .... 1437  
 Vena cava, inflammation of. .... 1441  
   obliteration of. .... 1441  
 Vena portæ, inflammation of. .... 1441  
 Venæsection, &c., of recourse to,  
   in phthisis. .... 1274  
 Venereal acne described. .... i. 36  
 Venereal diseases, *Bibliog. and  
   Refer.* .... 1492  
   defined. .... 1451  
   their history. .... 1459  
 Venous sinuses of the vertebrae,  
   congestion of the. .... 40  
 Ventilation, requisite attention  
   to, insisted upon. .... 266  
 Ventricles of the heart, organic  
   changes of the. .... ii. 285  
   terminations and prog-  
   nosis. .... ii. 242  
   treatment of. .... ii. 242, 44  
 Veratria, poisoning by. .... 424  
   treatment of. .... 425  
 Vermes, general description of. .... 1519  
 Vermifuge described. .... 1514  
 Vertebrae, diseased, predisposing  
   and exciting causes of. .... 952  
   complications, conse-  
   quences, and terminations of. .... 954  
   duration and prognosis  
   of. .... 955  
   treatment of. .... 953-6  
   inflammation and caries of  
   regimental treatment of  
   symptoms and diagnosis of  
   diseases of the. .... 953  
   tubercular disease of. .... 953  
 Vertigo, associations and states  
   of. .... 1495  
   *Bibliog. and Refer.* .... 1498  
   causes of. .... 1496  
   conditions of, their treat-  
   ment. .... 1498  
   definition of. .... 1495  
   description of. .... 1495  
   diagnosis of its morbid con-  
   nexions. .... 1496, 97  
   in connexion with insanity. .... ii. 535  
   morbid relations of. .... 1496  
   pathological states occasion-  
   ing. .... 1496  
   regulating its treat-  
   ment. .... 1497  
   prognosis of. .... 1497  
   treatment of. .... 1497  
   varieties and states of. .... 1496  
 Vesicles, or simple cysts, de-  
   scription of. .... ii. 295  
   Graafian, disease of. .... ii. 1063



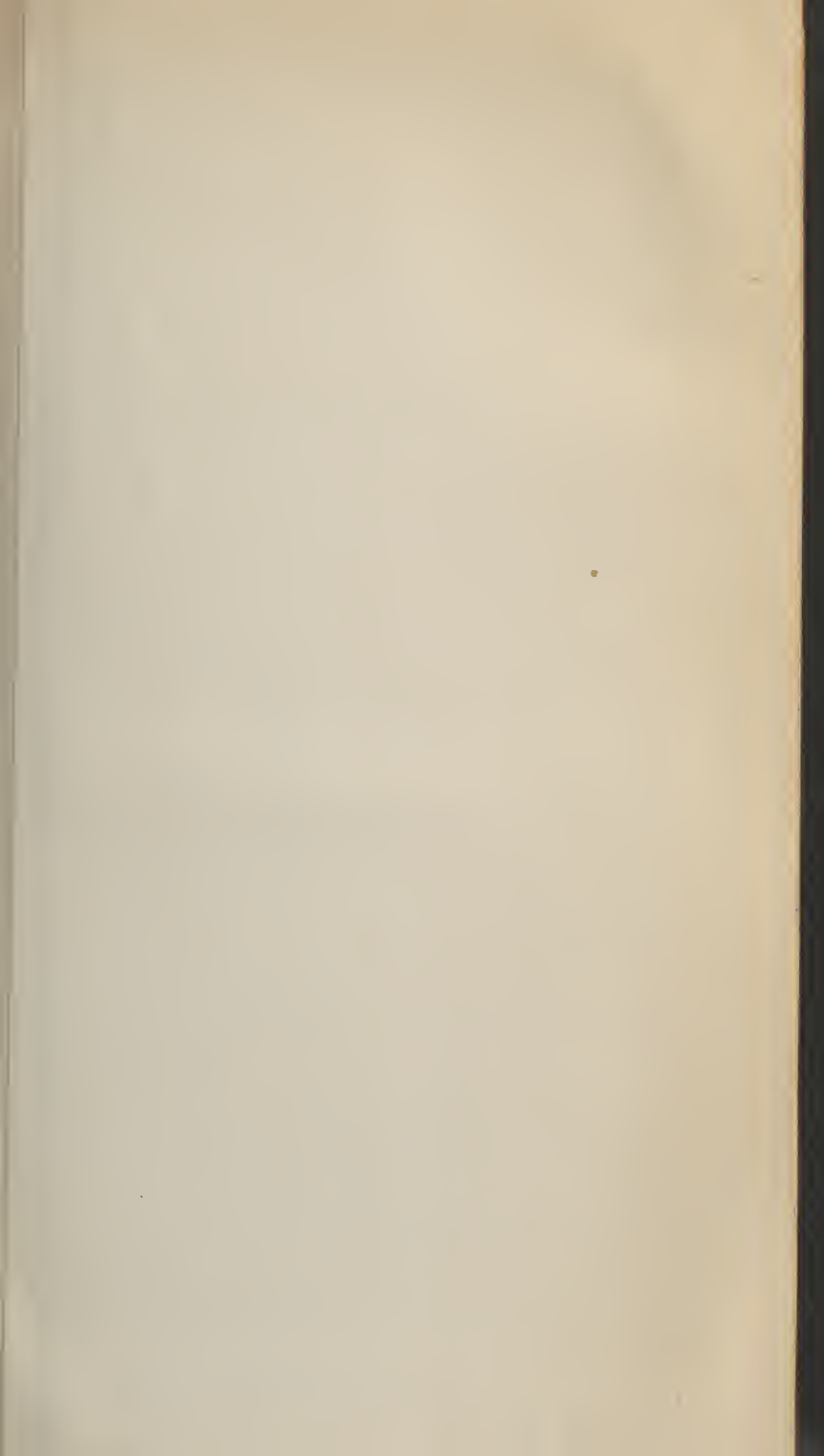
Vinum Aloes Alkalinum	F. 778. <i>Ap.</i> 29	Vomiting and retching, <i>definit-</i>		Worms, cancer of, treatment of.	1407
— Aloes et Sodæ Compositum	F. 779. <i>Ap.</i> 29	tion of	1506	— diseases of the, description	
— Anthelminticum	F. 780. <i>Ap.</i> 29	— from sea-sickness	1510	and treatment of. See, also,	
— Diureticum Anti-arthritis	F. 781. <i>Ap.</i> 29	— primary or idiopathic	1510	Uterus	1370
— cum	F. 781. <i>Ap.</i> 29	Vomit, enumeration of	1146	Worms, their alternations of	
— Ferri	F. 782. <i>Ap.</i> 29	Voyaging, in temperate and	1277	generation	1521
— Ferri Citratum	F. 782. <i>Ap.</i> 29	warm seas, advised for phthisis	1253	— <i>Intbiog. and Refer.</i>	1561
— Ferri Comp.	F. 783. <i>Ap.</i> 29	in first stage of phthisis		— cause a peculiar cachexia	1546
— Quinae	F. 784. <i>Ap.</i> 29	— advantages of, in pulmon-		— causes of	1547
Viper, symptoms of its poison	ii. 478	ary disease	1. 417	— predisposing causes of	1547
— antidotes and treat-		Vulva, abscess of	1440	— first class of, noticed	1523
ment	480, 1	— <i>Bibliog. and Refer.</i>	1436	embryos of, strayed, noticed	1522
Viscera, lesions, of, after dropsy	i. 692	— diseases of, described	1428	Intentions of cure after the	
Visceral neuralgia	ii. 1913	inflammations of. See, also,		expulsion of	1547
— various forms of	i. 1913	Vulvitis	1435	— of the generation of	1519
Vital action, dynamic state of	i. 653	— structural and other lesions	1440	— of their origin	1519
Vital power or force, of support-	ing, in fever	— priapitis of	498	— general pathology of	1523
— its influence on hæmorr-	rhage	— treatment of	498	— general prognosis of	1523
— dynamic states of	ii. 73	— sanguineous tumour of the	541	— kamala, preparations of,	
— various morbid states of	i. 653	symptoms of	541	remedies for	1543
— perverted states of	i. 665	— treatment of	542	— prophylaxis, or prevention	
Vital power, or influence, when	altered, occasions diseased	Vulvitis, consequences of	1434	of	1547
states of fluids and solids	i. 666	— <i>defined and described</i>	1432	— means for preventing the	
Vitality, states of, affecting the	pulse	— treatment of	1425	development of the ova of	1547
Voice, auscultation of	i. 202	— catarrhal, described	1432	— general view of the symp-	
— losses of, described	1500	— cezenacious, described	1433	— toms of	1546
Voice and speech, <i>Bibliog. and</i>	<i>Refer.</i>	— erythematous, described	1433	— local or direct symptoms of	1546
— affections of, considered	1504	— erysipelatous, described	1433	— sympathetic phenomena	
— treatment of	1504	— treatment of	1436	caused by	1546
— physiological view of	1499	— gonorrhœal	1435	— treatment of	1547
Volition, organs of, signs of dis-	ease furnished by	— treatment of	1426	— the treatment advised after	
Volulus, described. See Uenis	1. 452	— irritable, described	1432	their expulsion	1550
Vomica in the lungs in phthisis	1218	— pollicular, described	1434	— of	1548
Vomiting considered as a thera-	peutical agent	— phagedenic or gangrenous	1435	— general principles of treat-	
— diseases in which it may be	beneficial	— nature, &c., of	1436	ment for	1524
— caution required in ascer-	taining the causes of	— treatment of	1433	— in the urine	1538
— from gastro-colic fistula	diagnosis of	— phlegmonous, described	1433	— cystic, described	1535
— from gastro-intestinal fis-	tula	— pruriginous, described	1432	— their generation and	
— of the mechanism of	— of the mechanism of	— treatment of catarrhal, ir-	ritable, and pruriginous	growth	1524
— from organic lesions	— from organic lesions	— ulcerative or sthenic	1431	human, <i>definition</i> of	1518
— from poisons, caution as to	during pregnancy		1433	— intestinal, classification of	1522
— treatment of	— treatment of			— described	1518
— attended by sarcina ventri-	culi			— emigration of	1520
— treatment of	— treatment of			— metamorphoses of	1522
— from sea-sickness, treat-	ment of			— mature nematode, described	1540
— from sympathetic irritation	— treatment of			— round, described	1543
— treatment of	— viewed as a symptom			— treatment of tape-worm	1548
— viewed as a symptom	Vomitings, &c., treatment of,			— thread, described	1537-40
Vomitings, &c., treatment of,	when caused by fermenting			Wounds, voluntary	i. 1037
ingesta and drunkenness	Vomiting and retching, <i>Bibliog.</i>				
Vomiting and retching, <i>Bibliog.</i>	and <i>Refer.</i>				
— considered					

\* \* The Editor's additions will be found under the various subjects.



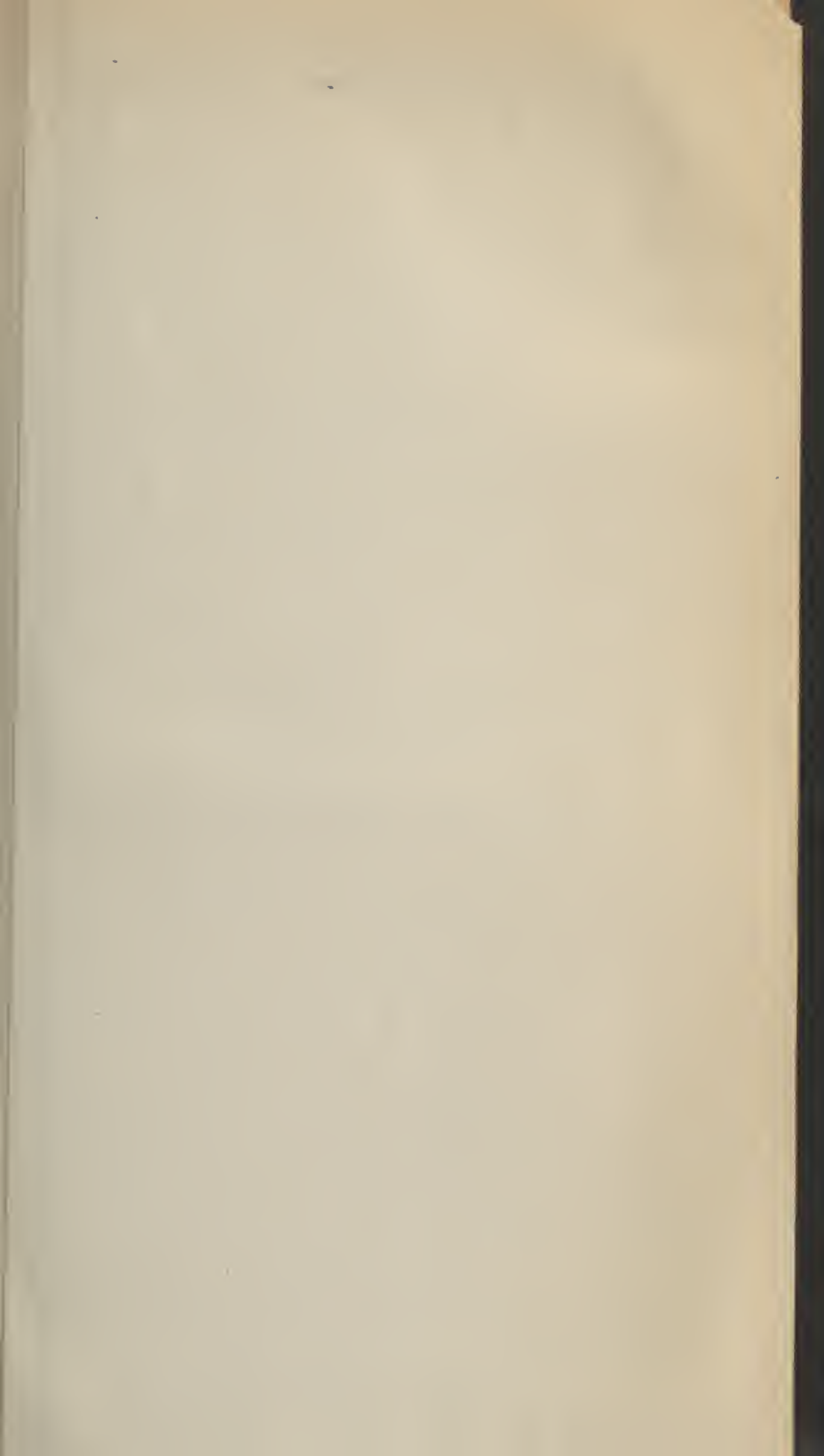
















SEP 20 1945



